

NORTHWEST ATLANTIC FISHERIES ORGANIZATION



Scientific Council Studies Number 37

Working Group on Reproductive Potential

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Northwest Atlantic Fisheries Organization
2 Morris Drive, P. O. Box 638
Dartmouth, Nova Scotia, Canada B2Y 3Y9
Tel.: (902) 468-5590 • Fax: (902) 468-5538
E-mail: info@nafo.int • Website: www.nafo.int

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Foreword

In accordance with its mandate to disseminate information on fisheries research to the scientific community, the Scientific Council of NAFO publishes the *Journal of Northwest Atlantic Fishery Science*, which contains peer-reviewed primary papers and notes on original research, and *NAFO Scientific Council Studies*, which contains review papers of topical interest and importance. Each year since 1981, the Scientific Council has held at least one Special Session on a topic of particular interest, and many of the contributions to those sessions have been published in one of these NAFO publications.

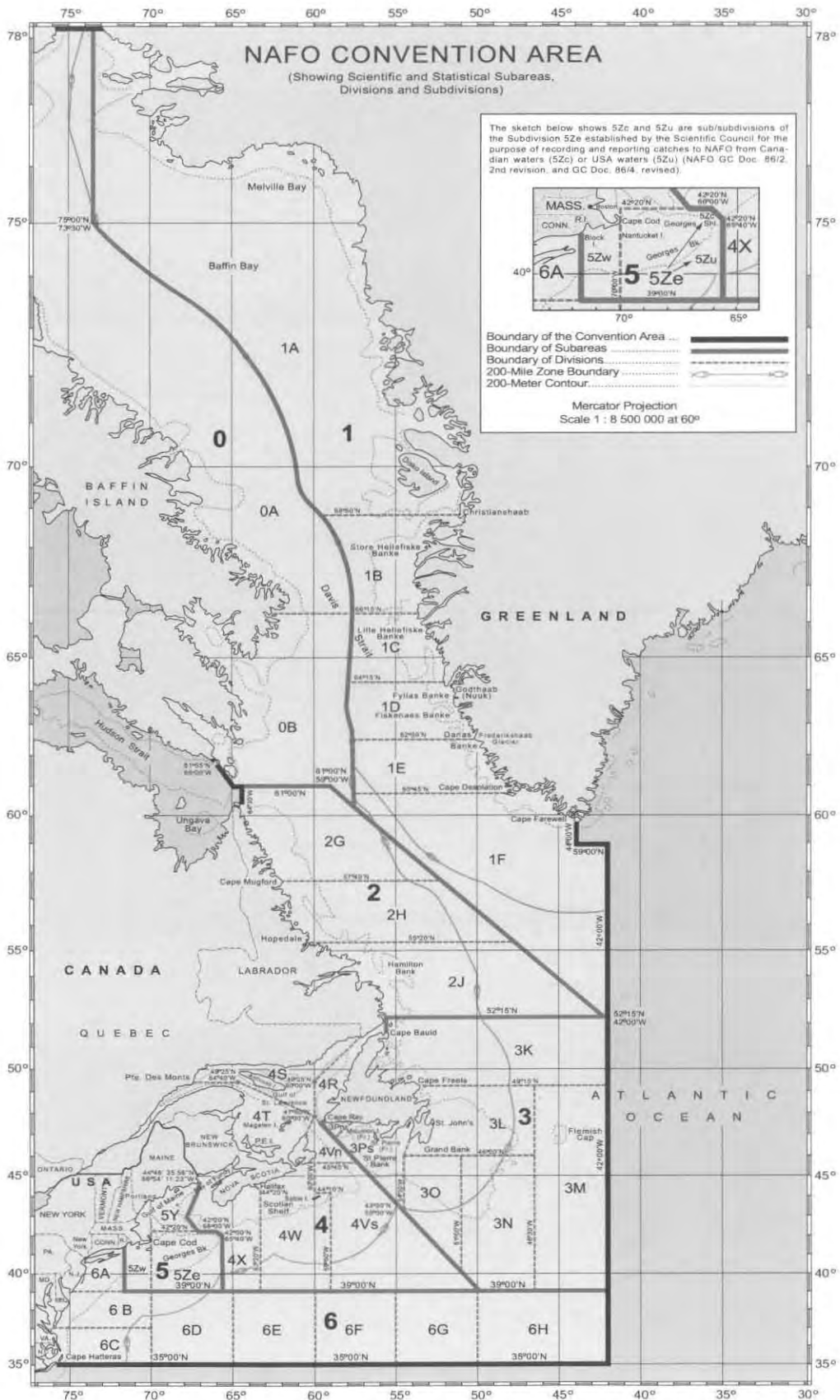
The Scientific Council Special Session, the Symposium on *Variations in Maturation, Growth, Condition and Spawning Biomass Production in Groundfish* held at the Altis Hotel in Lisbon Portugal during 9–11 September 1998 in conjunction with the 20th NAFO Annual Meeting, resulted with the Scientific Council establishing the *Working Group on Reproductive Potential*. The Working Group (Chair E. Trippel) through its deliberations concerning fish stocks in the North Atlantic recommended to the Scientific Council that

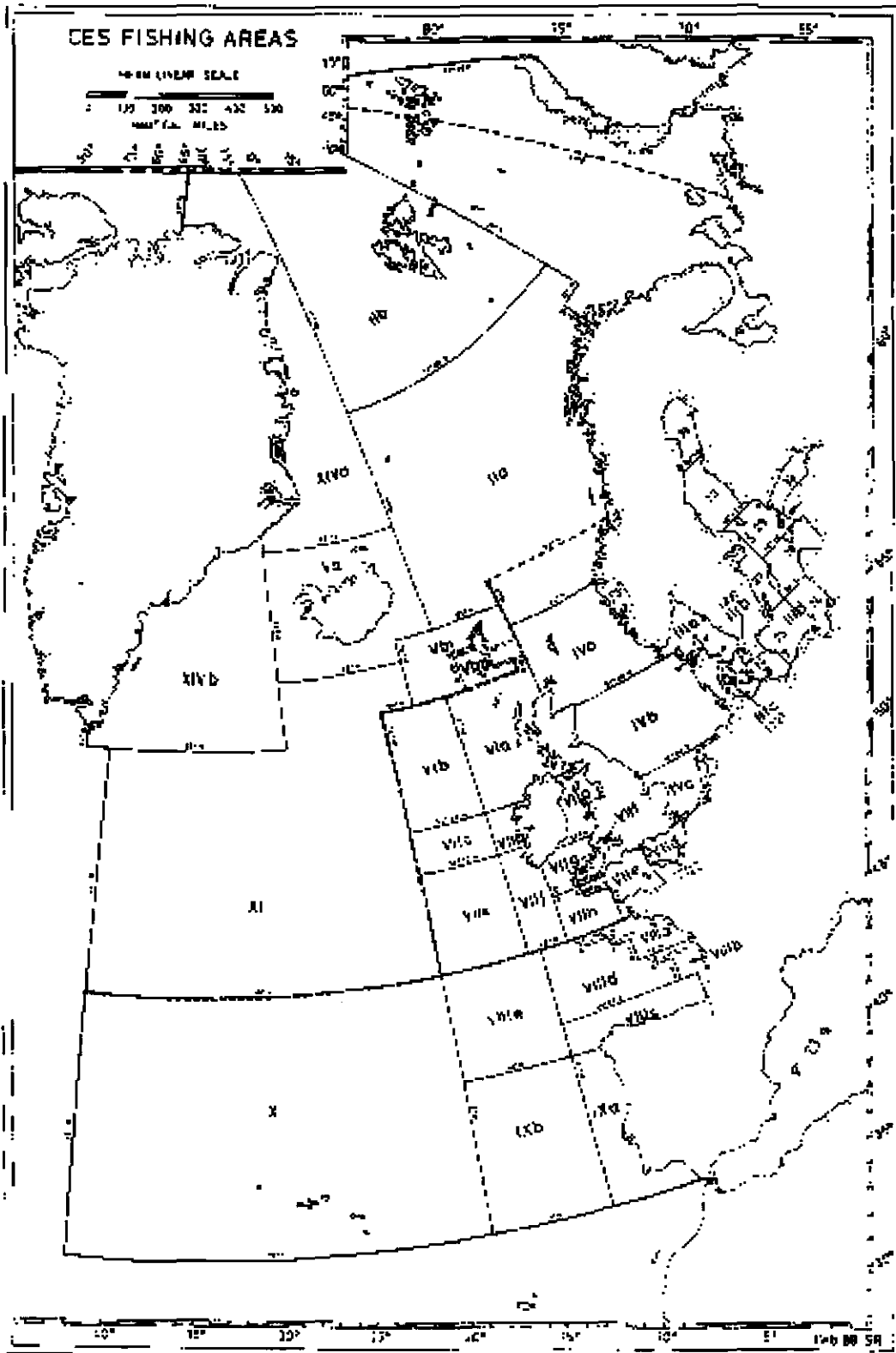
- i) a complete collection of scientific papers relating to the subject be peer reviewed and considered for publication in the *Journal of Northwest Atlantic Fishery Science*, and
- ii) a compilation of available data for those stocks be published in the *Scientific Council Studies*.

The Scientific Council endorsed the recommendation, and this issue of the *Scientific Council Studies* series is dedicated to the compilation regarding the available data. Many members of the Working Group and scientists both within the Scientific Council circles and outside these circles have spent a great deal of time and effort collecting, collating and refining the information base. The comprehensive coverage achieved in this publication is timely and important for scientists dealing with fish stocks and stock complexes in the North Atlantic, particularly in the NAFO and ICES areas.

May 2003

Tissa Amaratunga, Editor
NAFO Scientific Council Studies
Northwest Atlantic Fisheries Organization
P. O. Box 638
Dartmouth, Nova Scotia
Canada B2Y 3Y9





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The Availability of Data for Estimating Reproductive Potential for Selected Stocks in the North Atlantic

by

M. J. Morgan

Dept. of Fisheries and Oceans
P.O. Box 5667, St. John's, NL A1C 5X1, Canada

J. Burnett

Northeast Fisheries Science Center
166 Water Street, Woods Hole, MA 02543, USA

J. Tomkiewicz

Danish Institute for Fisheries Research,
Kavalergaarden 6, 2920 Charlottenlund, Denmark

and

F. Saborido-Rey

Instituto de Investigaciones Marinas
Eduardo Cabello, 6, 36208 Vigo, Spain

Abstract

Information was collected on the availability of data to estimate reproductive potential on fish stocks in the north Atlantic. Information was collected on a total of 53 stocks or stock complexes from both the Northeast and Northwest Atlantic. A series of tables was compiled that provide an overview of the availability of basic information, evaluate the quality of the information and provide references to this information. The tables were not designed to include actual data, but rather to reference existing data and studies published in journals, reports, etc., or to identify persons who might provide information regarding data which may exist in national laboratories but have not been analysed or published. The tables provide an overview of the years for which basic data are available, details on the collection and quality of the data, the existence of studies that estimate reproductive potential or evaluate stock-recruitment relations and references to the data and studies.

Keywords: data availability, data quality, reproductive potential

Introduction

The importance of estimating the reproductive potential of a fish stock, rather than just spawning stock biomass is becoming widely accepted. However, little is known about the general availability of data required to produce such estimates. This gap in information was recognized in the first Term of Reference of the NAFO Working Group on reproductive potential which was: explore and review availability of information and existing data on reproductive potential by areas and species. To address this question information was collected on the availability of data to estimate reproductive potential on fish stocks in the north Atlantic. A series of tables was compiled that provide an overview of the availability of basic information, evaluate the quality of the information and provide references to this information. The purpose of the tables was to provide an overview of available information and existing data that can be applied to estimate stock reproductive potential. Unpublished as well as published data may be available for this purpose and, by recording identified stock characteristics (e.g. stock size, maturity, fecundity, etc.) and data sources in a systematic fashion, the potential for estimating the total, realised or viable egg and larval production can be evaluated for different stocks.

The tables were not designed to include actual data, but rather to reference existing data and studies published in journals, reports, etc. or to identify persons who might provide information relative to data which

may exist in national laboratories but have not been analysed or published. Four tables were developed: 1) Available Data; 2) Data Basis, Format and Quality; 3) Studies of Reproductive Potential; and 4) Data Sources. The first table provides an overview of the availability of basic information to estimate the reproductive potential of a given stock. The table is on a yearly scale and includes basic variables only. Table 2 provides more details about the available data and adds information about compatibility of different data sets (e.g. age-based versus length-based data) and their quality (e.g. differences in accuracy due to differences in methodology, sampling intensity, experimental design, etc.). This table includes more variables than Table 1, and some variables have been divided into sub-levels to specify different data types. Table 3 refers to existing studies that estimate reproductive potential or evaluate stock-recruitment relations. In both Tables 2 and 3, a reference number links the identified data and studies with their sources in Table 4. Table 4 provides the full reference to journals, reports etc. or the address of persons and laboratories is given.

The listed variables are intended to primarily cover aspects related to maternal and paternal influences on the reproductive potential, i.e. at the basic level estimating the total egg production, to the ultimate level of estimating the viable larvae production. The influences of the ambient environment on egg and larval survival during the recruitment process have had a lower priority but may be very important to stock-recruitment relations; options to record information of this type exist in both Tables 2 and 3.

The availability of data and information to estimate reproductive potential varies tremendously, from hardly any data existing for some species or stocks to those that are data-rich with studies of reproductive potential and recruitment processes at an advanced level. However, tables recording data-poor stocks may prove to be as valuable as data-rich as they may draw attention to specific variables and research fields where information is needed in order to estimate the stock reproductive potential. The availability of data has thus not been a criterion in the selection of species to be included.

In total tables were completed for 53 stocks or stock complexes in the north Atlantic. There were a total of 20 species and although most (15) were demersal teleosts, other groups were included. The Working Group focused on the Northwest Atlantic in the NAFO area but, 5 stocks are included from the ICES area. A list of people who contributed tables or who reviewed tables is given in the Acknowledgements.

Guide to the Tables

The tables consist of text and form fields indicated by shading. Only the form fields could be filled in. There were two types of form fields, text and drop-down form fields. Numbers or text of variable length could be filled in the text fields with standard formats. The drop-down fields offered different choices, but no text could be added. A help function providing an explanatory text was available for each form field. The help function generally contained both an explanation and an example.

Table 1

The form fields in the header of Table 1 specify the fish species, area and stock. The latter two were applied as headers in subsequent tables.

The person(s) initially reviewing the literature and creating the table is referenced in the lower header of Table 1, and the date of submission of data to the NAFO Working Group is included. If the tables are updated later, the name of the person(s) providing new data or reviewing the tables as well as the date is recorded in addition.

The review of a specific stock attempted to encompass all data and information that can be used to quantify the total or realised egg production and potentially estimate the viable egg and larvae production. This implies that highest priority should be given to inclusion of quantitative measures or relationships that can be used as parameter estimates. The review extended as far back in time as possible.

In this overview table, three different options existed in the drop-down form fields: Option 1: \surd is selected if quantitative estimates about a given variable is available. Option 2: (\surd) is chosen if for example no applicable estimates are available but basic data or information exists although not analysed or published. The reason for choosing option 2 should be specified under comments in Table 2. The default, Option 3: blank, indicates that no information is available. The availability of data or information about the specific variables is recorded on a yearly basis back to 1960. If information before 1960 exists, particular years are included to record specific information about variables.

Table 2

The text fields in the header to be filled in include information about Reproductive Strategy, Timing of Spawning, and Optimal Time for Maturity Sampling as well as their references. This information is intended to provide the reader with some criteria to evaluate the data quality. The data types and analytical methods needed to estimate the total egg production depend on the type of reproductive strategy. The timing of spawning is important in relation to the timing of fecundity sampling for the given species and stock. The optimal time for maturity sampling is normally during the pre-spawning period when fish that will participate in spawning will have initiated the gonadal maturation process, but before for example spawning migration has started.

The table Data Basis, Format and Quality provides the opportunity to enter more detailed information about data or studies for specific variables. The variable column lists different categories and sub-categories, which may be utilised in the estimation of the reproductive potential of a stock. The list is not meant to be all encompassing, but to specify the data basis, format and quality of important variables making an evaluation of the compatibility and applicability of data possible as well as identifying data sets potentially complementing each other. In the event that the listed categories do not suffice, information could be added under 'Other factors and parameters' at the end of the table, specifying under 'Notes' the kind of information; if sub-categories are not comprehensive, the information is similarly entered under 'Other'. For each data source, the following information is entered: the year range, the data basis, data origin, sampling frequency and the reference number referring to the source of the study (should be given in full in Table 4). Under 'Notes on data, methods and contents', additional information about the particular data source can be added.

Table 3

In some cases, studies of the reproductive potential of the stock may have been performed and for example estimates of egg or larvae production may be available. This information should be included in Table 3. The table lists different subject-related categories to include information about the reproductive potential as well as about processes affecting stock reproduction. For each study, a brief description of its focus is filled in as well as the year range covered and the reference number referring to its source.

Table 4

This table references the sources of data or other information referenced in Tables 2 and 3. The reference numbers applying to the proceeding tables as well as the data sources should be filled in, i.e. full literature reference or the name and postal address of contact persons.

Acknowledgements

Many people other than the authors contributed to the compilation of the tables in this volume. We thank them for their efforts. They are: R. Bowering, J. Brattey, G. Chouinard, A. Frechet, G. Kraus, Y. Lambert, G. Lilly, T. Marshall, G. Marteinsdottir, H. Murua, L. O'Brien, D. Power, C. Schmitz, G. Shepherd, D. Stansbury, E. Trippel, S. Walsh, P. Wright, N. Yaragina.

List of Stocks

List of stocks included in this volume.

Species	Common Name	Stock name	NAFO or ICES area
Gadidae			
<i>Gadus morhua</i>	Atlantic cod	Flemish Cap Northern Grand Bank Southern Grand Bank Newfoundland South Coast Northern Gulf of St. Lawrence Southern Gulf of St. Lawrence Eastern Scotian Shelf Bay of Fundy/Western Scotian Shelf Georges Bank Gulf of Maine North Sea Baltic Sea Northeast Arctic Icelandic	NAFO Div. 3M NAFO Div. 2J+3KL NAFO Div. 3NO NAFO Subdiv. 3Ps NAFO Subdiv. 3Pn+Div. 4RS NAFO Div. 4T+Subdiv. 4Vn (J-A) NAFO Subdiv. 4Vs+Div. 4W NAFO Div. 4X NAFO Div. 5Z+Subarea 6 NAFO Div. 5Y ICES IV ICES SD 25-32 ICES t+2 ICES Va
<i>Melanogrammus aeglefinus</i>	Haddock	Eastern Scotian Shelf Bay of Fundy/Western Scotian Shelf Georges Bank North Sea	NAFO Div. 4TVW NAFO Div. 4X NAFO Div. 5Z+Subarea 6 ICES IV
<i>Pollachius virens</i>	Pollock	Scotian Shelf/Bay of Fundy/Georges Bank	NAFO Div. 4VWX+5Zc
<i>Urophycis tenuis</i>	White hake	Gulf of Maine/Georges Bank	NAFO Subareas 5+6
Pleuronectiformes			
Pleuronectidae			
<i>Hippoglossoides platessoides</i>	American plaice	Flemish Cap Labrador and Northeast Newfoundland Grand Bank Newfoundland South Coast Gulf of Maine/Mid Atlantic	NAFO Div. 3M NAFO Subarea 2+Div. 3K NAFO Div. 3LNO NAFO Subdiv. 3Ps NAFO Subarea 5
<i>Reinhardtius hippoglossoides</i>	Greenland halibut	Labrador/Eastern Newfoundland	NAFO Subarea 2+Div. 3KLMNO
<i>Glyptocephalus cynoglossus</i>	Witch flounder	Labrador and Northeast Newfoundland Southern Grand Bank Newfoundland South Coast Gulf of Maine/Georges Bank	NAFO Div. 2J+3KL NAFO Div. 3NO NAFO Div. 3Ps NAFO Div. 5+6
<i>Limanda ferruginea</i>	Yellowtail flounder	Grand Bank Georges Bank Southern New England Cape Cod	NAFO Div. 3LNO NAFO Div. 5Ze NAFO Div. 5Zw US Statistical areas 514 and 521
<i>Pseudopleuronectes americanus</i>	Winter flounder	Georges Bank Coastal - Southern New England/Mid-Atlantic	NAFO Div. 5Z NAFO Subarea 5+6
Bothidae			
<i>Paralichthys dentatus</i>	Summer flounder	Mid Atlantic/Georges Bank	NAFO Subarea 5+6
Scorpaenidae			
<i>Sebastes fasciatus</i> <i>Sebastes marinus</i> <i>Sebastes mentella</i> <i>Sebastes spp.</i>	Red fish	Flemish Cap Flemish Cap Flemish Cap Flemish Cap	NAFO Div. 3M NAFO Div. 3M NAFO Div. 3M NAFO Div. 3M

TABLE 1 (Cont'd). List of stocks included in this volume.

Species	Common Name	Stock name	NAFO or ICES area
Scorpaenidae (Cont'd)	Redfish	Labrador/Northeast Newfoundland Eastern Grand Bank Southwestern Grand Bank Unit 2 (Canadian coastal) Gulf of Maine/Georges Bank	NAFO Div. 2+3K NAFO Div. 3LN NAFO Div. 3O NAFO Div. 3Ps 4Vs 4Wfgj+ 3Pn 4Vn (Jun-Dec) NAFO Div. 5
Macrouridae			
<i>Macrourus berglax</i>	Roughhead grenadier	Labrador/Eastern Newfoundland	NAFO Subarea 2+3
<i>Coryphaenoides rupestris</i>	Roundnose grenadier	Labrador/Eastern Newfoundland	NAFO Subarea 2+3
Clupeidae			
<i>Clupea harengus</i>	Herring	Mid-Atlantic/Gulf of Maine Coastal Complex and Georges Bank	NAFO Subarea 5+6
Scombridae			
<i>Scomber scombrus</i>	Mackerel	Northwest Atlantic	NAFO Subarea 2+6
Pomatomidae			
<i>Pomatomus saltatrix</i>	Bluefish	Mid-Atlantic/Gulf of Maine	NAFO Subarea 5+6
Percichthyidae			
<i>Morone saxatilis</i>	Striped Bass	Coastal-Mid-Atlantic/Gulf of Maine	NAFO Subarea 5+6
Rajidae			
<i>Raja radiata</i>	Thorny skate	Flemish Cap	NAFO Div. 3M



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.: <input type="text"/>
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) VPA Relative abundance Relative abundance, VPA	15
	1973-1998	A	S,CL	Y,Q		16
	1978-1985	A	S	Y		13
	1988-2000	A	S	Y		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 14 7
	1978-1985	A,L	S	Y		
	1988-2000	A,L	S	Y		
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.

TABLE 1: AVAILABLE DATA

COMMON NAME: ATLANTIC COD **SPECIES:** *Gadus morhua*

AREA: NORTHWEST ATLANTIC **STOCK:** NAFO DIV. 2J+3KL

CREATED BY: JOANNE MORGAN **UPDATED BY:** JOANNE MORGAN 2002-03-19

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 DIVISIONS 2J3KL	
REPRODUCTIVE STRATEGY:	DETERMINATE BATCH SPAWNER	REF. NO.: 15,16
TIMING OF SPAWNING:	MARCH-JULY	REF. NO.: 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	1962-1970	A	CL	Q	VPA - last accepted model in 1993 survey offshore only prior to 1996 mark recapture commercial sentinel index inshore only	1
	1971-1977	A,L	CC,CL,S	Q,Q,Y		1,2,5
	1978-1992	A,L	CC,CL,S	Q,Q,B		1,2,14
	1993-1999	A,L	S	B		2
	2000	A,L	S	B		5
	1998-1999	L	CL			12
	1995-1999	A,L	CC			13
Stock composition	1962-1970	A	CL	Q		2
	1971-1977	A,L	CC,CL,S	Q,Q,Y		1,2,5
	1978-1992	A,L	CC,CL,S	Q,Q,B		2,5
	1993-1999	A,L	CC,CL,S	Q,Q,B		2,5
	2000	A,L	CC,CL,S	Q,Q,B		5
	1995-1999	A,L	CC			13
Age determination	1962-1970	A	CL	Q		2
	1971-1977	A	CC,CL,S	Q,Q,Y		1,2,5
	1978-1999	A	CC,CL,S	Q,Q,B		2,5
	2000	A	CC,CL,S	Q,Q,B		5
Sex ratio	1978-1999	A,L	S	Y		5,11
	2000	A,L	S	Y		5
Maturity:						
A. Ogives (E)	1962-1999	A	S	Y	By cohort annual	11
	1982-2000	A,L	S	Y		2,5
B. Skip of spawning						

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.
C. Spawning probability						
D. Other						
Fecundity:						
A. Estimation	1964	A,L	S	SPRING		3
	1967-1968	A,L	S,CL	FEB-MAY		4
	1988-90, 1993-94, 1998-99	A,L,W	S	APR-JUNE	Most samples from 3L only	5
B. First time vs. repeat spawners						
C. Atresia						
D. Other						
Weight:						
A. Commercial fisheries data	1962-1999	L	CL,CC	Q,Q	invariant length/weight relationship	2
	2000	L	CL,CC	Q,Q		5
B. Survey data	1978-1999	A,L,W	S	B		2,5,8
	2000	A,L,W	S	B		5
	1947-54, 1958, 1960-70, 1975	A,L,W	S	VARIOUS	Many years only part of stock area	5
C. Other						
Condition:						
A. Fulton	1978-1999	A,L,W	S	Y		2,8
	2000	A,L,W	S	Y		5
	1947-54, 1958, 1960-70, 1975	A,L,W	S	various	many years only part of stock area	5
B. HSI	1978-1999	A,L,W	S	Y		2,8
	2000	A,L,W	S	Y		5
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						

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.
C. Mortality						
D. Other						
Spawning time	1946-1991	A,L	S	VARIOUS		6,7
Contamination						
Environmental key factors						
Other factors or parameters	1994-1999	L	S	Y	Pelagic O group survey	9

TABLE 3: STUDIES OF REPRODUCTIVE POTENTIAL

COMMON NAME:	ATLANTIC COD
AREA:	NORTHWEST ATLANTIC
STOCK:	NAFO DIVISIONS 2J3KL

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	1959-1986	17
	Rejection of salinity effect	1959-1989	18
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	1962-1995	10
Other studies			

TABLE 4: DATA SOURCES

COMMON NAME:	ATLANTIC COD
AREA:	NORTHWEST ATLANTIC
STOCK:	NAFO DIV. 2J+3KL

Data sources	(literature reference or contact person)
1.	BISHOP, C.A., E. F. MURPHY, M. B. DAVIS, J.W. BAIRD, and G. A. ROSE. MS 1993. An assessment of the cod stock in NAFO Divisions 2J+3KL. <i>NAFO SCR Doc.</i> , No. 86, 51 p.
2.	LILLY, G. R., P. A. SHELTON, J. BRATTEY, N. G. CADIGAN, E. F. MURPHY, and D. E. STANSBURY. MS 2000. An assessment of the cod stock in NAFO Divisions 2J+3KL. <i>Can. Stock Ass. Sec. Res. Doc.</i> , No. 63.
3.	MAY, A.W. 1967. Fecundity of Atlantic cod. <i>J. Fish. Res. Bd. Canada</i> , 24 : 1531-1551.
4.	PINHORN, A.T. 1984. Temporal and spatial variation in fecundity of Atlantic cod (<i>Gadus morhua</i>) in Newfoundland waters. <i>J. Northw. Atl. Fish. Sci.</i> , 5 : 161-170.
5.	UNPUBL. DATA: G.R. Lilly, DFO, P.O. Box 5667, St. John's, NF, A1C 5X1, Canada (lillyg@dfo-mpo.gc.ca).
6.	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.
7.	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.
8.	LILLY, G. R. MS 1998. Size-at-age and condition of cod in Divisions 2J+3KL during 1978-1997. <i>Can. Stock Ass. Sec. Res. Doc.</i> , No. 76.
9.	DALLEY, E. L., J. T. ANDERSON, and D. J. DAVIS. MS 2000. Year-class strength of northern cod (2J3KL) and southern Grand Bank cod (3NO) estimated from the pelagic juvenile fish survey in 1999. <i>Can. Stock Ass. Sec. Res. Doc.</i> , No. 96.
10.	MORGAN, M. J., P. A. SHELTON, D. P. STANSBURY, J. BRATTEY, 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.
11.	MORGAN, M. J. MS 2000. Estimating spawning stock biomass in 2J3KL cod using a cohort maturation model and variable sex ratio. <i>Can. Stock Ass. Sec. Res. Doc.</i> , No. 110.
12.	CADIGAN, N. and J. BRATTEY. MS 2000. Lower bounds on the exploitation of cod (<i>Gadus morhua</i>) in NAFO Subdivision 3Ps and Divs. 3KL in 1997-1999 from tagging experiments. <i>Can. Stock Ass. Sec. Res. Doc.</i> , No. 74.
13.	STANSBURY, D. E., D. MADDOCK PARSONS, and P.A. SHELTON. MS 2000. An age-disaggregated index from the sentinel program for cod in 2J3KL. <i>Can. Stock Ass. Sec. Res. Doc.</i> , No. 90.
14.	SHELTON, P. A., D. E. STANSBURY, E. F. MURPHY, G. R. LILLY, and J. BRATTEY. MS 1996. An assessment of the cod stock in NAFO Divisions 2J+3KL. <i>NAFO SCR Doc.</i> , No. 62.
15.	KJESBU, O.S. 1989. The spawning activity of cod, <i>Gadus morhua</i> L. <i>J. Fish. Biol.</i> , 34 : 195-206.
16.	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.
17.	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.
18.	SHELTON, P. A. and D. B. ATKINSON. MS 1994. Failure of the Div. 2J3KL cod recruitment prediction using salinity. <i>DFO Atl. Fish. Res. Doc.</i> , No. 66.

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	Spanish survey covers only part of stock area	1,11
	1999-2000	A,L	CC,CL,S	Q,Q,3/YR		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	Spanish survey covers only part of stock area	1,11
	1999-2000	A,L	CC,CL,S	Q,Q,3/YR		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. Brattey, 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.

TABLE 1: AVAILABLE DATA

COMMON NAME: ATLANTIC COD **SPECIES:** *Gadus morhua*

AREA: NORTHWEST ATLANTIC **STOCK:** NAFO SUBDIV. 3Ps

CREATED BY: JOANNE MORGAN **UPDATED BY:** JOANNE MORGAN 2002-03-19

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 SUBDIV. 3Ps		
REPRODUCTIVE STRATEGY:	DETERMINATE BATCH SPAWNER	REF. NO.:	11,12
TIMING OF SPAWNING:	FEB-JUL	REF. NO.:	8,9,10
OPTIMAL TIME FOR MATURITY SAMPLING:	JAN-APRIL	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	1959-1971	A	CL	Q	VPA	1
	1972-1977	A,L	CC,CL,S	Q,Q,Y		1
	1978-1982	A,L	CC,CL,S	Q,Q,B		1
	1983-1992	A,L	CC,CL,S	Q,Q,B		1
	1993-1996	A,L	CC,CL,S	Q,Q,Y		1
	1997-2000	A,L	CC,CL,S	Q,Q,B		1,2
	1995-2000	A,L	CC		commercial sentinel index inshore only	1
	1997-1999	L	CL		mark recapture	1,3
Stock composition	1959-1971	A	CL	Q	VPA	1
	1972-1977	A,L	CC,CL,S	Q,Q,Y		1
	1978-1982	A,L	CC,CL,S	Q,Q,B		1
	1983-1992	A,L	CC,CL,S	Q,Q,B		1
	1993-1996	A,L	CC,CL,S	Q,Q,Y		1
	1997-2000	A,L	CC,CL,S	Q,Q,B		1,2
	1995-2000	A,L	CC		commercial sentinel index inshore only	1
Age determination	1959-1971	A	CL	Q		1
	1972-1977	A	CC,CL,S	Q,Q,Y		1
	1978-1982	A	CC,CL,S	Q,Q,B		1
	1983-1992	A	CC,CL,S	Q,Q,B		1
	1993-1996	A	CC,CL,S	Q,Q,Y		1
	1997-2000	A	CC,CL,S	Q,Q,B		1,2
Sex ratio	1972-2000	A,L	S	Y		4
Maturity:						

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.
A. Ogives (E)	1959-1995	A	S	Y	By cohort annual from Canadian survey annual from French survey	5
	1972-2000	A,L	S	Y		1,4
	1978-1992	L	S	Y		6
B. Skip of spawning						
C. Spawning probability						
D. Other						
Fecundity:						
A. Estimation	1967, 1969-70	A,L	S	FEB-MAY		7
	1993-95, 1998-99	A,L,W	S	Y		4
B. First time vs. repeat spawners						
C. Atresia						
D. Other						
Weight:						
A. Commercial fisheries data	1959-2000	L	CC,CL	Q,Q	Invariant length weight relationship	1
B. Survey data	1978-2000	A,L	S	Y		1
	1947-48, 1951, 1953, 1967	A,L	S	various		4
C. Other						
Condition:						
A. Fulton	1978-2000	L	S	Y		1
	1947-48, 1951, 1953, 1967	L	S	various		4
B. HSI	1978-2000	L	S	Y		1
C. Energy						
D. Other	1978-2000	L	S	Y	GSI	4
Egg viability:						
A. Egg quality						
B. Fertilisation success						
C. Egg mortality						
D. Other						
Larval viability:						

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.
A. Hatching success						
B. Larvae quality						
C. Mortality						
D. Other						
Spawning time	1947-1992	A,L	S	VARIOUS	Data from all years combined	8,9
	1998	A,L	CC	M	indicates spawning occurs past July inshore	10
Contamination						
Environmental key factors						
Other factors or parameters						

TABLE 3: STUDIES OF REPRODUCTIVE POTENTIAL

COMMON NAME:	ATLANTIC COD
AREA:	NORTHWEST ATLANTIC
STOCK:	NAFO SUBDIV. 3Ps

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	13
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	5
Other studies			

TABLE 4: DATA SOURCES

COMMON NAME:	ATLANTIC COD
AREA:	NORTHWEST ATLANTIC
STOCK:	NAFO SUBDIV. 3Ps

Data sources (literature reference or contact person)
1. BRATTEY, J., N. G. CADIGAN, G. R. LILLY, E. F. MURPHY, P. A. SHELTON, and D.E. STANSBURY. MS 2000. An assessment of the cod stock in NAFO Subdiv. 3Ps in October 2000. <i>Can. Stock Ass. Sec. Res. Doc.</i> , No. 134.
2. McCLINTOCK, J. MS 2000. Cod catch results from fall 1999 survey in NAFO Division 3Ps. <i>Can. Stock Ass. Res. Doc.</i> , No. 24.
3. CADIGAN, N. and J. BRATTEY. MS 2000. Lower bounds on the exploitation of cod (<i>Gadus morhua</i>) in NAFO Subdivision 3Ps and Divs. 3KL in 1997-1999 from tagging experiments. <i>Can. Stock Ass. Sec. Res. Doc.</i> , No. 74.
4. UNPUBL. DATA: J. Bratney, DFO, PO Box 5667, St. John's, NF, A1C 5X1, Canada (bratneyj@dfo-mpo.gc.ca).
5. MORGAN, M. J., P. A. SHELTON, D. P. STANSBURY, J. BRATTEY, 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.
6. MAHE, J. C. MS 1994. Median length at 50% maturity of Atlantic cod in Subdivision 3Ps: year to year variation and comparison of samples from Burgeo Bank, St. Pierre Bank and south slope. <i>NAFO SCR Doc.</i> , No. 11, 12 p.
7. PINHORN, A.T. 1984. Temporal and spatial variation in fecundity of Atlantic cod (<i>Gadus morhua</i>) in Newfoundland waters. <i>J. Northw. Atl. Fish. Sci.</i> , 5: 161-170.
8. 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.
9. 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.
10. BOLON, A. D. and D. C. SCHNEIDER. MS 1999. Temporal trends in condition, gonado somatic index and maturity stages of Atlantic cod (<i>Gadus morhua</i>) from northern Placentia Bay (Subdivision 3Ps), Newfoundland, during 1998. <i>Can. Stock Ass. Sec. Res. Doc.</i> , No. 45.
11. KJESBU, O. S. 1989. The spawning activity of cod, <i>Gadus morhua</i> L. <i>J. Fish. Biol.</i> , 34: 195-206.
12. 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.
13. 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.

TABLE 1: AVAILABLE DATA

COMMON NAME: **SPECIES:**

AREA: **STOCK:**

CREATED BY: **UPDATED BY:**

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	√	√	√	(√)			√		

Data status									
Year	Stock size	Stock composition	Age	Sex ratio	Maturity	Fecundity	Weight	Condition	Additional data
1975	√	√	√	(√)			√		
1974	√	√	√	(√)			√		
1973					√				

TABLE 2: DATA BASIS, FORMAT AND QUALITY

COMMON NAME:	ATLANTIC COD	
AREA:	NORTHWEST ATLANTIC	
STOCK:	NORTHERN GULF OF ST. LAWRENCE (NAFO SUBDIV. 3PN+DIV. 4RS)	
REPRODUCTIVE STRATEGY:	DETERMINATE SPAWNER	REF. NO.: 11,12
TIMING OF SPAWNING:	APRIL-JUNE	REF. NO.: 14, 15
OPTIMAL TIME FOR MATURITY SAMPLING:	JANUARY-MAY	REF. NO.: 13

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	1974-2001	A	CL	Q	No landings between 1994-1996 moratorium VPA estimates	1,2,3
	1978-1994	A	S	JANUARY		
	1984-2001	A	S	JULY-AUGUST		
Stock composition	1974-2000	A,L,W	S,CL	Y,Q	Poor data sampling in early years	2,3
Age determination	1974-2000		S,CL	Y,Q	No commercial otolith sampling in 1974-1976	2,3,4
Sex ratio					Assumed 1:1 could be extracted from survey data bases	
Maturity:						
A. Ogives (E)	1947-1950	A, L	S			5
	1973	L	S	JANUARY TO APRIL	By sex	6
	1978-1994	A, L, W	S	JANUARY APRIL-MAY	By sex	7
	1994-1995,1997-1998	L	S		By sex and by age from mean length at age	8,9
B. Skip of spawning	1997-1998	L,W	EC	LAB EXPT	Influence of condition factor on maturation	10
C. Spawning probability						

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.
D. Other	1995	L,W	S	APRIL-MAY	Histological and macroscopic stage of gonad development	9
Fecundity:						
A. Estimation	1995,1998	L,W	S	APRIL-MAY	Size range: 35-65 cm	10,11
	2001	L,W	S	MAY	Size range 35-65 cm samples collected but analysis not completed	
	1994-1996	L,W	EC	Lab expmt 35 females	Realised fecundity in relation to condition and temperature	10,11,12
B. First time vs. repeat spawners						
C. Atresia						
D. Other						
Weight:						
A. Commercial fisheries data	1974-2000	A,L,W	CL	M,Q,Y		1,2,3
B. Survey data	1978-1994	A,L,W	S	JANUARY, AUGUST	Estimated means	2
	1990-2001	A,L,W	S		Estimated means	1,2,3
C. Other	1995-2000	A,L,W	CL,S	JULY, OCTOBER	Sentinel surveys: fixed and mobile gears	2,3
Condition:						
A. Fulton	1988-2000	L, W	S	AUGUST		2,3,13
	1984-1995	L, W	S	JANUARY		13
	1995-2000	L, W	S,CL	JULY-OCTOBER	Sentinel fixed gears	2,3
	1995-2000		S,CL	JULY, OCTOBER	Sentinel mobile gears	2,3
	1993-1995	L,W	S,CL	APRIL-MAY	Seasonal variations in the condition factor	13, 14
	1994,1995, 1997,1998	L,W	S		Condition factor in relation to maturity stage	10, 11
B. HSI	1994-2000	L, W	S	AUGUST		3
	1995-2001	L, W	S,CL	JULY TO OCTOBER	Sentinel fixed gears	2,3
	1995-2000		S,CL	JULY, OCTOBER	Sentinel mobile gears	2,3
	1993-1995	L,W	S,CL	M,Q	Seasonal variations in the HSI	13
C. Energy	1993-1995	L,W	S,CL	M,Q	Seasonal variations in somatic, liver and gonad energy contents	13

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.
D. Other	1994-2001	L, W	S	AUGUST	Liver and muscle dry weights	2,3
	1995-2001	L, W	S,CL	JULY TO OCTOBER	Sentinel fixed gears: liver and muscle dry weights	2,3
	1995-2000	L,W	S,CL	JULY, OCTOBER	Sentinel mobile gears: liver and muscle dry weights	2,3
	1993-1995	L,W	S,CL	M,Q	Biochemical composition of tissues (lipids, proteins) and seasonal variations in dry weights of muscle, liver and gonads	13,15
Egg viability:						
A. Egg quality	1993-1995		S	MAY-JUNE	Eggs from plankton samples	16
	1995-1996	L,W	EC	Lab expmt APRIL-AUGUST	Egg batches spawned under controlled T° conditions	17
B. Fertilisation success						
C. Egg mortality	1995-1996	L,W	EC	Lab expmt APRIL-AUGUST	Egg batches spawned under controlled T° conditions	17
D. Other						
Larval viability:						
A. Hatching success	1995-1996	L,W	EC	Lab expmt APRIL-AUGUST	Egg batches spawned under controlled T° conditions	17
B. Larvae quality						
C. Mortality						
D. Other						
Spawning time	1985,1987, 1991,1992		S	MAY-JUNE	Egg (plancton) surveys	18
	1993-1995		S	APRIL-MAY	Hydroacoustic, bottom trawl and plancton samples	8
Contamination						
Environmental key factors						
Other factors or parameters						

TABLE 3: STUDIES OF REPRODUCTIVE POTENTIAL

COMMON NAME:	ATLANTIC COD
AREA:	NORTHWEST ATLANTIC
STOCK:	NORTHERN GULF OF ST. LAWRENCE (NAFO SUBDIV. 3PN+DIV. 4RS)

Estimation of reproductive potential			
Subject	Brief description	Year range	Ref. No.
Potential or realized egg production	Egg production estimated from applying relationship between length, condition and fecundity in 1995 and 1998 to condition factor data between 1984 and 1998	1984-1998	10
Viable egg and larvae production	Egg size, energy content, egg survival, hatching success, larval size	1995-1996	17,19
Critical life stages			
Environmental influences	Effect of UV radiation on cod eggs and larvae.	1996-1997	20,21,22
Stock recruitment relations	Spawning stock biomass vs recruits (SSB from VPA and surveys)	1974-1997	23,24
Other studies	Realised fecundity of captive fish	1993-1995	11

TABLE 4: DATA SOURCES

COMMON NAME:	ATLANTIC COD
AREA:	NORTHWEST ATLANTIC
STOCK:	NORTHERN GULF OF ST. LAWRENCE (NAFO SUBDIV. 3PN+DIV. 4RS)

Data sources (literature reference or contact person)
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TABLE 1: AVAILABLE DATA

COMMON NAME: **SPECIES:**

AREA: **STOCK:**

CREATED BY: **UPDATED BY:**

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	√	√	√	(√)	√		√	√	(√)
1975	√	√	√	(√)	√		√	√	(√)
1974	√	√	√	(√)	√		√	√	(√)
1973	√	√	√	(√)	√		√	√	(√)

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

TABLE 2: DATA BASIS, FORMAT AND QUALITY

COMMON NAME:	ATLANTIC COD	
AREA:	NORTHWEST ATLANTIC	
STOCK:	SOUTHERN GULF OF ST. LAWRENCE NAFO DIV. 4T+SUBDIV. 4VN (JANUARY-APRIL)	
REPRODUCTIVE STRATEGY:	DETERMINATE BATCH SPAWNER	REF. NO.: 4,7
TIMING OF SPAWNING:	APRIL-MID JULY	REF. NO.: 4,7,10,11, 15,16
OPTIMAL TIME FOR MATURITY SAMPLING:	APRIL-MAY	REF. NO.: 6,10

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	1950-1970	A,L	CL	Q	VPA Estimates	1
	1971-2001	A,L,W	CL,S	Q,Y	VPA Estimates	2,3,17, 18
Stock composition	1950-1970	A,L	CL	Q	RV survey (September) Sentinel survey (mobile and longline) - abundance; a number of seasonal surveys/projects	1
	1971-2001	A,L,W	S,CL	M,Q		2,3
	1995-2001		S	Q		2,3
Age determination	1950-1970	A,L	CL	Q		1
	1971-2001	A,L,W	S,CL	Q,Y		2,3,13
Sex ratio	1971-2001	A,L,W	S	Y	Could be extracted from survey data bases	3
Maturity:						
A. Ogives (E)	1955-1956	A,L	S	MAY-SEP	Maturity ogives by sex and description of maturity stages Proportion mature at age for 1955-1977 year classes and ogives by sex over four 5-year periods Maturity ogives by sex (based on Shediac Valley area- 1990-1995). September collected data also exists for all years (1971-2001) for the entire stock region but considered inappropriate by DFO Maturity WG. Difficulty distinguishing resting from immature (see 6).	4
	1955-1977	A	S	SEPT		5
	1971-2001	A,L	S	JULY		6, 2, 14
B. Skip of spawning						
C. Spawning probability						

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.
D. Other						
Fecundity:						
A. Estimation	1955-1956	A,L	EW	MAY-SEP	size range 50-140 cm (n=43). Oocytes sorted using entomological mesh size #70). Gilson's fluid preserved and dried (Simpson 1951).	4,12
	1980	A,L,W	EW	MAY-JUN	size range 49-102 cm (n=30). Gilson's fluid preserved followed by whirling blender. Equations also integrate data by Powles (1958)	7
	1999-2000	A,L,W	EW		Samples collected and in process of being analysed	8
B. First time vs. repeat spawners						
C. Atresia						
D. Other	1980-1981	A,L,W	S	MAY-JUN	Gonadosomatic indices per female (n=30)	7
	1991-1993	W	S	M	Seasonal changes in dry gonad weight	10
	1991-1999	A,L,W	S	M	Seasonal changes in gonadosomatic indices for each year. 130 fish/month (5 fish /cm in 30-60 cm range)	9
Weight:						
A. Commercial fisheries data	1950-2001	A,L	CL	Q		1,2,3
B. Survey data	1971-2001	A,L,W	S	Y	Estimated means	2,3
C. Other	1961-1969	A,L,W	S	Y		3
	1985-1989	A,L,W	S	Q		
	1990-1995	A,L,W	S	Y		
Condition:						
A. Fulton	1971-2001	A,L,W	S	Y		1,3,10
	1991-2001	A,L,W	EW	Q,M		
B. HSI	1991-1993	W	S	SEP-JUN	Minimum and maximum HSI values by sex	10
	1991-1993	W	S	M	Seasonal changes in dry liver weight by sex	10
	1991-2001	A,L,W	EW	Q,M	HSI vs. length and wt; 130 fish/month; 5 fish/cm (30-60 cm)	9,3
C. Energy						

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.
D. Other	1971-1999	L,W	S	SEPT	Weight at 45 cm and 55 cm	2
	1991-1993	W	S	M	Seasonal changes in carcass dry weight; trends in organ weights discussed in relation bioenergetics, feeding and temperature (small 40-51 cm and large (51-60 cm) fish reviewed	10
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	1955-1956	L,W	S	MAY-SEP	Gonadal stages of development give evidence of spawning time	4
	1982-1991		S	JUN-AUG	Pelagic egg and larval surveys; dedicated to mackerel but gives evidence of cod spawning	11
	1991-1993	L,W	S	M	Monthly sampling of organ weights indicates spawning period	10
	1985-1989 1991-2001	A,L,W A,L,W	S EW	M M	Seasonal; surveys data available from GSI	3,15,16
Contamination						
Environmental key factors						
Other factors or parameters						

TABLE 3: STUDIES OF REPRODUCTIVE POTENTIAL

COMMON NAME:	ATLANTIC COD
AREA:	NORTHWEST ATLANTIC
STOCK:	SOUTHERN GULF OF ST. LAWRENCE (NAFO DIV. 4T+SUBDIV.4VN (JANUARY-APRIL))

Estimation of reproductive potential			
Subject	Brief description	Year range	Ref. No.
Potential or realised egg production	Fecundity estimates of wild fish during period of fast growth	1955-1956	4
	Fecundity estimates of wild fish during period of slow growth	1980	7
Viable egg and larvae production			
Critical life stages			
Environmental influences	Examination of relationships between environmental indicators and index of survival	1971-2000	17,19
Stock recruitment relations	Spawning stock biomass (limited by maturity data) vs recruitment	1950-1977	20
	Stock-recruitment relationships	1971-1995	21,22
Other studies	General paper on spawning characteristics	1971-2000	23

TABLE 4: DATA SOURCES

COMMON NAME:	ATLANTIC COD
AREA:	NORTHWEST ATLANTIC
STOCK:	SOUTHERN GULF OF ST. LAWRENCE (NAFO DIV. 4T+SUBDIV. 4VN (JANUARY-APRIL))

Data sources (literature reference or contact person)
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15. LETT, P.F. 1980. A comparative study of the recruitment mechanisms of cod and mackerel, their interaction and its implication for dual stock assessment. <i>Can. Tech. Rep. Fish. Aquat. Sci.</i> , 988: 51.

Data sources (literature reference or contact person)
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TABLE 1: AVAILABLE DATA

COMMON NAME:	ATLANTIC COD	SPECIES:	<i>Gadus morhua</i>
AREA:	NORTHWEST ATLANTIC	STOCK:	EASTERN SCOTIAN SHELF (NAFO SUBDIV. 4Vs+Div. 4W)
CREATED BY:	ED TRIPPEL 2001-07-17	UPDATED BY:	ED TRIPPEL 2003-02-03

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	√	√	√	(√)	√		√	√	(√)
1975	√	√	√	(√)	√		√	√	(√)
1974	√	√	√	(√)	√		√	√	(√)

Data status									
Year	Stock size	Stock composition	Age	Sex ratio	Maturity	Fecundity	Weight	Condition	Additional data
1973	√	√	√	(√)	√		√	√	(√)
1972	√	√	√	(√)	√		√	√	(√)
1971	√	√	√	(√)	√		√	√	(√)
1970	√	√	√	(√)	√		√	√	(√)
1969	√	√	√	(√)	√		√		
1968	√	√	√	(√)	√		√		
1967	√	√	√	(√)	√		√		
1966	√	√	√	(√)	√		√		
1965	√	√	√	(√)	√		√		
1964	√	√	√	(√)	√		√		
1963	√	√	√	(√)	√		√		
1962	√	√	√	(√)	√		√		
1961	√	√	√	(√)	√		√		
1960	√	√	√	(√)	√		√		
1959	√	√	√	(√)	√		√		
1958	√	√	√	(√)	√		√		

TABLE 2: DATA BASIS, FORMAT AND QUALITY

COMMON NAME:	ATLANTIC COD	
AREA:	NORTHWEST ATLANTIC	
STOCK:	EASTERN SCOTIAN SHELF (NAFO SUBDIV. 4VS+DIV. 4W)	
REPRODUCTIVE STRATEGY:	DETERMINATE SPAWNER	REF. NO.: 13
TIMING OF SPAWNING:	NOV-DEC/MAR-JUN	REF. NO.: 10,11,12
OPTIMAL TIME FOR MATURITY SAMPLING:	NOV-DEC AND MAR-APR	REF. NO.: 6,10

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	1958-1981	A	CL,S	M,Q	SPA Estimates	1
	1970-2002	A	CL,S	M,Q	SPA Estimates	2,3,4
Stock composition	1958-1981	A,L,W	S,CL	Y,Q		1
	1970-2002	A,L,W	S,CL	JULY	July survey	2,4
	1979-2002	A,L,W	S,CL	MARCH	(March survey, excludes 1985)	2,4
	1995-2002	A,L,W	S	FALL	Fixed gear survey (hook)	2,4
Age determination	1958-1981	A	S,CL	M,Q,Y		1
	1970-2002	A	S,CL	Y,Q		2,4
Sex ratio	1958-2002	A,L,W	S		Could be extracted from survey data bases	4
Maturity:						
A. Ogives (E)	1958-1979	A,L	S	JAN-SEP	Maturity ogives in 5 - year periods and percent mature by age (4Vn, 4Vs, 4W)	5
	1979-2002	A,L	S	MARCH	Proportion mature by age and length intervals by sex; including ogives. No maturity data available in fall (Nov-Dec spawners).	4,6
B. Skip of spawning						
C. Spawning probability						
D. Other						
Fecundity:						
A. Estimation	1999-2000	A,L, W	S		1999 (9 females) and 2000 (19 ovaries); 182 um mesh used to separate 1 st from 2 nd generation oocytes	15
B. First time vs. repeat spawners						

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.
C. Atresia						
D. Other						
Weight:						
A. Commercial fisheries data	1958-1981 1970-2002	A,L,W A,L,W	CL CL	M,Q,B,Y M,Q,B,Y		1 2,4
B. Survey data	1970-2002 1979-2002	A,L,W A,L,W	S S	JULY MARCH	Estimated means Estimated means	2,4 2,4
C. Other						
Condition:						
A. Fulton						
B. HSI						
C. Energy						
D. Other	1970-1994 1995-2002 1979-2002	L,W L,W L,W	S S S	JULY JULY MARCH	Predicted weights at 60 cm Condition data could be extracted from data bases Condition data could be extracted from data bases	7 4 4
Egg viability:						
A. Egg quality						
B. Fertilisation success	1995	L,W	EC	NOV NINE FEMALE AND SEVEN MALE	Spawning behaviour reported over nine weeks. Multiple paternity, fertilization success, size-based dominance, microsatellite DNA analysis	13
C. Egg mortality						
D. Other						
Larval viability:						
A. Hatching success						
B. Larvae quality						
C. Mortality						
D. Other						

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.
Spawning time	1920-1997	L,W	X		Fishermen's knowledge through interviews, includes spawning areas (present and lost)	8
	1979-1981		S	Sesaonal	Stage 1-3 cod eggs (SSIP)- Spawning from January-June (spring) and October-December (fall); in same locations	9,10,11
	1991-1993		S	Seasonal	Eggs and larvae of fall spawned production account for 90% of total indicating major loss of spring spawning component since SSIP study (1979-1981). 1991-1993 study conducted by OPEN, Dalhousie Univ.	7,12
Contamination						
Environmental key factors	1958-1994				Prior to 1980s a strong correlation between recruitment and St. Lawrence River discharge existed (mechanims unclear); correlation disappeared with addition of data from 1980s., though correlation re-appeared slightly with more recent data.	7,12
	1958-1994				Emerald Basin 200m water temperature correlates with recruitment	7
Other factors or parameters						

TABLE 3: STUDIES OF REPRODUCTIVE POTENTIAL

COMMON NAME:	ATLANTIC COD
AREA:	NORTHWEST ATLANTIC
STOCK:	EASTERN SCOTIAN SHELF (NAFO SUBDIV. 4Vs+DIV. 4W)

Estimation of reproductive potential			
Subject	Brief description	Year range	Ref. No.
Potential or realised egg production			
Viable egg and larvae production	Spawning behaviour and associated fertilization success	1995	14
Critical life stages			
Environmental influences	St. Lawrence River discharge vs recruitment	1958-1994	7,12
	Emerald Basin 200m water temperature vs recruitment	1958-1994	7
Stock recruitment relations	Spawning stock biomass vs recruitment	1958-1994	2
Other studies			

TABLE 4: DATA SOURCES

COMMON NAME:	ATLANTIC COD
AREA:	NORTHWEST ATLANTIC
STOCK:	EASTERN SCOTIAN SHELF (NAFO SUBDIV. 4VS+DIV. 4W)

Data sources (literature reference or contact person)
1. MAGUIRE, J. J. G. A. YOUNG, and A. F. SINCLAIR. 1982. The 1982 assessment of the Eastern Scotian Shelf (4VsW) cod stock complex. <i>DFO CAFSAC Res. Doc.</i> , No. 40.
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3. MOHN, R. 1999. The retrospective problem in sequential population analysis: An investigation using cod fishery and simulated data. <i>ICES J. Mar. Sci.</i> , 56 : 473-488.
4. FANNING, P. Marine Fish Division, Bedford Institute of Oceanography, P. O. Box 1006, Dartmouth, Nova Scotia, B2Y 4A2 (fanningp@mar.dfo-mpo.gc.ca).
5. BEACHMAN, T. D. 1983. Variability in median size and age at sexual maturity of Atlantic cod (<i>Gadus morhua</i>) on the Scotian Shelf in the Northwest Atlantic Ocean. <i>Fish. Bull.</i> , 81 : 303-321.
6. TRIPPEL, E. A., M. J. MORGAN, A. FRECHET, C. ROLLET, A. SINCLAIR, C. ANNAND, D. BEANLANDS, and L. BROWN. 1997. Changes in age and length at sexual maturity of northwest Atlantic cod, haddock and pollock stocks, 1972-1995. <i>Can. Tech. Rept. Fish. Aquat. Sci.</i> , No. 2157.
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10. BRANDER, K., and P.C.F. HURLEY. 1992. Distribution of early-stage Atlantic cod (<i>Gadus morhua</i>), haddock (<i>Melanogrammus aeglefinus</i>), and witch flounder (<i>Glyptocephalus cynoglossus</i>) eggs on the Scotian Shelf: a reappraisal of evidence on the coupling of cod spawning and plankton production. <i>Can. J. Fish. Aquat. Sci.</i> , 49 : 238-251.
11. HANKE, A.R., F.H. PAGE, and J. NEILSON. 2001. Distribution of Atlantic cod (<i>Gadus morhua</i>) eggs and larvae on the Scotian Shelf, Eastern Gulf of Maine, Bay of Fundy and Eastern Georges Bank. <i>Can. Tech. Rept. Fish. Aquat. Sci.</i> , No. 2308.
12. FRANK, K.T., K.F. DRINKWATER, and F.H. PAGE. 1994. Possible causes of recent trends and fluctuations in Scotian Shelf/Gulf of Maine cod stocks. <i>ICES Mar. Sci. Symp.</i> 198 : 110-120.
13. TRIPPEL, E.A. 1998. Egg size and viability and seasonal offspring production of young Atlantic cod. <i>Trans. Am. Fish. Soc.</i> , 127 : 339-359.
14. HUTCHINGS, J.A., T.D. BISHOP, and C.R. MCGREGOR-SHAW. 1999. Spawning behaviour of Atlantic cod, <i>Gadus morhua</i> : evidence of mate competition and mate choice in a broadcast spawner. <i>Can. J. Fish. Aquat. Sci.</i> , 56 : 97-104.

TABLE 1: AVAILABLE DATA

COMMON NAME:	ATLANTIC COD	SPECIES:	<i>Gadus morhua</i>
AREA:	NORTHWEST ATLANTIC	STOCK:	BAY OF FUNDY/WESTERN SCOTIAN SHELF (NAFO Div. 4X)
CREATED BY:	ED TRIPPEL 2001-07-17	UPDATED BY:	

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	√	√	√	(√)	√		√	(√)	(√)
1975	√	√	√	(√)	√		√	(√)	(√)

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

TABLE 2: DATA BASIS, FORMAT AND QUALITY

COMMON NAME:	ATLANTIC COD	
AREA:	NORTHWEST ATLANTIC	
STOCK:	BAY OF FUNDY/WESTERN SCOTIAN SHELF (NAFO DIV. 4X)	
REPRODUCTIVE STRATEGY:	DETERMINATE SPAWNER	REF. NO.: 11
TIMING OF SPAWNING:	JANUARY-APRIL	REF. NO.: 11,12,14,16
OPTIMAL TIME FOR MATURITY SAMPLING:	DECEMBER-JANUARY	REF. NO.: 5,11

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	1948-1989	A	C,L,S		VPA (quality of VPA considered suspect due to poor sampling in early years)	1
	1970-2000	A	S	JULY	Relative abundance	2
	1983-2000	A	C,L,S	Q	VPA	2,3
Stock composition	1948-1969	A,L,W	S,CL		Poor data sampling in early years	1
	1970-2000	A,L,W	S,CL	Y,Q		2,3
Age determination	1948-1969		S,CL		Poor otolith sampling in early years	1,3
	1970-2000		S,CL	Y,Q		2
Sex ratio	1980-2000	A,L,W	S	Y		2
Maturity:						
A. Ogives (E)	1963-1979	A,L	S	Spring	Age and length by sex. Spring survey terminated in 1985, remaining summer survey not appropriate time to conduct maturity determination.	4
	1980-1985	A,L	S	Spring		5
B. Skip of spawning						
C. Spawning probability	1978-1979	A,L,W	EC	lab expt	Ovarian wall thickness in relation to maturity. Study of growth in relation to maturity	6
	1978-1979	A,L,W	EC, S			7
D. Other		A,L,W.	S	N<10	Photographs of histological and macroscopic stages of gonad development	8

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.
Fecundity:						
A. Estimation	1983-1985	L,W	X		Seasonal stock production of eggs (modelled)	9
	1997	L,W	EC	13 PAIRS	Seasonal egg production and related feeding habits	10
B. First time vs. repeat spawners	1994-1995	A,L,W	EC	14 PAIRS	Seasonal egg production	11
C. Atresia						
D. Other						
Weight:						
A. Commercial fisheries data	1948-1989	A,L,W	CL	M,Q,B,Y	In many early years sampling was very poor or non-existent	1,3
	1980-2000	A,L	CL	Q		2,3
B. Survey data	1970-2000	A,L,W	S	JULY	Estimated means	2
C. Other						
Condition:						
A. Fulton						
B. HSI						
C. Energy						
D. Other	1997	L,W	EC	13 PAIRS	Weight loss during spawning	10
Egg viability:						
A. Egg quality	1994-1995	A,L,W	EC	14 PAIRS	First-time and second-time spawners	11
B. Fertilisation success	1994-1995	A,L,W	EC	14 PAIRS	First-time and second-time spawners	11
C. Egg mortality						
D. Other						
Larval viability:						
A. Hatching success	1994-1995	A,L,W	EC	14 PAIRS	First-time and second-time spawners	11
B. Larvae quality	1994-1995	A,L,W	EC	14 PAIRS	First-time and second-time spawners (larval dry weight)	11
C. Mortality						
D. Other	1994-1995	A,L,W	EC	14 PAIRS	Yok sac size in relation to batch number	11

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.
Spawning time	1920-1997	L,W	X		Fishermen's knowledge through interviews, includes spawning areas (present and lost)	12
	1933-1938	L,W	S	Q	Evidence of October-November spawning (Halifax, St. Margaret Bay)	13
	1979-1985	A,L,W	S	MAR-APR	Skewed sex ratios (Browns Bank)	14
	1983-1985	L,W	S	SPRING	Pelagic eggs (Browns Bank /SW Nova Scotia)	15
	1975-1997		S		Egg and larval surveys (LHP, FEP, SSIP)	16
	1994-1995			EC	14 PAIRS	Spawning duration/pair
	1997		EC	13 PAIRS	Spawning duration/pair	10
Contamination						
Environmental key factors	1988		EC		Larval size at hatch in relation to incubation temperature	17
	1994	L,W	EC	5 MALES	Salinity effects on sperm motility	18
Other factors or parameters	1991	A,L,W	EC	14 MALES	Sperm quality of first-time and second-time spawners (sperm motility, spermatocrit, fertilization success, hatching success).	19
	1993	L,W	EC	3 MALES	Sperm longevity in seawater	20
	1994-1996	A,L,W	EC	40 MALES	Sperm density, spermatocrit, sperm size, seasonal trends	21
	1994-1996	L,W	EC	18 MALES	Sperm potency and sperm competitions in relation to sire condition and body size	22
	1995	L,W	EC	8 FEMALE AND 16 MALES	Spawning trios; genotypes of progeny of 51 egg batches related to male body size, condition, and activity	23

TABLE 3: STUDIES OF REPRODUCTIVE POTENTIAL

COMMON NAME:	ATLANTIC COD
AREA:	NORTHWEST ATLANTIC
STOCK:	BAY OF FUNDY/WESTERN SCOTIAN SHELF (NAFO DIV. 4X)

Estimation of reproductive potential			
Subject	Brief description	Year range	Ref. No.
Potential or realised egg production	Fecundity of captive cod	1994, 1997	11,10
Viable egg and larvae production	Egg size, larval size, fertilization, hatching success, spawning duration of first-time and second-time spawners	1994-1995	11
Critical life stages			
Environmental influences	Larval size at hatch in relation to incubation temperature	1988	17
Stock recruitment relations	Spawning stock biomass <i>vs</i> recruits	1948-1989	24
	Predicted egg production from egg surveys <i>vs</i> recruits	1983-1985	9
	age 5+ SSB <i>vs</i> age 2 survey recruits	1980-1995	25
Other studies	Sperm quality of first-time and repeat spawners	1991	19
	Fertilization success of males in relation to condition and size using in vivo sperm competition experiments	1994-1996	22
	Fertilization success of males in relation to condition and size using captive spawning trio experiments	1995	23

TABLE 4: DATA SOURCES

COMMON NAME:	ATLANTIC COD
AREA:	NORTHWEST ATLANTIC
STOCK:	BAY OF FUNDY/WESTERN SCOTIAN SHELF (NAFO DIV. 4X)

Data sources (literature reference or contact person)
1. CAMPANA, S., and J. HAMEL. 1990. Assessment of the 1989 4X cod fishery. <i>DFO CAFSAC Res. Co.</i> , No. 90/44.
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TABLE 1: AVAILABLE DATA

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

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

TABLE 2: DATA BASIS, FORMAT AND QUALITY

COMMON NAME:	ATLANTIC COD	REF. NO.:	
AREA:	NORTHWEST ATLANTIC	REF. NO.:	1
STOCK:	GEORGES BANK AND SOUTH (NAFO DIV. 5Z+SUBAREA 6)	REF. NO.:	1
REPRODUCTIVE STRATEGY:	DETERMINATE BATCH SPAWNER	REF. NO.:	
TIMING OF SPAWNING:	NOVEMBER-MAY	REF. NO.:	1
OPTIMAL TIME FOR MATURITY SAMPLING:	JANUARY-FEBRUARY	REF. NO.:	1

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 VPA	2
	1978-2001	A,L	CL,S	Q		2
Stock composition	1963-1977	A,L	S	B	Low sampling of large market categories	2
	1978-1991	A,L	S,CL,CC	B,Q,Q		2
	1992-2001	A,L,W	S,CL,CC	B,Q,Q		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	
Maturity:						
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						
Fecundity:						
A. Estimation	1879	L,W	CL		Six fish sampled 5Ze: 1999 - 55 ovaries 2000 - 41 ovaries	10
	1999-2000	A,L, W	S			19
B. First time vs repeat spawners						
C. Atresia						
D. Other						
Weight:						
A. Commercial fisheries data	1978-2001	L,A	CL	Q		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. Survey data	1992-2001	L,A	S	B		5
C. Other						
Condition:						
A. Fulton	1992-2001	L,A	S	B		5
B. HSI						
C. Energy						
D. Other	1988	L,A	S	B	GSI	4,5
Egg viability:						
A. Egg quality						
B. Fertilisation success						
C. Egg mortality	1978-1999		S	Q	Egg and larval surveys	15
D. Other						
Larval viability:						
A. Hatching success						
B. Larvae quality						
C. Mortality	1977-1987		S	M	Egg and larval survey	11
D. Other						
Spawning time	1963-2001		S	M,Q	Egg and larval survey	1,12,13,14
Contamination	1980		S	A	12 fish- muscle sample	16
Environmental key factors	1970-2001		S	B	Bottom temperature data	5,18
Other factors or parameters	1973-2001	A,L	S	B	Food habits	17,18

TABLE 3: STUDIES OF REPRODUCTIVE POTENTIAL

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

Estimation of reproductive potential			
Subject	Brief description	Year range	Ref. No.
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

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

Data sources (literature reference or contact person)
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.
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5. O'BRIEN, L. Northeast Fisheries Science Center, Woods Hole Laboratory, 166 Water Street, Woods Hole, MA 02543, USA (Loretta.O'Brien@noaa.gov).
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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.
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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.
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TABLE 1: AVAILABLE DATA

COMMON NAME: **SPECIES:**

AREA: **STOCK:**

CREATED BY: **UPDATED BY:**

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	(√)	√	√	(√)	√				(√)
1975	(√)	√	√	(√)	√				(√)
1974	(√)	√	√	(√)	√				(√)

Data status									
Year	Stock size	Stock composition	Age	Sex ratio	Maturity	Fecundity	Weight	Condition	Additional data
1973	(√)	√	√	(√)	√				(√)
1972	(√)	√	√	(√)	√				(√)
1971	(√)	√	√	(√)	√				(√)
1970	(√)	√	√	(√)	√				(√)
1969	(√)	√		(√)					(√)
1968	(√)	√		(√)					(√)
1967	(√)	√		(√)					(√)
1966	(√)	√		(√)					(√)
1965	(√)	√		(√)					(√)
1964	(√)	√		(√)					(√)
1963	(√)	√		(√)					(√)

TABLE 2: DATA BASIS, FORMAT AND QUALITY

COMMON NAME:	ATLANTIC COD	
AREA:	NORTHWEST ATLANTIC	
STOCK:	GULF OF MAINE (NAFO DIV. 5Y)	
REPRODUCTIVE STRATEGY:	DETERMINATE BATCH SPAWNER	REF. NO.: <input type="text"/>
TIMING OF SPAWNING:	NOVEMBER-MAY	REF. NO.: <input type="text" value="1"/>
OPTIMAL TIME FOR MATURITY SAMPLING:	FEBRUARY-APRIL	REF. NO.: <input type="text" value="1"/>

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	1963-1981	A,L	S	B	Relative abundance VPA	2
	1982-2001	A,L	CL,S	Q		2
Stock composition	1963-1981	A,L	S	B	Low sampling of large market categories	2
	1982-1991	A,L	S,CL,CC	B,Q,Q		2
	1992-2001	A,L,W	S,CL,CC	B,Q,Q		2
Age determination	1970-1981		S	B		3
	1982-2001		S,CC	B,Q		3
Sex ratio	1970-2001	L,A	S	B		4
Maturity:						
A. Ogives (E)	1970-2001	A,L	S	B	Macroscopic observations from spring	2,5,6,7
B. Skip of spawning						
C. Spawning probability						
D. Other						
Fecundity:						
A. Estimation	1879	L,W	CL		Six fish sampled	8
B. First time vs. repeat spawners						
C. Atresia						
D. Other						
Weight:						
A. Commercial fisheries data	1982-2001	L,A	CC,CL	Q		2
B. Survey data	1992-2001	L,A	S	B		4
C. Other						

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.
Condition:						
A. Fulton	1992-2001	L,A	S	B		4
B. HSI						
C. Energy						
D. Other						
Egg viability:						
A. Egg quality						
B. Fertilisation success						
C. Egg mortality	1978-1999		S	Q	Egg and larval surveys	9
D. Other						
Larval viability:						
A. Hatching success						
B. Larvae quality						
C. Mortality	1977-1987		S	M	Egg and larval survey	10
D. Other						
Spawning time	1963-2001		S	M,Q	Egg and larval survey	1, 11, 12, 13, 14
Contamination	1980		S	A	6 fish -muscle sampled	16
Environmental key factors	1963-2001		S	B	Bottom temperature data	4,17
Other factors or parameters	1973-2001	A,L	S	B	Food habits	15, 17

TABLE 3: STUDIES OF REPRODUCTIVE POTENTIAL

COMMON NAME:	ATLANTIC COD
AREA:	NORTHWEST ATLANTIC
STOCK:	GULF OF MAINE (NAFO DIV. 5Y)

Estimation of reproductive potential			
Subject	Brief description	Year range	Ref. No.
Potential or realised egg production	Estimates of egg production	1978-1999	9,11
Viable egg and larvae production			
Critical life stages			
Environmental influences			
Stock recruitment relations	Spawning stock biomass vs age 1 recruitment	1982-2000	2
Other studies			

TABLE 4: DATA SOURCES

COMMON NAME:	ATLANTIC COD
AREA:	NORTHWEST ATLANTIC
STOCK:	GULF OF MAINE (NAFO DIV. 5Y)

Data sources (literature reference or contact person)
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. Rep.</i> , No. SHL 85-04, 35 p.
2. MAYO, R. K., E. M. THUNBERG, S. E. WIGLEY, and S. X. CADRIN. 2002. The 2001 assessment of the Gulf of Maine Atlantic cod stock: A report of the 33 rd Northeast Regional Stock Assessment Workshop (33 rd SAW). <i>NEFSC Ref. Doc.</i> , 02-02.
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5. 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.
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Data sources (literature reference or contact person)
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TABLE 1: AVAILABLE DATA

COMMON NAME: **SPECIES:**

AREA: **STOCK:**

CREATED BY: **UPDATED BY:**

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	√	√	√	√	√				

Data status									
Year	Stock size	Stock composition	Age	Sex ratio	Maturity	Fecundity	Weight	Condition	Additional data
1979	√	√	√						
1978	√	√	√						
1977	√	√	√						
1976	√	√	√						
1975	√	√	√						
1974	√	√	√						
1973	√	√	√						
1972	√	√	√		√	√			
1971	√	√	√			√			
1970	√	√	√			√	√		
1969	√	√	√		√	√	√		
1968	√	√	√		√				
1967	√	√	√						
1966	√	√	√						
1965	√	√	√						
1964	√	√	√						
1963	√	√	√						
1962									
1961									
1960									
1934					√				
1893					√				
1891						√			
1920-63	√	√							

TABLE 2: DATA BASIS, FORMAT AND QUALITY

COMMON NAME:	COD	
AREA:	NORTH SEA	
STOCK:	ICES AREA IV	
REPRODUCTIVE STRATEGY:	DETERMINATE BATCH SPAWNER	REF. NO.: 16
TIMING OF SPAWNING:	JANUARY -APRIL	REF. NO.: 6,16
OPTIMAL TIME FOR MATURITY SAMPLING:	DECEMBER-JANUARY	REF. NO.: 6

Data basis, format and quality						
Parameters	Year range	Data basis (A/L/W)	Data origin	Sampling frequency	Notes on data, methods and contents	Ref. No.
Stock size	1920-63	A	CL	M	VPA but high uncertainty in estimates Catch at age analysis (VPA)	20 1
	1963 –2000	A	CL, CC in some areas after 1990	M		
Stock composition	1963 –2000	L, A	CL	M	Catch at age analysis (VPA) No routine weight measurements	1 11, 12, 13
	1970s, 1988-90, 1999	L,A, W	CL,CC			
Age determination	1963 –2000	otoliths	C,L	M	age based assessments	1
Sex ratio	1963-2000	L, A	S	A	Surveys	13
Maturity:						
A. Ogives	1883, 1924, 1968-72	A,L, W	S	A	dedicated study dedicated study dedicated study analysis from ICES IBTS analysis of survey data in progress P. Wright, FRS	2
	1980-1995					3
						4
	1995-2001					5 13
B. Skip of spawning						
C. Spawning probability	1953-90		S	A	from egg surveys review	6 7
D. Other						

Data basis, format and quality						
Parameters	Year range	Data basis (A/L/W)	Data origin	Sampling frequency	Notes on data, methods and contents	Ref. No.
Fecundity:						
A. Estimation	<1891	A,L				8
	1969	A,L				9
	1970 -72	A,L,W	S	A	n=92	4
	1999	A,L,W	S	A	n=26	10
B. First time vs. repeat spawners						
C. Atresia						
D. Other						
Weight:						
A. Commercial fisheries data	1970s 1988-90		CC		no regular sampling	11 11 12
B. Survey data			S			
C. Other						
Condition:						
A. Fulton						
B. HSI	1969-70 1999		CC, S	M	few data 1 st quarter	11 10
C. Energy						
D. Other						
Egg viability:						
A. Egg quality	1970-72	A,L,W	S	A	n=30 weights	4
B. Fertilisation success						
C. Egg mortality					size selective mortality	14
D. Other						
Larval viability:						
A. Hatching success						
B. Larvae quality						
C. Mortality						
D. Other					study of temperature related larval development	15
Spawning time	1953-90		S	A	plankton surveys	5, 16
Contamination						
Environmental key factors			S		regional trophic studies temperature effects on recruitment	17, 18 19

Data basis, format and quality						
Parameters	Year range	Data basis (A/L/W)	Data origin	Sampling frequency	Notes on data, methods and contents	Ref. No.
Other factors or parameters						

TABLE 3: STUDIES OF REPRODUCTIVE POTENTIAL

COMMON NAME:	COD
AREA:	ICES AREA IV
STOCK:	NORTH SEA

Estimation of reproductive potential			
Subject	Short description	Year range	Ref. No.
Potential or realised egg production			
Viable egg and larvae production			
Critical life stages	REVIEW OF GADOID STOCK CHANGES	1962-1993	21
Environmental influences			
Stock recruitment relations	REVIEW OF GADOID STOCK CHANGES	1962-1993	21
Other studies			

TABLE 4: DATA SOURCES

COMMON NAME:	COD
AREA:	NORTH SEA
STOCKS:	ICES IV

Data sources (literature reference or contact person)
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17. MUNK, P. 1997. Prey size spectra and prey availability of larval and small juvenile cod. <i>J. Fish. Biol.</i> , 51(Suppl.A): 340-351.

Data sources (literature reference or contact person)
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21. ICES. MS 2001. Workshop on Gadoid stocks in the North sea during the 1960s and 1970s. The Fourth ICES/GLOBEC backward facing workshop. <i>ICES Co-op. Res. Report</i> , No. 244, 55 p.

TABLE 1: AVAILABLE DATA

COMMON NAME:	COD	SPECIES:	<i>Gadus morhua</i> , L.
AREA:	BALTIC SEA	STOCK:	EASTERN BALTIC COD (ICES SD 25-32)
CREATED BY:	GERD KRAUS JONNA TOMKIEWICZ 2000-09-27	UPDATED BY:	JONNA TOMKIEWICZ CORDULA SCHMITZ 2003-04-09

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	√	√	√	(√)	(√)	√	√		√

Data status									
Year	Stock size	Stock composition	Age	Sex ratio	Maturity	Fecundity	Weight	Condition	Additional data
1975	√	√	√	(√)	(√)		√		
1974	√	√	√	(√)	(√)		√		
1973	√	√	√	(√)	(√)		√		
1972	√	√	√	(√)	(√)		√		
1971	√	√	√	(√)	(√)		√		
1970	√	√	√	(√)	(√)		√		
1969	√	√	√	(√)	(√)		√		
1968	√	√	√	(√)	(√)	√	√		
1967	√	√	√	(√)	(√)		√		
1966	√	√	√				√		
1965									
1964									
1963									
1962						(√)			
1961						(√)			
1960						(√)			

TABLE 2: DATA BASIS, FORMAT AND QUALITY

COMMON NAME:	COD	
AREA:	BALTIC SEA	
STOCK:	EASTERN BALTIC COD (ICES SD 25-32)	
REPRODUCTIVE STRATEGY:	DETERMINATE BATCH SPAWNER	REF. NO.: 84
TIMING OF SPAWNING:	MARCH-SEPTEMBER	REF. NO.: 12,13,58,59
OPTIMAL TIME FOR MATURITY SAMPLING:	FEBRUARY-MARCH	REF. NO.: 8,12,13,58,59

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	1966-2001	Age-based (2-8+)	VPA	Yearly	SD25-32 combined, based on commercial landings and survey abundance indices	1
	1974-2001	Age-based (0-8+)	MSVPA	Quarterly	SD25-32, SD disaggregated commercial quarterly landings and surveys Q1	2
	1982-2001	Age-based (1-10+)	Surveys	M 2-3	Baltic International Trawl Survey (BITS): SD 25, 26, 27 and 28	1,2,3,4
	1999-2001	Age-based (1-10+)	Surveys	M10-11	Baltic International Trawl Survey (BITS): SD 25, 26, 27 and 28	1,3
Stock composition	1966-2001	A (2-8+)	VPA	Y	SD25-32	1
	1974-2001	A (0-8+)	MSVPA	Q	SD25-32, combined or SD disaggregated	2
	1982-2001	A (1-10+)	Surveys	M2-3, M10-11	SD 25, 26, 27, 28	1,3
Age determination	1966-2001	L, W, A	CL	Q	National laboratories: SD 25-32, harbour sampling	1,2,5
	1994-2001	L, W, A	CL	Q	National laboratories: SD 25-32, at sea sampling	1,2,5
	1996-2001	L, W, A	CC	M	National laboratories: SD 25-28 - discard sampling	1,5
	1982-2001	L, W, A	Surveys	M2-3, M10-11	National laboratories: BIT Survey SD 25-28	1,3,5

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.
Sex ratio	1965-1990	A	CC	2-3 Y intervals	SD26 -first quarter, unsuited for SRP	7, 9
	1967-1977	A,L	??		SD 25, average over 6-7 years, incl. L50 and A50	6, 9
	1980-1999	A	Surveys	M1-3	SD 25-28 and SD disaggregated, average over 5 year periods, yearly after 1990	8,1,2,9, 10
	2000-2001	A	Surveys	M2-3	Data exist from BITS, but not published	C1
Maturity:						
A. Ogives (E)	1965-1990	A	CC	2-3 Y intervals	SD26 -first quarter, unsuited for SRP: Macroscopic staging, sex-specific	7, 9
	1967-1977	A,L	??	6-7 years out of 11	SD 25, average over 6-7 years, incl. L50 and A50: Macroscopic staging, sex-specific	6, 9
	1980-1999	A	Surveys (BITS)	M1-3	SD 25,26,27,28 separate and combined, sex specific average over 5 year periods, yearly after 1990, sex specific, macroscopic staging	8,1,2,9, 10
	1988-1997	L	Surveys	M2-3	sex specific, macroscopic staging, coverage largely limited to Swedish waters, incl. L50	11
	2000-2001	A	Surveys (BITS)	M2-3	Data exist from BITS, but not published, sex-specific	C1
B. Skip of spawning	1979-1986	A	??	Y	SD 26, 28, analysis based on visual maturity determination during spawning time	14
C. Spawning probability	1961-1970	A,L	CL, Lab.	M1-12	Histological criteria separating immature and mature females	15
	1998-1999	L	Surveys, lab.	M1-12	Histological validation of macroscopic scale and estimation of spawning probability	12,13
D. Other	1998-1999	L	Surveys	M1-12	Illustrated manual based on a histologically validated macroscopic scale	12

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.
Fecundity:						
A. Estimation	1959-1962	L, W	??	(n=116)	SD 26, method not provided	85
	1968	L-, W-relationships	Survey	Y seasonal (n=84)	SD 24, 25, 26, no area differences	16,9
	1976-1978	A-, W-relationships	Survey, commercial	Y seasonal	Potential rel. fecundity eastern Baltic, only relative fecundity useful	17
	1983-1984	L-, W-, A-relationships	Survey, commercial trawl/gillnet	Y seasonal (n=435)	Potential rel. fecundity. SD 22, 24, 25 separated	18,9
	1993-1995	L-, W-, A-relationships	Survey, commercial trawl/gillnet	Y seasonal (n=435)	Potential rel. fecundity. SD 22, 24, 25 separated	18,9
	1987-1992	L-, W-relationships	Survey	Y: M3-7 (n=807)	Potential rel. fecundity model (growth+temp). SD 25 and 26 separated by area and partly month	19,9
	1996	L-, W-relationships	survey	Y:M3-7 (n=807 + 199)	Potential rel. fecundity model (prey availability). SD 25 and 26 separated by area and partly month	10
	1987-1992	L-, W-relationships	survey	Y:M3-7 (n=807 + 199)	Potential rel. fecundity model (prey availability). SD 25 and 26 separated by area and partly month	10
	1996	L-, W-relationships	survey	Y:M3-7 (n=807 + 199)	Potential rel. fecundity model (prey availability). SD 25 and 26 separated by area and partly month	10
	1998-2000	L-, W-relationships	survey	Y:M3-7 (n=807 + 199)	Potential rel. fecundity model (prey availability). SD 25 and 26 separated by area and partly month	10
B. First time vs. repeat spawners	1993-1997	L/A	Experiments (EC)	Caught in spring	Analysis of batch fecundity and total fecundity of recruit-and repeat spawners	20
C. Atresia	2000	L	Survey/lab.	Y: M3-9	Histological analyses and quantification of atresia (SD 25)	21
D. Other						
Weight:						
A. Commercial fisheries data	1966-2001	A (1-10+)	Landings (WECA)	Y	SD 25-32 separated by SD, since 1997 documented by gear and quarter in report	1
	1974-2000	A (0-8+)	Landings (WECA)	Q	SD 25-32 separated by SD and quarter, since 1997 separated by gear	2
	1997-2001	A	Discard	Q	At sea sampling of discard by country, quarter, gear.	1
B. Survey data	1982-2001	A	Survey	M1-3 M10-11	SD 25-28, since 1988 with information on individual fish	1,3
C. Other	1960-1985	L,A	Surveys	M3-4	SD 26 and 28. growth parameters in relation to abundance and food availability	22
	1975-1986	L,A	Surveys	M3-4	SD 26 and 28. Growth and maturation in relation to abundance	15
	1972-1991	L,A	Surveys	M12-1 M3-4	SD 26, 28. Length and weight at age, otolith increments in relation stock size and prey availability	23
	1995-2000	A	Surveys	M2-3	Area, sex and maturation specific differences in weight at age	24

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.
Condition:						
A. Fulton	1998-1999	STAGE	Surveys	M11-12 /M2-3/ M6	Relation between K and maturity stage for females, SD 25	13
	1995-2000	L	Surveys	6-8 X PER YEAR	Mainly SD 25, unpublished data (C1,C3)	24
B. HSI	1998-1999	STAGE	Surveys	M11-12/ M2-3/ M6	Relation between HSI and maturity stage for females, SD 25	13
	1995-2000	L	Surveys	6-8 X PER YEAR	Mainly SD 25, unpublished data (C1,C3)	24
C. Energy						
D. Other	1998-1999	Stage	Surveys	M11-12/ M2-3/ M6	Relation between GSI and maturity stage for females, SD 25	13
	1995-2000	L	Surveys	6-8 X PER YEAR	Mainly SD 25, unpublished data (C1,C3)	24
	1987-2001	L/A	CC/CL	Y/Q	Different time series of condition data derived from biological sampling of the fisheries	24
Egg viability:						
A. Egg quality	?	?	?	?	Effect of egg size on egg survival	25
	?	?	?	?	Changes in egg size over the spawning season	26
	1958-1978		Surveys	Sp. season	Relationship between egg diameter and density	87
	1990		Experiment (EW)	M5+M6	Egg bouyancy in relation to egg size for different females	27
	1990-1993		Experiments (EC)	M5+M6	Egg boyancy in relation to egg size and batch number	28
	1992-1994		Experiments (EW)	Caught during pre-spawning.	Fatty acid composition, cleavage pattern in and hatching success	91
	1994-1997		Experiment (EC)		Comparison of egg size viability and survival after hatch between Skagerak and Eastern Baltic cod	29
	1993-1997	A	Experiment (EW)	Caught during pre-sp.	SD 25-28, modelled age- and batch-specific egg production, buoyancy, size	20
	1999-2000	A,L,W	Experiments (EC)	Caught during pre-spawning	Relationship between egg size and maternal condition.	24

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. Fertilisation success	1989-1990		Experiments (EW)	M4-6	Effects of salinity on spermatazoa motility, fertilisation success and egg development	30
	1991-1995		Experiments (EW)	Caught during pre-spawning	SD25, 28. Sperm motility in relation to salinity and potential influence on the reproductive potential	31
	1999-2000	A,L,W	Experiments (EC)	Caught during pre-spawning	Effects of paternal characteristics on fertilisation success	24
C. Egg mortality	1986		Surveys	SP. SEASON	SD 25, egg mortality in relation to hydrography	36
	1958-1978		Surveys	SP. SEASON	Dependence of egg instantaneous mortality coefficient on oxygen concentrations (SD25, 28)	87
	1990		Experiments (EW)		Daily mortality of yolk-sac larvae reared at different salinities	32
	1992-1993		Experiments (EW)		Survival of eggs and yolk-sac larvae at low oxygen level at different salinities	33
	1994-1995		Experiments (EW)	M 4,5,7	Neutral bouyancy of cod eggs and survival potential	34
	1991	STAGE SPECIFIC	Surveys		Size and visibility of cod eggs	35
	1991-1992	STAGE SPECIFIC	Experiments (EW)	M4,7 (91) M5,7 (92)	SD25, egg mortality in relation to oxygen and temperature	40
	1994-1997		Experiments (EW)	ONCE		29
	1996	STAGE SPECIFIC	Surveys		Comparison of egg size viability and survival after hatch between SD21 and Sd 25	37
	1999-2000		Experiments (EW)		SD 25, mortality of different egg stages	38
					Effects of temperature on egg/larvae development	

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.
D. Other	1973		Surveys	M6	Vertical distribution in relation to egg size	39
	1991-1992	STAGE SPECIFIC	Experiments (EW)	M4,7 (91) M5,7(92)	SD25, Egg development time in relation to oxygen and temperature	40
	1986-1996		Surveys	M4-7	Model to predict vertical egg distribution and ambient temperature	41
	1996	STAGE SPECIFIC	Experiments (EC)	ONCE	Female and stage specific relation between mal-formation of early egg stages and viable hatch	42
	1996		Experiments (EW)	M6	SD 25, changings in stage-specific criteria	43
Larval viability:						
A. Hatching success	1994-1997		Experiments (EW)		Comparison of egg size viability and survival after hatch between Skagerak and Eastern Baltic cod	29
	1990		Experiments (EW)	Spawning season	Daily mortality of yolk-sac larvae reared at different salinities	32
	1992-1994		Experiments (EW)	Caught during pre-sp.	Fatty acid composition, cleavage pattern in and hatching success	91
	1996		Experiments (EC)		Female and stage specific relation between mal-formation of early egg stages and viable hatch	42
B. Larvae quality	1994-1997		Experiment (EW)		Comparison of egg size viability and survival after hatch between Skagerak and Eastern Baltic cod	29
C. Mortality	1994-1997		Experiments (EW)		Survival of eggs and yolk-sac larvae at low oxygen level at different salinities	33
	1999-2000		Experiments (EW)		Effects of temperature on egg and larval development	38
	1994-1995	A	Surveys	M5-7(94), M5(95)	Hatch checks in otoliths indicate size dependent larvae mortality	44
	1988,1991	STAGE SPECIFIC	Experiments (EW)	M5(88) M8(91)	Deep part of the Bornholm Basin, distribution and abundance of eggs and larvae	45

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.
D. Other	1994	L	Surveys	M5-7	Bornholm Basin (SD 25), vertical distribution	46
	1994-1995	A, L	Surveys	M5-7 (94), M5 (95)	Bornholm Basin (SD 25) larval condition and distribution	47
	1988, 1991	A,L	Surveys	M5 (88) M8 (91)	SD 25, partly SD 24, larval drift, 1 week intervals	48
	1988,1993	A,L	Survey data, hydrography +meterology databases	M9-10 (93-96)	Drift models investigating advective exchange of larvae between western and eastern Baltic	49
	1979-1994	A	hydrography +meterology databases		Larvae drift modelling to construct a transport index (simulation study)	50
	1986-1999	A	Zooplankton hydrography +meterology databases		Thropho-hydrodynamic model of larval drift, growth and survival	52
	1986-1999	A	juv. surveys, hydrography +meterology databases		Identification of nursery areas by larvae and juvenile drift modelling	53
Spawning time	1953-1955	A,L,W	Surveys	M1-12	Timing of ripening and spawning, sex ratios in relation to maturity stage	54
	1953-1955 1971-1978 1981-1984	L,W	??	M1-12	Changes in gonad weight during the year indicating the reproductive cycle	55
	1972-1995	A	Surveys	M3-6	Spawning stock age, maturity stage and sex composition and distribution	56
	1992-1996	L	Surveys	M2,3,4,5, 7,10,11	SD25. Sex-specific timing of ripening and spawning	58
	1995-1997	L	Surveys	5-8 X PER YEAR	SD 25 – sex and size specific ripening and spawning times	59
	1969-1996	STAGE	Surveys	SP.- SEASON	SD 25, based on peak egg abundance	60
Contamination	1995	L,W,A	Survey/ experiments	M5	SD 25, maternal burden of organochlorines and viable hatch, larvae survival and growth	51
	1996	L,W,A	Survey/ experiments	Sp. season	Maternal burden of organohlorines and viable hatch, larvae survival and growth	57
	1996	L,W	Surveys	M7	Xenobiotic compounds and related enzyme activity in adults and viable hatch	61
	2000-2001	L, W	Experiments (EW)	Sp. season	Contamination, mixed function oxidase activity and viable hatch	62

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.
Environmental key factors	1897-1976		hydrography databases	D/W/M/Y	Analysis of inflow events and their intensity	63
	1986,1988, 1993,1994		hydrography meteorology databases	D/W/M/Y	Analysis of circulation patterns and their variability	64
	1979-1998		hydrography meteorology databases	D/W/M/Y	Analyses of water storage and sea level inclination in relation to physical forcing	65
	1992-1997		hydrography measurements	14 cruises	Reproductive volume (salinity, oxygen and temperature limits) in SD26 and 28	75
	1958-1992		hydrography meteorology databases	D/W/M/Y	sensitivity analysis of driving forces causing long term changes in spawning habitat size	85
Other factors or parameters						

TABLE 3: STUDIES OF REPRODUCTIVE POTENTIAL

COMMON NAME:	COD
AREA:	BALTIC SEA
STOCK:	EASTERN BALTIC COD (ICES SD 25-32)

Estimation of reproductive potential			
Subject	Brief description	Year range	Ref. No.
Potential or realised egg production	Data sets of sex ratios and maturity from commercial catches are together with fecundity estimates used to estimate population egg production and show that sex ratio and maturity are variable - not constant as assumed in assessment	1965-90	7
	Sensitivity analysis of variability in potential egg production caused by different maturity, sex ratio and fecundity data sets. Estimation of hydrographic and spatial influences on the viable larvae production.	1966-96	9
	Female SSB and potential egg production were estimated for different spawning areas and compared with independent time series of realised egg production and recruitment considering environmental impact on early life stage survival.	1977-96	66
	Batch fecundity and total fecundity estimated for recruit and repeat spawners are used to estimate age specific potential egg production and viability in relation to age/size and batch specific egg buoyancy	1967-96	20
	Potential egg production were estimated using female SSB and compared with independent time series of realised egg production.	1976-95	67
	The potential egg production is established using different input data - constant, variable or female only maturity ogives, sex ratios and fecundity and compared to survey derived estimates of realised egg production / recruitment.	1976-99	10
	Validation of potential egg production estimates as a measure of reproductive potential in the stock-recruitment relationship and application in recruitment models.	1976-96	68
Viable egg and larvae production	Influences of hydrographical conditions, fishing mortality, species interaction, spawning time, egg quality and spawning stock age structure on the reproductive success	1966-96	70
Critical life stages	Using Pauliks approach, the effects of environmental factors on individual early history stages are examined and identified. Key factors are incorporated into environmentally sensitive and spatially explicit stock-recruitment models.	1976-96	68

Estimation of reproductive potential			
Subject	Brief description	Year range	Ref. No.
Environmental influences	Regression analysis of the egg survival and potential recruitment in relation to the volume, salinity, temperature and oxygen content of the spawning layer as well as the abundance of large females, SD 26,28.	1954-86	86
	The cod reproductive volume (RV) as the available water volume that sustain egg survival and development in relation to hydrography (SD 25, 26 and 28). A GLM model predicts recruitment as a function of SSB, egg abundance and RV.	1960-92	71
	Impact of environmental variability and spawner abundance and nutritional condition on reproductive success.	1960-86	72
	Recruitment success in dependence of adult stock size and hydrographic conditions.	1968-88	74
	Influence of hydrographic conditions and spawning stock biomass on stock recruitment.	1969-83	76
	A review of processes affecting survival and growth of eggs and larvae including interannual and temporal variability in SSB, egg abundances, hydrographic conditions, larval transport and zooplankton availability as food for larvae.	1966-96	73
	Distribution of cod in relation to salinity and oxygen during spawning in the Bornholm basin - sex and maturity specific.	1996	77
	Improvement of RV estimates using the Gotland Basin as test area.	1966-96	78
	A review of abiotic, biotic and human influences to explain the dramatic decline in recruitment and abundance of eastern Baltic cod in recent decades.	1966-96	70
	Analysis of the influence of stock structure and environmental conditions on the recruitment process estimated using a generalised additive model.	1968-96	79
Sensitivity analysis of variability in potential egg production caused by different maturity, sex ratio and fecundity data sets. Estimation of hydrographic and spatial influences on the viable larval production.	1966-96	9	
Explaining stock dynamics in relation to fisheries, species interactions (i.e. egg predation and cannibalism) and hydrographic conditions.	1976-2000	80	

Estimation of reproductive potential			
Subject	Brief description	Year range	Ref. No.
Stock recruitment relations	Stock-recruitment relationships accounting for hydrographic impact on egg survival and clupeid predation on cod eggs.	1966-92	88
	Non-linear stock-recruitment relationship based on the assumption of multiple steady-state characterised by variable carrying capacity for young cod and density dependent transition between steady-states.	1966-95	89
	Effects of species interactions on biological reference points derived from VPA, MSVPA and modified MSVPA (coupled consumption, growth and food availability).	1977-96	81
	Environmentally sensitive stock-recruitment relationships for two different hydrographic regimes using SSB and recruitment estimates from VPA and MSVPA	1965-94	82
	Changes in growth rate caused by prey variability and impact on biological reference points	1977-96	90
	Spatially dis-aggregated MSVPA developed, establishing separate SSB and recruitment time series for the three spawning areas (SD25, 26 and 28).	1977-96	83
	Area specific data series of potential egg production, RV and recruitment are used to establish environmentally sensitive stock-recruitment relationships and recruitment models.	1976-95	67
	Stock recruitment model based on potential egg production, a survival index based on the reproductive volume and recruitment at age 2.	1976-99	10
	Using Pauliks approach, the effects of environmental factors on individual early history stages are examined and identified. Key factors are incorporated into environmentally sensitive and spatially explicit stock-recruitment models.	1976-96	68
Potential for improving biological reference points using adequate measure for reproductive potential in stock recruitment relationships - case studies.	1976-96	69	
Other studies			

TABLE 4: DATA SOURCES

COMMON NAME:	COD
AREA:	BALTIC SEA
STOCK:	EASTERN BALTIC COD (ICES SD 25-32)

Data sources (literature reference or contact person)
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C2. KRAUS, G., Institute for Marine Sciences, Kiel, Germany (gkraus@ifm.uni-kiel.de).
C3. KÖSTER, F. W. Institute for Fisheries Research, Charlottenlund, 2920 Charlottenlund, Denmark, (fwk@dfu.min.dk).

TABLE 1: AVAILABLE DATA

COMMON NAME:	ATLANTIC COD	SPECIES:	<i>Gadus morhua</i>
AREA:	BARENTS SEA	STOCK:	NORTHEAST ARCTIC (ICES AREAS I AND II)
CREATED BY:	C.T. MARSHALL/N.A. YARAGINA 2001-08	UPDATED BY:	

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	√	√	√	(√)	√		√	√	
1946	√	√	√	(√)	√		√	√	

TABLE 2: DATA BASIS, FORMAT AND QUALITY

COMMON NAME:	ATLANTIC COD	
AREA:	BARENTS SEA	
STOCK:	NORTHEAST ARCTIC (ICES AREAS I AND II)	
REPRODUCTIVE STRATEGY:	DETERMINATE BATCH SPAWNER	REF. NO.: 1
TIMING OF SPAWNING:	FEB-MAY	REF. NO.: 2
OPTIMAL TIME FOR MATURITY SAMPLING:	JAN-MAR	REF. NO.: 3

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	1946-2001	A	CC, S	Q,A	VPA	6
Stock composition	1978-2001	L,A,W	CC, S	Q	Winter survey	6
	1985-2001	L,A,W			Lofoten survey	6
	1946-2000	L,A,W			Russian survey	6,7
	1932-1979	L,A			Norwegian sampling of commercial fishery	8
Age determination	1946-2001	A	CC, S	Q	Otoliths	33, 50
Sex ratio	1985-1996	L	S	A	Winter + Lofoten surveys combined	9
	1950's-1990's	A	CC,S	10 YEAR MEANS		10
Maturity:						
A. Ogives (E)	1946-2001	A	S	A		6, 10
B. Skip of spawning	1985-1996	L	S	A		9
	1991-1992	L,A	S	A		51
C. Spawning probability						
D. Other	1923-1976	A, L	CC	M	Spawning check in otolith	11
	1989-1997	A, L	S		sex differences in ogive	12
	1950's-1990's	A	CC,S		sex differences in ogive	10
	1940's-1950's				Sorokin maturity scale	56, 57
Fecundity:						

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.
A. Estimation	1986-1991	L, W	EW		Gravimetric	4
	1999	L, W	EW		auto-diametric	5
	1971-1972	L,W,A			gravimetric	42
	1990, 1991, 1993-1996, 1999	L,W,A			gravimetric	52
B. First time vs. repeat spawners	1989-1992	L,W	X		Spawners held in captivity over consecutive seasons	13,14
C. Atresia	lab expt	L,W	EC		Laboratory-reared cod	15
D. Other	lab expt		EC		Effects of starvation on relative fecundity	20
Weight:						
A. Commercial fisheries data	1946-2001	A	CC, S	A	Russian+Norwegian	6,8
	1949-1993	A	CC, S	A	Russian	53
B. Survey data	1984-2001	A	S	A	Russian+Norwegian	6
C. Other	1913-1953	L	CL	A	Historical data on size from Lofoten	47
Condition:						
A. Fulton						
B. HSI	1927-1996	L	CC	M	By 10-cm length class industrial index of liver	16
	1828-1842	-	CL	A		48
C. Energy	1946-1996	L	CC,S	A	Total lipid energy in livers of mature females	17
D. Other	1929-1982	W	CL	A	median spawning intensity based on roe samples	2
Egg viability:						
A. Egg quality	lab expt		EC		Cortical reaction following fertilization	18
	lab expt		EC		egg diameter and dry weight	19
	lab expt		EC		egg diameter in relation to maternal size	1
	lab expt		EC		egg diameter in relation to maternal condition	15
	lab expt		EC		egg dry weight in relation to spawning experience	13
	lab expt		EW		buoyancy studies	30
B. Fertilisation success	lab expt		EC		Incomplete hardening of chorion associated with poor fertilization	18
	lab expt		EC		links between broodstock, egg quality and fertilization	21
	lab expt		EW		links between length and condition of females and fertilization	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.
C. Egg mortality	lab expt		EC		Links between egg mortality and spawning experience	14
	1983-1984		S	A	field estimate of egg mortality	22
D. Other	review				Broodstock management and egg rearing	23
	review				egg quality	24
	review				maternal effects	25
	lab expt		EC		fatty acid composition	26
Larval viability:						
A. Hatching success						
B. Larvae quality	mesocosm		EC		Relationship between larval growth and survival and links to broodstock	28
	mesocosm		EC		relationship between larval growth and survival	29
C. Mortality	1983-1985		S		Mortality and first-feeding mortality estimates from ichthyoplankton surveys	31
	1983-1985		S			32
D. Other						
Spawning time	consult original reference				ref. 34 describes seasonal activity of thyroid gland	2,3,34
Contamination	1993		S	A	Concentration of heavy metals, PAH, and organochlorine discussed in relation to egg abnormalities	35
Environmental key factors	consult original reference				Temperature, wind stress	36, 37,54
Other factors or parameters	consult original reference				Cannibalism,	38
					overwintering of recently settled juveniles	39
					historical data on Barents Sea	55

TABLE 3: STUDIES OF REPRODUCTIVE POTENTIAL

COMMON NAME:	ATLANTIC COD
AREA:	BARENTS SEA
STOCK:	NORTHEAST ARCTIC (ICES AREAS I AND II)

Estimation of reproductive potential			
Subject	Brief description	Year range	Ref. No.
Potential or realised egg production	Estimates of total egg production (also referred to as population fecundity)	1985-1996	9, 40, 41, 42, 43, 44
Viable egg and larvae production	Estimates of relative abundance of eggs and larvae from Russian ichthyoplankton surveys conducted from April-July	1959-1993	45
Critical life stages	Early pelagic juveniles and 0-group surveys		32, 46
Environmental influences	Influence of wind and temperature on S/R relationship		37
Stock recruitment relations	Biomass-based S/R relationship bioenergetic index of reproductive potential	1946-1989	37
		1946-1996	17
Other studies	Reconstructing the S/R relationship using the total lipid energy contained in the livers of mature females	1946-1996	17, 49

TABLE 4: DATA SOURCES

COMMON NAME:	ATLANTIC COD
AREA:	BARENTS SEA
STOCK:	NORTHEAST ARCTIC (ICES AREAS I AND II)

Data sources (literature reference or contact person)
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11. JØRGENSEN, T. 1990. Long-term changes in age at sexual maturity of Northeast Arctic cod (<i>Gadus morhua</i> L.). <i>J. Cons. int. Explor. Mer</i> , 46 : 235-248.
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14. SOLEMDAL, P., O. S. KJESBU, and M. FONN. 1995. Egg mortality in recruit- and repeat-spawning cod - an experimental study. <i>ICES C. M. Doc.</i> , No. G:35.
15. KJESBU, O.S., J. KLUNGSØYR, H. KRYVI, P. R. WITTHAMES, and M. GREER WALKER. 1991. Fecundity, atresia, and egg size of captive Atlantic cod (<i>Gadus morhua</i>) in relation to proximate body composition. <i>Can. J. Fish. Aquat. Sci.</i> , 48 : 2333-2343.
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TABLE 1: AVAILABLE DATA

COMMON NAME:	ATLANTIC COD	SPECIES:	<i>GADUS MORHUA</i>
AREA:	ICELANDIC WATERS	STOCK:	ICELANDIC COD (ICES DIV. Va)
CREATED BY:	GUDRUN MARTEINSDOTTIR	UPDATED BY:	

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	√	√	√		√				√

TABLE 2: DATA BASIS, FORMAT AND QUALITY

COMMON NAME:	ATLANTIC COD		
AREA:	ICELANDIC WATERS		
STOCK:	ICELANDIC COD (ICES DIV. Va)		
REPRODUCTIVE STRATEGY:	DETERMINATE SPAWNER	REF. NO.:	
TIMING OF SPAWNING:	MARCH - JUNE	REF. NO.:	
OPTIMAL TIME FOR MATURITY SAMPLING:	JANUARY - FEBRUARY	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	1925-1991	A,L	S,CC,CL	M	VPA	1 2
	1955-1991	A,L	S,CC,CL	M	VPA	
	1980-2000	A,L	S,CC,CL	M	VPA	
Stock composition	1955-1991	A	S,CC,CL	M		1
	1955-1992	A	S,CC,CL	M		3
	1980-2000	A	S,CC,CL	M		2
Age determination	1955-1991		S,CC,CL	M	Monthly sampling used in annual VPA	1
Sex ratio	1990-1999		S			4
Maturity:						
A. Ogives (E)	1955-1991	A	S,CCCL	A	Survey data L50 from survey data	1
	1980-2000	A	S,CC,CL	A		2
	1985-1999	A,L	S	A		5, 6
B. Skip of spawning						
C. Spawning probability						
D. Other						
Fecundity:						
A. Estimation	1960	L	CL	A		8
	1967	L,A	CL	A		7
	1997	L	S,CL	A		9
	1995-2000	L,A	S,CL			6
B. First time vs. repeat spawners						
C. Atresia	1998-1999	L,A	S,CL	W	February-May	10

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.
D. Other	1999	L,A	S,Cl	W	Batch fecundity: March-May	6
Weight:						
A. Commercial fisheries data						
B. Survey data						
C. Other						
Condition:						
A. Fulton	1991-1999	L,A	S, CL	A		6
	1994-1999	L	S,CL	W	Spawning fish	11
	1994-1995		CL,EW		Spawning fish	15
B. HSI	1994-1999	L	S,CL	W		11
C. Energy						
D. Other						
Egg viability:						
A. Egg quality	1994	L	EW	MAR-MAY		12
	1994-1996	L	EW	MAR-MAY		6
B. Fertilisation success						
C. Egg mortality						
D. Other						
Larval viability:						
A. Hatching success	1994	L	EW	MAR-MAY		12
B. Larvae quality	1994	L	EW	MAR-MAY		12
	1994, 1996	L	EW			6
C. Mortality						
D. Other						
Spawning time	1953-1981	L	S	W-MAR-MAY		13
	1994-1999	L,A	EW	MAY		11
	1995-1997		S,EW	W-MAR-MAY		14
	1994-1995	L	S,EW			15
Contamination						
Environmental key factors						
Other factors or parameters						

TABLE 3: STUDIES OF REPRODUCTIVE POTENTIAL

COMMON NAME:	ATLANTIC COD
AREA:	ICELANDIC WATERS
STOCK:	ICELANDIC COD (ICES DIV. Va)

Estimation of reproductive potential			
Subject	Brief description	Year range	Ref. No.
Potential or realised egg production	Spatial variation in length based egg production	1997	9
	Egg production model for different population scenarios		17
Viable egg and larvae production	Spatial variation in length based egg production		9
	Egg production model for different population scenarios		17
Critical life stages			
Environmental influences	Environmental effects on mature cod distribution	1985-1991	5
Stock recruitment relations	Importance of stock composition with respect to recruitment	1955-1993	3
	Simulations to investigate probability of stock recovery		18
	Influence of environmental factors on recruitment	1972-1999	4, 16, 19
Other studies			

TABLE 4: DATA SOURCES

COMMON NAME:	ATLANTIC COD
AREA:	ICELANDIC WATERS
STOCK:	ICELANDIC COD (ICES DIV. Va)

Data sources (literature reference or contact person)	
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2.	ANON. 2000. State of the marine stocks in Icelandic waters 1999/2000. <i>Hafrannsóknastofnunin Fjöldrit</i> , 75: 1-76.
3.	MARTEINSDOTTIR, G., and K. THORARINSSON. 1998. Improving the stock-recruitment relationship in Icelandic cod (<i>Gadus morhua</i> L.) by including age diversity of spawners. <i>Can. J. Fish. Aquat. Sci.</i> , 55: 1372-1377.
4.	BEGG, G., and G. MARTEINSDOTTIR. Spatial and temporal partitioning of spawning stock biomass: effects of fishing on the composition of spawners. <i>Fish. Res.</i> (submitted).
5.	BEGG, G., and G. MARTEINSDOTTIR. Environmental and stock effects on spatial distribution of mature cod <i>Gadus morhua</i> . <i>Mar. Ecol. Prog. Ser.</i> (submitted).
6.	MARTEINSDOTTIR, G., and G. A. BEGG. 2002. Essential relationships incorporating the influence of age, size, and condition on variables required for re-estimation of reproductive potential in Atlantic cod <i>Gadus morhua</i> stocks. <i>Mar. Ecol. Prog. Ser.</i> , 235: 235-256.
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10.	HARDARDOTTIR, K., O. KJESBU, and G. MARTEINSDOTTIR. MS 2001. Relationship between atresia, fish size, and condition in Icelandic cod (<i>Gadus morhua</i> L.). <i>ICES C.M.</i> , 2001.
11.	MARTEINSDOTTIR, G., and H. BJORNSSON. 1999. Time and duration of spawning of cod in Icelandic waters. <i>ICES C.M. Doc.</i> , No. 1999/Y: 34.
12.	MARTEINSDOTTIR, G., and A. STEINARSSON. 1998. Maternal influence on the size and viability of Iceland cod (<i>Gadus morhua</i> L.) eggs and larvae. <i>J. Fish. Biol.</i> , 52(6): 1241-1258.
13.	JONSSON, E. 1982. A survey of spawning and reproduction of Icelandic cod. <i>Rit. Fiskideilar</i> , 6: 45.
14.	MARTEINSDOTTIR, G. B. GUNNARSSON, and I. M. SUTHERS. 2000. Spatial variation in hatch date distributions and origin of pelagic juvenile cod in Icelandic waters. <i>ICES J. Mar. Sci.</i> , 57: 1184-1197.
15.	MARTEINSDOTTIR, G., and G. PETURSDOTTIR. 1995. Spatial and temporal variation in reproduction of Icelandic cod at Selvogsbanki and nearby coastal areas. <i>ICES C.M. Doc.</i> , No. 1995/G: 15.

Data sources (literature reference or contact person)
16. OLAFSSON, J. 1985. Recruitment of Icelandic haddock and cod in relation to variability in the physical environment. <i>ICES C.M. Doc.</i> , No. 1985/Q: 59.
17. SCOTT, B., G. MARTEINSDOTTIR, and P. WRIGHT. 1999. Potential effects of maternal factors on spawning stock-recruitment relationships under varying fishing pressure. <i>Can. J. Fish. Aquat. Sci.</i> , 56 : 1882-1890.
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19. OLAFSSON, J., G. JOHANSSON, and G. STEFANSSON. 1993. Recruitment of Icelandic cod in relation to spawning stock biomass and environmental factors. <i>ICES 1993/CCC Symposium</i> , No. 37.

TABLE 1: AVAILABLE DATA

COMMON NAME:	HADDOCK	SPECIES:	<i>Melanogrammus aeglefinus</i>
AREA:	NORTHWEST ATLANTIC	STOCK:	EASTERN SCOTIAN SHELF (NAFO DIV. 4TVW)
CREATED BY:	ED TRIPPEL 2001-07-17	UPDATED BY:	ED TRIPPEL 2003-02-03

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	√	√	√	(√)	√		√	√	(√)

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

TABLE 2: DATA BASIS, FORMAT AND QUALITY

COMMON NAME:	HADDOCK	
AREA:	NORTHWEST ATLANTIC	
STOCK:	EASTERN SCOTIAN SHELF (NAFO DIV. 4TVW)	
REPRODUCTIVE STRATEGY:	DETERMINATE SPAWNER	REF. NO.: 5
TIMING OF SPAWNING:	FEBRUARY-JUNE	REF. NO.: 4,8,9
OPTIMAL TIME FOR MATURITY SAMPLING:	FEBRUARY-MARCH	REF. NO.: 4

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	1948-1984	A	C,L,S	Q	SPA Estimates	1
	1970-2000	A	C,L,S	Q	SPA Estimates	2
Stock composition	1948-1984	A,L,W	S,CL	Y,Q	(Excludes 1985) Fixed gear survey (hook)	1
	1970-2000	A,L,W	S,CL	JULY		2
	1979-2000	A,L,W	S,CL	MARCH		2
	1995-1996	A,L,W	S	FALL		2
Age determination	1948-1984	A	S,CL	Y,Q		1
	1970-2000	A	S,CL	Y,Q		2
Sex ratio	1948-2000	A,L,W	S		Could be extracted from survey data bases	3
Maturity:						
A. Ogives (E)	1958-1979	A,L	S	JAN-SEP	Maturity ogives in 5 - year periods and percent mature by age (4Vn, 4Vs, 4W)	6
	1958-1993 1979-1995	A	S	JAN-SEP	Percent females at age	1
		L	S	MARCH		Proportion mature at length (both sexes)
	1979-2000 1979-2000	L	S	MARCH	Females -length at 50% maturity	2
		L	S	MARCH	Proportion mature at length	2,5
B. Skip of spawning						
C. Spawning probability						
D. Other						

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.
Fecundity:						
A. Estimation	1997-1999	A,L,W	S	MARCH	1997 (Waiwood and Buzeta 1989 technique- 250 um mesh); 1998- Gilson's fluid, 1999 - 95% ethanol, 235 um mesh)- primarily Western Bank; with multiple regressions on L, W, CF and HSI	5,10
B. First time vs. repeat spawners	1979-1999	L	S		Females > 40.5 cm considered repeat spawners (egg production evaluated separately)	5
C. Atresia						
D. Other	1997-1999	L,W	S	MARCH	Gonadosomatic indices and gonad wt/whole body wt equations	5
Weight:						
A. Commercial fisheries data	1948-1984 1954-2000 1989-2000	A,L,W A,L,W A,L,W	CL CL CL	M,Q,B,Y M,Q,B,Y Q	By NAFO area/country	1 2 2
B. Survey data	1970-2000	A,L,W			Estimated means	2
C. Other						
Condition:						
A. Fulton	1997-1999	L,W	S	MARCH	Fultons vs length and wt.	5
B. HSI	1997-1999	L,W	S	MARCH	HSI vs. length and wt	5
C. Energy						
D. Other	1970-1984 1970-2000	L,W L,W	S S		L/W equations (spring/summer/fall) Annual L/W equations Predicted weights at 30 cm and 45 cm (summer)	1 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						

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.
Spawning time	1920-1997	L,W	X	Sesaonal	Fishermen's knowledge through interviews, includes spawning areas (present and lost) Stage 1-3 haddock eggs (SSIP)- Spawning from February-June	7
	1979-1981		S			8,9
Contamination						
Environmental key factors						
Other factors or parameters						

TABLE 3: STUDIES OF REPRODUCTIVE POTENTIAL

COMMON NAME:

HADDOCK

AREA:

NORTHWEST ATLANTIC

STOCK:

EASTERN SCOTIAN SHELF (NAFO DIV. 4TVW)

Estimation of reproductive potential			
Subject	Brief description	Year range	Ref. No.
Potential or realised egg production	Fecundity estimates of wild fish	1997-1999	5
	Fecundity projections for time series	1970-1999	5
Viable egg and larvae production			
Critical life stages			
Environmental influences			
Stock recruitment relations	Mature female spawning stock vs recruitment (SPA age 1)	1948-1983	1
	Age#+ biomass vs recruitment (SPA age 1)	1970-1996	2
	Total egg production vs recruitment (SPA age 1)	1970-1999	5
	Egg production of repeat spawners vs recruitment	1970-1999	5
	Mean weight (46.5 cm) vs recruitment	1970-1999	5
	Fultons condition factor vs recruitment	1970-1999	5
Other studies			

TABLE 4: DATA SOURCES

COMMON NAME:	HADDOCK
AREA:	NORTHWEST ATLANTIC
STOCK:	EASTERN SCOTIAN SHELF (NAFO DIV. 4TVW)

Data sources (literature reference or contact person)
1. MAHON, R., P. SIMPSON, and D. E. WALDRON. 1985. The eastern Scotian Shelf (4VW) haddock stock and fishery in 1984, with an historical perspective on stock and recruitment back to 1948. <i>DFO CAFSAC Res. Doc.</i> , No. 47.
2. FRANK, K.T., R.K. MOHN, and J.E. SIMON. 1996. Assessment of 4TVW haddock in 1996. <i>DFO CSAS Res. Doc.</i> , No. 107.
3. K. FRANK, Marine Fish Division, Bedford Institute of Oceanography, P.O. Box 1006, Dartmouth, Nova Scotia, B2Y 4A2 (frankk@mar.dfo-mpo.gc.ca).
4. TRIPPEL, E. A., M. J. MORGAN, A. FRECHET, C. ROLLET, A. SINCLAIR, C. ANNAND, D. BEANLANDS, and L. BROWN. 1997. Changes in age and length at sexual maturity of northwest Atlantic cod, haddock and pollock stocks, 1972-1995. <i>Can. Tech. Rep. Fish. Aquat. Sci.</i> , No. 2157.
5. BLANCHARD, J. L. 2000. Maternal contribution to the reproductive potential of a recovering fish stock: Variability in the fecundity and condition of haddock (<i>Melanogrammus aeglefinus</i>) on the Scotian Shelf. M.Sc. Thesis, Dalhousie University, Halifax, N. S.
6. BEACHAM, T.D. 1983. Variability in size and age at sexual maturity of haddock (<i>Melanogrammus aeglefinus</i>) on the Scotian Shelf in the Northwest Atlantic. <i>Can. Tech. Rep. Fish. Aquat. Sci.</i> , No. 1168.
7. BENHAM, A.A., and E.A. TRIPPEL. Mapping fishermen's knowledge of groundfish and herring spawning and nursery areas in the Bay of Fundy, Gulf of Maine and Eastern Nova Scotian Shelf. <i>Can. Tech. Rep. Fish. Aquat. Sci.</i> (submitted).
8. BRANDER, K., and P.C.F. HURLEY. 1992. Distribution of early-stage Atlantic cod (<i>Gadus morhua</i>), haddock (<i>Melanogrammus aeglefinus</i>), and witch flounder (<i>Glyptocephalus cynoglossus</i>) eggs on the Scotian Shelf: a reappraisal of evidence on the coupling of cod spawning and plankton production. <i>Can. J. Fish. Aquat. Sci.</i> , 49 : 238-251.
9. HANKE, A.R., F.H. PAGE, and J. NEILSON. 2001. Distribution of haddock (<i>Melanogrammus aeglefinus</i>) eggs and larvae on the Scotian Shelf, Eastern Gulf of Maine, Bay of Fundy and Eastern Georges Bank. <i>Can. Tech. Rep. Fish. Aquat. Sci.</i> , No. 2329.
10. WAIWOOD, K. G., and M. I. BUZETA. 1989. Reproductive biology of the southwestern Scotian shelf haddock (<i>Melanogrammus aeglefinus</i>). <i>Can. J. Fish. Aquat. Sci.</i> , 46 (Suppl. 1): 153-170.

TABLE 1: AVAILABLE DATA

COMMON NAME:	HADDOCK	SPECIES:	<i>Melanogrammus aeglefinus</i>
AREA:	NORTHWEST ATLANTIC	STOCK:	BAY OF FUNDY/WESTERN SCOTIAN SHELF (NAFO DIV. 4X)
CREATED BY:	ED TRIPPEL 2001-07-18	UPDATED BY:	ED TRIPPEL 2003-02-03

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	√	√	√	(√)	√		√	√	(√)
1975	√	√	√	(√)	√		√	√	(√)

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

TABLE 2: DATA BASIS, FORMAT AND QUALITY

COMMON NAME:	HADDOCK	
AREA:	NORTHWEST ATLANTIC	
STOCK:	BAY OF FUNDY/WESTERN SCOTIAN SHELF (NAFO DIV. 4X)	
REPRODUCTIVE STRATEGY:	DETERMINATE SPAWNER	REF. NO.: 10
TIMING OF SPAWNING:	FEBRUARY-APRIL	REF. NO.: 6,12,13
OPTIMAL TIME FOR MATURITY SAMPLING:	JANUARY-FEBRUARY	REF. NO.: 6,10

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	1962-1987	A	C,L,S	Q	VPA estimates	1
	1970-1999	A	C,L,S	Q	VPA (number and biomass at age)	2,3
	1995-1999	L	S	JULY	Industry survey (includes untrawable area)	2,3
Stock composition	1962-1987	L,W	S	JULY	Bay of Fundy and W. Scotian Shelf separate Industry survey	1
	1970-2000	L,W	S	JULY		2,3
	1995-2000	L,A	S	JULY		2,3
Age determination	1948-1985	A	S,CL	Y,Q		1
	1970-2000	A	S,CL	Y,Q		2,3
Sex ratio	1948-2000	A,L,W	S		Could be extracted from survey data bases	3
Maturity:						
A. Ogives (E)	1959-1979	A,L	S	SPRING	Age and length by sex	4,5
	1970-1985	L	S	SPRING	Length by sex	6
	1979-1985	A,L	S	SPRING	Spring survey terminated in 1985, remaining summer survey not appropriate time to conduct maturity determination.	7
B. Skip of spawning						
C. Spawning probability						

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.
D. Other	1978-1980	W	S	M	Gonadosomatic index (pooled fish from 4X and 4VW)	8
	1983-1985	W	S	Q	Gonad wt-body wt relationships by maturity stage and sex	6
	1998-1999	W	S		Gonad wt-body wt relationships for females	9
			S	Q	Maturity stage description (macroscopic)	6
Fecundity:						
A. Estimation	1978-1980	L	S		Fecundity equations (problem in that fish from 4X and 4VW combined) (n=88)	8
	1983-1985	A,L,W	S	Q,Y	Fecundity equations include changes with season. Browns Bank and Bay of Fundy approaches (n=405)	6
	1997	L,W	EC	6 PAIRS	Seasonal egg production (Bay of Fundy fish)	10
	1998-1999	A,L,W	S		W. Scotian Shelf (1998, n=77; 1999, n=159);	9
B. First time vs. repeat spawners						
C. Atresia						
D. Other						
Weight:						
A. Commercial fisheries data	1962-1987	A,L,W	S,CL	M,Q,B,Y		1
	1970-2000	A,L,W	S,CL	M,Q,B,Y		2,3
B. Survey data	1962-1987	A,L,W	S	JULY	Estimated means	1
	1970-2000	A,L,W	S	JULY	Estimated means	2,3
	1995-2000	A,L,W	S	JULY	Industry survey	2,3
C. Other						
Condition:						
A. Fulton	1998-1999	L,W	S		females	9
B. HSI						
C. Energy						
D. Other	1970-1995	L,W	S	JULY	Weight at 50 cm (Bay of Fundy and W.Scotian Shelf separate)	11
	1970-2000	L,W	S	JULY	Annual L/W equations, estimated weight of 35, 50 cm haddock (Bay of Fundy and W. Scotian Shelf separate)	2,3
Egg viability:						

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.
A. Egg quality	1978-1980		S	Q	Seasonal oocyte diameter changes in relation to maturity stage	8
	1997	L,W	EC	6 PAIRS	Seasonal changes in egg diameter/batch	10
B. Fertilisation success	1997	L,W	EC	6 PAIRS	Seasonal changes in fertilization rate/batch	10
C. Egg mortality						
D. Other	1997	L,W	EC	6 MALES	Seasonal changes in milt volume and spermatocrit	10
Larval viability:						
A. Hatching success						
B. Larvae quality						
C. Mortality						
D. Other						
Spawning time	1920-1997	L,W	X		Fishermen's knowledge through interviews, includes spawning areas (present and lost)	12
	1970-1975	L	S	M	Frequency of different maturity stages (Jan-Nov) Browns Bank females peak Mar-Apr.	6
	1975-1997	S	S	SPRING	Egg and larval surveys (LHP, FEP, SSIP)	13
	1979-1981		S		Egg surveys (SSIP)	14
	1997	L,W	EC	6 PAIRS	Spawning duration/pair	10
Contamination						
Environmental key factors	1948-1980		S	M,Y	Time to hatch in days on Browns Bank in relation to temperature model	15
Other factors or parameters	1964-1995	A,L,W			Body metrics in relation to recruitment	11

TABLE 3: STUDIES OF REPRODUCTIVE POTENTIAL

COMMON NAME:	HADDOCK
AREA:	NORTHWEST ATLANTIC
STOCK:	BAY OF FUNDY/WESTERN SCOTIAN SHELF (NAFO DIV. 4X)

Estimation of reproductive potential			
Subject	Brief description	Year range	Ref. No.
Potential or realised egg production	Fecundity estimates	1978-1980	8
		1983-1985	6
		1997	10
		1998-1999	9
Viable egg and larvae production	Fertilization rates of captive haddock and milt characteristics, spawning duration	1997	10
Critical life stages			
Environmental influences	Temperature model in relation to time to hatch	1948-1980	15
Stock recruitment relations	Spawning stock biomass (constant maturity ogive) and recruitment to age 1	1964-1995	11
	Spawning stock vs recruitment	1970-1979	16
	Compensatory responses in recruitment	1970-1995	17
	Spawning stock biomass (age 4+) vs recruits	1970-1997	2
Other studies	Body metrics vs recruitment (e.g., length at age 4, predicted weight at 50 cm); year range varies with data availability (10 regressions)	1964-1995	11

TABLE 4: DATA SOURCES

COMMON NAME:	HADDOCK
AREA:	NORTHWEST ATLANTIC
STOCK:	BAY OF FUNDY/WESTERN SCOTIAN SHELF (NAFO DIV. 4X)

Data sources (literature reference or contact person)
1. O'BOYLE, R. N., and D. WALLACE. 1988. An evaluation of the population dynamics of 4X haddock during 1962-87 with yield projected to 1988. <i>DFO CAFSAC Res. Doc.</i> , No. 97, 57 p.
2. HURLEY, P. C. F., G. A. P. BLACK, P. A. COMEAU, and R. K. MOHN. 1999. Assessment of 4X haddock in 1998 and the first half of 1999. <i>DFO Can. Stock Ass. Sec. Res. Doc.</i> , No. 147.
3. HURLEY, P. C. F. Fisheries and Oceans Canada, Bedford Institute of Oceanography, P. O. Box 1006, Dartmouth, N. S., B2Y 4A2 (hurleyp@mar.dfo-mpo.gc.ca).
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5. HALLIDAY, R. G. 1987. Size and age of sexual maturity of Atlantic argentine, <i>Argentina silus</i> : a critique. <i>Environ. Biol. Fishes</i> , 19 : 137-147.
6. WAIWOOD, K. G., and M. I. BUZETA. 1989. Reproductive biology of Southwest Scotian Shelf haddock (<i>Melanogrammus aeglefinus</i>). <i>Can. J. Fish. Aquat. Sci.</i> , 46 (Suppl. 1): 153-170.
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8. CLAY, D. 1989. Oogenesis and fecundity of haddock (<i>Melanogrammus aeglefinus</i> L.) from the Nova Scotia shelf. <i>ICES J. Cons.</i> , 46 : 24-34.
9. BLANCHARD, J. L. 2000. Maternal contribution to the reproductive potential of a recovering fish stock: Variability in the fecundity and condition of haddock (<i>Melanogrammus aeglefinus</i>) on the Scotian Shelf. M.Sc. Thesis, Dalhousie University, Halifax, NS
10. TRIPPEL, E. A., C. M. DOHERTY, J. WADE, and P. R. HARMON. 1998. Controlled breeding technology for haddock (<i>Melanogrammus aeglefinus</i>) in mated pairs. <i>Bull. Aquacult. Assoc. Can.</i> , 98-3 : 30-35.
11. MARSHALL, C. T., and K. T. FRANK. 1999. The effect of interannual variation in growth and condition on haddock recruitment. <i>Can. J. Fish. Aquat. Sci.</i> , 56 : 347-355.
12. BENHAM, A.A., and E.A. TRIPPEL. Mapping fishermen's knowledge of groundfish and herring spawning and nursery areas in the Bay of Fundy, Gulf of Maine and Eastern Scotian Shelf. <i>Can. Tech. Rept. Fish. Aquat. Sci.</i> (submitted).
13. HANKE, A. R., F. H. PAGE, and J. NEILSON. 2001. Distribution of haddock (<i>Melanogrammus aeglefinus</i>) eggs and larvae on the Scotian Shelf, Eastern Gulf of Maine, Bay of Fundy and Eastern Georges Bank. <i>Can. Tech. Rep. Fish. Aquat. Sci.</i> , No. 2329.
14. BRANDER, K., and P. C. F. HURLEY. 1992. Distribution of early-stage Atlantic cod (<i>Gadus morhua</i>), haddock (<i>Melanogrammus aeglefinus</i>), and witch flounder (<i>Glyptocephalus cynoglossus</i>) eggs on the Scotian Shelf: a reappraisal of evidence on the coupling of cod spawning and plankton production. <i>Can. J. Fish. Aquat. Sci.</i> , 49 : 238-251.

Data sources (literature reference or contact person)
15. PAGE, F. H., and K. T. FRANK. 1989. Spawning time and egg stage duration in northwest Atlantic haddock (<i>Melanogrammus aeglefinus</i>) stocks with emphasis on Georges and Browns Bank. <i>Can. J. Fish. Aquat. Sci.</i> , 46 (Suppl. 1): 68-81.
16. BEACHAM, T. D. 1982. Some aspects of growth and Canadian exploitation of haddock (<i>Melanogrammus aeglefinus</i>) on Browns Bank and Georges Bank in the Northwest Atlantic Ocean. <i>Can. Tech. Rep. Fish. Aquat. Sci.</i> , No. 1066.
17. MARSHALL, C. T., and K. T. FRANK. 1999. Implications of density-dependent juvenile growth for compensatory recruitment regulation of haddock. <i>Can. J. Fish. Aquat. Sci.</i> , 56 : 356-363.

TABLE 1: AVAILABLE DATA

COMMON NAME:	HADDOCK	SPECIES:	<i>Melanogrammus aeglefinus</i>
AREA:	NORTHWEST ATLANTIC	STOCK:	GEORGES BANK (NAFO DIV. 5Z+SUBAREA 6)
CREATED BY:	LORETTA O'BRIEN 2000-7-13	UPDATED BY:	

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	√	√	√	(√)	√		√		(√)
1975	√	√	√	(√)	√		√		(√)

Data status									
Year	Stock size	Stock composition	Age	Sex ratio	Maturity	Fecundity	Weight	Condition	Additional data
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	√	√	√				√		(√)
1946	√	√	√				√		(√)
1945	√	√	√				√		(√)
1944	√	√	√				√		(√)
1943	√	√	√				√		(√)
1942	√	√	√				√		(√)
1941	√	√	√				√		(√)
1931	√	√	√				√		(√)

TABLE 2: DATA BASIS, FORMAT AND QUALITY

COMMON NAME:	HADDOCK	
AREA:	NORTHWEST ATLANTIC	
STOCK:	GEORGES BANK (NAFO DIV. 5Z+SUBAREA 6)	
REPRODUCTIVE STRATEGY:	DETERMINATE BATCH SPAWNER	REF. NO.: <input type="text"/>
TIMING OF SPAWNING:	JANUARY-MAY	REF. NO.: <input type="text" value="1"/>
OPTIMAL TIME FOR MATURITY SAMPLING:	FEBRUARY-MARCH	REF. NO.: <input type="text" value="1"/>

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	1931-1962	A,L	CL	Q	VPA	2
	1963-2001	A,L	CL,S	Q,B	VPA, relative abundance	2
Stock composition	1931-1962	A,L	CL	B	Low sampling of market categories in mid-1990s	2
	1963-1991	A,L	S,CL,CC	B,Q,Q		2
	1992-2001	A,L,W	S,CL,CC	B,Q,Q		2
Age determination	1931-1962		CL	Q		3
	1963-2001		S,CC	B,Q		3
Sex ratio	1963-2001	L,A	S	B		4
Maturity:						
A. Ogives (E)	1949-1950		CL,S	MARCH	Macroscopic observations from spring	2, 5, 6,7,8,9, 10
	1963-1969	A,L	S	B		
	1970-2001	A,L	S	B		
B. Skip of spawning						
C. Spawning probability						
D. Other						
Fecundity:						
A. Estimation	1879	L,W		CL	7 fish sampled	11
B. First time vs repeat spawners	1963-1996	A	S	A	Derived from maturity ogives	12
C. Atresia						
D. Other						
Weight:						
A. Commercial fisheries data	1931-1962	L,A	CC,CL	Q		2
	1963-2001					
B. Survey data	1992-2001	L,A	S	B		4
C. Other						

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.
Condition:						
A. Fulton	1992-2001	L,A	S	B		4
B. HSI						
C. Energy						
D. Other						
Egg viability:						
A. Egg quality						
B. Fertilisation success						
C. Egg mortality	1978-1999		S	B	Egg and larval surveys	13
D. Other						
Larval viability:						
A. Hatching success						
B. Larvae quality						
C. Mortality						
D. Other						
Spawning time	1963-2001		S	M,Q	Egg and larval survey	1,14,15,16,17,18
Contamination	1980		S		7 fish - muscle sampled	19
Environmental key factors	1963-2001		S	B	Temperature data	4
Other factors or parameters	1973-1984 1999	A,L A,L	S S	B B	Food habits	20

TABLE 3: STUDIES OF REPRODUCTIVE POTENTIAL

COMMON NAME:	HADDOCK
AREA:	NORTHWEST ATLANTIC
STOCK:	GEORGES BANK (NAFO DIV. 5Z+SUBAREA 6)

Estimation of reproductive potential			
Subject	Brief description	Year range	Ref. No.
Potential or realised egg production	Estimates of egg production	1978-1999	13,14
Viable egg and larvae production			
Critical life stages			
Environmental influences	Temperature	1963-2001	4
Stock recruitment relations	Spawning stock biomass vs age 1 recruitment	1931-2000	2
	Adjusted for first-time vs repeat spawners	1963-1996	12
Other studies			

TABLE 4: DATA SOURCES

COMMON NAME:	HADDOCK
AREA:	NORTHWEST ATLANTIC
STOCK:	GEORGES BANK (NAFO DIV. 5Z+SUBAREA 6)

Data sources (literature reference or contact person)
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. Rep.</i> , No. SHL 85-04, 35 p.
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12. WIGLEY, S. E. 1999. Effects of first-time spawners on stock-recruitment relationships for two groundfish species. In: Variations in maturation, growth, condition and spawning stock biomass production in groundfish. J. Morgan, J. Burnett, and E. Aro (eds.). <i>J. Northw. Atl. Fish. Sci.</i> , 25: 215-218.
13. BERRIEN, P. Northeast Fisheries Science Center, J. J. Howard Marine Laboratory, 74 Magruder Road, Sandy Hook, Highlands, NJ 07732.
14. 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.
15. 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.

Data sources (literature reference or contact person)
16. 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> 76, 4: 911-915.
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TABLE 1: AVAILABLE DATA

COMMON NAME: **SPECIES:**

AREA: **STOCK:**

CREATED BY: **UPDATED BY:**

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	√	√	√		√				

Data status									
Year	Stock size	Stock composition	Age	Sex ratio	Maturity	Fecundity	Weight	Condition	Additional data
1978	√	√	√		√				
1977	√	√	√		√				
1976	√	√	√		√	√			
1975	√	√	√		√	√			
1974	√	√	√		√				
1973	√	√	√		√				
1972	√	√	√		√				
1971	√	√	√		√				
1970	√	√	√		√				
1969	√	√	√		√				
1968	√	√	√		√				
1967	√	√	√		√				
1966	√	√	√		√				
1965	√	√	√						
1964	√	√	√						
1963	√	√	√						
1962									
1961									
1960									
1932						√			
1920-63	√	√							

TABLE 2: DATA BASIS, FORMAT AND QUALITY

COMMON NAME:	HADDOCK	
AREA:	NORTH SEA	
STOCK:	ICES AREA IV	
REPRODUCTIVE STRATEGY:	DETERMINATE BATCH SPAWNER	REF. NO.: 15, 18
TIMING OF SPAWNING:	FEBRUARY -MAY	REF. NO.: 14-19
OPTIMAL TIME FOR MATURITY SAMPLING:	DECEMBER-FEBRUARY	REF. NO.: 6

Data basis, format and quality						
Parameters	Year range	Data basis (A/L/W)	Data origin	Sampling frequency	Notes on data, methods and contents	Ref. No.
Stock size	1920-63	A	CL	M	VPA but high uncertainty in estimates Catch at age analysis (VPA)	2
	1963-2000	A	CL, CC in some areas after 1990	M		1
Stock composition	1963-2000	L, A	CL	M	Catch at age analysis (VPA)	1
	1970s, 1988-90	L,A, W	CL,CC		No routine weight measurements	8
Age determination	1963-2000	otoliths	C,L	M	age based assessments	1
Sex ratio	1963-2000	L, A	S	A	Surveys	10
Maturity:						
A. Ogives	1966-1976	A,L,	S		dedicated study	3
		A,L,				4
	1977-80	A,L, W				5
	1980-1997	A,L				23
B. Skip of spawning						
C. Spawning probability						
D. Other						
Fecundity:						
A. Estimation	1920s	A,L	S	A		7
	1969-7	A,L				3
	1977-80	A,L,W				5

Data basis, format and quality						
Parameters	Year range	Data basis (A/L/W)	Data origin	Sampling frequency	Notes on data, methods and contents	Ref. No.
B. First time vs. repeat spawners						
C. Atresia						
D. Other						
Weight:						
A. Commercial fisheries data	1970s 1988-90		CC		no regular sampling	8
B. Survey data			S			
C. Other						
Condition:						
A. Fulton						
B. HSI	1969-70		CC, S	M		8
C. Energy						
D. Other						
Egg viability:						
A. Egg quality	1978-1986 1978-1986	A,L,W	S	A		11 12
B. Fertilisation success						
C. Egg mortality						
D. Other	1992		S		egg distribution survey	13
Larval viability:						
A. Hatching success						
B. Larvae quality						
C. Mortality						
D. Other						
Spawning time	1950s 1971-73		S	A	plankton surveys experiments review review review experiments	14 15 16 17 18 19
Contamination						
Environmental key factors	1970s		S	dedicated	regional trophic studies	20
Other factors or parameters						

TABLE 3: STUDIES OF REPRODUCTIVE POTENTIAL

COMMON NAME:	HADDOCK
AREA:	NORTH SEA
STOCK:	ICES AREA IV

Estimation of reproductive potential			
Subject	Short description	Year range	Ref. No.
Potential or realised egg production			
Viable egg and larvae production			
Critical life stages	REVIEW OF GADOID STOCK CHANGES	1962-1993	21
Environmental influences			
Stock recruitment relations	REVIEW OF GADOID STOCK CHANGES	1922-1993	21, 22
Other studies			

TABLE 4: DATA SOURCES

COMMON NAME:	HADDOCK
AREA:	NORTH SEA
STOCK:	ICES IV

Data sources (literature reference or contact person)
1. ICES. MS 2001. Report of the ICES Advisory Committee on Fishery Management, 2000. <i>ICES Co-op. Res. Report</i> , No. 242, 361-366.
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3. ALEKSEYEVA, Y. I. AND I. D. TORMOSOVA. 1979. Maturation, Spawning and Fecundity of the North Sea Haddock, <i>Melanogrammus aeglefinus</i> . <i>J. Ichthyol.</i> , 19 : 56-64.
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5. HISLOP, J. R. G. and A. M. SHANKS. 1981. Recent Investigations on the Reproductive Biology of the Haddock, <i>Melanogrammus aeglefinus</i> , of the Northern North Sea and the Effects on Fecundity of Infection With the Copepod Parasite <i>Lernaecocera branchialis</i> . <i>J. Cons. Int. Explor. Mer.</i> , 39 : 244-251.
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8. UNPUBL. DATA. FRS Marine Laboratory, Aberdeen, Scotland.
9. UNPUBL. DATA. CEFAS Fishery laboratory, Lowestoft, England and other institutes.
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12. HISLOP, J. R. G. and M. A. BELL. 1987. Observations on the size, dry weight and energy content of the eggs of some demersal fish species from British marine waters. <i>J. Fish Biol.</i> , 31 : 1-20.
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14. SAVILLE, A. 1959. The planktonic stages of the haddock in Scottish waters. <i>Marine Research</i> , 3 : 3-23.
15. HISLOP, J. R. G., A. P. ROBB, and J. A. GAULD. 1978. Observations on effects of feeding level on growth and reproduction in haddock, <i>Melanogrammus aeglefinus</i> (L.) in captivity. <i>J. Fish Biol.</i> , 13 : 85-98
16. HISLOP, J. R. G. 1984. A comparison of the reproductive tactics and strategies of cod, haddock, whiting, and Norway Pout in the North Sea. In: <i>Fish Reproduction Strategies and Tactics</i> , G. W. Potts and R. J. Wootton (eds.), Academic Press, London, p. 311-329.

Data sources (literature reference or contact person)
17. BRANDER, K. 1993. Comparison of spawning characteristics of cod (<i>Gadus morhua</i>) stocks in the North Atlantic. <i>NAFO Sci. Coun. Studies</i> , 18 : 13-20.
18. MOKSNESS, E. and J. RIIS VESTERGAARD. MS 1983. Spawning of haddock (<i>Melanogrammus aeglefinus</i>) in captivity. <i>ICES CM Doc.</i> , No. G:30
19. MOKSNESS, E. MS 1983. Spawning of haddock (<i>Melanogrammus aeglefinus</i> L.) in captivity new experiments in 1983. <i>ICES CM Doc.</i> , No. G:24.
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21. ICES. MS 2001. Workshop on Gadoid stocks in the North sea during the 1960s and 1970s. The Fourth ICES/GLOBEC backward facing workshop. <i>ICES Co-op. Res. Report</i> , No. 244, 55 p.
22. SAHRHAGE, B. and G. WAGNER. 1978. On fluctuations in the haddock population of the North Sea. <i>ICES Rapp. Proc.-Verb.</i> , 172 : 72-85.
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AREA: TABLE 1: AVAILABLE DATA

COMMON NAME:	POLLOCK	SPECIES:	<i>Pollachius virens</i>
	NORTHWEST ATLANTIC	STOCK:	SCOTIAN SHELF/BAY OF FUNDY/GEORGES BANK (NAFO Div. 4VWX+5ZC)
CREATED BY:	ED TRIPPEL 2001-07-22	UPDATED BY:	ED TRIPPEL 2003-02-03

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	√	√	√	(√)	√		√	√	(√)

Data status									
Year	Stock size	Stock composition	Age	Sex ratio	Maturity	Fecundity	Weight	Condition	Additional data
1975	√	√	√	(√)	√		√	√	(√)
1974	√	√	√	(√)	√		√	√	(√)
1973	√	√	√	(√)	√		√	√	(√)
1972	√	√	√	(√)	√		√	√	(√)
1971	√	√	√	(√)	√		√	√	(√)
1970	√	√	√	(√)	√		√	√	(√)
1969	√	√	√	(√)	√		√		
1968	√	√	√	(√)	√		√		
1967	√	√	√	(√)	√		√		
1966	√	√	√	(√)	√		√		
1965	√	√	√	(√)	√		√		
1964	√	√	√	(√)	√		√		
1963	√	√	√	(√)	√		√		
1962	√	√	√	(√)	√		√		
1961	√	√	√	(√)	√		√		
1960	√	√	√	(√)	√		√		
1959	√	√	√	(√)	√		√		
1958	√	√	√	(√)	√		√		

TABLE 2: DATA BASIS, FORMAT AND QUALITY

COMMON NAME:	POLLOCK	
AREA:	NORTHWEST ATLANTIC	
STOCK:	SCOTIAN SHELF/BAY OF FUNDY/GEORGES BANK (NAFO Div. 4VWX+5ZC)	
REPRODUCTIVE STRATEGY:	DETERMINATE SPAWNER	REF. NO.: 9
TIMING OF SPAWNING:	SEPTEMBER- MARCH	REF. NO.: 7,8
OPTIMAL TIME FOR MATURITY SAMPLING:	NOVEMBER-DECEMBER	REF. NO.: 8

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	1970-2001	A,L,W	S	JULY	Estimated abundance for 4VWX, though survey not suitable for SPA	1,2
	1982-1997	A	CL,S	M,T	VPA Estimates	1
Stock composition	1970-2001	A,L,W	S	JULY	Commercial fishery data unavailable in 4VW after Sept. 1993 due to fishery closure	1,2
	1974-2001	A,L,W A,L,W	CL	Trimester		1
	1996-2001	L,W	S	JULY	Mobile survey in 4X	1,2
Age determination	1970-2001	A	S,CL	Trimester	No research survey aging since 1997	1,2
Sex ratio	1970-2001	A,L,W	S		Could be extracted from survey data bases	2
Maturity:						
A. Ogives (E)	1958-1979	A,L	S	JAN-SEP	Maturity ogives in 5 - year periods and percent mature by age (4Vn, 4Vs, 4W)	3
	1979-1984, 1995	A,L	S	MARCH	Proportion mature by age and length intervals by sex; including ogives (4VW, 4X). Also includes 1995 by length.	4
B. Skip of spawning						
C. Spawning probability						
D. Other						

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.
Fecundity:						
A. Estimation						
B. First time vs. repeat spawners						
C. Atresia						
D. Other						
Weight:						
A. Commercial fisheries data	1970-2001	A,L,W A,L,W	CL CL	T	4VW and (4X,5Zc) separate; primarily 4X5Zc since closure of 4VW in 1993	1,2
B. Survey data	1974-2001	A,L,W	S	JULY	Estimated means	1,2
C. Other						
Condition:						
A. Fulton	1988-1998	L,W	S	JULY	4X: five separate length intervals	1
B. HSI						
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						

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.
Spawning time	1920-1997	L,W	X		Fishermen's knowledge through interviews, includes spawning areas (present and lost)	5
	pre 1963		S		Evidence of Scotian Shelf, Cape Breton and Gulf of Maine spawning	6
	1975-1997		S	Sesaonal	Egg and larval surveys from Larval Herring Program, 1975-1995) (Bay of Fundy and Georges Bank); FEP (1983-1985) and SSIP (1976-1982). Spatial differences in spawning with peak from November-January	7,8
Contamination						
Environmental key factors						
Other factors or parameters						

TABLE 3: STUDIES OF REPRODUCTIVE POTENTIAL

COMMON NAME:	POLLOCK
AREA:	NORTHWEST ATLANTIC
STOCK:	SCOTIAN SHELF/BAY OF FUNDY/GEORGES BANK (NAFO DIV. 4VWX+5ZC)

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			
Stock recruitment relations	Spawning stock biomass (age 5+) vs recruitment (age 2)	1982-1999	1
Other studies			

TABLE 4: DATA SOURCES

COMMON NAME:	POLLOCK
AREA:	NORTHWEST ATLANTIC
STOCK:	SCOTIAN SHELF/BAY OF FUNDY/GEORGES BANK (NAFO DIV. 4VWX+5ZC)

Data sources (literature reference or contact person)
1. NEILSON, J. D., P. PERLEY, C. NELSON, T. JOHNSTON, and K. ZWANENBURG. 1999. The 1999 Assessment of pollock (<i>Pollachius virens</i>) in NAFO Divisions 4VWX and Subdivision 5Zc. <i>DFO CSAS Res. Doc.</i> , 99/160.
2. NEILSON, J. Marine Fish Division, Fisheries and Oceans Canada, Biological Station. St. Andrews, N. B. E5B 2L9 (neilsonj@mar.dfo-mpo.gc.ca).
3. BEACHAM, T. D. 1983. Variability in size or age at sexual maturity of white hake, pollock, longfin hake, and silver hake in the Canadian Maritimes area of the Northwest Atlantic Ocean. <i>Can. Tech. Rep. Fish. Aquat. Sci.</i> , No. 1157.
4. TRIPPEL, E. A., M. J. MORGAN, A. FRECHET, C. ROLLET, A. SINCLAIR, C. ANNAND, D. BEANLANDS, and L. BROWN. 1997. Changes in age and length at sexual maturity of northwest Atlantic cod, haddock and pollock stocks, 1972-1995. <i>Can. Tech. Rep. Fish. Aquat. Sci.</i> , No. 2157.
5. BENHAM, A. A., and E. A. TRIPPEL. Mapping fishermen's knowledge of groundfish and herring spawning and nursery areas in the Bay of Fundy, Gulf of Maine and Eastern Nova Scotian Shelf. <i>Can. Tech. Rep. Fish. Aquat. Sci.</i> (submitted).
6. STEELE, D. H. 1963. Pollock (<i>Pollachius virens</i> L.) in the Bay of Fundy. <i>J. Fish. Res. Board Can.</i> , 20 : 1267-1314.
7. NEILSON, J. D., and P. PERLEY. 1996. Can ichthyoplankton data be used to describe spawning areas of marine fish? <i>Can. Tech. Rep. Fish. Aquat. Sci.</i> , 2100.
8. HANKE, A. R., F. H. PAGE, and J. NEILSON. 2001. Distribution of Atlantic cod (<i>Gadus morhua</i>) eggs and larvae on the Scotian Shelf, Eastern Gulf of Maine, Bay of Fundy and Eastern Georges Bank. <i>Can. Tech. Rep. Fish. Aquat. Sci.</i> , No. 2308.
9. BIGELOW, H. B., and W. C. SCHROEDER. 1935. Fishes of the Gulf of Maine. <i>U.S. Fish Wildl. Serv. Fish. Bull.</i> 74 , 53 : 577.

TABLE 1: AVAILABLE DATA

COMMON NAME:	WHITE HAKE	SPECIES:	<i>Urophycis tenuis</i>
AREA:	NORTHWEST ATLANTIC	STOCK:	GULF OF MAINE-GEORGES BANK (NAFO SUBAREAS 5+6)
CREATED BY:	JAY BURNETT 2001-07-13	UPDATED BY:	

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	(√)	√							√

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

TABLE 2: DATA BASIS, FORMAT AND QUALITY

COMMON NAME:	WHITE HAKE	
AREA:	NORTHWEST ATLANTIC	
STOCK:	GULF OF MAINE-GEORGES BANK (NAFO SUBAREAS 5+6)	
REPRODUCTIVE STRATEGY:	DETERMINATE BATCH SPAWNER	REF. NO.:
TIMING OF SPAWNING:	ASYNCHRONOUS OCTOBER-MAY	REF. NO.: 1 5
OPTIMAL TIME FOR MATURITY SAMPLING:	OCTOBER, APRIL	REF. NO.: 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.
Stock size	1963-1981	L	S	B	Relative abundance	2
	1982-1988	L,A	S	B	Relative abundance	2
	1989-2001	L,A,W	CL,S	Q,B	VPA	2,3
Stock composition	1963-1981	L	S	B		2
	1982-1988	L,A	S	B		2
	1989-2001	L,A,W	CL,S	Q,B	Species IDs in CL	2,3
Age determination	1982-2001		S,CL,CC	B,Q		2,3
Sex ratio	1977-1981	L	S	B		3
	1982-2001	L,A	S	B		3
Maturity:						
A. Ogives (E)	1977-1981	L	S	B	Macroscopic observations	2,3
	1982-2001	L,A	S	B		2,3,4
B. Skip of spawning						
C. Spawning probability						
D. Other						
Fecundity:						
A. Estimation						
B. First time vs. repeat spawners						
C. Atresia						
D. Other						

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.
Weight:						
A. Commercial fisheries data	1985-2001	L	CL	Q	Derived from mean lengths	2,3
B. Survey data	1992-2001	L,A	S	B	Individual weights	3
C. Other						
Condition:						
A. Fulton						
B. HSI						
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	1963-2001		S	Q,M	Egg and larval surveys	5
Contamination						
Environmental key factors						
Other factors or parameters						

TABLE 3: STUDIES OF REPRODUCTIVE POTENTIAL

COMMON NAME:	WHITE HAKE
AREA:	NORTHWEST ATLANTIC
STOCK:	GULF OF MAINE-GEORGES BANK (NAFO SUBAREAS 5+6)

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			
Stock recruitment relations	Spawning stock biomass vs. Age 1 recruits	1985-1997	6
Other studies			

TABLE 4: DATA SOURCES

COMMON NAME:	WHITE HAKE
AREA:	NORTHWEST ATLANTIC
STOCK:	GULF OF MAINE-GEORGES BANK (NAFO SUBAREAS 5+6)

Data sources (literature reference or contact person)
1. FAHAY, M. P., and K. W. ABLE. 1989. White hake, <i>Urophycis tenuis</i> , in the Gulf of Maine: spawning seasonality, habitat use, and growth in young of the year and relationships to the Scotian Shelf population. <i>Can. J. Zool.</i> , 67 : 1715-1724.
2. SOSEBEE, K.A., L. O'BRIEN, and L.C. HENDRICKSON. 1998. A preliminary analytical assessment for white hake in the Gulf of Maine-Georges Bank region. <i>NEFSC Ref. Doc.</i> , 98-05, 96 p.
3. K. SOSEBEE, Northeast Fisheries Science Center, 166 Water St., Woods Hole, MA 02543 USA (Katherine.Sosebee@noaa.gov).
4. 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.
5. 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. Rep.</i> , No. SHL 85-04, 35 p.
6. NORTHERN DEMERSAL WORKING GROUP, NORTHEAST REGIONAL STOCK ASSESSMENT WORKSHOP. 2000. Assessment of 11 Northeast groundfish stocks through 1999. <i>NEFSC Ref. Doc.</i> , 00-05, 175 p.

TABLE 2: DATA BASIS, FORMAT AND QUALITY

COMMON NAME:	AMERICAN PLAICE	REF. NO.:	
AREA:	NORTHWEST ATLANTIC	REF. NO.:	1
STOCK:	FLEMISH CAP (NAFO DIV. 3M)	REF. NO.:	1
REPRODUCTIVE STRATEGY:	DETERMINATE SPAWNER	REF. NO.:	
TIMING OF SPAWNING:	APRIL-MAY	REF. NO.:	1
OPTIMAL TIME FOR MATURITY SAMPLING:	MARCH	REF. NO.:	1

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	1988-2000	A	S	Y	EU survey	2,3
	1986-1987	L	S	Y	Russian survey	6,7
	1978-1985	A,L,W	S	Y	Canadian survey	5
Stock composition	1988-2000	A,L,W	S	Y	EU survey	2,3
	1986-1987	L	S	Y	Russian survey	6,7
	1978-1985	A,L,W	S	Y	Canadian survey	4
Age determination	1988-2000		S	Y		2,4
	1978-1985		S	Y	Canadian survey	5
Sex ratio	1988-2000	A,L	S	Y	EU survey	2,3
	1986-1987	L	S	Y	Russian survey	6,7
	1978-1985	A,L	S	Y	Canadian survey	5
Maturity:						
A. Ogives (E)	1990-1992	A,L	S	Y	Microscopic observations	
	1998-2000 1985	A,L	S	Y	Canadian survey - all data from 1978-1985 combined	5
B. Skip of spawning						
C. Spawning probability						
D. Other						
Fecundity:						
A. Estimation						1
B. First time vs. repeat spawners						
C. Atresia						
D. Other						

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.
Weight:						
A. Commercial fisheries data						
B. Survey data	1988-2000	A,L	S	Y	Individual fish weights	
C. Other						
Condition:						
A. Fulton	1998-2000	A,L	S	Y	Summer values	
B. HSI						
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						
Contamination						
Environmental key factors	Temperature		S	Y	Summer values	
Other factors or parameters						

TABLE 4: DATA SOURCES

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

Data sources (literature reference or contact person)
1. ZAMARRO, J. 1992. The fecundity of American plaice (<i>Hippoglossoides platessoides</i>) from the south of Grand Bank and Flemish Cap. <i>NAFO SCR Doc.</i> , No. 26, 11 p.
2. SABORIDO, F. 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. ALPOIM, R. 2001. A Stock Status Update of American plaice (<i>Hippoglossoides platessoides</i>) in NAFO Division 3M, <i>NAFO SCR Doc.</i> , No. 38, 7 p.
4. ZAMARRO. 1991. The American plaice stock on the Flemish Cap (NAFO Division 3M) <i>NAFO SCR Doc.</i> , No. 82, 3 p.
5. BOWERING, W.R. and W.B. BRODIE. 1994. Distribution, age and growth, and sexual maturity of American plaice (<i>Hippoglossoides platessoides</i> (Fabricius)) on Flemish Cap (NAFO Division 3M). <i>J. Northw. Atl. Fish. Sci.</i> , 16 : 49-61.
6. CHUMAKOV, A. K., V. A. BOROVKOV, and A.S. NOSKOV. 1987. USSR research report for 1986. <i>NAFO SCS Doc.</i> , No. 15, 39 p.
7. NOSKOV, A. S., V. A. BOROVKOV, A. K. CHUMAKOV, and S. M. KOVALEV. 1998. USSR research report for 1987. <i>NAFO SCS Doc.</i> , No. 15, 14 p.

TABLE 1: AVAILABLE DATA

COMMON NAME: AMERICAN PLAICE **SPECIES:** *Hippoglossoides platessoides*

AREA: NORTHWEST ATLANTIC **STOCK:** NAFO SUBAREA 2+DIV. 3K

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				(√)	(√)				

TABLE 2: DATA BASIS, FORMAT AND QUALITY

COMMON NAME:	AMERICAN PLAICE	
AREA:	NORTHWEST ATLANTIC	
STOCK:	NAFO SUBAREA 2+DIV. 3K	
REPRODUCTIVE STRATEGY:	DETERMINATE BATCH SPAWNER	REF. NO.: 8,9
TIMING OF SPAWNING:	JAN-JUNE	REF. NO.: 4,5
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	1978-1999	A,L	S	Y		1
	2000	A,L	S	Y		2
Stock composition	1978-1983	A,L	S	Y		1
	1984-1990	A,L	CC,CL,S	Q,Q,Y		1,2
	1991-1999	A,L	S	Y		1
	2000	A,L	S	Y		2
Age determination	1976-1977	A	CL	Q		6
	1978-1982	A	CC,CL,S	Q,Q,Y		1,6
	1983	A	S	Y		1
	1984-1990	A	CC,CL,S	Q,Q,Y		1,2
	1991-1999	A	S	Y		1
	2000	A	S	Y		2
Sex ratio	1978-2000	A,L	S	Y		2
	1964	A,L	S	Apr-June	data from 1963-1964 combined	10
Maturity:						
A. Ogives (E)	1967-2000	A,L	S	Y		1,2,3
	1964	A,L	S	Apr-June	By cohort data from 1963-1964 combined	10
B. Skip of spawning						
C. Spawning probability						
D. Other						
Fecundity:						
A. Estimation						

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. First time vs. repeat spawners						
C. Atresia						
D. Other						
Weight:						
A. Commercial fisheries data	1976-1982	L	CC,CL	Q,Q	Invariant length weight relationship	6,7
B. Survey data	1990-1999	A,L	S	Y		1
	2000	A,L	S	Y		2
C. Other						
Condition:						
A. Fulton	1990-2000	A,L	S	Y		2
B. HSI	1990-2000	A,L	S	Y		2
C. Energy						
D. Other	1990-2000	A,L	S	Y	GSI	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	1950,1953	A,L	S	MAR,JUN		4
	1959-1970		S	VARIOUS	all data combined	5
Contamination						
Environmental key factors						
Other factors or parameters						

TABLE 4: DATA SOURCES

COMMON NAME:	AMERICAN PLAICE
AREA:	NORTHWEST ATLANTIC
STOCK:	NAFO SUBAREA 2+DIV. 3K

Data sources (literature reference or contact person)
1. BRODIE, W. B. and M. J. MORGAN. MS 2000. An assessment of the American plaice stock in NAFO Subarea 2 and Division 3K. <i>DFO Can. Stock Ass. Res. Doc.</i> , No. 130.
2. UNPUBL. DATA. W. B. BRODIE, DFO, PO Box 5667, St. John's, NF, A1C 5X1, Canada (brodieb@dfo-mpo.gc.ca)
3. MORGAN, M. J. and E. B. COLBOURNE. 1999. Variation in maturity-at age and size in three populations of American plaice. <i>ICES J. Mar. Sci.</i> , 56 : 673-688.
4. PITT, T. K. 1966. Sexual maturity and spawning of the American plaice, <i>Hippoglossoides platessoides</i> (Fabricius), from Newfoundland and Grand Bank areas. <i>J. Fish. Res. Board Canada</i> , 23 : 651-672.
5. NEVINSKY, M. M. and V. P. SEREBRYAKOV. 1973. American plaice, <i>Hippoglossoides platessoides</i> Fabr., spawning in the northwest Atlantic area. <i>ICNAF Res. Bull.</i> , 10 : 23-36.
6. BRODIE, W. B. MS 1984. American plaice in NAFO Subarea 2 + Div. 3K – an assessment update. <i>DFO CAFSAC Res. Doc.</i> , No. 50.
7. BRODIE, W. B. MS 1985. An assessment update of the American plaice stock in NAFO Divisions 3LNO. <i>NAFO SCR Doc.</i> , No. 51.
8. ZAMARRO, J. 1992. Determination of fecundity in American plaice (<i>Hippoglossoides platessoides</i>) and its variation from 1987 to 1989 on the tail of the Grand Bank. <i>Neth. J. Sea Res.</i> , 29 : 205-209.
9. MADDOCK, D. M. and M. P. M. BURTON. 1999. Gross and histological observations of ovarian development and related condition changes in American plaice. <i>J. Fish. Biol.</i> , 53 : 928-944.
10. PITT, T.K. 1966. Sexual maturity and spawning of the American plaice, <i>Hippoglossoides platessoides</i> (Fabricius), from Newfoundland and Grand Bank areas. <i>J. Fish. Res. Board Canada</i> , 23 : 651-672.

TABLE 1: AVAILABLE DATA

COMMON NAME:	AMERICAN PLAICE	SPECIES:	<i>Hippoglossoides platessoides</i>
AREA:	NORTHWEST ATLANTIC	STOCK:	NAFO DIV. 3LNO
CREATED BY:	JOANNE MORGAN SUSANA JUNQUERA	UPDATED BY:	JM 2002-03-26

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				(√)					

TABLE 2: DATA BASIS, FORMAT AND QUALITY

COMMON NAME:	AMERICAN PLAICE		
AREA:	NORTHWEST ATLANTIC		
STOCK:	NAFO DIV. 3LNO		
REPRODUCTIVE STRATEGY:	DETERMINATE BATCH SPAWNER	REF. NO.:	1,9
TIMING OF SPAWNING:	MARCH-JULY	REF. NO.:	1,2,3,4
OPTIMAL TIME FOR MATURITY SAMPLING:	FEB-JUNE	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	1960-1974	A	CL	Q	VPA starting 1960	5
	1975-1989	A,L	CC,CL,S	Q,Q,Y		6
	1990-1995	A,L	CC,CL,S	Q,Q,B	few otoliths sampled from the commercial fishery from 1993-1998	6
	1996-2001	A,L	CC,CL,S	Q,Q,3/yr		4,6,12
Stock composition	1960-1974	A	CL,S	Q,Q,Y		5
	1975-1989	A,L	CC,CL,S	Q,Q,Y		6
	1990-1995	A,L	CC,CL,S	Q,Q,B		6
	1996-2001	A,L	CC,CL,S	Q,Q,3/yr		4,6,12
Age determination	1960-1974	A	CL	Q		5
	1975-1989	A	CC,CL,S	Q,Q,Y		6
	1990-2000	A	CC,CL,S	Q,Q,B		6
	2001	A	CC,CL,S	Q,Q,B		4
Sex ratio	1975-1983	A	S	Y		4
	1984-1989	A	S	Y		4
	1990-1995	A	S	B		4
	1996-2001	A	S	3/YR		4,12
	1964	A,L	S	APR-JUNE	data from 1950-51, 1953, 1957-61, 1963-64 combined	13
Maturity:						
A. Ogives (E)	1960-2001	A,L	S	Y	Maturities are produced by cohort	8,4,6
B. Skip of spawning						
C. Spawning probability						

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.
D. Other						
Fecundity:						
A. Estimation	1961-1962	A,L	S	FEB-MAR	part of stock area	2
	1987-1989	L,W	CC	M	part of stock area	1
	1993-1998	A,L,W	S	Apr-Jun		4
B. First time vs. repeat spawners						
C. Atresia	1987-1989		CC	M	Part of stock area	1
	1998	A,L,W	CL,S	FALL		4
D. Other						
Weight:						
A. Commercial fisheries data	1960-1974	L	CL	Q	Invariant length/weight relationship	5
	1975-2000	L	CC,CL	Q		6
	2001	L	CC,CL	Q		4
	1987-1989	L	CC	M	part of stock area	1
B. Survey data	1990-2000	A,L	S	B		6
	2001	A,L	S	B		4
C. Other						
Condition:						
A. Fulton	1990-2001	A,L	S	B		4
	1993-1995	A,L	S	sporadic		9
B. HSI	1990-2001	A,L	S	B		4
	1993-1995		S	sporadic		9
C. Energy						
D. Other	1987-1989		CC	M	GSI, part of stock area	1
	1990-2001	A,L	S	B	GSI	4
	1993-1995		S	sporadic	GSI	9
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						

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.		
Spawning time	1950's early	L	S	MAR-JUN	part of stock area, not every year	2		
	1960's							
	1954-1970					CC,S	Jan-Sep	3
	1987-1989					CC	M	1
	1975-1999					S	Apr-Jul,	14
2000-2001	S	Sept-Dec	4					
Contamination								
Environmental key factors								
Other factors or parameters	1994-1999	L	S	Y	Pelagic O group survey	11		

TABLE 3: STUDIES OF REPRODUCTIVE POTENTIAL

COMMON NAME:	AMERICAN PLAICE
AREA:	NORTHWEST ATLANTIC
STOCK:	NAFO DIV. 3LNO

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			
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	1960-1995	10
Other studies			

TABLE 4: DATA SOURCES

COMMON NAME:	AMERICAN PLAICE
AREA:	NORTHWEST ATLANTIC
STOCK:	NAFO DIV. 3LNO

Data sources (literature reference or contact person)	
1.	ZAMARRO, J. 1992. Determination of fecundity in American plaice (<i>Hippoglossoides platessoides</i>) and its variation from 1987 to 1989 on the tail of the Grand Bank. <i>Neth. J. Sea Res.</i> , 29 : 205-209.
2.	PITT, T. K. 1966. Sexual maturity and spawning of the American plaice, <i>Hippoglossoides platessoides</i> (Fabricius), from Newfoundland and Grand Bank areas. <i>J. Fish. Res. Board Canada</i> , 23 : 651-672.
3.	NEVINSKY, M. M. and V. P. SEREBRYAKOV. 1973. American plaice, <i>Hippoglossoides platessoides platessoides</i> Fabr., spawning in the Northwest Atlantic area. <i>ICNAF Bull.</i> , 10 : 23-36.
4.	UNPUBL. DATA: M. J. MORGAN, DFO, P.O. Box 5667, St. John's NF, A1C 5X1, Canada (morganj@dfo-mpo.gc.ca).
5.	BRODIE, W. B. MS 1985. An assessment update of the American plaice stock in NAFO Div. 3LNO. <i>NAFO SCR Doc.</i> , No. 51, 30 p.
6.	MORGAN, M. J., W. B. BRODIE, B. P. HEALEY, D. MADDOCK PARSONS, D. STANSBURY, and D. POWER. MS 2001. An assessment of American plaice in NAFO Divisions 3LNO. <i>NAFO SCR Doc.</i> , No. 59, 13 p.
7.	MORGAN, M. J. MS 2000. A stock status update of American plaice in NAFO Div. 3LNO. <i>NAFO SCR Doc.</i> , No. 41, 15 p.
8.	MORGAN, M. J. and E. B. COLBOURNE. 1999. Variation in maturity-at-age and size in three populations of American plaice. <i>ICES J. Mar. Sci.</i> , 56 : 673-688.
9.	MADDOCK, D.M. and M.P.M. BURTON. 1999. Gross and histological observations of ovarian development and related condition changes in American plaice. <i>J. Fish. Biol.</i> , 53 : 928-944.
10.	MORGAN, M. J., P. A. SHELTON, D.P. STANSBURY, J. BRATTEY, 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.
11.	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.
12.	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.
13.	PITT, T. K. 1966. Sexual maturity and spawning of the American plaice, <i>Hippoglossoides platessoides</i> (Fabricius), from Newfoundland and Grand Bank areas. <i>J. Fish. Res. Board Canada</i> , 23 : 651-672.
14.	MORGAN, M. J. 2001. Time and location of spawning of American plaice in NAFO Divisions 3LNO. <i>J. Northw. Atl. Fish. Sci.</i> , 29 : 41-49.

TABLE 1: AVAILABLE DATA

COMMON NAME: AMERICAN PLAICE **SPECIES:** *Hippoglossoides platessoides*

AREA: NORTHWEST ATLANTIC **STOCK:** NAFO SUBDIV. 3Ps

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									
1953					√				
1950					(√)				

TABLE 2: DATA BASIS, FORMAT AND QUALITY

COMMON NAME:	AMERICAN PLAICE	
AREA:	NORTHWEST ATLANTIC	
STOCK:	NAFO SUBDIV. 3Ps	
REPRODUCTIVE STRATEGY:	DETERMINATE BATCH SPAWNER	REF. NO.: 9,10
TIMING OF SPAWNING:	APRIL-MAY	REF. NO.: 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	1972-1997	A,L	S	Y	Survey coverage poor prior to 1980	1
	1998-2000	A,L	S	B		1,2,11
Stock composition	1972	L	S	Y		2
	1973	A,L	S	Y		3
	1974-1982	A,L	CC,CL,S	Q,Q,Y		3,4
	1983-1992	A,L	CC,CL,S	Q,Q,Y		1,3
	1993-1997	A,L	S	Y		1
	1998-2000	A,L	S	Y		1,2,11
Age determination	1973	A	S	Y		3
	1974-1982	A	CC,CL,S	Q,Q,Y		3,4
	1983-1992	A	CC,CL,S	Q,Q,Y		1,3
	1993-1998	A	S	Y		1
	1999-2000	A	S	Y		2
Sex ratio	1972	L	S	Y		2
	1973-1982	A,L	S	Y		2
	1983-2000	A,L	S	Y		2
Maturity:						
A. Ogives (E)	1963-1989	A,L	S	Y	By cohort annual data from 1950 and 1953 combined	5,2
	1983-2000	A	S	Y		1,2
	1973-2000	L	S	Y		1,2
	1953	A,L	S	Mar,Jun		6
B. Skip of spawning						
C. Spawning probability						

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.
D. Other						
Fecundity:						
A. Estimation	1993-1998	A,L,W	S	Y		2
B. First time vs. repeat spawners						
C. Atresia						
D. Other						
Weight:						
A. Commercial fisheries data	1974-1992	A,L	CC,CL	Q,Q	Invariant length weight relationship	7,8
B. Survey data	1990-1998	A,L	S	Y		1
	1999-2000	A,L	S	Y		2
C. Other						
Condition:						
A. Fulton	1990-2000	L	S	Y		2
B. HSI	1990-2000	L	S	Y		2
C. Energy						
D. Other	1990-2000	L	S	Y	GSI	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	1950,1953	A,L	S	MAR,JUN		6
	1959-1970		S	VARIOUS	all data combined	7
Contamination						
Environmental key factors						
Other factors or parameters						

TABLE 4: DATA SOURCES

COMMON NAME:	AMERICAN PLAICE
AREA:	NORTHWEST ATLANTIC
STOCK:	NAFO SUBDIV. 3Ps

Data sources (literature reference or contact person)
1. MORGAN, M. J., W. B. BRODIE, and D. POWER. MS 1999. An assessment of American plaice in Subdivision 3Ps. <i>Can. Stock Ass. Sec. Res. Doc.</i> , No. 145.
2. UNPUBL. DATA: M. J. MORGAN. DFO, P.O. Box 5667, St. John's, NF, A1C 5X1, Canada (morganj@dfo-mpo.gc.ca).
3. BOWERING, W. R., W. B. BRODIE, and M. J. MORGAN. 1996. Changes in abundance and certain population parameters of American plaice on St. Pierre Bank off Newfoundland during 1972-1994, with implications for fisheries management. <i>North Amer. J. Fish. Manag.</i> , 16 : 747-769
4. MORGAN, M. J., W. B. BRODIE, and G. T. EVANS. MS 1995. Assessment of the American plaice stock in NAFO Subdiv. 3Ps. <i>DFO Atl. Fish. Res. Doc.</i> , No. 36.
5. MORGAN, M. J. and E. B. COLBOURNE. 1999. Variation in maturity-at-age and size in three populations of American plaice. <i>ICES J. Mar. Sci.</i> , 56 : 673-688.
6. PITT, T. K. 1966. Sexual maturity and spawning of the American plaice, <i>Hippoglossoides platessoides</i> (Fabricius), from Newfoundland and Grand Bank areas. <i>J. Fish. Res. Board Canada</i> , 23 : 651-672.
7. BRODIE, W. B., D. POWER, and W. R. BOWERING. MS 1993. Assessment of the American plaice stock in NAFO Sudiv. 3Ps. <i>DFO Atl. Fish. Res. Doc.</i> , No. 24.
8. BRODIE, W.B. MS 1985. An assessment update of the American plaice stock in NAFO Div. 3LNO. <i>NAFO SCR Doc.</i> , No. 51.
9. ZAMARRO, J. 1992. Determination of fecundity in American plaice (<i>Hippoglossoides platessoides</i>) and its variation from 1987 to 1989 on the tail of the Grand Bank. <i>Neth. J. Sea Res.</i> , 29 : 205-209.
10. MADDOCK, D. M. and M. P. M. BURTON. 1999. Gross and histological observations of ovarian development and related condition changes in American plaice. <i>J. Fish. Biol.</i> , 53 : 928-944.
11. MCCLINTOCK, J. MS 2001. American plaice catch results from fall 2000 GEAC survey in NAFO Division 3Ps. <i>Can. Stock Ass. Sec. Res. Doc.</i> , No. 25.

TABLE 1: AVAILABLE DATA

COMMON NAME: AMERICAN PLAICE **SPECIES:** *Hippoglossoides platessoides*

AREA: NORTHWEST ATLANTIC **STOCK:** GULF OF MAINE-GEORGES BANK (NAFO SUBAREA 5)

CREATED BY: JAY BURNETT 2000-01-12 **UPDATED BY:** LORETTA O'BRIEN 2000-7-19

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	(√)	√							(√)

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

TABLE 2: DATA BASIS, FORMAT AND QUALITY

COMMON NAME:	AMERICAN PLAICE	
AREA:	NORTHWEST ATLANTIC	
STOCK:	GULF OF MAINE-GEORGES BANK (NAFO SUBAREA 5)	
REPRODUCTIVE STRATEGY:	DETERMINATE BATCH SPAWNER	REF. NO.: []
TIMING OF SPAWNING:	FEBRUARY-JUNE	REF. NO.: [1]
OPTIMAL TIME FOR MATURITY SAMPLING:	MARCH-APRIL	REF. NO.: [1]

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	1963-1979	L	S	B	Relative abundance	2
	1980-2000	A	S,CL,CC	Q	VPA	2,3
Stock composition	1963-1979	L	S	B		2
	1980-2000	L,A,W	S,CL,CC	Q		2,3
Age determination	1980-2000		S,CL,CC	B,Q		2,4
Sex ratio	1980-2000	L,A	S	B		3
Maturity:						
A. Ogives (E)	1986-1990	L,A	S	B	Pooled; macroscopic obs.	5
	1980-2000	L,A	S	B	Annual; macroscopic obs.	3
B. Skip of spawning						
C. Spawning probability						
D. Other						
Fecundity:						
A. Estimation						
B. First time vs. repeat spawners						
C. Atresia						
D. Other						
Weight:						
A. Commercial fisheries data	1980-2000	L,A	CL,CC	Q	Estimated means	2,3
B. Survey data	1992-2000	L,A	S	B	Individual fish weights	3
C. Other						

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.
Condition:						
A. Fulton	1992-2000	L,A	S	B		3
B. HSI						
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	1963-2000		S	M-Q	Egg and larval surveys	1,6,7,8,9,10
Contamination	1980		S		4 fish- muscle sampled	11
Environmental key factors	1963-2000		S	B	Temperature data	3
Other factors or parameters	1973-1979 1980, 1999	L A,L	S S	B B	Food habits	12

TABLE 4: DATA SOURCES

COMMON NAME:	AMERICAN PLAICE
AREA:	NORTHWEST ATLANTIC
STOCK:	NAFO SUBDIV. 3Ps

Data sources (literature reference or contact person)
1. MORGAN, M. J., W. B. BRODIE, and D. POWER. MS 1999. An assessment of American plaice in Subdivision 3Ps. <i>Can. Stock Ass. Sec. Res. Doc.</i> , No. 145.
2. UNPUBL. DATA: M. J. MORGAN. DFO, P.O. Box 5667, St. John's, NF, A1C 5X1, Canada (morganj@dfo-mpo.gc.ca).
3. BOWERING, W. R., W. B. BRODIE, and M. J. MORGAN. 1996. Changes in abundance and certain population parameters of American plaice on St. Pierre Bank off Newfoundland during 1972-1994, with implications for fisheries management. <i>North Amer. J. Fish. Manag.</i> , 16 : 747-769
4. MORGAN, M. J., W. B. BRODIE, and G. T. EVANS. MS 1995. Assessment of the American plaice stock in NAFO Subdiv. 3Ps. <i>DFO Atl. Fish. Res. Doc.</i> , No. 36.
5. MORGAN, M. J. and E. B. COLBOURNE. 1999. Variation in maturity-at-age and size in three populations of American plaice. <i>ICES J. Mar. Sci.</i> , 56 : 673-688.
6. PITT, T. K. 1966. Sexual maturity and spawning of the American plaice, <i>Hippoglossoides platessoides</i> (Fabricius), from Newfoundland and Grand Bank areas. <i>J. Fish. Res. Board Canada</i> , 23 : 651-672.
7. BRODIE, W. B., D. POWER, and W. R. BOWERING. MS 1993. Assessment of the American plaice stock in NAFO Sudiv. 3Ps. <i>DFO Atl. Fish. Res. Doc.</i> , No. 24.
8. BRODIE, W.B. MS 1985. An assessment update of the American plaice stock in NAFO Div. 3LNO. <i>NAFO SCR Doc.</i> , No. 51.
9. ZAMARRO, J. 1992. Determination of fecundity in American plaice (<i>Hippoglossoides platessoides</i>) and its variation from 1987 to 1989 on the tail of the Grand Bank. <i>Neth. J. Sea Res.</i> , 29 : 205-209.
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11. MCCLINTOCK, J. MS 2001. American plaice catch results from fall 2000 GEAC survey in NAFO Division 3Ps. <i>Can. Stock Ass. Sec. Res. Doc.</i> , No. 25.

TABLE 4: DATA SOURCES

COMMON NAME:	AMERICAN PLAICE
AREA:	NORTHWEST ATLANTIC
STOCK:	GULF OF MAINE-GEORGES BANK (NAFO SUBAREA 5)

Data sources (literature reference or contact person)
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. Rep.</i> , No. SHL 85-04, 35 p.
2. O'BRIEN, L., and C. ESTEVES. 2001. Update assessment of American plaice in the Gulf of Maine-Georges Bank region for 2000. <i>NEFSC Ref. Doc.</i> , 01-02, 114 p.
3. UNPUBL. DATA: L. O'BRIEN, Northeast Fisheries Science Center, 166 Water St., Woods Hole, MA 02543, USA (Loretta.O'Brien@noaa.gov).
4. DERY, L. M. 1988. American plaice, <i>Hippoglossoides platessoides</i> (Chapter 17). In: Age determination methods for Northwest Atlantic species. J. Penttila, and L. M. Dery (eds.). <i>NOAA Tech. Rep.</i> , NMFS 72, 135 p.
5. 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.
6. SULLIVAN, L. F. 1982. American plaice, <i>Hippoglossoides platessoides</i> , in the Gulf of Maine. III. Spawning and larval distributions. M.Sc. Thesis, University of Rhode Island, Kingston, RI, 127 p.
7. COLTON, J., and J. ST. ONGE. 1974. Distribution of fish eggs and larvae in continental shelf waters, Nova Scotia to Long Island. <i>Ser. Atlas Mar. Environ., Am. Geogr. Soc. Folio</i> , 23.
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9. SMITH, W. G., J. D. SIBUNKA, and A. WELLS. 1975. Seasonal distributions of larval flatfish (Pleuronectiformes) on the continental shelf between Cape Cod and Cape Lookout, N.C., 1965-66. <i>NOAA Tech. Rep., Spec. Sci. Rep. Fish.</i> , 691: 68 p.
10. 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.
11. 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.
12. LINK, J. Northeast Fisheries Science Center, Woods Hole Laboratory, 166 Water Street, Woods Hole, MA 02543, USA (Jason.Link@noaa.gov).

TABLE 1: AVAILABLE DATA

COMMON NAME: GREENLAND HALIBUT **SPECIES:** *Reinhardtius hippoglossoides*

AREA: NORTHWEST ATLANTIC **STOCK:** SUBAREA 2+DIV. 3KLMNO

CREATED BY: JOANNE MORGAN
SUSANA JUNQUERA **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						(√)			

TABLE 2: DATA BASIS, FORMAT AND QUALITY

COMMON NAME:	GREENLAND HALIBUT	
AREA:	NORTHWEST ATLANTIC	
STOCK:	SUBAREA 2+DIV. 3KLMNO	
REPRODUCTIVE STRATEGY:	DETERMINATE SPAWNER SINGLE BATCH	REF. NO.: 16,17
TIMING OF SPAWNING:	WINTER/SPRING JULY-AUGUST	REF. NO.: 15 12
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	1975-1977	A	CL	Q	VPA starting 1975 uncertainties in historical trajectory	1,2
	1978-1987	A,L	CC,CL,S	Q,Q,Y		1,2
	1988-1995	A,L	CC,CL,S	Q,Q,B		1,2,13
	1996-2000	A,L	CC,CL,S	Q,Q,3/yr		1,2,13,18
Stock composition	1975-1977	A	CL	Q	See above	1,2
	1978-1987	A,L	CC,CL,S	Q,Q,Y		1,2
	1988-1995	A,L	CC,CL,S	Q,Q,B		1,2,13
	1996-2000	A,L	CC,CL,S	Q,Q,3/yr		1,2,13,18
Age determination	1975-1977	A	CL	Q	See above	1,2
	1978-1990	A,L	CC,CL,S	Q,Q,Y		1,2
	1991-2000	A,L	CC,CL,S	Q,Q,B		1,2,13
Sex ratio	1978-1995	A,L	S	Y		3
	1996-2000	A,L	S	B		3,18
	1992-1994	A,L	CC	M		14
Maturity:						
A. Ogives (E)	1978-2000	A,L	S	Y	Only some years cover whole stock area includes more of stock area but limited at age, includes 0B 3LMNO	4
	1978-1995	A,L	CL,S	VARIOUS, Y		5
	1990-1997	L	CC,S	M		6
B. Skip of spawning						
C. Spawning probability						

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.
D. Other						
Fecundity:						
A. Estimation	1969	A,L	CL,S	VARIOUS	Data 1967-1969 combined	7
	1976-1977	A,L	S	FALL	Data 1975-80, 1987-88 combined, included data from 0B	8
	1988	A,L,W	S	FALL		9
	1992-1997	A,L,W	CC,S	M,Y	all studies (6,7,8,9) cover only part of stock area	6
B. First time vs. repeat spawners						
C. Atresia	1990-1997	L,W	CC	M,Y	Part of stock area	6
D. Other						
Weight:						
A. Commercial fisheries data	1975-1999 2000	L L	CC,CL CC,CL	Q,Q Q,Q	Length/weight relationship	10,11 3
B. Survey data	1988-2000 1990-2000	A,L A,L	S S	Y Y		3,11 13
C. Other						
Condition:						
A. Fulton	1991-1997 1990-2000	A A,L	CC,S S	M,Y Y	3M only some years cover entire area	6 3
B. HSI	1990-2000	A,L	S	Y		Only some years cover entire stock area
C. Energy						
D. Other	1990-2000	A,L	S	Y	GSI: only some years cover entire stock area	3
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						

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.
Spawning time	1990-1991	L	CC	M	3LM, some spawning fish present year round	12
	1909		S	MAY-JUL	Davis Strait	15
Contamination						
Environmental key factors						
Other factors or parameters						

TABLE 3: STUDIES OF REPRODUCTIVE POTENTIAL

COMMON NAME:	GREENLAND HALIBUT
AREA:	NORTHWEST ATLANTIC
STOCK:	SUBAREA 2+DIV. 3KLMNO

Estimation of reproductive potential			
Subject	Brief description	Year range	Ref. No.
Potential or realised egg production	Potential egg production calculated from 1969-1988 using single fecundity at age relationship. Survival from eggs to recruits related to water temperature.	1969-1988	9
	Comparison with stock abundance. Interannual variations. relationship with age.	1990-1997	6
Viable egg and larvae production			
Critical life stages			
Environmental influences			
Stock recruitment relations			
Other studies			

TABLE 4: DATA SOURCES

COMMON NAME:	GREENLAND HALIBUT
AREA:	NORTHWEST ATLANTIC
STOCK:	SUBAREA 2+DIV. 3KLMNO

Data sources (literature reference or contact person)
1. MAHE, J-C. AND W. R. BOWERING. MS 2001. An assessment of stock status of the Greenland halibut resource in NAFO Subarea 2 and Divisions 3KLMNO based on extended survivors analysis. <i>NAFO SCR Doc.</i> , No. 80, 18 p.
2. BOWERING, W.R. MS 2001. Population trends in the Greenland halibut (<i>Reinhardtius hippoglossoides</i>) resource of NAFO Subarea 2 and Divisions 3KLMNO based on Canadian research vessel surveys during 1978-2000. <i>NAFO SCR Doc.</i> , No. 39, 42 p.
3. UNPUBL. DATA: W.R. BOWERING, DFO, PO Box 5667, St. John's, NF, A1C 5X1, Canada (bowering@dfo-mpo.gc.ca).
4. MORGAN, M. J. and W. R. BOWERING. MS 2001. Further comparisons of estimates of maturity for Greenland halibut for surveys covering different portions of the stock area. <i>NAFO SCR Doc.</i> , No. 49, 10 p.
5. MORGAN, M. J. and W. R. BOWERING. 1997. Temporal and geographic variation in maturity at length and age of Greenland halibut (<i>Reinhardtius hippoglossoides</i>) from the Canadian north-west Atlantic with implications for fisheries management. <i>ICES J. Mar. Sci.</i> , 54 : 875-885.
6. JUNQUERA, S., E. ROMAN, X. PAZ, and G. RAMILO. 1999. Changes in Greenland halibut growth, condition and fecundity in the northwest Atlantic (Flemish Pass, Flemish Cap and southern Grand Bank). <i>J. Northw. Atl. Fish. Sci.</i> , 25 : 17-28.
7. LEAR, W. H. 1970. Fecundity of Greenland halibut (<i>Reinhardtius hippoglossoides</i>) in the Newfoundland-Labrador area. <i>J. Fish. Res. Board Canada</i> , 27 : 1880-1882.
8. BOWERING, W. R. 1980. Fecundity of Greenland halibut, <i>Reinhardtius hippoglossoides</i> (Walbaum), from southern Labrador and southeastern Gulf of St. Lawrence. <i>J. Northw. Atl. Fish. Sci.</i> , 1 : 39-43.
9. SEREBRYAKOV, V. P., A. K. CHUMAKOV, and I. I. TEVS. 1992. Spawning stock, population fecundity and year-class strength of Greenland halibut (<i>Reinhardtius hippoglossoides</i>) in the northwest Atlantic, 1969-88. <i>J. Northw. Atl. Fish. Sci.</i> , 14 : 107-113.
10. BOWERING, W. R. and D. E. STANSBURY. 1984. Regressions of weight on length for Greenland halibut, from Canadian waters of the Northwest Atlantic. <i>J. Northw. Atl. Fish. Sci.</i> , 5 : 107-108.
11. GUNDERSEN, A. C. and W. B. BRODIE. MS 1999. Length-weight relationships for Greenland halibut (<i>Reinhardtius hippoglossoides</i>) in NAFO Divisions 2GHJ and 3KLMNO, 1990-1997. <i>NAFO SCR Doc.</i> , No. 31, 21 p.
12. JUNQUERA, S. and J. ZAMARRO. 1994. Sexual maturity and spawning of Greenland halibut (<i>Reinhardtius hippoglossoides</i>) from Flemish Pass area. <i>NAFO Sci. Coun. Studies</i> , 20 : 47-52.
13. SABORIDO-REY, F. and A. VAZQUEZ. MS 2001. Results from the bottom trawl survey on Flemish Cap of July 2000. <i>NAFO SCR Doc.</i> , No. 22, 56 p.
14. DeCARDENAS, E. MS 1996. The females ratio by length as an indicator of sexual differences in mortality of Greenland halibut (<i>Reinhardtius hippoglossoides</i>) at age 8+. <i>NAFO SCR Doc.</i> , No. 35, 10 p.
15. JENSEN, A. S. 1935. The Greenland halibut (<i>Reinhardtius hippoglossoides</i> (Walb.)) its development and migrations. <i>K. danske vidensk. Selsk. Skr. 9 Rk.</i> , 6 : 1-32.
16. JUNQUERA, S. and F. SABORIDO-REY. 1995. Histological assessment of sexual maturity in Greenland halibut in Div. 3LM. <i>NAFO SCR Doc.</i> , No. 28, 9 p.

Data sources (literature reference or contact person)
17. STENE, A., A. C. GUNDERSEN, O. T. ALBERT, K. H. NEDREAAS, and P. SOLEMDAL. 1999. Early development of northeast Arctic Greenland halibut (<i>Reinhardtius hippoglossoides</i>). <i>J. Northw. Atl. Fish. Sci.</i> , 25 : 171-177.
18. PAZ, X., E. ROMAN, and P. DURAN MUNOZ. 2000. Results from the 2000 Spanish bottom trawl survey in the NAFO regulatory area for Divisions 3NO. <i>NAFO SCR Doc.</i> , No. 46, 18 p.

TABLE 1: AVAILABLE DATA

COMMON NAME: **SPECIES:**

AREA: **STOCK:**

CREATED BY: **UPDATED BY:**

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		(√)	(√)	(√)	(√)				

TABLE 2: DATA BASIS, FORMAT AND QUALITY

COMMON NAME:	WITCH FLOUNDER		
AREA:	NORTHWEST ATLANTIC		
STOCK:	NAFO DIV. 2J+3KL		
REPRODUCTIVE STRATEGY:	DETERMINATE BATCH SPAWNER	REF. NO.:	
TIMING OF SPAWNING:	MAR-JULY	REF. NO.:	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	1977-1999	A,L	S	Y	1977 2J only 3L not until 1981	1,3
	2000	A,L	S	Y		2
Stock composition	1977-1980	A,L	S	Y	See above otoliths collected but no ageing done since 1993	1
	1981-1992	A,L	CC,CL,S	Q,Q,Y		1,3
	1993	A,L	CC,CL,S	Q,Q,Y		1,2
	1994-2000	L	S	Y		1,2
	1978,1983	A,L	S	summer-fall		data from 1973-1977 and 1978-1983 combined

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.
Age determination	1977-1980	A	S	Y	Otoliths collected but no ageing done since 1993 data from 1973-1977 and 1978-1983 combined	3
	1981-1992	A	CC,CL,S	Q,Q,Y		3
	1993	A	CC,CL,S	Q,Q,Y		2
	1994-2000	A	S	Y		2
	1978,1983	A	S	summer-fall		4
Sex ratio	1977-1993	A,L	S	Y	data from 1973-1977 and 1978-1983 combined	2
	1994-2000	L	S	Y		2
	1978,1983	A,L	S	summer-fall		4
Maturity:						
A. Ogives (E)	1974	A,L	S	VARIOUS	Data from 1958-1974 combined	5
	1978,1983	A,L	S	summer-fall	data from 1973-1977 and 1978-1983 combined	4
	1977-1993	A,L	S	Y		2
	1994-2000	L	S			2
B. Skip of spawning						
C. Spawning probability						
D. Other						
Fecundity:						
A. Estimation	1994-1995, 1997-1998	A,L,W	S	Y	3L only, small sample size	2
B. First time vs. repeat spawners						
C. Atresia						
D. Other						
Weight:						
A. Commercial fisheries data	1981-1992	L	CC,CL	Q,Q	Invariant length weight relationship	2,6
B. Survey data	1978,1983	A,L	S	summer-fall fall	Data from 1973-1977 and 1978-1983 combined	4 6
	1982	A,L	S	Y		2
	1990-1993	A,L	S	Y		2
	1994-2000	A,L	S		otoliths collected but no ageing since 1993	2
C. Other						
Condition:						

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.
A. Fulton	1978,1983	A,L	S	summer-fall FALL	Data from 1973-1977 and 1978-1983 combined	2
	1982	A,L	S	Y		2
	1990-1993	A,L	S	Y	otoliths collected but no ageing since 1993	2
	1994-2000	A,L	S			2
B. HSI	1990-1993	A,L	S	Y	otoliths collected but no ageing since 1993	2
	1994-2000	A,L	S	Y		2
C. Energy						
D. Other	1990-1993	A,L	S	Y	GSI	2
	1994-2000	A,L	S	Y	GSI, otoliths collected but no ageing since 1993	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	1990	A,L	S	VARIOUS	All available data combined	7
Contamination						
Environmental key factors						
Other factors or parameters						

TABLE 4: DATA SOURCES

COMMON NAME:	WITCH FLOUNDER
AREA:	NORTHWEST ATLANTIC
STOCK:	NAFO DIV. 2J+3KL

Data sources (literature reference or contact person)
1. BOWERING, W. R. MS 2000. Stock status update of witch flounder in Divisions 2J, 3K and 3L. <i>NAFO SCR Doc.</i> , No. 13, 14 p.
2. UNPUBL. DATA: W.R. BOWERING, DFO, P.O. Box 5667, St. John's, NF, A1C 5X1, Canada (boweringr@dfo-mpo.gc.ca).
3. BOWERING, W. R., D. POWER, and W. B. BRODIE. MS 1993. The status of the witch flounder stock in Division 2J, 3K, and 3L. <i>DFO Atlantic Fish. Res. Doc.</i> , No. 49.
4. BOWERING, W. R. 1987. Distribution of witch flounder, <i>Glyptocephalus cynoglossus</i> , in the southern Labrador and eastern Newfoundland area and changes in certain biological parameters after 20 years of exploitation. <i>Fish. Bull.</i> , 85 : 611-629.
5. BOWERING, W. R. 1976. Distribution, age and growth, and sexual maturity of witch flounder (<i>Glyptocephalus cynoglossus</i>) in Newfoundland waters. <i>J. Fish. Res. Board Can.</i> , 33 : 1574-1584.
6. BOWERING, W.R. and D.E. STANSBURY. 1984. Regressions of weight on length for witch flounder, <i>Glyptocephalus cynoglossus</i> , of the eastern Newfoundland area. <i>J. Northw. Atl. Fish. Sci.</i> , 5 : 105-106.
7. BOWERING, W. R. 1990. Spawning of witch flounder (<i>Glyptocephalus cynoglossus</i> L.) in the Newfoundland-Labrador area of the northwest Atlantic as a function of depth and water temperature. <i>Fish. Res.</i> , 9 : 23-39.

TABLE 1: AVAILABLE DATA

COMMON NAME: WITCH FLOUNDER **SPECIES:** *Glyptocephalus cynoglossus*

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	(√)	√	√	(√)	(√)				

TABLE 2: DATA BASIS, FORMAT AND QUALITY

COMMON NAME:	WITCH FLOUNDER		
AREA:	NORTHWEST ATLANTIC		
STOCK:	NAFO DIV. 3NO		
REPRODUCTIVE STRATEGY:	DETERMINATE BATCH SPAWNER	REF. NO.:	
TIMING OF SPAWNING:	APRIL-JUNE	REF. NO.:	6
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	1973-1989	A,L	S	Y		1
	1990-1993	A,L	S	B		1
	1994-1995	L	S	B		2
	1996-2000	L	S	3/yr		2,9
Stock composition	1973-1978	A,L	S	Y		1
	1979-1989	A,L	CC,CL,S	Q,Q,Y		1
	1990-1993	A,L	CC,CL,S	Q,Q,B	Otoliths collected but no ageing done since 1993	1
	1994-1995	L	S	B		2
Age determination	1996-2000	L	S	3/yr		2,9
	1973-1978	A	S	Y	Otoliths collected but no ageing done since 1993	1
	1979-1989	A	CC,CL,S	Q,Q,Y		1
	1990-1993	A	CC,CL,S	Q,Q,B		1
	1994-2000	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	1973-1989	A,L	S	Y		3
	1990-1993	A,L	S	B		3
	1994-1995	L	S	B		3
	1996-2000	L	S	3/yr		3,9
Maturity:						
A. Ogives (E)	1973-1993	A,L	S	Y		3,4
	1994-2000	L	S	Y		3
B. Skip of spawning						
C. Spawning probability						
D. Other						
Fecundity:						
A. Estimation	1978	A,L,W	S	APRIL-MAY	Data from 1974-1977 combined	8
	1993-1998	A,L,W	S	Y	no ageing since 1993	3
B. First time vs. repeat spawners						
C. Atresia	1998	A,L,W	CL,S	FALL		5
D. Other						
Weight:						
A. Commercial fisheries data	1979-1993	L	CC,CL	Q,Q	invariant length weight relationship	3,7
B. Survey data	1973-1989	A,L	S	Y		3
	1990-1993	A,L	S	B		3
	1994-2000	A,L	S	B	otoliths collected but no ageing since 1993	3
C. Other						
Condition:						
A. Fulton	1990-1993	A,L	S	B		3
	1994-2000	A,L	S	B	Otoliths collected but no ageing since 1993	3
B. HSI	1990-1993	A,L	S	B		3
	1994-2000	A,L	S	B	Otoliths collected but no ageing since 1993	3
C. Energy						
D. Other	1990-1993	A,L	S	B	GSI	3
	1994-2000	A,L	S	B	GSI, otoliths collected but no ageing since 1993	3
Egg viability:						
A. Egg quality						
B. Fertilisation success						

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.
C. Egg mortality						
D. Other						
Larval viability:						
A. Hatching success						
B. Larvae quality						
C. Mortality						
D. Other						
Spawning time	1990		S	VARIOUS	All available data combined	6
Contamination						
Environmental key factors						
Other factors or parameters						

TABLE 4: DATA SOURCES

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

Data sources (literature reference or contact person)
1. BOWERING, W. R., D. POWER, and W. B. BRODIE. MS 1994. Stock status of witch flounder in NAFO Divisions 3NO. <i>NAFO SCR Doc.</i> , No. 49, 15 p.
2. BOWERING, W. R. MS 2000. Resource status of witch flounder in NAFO Divisions 3NO. <i>NAFO SCR Doc.</i> , No. 14, 20 p.
3. UNPUBL. DATA: W.R. BOWERING, DFO, P. O. Box 5667, St. John's, NF, A1C 5X1, Canada (boweringr@dfo-mpo.gc.ca).
4. BOWERING, W. R. 1976. Distribution, age and growth, and sexual maturity of witch flounder (<i>Glyptocephalus cynoglossus</i>) in Newfoundland waters. <i>J. Fish. Res. Board Can.</i> , 33 : 1574-1584.
5. UNPUBL. DATA: M. J. MORGAN, DFO, P.O. Box 5667, St. John's, NF, A1C 5X1, Canada (morganj@dfo-mpo.gc.ca).
6. BOWERING, W. R. 1990. Spawning of witch flounder (<i>Glyptocephalus cynoglossus</i> L.) in the Newfoundland-Labrador area of the northwest Atlantic as a function of depth and water temperature. <i>Fish. Res.</i> , 9 : 23-39.
7. BOWERING, W. R. and D.E. STANSBURY. 1984. Regressions of weight on length for witch flounder, <i>Glyptocephalus cynoglossus</i> , of the eastern Newfoundland area. <i>J. Northw. Atl. Fish. Sci.</i> , 5 : 105-106.
8. BOWERING, W. R. 1978. Fecundity of witch flounder (<i>Glyptocephalus cynoglossus</i>) from St. Pierre Bank and the Grand Bank of Newfoundland. <i>J. Fish. Res. Board Can.</i> , 35 : 1199-1206.
9. 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, 18 p.

TABLE 1: AVAILABLE DATA

COMMON NAME: **SPECIES:**

AREA: **STOCK:**

CREATED BY: **UPDATED BY:**

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		(√)	(√)	(√)	(√)				

TABLE 2: DATA BASIS, FORMAT AND QUALITY

COMMON NAME:

AREA:

STOCK:

REPRODUCTIVE STRATEGY: **REF. NO.:**

TIMING OF SPAWNING: **REF. NO.:**

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	1976-1994	A,L	S	Y		1
	1995-2000	L	S	Y		1,2
Stock composition	1974	A,L	S	various	data from 1958-74 combined	4
	1976-1994 1995-2000	A,L L	CC,CL,S CC,CL,S	Q,Q,Y Q,Q,Y	Otoliths still collected but no ageing since 1994	1,3 1,2
Age determination	1974	A	S	various	data from 1958-74 combined	4
	1975	A	CC,CL	Q,Q		2
	1976-1994	A	CC,CL,S	Q,Q,Y		1,3
	1995-2000	A	CC,CL,S	Q,Q,Y	Otoliths still collected but no ageing since 1994	2
Sex ratio	1974	A,L	S	VARIOUS	data from 1958-74 combined	4
	1976-1994	A,L	S	Y		2
	1995-2000	L	S	Y		2
Maturity:						
A. Ogives (E)	1974	A,L	S	VARIOUS	data from 1958-74 combined	4
	1976-1994	A,L	S	Y		2
	1995-2000	L	S	Y		2
B. Skip of spawning						
C. Spawning probability						
D. Other						

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.
Fecundity:						
A. Estimation	1978	A,L,W	S	APRIL-MAY	data from 1974-1977 combined	6
	1993-1994	A,L,W	S	Y		2
	1995-1998	A,L,W	S	Y	otoliths sampled but not aged	2
B. First time vs. repeat spawners						
C. Atresia						
D. Other						
Weight:						
A. Commercial fisheries data	1975-1994 1995-2000	L	CC,CL	Q,Q	invariant length weight relationship Otoliths collected but no ageing since 1994	2,7
B. Survey data	1990-1994 1995-2000	A,L A,L	S S	Y Y	Otoliths collected but no ageing since 1994	2 2
C. Other						
Condition:						
A. Fulton	1990-1994 1995-2000	A,L A,L	S S	Y Y	Otoliths collected but no ageing since 1994	2 2
B. HSI	1990-1994 1995-2000	A,L A,L	S S	Y Y	Otoliths collected but no ageing since 1994	2 2
C. Energy						
D. Other	1990-1994 1995-2000	A,L A,L	S S	Y Y	GSI GSI, otoliths collected but no ageing since 1994	2 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	1990	A,L	S	VARIOUS	All available data combined	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.
Contamination						
Environmental key factors						
Other factors or parameters						

TABLE 4: DATA SOURCES

COMMON NAME:	WITCH FLOUNDER
AREA:	NORTHWEST ATLANTIC
STOCK:	NAFO SUBDIV. 3Ps

Data sources (literature reference or contact person)
1. BOWERING, W. R. MS 1999. Stock status of witch flounder in NAFO Subdivision 3Ps. <i>Can. Stock Ass. Sec. Res. Doc.</i> , No. 144.
2. UNPUBL. DATA: W.R. BOWERING, DFO, P. O. Box 5667, St. John's, NF, A1C 5X1, Canada (boweringr@dfo-mpo.gc.ca).
3. BOWERING, W. R. MS 1995. Witch flounder in Subdivision 3Ps: a stock status update. <i>DFO Atl. Fish. Res. Doc.</i> , No. 38.
4. BOWERING, W. R. 1976. Distribution, age and growth, and sexual maturity of witch flounder (<i>Glyptocephalus cynoglossus</i>) in Newfoundland waters. <i>J. Fish. Res. Board Can.</i> , 33 : 1574-1584.
5. BOWERING, W. R. 1990. Spawning of witch flounder (<i>Glyptocephalus cynoglossus</i> L.) in the Newfoundland-Labrador area of the northwest Atlantic as a function of depth and water temperature. <i>Fish. Res.</i> , 9 : 23-39.
6. BOWERING, W. R. 1978. Fecundity of witch flounder (<i>Glyptocephalus cynoglossus</i>) from St. Pierre Bank and the Grand Bank of Newfoundland. <i>J. Fish. Res. Board Can.</i> , 35 : 1199-1206.
7. BOWERING, W. R. and D. E. STANSBURY. 1984. Regressions of weight on length for witch flounder, <i>Glyptocephalus cynoglossus</i> , of the eastern Newfoundland area. <i>J. Northw. Atl. Fish. Sci.</i> , 5 : 105-106.

TABLE 1: AVAILABLE DATA

COMMON NAME:	WITCH FLOUNDER	SPECIES:	<i>Glyptocephalus cynoglossus</i>
AREA:	NORTHWEST ATLANTIC	STOCK:	GULF OF MAINE-GEORGES BANK (NAFO SUBAREAS 5+6)
CREATED BY:	JAY BURNETT 2000-12-18	UPDATED BY:	

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	(√)	√							(√)

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

TABLE 2: DATA BASIS, FORMAT AND QUALITY

COMMON NAME:	WITCH FLOUNDER		
AREA:	NORTHWEST ATLANTIC		
STOCK:	GULF OF MAINE-GEORGES BANK (NAFO SUBAREAS 5+6)		
REPRODUCTIVE STRATEGY:	DETERMINATE SPAWNER	REF. NO.:	
TIMING OF SPAWNING:	APRIL-AUGUST	REF. NO.:	1
OPTIMAL TIME FOR MATURITY SAMPLING:	MARCH-APRIL	REF. NO.:	1

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	1963-1981	L	S	B	Relative abundance	2
	1982-1999	A	CL,S	Q	VPA	2
	2000	L	S	B	Relative abundance	3
Stock composition	1963-1979	L	S	B		2
	1980-1991	L,A	S,CL	Q		2
	1992-2000	L,A,W	S,CL,CC	Q	Low sampling of large market categories	2,3
Age determination	1980-2000		S,CL,CC	B,Q		2,4
Sex ratio	1980-2000	L,A	S	B		3
Maturity:						
A. Ogives (E)	1977-1979	L	S	B	Macroscopic observations	2,5,6
	1980-2000	L,A	S	B		
B. Skip of spawning						
C. Spawning probability						
D. Other						
Fecundity:						
A. Estimation	1983	L,A,W	CC	JUNE	Small sample n=25	5
B. First time vs. repeat spawners	1982-1993	A	S	B		7
C. Atresia						
D. Other						
Weight:						
A. Commercial fisheries data	1982-2000	L,A	CL	Q	Estimated using method of Rivard (1980)	2,3

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. Survey data	1963-1979	L,W	S	B	Estimated means	2,3
	1980-1982	L,A	S	B	Individual fish weights	8
	1983-1991	L,A	S	B	Estimated means	2,3
	1992-2000	L,A	S	B	Individual fish weights	2,3
C. Other						
Condition:						
A. Fulton						
B. HSI						
C. Energy						
D. Other	1980-1982	L,A,W	S	B	Gonadosomatic indices, n=>1100	8
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	1963-2000		S	M-Q	Egg and larval surveys	1,9,10,11
Contamination						
Environmental key factors						
Other factors or parameters						

TABLE 3: STUDIES OF REPRODUCTIVE POTENTIAL

COMMON NAME:	WITCH FLOUNDER
AREA:	NORTHWEST ATLANTIC
STOCK:	GULF OF MAINE-GEORGES BANK (NAFO SUBAREAS 5+6)

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			
Stock recruitment relations	Spawning stock biomass vs age 3 recruits	1982-1994	2
	Adjusted for first-time vs repeat spawners	1982-1993	7
Other studies			

TABLE 4: DATA SOURCES

COMMON NAME:	WITCH FLOUNDER
AREA:	NORTHWEST ATLANTIC
STOCK:	GULF OF MAINE-GEORGES BANK (NAFO SUBAREAS 5+6)

Data sources (literature reference or contact person)
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. Rep.</i> , No. SHL 85-04, 35 p.
2. WIGLEY, S. E., J. K. T. BRODZIAK, and S. X. CADRIN. 1999. Assessment of the witch flounder stock in Subareas 5 and 6 for 1999. <i>NEFSC Ref. Doc.</i> , 99-16, 153 p.
3. S.E. WIGLEY, Northeast Fisheries Science Center, 166 Water St, Woods Hole, MA 02543, USA (Susan.Wigley@noaa.gov).
4. BURNETT, J. 1988. Witch flounder. <i>In: Age determination methods for Northwest Atlantic species.</i> J. Penttila, and L. M. Dery (eds.). <i>NOAA Tech. Rep., NMFS</i> , 72: 135 p.
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8. UNPUBL. DATA: J. BURNETT, Northeast Fisheries Science Center, 166 Water St., Woods Hole, MA 02543, USA (Jay.Burnett@noaa.gov).
9. COLTON, J., and J. ST. ONGE. 1974. Distribution of fish eggs and larvae in continental shelf waters, Nova Scotia to Long Island. <i>Ser. Atlas Mar. Environ., Am. Geogr. Soc. Folio</i> , 23.
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11. SMITH, W.G., J. D. Sibunka, and A. WELLS. 1975. Seasonal distributions of larval flatfish (Pleuronectiformes) on the continental shelf between Cape Cod and Cape Lookout, N.C., 1965-66. <i>NOAA Tech. Rep., Spec. Sci. Rep. Fish</i> , 691: 68 p.

TABLE 1: AVAILABLE DATA

COMMON NAME:	YELLOWTAIL FLOUNDER	SPECIES:	<i>Limanda ferruginea</i>
AREA:	NORTHWEST ATLANTIC	STOCK:	NAFO DIV. 3LNO
CREATED BY:	JOANNE MORGAN SUSANA JUNQUERA	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					(√)				

TABLE 2: DATA BASIS, FORMAT AND QUALITY

COMMON NAME:	YELLOWTAIL FLOUNDER	
AREA:	NORTHWEST ATLANTIC	
STOCK:	NAFO DIV. 3LNO	
REPRODUCTIVE STRATEGY:	DERTERMINATE BATCH SPAWNER	REF. NO.: 8,9
TIMING OF SPAWNING:	MAY-JULY	REF. NO.: 6,8
OPTIMAL TIME FOR MATURITY SAMPLING:	MARCH-JUNE	REF. NO.: 8

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	1965-1974	W	CL	Q	Production model	1
	1975-1985	A,L	S,CC,CL	Y,Q,Q		2
	1986-1989	A,L	S,CC,CL	B,Q,Q		2
	1990-1996	A,L	S,CC,CL	3/YR,Q,Q		2,3
	1997-1998	A,L	S,CC,CL	6/YR,Q,Q		2,3
	1999	A,L	S,CC,CL	5/YR,Q,Q		2,3
	2000	A,L	S,CC,CL	3/YR,Q,Q		2,3
Stock composition	1968-1974	A,L	CL	Q		4
	1975-1985	A,L	S,CC,CL	Y,Q,Q		2
	1986-1989	A,L	S,CC,CL	B,Q,Q		2
	1990-1996	A,L	S,CC,CL	3/YR,Q,Q		2
	1997-1998	A,L	S,CC,CL	6/YR,Q,Q		2,3
	1999	A,L	S,CC,CL	5/YR,Q,Q		2,3
	2000	A,L	S,CC,CL	3/YR,Q,Q		2,3
Age determination	1968-1974	A	CL	Q	Age determination beyond age 7 unreliable	4
	1975-1985	A	S,CC,CL	Y,Q,Q		2,4
	1986-1989	A	S,CC,CL	B,Q,Q		2,4
	1990-1994	A	S,CC,CL	3/YR,Q,Q		2
	1995-2000	A	S,CC,CL	B,Q,Q		2
Sex ratio	1975-1985	A	S	Y	part of stock area	5,15
	1986-1989	A	S	B		5,15
	1987	L,W	CC	JUN-JUL		8
	1990-1994	A	S	3/YR		5,15
	1995-2000	A	S	B		5,15

Maturity:							
A. Ogives (E)	1949-1953	A,L	S	NOT GIVEN	Data for 1959-1968 combined	5	
	1968	A,L	S			6	
	1969-1977	A,L	S			A	5
	1978-1983	A,L	S			A	7,5
	1984-1999	A,L	S			A	2,7,5
	1995-1998	L,W	S			A	17
	2000	A,L	S	A		5	
B. Skip of spawning							
C. Spawning probability							
D. Other							
Fecundity:							
A. Estimation	1966-1967	A,L	S	spring	Both years combined	12	
	1993-1994,1996-1998	A,L	S	A		5	
	1987	L,W	CC	JUN-JUL	part of stock area	8	
	B. First time vs. repeat spawners						
C. Atresia	1987	L,W	CC	JUN-JUL	part of stock area	8	
	1998	A,L,W	CL,S	FALL		13	
D. Other							
Weight:							
A. Commercial fisheries data	1968-1987	L	CC,CL	Q	Invariant length/weight relationship	4,14	
	1988-2000	L	CC,CL	Q		5,14	
B. Survey data	1990-1994	A,L	S	3/YR	part of stock area	5	
	1995-1998	L	S	A		17	
	1995-2000	A,L	S	B		5	
C. Other							
Condition:							
A. Fulton	1990-2000	A,L	S	B		5	
B. HSI	1990-2000	A,L	S	B		5	
C. Energy							
D. Other	1990-2000	A,L	S	B	GSI	5	
Egg viability:							
A. Egg quality							
B. Fertilisation success							
C. Egg mortality							
D. Other							

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.
Larval viability:						
A. Hatching success	1999	L	EC	4 FISH		11
B. Larvae quality	1999	L	EC	6 FISH		16
C. Mortality						
D. Other						
Spawning time	1968		S	NOT GIVEN	Data combined for 1959-1968 part of stock area	6
	1987	L,W	CC	Jun-Jul		8
	1975-2000	A,L	S	Y		5
Contamination						
Environmental key factors	1999	L	EC	4 FISH	Effect of temperature on hatching success	11
Other factors or parameters	1994-1999	L	S	Y	Pelagic O group survey	10

TABLE 4: DATA SOURCES

COMMON NAME:	YELLOWTAIL FLOUNDER
AREA:	NORTHWEST ATLANTIC
STOCK:	NAFO DIV. 3LNO

Data sources (literature reference or contact person)
1. WALSH, S. J. MS 2000. Evaluating total allowable catch projections for yellowtail flounder (<i>Pleuronectes [Limanda] ferruginea</i>) on the Grand Bank using multiple indices and surplus production analysis. <i>NAFO SCR Doc.</i> , No. 44, 40 p.
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4. BRODIE, W. B. and S. J. WALSH. MS 1988. An update on the status of the yellowtail flounder stock in Divisions 3LNO. <i>NAFO SCR Doc.</i> , No. 38, 42 p.
5. UNPUBL. DATA: S. J. Walsh, DFO, P. O. Box 5667, St. John's, NF, A1C 5X1, Canada (walshj@dfo-mpo.gc.ca).
6. PITT, T. K. 1970. Distribution, abundance, and spawning of yellowtail flounder, <i>Limanda ferruginea</i> , in the Newfoundland area of the northwest Atlantic. <i>J. Fish. Res. Board Canada</i> , 27 : 2261-2271.
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11. BENOIT, H. P. and P. PEPIN. 1999. Interaction of rearing temperature and maternal influence on egg development rates and larval size at hatch in yellowtail flounder (<i>Pleuronectes ferrugineus</i>). <i>Can. J. Fish. Aquat. Sci.</i> , 56 : 785-794.
12. PITT, T. K. 1971. Fecundity of the yellowtail flounder (<i>Limanda ferruginea</i>) from the Grand Bank, Newfoundland. <i>J. Fish. Res. Board Canada</i> , 28 : 456-457.
13. UNPUBL. DATA: M. J. Morgan, DFO, P. O. Box 5667, St. John's, NF, A1C 5X1, Canada (morganj@dfo-mpo.gc.ca).
14. BRODIE, W. B. MS 1985. An assessment of the yellowtail flounder stock in NAFO Divisions 3LNO. <i>NAFO SCR Doc.</i> , No. 50, 20 p.
15. WALSH, S. J., W. B. BRODIE, M. VEITCH, D. ORR, C. MCFADDEN, and D. MADDOCK-PARSONS. MS 1998. An assessment of the Grand Bank yellowtail flounder stock in NAFO Divisions 3LNO. <i>NAFO SCR Doc.</i> , No. 72, 78 p.
16. BENOIT, H. P. and P. PEPIN. 1999 Individual variability in growth rate and timing of metamorphosis in yellowtail flounder <i>Pleuronectes ferrugineus</i> . <i>Mar. Ecol. Prog. Ser.</i> , 184 : 231-244.
17. DURÁN P., S. JUNQUERA, and M. S. ALVAREZ. MS 1999. Yellowtail flounder length at maturity in the Grand Bank (1995-98). <i>NAFO SCR Doc.</i> , No. 16, 86 p.

TABLE 1: AVAILABLE DATA

COMMON NAME:	YELLOWTAIL FLOUNDER	SPECIES:	<i>Limanda ferruginea</i>
AREA:	NORTHWEST ATLANTIC	STOCK:	GEORGES BANK NAFO DIV. 5ZE
CREATED BY:	JAY BURNETT	UPDATED BY:	

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	√	√	√		√		√		√

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

TABLE 2: DATA BASIS, FORMAT AND QUALITY

COMMON NAME:	YELLOWTAIL FLOUNDER			REF. NO.:	
AREA:	NORTHWEST ATLANTIC			REF. NO.:	1
STOCK:	GEORGES BANK NAFO DIV. 5ZE			REF. NO.:	
REPRODUCTIVE STRATEGY:	DETERMINATE BATCH SPAWNER			REF. NO.:	
TIMING OF SPAWNING:	APRIL-AUGUST			REF. NO.:	1
OPTIMAL TIME FOR MATURITY SAMPLING:	MARCH-APRIL			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	1963-1972 1973-1993 1994-2001	A,L A,L,W A,L,W	S S,CL S,CL,CC	B B,Q B,Q,M	Relative abundance VPA VPA	2
Stock composition	1963-1964 1965-1991 1992-2001	A,L A,L A,L,W	S S,CL S,CL	Y B,Q B,Q		2,3 2,3 2,3
Age determination	1963-1964 1965-1988 1989-2001		S S,CL S,CL,CC	Y B,Q B,Q,M		2,4
Sex ratio	1977-2001	A,L	S	B		5
Maturity:						
A. Ogives (E)	1973-1991 1985-1990 1992-2001	A,L A,L A,L	S S S	B B B	Macroscopic observations	6 7 2,3
B. Skip of spawning						
C. Spawning probability						
D. Other						
Fecundity:						
A. Estimation						
B. First time vs. repeat spawners						
C. Atresia						
D. Other						

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.
Weight:						
A. Commercial fisheries data	1973-2001	A,L	CL	Q	Estimated mean weights at age	2,3
B. Survey data	1992-2001	A,L	S	B	Individual weights	5
C. Other						
Condition:						
A. Fulton						
B. HSI						
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	1963-2001	L	S	M-Q	Egg and larval surveys	1,8,9,10
Contamination						
Environmental key factors						
Other factors or parameters						

TABLE 3: STUDIES OF REPRODUCTIVE POTENTIAL

COMMON NAME:	YELLOWTAIL FLOUNDER
AREA:	NORTHWEST ATLANTIC
STOCK:	GEORGES BANK NAFO DIV. 5ZE

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			
Stock recruitment relations	Spawning stock biomass vs Age 1 recruits	1973-1999	2
Other studies			

TABLE 4: DATA SOURCES

COMMON NAME:	YELLOWTAIL FLOUNDER
AREA:	NORTHWEST ATLANTIC
STOCK:	GEORGES BANK NAFO DIV. 5ZE

Data sources (literature reference or contact person)
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. Rep.</i> , No. SHL 85-04, 35 p.
2. CADRIN, S. X., J. D. NEILSON, S. GAVARIS, and P. PERLEY. 2000. Assessment of the Georges Bank yellowtail flounder stock for 2000. <i>NEFSC Ref. Doc.</i> , 00-10, 71 p.
3. CADRIN, S. Northeast Fisheries Science Center, 166 Water St., Woods Hole, MA 02543, USA (Steven.Cadrin@noaa.gov).
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8. COLTON, J., and J. ST. ONGE. 1974. Distribution of fish eggs and larvae in continental shelf waters, Nova Scotia to Long Island. <i>Ser. Atlas Mar. Environ., Am. Geogr. Soc. Folio</i> , 23.
9. 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> , 76(4): 5.
10. SMITH, W. G., J. D. SIBUNKA, and A. WELLS. 1975. Seasonal distributions of larval flatfish (Pleuronectiformes) on the continental shelf between Cape Cod and Cape Lookout, N.C., 1965-66. <i>NOAA Tech. Rpt., Spec. Sci. Rep. Fish.</i> , 691, 68 p.

TABLE 1: AVAILABLE DATA

COMMON NAME:	YELLOWTAIL FLOUNDER	SPECIES:	<i>Limanda ferruginea</i>
AREA:	NORTHWEST ATLANTIC	STOCK:	SOUTHERN NEW ENGLAND NAFO SUBDIV. 5ZW
CREATED BY:	JAY BURNETT 2001-07-30	UPDATED BY:	

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	√	√	√	(√)	√		√		√
1975	√	√	√	(√)	√		√		√

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

TABLE 2: DATA BASIS, FORMAT AND QUALITY

COMMON NAME:

AREA:

STOCK:

REPRODUCTIVE STRATEGY: **REF. NO.:**

TIMING OF SPAWNING: **REF. NO.:**

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	1963-1972	A,L	S	Y,B	Relative abundance VPA	2
	1973-1998	A,L,W	S,CL,(CC)	B,Q, (M)		2,3
	1999-2001	A,L,W	S,CL CC	B,Q,M		3
Stock composition	1963-1964	A,L	S	Y		2
	1965-1991	A,L	S,CL	B,Q		2
	1992-2001	A,L,W	S,CL	B,Q		2,3
Age determination	1963-1964		S	Y		2,3,4
	1965-1988		S,CL	Y,B,Q		
	1989-2001		S,CL,CC	B,Q,M		
Sex ratio	1970-2001	A,L	S	B		5
Maturity:						
A. Ogives (E)	1973-1991	A,L	S	B	Macroscopic observations	6
	1985-1990	A,L	S	B		7
	1992-2001	A,L	S	B		2,3,8
B. Skip of spawning						
C. Spawning probability						
D. Other						
Fecundity:						
A. Estimation						
B. First time vs. repeat spawners						
C. Atresia						
D. Other						

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.
Weight:						
A. Commercial fisheries data	1973-2001	A,L	CL	Q	Estimated mean weights at age	2,3
B. Survey data	1992-2001	A,L	B	B	Individual weights	5
C. Other						
Condition:						
A. Fulton						
B. HSI						
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	1963-2001	L	S	M-Q	Egg and larval surveys	1,9,10,11,12
Contamination	1980	L	Special study		PCH and PCB levels n=23	13
Environmental key factors						
Other factors or parameters	1973-2001	A,L	S	B,Q	Food habits studies	14

TABLE 3: STUDIES OF REPRODUCTIVE POTENTIAL

COMMON NAME:	YELLOWTAIL FLOUNDER
AREA:	NORTHWEST ATLANTIC
STOCK:	SOUTHERN NEW ENGLAND NAFO SUBDIV. 5ZW

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			
Stock recruitment relations	Spawning stock biomass vs Age 1 recruits	1963-1998	2
Other studies			

TABLE 4: DATA SOURCES

COMMON NAME:	YELLOWTAIL FLOUNDER
AREA:	NORTHWEST ATLANTIC
STOCK:	SOUTHERN NEW ENGLAND NAFO SUBDIV. 5ZW

Data sources (literature reference or contact person)
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. Rep.</i> , No. SHL 85-04, 35 p.
2. NORTHERN DEMERAL WORKING GROUP, NORTHEAST REGIONAL STOCK ASSESSMENT WORKSHOP. 2000. Assessment of 11 Northeast groundfish stocks through 1999. <i>NEFSC Ref. Doc.</i> , 00-05, 175 p.
3. CADRIN, S. Northeast Fisheries Science Center, 166 Water St., Woods Hole, MA 02543, USA (Steven.Cadrin@noaa.gov).
4. PENTTILA, J. 1988. Yellowtail flounder <i>Limanda ferruginea</i> (Chapter 19). In: Age determination methods for Northwest Atlantic species. J. Penttila, and L. M. Dery (eds.). <i>NOAA Tech. Rep., NMFS 72</i> , 135 p.
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7. 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., NMFS 113</i> , 66 p.
8. NORTHEAST FISHERIES SCIENCE CENTER. 1998. Southern New England yellowtail flounder. <i>NEFSC Ref. Doc.</i> , 98-15, 328-350 p.
9. COLTON, J., and J. ST. ONGE. 1974. Distribution of fish eggs and larvae in continental shelf waters, Nova Scotia to Long Island. <i>Ser. Atlas Mar. Environ., Am. Geogr. Soc. Folio</i> , 23.
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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., NMFS 145</i> : 310 p.
13. 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.
14. LINK, J. S., and F. P. ALMEIDA. 2000. An overview and history of the Food Web Dynamics Program of the Northeast Fisheries Science Center, Woods Hole, Massachusetts. <i>NOAA Tech. Mem.</i> , NMFS-NE-159, 60 p.

TABLE 1: AVAILABLE DATA

COMMON NAME:	YELLOWTAIL FLOUNDER	SPECIES:	<i>Limanda ferruginea</i>
AREA:	NORTHWEST ATLANTIC	STOCK:	CAPE COD US STATISTICAL AREAS 514 AND 521
CREATED BY:	JAY BURNETT 2001-07-31	UPDATED BY:	

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	(√)	√							√
1975	(√)	√							√

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

TABLE 2: DATA BASIS, FORMAT AND QUALITY

COMMON NAME:

AREA:

STOCK:

REPRODUCTIVE STRATEGY: **REF. NO.:**

TIMING OF SPAWNING: **REF. NO.:**

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	1963-1984	L	S	Y,B	Relative abundance	2,3
	1985-1999	A,L	S,CL,CC	B,Q	VPA	2,3,4
	2000-2001	A,L	S,CL,CC	B,Q		3
Stock composition	1963-1977	L	S	Y,B	Fall survey only 1963-67	2,3
	1978-2001	A,L	S,CL,CC	B,Q	Sea sampling began 1989	2,3
Age determination	1978-2001		S,CL,CC	B,Q	NEFSC and MA DMF surveys	2,5
Sex ratio	1978-2001	A,L	S,CL	B,Q	Commercial samples sexed	6
Maturity:						
A. Ogives (E)	1985-1990 combined	A,L	S	B	Macroscopic observations	7
B. Skip of spawning						
C. Spawning probability						
D. Other						
Fecundity:						
A. Estimation						
B. First time vs. repeat spawners						
C. Atresia						
D. Other						
Weight:						
A. Commercial fisheries data	1985-1998	A,L	CL	Q	Estimated mean weights	2,3
B. Survey data	1992-2001	A,L	S	B	Individual fish weights	6
C. Other						

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.
Condition:						
A. Fulton						
B. HSI						
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	1963-2001	L	S	Q-M	Egg and larval surveys	1,8,9 10,11
Contamination	1980	L	Special study		PCH and PCB levels n=8	12
Environmental key factors						
Other factors or parameters	1973-2001	A,L	S	B	Food habits data	13

TABLE 3: STUDIES OF REPRODUCTIVE POTENTIAL

COMMON NAME:	YELLOWTAIL FLOUNDER
AREA:	NORTHWEST ATLANTIC
STOCK:	CAPE COD US STATISTICAL AREAS 514 AND 521

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			
Stock recruitment relations	Spawning stock biomass vs Age 1 recruits	1985-1996	2
Other studies			

TABLE 4: DATA SOURCES

COMMON NAME:	YELLOWTAIL FLOUNDER
AREA:	NORTHWEST ATLANTIC
STOCK:	CAPE COD US STATISTICAL AREAS 514 AND 521

Data sources (literature reference or contact person)
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. Rep.</i> , No. SHL 85-04, 35 p.
2. 28th NORTHEAST REGIONAL STOCK ASSESSMENT WORKSHOP (28th SAW). 1999. Stock Assessment Review Committee (SARC) Consensus Summary of Assessments. <i>NEFSC Ref. Doc.</i> , 99-08, 304 p.
3. CADRIN, S. Northeast Fisheries Science Center, 166 Water St., Woods Hole, MA 02543 USA (Steven.Cadrin@noaa.gov).
4. NORTHERN DEMERSAL WORKING GROUP. 2000. Assessment of 11 Northeast groundfish stocks through 1999: a report to the New England Fishery Management Council's Multi-species Monitoring Committee. <i>NEFSC Ref. Doc.</i> , 00-05, 175 p.
5. PENTTILA, J. 1988. Yellowtail flounder <i>Limanda ferruginea</i> (Chapter 19). In: Age determination methods for Northwest Atlantic species. J. Penttila, and L.M. Dery (eds.). <i>NOAA Tech. Rep., NMFS 72</i> , 135 p.
6. BURNETT, J. Northeast Fisheries Science Center, 166 Water St., Woods Hole, MA 02543, USA (Jay.Burnett@noaa.gov).
7. 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., NMFS</i> , 113: 66 p.
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10. SMITH, W. G., J. D. SIBUNKA, and A. WELLS. 1975. Seasonal distributions of larval flatfish (Pleuronectiformes) on the continental shelf between Cape Cod and Cape Lookout, N.C., 1965-66. <i>NOAA Tech. Rep. Spec. Sci. Rep. Fish.</i> , 691: 68.
11. 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., NMFS</i> , 145, 310 p.
12. 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.
13. LINK, J. S., and F.P. ALMEIDA. 2000. An overview and history of the Food Web Dynamics Program of the Northeast Fisheries Science Center, Woods Hole, Massachusetts. <i>NOAA Tech. Mem.</i> , NMFS-NE-159, 60 p.

TABLE 1: AVAILABLE DATA

COMMON NAME:	WINTER FLOUNDER	SPECIES:	<i>Pseudopleuronectes americanus</i>
AREA:	NORTHWEST ATLANTIC	STOCK:	GEORGES BANK (NAFO DIV. 5Z)
CREATED BY:	JAY BURNETT 2001-01-08	UPDATED BY:	

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	(√)	√	(√)	(√)	(√)				(√)

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

TABLE 2: DATA BASIS, FORMAT AND QUALITY

COMMON NAME:	WINTER FLOUNDER		
AREA:	NORTHWEST ATLANTIC		
STOCK:	GEORGES BANK (NAFO DIV. 5Z)		
REPRODUCTIVE STRATEGY:	DETERMINATE BATCH SPAWNER	REF. NO.:	
TIMING OF SPAWNING:	MARCH-MAY	REF. NO.:	1
OPTIMAL TIME FOR MATURITY SAMPLING:	FEBRUARY-APRIL	REF. NO.:	1

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	1963-1981	L	S	B	Relative abundance	2
	1982-1998	A	CL,S	Q	VPA	2
	1999-2000	L	S	B	Relative abundance	3
Stock composition	1963-1979	L	S	B	Low survey catches	2
	1980-1991	L,A	S,CL	Q	Low survey catches	2
	1992-2000	L,A,W	S,CL,CC	Q	Low survey catches	2,3
Age determination	1976-1979		S,CL	B,Q	Unaged samples	4
	1980-2000		S,CL,CC	B,Q		2
Sex ratio	1976-2000	L,A	S	B	Unanalyzed data	4
Maturity:						
A. Ogives (E)	1985-1989	A,L	S	B	Pooled; macroscopic obs.	5
	1982-1998	A,L	S	B	Pooled; macroscopic obs.	2
	1976-1981	A,L	S	B	Unanalyzed data	4
	1999-2000	A,L	S	B	Unanalyzed data	4
B. Skip of spawning						
C. Spawning probability						
D. Other						
Fecundity:						
A. Estimation						
B. First time vs repeat spawners						
C. Atresia						
D. Other						

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.
A. Commercial fisheries data	1982-2000	L,A	CL	Q		2
B. Survey data	1992-2000	L,A	S	B	Individual fish weights	4
C. Other						
Condition:						
A. Fulton						
B. HSI						
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	1963-2000		S	M-Q	Egg and larval surveys	1,6,7,8
Contamination						
Environmental key factors						
Other factors or parameters						

TABLE 3: STUDIES OF REPRODUCTIVE POTENTIAL

COMMON NAME:	WINTER FLOUNDER
AREA:	NORTHWEST ATLANTIC
STOCK:	GEORGES BANK (NAFO DIV. 5Z)

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			
Stock recruitment relations	Spawning stock biomass vs age 2 recruits	1980-1997	2
Other studies			

TABLE 4: DATA SOURCES

COMMON NAME:	WINTER FLOUNDER
AREA:	NORTHWEST ATLANTIC
STOCK:	GEORGES BANK (NAFO DIV. 5Z)

Data sources (literature reference or contact person)
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. Rep.</i> , No. SHL 85-04, 35 p.
2. BROWN, R. W., J. M. BURNETT, G. A. BEGG, and S. X. CADRIN. 2000. Assessment of the Georges Bank winter flounder stock, 1982-1997. <i>NEFSC Ref. Doc.</i> , 00-16, 88 p.
3. Unpublished data; L. HENDRICKSON, Northeast Fisheries Science Center, 166 Water St., Woods Hole, MA 02543, USA (Lisa.Hendrickson@noaa.gov).
4. UNPUBL. DATA, J. BURNETT. Northeast Fisheries Science Center, 166 Water St., Woods Hole, MA 02543, USA (Jay.Burnett@noaa.gov).
5. 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., NMFS</i> , 113: 66 p.
6. COLTON, J., and J. ST. ONGE. 1974. Distribution of fish eggs and larvae in continental shelf waters, Nova Scotia to Long Island. <i>Ser. Atlas Mar. Environ., Am. Geogr. Soc. Folio</i> , 23.
7. 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> , 76(4): 5.
8. SMITH, W.G., J. D. SIBUNKA, and A. WELLS. 1975. Seasonal distributions of larval flatfish (Pleuronectiformes) on the continental shelf between Cape Cod and Cape Lookout, N.C., 1965-66. <i>NOAA Tech. Rep., Spec. Sci. Rep. Fish.</i> , 691: 68 p.

TABLE 1: AVAILABLE DATA

COMMON NAME:	WINTER FLOUNDER	SPECIES:	<i>Pseudopleuronectes americanus</i>
AREA:	NORTHWEST ATLANTIC	STOCK:	COASTAL (SOUTHERN NEW ENGLAND/MID-ATLANTIC) NAFO SUBAREAS 5+6
CREATED BY:	JAY BURNETT 2001-08-10	UPDATED BY:	

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	(√)	√							√

Data status									
Year	Stock size	Stock composition	Age	Sex ratio	Maturity	Fecundity	Weight	Condition	Additional data
1975	(√)	√							√
1974	(√)	√							√
1973	(√)	√							√
1972	(√)	√							√
1971	(√)	√							√
1970	(√)	√							√
1969	(√)	√							√
1968	(√)	√							√
1967	(√)	√							√
1966	(√)	√							√
1965	(√)	√							√
1964	(√)	√							√
1963	(√)	√							√
1962									
1961									
1960									
1959									
1958						√			

TABLE 2: DATA BASIS, FORMAT AND QUALITY

COMMON NAME:	WINTER FLOUNDER	
AREA:	NORTHWEST ATLANTIC	
STOCK:	COASTAL (SOUTHERN NEW ENGLAND/MID-ATLANTIC) NAFO SUBAREAS 5+6	
REPRODUCTIVE STRATEGY:	DETERMINATE BATCH SPAWNER	REF. NO.: <input type="text"/>
TIMING OF SPAWNING:	FEBRUARY-MAY	REF. NO.: <input type="text" value="1"/>
OPTIMAL TIME FOR MATURITY SAMPLING:	MARCH	REF. NO.: <input type="text"/>

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	1963-1980	L	S	Y,B	Relative abundance	2,3,4
	1981-1998	A,L,W	S,CL,CC	B,Q	VPA	2,3,4
	1999-2001	A,L,W	S,CL,CC	B,Q		4
Stock composition	1963-1980	L	S	Y,B	Fall survey only 1963-67	2
	1981-2001	A,L,W	S,CL,CC	B,Q	Sea sampling begun 1989	2,3,4
Age determination	1978-2001		S,CL,CC	B,Q	MA DMF only 1978-79 Commercial 1981-2000	2,4,5
Sex ratio	1977-2001	A,L	S	B		6
Maturity:						
A. Ogives (E)	1985-1990	A,L	S	B	Macroscopic observations 1977-2001	6,7
B. Skip of spawning						
C. Spawning probability						
D. Other	1988	A,L,W	Special study		Gonadosomatic index	8
Fecundity:						
A. Estimation	1958	A,L,W	Special studies		Narragansett Bay, RI n=40 Narragansett Bay	9
	1988	A,L,W				8
B. First time vs. repeat spawners						
C. Atresia	1966	L	Experimental studies		N=103 n=120	10
	1966	L				11
D. Other						
Weight:						
A. Commercial fisheries data	1981-1997	A,L	CL	Q	Estimated mean weights	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. Survey data	1992-2001	A,L	S	B	Individual fish weights	6
C. Other						
Condition:						
A. Fulton						
B. HSI	1966	L,W	Experiment		N=120	11
C. Energy	1966	L,W	Experiment		N=120	11
D. Other						
Egg viability:						
A. Egg quality	1988	A,L,W	Experiment		N=40	8
B. Fertilisation success	1986-1988 1988	A,L,W A,L,W	Special studies		Long I. Sound & Boston Narragansett Bay, RI	12 8
C. Egg mortality						
D. Other						
Larval viability:						
A. Hatching success	1986-1988 1988	A,L,W	Special studies		Long I. Sound & Boston Narragansett Bay, RI	12 8
B. Larvae quality	1986-1988	A,L,W	Special study		Long Island Sound and Boston Harbor	12
C. Mortality	1986-1988 1988	A,L,W	Special studies		Long I. Sound & Boston Narragansett Bay, RI	12 8
D. Other						
Spawning time	1963-2001	L	S	Q-M	Egg and larval surveys	1,13,14 15,16
Contamination	1980 1986-1988	L A,L,W	Special studies		PCH/PCB levels n=22 Long Island Sound	17 12
Environmental key factors						
Other factors or parameters	1973-2001	A,L	S	B	Food habits data	18

TABLE 3: STUDIES OF REPRODUCTIVE POTENTIAL

COMMON NAME:	WINTER FLOUNDER
AREA:	NORTHWEST ATLANTIC
STOCK:	COASTAL (SOUTHERN NEW ENGLAND/MID-ATLANTIC) NAFO SUBAREAS 5+6

Estimation of reproductive potential			
Subject	Brief description	Year range	Ref. No.
Potential or realised egg production			
Viable egg and larvae production	Experimental study with Narragansett Bay fish	1988	8
	Experimental study with Long Island Sound and Boston fish	1986-1988	12
Critical life stages			
Environmental influences			
Stock recruitment relations	Spawning stock biomass vs Age 1 recruits	1981-1997	2
Other studies			

TABLE 4: DATA SOURCES

COMMON NAME:	WINTER FLOUNDER
AREA:	NORTHWEST ATLANTIC
STOCK:	COASTAL (SOUTHERN NEW ENGLAND/MID-ATLANTIC) NAFO SUBAREAS 5+6

Data sources (literature reference or contact person)	
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. Rep.</i> , No. SHL 85-04, 35 p.
2.	28th NORTHEAST REGIONAL STOCK ASSESSMENT WORKSHOP (28th SAW). 1999. E. Southern New England/Mid-Atlantic Winter Flounder. <i>In: Stock Assessment Review Committee (SARC) Consensus Summary of Assessments. NEFSC Ref. Doc.</i> , 99-08, 304 p.
3.	NORTHERN DEMERSAL WORKING GROUP. 2000. Assessment of 11 Northeast Groundfish Stocks through 1999: a report to the New England Fishery Management Council's Multi-species Monitoring Committee. <i>NEFSC Ref. Doc.</i> , 00-05, 175 p.
4.	NITSCHKE, P. Northeast Fisheries Science Center, 166 Water St., Woods Hole, MA 02543 USA (Paul.Nitschke@noaa.gov).
5.	FIELDS, B. 1988. Winter flounder <i>Pseudopleuronectes americanus</i> (Chapter 16). <i>In: Age determination methods for Northwest Atlantic species.</i> J. Penttila, and L. M. Dery (eds.). <i>NOAA Tech. Rep., NMFS 72</i> , 135 p.
6.	BURNETT, J. Northeast Fisheries Science Center, 166 Water St., Woods Hole, MA 02543, USA (Jay.Burnett@noaa.gov).
7.	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., NMFS</i> , 113 , 66 p.
8.	BUCKLEY, L. J., A. S. SMIGIELSKI, T. A. HALAVIK, E. M. CALDARONE, B. R. BURNS, and G. C. LAURENCE. 1991. Winter flounder <i>Pseudopleuronectes americanus</i> reproductive success. II. Effects of spawning time and female size on size, composition and viability of eggs and larvae. <i>Mar. Ecol. Prog. Ser.</i> , 74 : 125-135.
9.	SAILA, S. B. 1963. The contribution of estuaries to the offshore winter flounder fishery in Rhode Island. <i>Proc. Carrib. Fish. Inst.</i> , 14 : 95-109.
10.	DUNN, R.S., and A.V. TYLER. 1969. Aspects of the anatomy of the winter flounder ovary with hypotheses on oocyte maturation time. <i>J. Fish. Res. Board Can.</i> , 26 : 1943-1947.
11.	TYLER, A.V., and R.S. DUNN. 1976. Ration, growth, and measures of somatic and organic condition in relation to meal frequency in winter flounder, <i>Pseudopleuronectes americanus</i> , with hypotheses regarding population homeostasis. <i>J. Fish. Res. Board Can.</i> , 33 : 63-75.
12.	NOAA, NMFS, NEFC. 1990. Final Report on a three-year assessment of reproductive success in winter flounder, <i>Pseudopleuronectes americanus</i> (Walbaum), in Long Island Sound, with comparisons to Boston Harbor, 1986-1988. I. Reproductive cycle: vitellogenin. II. Comparative reproductive success: biology, biochemistry, chemistry. III. Comparative embryo development and mortality. Milford Laboratory, Milford, CT, 118 p.
13.	COLTON, J., and J. ST. ONGE. 1974. Distribution of fish eggs and larvae in continental shelf waters, Nova Scotia to Long Island. <i>Ser. Atlas Mar. Environ., Am. Geogr. Soc. Folio</i> , 23 .

Data sources (literature reference or contact person)
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> , 76 (4): 5.
15. SMITH, W. G., J. D. SIBUNKA, and A. WELLS. 1975. Seasonal distributions of larval flatfish (Pleuronectiformes) on the continental shelf between Cape Cod and Cape Lookout, N.C., 1965-66. <i>NOAA Tech. Rep. Spec. Sci. Rep. Fish.</i> , 691 : 68.
16. 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., NMFS</i> , 145 , 310 p.
17. 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.
18. LINK, J. S., and F. P. ALMEIDA. 2000. An overview and history of the Food Web Dynamics Program of the Northeast Fisheries Science Center, Woods Hole, Massachusetts. <i>NOAA Tech. Mem.</i> , NMFS-NE-159, 60 p.

TABLE 1: AVAILABLE DATA

COMMON NAME: **SPECIES:**

AREA: **STOCK:**

CREATED BY: **UPDATED BY:**

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	(√)	√	√	(√)	√				√

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

TABLE 2: DATA BASIS, FORMAT AND QUALITY

COMMON NAME:	SUMMER FLOUNDER		
AREA:	NORTHWEST ATLANTIC		
STOCK:	MID-ATLANTIC-GEORGES BANK (NAFO SUBAREAS 5+6)		
REPRODUCTIVE STRATEGY:	DETERMINATE BATCH SPAWNER	REF. NO.:	1
TIMING OF SPAWNING:	AUGUST-DECEMBER	REF. NO.:	2
OPTIMAL TIME FOR MATURITY SAMPLING:	SEPTEMBER-OCTOBER	REF. NO.:	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.
Stock size	1963-1981	A,L	S	Y,B	Relative abundance	3
	1982-1988	A,L,W	S,CL,R	B,Q,M	VPA	3
	1989-1999	A,L,W	S,CL,CC,R	B,Q,Q,M	VPA	3
	2000-2001	A,L,W	S,CL,CC,R	B,Q,Q,M	updated VPA	4
Stock composition	1963-1975	L	S	Y,B	Spring survey added 1968	3,4
	1976-1981	A,L	S,CL	B,Q		
	1982-1988	A,L,W	S,CL,R	B,Q,Q,M	Recreational sampling	
	1989-1991	A,L,W	S,CL,CC,R	B,Q,Q,M		
	1992-2001	A,L,W	S,CL,CC,R	B,Q,Q,M	Individual fish weights	
Age determination	1976-1988		S,CL	B,Q		3,5
	1989-2001		S,CL,CC	B,Q,Q		
Sex ratio	1976-2001	A,L	S	B		6
Maturity:						
A. Ogives (E)	1978-1989	A,L	S	Y	Macroscopic observations	3
	1982-1989	A,L	S	Y		3
	1985-1990	A,L	S	Y		7
	1992-1998	A,L	S	Y	Histological analysis	3
	1999	A,L	S	Q		1
B. Skip of spawning						
C. Spawning probability						
D. Other						
Fecundity:						
A. Estimation						
B. First time vs. repeat spawners						
C. Atresia						

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.
D. Other						
Weight:						
A. Commercial fisheries data	1982-1999	A,L	CL	Q	Estimated mean weights	3
B. Survey data	1992-2001	A.L	S	B	Individual fish weights	6
C. Other	1982-1999	L	R	Q	Estimated mean weights recreational fishery	3,4
Condition:						
A. Fulton						
B. HSI						
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	1963-2001	L	S	Q-M	Egg and larval surveys	2,8,9,10
Contamination	1980	L	Special study		PCH and PCB levels n=2 fish	11
Environmental key factors						
Other factors or parameters	1973-2001	A,L	S	B,Q	Food habits studies	12

TABLE 3: STUDIES OF REPRODUCTIVE POTENTIAL

COMMON NAME:	SUMMER FLOUNDER
AREA:	NORTHWEST ATLANTIC
STOCK:	MID-ATLANTIC-GEORGES BANK (NAFO SUBAREAS 5+6)

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			
Stock recruitment relations	Spawning stock biomass vs Age 0 recruits	1983-1999	3
Other studies			

TABLE 4: DATA SOURCES

COMMON NAME:	SUMMER FLOUNDER
AREA:	NORTHWEST ATLANTIC
STOCK:	MID-ATLANTIC-GEORGES BANK (NAFO SUBAREAS 5+6)

Data sources (literature reference or contact person)
1. SPECKER, J., R. R. MERSON, C. MARTINEZ, and B. SOFFIENTINO. 1999. Maturity status of female summer flounder and monkfish. <i>URI/NOAA Cooperative Marine Education and Research Program (CMER) Final Report</i> , Award No. NA67FE0385, 9 p.
2. 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. Rep.</i> , No. SHL 85-04, 35 p.
3. NORTHEAST FISHERIES SCIENCE CENTER. 2000. D. Summer Flounder. <i>In: 31st Northeast Regional Stock Assessment Workshop: Stock Assessment Review Committee Consensus Summary of Assessments. NEFSC Ref. Doc.</i> , 00-15, 305-400 p.
4. TERCEIRO, M. Northeast Fisheries Science Center, 166 Water St., Woods Hole, MA 02543, USA (Mark.Terceiro@noaa.gov).
5. DERY, L. M. 1988. Summer flounder <i>Paralichthys dentatus</i> (Chapter 15). <i>In: Age determination methods for Northwest Atlantic species</i> . J. Penttila, and L. M. Dery (eds.). <i>NOAA Tech. Rep.</i> , NMFS 72, 135 p.
6. BURNETT, J. Northeast Fisheries Science Center, 166 Water St., Woods Hole, MA 02543, USA (Jay.Burnett@noaa.gov).
7. 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.
8. COLTON, J., and J. ST. ONGE. 1974. Distribution of fish eggs and larvae in continental shelf waters, Nova Scotia to Long Island. <i>Ser. Atlas Mar. Environ., Am. Geogr. Soc. Folio</i> , 23.
9. 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> , 76(4): 5.
10. 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.
11. 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.
12. LINK, J. S., and F. P. ALMEIDA. 2000. An overview and history of the Food Web Dynamics Program of the Northeast Fisheries Science Center, Woods Hole, Massachusetts. <i>NOAA Tech. Mem.</i> , NMFS-NE-159, 60 p.

TABLE 1: AVAILABLE DATA

COMMON NAME:	ACADIAN REDFISH	SPECIES:	<i>Sebastes fasciatus</i>
AREA:	NORTHWEST ATLANTIC	STOCK:	FLEMISH CAP (NAFO DIV. 3M)
CREATED BY:	FRAN SABORIDO-REY 2001-05-30	UPDATED BY:	

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	√	√	√	√			√	√	

TABLE 2: DATA BASIS, FORMAT AND QUALITY

COMMON NAME:	ACADIAN REDFISH	
AREA:	NORTHWEST ATLANTIC	
STOCK:	FLEMISH CAP (NAFO DIV. 3M)	
REPRODUCTIVE STRATEGY:	DETERMINATE SPAWNER	REF. NO.:
TIMING OF SPAWNING:	JUNE-JULY	REF. NO.: 1,2
OPTIMAL TIME FOR MATURITY SAMPLING:	MAY-JUNE	REF. NO.: 1,2

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.
Stock size	1991-2000	A	S	Y	Relative abundance, VPA	2,3,4
Stock composition	1991-2000	A,L,W	S	Y		2,3,4
Age determination	1991-2000		S	Y		2,5,6
Sex ratio	1991-2000	A,L	S	Y		2,3,4
Maturity:						
A. Ogives (E)	1992-2000	A,L	S	Y	Microscopic observations	1,2
B. Skip of spawning						
C. Spawning probability	1992-2000	A,L	S	Y	Microscopic observations	1,2
D. Other						
Fecundity:						
A. Estimation						
B. First time vs. repeat spawners						
C. Atresia						
D. Other						
Weight:						
A. Commercial fisheries data						
B. Survey data	1991-2000	A,L	S	Y	Individual fish weights	2, 3
C. Other						
Condition:						
A. Fulton						

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						
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	1978-1986		S			7
C. Mortality						
D. Other						
Spawning time						
Contamination						
Environmental key factors	Temperature; salinity		S	Y	Summer values	2
Other factors or parameters						

TABLE 3: STUDIES OF REPRODUCTIVE POTENTIAL

COMMON NAME:	ACADIAN REDFISH
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	Variations in larval abundance	1978-1986	8
Critical life stages			
Environmental influences			
Stock recruitment relations	Spawning stock biomass vs age 5 recruits	1992-2000	2
Other studies			

TABLE 4: DATA SOURCES

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

Data sources (literature reference or contact person)
1. SABORIDO-REY, F. 1994. Genus <i>Sebastes</i> Cuvier, 1829 (Pisces, Scorpaenidae) in the North Atlantic: Identification of species and populations using morphometric methods; Growth and reproduction of the Flemish Cap populations. Ph. D Thesis. Autonomous University of Madrid.
2. SABORIDO-REY, F. Institute of Marine Research. C/ Eduardo Cabello, 6. 36208, Vigo, Spain. (fran@iim.csic.es).
3. F. Saborido-Rey and A. Vázquez. 2001. Results from Bottom Trawl Survey on Flemish Cap of July 2000. <i>NAFO SCR Doc.</i> , No. 22, 56 p.
4. ÁVILA DE MELO, A., R. ALPOIM and F. SABORIDO-REY. 2001. A Comparative Assessment and Medium Term Projections of Redfish (<i>S. mentella</i> and <i>S. fasciatus</i>) in NAFO Division 3M. <i>NAFO SCR Doc.</i> , No 45, 66 p.
5. SABORIDO REY, F. 1995. Age and growth of redfish in Flemish Cap (Div. 3M). 1995. <i>NAFO SCR Doc.</i> , No 31, 16 p.
6. ICES. 1996. Report of the workshop on age reading of <i>Sebastes</i> spp. <i>ICES C.M. Doc.</i> , No. G:1.
7. ANDERSON, J. T. 1994. Feeding ecology and condition of larval and pelagic juvenile redfish <i>Sebastes</i> spp. <i>Mar. Ecol. Prog. Ser.</i> , Vol. 104, No. 3, pp. 211-226.
8. PEPIN, P, J. T. ANDERSON. 1997. Scale-dependent variations in the precision of larval fish abundance estimates: A case study of <i>Sebastes</i> sp. on Flemish Cap. <i>Can. J. Fish. Aquat. Sci.</i> , Vol. 54, No. 5, p. 1111-1120.

Data status									
Year	Stock size	Stock composition	Age	Sex ratio	Maturity	Fecundity	Weight	Condition	Additional data
1978	(√)								
1977									
1976									
1975									
1974									
1973									
1972									
1971									
1970									
1969				(√)	(√)				
1968				(√)	(√)				
1967				(√)	(√)				
1966				(√)	(√)				
1965				(√)	(√)				
1964				(√)	(√)				
1963				(√)	(√)				
1962				(√)	(√)				
1961				(√)	(√)				
1960				(√)	(√)				
1959				(√)	(√)				
1958				(√)	(√)				
1957				(√)	(√)				

TABLE 2: DATA BASIS, FORMAT AND QUALITY

COMMON NAME:	GOLDEN REDFISH		
AREA:	NORTHWEST ATLANTIC		
STOCK:	FLEMISH CAP (NAFO DIV. 3M)		
REPRODUCTIVE STRATEGY:	DETERMINATE SPAWNER	REF. NO.:	
TIMING OF SPAWNING:	APRIL-JUNE	REF. NO.:	1,2
OPTIMAL TIME FOR MATURITY SAMPLING:	FEBRUARY-APRIL	REF. NO.:	1,2

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.
Stock size	1978-1985	W	S	Y	Relative abundance, VPA	8
	1988-2000	A	S	Y		2,3,4
Stock composition	1988-2000	A,L,W	S	Y		2,3,4
Age determination	1988-2000		S	Y		2,5,6
Sex ratio	1957-1969	L	S	Y	For various NAFO areas	9,10
	1988-2000	A,L	S	Y		2,3,4
Maturity:						
A. Ogives (E)	1957-1969	L	S	Y	ogives for a number of NAFO areas Microscopic observations	9,10
	1992-2000	A,L	S	Y		1,2
B. Skip of spawning						
C. Spawning probability	1992-2000	A,L	S	Y	Microscopic observations	1,2
D. Other						
Fecundity:						
A. Estimation						
B. First time vs. repeat spawners						
C. Atresia						
D. Other						
Weight:						

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.
A. Commercial fisheries data						
B. Survey data	1988-2000	A,L	S	Y	Individual fish weights	3
C. Other						
Condition:						
A. Fulton						
B. HSI						
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						
Contamination						
Environmental key factors	Temperature		S	Y	Summer values	2,7
Other factors or parameters						

TABLE 3: STUDIES OF REPRODUCTIVE POTENTIAL

COMMON NAME:	GOLDEN REDFISH
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			
Critical life stages			
Environmental influences			
Stock recruitment relations	Spawning stock biomass vs age 5 recruits	1992-2000	2
Other studies			

TABLE 4: DATA SOURCES

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

Data sources (literature reference or contact person)
1. SABORIDO-REY, F. 1994. Genus <i>Sebastes</i> Cuvier, 1829 (Pisces, Scorpaenidae) in the North Atlantic: Identification of species and populations using morphometric methods; Growth and reproduction of the Flemish Cap populations. Ph. D Thesis. Autonomous University of Madrid.
2. SABORIDO-REY, F. Institute of Marine Research. C/ Eduardo Cabello, 6. 36208, Vigo, Spain. (fran@iim.csic.es).
3. SABORIDO-REY, F. and A. VÁZQUEZ. MS 2001. Results from Bottom Trawl Survey on Flemish Cap of July 2000. <i>NAFO SCR Doc.</i> , No. 22, 56 p.
4. ÁVILA DE MELO, A., R. ALPOIM, and F. SABORIDO-REY. MS 2001. A Comparative Assessment and Medium Term Projections of Redfish (<i>S. mentella</i> and <i>S. fasciatus</i>) in NAFO Division 3M. <i>NAFO SCR Doc.</i> , No. 45.
5. SABORIDO REY, F. MS 1995. Age and growth of redfish in Flemish Cap (Div. 3M). 1995. <i>NAFO SCR Doc.</i> , No. 31, 16 p.
6. ICES. 1996. Report of the workshop on age reading of <i>Sebastes</i> spp. <i>ICES C.M. Doc.</i> , No. G:1
7. CERVIÑO, S. MS 2001. Hydrographic Conditions on Flemish Cap in July 2000 and Comparison with those Observed in 1999. <i>NAFO SCR Doc.</i> , No. 24.
8. POWER, D. Redfish Assessment Biologist. Aquatic Resources Division. Department of Fisheries and Oceans, P. O. Box 5667, St. John's, NF, Canada, A1C 5X1 (PowerD@dfp-mpo.gc.ca).
9. NI, I-H., and E. J. SANDEMAN. 1984. Size at maturity for Northwest Atlantic redfishes (<i>Sebastes</i>). <i>Can. J. Fish. Aquat. Sci.</i> , 41: 1753-1762.
10. NI, I-H., and W. TEMPLEMAN. 1985. Reproductive cycles of redfishes (<i>Sebastes</i>) in southern Newfoundland waters. <i>J. Northw. Atl. Fish. Sci.</i> , 6: 57-63.

TABLE 1: AVAILABLE DATA

COMMON NAME:	DEEP-SEA REDFISH	SPECIES:	<i>Sebastes mentella</i>
AREA:	NORTHWEST ATLANTIC	STOCK:	FLEMISH CAP (NAFO DIV. 3M)
CREATED BY:	FRAN SABORIDO-REY 2001-05-30	UPDATED BY:	

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	√	√	√	√			√	√	

TABLE 2: DATA BASIS, FORMAT AND QUALITY

COMMON NAME:	DEEP-SEA REDFISH	
AREA:	NORTHWEST ATLANTIC	
STOCK:	FLEMISH CAP (NAFO DIV. 3M)	
REPRODUCTIVE STRATEGY:	DETERMINATE SPAWNER	REF. NO.: <input type="text"/>
TIMING OF SPAWNING:	FEBRUARY-APRIL	REF. NO.: <input type="text" value="1,2"/>
OPTIMAL TIME FOR MATURITY SAMPLING:	JANUARY-FEBRUARY	REF. NO.: <input type="text" value="1,2"/>

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.
Stock size	1991-2000	A	S	Y	Relative abundance, VPA	2,3,4
Stock composition	1991-2000	A,L,W	S	Y		2,3,4
Age determination	1991-2000		S	Y		2,5,6
Sex ratio	1991-2000	A,L	S	Y		2,3,4
Maturity:						
A. Ogives (E)	1992-2000	A,L	S	Y	Microscopic observations	1,2
B. Skip of spawning						
C. Spawning probability	1992-2000	A,L	S	Y	Microscopic observations	1,2
D. Other						
Fecundity:						
A. Estimation						
B. First time vs. repeat spawners						
C. Atresia						
D. Other						
Weight:						
A. Commercial fisheries data						
B. Survey data	1991-2000	A,L	S	Y	Individual fish weights	3

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.
C. Other						
Condition:						
A. Fulton						
B. HSI						
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						
Contamination						
Environmental key factors	Temperature		S	Y	Summer values	2,7
Other factors or parameters						

TABLE 3: STUDIES OF REPRODUCTIVE POTENTIAL

COMMON NAME:	DEEP-SEA REDFISH
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			
Critical life stages			
Environmental influences			
Stock recruitment relations	Spawning stock biomass vs age 5 recruits	1992-2000	2
Other studies			

TABLE 4: DATA SOURCES

COMMON NAME:	DEEP-SEA REDFISH
AREA:	NORTHWEST ATLANTIC
STOCK:	FLEMISH CAP (NAFO DIV. 3M)

Data sources (literature reference or contact person)
1. SABORIDO-REY, F. 1994. Genus <i>Sebastes</i> Cuvier, 1829 (Pisces, Scorpaenidae) in the North Atlantic: Identification of species and populations using morphometric methods; Growth and reproduction of the Flemish Cap populations. Ph. D. Thesis. Autonomous University of Madrid.
2. SABORIDO-REY, F. Institute of Marine Research. C/ Eduardo Cabello, 6. 36208, Vigo, Spain. (fran@iim.csic.es).
3. SABORIDO-REY, F. and A. VÁZQUEZ. MS 2001. Results from Bottom Trawl Survey on Flemish Cap of July 2000. <i>NAFO SCR Doc.</i> , No. 22.
4. ÁVILA DE MELO, A., R. ALPOIM, and F. SABORIDO-REY. MS 2001. A Comparative Assessment and Medium Term Projections of Redfish (<i>S. mentella</i> and <i>S. fasciatus</i>) in NAFO Division 3M. <i>NAFO SCR Doc.</i> , No. 45.
5. SABORIDO REY, F. MS 1995. Age and growth of redfish in Flemish Cap (Div. 3M). <i>NAFO SCR Doc.</i> , No. 31.
6. ICES. 1996. Report of the workshop on age reading of <i>Sebastes</i> spp. <i>ICES C.M. Doc.</i> , No. G:1.
7. CERVIÑO, S. MS 2001. Hydrographic Conditions on Flemish Cap in July 2000 and Comparison with those Observed in 1999. <i>NAFO SCR Doc.</i> , No. 24.

Data status									
Year	Stock size	Stock composition	Age	Sex ratio	Maturity	Fecundity	Weight	Condition	Additional data
1975									
1974									
1973									
1972									
1971									
1970									
1969				(√)	(√)				
1968				(√)	(√)				
1967				(√)	(√)				
1966				(√)	(√)				
1965				(√)	(√)				
1964				(√)	(√)				
1963				(√)	(√)				
1962				(√)	(√)				
1961				(√)	(√)				
1960				(√)	(√)				
1959				(√)	(√)				
1958				(√)	(√)				
1957				(√)	(√)				

TABLE 2: DATA BASIS, FORMAT AND QUALITY

COMMON NAME:

AREA:

STOCK:

REPRODUCTIVE STRATEGY: **REF. NO.:**

TIMING OF SPAWNING: **REF. NO.:**

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	1978-1985	W	S	Y	Relative abundance	7
	1988-1990	A	S	Y		1,2,7
Stock composition	1988-1990	A,L,W	S	Y		1,2
Age determination	1978-1985	A	S	Y		8
	1988-1990	A	S	Y		1,3,4
Sex ratio	1957-1969	L	S	Y	for a number of areas	5,6
	1978-1985	L	S	Y		8
	1988-1990	A,L	S	Y		1,2
Maturity:						
A. Ogives (E)	1957-1969	L	S	Y	Ogives for a number of NAFO areas	5,6
B. Skip of spawning						
C. Spawning probability						
D. Other						
Fecundity:						
A. Estimation						
B. First time vs. repeat spawners						
C. Atresia						
D. Other						
Weight:						
A. Commercial fisheries data						
B. Survey data	1978-1985	W	S	Y	Individual fish weights	8
	1988-1990	A,L	S	Y		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.
C. Other						
Condition:						
A. Fulton						
B. HSI						
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	1957-1969	L	S			5,6
Contamination						
Environmental key factors	Temperature		S	Y	Summer values	1
Other factors or parameters						

TABLE 4: DATA SOURCES

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

Data sources (literature reference or contact person)
1. SABORIDO-REY, F. Institute of Marine Research. C/ Eduardo Cabello, 6. 36208, Vigo, Spain. (fran@iim.csic.es).
2. SABORIDO-REY, and A. VÁZQUEZ. MS 2001. Results from Bottom Trawl Survey on Flemish Cap of July 2000. <i>NAFO SCR Doc.</i> , No. 22, 56 p.
3. SABORIDO REY, F. MS 1995. Age and growth of redfish in Flemish Cap (Div. 3M). 1995. <i>NAFO SCR Doc.</i> , No. 31, 16 p.
4. ICES. 1996. Report of the workshop on age reading of <i>Sebastes</i> spp. <i>ICES C.M. Doc.</i> , G:1.
5. NI, I-H., and E. J. SANDEMAN. 1984. Size at maturity for Northwest Atlantic redfishes (<i>Sebastes</i>). <i>Can. J. Fish. Aquat. Sci.</i> , 41 : 1753-1762.
6. NI, I-H., and W. TEMPLEMAN. 1985. Reproductive cycles of redfishes (<i>Sebastes</i>) in southern Newfoundland waters. <i>J. Northw. Atl. Fish. Sci.</i> , 6 : 57-63.
7. ATKINSON, D. B. MS 1985. The Redfish of NAFO Div. 3M. <i>NAFO SCR Doc.</i> , No. 48, Serial No. N997, 10 p.
8. POWER, D. Redfish Assessment Biologist, Aquatic Resources Division, Department of Fisheries and Oceans, P. O. Box 5667, St. John's, NF, Canada, A1C (PowerD@dfo-mpo.gc.ca).

TABLE 1: AVAILABLE DATA

COMMON NAME: **SPECIES:**

AREA: **STOCK:**

CREATED BY: **UPDATED BY:**

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				(√)	(√)				

TABLE 2: DATA BASIS, FORMAT AND QUALITY

COMMON NAME:	REDFISH	REF. NO.:	5
AREA:	NORTHWEST ATLANTIC	REF. NO.:	
STOCK:	NAFO SUBAREA 2+DIV. 3K	REF. NO.:	
REPRODUCTIVE STRATEGY:	OVOVIVIPAROUS	REF. NO.:	
TIMING OF SPAWNING:	UNKNOWN	REF. NO.:	
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	1978-1994	A,L	S	A		1,2
	1995-2000	A,L	S	A		2
Stock composition	1978-1993	A,L	S	A		1
	1994-2000	A,L	S	A		2
Age determination	1976-1977	A	CL	Q	No commercial ageing since 1990 survey otoliths collected but no ageing since 1996	4
	1978-1990	A	CC,CL,S	Q,Q,A		1,4
	1991-1993	A	S	A		1
	1994-2000	A	S	A		2
Sex ratio	1969	L	S	Not given	Data from 1957-1969 combined	3
	1978-2000	L	S	A		2
Maturity:						
A. Ogives (E)	1969	L	S	NOT GIVEN Y	Data from 1957-1969 combined	3
	1978-2000	L	S			2
B. Skip of spawning						
C. Spawning probability						
D. Other						
Fecundity:						
A. Estimation						
B. First time vs. repeat spawners						

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.
C. Atresia						
D. Other						
Weight:						
A. Commercial fisheries data	1976-1990	L	CC,CL	Q	invariant length weight relationship	4
B. Survey data	1990-2000	A,L	S	A		2
C. Other						
Condition:						
A. Fulton	1990-2000	A,L	S	A		2
B. HSI						
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						
Contamination						
Environmental key factors						
Other factors or parameters						

TABLE 4: DATA SOURCES

COMMON NAME:	REDFISH
AREA:	NORTHWEST ATLANTIC
STOCK:	NAFO SUBAREA 2+DIV. 3K

Data sources (literature reference or contact person)
1. POWER, D. 1995. Status of redfish in Subarea 2 + Division 3K. <i>DFO Atlantic Fish. Res. Doc.</i> , No. 25.
2. UNPUBL. DATA: D. Power, DFO, PO Box 5667, St. John's NF, A1C 5X1, Canada (powerd@dfo-mpo.gc.ca).
3. NI, I-H. and E. J. SANDEMAN. MS 1982. The logistic model for determining size at maturity in species differentiation and stock discrimination for northwest Atlantic redfishes. <i>NAFO SCR Doc.</i> , No. IX/88.
4. POWER, D. MS 1991. Redfish in SA2 and Div. 3K. <i>CAFSAC Res. Doc.</i> , No. 61, 33 p.
5. SCOTT, W. B. and M. G. SCOTT. 1988. Atlantic Fishes of Canada. <i>Can. Bull. Fish. Aquat. Sci.</i> , 219 : 731 p.

TABLE 1: AVAILABLE DATA

COMMON NAME:	REDFISH	SPECIES:	<i>Sebastes spp.</i>
AREA:	NORTHWEST ATLANTIC	STOCK:	NAFO DIV. 3LN
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				(√)	(√)				

TABLE 2: DATA BASIS, FORMAT AND QUALITY

COMMON NAME:

AREA:

STOCK:

REPRODUCTIVE STRATEGY: **REF. NO.:**

TIMING OF SPAWNING: **REF. NO.:**

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	1990-2000	L	S	B		1
Stock composition	1968-1990	A,L	CC,CL	Q,Q	Based on scales otoliths collected but not aged since 1996	1,2,4
	1990-1996	A,L	S	B		1,2
	1997-2000	L	S	B		2
Age determination	1968-1990	A	CC,CL	Q,Q	Based on scales otoliths collected but not aged since 1996	1,2,4
	1990-1996	A	S	B		1,2
	1997-2000	A	S	B		2
Sex ratio	1969	L	S	Not given	Data from 1957-1969 combined	3
	1990-2000	L	S	B		2
Maturity:						
A. Ogives (E)	1969	L	S	NOT GIVEN	Data from 1957-1969 combined	3
	1990-2000	L	S	Y		2
B. Skip of spawning						
C. Spawning probability						
D. Other						
Fecundity:						
A. Estimation						
B. First time vs. repeat spawners						
C. Atresia						
D. Other						

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.
Weight:						
A. Commercial fisheries data	1968-1990		CC,CL	Q,Q	unclear how weight at age derived	4
B. Survey data	1990-2000	L	S	B		2
C. Other						
Condition:						
A. Fulton	1990-2000	L	S	B		2
B. HSI						
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						
Contamination						
Environmental key factors						
Other factors or parameters						

TABLE 4: DATA SOURCES

COMMON NAME:	REDFISH
AREA:	NORTHWEST ATLANTIC
STOCK:	NAFO DIV. 3LN

Data sources (literature reference or contact person)
1. POWER, D. MS 2000. A stock status update of redfish in NAFO Divisions 3LN. <i>NAFO SCR Doc.</i> , No. 52, 18 p.
2. UNPUBL. DATA: D. Power, DFO, P. O. Box 5667, St. John's NF, A1C 5X1, Canada (powerd@dfompo.gc.ca).
3. NI, I-H. and E. J. SANDEMAN. MS 1982. The logistic model for determining size at maturity in species differentiation and stock discrimination for northwest Atlantic redfishes. <i>NAFO SCR Doc.</i> , No. IX/88, 13 p.
4. VASKOV, A. A. and I. A. OGANIN. MS 1991. Status of Redfish Stock in Divisions 3LN. <i>NAFO SCR Doc.</i> , No. 6, Serial No. N1878, 8 p.
5. SCOTT, W. B. and M. G. SCOTT. 1988. Atlantic Fishes of Canada. <i>Can. Bull. Fish. Aquat. Sci.</i> , 219 : 731 p.

TABLE 1: AVAILABLE DATA

COMMON NAME: **SPECIES:**

AREA: **STOCK:**

CREATED BY: **UPDATED BY:**

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				(√)	(√)				

TABLE 2: DATA BASIS, FORMAT AND QUALITY

COMMON NAME:

AREA:

STOCK:

REPRODUCTIVE STRATEGY: **REF. NO.:**

TIMING OF SPAWNING: **REF. NO.:**

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	1973-1989	L	S	Y		1
	1990-2000	L	S	B		1
Stock composition	1973-1989	L	S	Y		1
	1990-2000	A,L	S	B		1
Age determination	1987-1989	A	CC,CL	Q,Q	Used survey otoliths	5
	1990	A	CC,CL,S	Q,Q,B		2,5
	1991-2000	A	S	B		2
Sex ratio	1969	L	S	NOT GIVEN	Data from 1957-1969 combined	3
	1973-2000	L	S	Y		2
Maturity:						
A. Ogives (E)	1969	L	S	NOT GIVEN	Data from 1957-1969 combined	3
	1973-2000	L	S	Y		
	1998	L	S	Y	combined data from 1972-1998	2 4
B. Skip of spawning						
C. Spawning probability						
D. Other						
Fecundity:						
A. Estimation						
B. First time vs. repeat spawners						
C. Atresia						

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.
D. Other						
Weight:						
A. Commercial fisheries data	1995-2000	L	CC,CL	Q,Q	invariant length weight relationship	1,2
B. Survey data	1990-2000	A,L	S	B		2
C. Other						
Condition:						
A. Fulton	1990-2000	A,L	S	B		2
B. HSI						
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						
Contamination						
Environmental key factors						
Other factors or parameters						

TABLE 4: DATA SOURCES

COMMON NAME:	REDFISH
AREA:	NORTHWEST ATLANTIC
STOCK:	NAFO DIV. 3LN

Data sources (literature reference or contact person)
1. POWER, D. MS 2000. A stock status update of redfish in NAFO Divisions 3LN. <i>NAFO SCR Doc.</i> , No. 52, 18 p.
2. UNPUBL. DATA: D. Power, DFO, P. O. Box 5667, St. John's NF, A1C 5X1, Canada (powerd@dfo-mpo.gc.ca).
3. NI, I-H. and E. J. SANDEMAN. MS 1982. The logistic model for determining size at maturity in species differentiation and stock discrimination for northwest Atlantic redfishes. <i>NAFO SCR Doc.</i> , No. IX/88, 13 p.
4. VASKOV, A. A. and I. A. OGANIN. MS 1991. Status of Redfish Stock in Divisions 3LN. <i>NAFO SCR Doc.</i> , No. 6, Serial No. N1878, 8 p.
5. SCOTT, W. B. and M. G. SCOTT. 1988. Atlantic Fishes of Canada. <i>Can. Bull. Fish. Aquat. Sci.</i> , 219 : 731 p.

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				(√)	(√)			(√)	

TABLE 2: DATA BASIS, FORMAT AND QUALITY

COMMON NAME:	REDFISH	
AREA:	NORTHWEST ATLANTIC	
STOCK:	UNIT 2 (NAFO SUBDIV. 3Ps 4Vs 4Wfgj+3Pn 4Vn (JUN-DEC))	
REPRODUCTIVE STRATEGY:	OVOVIVIPAROUS	REF. NO.: 7
TIMING OF SPAWNING:	MID MAR-MID JUNE	REF. NO.: 4
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	1994-1996	L	S	Y	Stock area changed in 1993	1
	1997	L	S	B		1,5
	1998-1999	L	S	Y		1,5
	2000	L	S	B		1,5
Stock composition	1994-1996	A,L	CC,CL,S	Q,Q,Y		1
	1997	A,L	CC,CL,S	Q,Q,B		1,5
	1998-1999	A,L	CC,CL,S	Q,Q,Y		1,5
	2000	A,L	CC,CL,S	Q,Q,B		1,5
Age determination	1994-1997	A	CC,CL,S	Q,Q,Y	Commercial otoliths not aged	2
	1998-1999	A	CC,CL,S	Q,Q,Y		2
	2000	A	CC,CL,S	Q,Q,Y		2
Sex ratio	1969	L	S	NOT GIVEN	data from 1957-1969 combined	3,4
	1994-1999	L	CC,CL,S	Q,Q,Y		1
	2000	L	CC,CL,S	Q,Q,Y		2
Maturity:						
A. Ogives (E)	1969	L	S	NOT GIVEN	Data from 1957-1969 combined	3,4
	1					
	1994-1997,2000	L	S	Y		
	1998	L	S	Y	data from 1972-1997 combined	6
B. Skip of spawning						
C. Spawning probability						
D. Other						

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.
Fecundity:						
A. Estimation						
B. First time vs. repeat spawners						
C. Atresia						
D. Other						
Weight:						
A. Commercial fisheries data	1994-2000	L	CC,CL	Q,Q	Invariant length weight relationship	1
B. Survey data	1994-1996	A,L	S	Y		1
	1997	A,L	S	B		1,5
	1998-1999	L	S	Y		1,5
	2000	A,L	S	B		1,5
C. Other						
Condition:						
A. Fulton	1994-1997,2000	A,L	S	Y		2
B. HSI						
C. Energy						
D. Other	1969		S	NOT GIVEN	GSI, data from 1957-1969 combined	4
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	1969		S	NOT GIVEN	Data from 1957-1969 combined	4
Contamination						
Environmental key factors						
Other factors or parameters						

TABLE 4: DATA SOURCES

COMMON NAME:	REDFISH
AREA:	NORTHWEST ATLANTIC
STOCK:	UNIT 2 (NAFO SUBDIV. 3Ps 4Vs 4Wfgj+3Pn 4Vn (JUN-DEC))

Data sources (literature reference or contact person)
1. POWER, D. and F. MOWBRAY. MS 2000. The status of redfish in Unit 2. <i>DFO, Can. Stock Assess. Sec. Res. Doc.</i> , No. 136.
2. UNPUBL. DATA: D. Power, DFO, P. O. Box 5667, St. John's NF, A1C 5X1, Canada (powerd@dfo-mpo.gc.ca).
3. NI, I-H. and E. J. SANDEMAN. MS 1982. The logistic model for determining size at maturity in species differentiation and stock discrimination for northwest Atlantic redfishes. <i>NAFO SCR Doc.</i> , No. IX/88, 13 p.
4. NI, I-H. and W. TEMPLEMAN. 1985. Reproductive cycles of redfishes (Sebastes) in southern Newfoundland waters. <i>J. Northw. Atl. Fish. Sci.</i> , 6 : 57-63.
5. MCCLINTOCK, J. MS 2000. Summer 2000 Unit 2 survey for redfish. <i>DFO, Can. Stock Assess. Sec. Res. Doc.</i> , No. 133.
6. POWER, D. and D. B. ATKINSON. MS 1998. The status of redfish in Unit 2 (Laurentian Channel Management Unit). <i>DFO, Can. Stock Assess. Sec. Res. Doc.</i> , No. 21.
7. SCOTT, W. B. and M. G. SCOTT. 1988. Atlantic Fishes of Canada. <i>Can. Bull. Fish. Aquat. Sci.</i> , 219 : 731 p.

TABLE 1: AVAILABLE DATA

COMMON NAME:	ACADIAN REDFISH	SPECIES:	<i>Sebastes fasciatus</i>
AREA:	NORTHWEST ATLANTIC	STOCK:	NAFO SUBAREA 5 (GULF OF MAINE-GEORGES BANK)
CREATED BY:	JAY BURNETT 20010702	UPDATED BY:	

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	√	√	√	(√)	√		√		√
1975	√	√	√	(√)	√		√		√

TABLE 2: DATA BASIS, FORMAT AND QUALITY

COMMON NAME:	ACADIAN REDFISH	
AREA:	NORTHWEST ATLANTIC	
STOCK:	NAFO SUBAREA 5 (GULF OF MAINE-GEORGES BANK)	
REPRODUCTIVE STRATEGY:	VIVIPARITY	REF. NO.: 1
TIMING OF SPAWNING:	APRIL-AUGUST	REF. NO.: 2
OPTIMAL TIME FOR MATURITY SAMPLING:	APRIL	REF. NO.: 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.
Stock size	1934-1962	A			Estimated by age-structured model	3
	1963-1968	A,L	CL,S	Q, OCT	Model, rel. abundance	3,4
	1969-1985	A,L,W	CL,S	Q,B	VPA	5
	1986-1991	A,L	S	B	Model, rel. abundance	3,4
	1992-2001	A,L,W	S	B	Model, rel. abundance	3,4
Stock composition	1963-1974	L	S	A,B	Spring survey added 1968	4
	1975-1991	A,L	S	B		4
	1992-2001	A,L,W	S	B		4
Age determination	1975-1985		CL,S	Q,B	Fall surveys only 1991-2000	5,6
	1986-2000		S	B		4,6
Sex ratio	1975-2000	A,L	S	B		4
Maturity:						
A. Ogives (E)	1975-1980	A,L	S	B		7,8
	1981-2000	A,L	S	B		4
B. Skip of spawning						
C. Spawning probability						
D. Other						
Fecundity:						
A. Estimation						
B. First time vs. repeat spawners						
C. Atresia						
D. Other						

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.
Weight:						
A. Commercial fisheries data	1969-1974	L, W	CL	Q	Estimated means	4
	1975-1985	A, L, W	CL	Q	Estimated means	4,5
B. Survey data	1992-2001	A, L, W	S	B	Individual fish weights	9
C. Other						
Condition:						
A. Fulton						
B. HSI						
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	1963-2001		S	Q, M	Egg and larval surveys	2,10,11
Contamination						
Environmental key factors						
Other factors or parameters						

TABLE 3: STUDIES OF REPRODUCTIVE POTENTIAL

COMMON NAME:	ACADIAN REDFISH
AREA:	NORTHWEST ATLANTIC
STOCK:	NAFO SUBAREA 5 (GULF OF MAINE-GEORGES BANK)

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			
Stock recruitment relations	Spawning stock biomass vs age 1 recruits	1963-2000	4
Other studies			

TABLE 4: DATA SOURCES

COMMON NAME:	ACADIAN REDFISH
AREA:	NORTHWEST ATLANTIC
STOCK:	NAFO SUBAREA 5 (GULF OF MAINE-GEORGES BANK)

Data sources (literature reference or contact person)	
1.	BOEHLERT, G.W., and M.M. YOKLAVICH. 1984. Reproduction, embryonic energetics, and the maternal-fetal relationship in the viviparous genus <i>Sebastes</i> (Pisces:Scorpaenidae). <i>Biol. Bull.</i> , (Woods Hole), 167 : 354-370.
2.	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. Rep.</i> , No. SHL 85-04, 35 p.
3.	J. BRODZIAK, Northeast Fisheries Science Center, 166 Water St., Woods Hole, MA 02543 USA (Jon.Brodziak@noaa.gov).
4.	R.K. MAYO, Northeast Fisheries Science Center, 166 Water St., Woods Hole, MA 02543 USA (RalphMayo@noaa.gov).
5.	NEFC. 1986. Report of the Second NEFC Stock Assessment Workshop (Second SAW). <i>NMFS, NEFC, Woods Hole Lab. Ref. Doc.</i> , No. 86-09, 114 p.
6.	GIFFORD, V.M., and M.K. CRAWFORD. 1988. Redfish <i>Sebastes fasciatus</i> (Chapter 14). In: Age determination methods for Northwest Atlantic species. J. Penttila, and L.M. Dery (eds.). <i>NOAA Tech. Rep., NMFS 72</i> : 135 p.
7.	MAYO, R. K., J. BURNETT, T. D. SMITH, and C. A. MUCHANT. 1990. Growth-maturation interactions of Acadian redfish (<i>Sebastes fasciatus</i> Storer) in the Gulf of Maine-Georges Bank region of the Northwest Atlantic. <i>J. Cons. int. Explor. Mer.</i> , 46 : 287-305.
8.	O'BRIEN, L., J. BURNETT, and R.K. MAYO. 1993. Maturation of 19 species of finfish off the northeast coast of the United States, 1985-1990. <i>NOAA Tech. Rep., NMFS 113</i> : 66 p.
9.	J. BURNETT, Northeast Fisheries Science Center, 166 Water St., Woods Hole, MA 02543 USA (Jay.Burnett@noaa.gov).
10.	COLTON, J., and J. ST. ONGE. 1974. Distribution of fish eggs and larvae in continental shelf waters, Nova Scotia to Long Island. <i>Ser. Atlas Mar. Environ., Am. Geogr. Soc. Folio 23</i> .
11.	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> , 76 (4): 5.

TABLE 1: AVAILABLE DATA

COMMON NAME: **SPECIES:**

AREA: **STOCK:**

CREATED BY: **UPDATED BY:**

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	(√)	(√)							

TABLE 2: DATA BASIS, FORMAT AND QUALITY

COMMON NAME:	ROUGHHEAD GRENADIER	
AREA:	NORTHWEST ATLANTIC	
STOCK:	NAFO SUBAREAS 2+3	
REPRODUCTIVE STRATEGY:	DETERMINATE SPAWNER	REF. NO.: 1, 2
TIMING OF SPAWNING:	DEPENDS ON AUTHOR	REF. NO.: 1,2,7,9
OPTIMAL TIME FOR MATURITY SAMPLING:	ALL YEAR	REF. NO.: 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.
Stock size	1967-1983	L	S	Y	0-600	3
	1972-1983	LW	S	Y	0-600	3
	1978-2001	LW	S	Y	0-730 m, 3LN	4
	1978-2001	LW	S	Y	1500m 2GHJ + 3	4
	1988-2001	ALW	S	JULY	0-720m, 3M	5
	1995-2001	LW	S	MAY	0-1500m, 3NO	6
	1982	ALW	S	MAY-JUL	300-1000 m, 3LMN	7
	1991	LW	S	AUGUST	>1000m, 3KLM	4
	1994	LW	S	FEB	>1000m, 3KLMN	4
	1995	LW	S	SPRING	>1000m, 3KLMN	4
1997-2000	ALW	CC	Q	800-1800m, 3LMN	8	
Stock composition	1967-1983	L	S	Y	0-600	3
	1972-1983	LW	S	Y	0-600	3
	1978-2001	LW	S	Y	0-730 m, 3LN	4
	1978-2001	LW	S	Y	1500m 2GHJ + 3	4
	1988-2001	ALW	S	JULY	0-720m, 3M	5
	1995-2001	LW	S	MAY	0-1500m, 3NO	6
	1982	ALW	S	MAY-JUL	300-1000 m, 3LMN	7
	1991	LW	S	AUGUST	>1000m, 3KLM	4
	1994	LW	S	FEB	>1000m, 3KLMN	4
	1995	LW	S	SPRING	>1000m, 3KLMN	4
1997-2000	ALW	CC	Q	800-1800m, 3LMN	8	

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.
Age determination	1982	ALW	S	Y	MAY-JULY	7
	1994-2001	ALW	S	Y	JULY	5
	1997-2000	ALW	CC	Q		8
Sex ratio	1978-2001	LW	S	Y	SPRING	4
	1978-2001	LW	S	Y	AUTUMN	4
	1982	ALW	S	Y	MAY-JUL	7
	1972-1983	ALW	S	Y	SUMMER	3
	1991-2001	ALW	S	Y	JULY	5
	1997-2000	ALW	CC	Q		8
Maturity:						
A. Ogives (E)	1995-1996	L	S	OPPORT.	FEB, JULY, APRIL	1
	1998-2000	AL	S, CC	M	ALL YEAR	2
B. Skip of spawning						
C. Spawning probability						
D. Other						
Fecundity:						
A. Estimation	1980	L	S	OPORT.	NOVEMBER	3
	1995-1996	L	S	OPORT.	FEB, JULY, APRIL	1
	1998-2000	AL	S, CC	M	ALL YEAR	2
B. First time vs. repeat spawners						
C. Atresia	1995-1996	L	S	OPORT.	FEB, JULY, APRIL	1
D. Other						
Weight:						
A. Commercial fisheries data	1997-2000	ALW	CC	Q		8
B. Survey data	1972-1983	LW	S	Y		3
	1978-2001	LW	S	Y		4
	1978-2001	LW	S	Y		4
	1991-2001	ALW	S	JULY		5
	1995-2001	LW	S	MAY		6
	1982	ALW	S	MAY-JUL		7
	1991	LW	S	AUGUST		4
	1994	LW	S	FEB		4
	1995	LW	S	SPRING		4
C. Other						
Condition:						
A. Fulton						

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						
C. Energy						
D. Other	1972-1983	LW	S	Y	SUMMER	3
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	1975-76	L	S	Y	SUMMER- WINTER	9
	1982	ALW	S	Y	MAY-JULY	7
	1995-1996	LW	S		FEB., JULY, APRIL	1
	1998-2000	ALW	S, CC	M	ALL YEAR	2
Contamination						
Environmental key factors						
Other factors or parameters						

TABLE 4: DATA SOURCES

COMMON NAME:	ROUGHHEAD GRENADIER
AREA:	NORTHWEST ATLANTIC
STOCK:	NAFO SUBAREA 2+3

Data sources (literature reference or contact person)
1. MURUA, H. and L. MOTOS. 2000. Reproductive biology of roughhead grenadier (<i>Macrourus berglax</i> Lacepède, 1801) (Pisces, Macrouridae), in northwest Atlantic waters. <i>SARSIA Nordic Journal of Marine Biology</i> , 85 : 393-402.
2. MURUA, H., MS 2001. Roughhead Grenadier (<i>Macrourus berglax</i>) Biology and Population Structure in NAFO Divisions 3LMN. <i>NAFO SCR Doc.</i> , No. 156, 23 p.
3. SAVVATIMSKY, P. I. 1989. Investigations of Roughhead Grenadier (<i>Macrourus berglax</i> L) in the Northwest Atlantic, 1967-83. <i>NAFO Sci. Coun. Studies</i> , 13 : 59-75.
4. UNPUBL. DATA: D. Power, DFO, P.O. Box 5667, St. John's NF, A1C 5X1, Canada (powerd@dfompo.gc.ca).
5. MURUA, H. MS 2001. A review on Roughhead Grenadier (<i>Macrourus berglax</i>) Biology and Population Structure on Flemish Cap (NAFO Div. 3M) 1991-2000. <i>NAFO SCR Doc.</i> , No. 29, 19 p.
6. UNPUBL. DATA: H. MURUA. Fish, Resour. – AZTI Foundation, Herrera Kaia, Portualde z/g, 20110 Pasaia, Basque Country, Spain (hmurua@pas.azti.es).
7. SAVVATIMSKY, P.I. 1984. Biological Aspects of Roughhead Grenadier (<i>Macrourus berglax</i>) from Longline Catches in the Eastern Grand Bank Area, 1982. <i>NAFO Sci. Coun. Studies</i> , 7 : 45-51.
8. JUNQUERA, S., A VAZQUEZ, H. MURUA, E. ROMAN, and J. L. DEL RIO. MS 2001. Spanish Research Report for 2000. <i>NAFO SCS Doc.</i> , No. 18. Serial No. N4402, 24 p.
9. ATKINSON, D. B and D. POWER. MS 1987. Distribution of roughhead and Roundnose grenadiers in the Northwest Atlantic. <i>NAFO SCR Doc.</i> , No. 94, Serial No. N1398, 28 p.

TABLE 1: AVAILABLE DATA

COMMON NAME: **SPECIES:**

AREA: **STOCK:**

CREATED BY: **UPDATED BY:**

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	(√)	(√)							

TABLE 2: DATA BASIS, FORMAT AND QUALITY

COMMON NAME:	ROUNDNOSE GRENADIER	
AREA:	NORTHWEST ATLANTIC	
STOCK:	NAFO SUBAREAS 2+3	
REPRODUCTIVE STRATEGY:	DETERMINATE	REF. NO.:
TIMING OF SPAWNING:	SPRING	REF. NO.: 4
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	1956-1973	L/W	S	Y	250->1250 m, 2+3	1
	1974-1986	L/W	S	Y	250->1250 m, 2+3	5
	1971-1992	L/W	S	Y	<1460 m, 3K, 0B, 2GH	6, 11
	1983-1992	A	S	Y	and Flemish Pass	6
	1988-2001	W	S	Y	201-720 m, 3M	12
	1991	L/W	S	Y	up to 1500 m, 3KLM	7
	1994	L/W	S	Y	up to 1500 m, 3KLMN	7
	1995	L/W	S	Y	up to 1500 m, 3KLMN	7
	1996	L/W	S	Y	up to 1500 m, 2HJ3K	8
	1997	L/W	S	Y	up to 1500 m, 2HJ3K	9, 10
Stock composition	1956-1973	L/W	S	Y	250->1250 m, 2+3	1
	1974-1986	L/W	S	Y	250->1250 m, 2+3	5
	1971-1992	L/W	S	Y	<1460 m, 3K, 0B, 2GH	6, 11
	1983-1992	A	S	Y	and Flemish Pass	6
	1988-2001	W	S	Y	201-720 m, 3M	12
	1991	L/W	S	Y	up to 1500 m, 3KLM	7
	1994	L/W	S	Y	up to 1500 m, 3KLMN	7
	1995	L/W	S	Y	up to 1500 m, 3KLMN	7
	1996	L/W	S	Y	up to 1500 m, 2HJ3K	8
	1997	L/W	S	Y	up to 1500 m, 2HJ3K	9, 10
Age determination	1983-1992	A	S	Y	<1460 m, 3K, 0B, 2GH and Flemish Pass	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.
Sex ratio	1974-1986	L/W	S	Y	250->1250 m, 2+3	5
	1965-1969	L/W	S	Y		2,
	1975	L/W	S	Y	July - August	4
	1971-1992	L/W	S	Y	<1460 m, 3K, 0B, 2GH	6, 11
	1983-1992	A	S	Y	and Flemish Pass	6
	1991	L/W	S	Y	up to 1500 m, 3KLM	7
	1994	L/W	S	Y	up to 1500 m, 3KLMN	7
	1995	L/W	S	Y	up to 1500 m, 3KLMN	7
	1996	L/W	S	Y	up to 1500 m, 2HJ3K	8
1997	L/W	S	Y	up to 1500 m, 2HJ3K	9, 10	
Maturity:						
A. Ogives (E)	1975	L/W	S	Y	Few individuals	4
B. Skip of spawning						
C. Spawning probability						
D. Other						
Fecundity:						
A. Estimation						
B. First time vs. repeat spawners						
C. Atresia						
D. Other						
Weight:						
A. Commercial fisheries data						
B. Survey data	1956-1973	L/W	S	Y	250->1250 m, 2+3	1
	1974-1986	L/W	S	Y	250->1250 m, 2+3	5
	1971-1992	L/W	S	Y	<1460 m, 3K, 0B, 2GH	6, 11
	1983-1992	A	S	Y	and Flemish Pass	6
	1988-2001	W	S	Y	201-720 m, 3M	12
	1991	L/W	S	Y	up to 1500 m, 3KLM	7
	1994	L/W	S	Y	up to 1500 m, 3KLMN	7
	1995	L/W	S	Y	up to 1500 m, 3KLMN	7
	1996	L/W	S	Y	up to 1500 m, 2HJ3K	8
1997	L/W	S	Y	up to 1500 m, 2HJ3K	9, 10	
C. Other						
Condition:						
A. Fulton						
B. HSI						
C. Energy						
D. Other						

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.
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	1975	L/W	S	Y	Few specimens	4
Contamination						
Environmental key factors						
Other factors or parameters						

TABLE 4: DATA SOURCES

COMMON NAME:	ROUNDNOSE GRENADIER
AREA:	NORTHWEST ATLANTIC
STOCK:	NAFO SUBAREAS 2+3

Data sources (literature reference or contact person)
1. PARSONS, L. S. MS 1976. Distribution and relative abundance of roundnose, roughhead and common grenadiers in the Northwest Atlantic. <i>ICNAF Sel. Papers</i> , 1: 73-88.
2. SAVVATIMSKY, P. I. 1969. The grenadier of the North Atlantic. <i>Trudy PINRO, Fish Res. Board, Can. Trans, Ser. No. 2879</i> , 72 p.
3. SAVVATIMSKY, P. I. 1972. The age of the rock grenadier in the Northwest Atlantic and a possible influence of fisheries on its population numbers. <i>Fish Res. Board Can. Trans., Serial No. 2879, Trudy PINRO</i> , 28: 116-127.
4. GEISTDOERFER, P. 1979. New data on the reproduction of Macrourids (Teleostei, Gadiformes). <i>Sarsia</i> , 64: 109-112.
5. ATKINSON, D. B. and D. POWER. MS 1987. Distribution of Roughhead and Roundnose Grenadiers in the Northwest Atlantic. <i>NAFO SCR Doc.</i> , No. 94, Serial No. N1398, 28 p.
6. SAVVATIMSKY, P. I. MS 1993. Results of investigations of Roundnose grenadier in NAFO Subarea 0, 2 and Div. 3K in 1971-1992. <i>NAFO SCR Doc.</i> , No. 12, Serial No. N2189, 8 p.
7. BOWERING, W. R., D. POWER, and M. J. MORGAN. MS 1995. Distribution and abundance of five major groundfish species at the continental slope of Divisions 3KLMN based upon Canadian Deepwater Surveys in 1991, 1994 and 1995. <i>NAFO SCR Doc.</i> , No. 51, Serial No. N2562, 26 p.
8. POWER, D. MS 1997. Roundnose grenadier (<i>Coryphaenoides rupestris</i>) in NAFO Subareas 2+3. <i>NAFO SCR Doc.</i> , No. 74, Serial No. N2908, 8 p.
9. YOKAWA, K. and M. SATANI. 1997. Results of a stratified random bottom trawl survey in NAFO Divisions 2GH in 1996. <i>NAFO SCR Doc.</i> , No. 23, Serial No. N2853, 19 p.
10. POWER, D. and D. MADDOCK PARSONS. MS 1998. An assessment of Roundnose grenadier (<i>Coryphaenoides rupestris</i>) in NAFO Subareas 2+3 and catch information on roughhead grenadier (<i>Macrourus berglax</i>). <i>NAFO SCR Doc.</i> , No. 57, Serial No. N3049, 11 p.
11. SAVVATIMSKY, P. I. MS 1998. Results from the assessment of roundnose grenadier stocks in NAFO divisions 2G and 2H by the data from Russian trawl surveys in 1987-1992. <i>NAFO SCR Doc.</i> , No. 14, Serial No. N2993, 9 p.
12. SABORIDO-REY, F. and A. VÁZQUEZ. MS 2001. Results from bottom trawl survey on Flemish Cap of July 2000. <i>NAFO SCR Doc.</i> , No. 22, 56 p.

TABLE 1: AVAILABLE DATA

COMMON NAME:	ATLANTIC HERRING	SPECIES:	<i>Clupea harengus</i>
AREA:	NORTHWEST ATLANTIC	STOCK:	COASTAL COMPLEX NAFO SUBAREAS 5+6
CREATED BY:	JAY BURNETT 2001-9-25	UPDATED BY:	

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	√	√	√	(√)	√		√		√

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

TABLE 2: DATA BASIS, FORMAT AND QUALITY

COMMON NAME:	ATLANTIC HERRING	
AREA:	NORTHWEST ATLANTIC	
STOCK:	COASTAL COMPLEX NAFO SUBAREAS 5+6	
REPRODUCTIVE STRATEGY:		REF. NO.: <input type="text"/>
TIMING OF SPAWNING:	AUGUST-DECEMBER	REF. NO.: <input type="text" value="1"/>
OPTIMAL TIME FOR MATURITY SAMPLING:	SEPT-OCT	REF. NO.: <input type="text" value="1"/>

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	1999-2001	A/L/W	S,CL	B,Q	Relative abundance	2
	1967-1998	A/L/W	S,CL	B,Q	VPA estimates	2,3
	1963-1966	A/L	S	A	Relative abundance	2
Stock composition	1967-2001	A/L/W	S,CL	B,Q		2,3
	1963-1966	A/L	S	A		2
Age determination	1967-2001		S,CL	B,Q		2,3,4
Sex ratio	1976-2001		S	B		5
Maturity:						
A. Ogives (E)	1976-1997	A/L	S,CL	B,Q	Macroscopic observations	3
	1985-1990	A/L	S	B		6
B. Skip of spawning						
C. Spawning probability						
D. Other						
Fecundity:						
A. Estimation	1989-1993	A/L/W	Special study	A	Unpublished data; n > 2000	10
B. First time vs. repeat spawners						
C. Atresia						
D. Other						
Weight:						
A. Commercial fisheries data	1967-1997	A/L	CL	Q	Estimated mean weights	2,3
B. Survey data	1992-2001	A/L	S	B	Individual fish weights	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.
C. Other						
Condition:						
A. Fulton						
B. HSI						
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	1963-2001	L	S	Q-M	Egg and larval surveys	1,7,8
Contamination						
Environmental key factors						
Other factors or parameters	1973-2001	L	S	B	Foods habits data	9

TABLE 3: STUDIES OF REPRODUCTIVE POTENTIAL

COMMON NAME:	ATLANTIC HERRING
AREA:	NORTHWEST ATLANTIC
STOCK:	COASTAL COMPLEX NAFO SUBAREAS 5+6

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			
Stock recruitment relations	Spawning stock biomass vs age 1 recruits	1965-1996	2,3
Other studies			

TABLE 4: DATA SOURCES

COMMON NAME:	ATLANTIC HERRING
AREA:	NORTHWEST ATLANTIC
STOCK:	COASTAL COMPLEX NAFO SUBAREAS 5+6

Data sources (literature reference or contact person)
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. OVERHOLTZ, W. J. Northeast Fisheries Science Center, 166 Water St., Woods Hole, MA 02543 USA (William.Overholtz@noaa.gov).
3. NORTHEAST FISHERIES SCIENCE CENTER. 1998. Report of the 27th Northeast Regional Stock Assessment Workshop (27th SAW). <i>NEFSC Ref. Doc.</i> , 98-15, 350 p.
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5. BURNETT, J. Northeast Fisheries Science Center, 166 Water St., Woods Hole, MA 02543 USA (Jay.Burnett@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., NMFS 113</i> , 66 p.
7. 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., NMFS 145</i> , 310 p.
8. SMITH, W. G., and W. W. MORSE. 1993. Larval distribution patterns: early signals for the collapse/recovery of Atlantic herring <i>Clupea harengus</i> in the Georges Bank area. <i>U.S. Fish. Bull.</i> , 91 : 338-347.
9. LINK, J. S., and F. P. ALMEIDA. 2000. An overview and history of the Food Web Dynamics Program of the Northeast Fisheries Science Center, Woods Hole, Massachusetts. <i>NOAA Tech. Mem.</i> , NMFS-NE-159, 60 p.
10. UNPUBL. DATA: J. BURNETT, Northeast Fisheries Science Center, 166 Water St., Woods Hole, MA 02543 USA (Jay.Burnett@noaa.gov).

TABLE 1: AVAILABLE DATA

COMMON NAME:	ATLANTIC MACKEREL	SPECIES:	<i>Scomber scombrus</i>
AREA:	NORTHWEST ATLANTIC	STOCK:	NAFO SUBAREAS 2-6
CREATED BY:	JAY BURNETT 2001-09-21	UPDATED BY:	

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	√	√	√				√		√

Data status									
Year	Stock size	Stock composition	Age	Sex ratio	Maturity	Fecundity	Weight	Condition	Additional data
1975	√	√	√				√		√
1974	√	√	√				√		√
1973	√	√	√				√		√
1972	√	√	√				√		√
1971	√	√	√				√		√
1970	√	√	√				√		√
1969	√	√	√				√		√
1968	√	√	√				√		√
1967	√	√	√				√		√
1966	√	√	√				√		√
1965	√	√	√				√		√
1964	√	√	√				√		√
1963	√	√	√				√		√
1962	√	√	√				√		

TABLE 2: DATA BASIS, FORMAT AND QUALITY

COMMON NAME:	ATLANTIC MACKEREL	
AREA:	NORTHWEST ATLANTIC	
STOCK:	NAFO SUBAREAS 2-6	
REPRODUCTIVE STRATEGY:	DETERMINATE BATCH SPAWNER	REF. NO.: 1
TIMING OF SPAWNING:	APRIL-JULY	REF. NO.: 2
OPTIMAL TIME FOR MATURITY SAMPLING:	MARCH-APRIL	REF. NO.: 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.
Stock size	1962-1999	A/L/W	S,CL,CC,R	B,Q,Q,Q	VPA estimates	4,5,6
	1999-2001	A/L/W	S	B	Relative abundance	6
Stock composition	1962-2001	A/L/W	S,CL,CC,R	B,Q,Q,Q		4,5,6
Age determination	1962-2001		S,CL,CC	B,Q,Q		4,5,6,7
Sex ratio	1977-2001	A/L	S	B		8
Maturity:						
A. Ogives (E)	1985-1990	A/L	S	B	Pooled; macroscopic observations	9
B. Skip of spawning						
C. Spawning probability						
D. Other	1977	A/L/W			Gonadosomatic index	1
Fecundity:						
A. Estimation	1977	A/L/W			N=214	1
	1982-1985	A/L/W			n=218	10
	1987	A/L/W			n=295	3
B. First time vs. repeat spawners						
C. Atresia						
D. Other						
Weight:						
A. Commercial fisheries data	1962-2001	A/L	CL	Q	Estimated mean weights at age	4,5,6
B. Survey data	1992-2001	A/L	S	B	Individual fish weights	8

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.
C. Other						
Condition:						
A. Fulton						
B. HSI						
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	1963-2001	L	S	Q-M	Egg and larval surveys	1,2,11
Contamination						
Environmental key factors						
Other factors or parameters	1973-2001	A/L	S	B	Food habits data	12

TABLE 3: STUDIES OF REPRODUCTIVE POTENTIAL

COMMON NAME:	ATLANTIC MACKEREL
AREA:	NORTHWEST ATLANTIC
STOCK:	NAFO SUBAREAS 2-6

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			
Stock recruitment relations	Spawning stock biomass vs age 1 recruits	1962-1993	4,6
Other studies	Density-dependent changes in growth and maturation	1962-1989	13,14

TABLE 4: DATA SOURCES

COMMON NAME:	ATLANTIC MACKEREL
AREA:	NORTHWEST ATLANTIC
STOCK:	NAFO SUBAREAS 2-6

Data sources (literature reference or contact person)
1. MORSE, W. W. 1980. Spawning and fecundity of Atlantic mackerel, <i>Scomber scombrus</i> , in the middle-Atlantic bight. <i>U.S. Fish. Bull.</i> , 78 : 103-108.
2. 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. Rep.</i> , No. SHL 85-04, 35 p.
3. GRISWOLD, C. A., and M. J. SILVERMAN. 1992. Fecundity of the Atlantic mackerel (<i>Scomber scombrus</i>) in the Northwest Atlantic in 1987. <i>J. Northw. Atl. Fish. Sci.</i> , 12 : 35-40.
4. NORTHEAST FISHERIES SCIENCE CENTER (NEFSC). 1996. Report of the 20th Northeast Regional Stock Assessment Workshop (20th SAW). <i>NEFSC Ref. Doc.</i> , 95-18.
5. NORTHEAST FISHERIES SCIENCE CENTER (NEFSC). 2000. Report of the 30th Northeast Regional Stock Assessment Workshop (30th SAW). <i>NEFSC Ref. Doc.</i> , 00-03.
6. OVERHOLTZ, W. J. Northeast Fisheries Science Center, 166 Water St., Woods Hole, MA 02543 USA (William.Overholtz@noaa.gov).
7. DERY, L. M. Atlantic mackerel <i>Scomber scombrus</i> (Chapter 12). In: Age determination methods for Northwest Atlantic species. J. Penttila, and L. M. Dery (eds.). <i>NOAA Tech. Rep.</i> , <i>NMFS 72</i> , 135 p.
8. BURNETT, J. Northeast Fisheries Science Center, 166 Water St., Woods Hole, MA 02543 USA (Jay.Burnett@noaa.gov).
9. 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> , <i>NMFS 113</i> , 66 p.
10. PELLETIER, L. 1986. Fecondite du maquereau bleu, <i>Scomber scombrus</i> L., du golfe du saint-laurent. <i>Rapport technique canadien des sciences halieutiques and aquatiques</i> , No. 1467, 37 p.
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12. LINK, J. S., and F. P. ALMEIDA. 2000. An overview and history of the Food Web Dynamics Program of the Northeast Fisheries Science Center, Woods Hole, Massachusetts. <i>NOAA Tech. Mem.</i> , <i>NMFS-NE-159</i> , 60 p.
13. OVERHOLTZ, W. J. 1989. Density-dependent growth in the Northwest Atlantic stock of Atlantic mackerel (<i>Scomber scombrus</i>). <i>J. Northw. Atl. Fish. Sci.</i> , 9 : 115-121.
14. OVERHOLTZ, W. J., S. A. MURAWSKI, and W. L. MICHAELS. 1991. Impact of compensatory responses on assessment advice for the Northwest Atlantic mackerel stock. <i>U.S. Fish. Bull.</i> , 89 : 117-128.

TABLE 1: AVAILABLE DATA

COMMON NAME:	BLUEFISH	SPECIES:	<i>Pomatomus saltatrix</i>
AREA:	NORTHWEST ATLANTIC	STOCK:	NAFO SUBAREAS 5+6
CREATED BY:	JAY BURNETT 2001-09-06	UPDATED BY:	

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	(√)	√							√

Data status									
Year	Stock size	Stock composition	Age	Sex ratio	Maturity	Fecundity	Weight	Condition	Additional data
1975	(√)	√							√
1974	(√)	√							√
1973	(√)	√							√
1972	(√)	√							√
1971	(√)	√							√
1970	(√)	√							√
1969	(√)	√							√
1968	(√)	√							√
1967	(√)	√							√
1966	(√)	√							√
1965	(√)	√							√
1964	(√)	√							√
1963	(√)	√							√
1962									
1961									
1960						√			

TABLE 2: DATA BASIS, FORMAT AND QUALITY

COMMON NAME:	BLUEFISH	REF. NO.:	
AREA:	NORTHWEST ATLANTIC	REF. NO.:	1
STOCK:	NAFO SUBAREAS 5+6	REF. NO.:	
REPRODUCTIVE STRATEGY:	UNKNOWN	REF. NO.:	
TIMING OF SPAWNING:	MAY-AUGUST	REF. NO.:	1
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	1963-1981	L	S	Y,B	Relative abundance	2,3
	1982-1995	A,L,W	S,CL,R	Y,Q	VPA estimates	3
	1996-2001	L,W	S,CL,R	Y,Q	Relative abundance	2
Stock composition	1963-1981	L	S	Y,B		2,3
	1982-1996	A,L,W	S,CL,R	Y,Q		2,3
	1997-2001	L,W	S,CL,R	Y,Q	No age data	2
Age determination	1982-1993		CL,R	Q	North Carolina DMF	2
	1985-1996		S,CL	B,Q	Northeast Fisheries Science Center	2,3,4
Sex ratio	1977-2001	L	S	B		2
Maturity:						
A. Ogives (E)	1993-1996	A,L	S	B	Macroscopic observations	4
B. Skip of spawning						
C. Spawning probability						
D. Other	late 1980s	L	Special study	M	Gonadosomatic index	5
Fecundity:						
A. Estimation	circa 1960	L	Special study		N=10	6
B. First time vs. repeat spawners						
C. Atresia						
D. Other						
Weight:						
A. Commercial fisheries data	1982-2001	A,L	CL	Q	Estimated mean weights	2,3

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. Survey data	1992-2001	A,L	S	B	Individual fish weights	7
C. Other						
Condition:						
A. Fulton						
B. HSI						
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	1963-2001	L	S	Q-M	Egg and larval surveys	1,5,8,9 10
Contamination						
Environmental key factors						
Other factors or parameters	1973-2001	L	S	B	Food habits data	11

TABLE 3: STUDIES OF REPRODUCTIVE POTENTIAL

COMMON NAME:	BLUEFISH
AREA:	NORTHWEST ATLANTIC
STOCK:	NAFO SUBAREAS 5+6

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			
Stock recruitment relations	Spawning stock biomass vs age 0 fish in the fall	1982-1995	3
Other studies			

TABLE 4: DATA SOURCES

COMMON NAME:	BLUEFISH
AREA:	NORTHWEST ATLANTIC
STOCK:	NAFO SUBAREAS 5+6

Data sources (literature reference or contact person)
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. Rep.</i> , No. SHL 85-04, 35 p.
2. TERCEIRO, M. Northeast Fisheries Science Center, 166 Water St., Woods Hole, MA 02543 USA (Mark.Terceiro@noaa.gov).
3. STOCK ASSESSMENT REVIEW COMMITTEE (SARC). 1997. A report of the 23rd Northeast Regional Stock Assessment Workshop. <i>NEFSC Ref. Doc.</i> , 97-05, 153-191 p.
4. SALERNO, D. J., J. BURNETT, and R. M. IBARA. 2001. Age, growth, maturity, and spatial distribution of bluefish, <i>Pomatomus saltatrix</i> (Linnaeus), off the northeast coast of the United States, 1985-96. <i>J. Northw. Atl. Fish. Sci.</i> , 29 : 31-39.
5. CHIARELLA, L. A., and D. O. CONOVER. 1990. Spawning season and first-year growth of adult bluefish from the New York Bight. <i>Trans. Am. Fish. Soc.</i> , 119 : 455-462.
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9. HARE, J. A., and R. K. COWEN. 1993. Ecological and evolutionary implications of the larval transport and reproductive strategy of bluefish <i>Pomatomus saltatrix</i> . <i>Mar. Ecol. Prog. Ser.</i> , 98 : 1-16.
10. MCBRIDE, R. S., and D. O. CONOVER. 1991. Recruitment of young-of-the-year bluefish <i>Pomatomus saltatrix</i> to the New York Bight: variation in abundance and growth of spring- and summer-spawned cohorts. <i>Mar. Ecol. Prog. Ser.</i> , 78 : 205-216.
11. LINK, J. S., and F. P. ALMEIDA. 2000. An overview and history of the Food Web Dynamics Program of the Northeast Fisheries Science Center, Woods Hole, Massachusetts. <i>NOAA Tech. Mem.</i> , <i>NMFS-NE-159</i> , 60 p.

TABLE 1: AVAILABLE DATA

COMMON NAME: **SPECIES:**

AREA: **STOCK:**

CREATED BY: **UPDATED BY:**

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									√
1975							√		√

TABLE 2: DATA BASIS, FORMAT AND QUALITY

COMMON NAME:	STRIPED BASS	
AREA:	MAINE TO NORTH CAROLINA	
STOCK:	NAFO SUBAREAS 5+6 (MULTIPLE STOCK COMPLEX)	
REPRODUCTIVE STRATEGY:	DETERMINISTIC SPAWNER	REF. NO.:
TIMING OF SPAWNING:	APRIL - JUNE	REF. NO.: 1
OPTIMAL TIME FOR MATURITY SAMPLING:	JAN - MARCH	REF. NO.: 1

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	1982-2001	A	CC,S	M	VPA	1,2,3,4
Stock composition	1982-2001	A	CC,S	M		1,2,3,4
Age determination	1982-2001	L,A	S,CL	M	Possible age error using scales, small samples in some area/month combinations	1,2,3
Sex ratio	1987-1999	A,L	S,C	SPRING, FALL	Chesapeake only, MD DNR	5-16
	1998-2001	A,L	S	SPRING	coastal NMFS survey	17
	1990-2000	L	C	SUMMER -FALL	Massachusetts Commercial sampling	18
Maturity:						
A. Ogives (E)	1998-2001	L	S	B	Macroscopic exam	19
	1987-1987	A,L	C	A	Histological exam	20
	1973-1975	A,L	C	SPRING	Macroscopic exam	21
B. Skip of spawning	1940				Mentioned as possible	22
C. Spawning probability						
D. Other						
Fecundity:						
A. Estimation	2000-2001	A,L	S	SPRING	Work in progress	23
B. First time vs repeat spawners						
C. Atresia						

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.
D. Other						
Weight:						
A. Commercial fisheries data	1982-2000	A,L	C,R	Q	Estimate from commercial and recreational data	1
B. Survey data	1998-2001 1987-2000 1987-1999	L L,A L,A	S S S	SPRING,F ALL FALL SPRING	NMFS survey data NY Ocean Haul Seine MD DNR survey	
C. Other						
Condition:						
A. Fulton						
B. HSI						
C. Energy						
D. Other						
Egg viability:						
A. Egg quality	1989	L			Published studies	24,25, 26
B. Fertilisation success						
C. Egg mortality						
D. Other						
Larval viability:						
A. Hatching success	1954-1999	A	S	A	Based on egg presence/absence and larval abundance	16
B. Larvae quality						
C. Mortality	1954-1999	A	S	A	Based on egg presence/absence and larval abundance	16
D. Other						
Spawning time						
Contamination	?				Numerous published studies and monitoring of PCB by New York DEC	
Environmental key factors						
Other factors or parameters						

TABLE 3: STUDIES OF REPRODUCTIVE POTENTIAL

COMMON NAME:	STRIPED BASS
AREA:	MAINE TO NORTH CAROLINA
STOCK:	NAFO SUBAREAS 5+6 (MULTIPLE STOCK COMPLEX)

Estimation of reproductive potential			
Subject	Brief description	Year range	Ref. No.
Potential or realised egg production	Egg presence/absence in the MD trributaries to the Chesapeake Bay.	1954-1999	16,27
Viable egg and larvae production			
Critical life stages	Limited to MD tributary of Chesapeake Bay.	1993-1994	28
Environmental influences	Limited to MD tributary of Chesapeake Bay.	1987-1989	29
	Nanticoke River (tributary of Chesapeake Bay).	1993-1994	30
	Hudson River study	1994	31
Stock recruitment relations	Spawning stock vs age 1 recrutis	1982-2000	32
Other studies			

TABLE 4: DATA SOURCES

COMMON NAME:	STRIPED BASS
AREA:	MAINE TO NORTH CAROLINA
STOCK:	NAFO SUBAREAS 5+6 (MULTIPLE STOCK COMPLEX)

Data sources (literature reference or contact person)
1. ATLANTIC STATES MARINE FISHERIES COMMISSION. 1998. Source document to Amendment 5 to the Interstate Fishery Management Plan for Atlantic Striped Bass. G. Shepherd and N. Lazar (eds.). <i>Fishery Management Report</i> , No. 34.
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Data sources (literature reference or contact person)
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18. MASSACHUSETTS DIVISION OF MARINE FISHERIES, Boston, MA, USA.
19. NMFS BOTTOM TRAWL SURVEY DATA, NEFSC database.
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TABLE 1: AVAILABLE DATA

COMMON NAME:	THORNY SKATE	SPECIES:	<i>Raja radiata</i>
AREA:	NORTHWEST ATLANTIC	STOCK:	FLEMISH CAP (NAFO DIV. 3M)
CREATED BY:	FRAN SABORIDO-REY 2001-05-30	UPDATED BY:	

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	√	√					√	√	

TABLE 2: DATA BASIS, FORMAT AND QUALITY

COMMON NAME:	<input type="text" value="THORNY SKATE"/>	
AREA:	<input type="text" value="NORTHWEST ATLANTIC"/>	
STOCK:	<input type="text" value="FLEMISH CAP (NAFO DIV. 3M)"/>	
REPRODUCTIVE STRATEGY:	<input type="text"/>	REF. NO.: <input type="text"/>
TIMING OF SPAWNING:	<input type="text"/>	REF. NO.: <input type="text"/>
OPTIMAL TIME FOR MATURITY SAMPLING:	<input type="text"/>	REF. NO.: <input type="text"/>

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	1988-2000	L	S	Y	Relative abundance	1
Stock composition	1988-2000	L,W	S	Y		1
Age determination						
Sex ratio	1992-2000	L	S	Y		1
Maturity:						
A. Ogives (E)						
B. Skip of spawning						
C. Spawning probability						
D. Other						
Fecundity:						
A. Estimation						
B. First time vs. repeat spawners						
C. Atresia						
D. Other						
Weight:						
A. Commercial fisheries data						
B. Survey data	1988-2000	A,L	S	Y	Individual fish weights	1

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.
C. Other						
Condition:						
A. Fulton	1988-2000	L,W	S	Y	Summer values	1
B. HSI						
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						
Contamination						
Environmental key factors	Temperature		S	Y	Summer values	1
Other factors or parameters						

DATA ON REPRODUCTIVE POTENTIAL**TABLE 4: DATA SOURCES**

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

Data sources (literature reference or contact person)
1. A. VAZQUEZ. Institute of Marine Research. Eduardo Cabello, 6. 36208 Vigo, Spain (avazquez@iim.csic.es).

NOTICE

Workshop on Mapping and Geostatistical Methods for Fisheries Stock Assessment

Hosted by the Scientific Council of the Northwest Atlantic Fisheries Organization (NAFO)

10–12 September 2003
Holiday Inn, Dartmouth, Canada

The Scientific Council of NAFO is pleased to announce this Workshop to be held in conjunction with the NAFO Annual Meeting in Canada in September 2003. The workshop will be convened by L. Hendrikson (National Marine Fisheries Service – USA) and D. W. Kulka (Fisheries and Oceans – Canada) and organized by the NAFO Secretariat.

The purpose of the Workshop is two fold:

- a) To introduce Scientific Council fisheries scientists, using practical demonstrations relevant to NAFO issues, to spatial techniques that can be applied to survey and environmental data to solve fisheries problems.
- b) To provide Scientific Council members with enough background that they can interpret GIS analyses.

GIS is a broad field and the Workshop can only touch upon some of the aspects of spatial analysis. It will focus on techniques that will be most useful to the user group. The Workshop will show how:

- the raw data (set attributes) can be effectively Visualized (mapping techniques), progressing through Point to Surface Transformation (e.g. methods such as Contouring, Voronoi, Potential Mapping, Kriging that produce the continuous surfaces required to facilitate spatial modeling),
- to Overlay Modeling and Geostatistics,
- to evaluate mixed species interactions within the Precautionary Approach framework.

The Workshop will be structured to introduce NAFO Scientific Council participants to a subset of techniques and concepts relevant to their work. Examples and demonstrations will use real data from the Grand Banks and Flemish Cap. Where appropriate, underlying theory and procedures of geostatistics will be elaborated to facilitate the understanding of GIS analyses.

Scientific Council agreed that the proposed Workshop is important to the work of Scientific Council. The Council scheduled the Workshop to be held in conjunction with the 25th Annual Meeting in 2003, to be held in Dartmouth, Nova Scotia, Canada, during 10–12 September 2003.

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Information for Preparing Manuscripts for NAFO Scientific Publications

Introduction

The manuscript should be in English. The sequence of the material should be: title page, Abstract, text including Introduction, Materials and Methods, Results, Discussion and Acknowledgements and References. Number all pages, including the title page, consecutively with arabic numbers in the center of the top margin. There is usually no page limitation or page charge for accepted publications.

Content of Manuscript

Title page

This page should contain the title, followed by the name(s) and address(es) of the author(s) including professional affiliation, and any related footnotes. The title should be limited to what is documented in the manuscript and be as concise as possible. Where necessary the scientific names of species should be included.

Abstract

An informative abstract must be provided, which does not exceed one double-spaced page or about 250 words, the ultimate length being dependent on the size of the manuscript. The abstract should concisely indicate the content and emphasis of the paper. It should begin with the main conclusion from the study and be supported by statements of relevant findings. The scientific names of species where necessary should be included here. It is important that the abstract accurately reflect the contents of the paper because it is often separated from the main body of the paper by abstracting and indexing services.

Text

In general, the text should be organized into Introduction, Materials and Methods, Results, Discussion, Acknowledgments and References. Authors should be guided by the organization of papers that have been published in the NAFO Journal or Studies and by such authorities as the Council of Biological Editors Style Manual (CBE, 9650 Rockville Pike, Bethesda, MD 20814, USA).

The **Introduction** should be limited to the purpose and rationale of the study. The article should begin with a clear description of the subject (include where necessary the scientific names of species), stating the hypothesis and/or defining the problem(s) the research was designed to solve. Define the time of the study, along with literature review and other information limited to what is relevant to the problem.

The **Materials and Methods** should provide the framework for obtaining answers to the problems which concern the purpose of the study. Describe in sufficient detail the materials and methods used so as to enable other scientists to evaluate the work or replicate the work.

The **Results** should answer the questions evolving from the purpose of the study in a comprehensive manner in an orderly and coherent sequence, with illustrative tables and figures. Ensure only relevant information is presented to substantiate the findings. Avoid any confusion between facts and inferences and the restatement of table and figure captions in the text.

The **Discussion** should give the main contributions from the study, with appropriate interpretation of the results focussing on the problem or hypothesis. Compare with those of other authors. Speculation should be limited to what can be supported with reasonable evidence. In the case of short papers, it may be useful to combine Results and Discussion to avoid repetition.

The **Acknowledgements** should be limited to the names of individuals who provided significant scientific and technical support, including reviews, during the preparation of the manuscript, and the names of agencies which provided financial support.

The **References** represents the list of references cited in the text listed alphabetically. Good judgment should be used in the selection of references, which should be restricted largely to significant published literature. Unpublished data and documents, manuscripts in preparation, and manuscripts awaiting acceptance to other journals may be noted in the text as unpublished data or personal communications, with full contact addresses.

Literature references cited in the text must be by author's surname and year of publication, e.g. (Collins, 1960). The surnames of two authors may be used in a citation, but, for more than two authors the citation should be (Collins *et al.*, 1960). The citation of mimeographed manuscript reports and meeting documents should contain the abbreviation "MS", e.g. (Collins *et al.*, MS 1960). All papers referred to in the text must be cited in the References alphabetically by the first author's surname and initials, followed by the initials and surnames of other authors, year of publication, full title of the paper, name of the periodical, volume and/or number, and range of pages. Abbreviations of periodicals should, if possible, follow the "*World List of Aquatic Sciences and Fisheries Serials Titles*", published periodically by FAO (Food and Agriculture Organization of the United Nations). References to monographs should, in addition to the author(s), year and title, contain the name and place of the publisher and the number of pages in the volume. Reference to a paper in a book containing a collection of papers should also contain the page range of the paper, name(s) of editor(s), and actual title of the book. The accuracy of all references and their correspondence with text citations is the responsibility of the author.

Comments on Tables and Figures

All Tables and Figures must be mentioned or discussed in the text. Tables and Figures must be numbered consecutively in arabic numerals, which correspond with the order of presentation in the text. The required position of the Tables and Figures in the text should be indicated in the left margin of the relevant page. Place the originals of Tables and Figures after the list of references.

Tables. Note a well constructed Table can eliminate elaborate text descriptions. Each Table should be carefully constructed to be easily read and understood. Each column and row must be concisely headed, ensuring relevant units of the values are given (usually within parentheses). Each Table should have a complete but concise descriptive heading, and should be on a separate sheets.

Figures. Note any reference to geographic areas relevant to the study should be shown in a Figure (or map) form giving coordinates. These and illustrations and photographs can eliminate elaborate text descriptions.

Each Figure should be carefully constructed and labelled to be easily read and understood. Each vertical and horizontal axis (e.g. x and y axes on a graph or latitude and longitudes on a map) must have a concise header with relevant units (usually within parentheses). Each Figure would have a complete but concise descriptive heading, and should be on a separate sheet.

When preparing figures, consideration should be given to details such as shading and lettering with respect to the effects of reduction in size to a page width (e.g. lettering should not be overbearing or too small). If oversized figures are necessary, only good quality page-size photocopies should be submitted. If the paper contains photographs, ensure they have good contrast whether they are in colour or black and white.

Mathematical equations and formulae must be accurately stated, with clear definitions of the various letters and symbols. If logarithmic expressions are used, the type of function (e.g. \log , \ln , \log_{10} or \log_e) must be clearly indicated.

Manuscript Submission

NOTE: The following are the two major NAFO scientific publications, while the Scientific Council Research Documents (SCR Doc.) and Summary Document (SCS Doc.) are series that are submitted for meeting considerations.

The NAFO Secretariat now prefers to receive manuscript submissions, for any of the above publications in a computer electronic form. Coloured Tables and Figures are now accepted.

The manuscript submissions may be done by e-mail (with a hard copy and diskette also forwarded by mail), or by mail (one hard copy and diskette). All texts, Tables and Figures should be formatted using Word or WordPerfect (Word is preferred), with each Table and Figure saved in a separate file (eps (preferably), tiff, pct, jpg, bmp or gif).

Please note: *In view of the considerable costs involved in colour printing, the NAFO Secretariat will be printing figures not requiring full colour in grayscale unless colour contributes to the content of the figure.*

The Secretariat may request alternative formats as publication technologies develop.

Journal of Northwest Atlantic Fishery Science

The Journal provides a forum for the primary publication of original research papers. While it is intended to be regional in scope, papers of general applicability and methodology, irrespective of region, may be considered. Both practical and theoretical papers are eligible. Space is also provided for notes, letters to the editor and notices.

Such manuscripts are considered for publication with the understanding that the content is unpublished and is not being submitted elsewhere for publication. Each manuscript is assigned to an Associate Editor of the Journals Editorial Board, for scientific editing. Papers are normally sent by the Associate Editors to two referees for appraisal regarding its suitability as a primary article.

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The Studies publishes papers which are of topical interest and importance to the current and future activities of the Scientific Council, but which are not considered to be sufficiently high quality to meet the standards for primary publication in the Journal. Such papers have usually been presented as research documents at Scientific Council meetings and nominated for publication by the Standing Committee on Publications. These manuscripts are not normally refereed but undergo critical scrutiny by the Studies editor and by an expert familiar with the subject matter selected from the Journal editorial board.

Manuscripts (one hard copy and one copy saved on a computer diskette) being submitted should be addressed to:

Deputy Executive Secretary
Northwest Atlantic Fisheries Organization
P. O. Box 638
Dartmouth, Nova Scotia
Canada B2Y 3Y9
Tel: +902-468-5590
Fax: +902-468-5538
E-mail: info@nafo.int

Scientific Publications of the Northwest Atlantic Fisheries Organization

Journal of Northwest Atlantic Fishery Science

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- Vol. 1 – Miscellaneous papers, (10), December 1980, 112 pp.
- Vol. 2 – Miscellaneous papers, (10), October 1981, 76 pp.
- Vol. 3, No. 1, 2 – Miscellaneous papers, (17), May and December 1982, 180 pp.
- Vol. 4 – Special issue *Guide to the Early Stages of Marine Fishes Occurring in the Western North Atlantic Ocean, Cape Hatteras to the Southern Scotian Shelf*, July 1983, 424 pp.
- Vol. 5, No. 1, 2 – Miscellaneous papers, (26), January and November 1984, 224 pp.
- Vol. 6, No. 1, 2 – Miscellaneous papers, (17), June and December 1985, 179 pp.
- Vol. 7, No. 1, 2 – Miscellaneous papers, (18), December 1986 and December 1987, 177 pp.
- Vol. 8 – Miscellaneous papers, (7), December 1988, 88 pp.
- Vol. 9 – Miscellaneous papers, (13), September and December 1989, 159 pp.
- Vol. 10 – Special issue, (1), *The Delimitation of Fishing Areas in the Northwest Atlantic*, December 1990, 57 pp.
- Vol. 11 – Miscellaneous papers, (7), February 1991, 80 pp.
- Vol. 12 – Miscellaneous papers, (7), January 1992, 84 pp.
- Vol. 13 – Miscellaneous papers, (7), December 1992, 114 pp.
- Vol. 14 – Symposium papers, (12), on *Changes in Biomass, Production and Species Composition of the Fish Populations in the Northwest Atlantic over the Last 30 Years, and Their Possible Causes*, December 1992, 160 pp.
- Vol. 15 – Special issue, (1), *Decapod Crustacean Larvae from Ungava Bay*, December 1993, 170 pp.
- Vol. 16 – Miscellaneous papers, (7), July 1994, 100 pp.
- Vol. 17 – Miscellaneous papers, (6), October 1994, 78 pp.
- Vol. 18 – Miscellaneous papers, (6) (1 Note), April 1996, 115 pp.
- Vol. 19 – Symposium papers, (11), on *Gear Selectivity/Technical Interactions in Mixed Species Fisheries*, September 1996, 145 pp.
- Vol. 20 – Special issue, (1), *North Atlantic Fishery Management Systems: A Comparison of Management Methods and Resource Trends*, September 1996, 143 pp.
- Vol. 21 – Miscellaneous papers, (5), April 1997, 83 pp.
- Vol. 22 – Symposium papers, (25) (1 Note), on *The Role of Marine Mammals in the Ecosystem*, December 1997, 387 pp.
- Vol. 23 – Symposium papers, (16), *What Future for Capture Fisheries*, October 1998, 277 pp.
- Vol. 24 – Miscellaneous papers, (4), November, 1998, 97 pp.
- Vol. 25 – Symposium papers, (17), (2 Notes), on *Variations in Maturation, Growth, Condition and Spawning Stock Biomass Production in Groundfish*, October 1999, 233 pp.
- Vol. 26 – Miscellaneous papers, (6), December 2000, 145 pp.
- Vol. 27 – Symposium papers (22) (1 Note), *Pandalid Shrimp Fisheries – Science and Management at the Millennium*, December 2000, 289 pp.
- Vol. 28 – Special issue, (1), *A Review of the Cod Fisheries at Greenland, 1910–1995*, December 2000, 121 pp.
- Vol. 29 – Miscellaneous papers, (5), December, 2001, 99 pp.
- Vol. 30 – Miscellaneous papers, (5), December, 2002, 91 pp.

NAFO Scientific Council Studies

This publication includes papers of topical interest and importance to the current and future activities of the Scientific Council.

- No. 1 – Miscellaneous papers, (11), March 1981, 101 pp.
- No. 2 – Manual on *Groundfish Surveys*, December 1981, 56 pp.
- No. 3 – Miscellaneous papers, (8), April 1982, 82 pp.

NAFO Scientific Council Studies (Continued)

- No. 4 – Special Session papers, (12), on *Remote-Sensing Applications to Fishery Science*, September 1982, 98 pp.
- No. 5 – Symposium papers, (12), on *Environmental Conditions in 1970–79*, December 1982, 114 pp.
- No. 6 – Miscellaneous papers, (8), December 1983, 104 pp.
- No. 7 – Miscellaneous papers, (9), August 1984, 98 pp.
- No. 8 – Miscellaneous papers, (12), April 1985, 96 pp.
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- No. 21 – Collections of Papers, (10), Related to *Northern Cod and Seals in NAFO Divisions 2J and 3KL*, December 1994, 165 pp.
- No. 22 – Miscellaneous papers, (6), May 1995, 95 pp.
- No. 23 – Miscellaneous papers, (5), September 1995, 95 pp.
- No. 24 – Symposium papers, (12), on *Impact of Anomalous Oceanographic Conditions at the Beginning of the 1990s in the Northwest Atlantic on the Distribution and Behaviour of Marine Life*, September 1994, 155 pp.
- No. 25 – Collection of Papers, (5), *Flemish Cap Selected Environmental and Other Papers*, July 1996, 91 pp.
- No. 26 – Selected Papers, (11), (2 Notes), on *Harp and Hooded Seals*, December 1996, 129 pp.
- No. 27 – Miscellaneous papers, (5), (1 Note), December 1996, 81 pp.
- No. 28 – Special Session papers, (6), on *Assessment of Groundfish Stocks Based on Bottom Trawl Survey Results*, December 1996, 105 pp.
- No. 29 – Selected Papers, (11), *Selected Studies Related to Assessment of Cod in NAFO Divisions 2J+3KL*, May 1997, 125 pp.
- No. 30 – Miscellaneous papers, (9), December 1997, 117 pp.
- No. 31 – Miscellaneous papers, (8), December 1998, 165 pp.
- No. 32 – Miscellaneous papers, (8), April 1999, 133 pp.
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- No. 34 – Miscellaneous papers, (3), October, 2001, 91 pp.
- No. 35 – Workshop: *The Canada-United States Yellowtail Flounder Age Reading*, December 2002, 68 pp.
- No. 36 – Workshop on Assessment Methods, May, 2003, 320 pp.

NAFO Scientific Council Reports

This publication contains reports of Scientific Council Meetings held through each year since NAFO replaced ICNAF. (The comparable publication during ICNAF was called the *Redbook*).

- 1980 – Reports of seven meetings in 1979 and 1980, Published December 1980, 190 pp.
- 1981 – Reports of four meetings in 1981, Published December 1981, 148 pp.
- 1982 – Reports of two meetings in 1982, Published December 1982, 110 pp.
- 1983 – Reports of three meetings in 1983, Published December 1983, 152 pp.
- 1984 – Reports of three meetings in 1984, Published December 1984, 126 pp.
- 1985 – Reports of three meetings in 1985, Published December 1985, 146 pp.
- 1986 – Reports of three meetings in 1986, Published December 1986, 156 pp.
- 1987 – Reports of three meetings in 1987, Published December 1987, 138 pp.
- 1988 – Reports of two meetings in 1988, Published December 1988, 150 pp.
- 1989 – Reports of two meetings in 1989, Published December 1989, 180 pp.
- 1990 – Reports of two meetings in 1990, Published December 1990, 188 pp.

NAFO Scientific Council Reports (Continued)

- 1991 – Reports of two meetings in 1991, Published December 1991, 164 pp.
- 1992 – Reports of four meetings in 1992, Published December 1992, 212 pp.
- 1993 – Reports of three meetings in 1993, Published January 1994, 234 pp.
- 1994 – Reports of four meetings in 1994, Published January 1995, 234 pp.
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- 1997 – Reports of three meetings in 1997, Published January 1998, 274 pp.
- 1998 – Reports of three meetings in 1998, Published January 1999, 257 pp.
- 1999 – Report of four meetings in 1999, Published January 2000, 327 pp.
- 2000 – Report of two meetings in 2000, Published January 2001, 303 pp.
- 2001 – Report of three meetings in 2001, Published January 2002, 339 pp.
- 2002 – Report of three meetings in 2002, Published January 2003, 323 pp.

NAFO Statistical Bulletin

This publication replaced *ICNAF Statistical Bulletin* which terminated with Vol. 28 (revised). The volume numbering continues the series as the *NAFO Statistical Bulletin*.

- Vol. 29 – Fishery statistics for 1979, Originally published July 1981; revised edition published November 1984, 290 pp.
- Vol. 30 – Fishery statistics for 1980, Originally published August 1982; revised edition published October 1984, 280 pp.
- Vol. 31 – Fishery statistics for 1981, Originally published September 1983; revised edition published March 1985, 276 pp.
- Vol. 32 – Fishery statistics for 1982, Published December 1984, 284 pp.
- Vol. 33 – Fishery statistics for 1983, Published December 1985, 280 pp.
- Vol. 34 – Fishery statistics for 1984, Published December 1986, 304 pp.
- Vol. 35 – Fishery statistics for 1985, Published December 1987, 322 pp.
- Vol. 36 – Fishery statistics for 1986, Published October 1989, 304 pp.
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- Vol. 38 – Fishery statistics for 1988, Published February 1991, 307 pp.
- Vol. 39 – Fishery statistics for 1989, Published February 1993, 300 pp.
- Vol. 40 – Fishery statistics for 1990, Published February 1994, 309 pp.
- Vol. 41 – Fishery statistics for 1991, Published February 1995, 318 pp.
- Statistical Bulletin Supplementary Issue, 1960–90, (statistics) Published April 1995, 156 pp.
- Vol. 42 – Fishery statistics for 1992, Published October 1995, 310 pp.
- Vol. 43 – Fishery statistics for 1993, Published December 1997, 329 pp.
- Vol. 44 – Fishery statistics for 1994, Published December 2000, 201 pp.
- Vol. 45 – Fishery statistics for 1995, Published October 2001, 207 pp.
- Vol. 46 – Fishery statistics for 1996, Published November 2001, 214 pp.
- Vol. 47 – Fishery statistics for 1997, Published November 2001, 216 pp.
- Vol. 48 – Fishery statistics for 1998, Published November 2001, 210 pp.
- Vol. 49 – Fishery statistics for 1999, Published January 2002, 210 pp.

Inventory of Sampling Data

This publication replaced *ICNAF Inventory of Sampling Data 1967–1978* which was completed in 1986.

- Inventory of Sampling Data 1979–1984, Published April 1989, 250 pp.
- Inventory of Sampling Data 1985–1989, Published March 1993, 265 pp.
- Inventory of Sampling Data 1990–1994, Published October 1999, 287 pp.
- Inventory of Sampling Data 1995–1999, Published November 2002, 142 pp.

NAFO Index of Meeting Documents

This publication contains lists of all documents along with a subject and author index of the NAFO Scientific Council documents issued during 5-year periods.

- 1979–84 – Index of Meeting Documents, Published March 1985, 146 pp.
 - 1985–89 – Index of Meeting Documents, Published December 1990, 116 pp.
 - 1990–94 – Index of Meeting Documents, Published November 1995, 139 pp.
 - 1995–99 – Index of Meeting Documents, Published December 2000, 141 pp.
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NAFO Scientific Council Studies

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- No. 1. Miscellaneous Selected Papers (101 pages, published March 1981)
- No. 2. Manual on Groundfish Surveys in the Northwest Atlantic. W. G. Doubleday, Editor (55 pages, published December 1981)
- No. 3. Miscellaneous Selected Papers (82 pages, published April 1982)
- No. 4. Special Session on Remote Sensing, September 1981 (98 pages, published September 1982)
- No. 5. Symposium on Environmental Conditions in the Northwest Atlantic During 1970–79, September 1981 (113 pages, published December 1982)
- No. 6. Miscellaneous Selected Papers (103 pages, published December 1983)
- No. 7. Miscellaneous Selected Papers (97 pages, published August 1984)
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