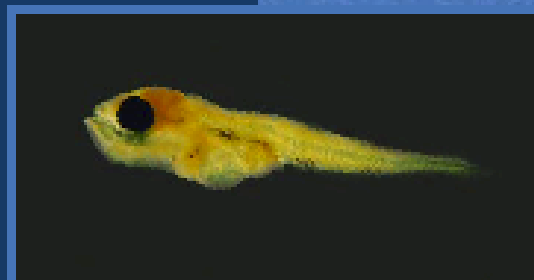


THE STOCK BOOK



*Annual Review of
Fish Stocks in 2003
with Management Advice
for 2004*



...TO ASSESS,
RESEARCH
AND ADVISE



Fisheries Science Services

November 2003



**Fisheries Science Services,
Galway Technology Park,
Parkmore, Galway, Ireland**

THE STOCK BOOK

Report to the Minister for Communications, Marine and Natural Resources Annual Review of Fish Stocks in 2003 with Management Advice for 2004

The FSS Team

*Paul Connolly, John Joyce,
Colm Lordan, Maurice Clarke, Rick Officer, Edward Fahy, Ciarán Kelly, Philip McGinnity,
Sara Jane Moore, Leonie Dransfeld, John Boyd, Jennifer Doyle, David Stokes, Ciaran O'Donnell,
Hans Gerritsen, Macdara O Cuaig, Gráinne Ní Chonchúir, Helen McCormick, Eugene Mullins, Afra Egan,
Graham Johnston, Turloch Smith, Selene Hoey, Imelda Hehir, Robert Bunn, Trudy Hyde, Edgar McGuinness,
Fiona Woods, Diarmaid Murphy, Ross Fitzgerald, Jim Carroll, Deirdre Lynch, Susan Beattie,
Ayesha Power, Nicola Donohoe, Denise O'Brien, Lisa Borges, Aisling Lannin,
Geraldine Kane, Niamh Slattery, John Molloy,
Maggie Ostdahl, Margaret O'Toole*

*Throughout 2003 the FSS Team were Involved in Data Collection, Data Analysis, Conducting Assessments,
Provision of Advice and Carrying out Scientific Research on Fish Stocks, both Nationally and Internationally.
The Results of this Work are Presented in the 2003 Stock Book*

NOVEMBER 2003

In the 2003 Stock Book, every effort has been made to use the most up to date version of the ICES and STECF advice. However, the final official ICES ACFM and STECF Reports should be consulted for the definitive advice. For more detailed information on specific stocks the relevant ICES Working Group Reports should be consulted. The official EU journal should be consulted for definitive TAC's and Quotas for 2003.

Marine Institute Headquarters
Galway Technology Park
Parkmore
Galway
Ireland

Telephone: +353 (0)91 730 400
Facsimile: +353 (0)91 730 470

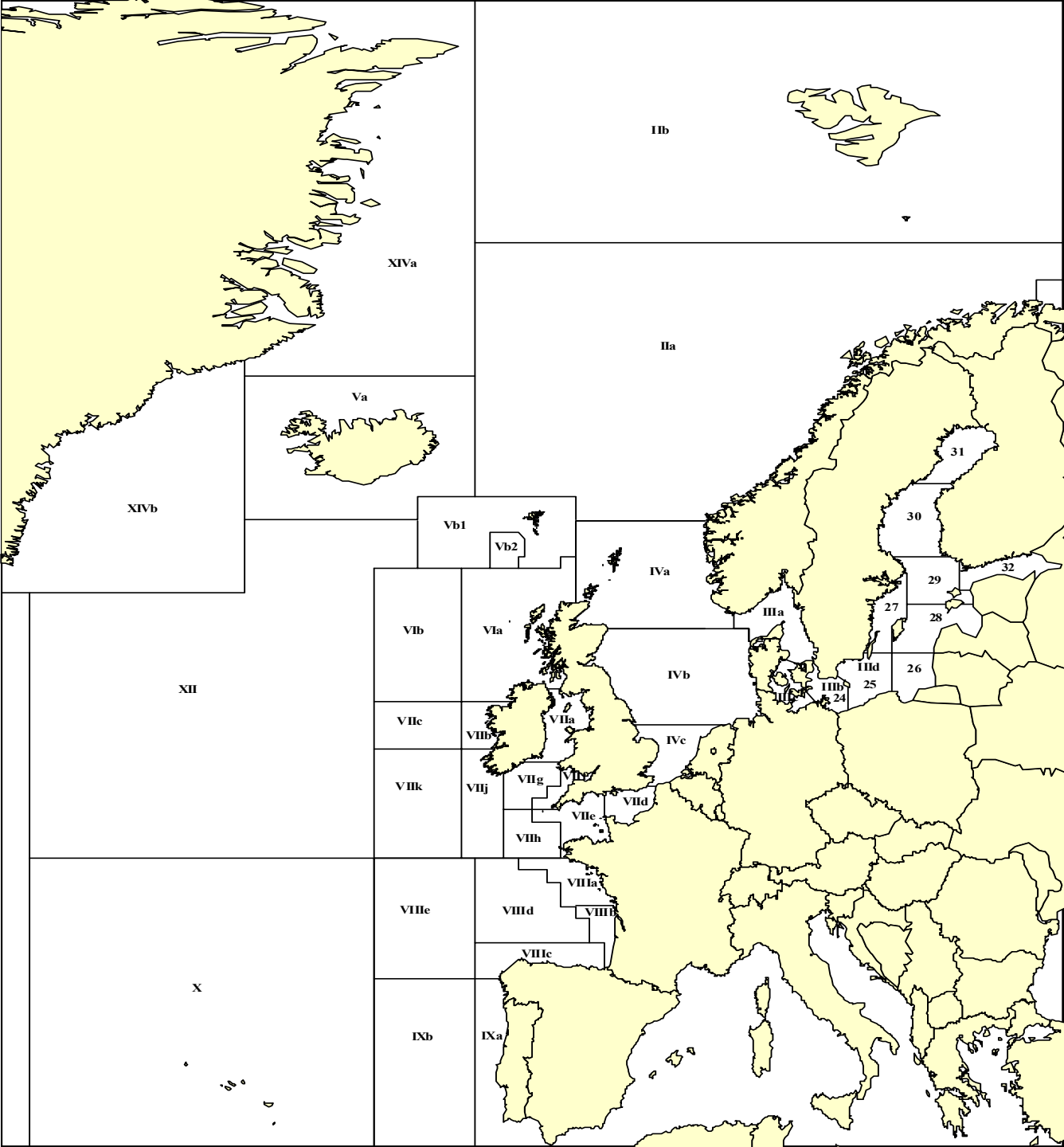
E-mail Information: institute.mail@marine.ie
E-mail Webmaster: webmaster@marine.ie
Website: www.marine.ie

Table of Contents

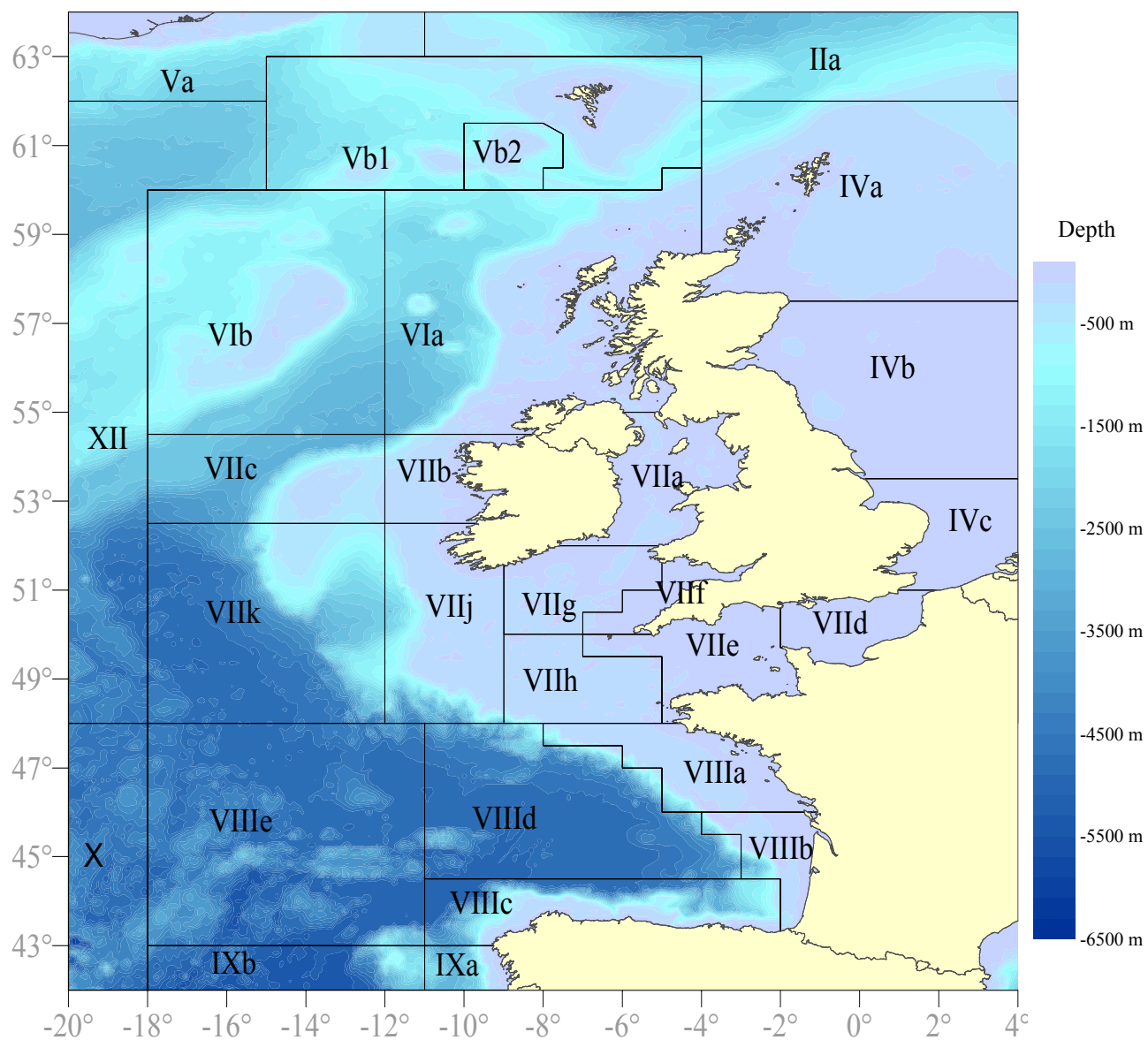
Table of Contents	1
ICES Fishing Areas	3
ICES Fishing Divisions around the Irish Coast	4
Introduction	5
Organisation of the Stock Book	7
Value of Irish Quota in 2003	8
Volume and Value of Irish Landings in 2002	9
FSS Work Overview 2003	13
The Form of ICES Management Advice and the Precautionary Approach	18
Some Key Issues in Fisheries Science	20
Pelagic Fisheries Review	24
HERRING - North Sea Herring (Sub-area IV, Divisions VIIId-e, Division IIIa)	30
HERRING - West of Scotland Herring (Division VIa North)	32
HERRING - North west of Ireland Herring (Divisions VIa South & VIIb,c)	39
HERRING - Irish Sea Herring (Division VIIa North)	47
HERRING - Celtic Sea Herring (Division VIIaS, VIIg-h, VIIj-k)	53
HERRING - Norwegian Spring Spawning Herring (Sub-areas I & II)	61
MACKEREL - North East Atlantic Mackerel	69
HORSE MACKEREL - Western Horse Mackerel	85
HORSE MACKEREL - North Sea Horse Mackerel	97
BLUE WHITING - Combined Stock (Sub-areas I-IX, XII and XIV)	101
ALBACORE TUNA - North Atlantic	111
BLUEFIN TUNA - East Atlantic and Mediterranean	113
SPRAT- Around Ireland	115
CAPELIN	116
Irish Sea Mixed Demersal Fisheries	117
COD - Irish Sea Cod (Division VIIa)	124
WHITING - Irish Sea Whiting (Division VIIa)	132
HADDOCK - Irish Sea Haddock (Division VIIa)	140
NEPHROPS - Irish Sea Nephrops (MA J = North of Division VIIa)	147
PLAICE - Irish Sea Plaice (Division VIIa)	152
SOLE - Irish Sea Sole (Division VIIa)	159
West of Scotland and Rockall Mixed Demersal Fisheries	166
COD - West of Scotland Cod (Division VIa)	172
COD - Rockall Cod (Division VIb)	181
HADDOCK - West of Scotland Haddock (Division VIa)	183
HADDOCK - Rockall Haddock (Division VIb)	191
WHITING - West of Scotland Whiting (Division VIa)	196
WHITING - Rockall Whiting (Division VIb)	204
MEGRIM - West of Scotland and Rockall Megrim (Sub-area VI)	205
ANGLERFISH - West of Scotland, Rockall and North Sea Anglerfish (Sub-areas IV and VI)	210
NEPHROPS - West of Scotland Nephrops (MA C = Division VIa)	222
PLAICE - West of Scotland Plaice (Sub-area VI)	226
SOLE - West of Scotland and Rockall Sole (Sub-area VI)	229
POLLACK - West of Scotland and Rockall Pollack (Sub-area VI)	232
SAITHE - North Sea Saithe (Sub-areas IV, VI and Divisions IIa, IIIa-d)	234
Celtic Sea, West and SW of Ireland Mixed Demersal Fisheries	243
HAKE - Northern Hake (Divisions IIa, IIIa-d, Vb, VIIIabde Sub-areas IV, VI, VIII, XII and XIV)	252
COD - Celtic Sea and Western Channel Cod (Divisions VIIe-k)	262

COD - West of Ireland Cod (Divisions VIIb,c)	271
HADDOCK - West of Ireland and Celtic Sea Haddock (Divisions VIIb-k)	273
WHITING - Celtic Sea and Western Channel Whiting (Divisions VIIe-k)	279
WHITING - West of Ireland Whiting (Divisions VIIb,c)	286
ANGLERFISH - Celtic Sea and Bay of Biscay Anglerfish (Divisions VIIb-k and VIIa,b)	288
MEGRIM - Celtic Sea and Bay of Biscay Megrim (Sub-area VII and Divisions, VIIa,b,d,e)	300
PLAICE - Celtic Sea Plaice (Divisions VIIf,g)	307
PLAICE - Southwest of Ireland (Divisions VIIh-k)	314
PLAICE - West of Ireland Plaice (Divisions VIIb,c)	318
SOLE - Celtic Sea Sole (Divisions VIIf,g)	321
SOLE - Southwest of Ireland Sole (Divisions VIIh-k)	328
SOLE - West of Ireland Sole (Divisions VIIb,c)	332
NEPHROPS - West of Ireland and inshore south of Ireland Nephrops (MA L = Divisions VIIbcgjk)	335
NEPHROPS - Southern Irish Sea and Celtic Sea Nephrops (MA M = Divisions VIIagh)	341
POLLACK - West of Ireland and Celtic Sea Pollack (Sub-area VII)	346
SAITHE - Sub Area VII	348
Nephrops Fisheries Review	350
INDUSTRIAL FISHERIES - Sandeel & Norway Pout - West of Scotland (Division VIa)	352
ARCTIC STOCKS - Cod, Haddock and Saithe	354
Deepwater Fisheries Review	356
DEEPWATER STOCKS - Northwestern Area	359
DEEPWATER STOCKS - South of 63° N	365
Non-quota Species Review	381
Inshore Fisheries Review	384
Bass on all Coasts (Sub-areas VI and VII)	387
Shrimp on South and West Coasts (Divisions VIa, VIIa (south coast), b,g and j)	390
Velvet Crab on all Coasts (Sub-areas VI and VII)	391
Northern Brown Crab (Sub-area VI, Division VIIb)	392
South East Brown Crab (Divisions VIIa,g)	394
Spider Crab on Mainly West and South Coasts (Sub-area VII)	396
Green Crab on all Coasts (Sub-areas VI and VII)	400
Lobster on all Coasts (Sub-areas VI and VII)	401
Crawfish on Mainly Western Coasts (Sub-areas VI and VII)	402
Whelk in the South West Irish Sea (Division VIIa)	403
Northern Whelk (Division VIa)	405
Periwinkle on all Coasts (Sub-areas VI and VII)	407
Purple Sea Urchin on West Coast (Divisions VIa, VIIb,j)	408
Palourde on West Coast (Divisions VIIb, j)	409
Common Cockle in the Irish Sea (Division VIIa)	410
Razor Clams on Mainly East Coast (Division VIIa)	411
Surf Clams on South and West Coasts (Sub-area VII)	413
South East Scallop Fisheries (Divisions VIIa,g)	415
Scallop off the North Coast (Division VIa)	419
Queen Scallop on North and East Coasts (Divisions VIa, and VIIa)	420
Appendices	
Appendix I - Nephrops Functional Units (FUs) and Management Areas (MAs) around Ireland	421
Appendix II - Herring Management Units Map	422
Appendix III - Herring Spawning Boxes off the South Coast	423
Appendix IV - EU Member States Shares of the 2003 TAC's	424
Definition of fisheries technical terms and acronyms.	427

ICES Fishing Areas



ICES Fishing Divisions around the Irish Coast



Purpose of the Stock Book

The Stock Book is produced annually by the Marine Institute's Fisheries Science Services team (FSS)*. Its purpose is to provide the latest scientific advice on commercially exploited fish stocks of interest to Ireland. The book is produced for the Marine Institute's main client, the Department of Communications Marine and Natural Resources. It is also available to the fishing industry, third level, semi state agencies and the general public. It is available electronically on compact disc or from the Marine Institute's web site at www.marine.ie.

The information contained in the Stock Book mainly focuses on the TAC fish stocks (and other exploited resources) of interest to Ireland and includes:

- The latest scientific advice from an Irish perspective.
- A summary of the current state of the stocks
- Relevant information on the biology, management and assessment of these stocks.
- Overviews of Ireland's marine fisheries (including non-TAC fisheries)
- Summaries of the Marine Institute's monitoring programmes that contribute to the international assessment of fish stocks in the waters around Ireland.
- Information on new developments in fisheries science, such as Regional Advisory Councils (RACs), recovery plans, working with industry and the Ecosystem Approach.

The information in the Stock Book is of vital importance in serving Ireland during the annual TAC negotiations at the EU Council of Ministers meeting in December. It also serves as a valuable reference throughout the year at other fisheries management meetings with the EU. The Stock Book is of interest to a wide audience, including the fishing industry, fisheries scientists, managers, third level institutes, financial institutions and others with an interest in the status and management of marine fisheries resources in the waters around Ireland.

While every effort has been made to ensure that the Stock Book contains the most up to date and accurate information, it should be noted that the advice for 2004 remain provisional at the time of going to press. However, final ICES, ICCAT and STECF reports should be consulted for the official and definitive advice. More detailed information on specific stocks is available in the relevant ICES Working Group Reports. Definitive information on TAC areas and quota allocations should be obtained from the official EU Journal.

Fisheries Science Services

Fisheries Science Services is one of seven service teams within the Marine Institute. Its mission is to 'assess, research and advise' on marine fisheries in order to ensure the sustainable exploitation of this vital resource. Work is carried out on demersal, pelagic, shellfisheries and inshore stocks as well as on mathematical modelling of stock dynamics, the ecosystem approach and genetic studies. Staff conduct data collection and stock assessment programmes, participate actively in the various ICES Working Groups, ACFM and STECF as well as providing scientific advice to the DCMNR on the status and management of these stocks. FSS also conducts a wide variety of fisheries research programmes aimed at both improving the advice and increasing our understanding of the fisheries resource.

The detailed data and information required for stock assessment and collated by FSS includes:

- The length distribution of landings
- A profile of the age structure of landings
- Discard information
- The number of boats fishing in a particular area
- The catch and time spent fishing
- Information on the annual landings into each port
- Data from various research surveys carried out by FSS

Landings are sampled at ports, fishermen's Co-operatives, fish processors and auction sites around the coast by contracted port samplers employed by FSS, as well as other FSS staff. Discards are assessed by a number of Fisheries Assessment Technicians (FAT's) based in the Institute's port facilities at Killybegs, Greencastle, Rossaveal, Castletownbere, Dunmore East and Howth. Research surveys are carried out either on contracted commercial fishing vessels, or on the Institute's own research vessels *Celtic Explorer* and *Celtic Voyager*. These data collection programmes are conducted under the EC Data Collection Regulation (EC Council Regulation 1543/2000) for which the Marine Institute is the Irish National Co-ordinator, working closely with DCMNR and An Bord Iascaigh Mhara.

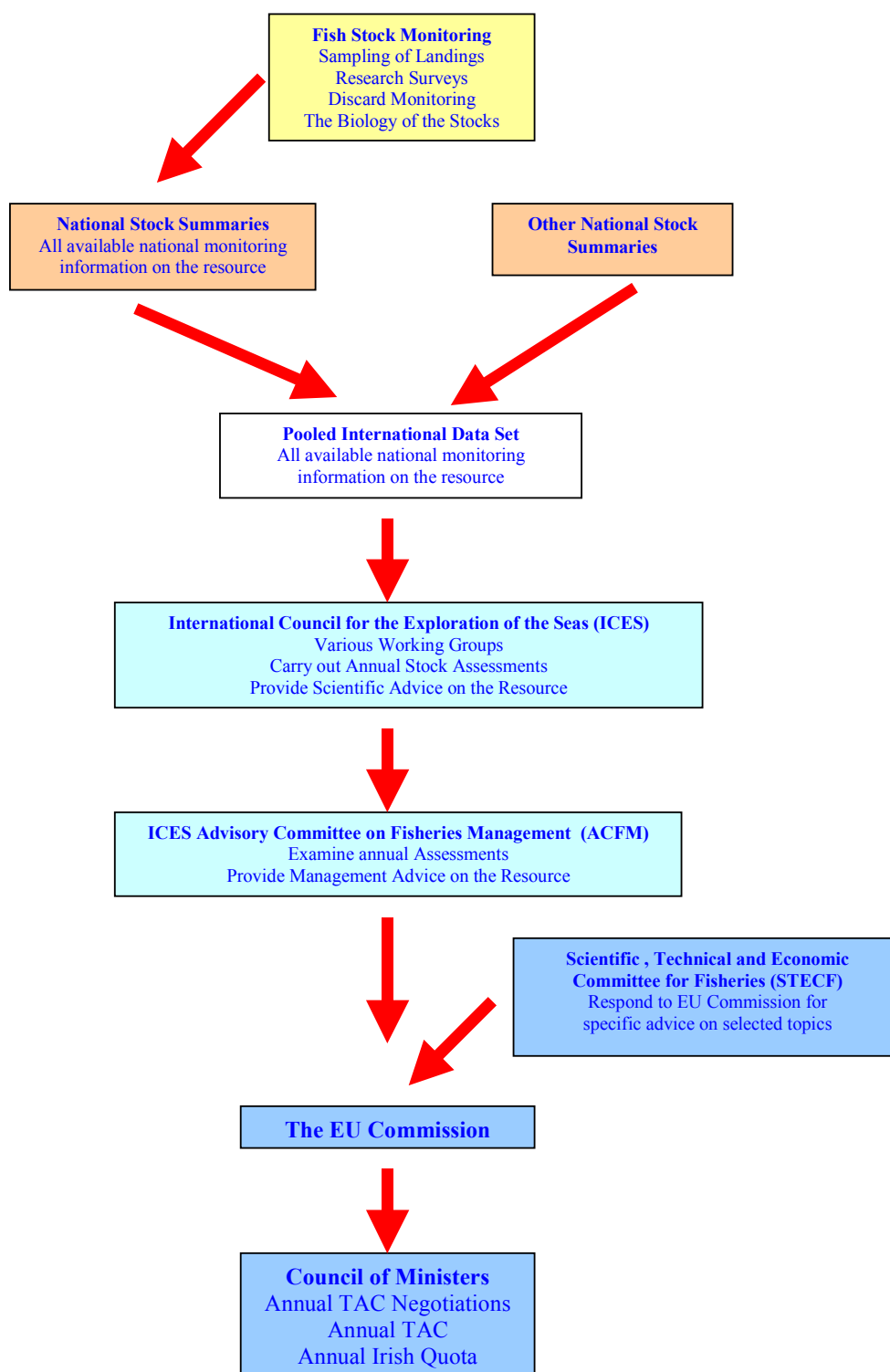
FSS sea-going missions include acoustic studies of pelagic stocks, the distribution of fish eggs, larvae and juveniles, under water TV surveys for *Nephrops*, ground fish surveys and fish tagging studies. Summaries on the status of each commercial stock are presented annually to the appropriate ICES Working Group for examination and validation by international experts. This information is then pooled with data from other countries to perform annual stock assessments.

These assessments provide scientific advice on each commercial stock, which are then reviewed by the ICES Advisory Committee on Fisheries Management (ACFM) and the EU Scientific Technical and Economic Committee on Fisheries (STECF). The final scientific advice is then de-

livered to the EU Commission who manage EU fish stocks under the Common Fisheries Policy.

*An explanation of the acronyms and technical terms used in the Stock Book is found in the appendices.

The Steps involved in the formulation of the annual TAC's



Organisation of the Stock Book

The Stock Book focuses on the main commercial fish stocks exploited by the Irish fleet. It features a main page for each stock which includes FSS commentary and stock considerations/advice, laid out in the following sections;

FSS – ADVICE (Pelagic Stocks)

OR

FSS – SINGLE STOCK CONSIDERATIONS (Demersal Stocks)

**STATE OF THE STOCK
CURRENT MANAGEMENT
FSS - ECONOMIC COMMENTS
ADDITIONAL INFORMATION**

*****SPECIAL COMMENTS (If Required)**

Following the main page, the ICES ACFM report for the stock is given.

****** SPECIAL NOTE**

This year, ICES gave ‘area based mixed fisheries advice’ for demersal stocks. The advice for these stocks can be found in the area overviews rather than under the specific stocks. For pelagic, deep water and inshore stocks, as in the past, the advice is given under the specific stock in question.

FSS – ADVICE (For Pelagic Stocks) appears in a yellow box and is highlighted in red. It provides the main management advice for each stock, mainly in terms of proposed catches for 2004 and any technical measures that need to be considered. The proposed TAC for 2004, with the associated Irish quota is also given. An explanation of the ‘ICES advice on Management’ is provided where this is necessary. FSS advice then elaborates on any major points that impact on the Irish fisheries. Relevant STECF comments are also included with the FSS advice.

OR

FSS – SINGLE STOCK CONSIDERATIONS (For Demersal Stocks) appears in a yellow box and is highlighted in red. It provides the main considerations for single species demersal stocks. Mainly in terms of proposed catches for 2004 and any technical measures that need to be considered. The proposed TAC for 2004, with the associated Irish quota is also given. An explanation of the ‘ICES advice on Management’ is provided where this is necessary. FSS advice then elaborates on any major points that impact on the Irish fisheries.

The advice for the mixed demersal fisheries is given on an ‘area basis’ and can be seen in the appropriate area based overview. Relevant STECF comments are also included with the FSS advice.

STATE OF THE STOCK details the salient features about the current and historic state of each stock. These include, current and future state of the stock, trends in biomass, recruitment, landings, fishing mortality and precautionary reference points

CURRENT MANAGEMENT gives the management and assessment area for the stock and provides the TAC and Irish quota for 2003. Any important points gleaned from ICES advice are highlighted in this section. A map indicates the assessment area in relation to the management area for the demersal and herring fish stocks. A pie chart gives the percentage national quota allocation for the TAC.

FSS – ECONOMIC COMMENTS detail the value of the TAC, Irish quota and 2002 Irish landings for each stock. The economic value of the fishery to Ireland is also highlighted. It should be noted that the figures used to calculate the economic value are based on an ‘annual average price per tonne’ sourced from the EU logbook data on Irish fleet activity. The figures are therefore only crude estimates of economic value and do not take account of seasonal, geographic or quality variations in prices.

ADDITIONAL INFORMATION provides important additional information on aspects of each stock, mainly from an Irish perspective, including information that does not appear in the ICES advice – derived from the FSS stock monitoring programmes and comments from the relevant ICES Working Groups. The complete ICES advice for the stock then follows.

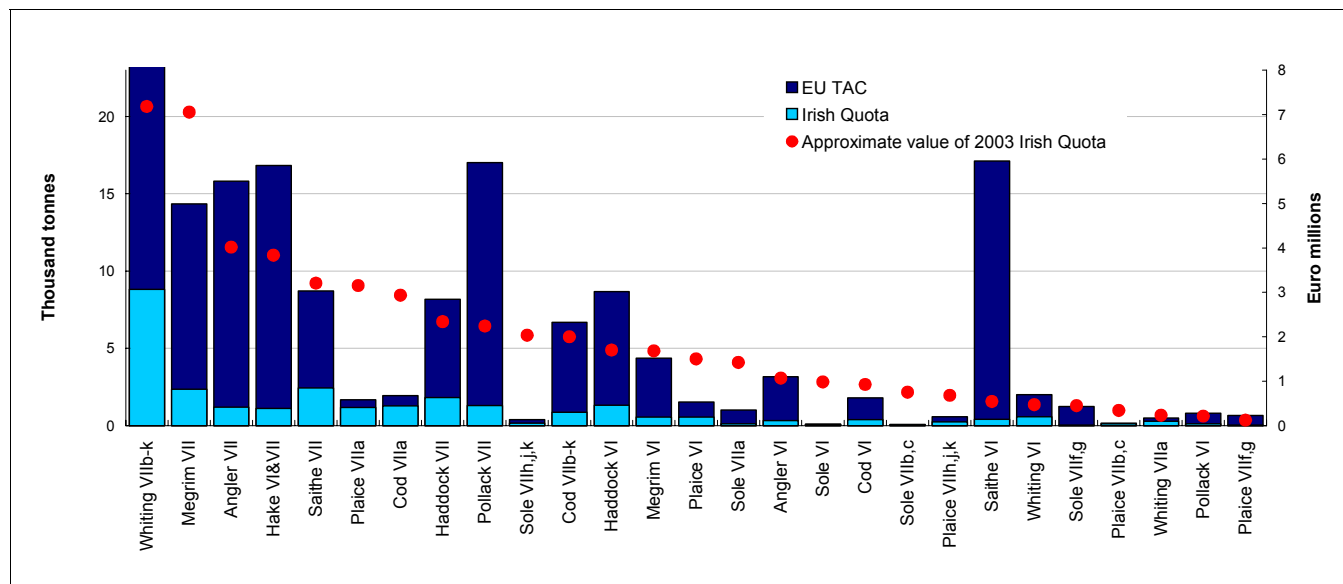
SPECIAL COMMENTS appear in certain stocks that warrant special comments in relation to the state of the stock or special measures that need to be considered. The special comments highlight important additional information that may have a significant impact on management considerations.

For all the key stocks, FSS have produced plots of the historic trends in biomass, catches, recruitment, and fishing mortality, together with the short term predictions. The short term predictions are not included in these graphs if they are considered to be a poor basis for management advice. The precautionary reference points have been shown on these plots where possible, in order to track the historic trends in each stock relative to the reference points.

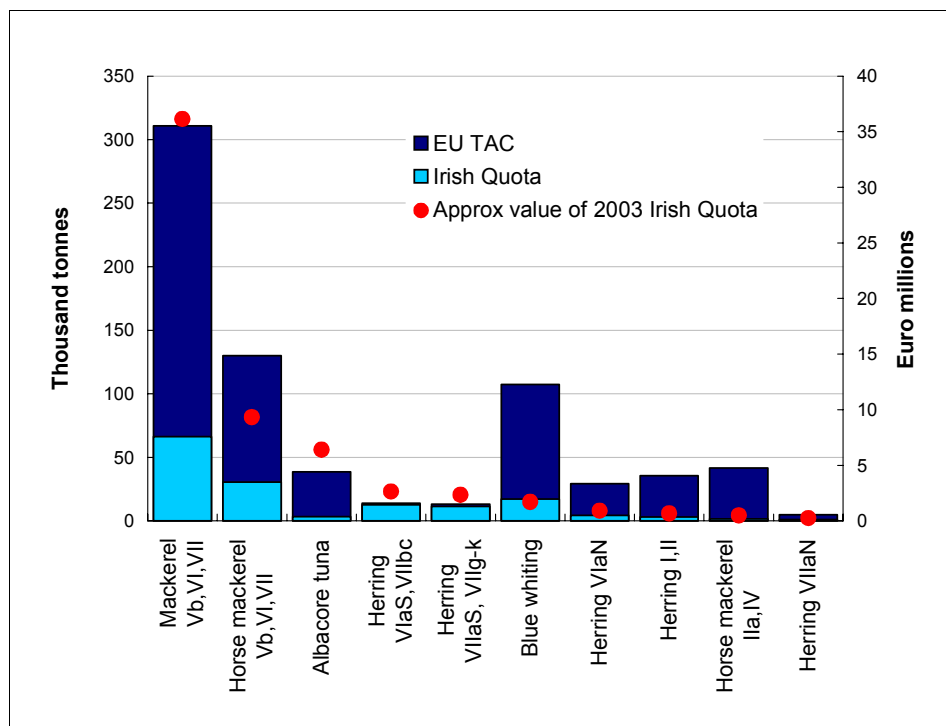
The length frequencies of the Irish catches (including discards when available) are also plotted for each stock together with the age profile of the Irish catches and the size (length) at age.

IRELAND'S SHARE OF THE 2003 EU TACS & Approximate Value of the Irish Quota in 2003

Demersal Fisheries



Pelagic Fisheries



Source: Dept. of Communications Marine and Natural Resources

Preliminary 2002 Irish Landings volume and value by species

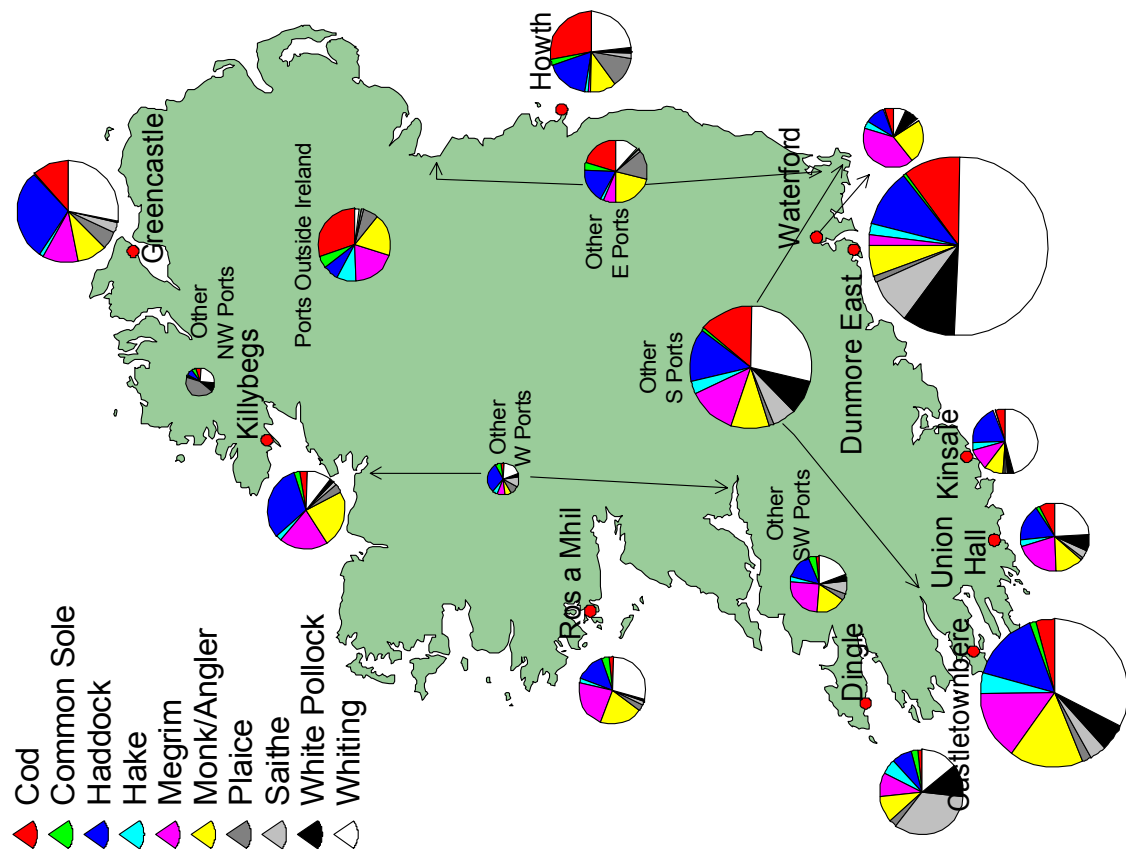
	Live Weight (Tonnes)	Landed Weight (Tonnes)	Value (Ir€)	Value Live Weight (€ / t)	(€ / kg)
Barbel	0.1	0.1	63	635	0.63
Black Scabbard	144.6	144.6	183,757	1,271	1.27
Blue Ling	332.7	289.3	423,402	1,273	1.27
Blue Shark	4.1	4.1	4,165	1,016	1.02
Brill	99.1	94.4	669,622	6,757	6.76
Cardinalfishes	53.7	53.7	68,185	1,270	1.27
Catfish	43.4	42.6	30,410	701	0.70
Cod	2,502.8	2,164.0	5,680,246	2,270	2.27
Common Sole	344.7	328.3	3,905,668	11,331	11.33
Conger Eel	278.0	247.1	237,828	855	0.86
Cutlassfish	837.6	837.6	1,504,002	1,796	1.80
Dabs	32.8	31.2	28,190	859	0.86
European Eel	0.2	0.2	317	1,587	1.59
Flounder	19.2	18.3	16,105	839	0.84
G/land Halibut	83.5	83.5	181,258	2,171	2.17
G/ter Forkbeard	380.1	337.9	426,319	1,122	1.12
Grenadier	616.8	550.7	744,030	1,206	1.21
Grunts	6.7	6.7	7,669	1,145	1.14
Gurnard	65.3	65.3	63,609	974	0.97
Haddock	3,595.8	3,178.3	4,628,256	1,287	1.29
Hake	641.6	572.9	2,208,954	3,443	3.44
Halibut	11.4	10.8	69,213	6,071	6.07
John Dory	153.9	136.8	655,325	4,258	4.26
Lemon Sole	482.0	463.4	1,196,691	2,483	2.48
Ling	1,304.9	1,165.1	1,626,548	1,246	1.25
Ling Roe	0.4	0.4	508	1,270	1.27
Megrim	2,760.3	2,628.9	8,202,418	2,972	2.97
Mixed Boxes	614.4	607.8	410,077	667	0.67
Monk/Angler	2,828.4	2,168.0	9,258,044	3,273	3.27
Mora Moro	42.8	42.8	55,951	1,307	1.31
Mullet	8.3	8.3	27,189	3,276	3.28
Orange Roughy	4,646.2	4,646.2	13,020,730	2,802	2.80
Other Demersal	8.0	7.3	9,991	1,249	1.25
Other Flatfish	13.5	12.9	18,629	1,380	1.38
Plaice	776.4	739.4	2,086,567	2,687	2.69
Porbeagle	3.3	3.3	3,855	1,168	1.17
Pouting	11.7	10.4	6,627	566	0.57
Rabbit Fish	15.8	14.1	11,637	737	0.74
Ray / Skate	2,502.0	2,175.6	2,777,979	1,110	1.11
Ray's Bream	403.7	403.7	587,738	1,456	1.46
Redfish	295.1	268.6	928,532	3,146	3.15
Saithe	1,354.2	1,147.6	1,771,527	1,308	1.31
Sand Sole	2.6	2.3	7,301	2,808	2.81
Sea Bream	0.2	0.2	762	3,809	3.81
Shark nei	216.6	216.6	219,893	1,015	1.02
Siki Shark	340.0	340.0	472,271	1,389	1.39
Spotted Dog	564.2	564.2	213,463	378	0.38
Spur Dog	1,292.4	1,292.4	2,336,731	1,808	1.81
Tope Shark	1.7	1.7	1,717	1,010	1.01
Turbot	183.4	174.6	1,950,357	10,634	10.63
Tusk	44.4	39.9	50,507	1,138	1.14
Various Dogs	14.2	14.2	12,621	889	0.89
White Pollock	1,383.4	1,213.5	2,390,389	1,728	1.73
Whiting	6,640.9	5,998.6	5,410,163	815	0.81
Witch	735.8	700.8	1,591,542	2,163	2.16
Total Demersal	39,739.4	36,271.5	78,395,550	1,973	1.97

(Source DCMNR 28/02/2003)

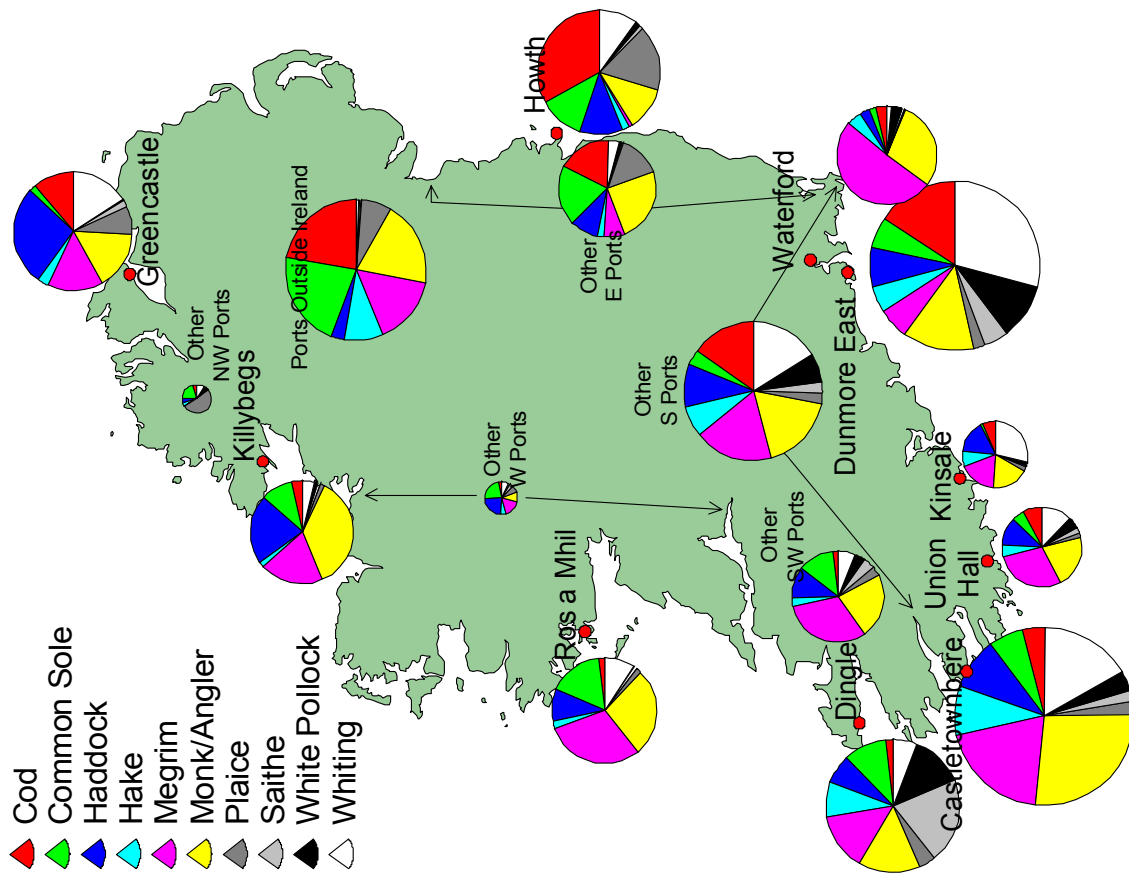
Preliminary 2002 Irish Landings volume and value by species continued

	Live Weight (Tonnes)	Landed Weight (Tonnes)	Value (Ir€)	Value Live Weight (€ / t)	(€ / kg)
Albacore Tuna	857.2	857.2	1,656,522	1,932	1.93
Argentines	7,592.4	7,592.4	897,565	118	0.12
Bigeye Tuna	0.1	0.1	165	1,651	1.65
Blue Whiting	17,825.2	17,825.2	1,770,981	99	0.10
Bluefin Tuna	15.5	15.5	93,564	6,036	6.04
Boarfishes	45.2	45.2	2,296	51	0.05
Herring	30,776.7	30,776.7	6,409,185	208	0.21
Horse Mackerel	36,482.8	36,482.8	11,101,014	304	0.30
Mackerel	72,085.2	72,085.2	39,287,180	545	0.55
Pilchard	12,159.7	12,159.7	4,103,525	337	0.34
Sprat	1,728.2	1,728.2	606,993	351	0.35
Swordfish	4.4	4.4	27,754	6,308	6.31
Tuna-like nei	237.8	237.8	216,770	912	0.91
Total Pelagic	179,810.4	179,810.4	66,173,515	368	0.37
Total WetFish	219,549.7	216,081.9	144,569,064	658	0.66
Blue Mussel	26,464.3	26,464.3	13,135,003	496	0.50
Clam	186.3	186.3	905,005	4,858	4.86
Cockle	111.5	111.5	219,545	1,969	1.97
Crab Claws	188.8	37.8	113,791	603	0.60
Crawfish	36.4	36.4	876,724	24,086	24.09
Edible Crab	10,097.9	10,097.9	13,213,410	1,309	1.31
Escallop	1,139.4	1,139.4	3,367,148	2,955	2.96
Euro Common Sq	0.1	0.1	127	1,270	1.27
Flat Oyster	695.3	695.3	3,012,057	4,332	4.33
Gigas Oys AQ.	3,388.2	3,388.2	5,421,912	1,600	1.60
<i>Illex</i> Squid	115.1	115.1	145,639	1,265	1.27
Lobster	539.0	539.0	7,690,466	14,268	14.27
<i>Loligo</i> Squid	40.4	40.4	137,787	3,411	3.41
<i>Nephrops</i>	6,981.7	5,637.3	27,161,005	3,890	3.89
Octopus	12.9	12.9	24,569	1,905	1.90
Other Crab	595.0	595.0	1,028,199	1,728	1.73
Other Shellfish	0.5	0.5	635	1,270	1.27
Periwinkle	1,368.0	1,368.0	1,347,061	985	0.98
Pota Squid	40.6	40.6	51,551	1,270	1.27
Queen Escallop	58.2	58.2	89,513	1,538	1.54
Razor-Shell	167.6	167.6	553,062	3,300	3.30
Sea Urchin	0.3	0.3	762	2,539	2.54
Shrimp (SMP)	37.0	37.0	269,025	7,271	7.27
Shrimps (PAL)	114.7	114.7	846,563	7,381	7.38
Spider Crab	130.2	130.2	123,682	950	0.95
Squid nei	317.3	317.3	732,992	2,310	2.31
Velvet Crab	315.7	315.7	711,694	2,254	2.25
Whelk	7,900.9	7,900.9	5,029,304	637	0.64
Total ShellFish	61,043.5	59,548.0	86,208,230	1,412	1.41
Total All Fish	280,593.2	275,629.9	230,777,295	822	0.82

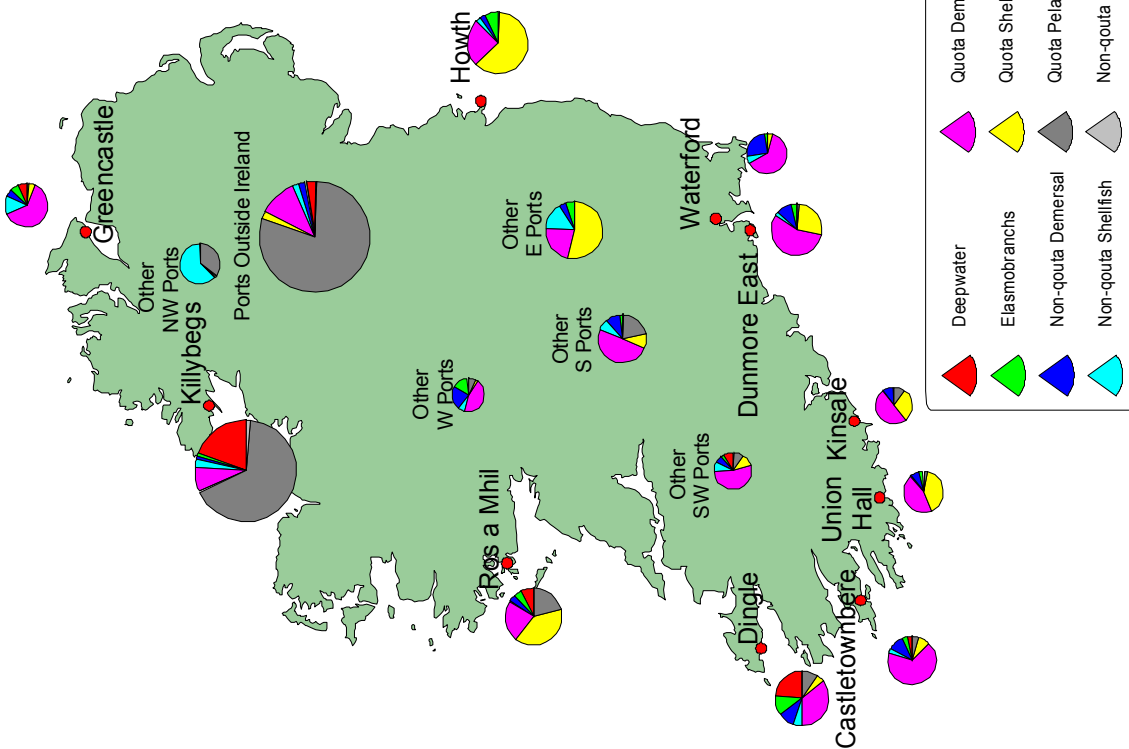
(Source DCMNR 28/02/2003)



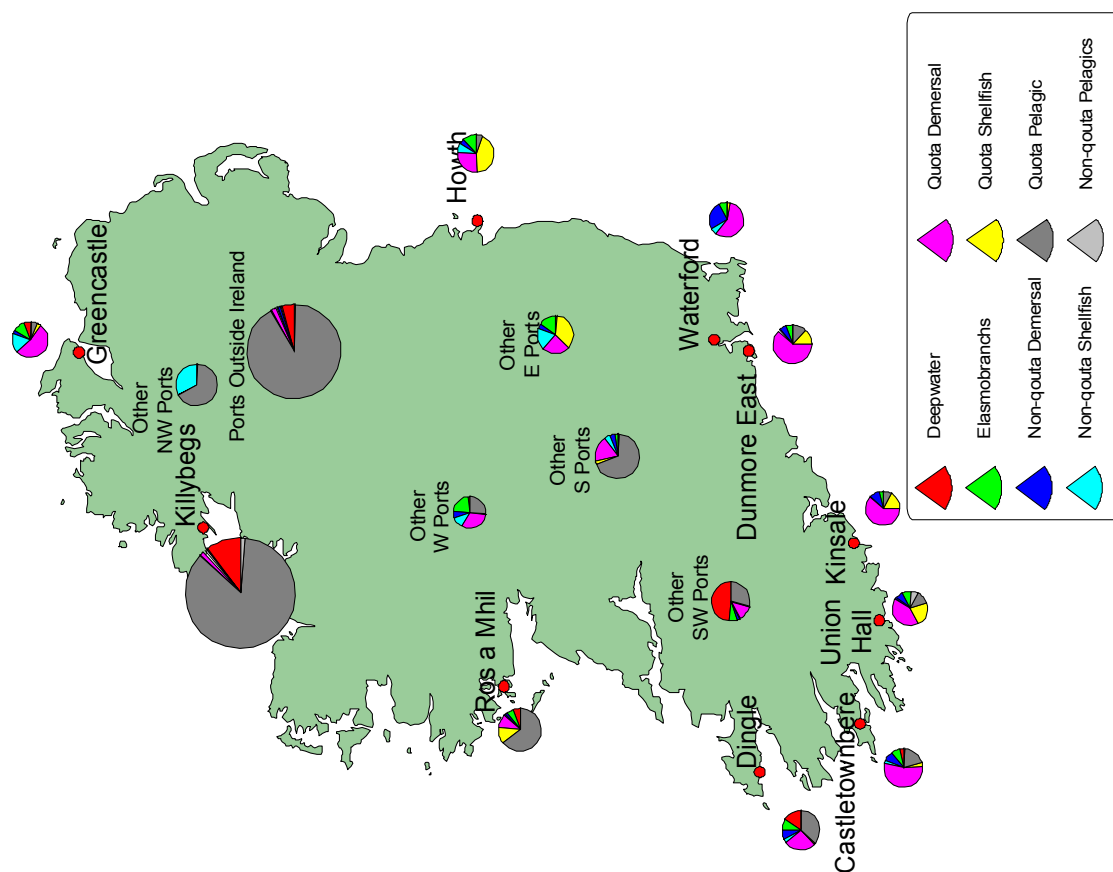
Landings (live weight) of quota demersal species by port in 2002



The quayside value of quota demersal species by port in 2002.



The quayside value of quota by category and by port in 2002.



Landings (live weight) by category and by port in 2002.

FSS Work Overview 2003

STOCK SAMPLING AND ASSESSMENT 2003

FSS assesses, researches and advises on the fisheries resources in waters around Ireland. This is achieved through a comprehensive program of fish market, port and sea sampling of landings; discard sampling; analysis of commercial catch and effort data and scientific research surveys.

In 2003, FSS's core sampling programme has been carried out under the national programme of the EC Data Collection Regulation 1543/2000 (DCR). In order to ensure the adequate provision of fisheries data for stock assessment by the member states the DCR was set up to "establish a community frame work for the collection and management of data needed to conduct the common fisheries policy". The programme includes the evaluation of fishing capacity and effort, catches and landings and the economic situation of the sector. It is divided into the 1) minimum programme requirements that detail sampling levels that must be achieved by each member state and 2) the extended programme requirements that detail the sampling levels that are desirable but not mandatory. FSS was responsible for the fulfilment of minimum requirements for biological sampling including age and length composition

of catches and discards and the carrying out of scientific fisheries surveys. The funding obtained from the DCR supplements the resources needed for the collection, management, and analysis of fisheries data for the demersal, pelagic, deep water, *Nephrops* and some inshore stocks that are currently monitored and assessed by FSS.

DEMERSAL FISHERIES ASSESSMENT

Demersal Stock Sampling Programme

Under the minimum programme of the DCR, FSS sampled the demersal fish stocks in waters around Ireland, including anglerfish, cod, haddock, hake, megrim, plaice, sole, whiting and saithe. In many cases sampling levels exceeded the minimum targets, especially when the stocks were of national importance or when they presented long time series that needed to be continued. Species sampled and aged outside the DCR were some plaice, sole and lemon sole stocks.

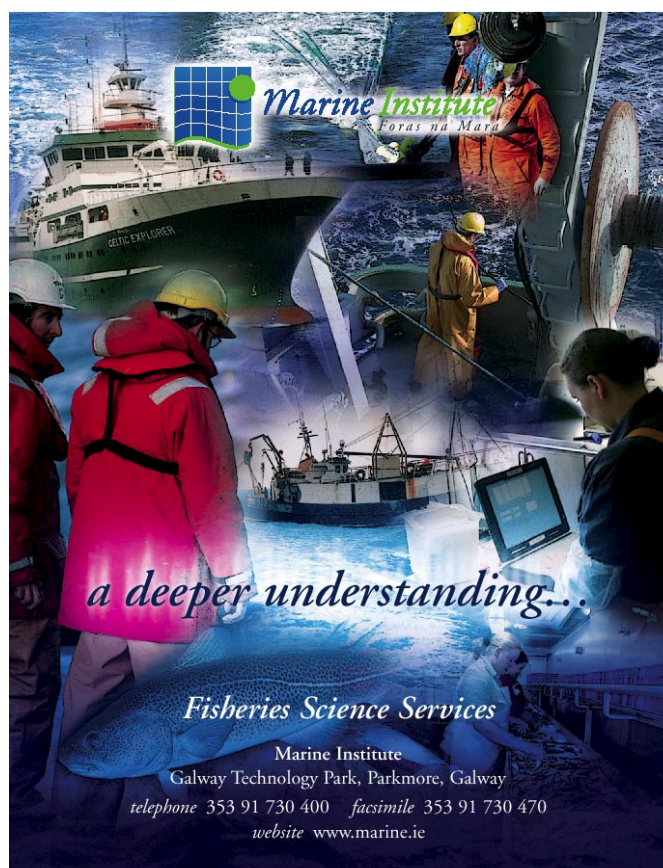
FSS contribute data to and participate in the following ICES assessment Working Groups:

- Working Group for the Assessment of Southern Shelf Hake, Monk, Megrim (**WGHMM**)
- Working Group on the Assessment of Southern Shelf Demersal Stocks (**WGSSDS**)
- Working Group on the Assessment of Northern Shelf Demersal Stocks (**WGNSDS**)

These Working Groups produce analytical assessments of the status of the most important TAC regulated demersal stocks around Ireland. The reports of these Working Groups are available at www.ices.dk. In 2003 FSS acted as international species co-ordinator for Division VIIa whiting, cod and haddock, Division VIIe-k whiting, Divisions VIIb-k haddock, Divisions VIIb,c plaice and sole and Divisions VIIh,j,k plaice and sole. The international data sets for these stocks were collated and checked by FSS prior to the ICES working groups. The biology, dynamics and fisheries for hake around Ireland is being investigated as a NDP project with NUI Cork and the larval ecology of selected fish species including whiting in the waters around Ireland is carried out by NUI Galway under the NDP program.

The Greencastle Codling Project was set up in 2003 and examines whether seasonal closure of juvenile grounds could be an effective alternative management measure for cod. The project demonstrates the foresight of the Industry: It was instigated by the Industry and local fishermen have voluntarily closed a productive fishing ground to protect juvenile cod. They are now working in close co-operation with the Marine Institute scientists to see how this closure will affect the cod stock. The main objectives of the project are to

- Demonstrate the change in yield resulting from the



seasonal closure.

- Determine the pattern of movement of cod from the Greencastle fishery.

The partners for the project are the Marine Institute, Foyle Fishermen's Co-op, KFO, Greencastle Fishermen's Co-op, Greencastle Fish Exports and BIM.

Demersal Research Surveys

During October and November 2003 the annual groundfish survey was carried out on the *RV Celtic Explorer* covering grounds to the west and east coast of Ireland. This new 45 day survey replaces the previous West Coast groundfish survey and Irish Sea and Celtic Sea groundfish survey programmes.

The survey forms part of the Western IBTS fourth quarter groundfish survey. As an active member of the ICES IBTS Working Group Ireland has been the international survey co-ordinator for western waters since 1998, co-ordinating surveys between UK (England), UK (Scotland), UK (Northern Ireland), Ireland, Spain and France under the ICES IBTS Working Group umbrella. ICES divisions covered by Ireland in this survey are VIa (south), VIIa, b, g and j.



The Irish Sea juvenile plaice survey has been carried out each May since 1975 with the objective of monitoring recruitment in plaice. The data was used in this year's ICES working group as a tuning fleet for the Irish Sea plaice stock.

As part of the Greencastle codling project, a fish egg and larval survey was carried out north of Ireland to examine the location of cod spawning grounds in this area. Stations of this survey are shown in Figure 1.

FSS has carried out plaice tagging surveys since 2001. In September 2003 beach seine surveys were carried out in Dingle and Galway Bays in conjunction with BIM and Taighde Mara Teo. To date a total of 2000 plaice have been tagged. There is currently a reward system in operation for returned tags.

FSS also participated in the following ICES Groups

- Study Group on Survey Trawl Gear (**SGSTG**)
- Planning Group on Commercial Catch, Discard

and Biological Sampling (**PGCCDBS**)

- International Bottom Trawl Survey Working Group (**IBTSWG**)

PELAGIC FISHERIES ASSESSMENT

Pelagic Stock Sampling Programme

Under the DCR, pelagic sampling was carried out on blue whiting, northeast Atlantic mackerel, western horse mackerel, albacore tuna and Celtic Sea, Irish Sea and west of Ireland herring. The investigations carried out in 2003 consisted of biological examinations of the catches for length, weight, age, sex, and maturity.

FSS contribute data to and participate in the following stock assessment working groups:

- ICES Herring Assessment Working Group (**HAWG**)
- ICES Northern Pelagic and Blue Whiting Working Group (**WGNPBW**)
- ICES Working Group on the Assessment of Mackerel, Horse Mackerel, Sardine and Anchovy (**WGMHSA**)
- ICCAT Working Group on the Assessment of North and South Atlantic Albacore Stocks
- EU Mauritania Joint scientific meeting

These Working Groups produce analytical assessments of the status of the most important TAC regulated pelagic stocks around Ireland. The reports of the ICES Working Groups are available at www.ices.dk. In 2003 FSS acted as the international species co-ordinator for catch and landings data for northeast Atlantic mackerel stock.

Pelagic Research Surveys

Irish acoustic surveys of herring stocks form an important part of the ICES assessment of the herring fishery in the Celtic Sea. These surveys were continued in 2003 using the *MFV Regina Ponti* from Greencastle. The acoustic survey, initiated in 2000 off the Northwest coast is carried out annually to assess the size of the winter spawning component. In 2003 the survey was conducted on the *MFV Regina Ponti*. The acoustic survey tracks are shown in Figure 1. In 2003 the herring acoustic programme underwent a reviewing process, which involved scientists from Norway and FSS assessing the Irish Acoustic Program that was run for the past 25 years. FSS staff also participated in a Norwegian blue whiting acoustic survey covering the Porcupine and the Rockall Banks.

FSS also participated in the following ICES and ICCAT Groups

- Working group on the Mackerel and Horse mackerel egg surveys (**WGMEGS**)
- Planning Group of aerial and acoustic surveys of mackerel (**PGAAM**)
- Blue whiting acoustic survey planning group
- Planning Group on Pelagic fish surveys in the Norwegian Sea (**PGPFNS**)
- Meeting of the ICCAT Commission in Dublin

The biology, dynamics and fisheries of blue whiting in the waters around Ireland is being investigated under a NDP project with Galway Mayo Institute of Technology.

FSS is a partner in WESTHER. WESTHER is an EU funded project involving six partners in Ireland, the UK and Germany. Using established and novel biological tools, WESTHER aims provide a framework for discriminating between the different stocks of herring around the west coasts of Britain and Ireland. Further information can be found at the project website: <http://www.fisheries.de/clupea/wether/index.html>



DEEPWATER FISHERIES ASSESSMENT

Deepwater Stock Sampling Programme

This year, in accordance with the DCR, sampling of deep-water species including orange roughly, roundnose grenadier, black scabbard and ling was conducted. In recent years FSS has carried out detailed sampling of several deepwater species. FSS contribute data to and participated by correspondence in the ICES Working Group on the biology and assessment of deep-sea fisheries resources (WGDEEP) This Group investigates the biology of deep-water species and produce analytical assessment of deep-sea fisheries resources. The report of this Group is available at www.ices.dk. The assessment of orange roughly stocks in deep waters off the west coast of Ireland using acoustic survey techniques is being investigated under a NDP project with NUI Cork.

ELASMOBRANCH FISHERIES ASSESSMENT

Elasmobranch Stock Sampling Programme

Under the DCR, FSS carried out biological sampling on elasmobranch catches landed into Ireland. These included rays, spur dogs and migratory sharks. As part of DELASS, FSS was international co-ordinator for data on blue shark to be used for stock assessment purposes. This includes international landings and discards information, tagging and by-catch data. The DELASS project was completed in 2003 and the final report has been reviewed and

accepted by the European Commission. FSS contributed data to and participate in the Study Group on Elasmobranch Fisheries (SGEF).

NEPHROPS FISHERIES ASSESSMENT

Nephrops Stock Sampling Programme

Under the DCR minimum programme, FSS is now required to routinely sample *Nephrops* from the following areas:

- Aran Grounds (FU17)
- Celtic Sea (FU20-22)
- Irish coast (FU19)
- Irish Sea West (FU15)
- Porcupine Bank (FU16)

Sample of unsorted catch and discards are routinely obtained from vessels operating in the Irish Sea, Celtic Sea and Aran grounds in line with DCR targets. These are augmented with data from discard sampling trips and port sampling. Only landings are current sampled from the Porcupine Bank. The length frequency and other biological data such as sex and maturity supplied to the stock coordinators at WGNEPH.

FSS contribute data to and participate in the following ICES assessment Working Groups:

- Working Group for the Assessment of *Nephrops* stocks (WGNEPH)

The responsibilities of FSS include stock co-ordinator for stocks in MA L (FUs 16, 17, 19) and assisting in the assessment of stock in MA J (FU14, 15) and MA M (FU 20-22). This Working Group produces analytical assessments of the status of the important TAC regulated *Nephrops* stocks around Ireland. The Marine Institute FSS hosted this Working Group in Galway in March 2003. This was the first time the WGNEPH has met in Ireland. The full report of the WGNEPH meeting are available at www.ices.dk.

Nephrops Research Surveys

The ICES Advisory Committee for Fisheries Management (ACFM) have recommended that underwater TV surveys should be used to provide biomass estimates for non-assessed and poorly assessed *Nephrops* stocks. Since 2002, FSS has started developing UWTV survey series for some of the *Nephrops* stocks around Ireland. The first survey in June 2002 on the Aran grounds (FU 17) proved very successful and this survey was repeated in June 2003.

In August September 2003, a joint survey project between the Marine Institute and the Department of Agriculture and Rural Development Northern Ireland (DARDNI) led to the successful completion of the first underwater television survey in the western Irish Sea *Nephrops* stock.

The primary objectives of these surveys are to provide a fishery independent estimate of stock size. These estimates can then be used as a basis for management advice either directly (i.e. harvest ratios) or indirectly by using

the estimates to calibrate analytical assessments. In addition the surveys map the distribution of the stock and can be used to ground truth acoustic data for habitat discrimination and collect information on the impact of trawling on the seabed. Further information and survey reports can be obtained on www.marine.ie.

INSHORE FISHERIES ASSESSMENT

Inshore Fisheries Sampling Programme

For the fulfilment of the DCR, the inshore section of FSS carried out sampling programmes for brown crab and razor clams. Other species were sampled due to their importance to the Irish inshore fishery although not required under the DCR. These were bass, spider crabs, other crab species, whelk, shrimp and various bivalve species. FSS contributed data to and participated in the following ICES Groups:

- Study Group on Sea Bass (SGBASS)
- Study Group on the Biology and Life History of Crabs (SGCRAB)
- Workshop on lobster reference points in fishery management

These Groups investigated the biology and produced analytical assessments of bass and various crab species while the third group reviewed methods of lobster assessment, comparing North American and European approaches to stock assessment and enhancement. The reports of these Groups are available at www.ices.dk. The results of various assessments of inshore stocks around Ireland are published in various Marine Institute publication series and are available at: www.marine.ie/information+services/library+services/marine+institute+publications/index.htm <<http://www.marine.ie/information+services/library+services/marine+institute+publications/index.htm>>.

Inshore Research Surveys

A number of inshore surveys were carried out by FSS to monitor species abundance and recruitment indices. Juvenile bass abundance was examined in the Rivers Nore, Slaney, and Munster Blackwater estuaries and at Ballymacoda, Youghal in collaboration with the Central and various regional fisheries boards. Spider crab surveys were undertaken in Brandon and Tralee bays where a logsheet reporting system was introduced while Green crab was surveyed in Cromane and on the Munster Blackwater. Bivalve surveys were carried out in Bertraghboy Bay and Kilkieran Bays, shrimp investigations in the Union Hall vicinity and a preliminary investigation of the cockle fishery in Annagasan, Co Louth was undertaken. FSS and BIM collaborated on a tag and recapture based investigation of the bionomics of brown crabs in the south east fishery.

DISCARD SAMPLING PROGRAMME

Ireland has carried out a discard monitoring programme since 1993 under various EU Study Contracts. Discard data were collected by Fisheries Assessment Technicians (FAT's) who are based at the major Irish fishing ports (Killybegs, Rossaveal, Castletownbere, Dunmore East and Howth). In 2003 under the DCR minimum programme, FSS was required to sample and produce an annual discard rate for the following stocks:

- | | |
|-----------|---------------------|
| • Herring | VIa, VIIa,b,c,j |
| • Haddock | VIa, VIb, VIIa, VII |
| • Whiting | VI, VIIa, VIIb-k |
| • Hake | VI, VII |
| • Plaice | VIIa, VIIe-g |

Discarding on other species is required by the DCR on a triennial basis. Nevertheless, FSS produces annual discard estimates for other species including *Nephrops*, sole and anglerfish for the various ICES stock assessment Working Groups. Discard information on other species is also routinely collected on an on-going basis. In 2003 the discard sampling was restructured to a fleet based approach for increased precision level and improvement in the discard estimations. The impact of discard data on the assessment and management of fish stocks in Irish Waters is being investigated in a NDP project with NUI Cork. Irish discard data have been collated and contributed to the following ICES Study Group:

- Study Group on Discards and By-catch Information (SGDBI)



FSS also participated in this Study Group. The reports of this Group are available at www.ices.dk. SGDBI have then made these data available for their inclusion in international stock assessments.

In 2003 FSS attended a Discard Workshop in Copenhagen, the objectives of which were to identify data requirements and appropriate sampling strategies in order to minimize bias and maximize precision in discard estimation.

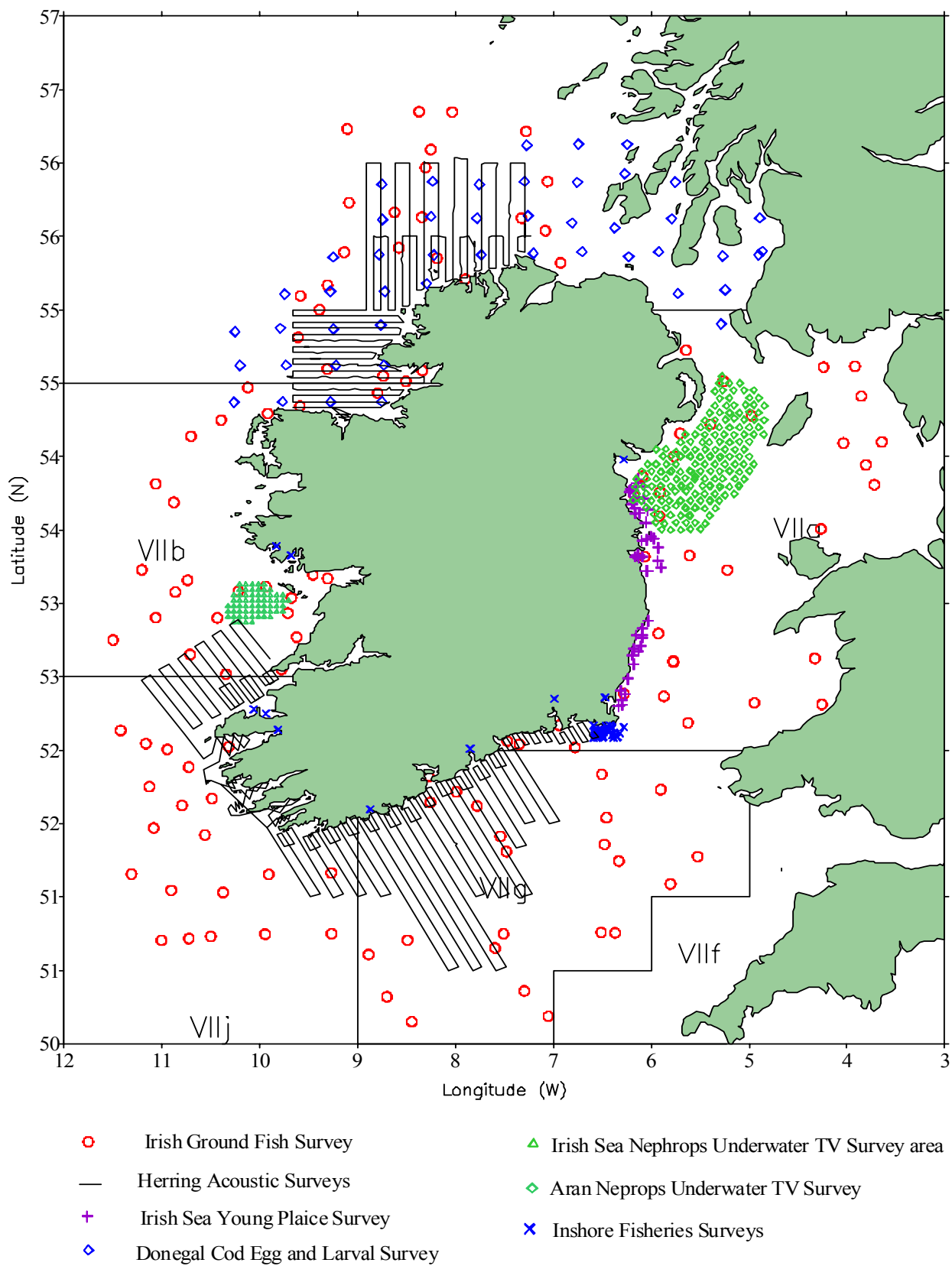


Figure 1. Sample positions and survey tracks of research surveys carried out by FSS in 2003.

The Form of the ICES Management Advice and the Precautionary Approach

The UN Agreement on Straddling Fish Stocks and Highly Migratory Stocks specifies that: a stock should be kept at a sustainable level by keeping it above a minimum biomass benchmark, and by keeping the fishing mortality below a maximum fishing rate benchmark. In 1998, ICES introduced precautionary biological reference points as the basis for its advice. With biomass reference points defined in terms of protecting stock productivity and fishing mortality reference points defined in terms of stability, these reference points meet the standards set by this Agreement.

ICES recognises that “changes in fisheries systems are only slowly reversible, difficult to control, not well understood, and subject to change in the environment and human values” (FAO 1996). Therefore, ICES agrees that a **precautionary approach** should be applied to fishery management. Biological reference points, stated in terms of **fishing mortality** rates or **biomass**, are key concepts in implementing a precautionary approach. They are predefined benchmarks (limit reference points) that should be avoided to ensure that stocks and their exploitation remain within safe biological limits and against which assessments should evaluate the status of the stock.

ICES provides advice on fishery management aimed at keeping the risk that the spawning biomass may fall below a minimum limit low. The minimum spawning stock biomass benchmark is described by the symbol B_{lim} (the biomass limit reference point). The value of B_{lim} is set on the basis of historical data, and chosen such that below it, there is a high risk that recruitment will ‘be impaired’ (seriously decline) and on average be significantly lower than at higher SSB. When information about the dependence of recruitment on SSB is absent or inconclusive, there will be a value of SSB, below which there is no historical record of recruitment. B_{lim} is then set close to this value to minimize the risk of the stock entering an area where stock dynamics is unknown.

Below B_{lim} there is a higher risk that the stock could ‘collapse’. The meaning of ‘collapse’ is that the stock has reached a level where it suffers from severely reduced productivity. ‘Collapse’ does not mean that a stock is at high risk of biological extinction, but does mean that recovery to improved status is likely to be slow, and dependent of effective conservation measures.

The fishing mortality rate should not be higher than an upper limit F_{lim} which is the fishing mortality that, if maintained, will drive the stock to the biomass limit.

Spawning biomass and fishing mortality can only be estimated with uncertainty. Therefore, operational reference points are required to take account of this. To keep the true risk low that spawning biomass falls below B_{lim} , the estimated spawning biomass should in practice be kept

above a higher level that allows for this uncertainty. Therefore, ICES applies a ‘buffer zone’ by setting a higher spawning biomass reference point B_{pa} (the biomass precautionary approach reference point). As long as the *estimate* of spawning biomass is at or above B_{pa} , the *true* biomass should have a low probability of being below B_{lim} . Therefore, ICES advises that when the spawning biomass is estimated to be below B_{pa} , management action should be taken to increase the stock to above B_{pa} . Because B_{pa} is a mechanism for managing the risk of the stock falling below B_{pa} , the distance between these reference points is not fixed, but will vary with the uncertainty of the assessment. For example if the quality of catch data were to decline, or multiyear forecasts were required for catch advice, a higher B_{pa} would be needed for the same B_{lim} .

Similarly, to be certain that fishing mortality is below F_{lim} , fishing mortality should in practice be kept below a lower level F_{pa} that allows for uncertainty as well. ICES advises that when fishing mortality is estimated to be above F_{pa} , management action to reduce it to F_{pa} should be taken. Such advice is given even if the spawning biomass is above B_{pa} because fishing mortalities above F_{pa} are not sustainable.

ICES stresses that these precautionary reference points should not be treated as management targets, but as lower bounds on spawning biomass and upper bounds on fishing mortality. Good management should strive to keep SSB well above B_{pa} and fishing mortality well below F_{pa} . If management keeps stocks very close to their precautionary reference points, then annual scientific advice will be altering conclusions on stock status and necessary management actions on the basis of assessment uncertainty as much as on the basis of true changes in stock status. Managing stocks to achieve targets well removed from the risk-based reference points would result in more stable scientific advice, as well as healthier stocks and more sustainable fisheries.

ICES gives advice on many stocks for which there is no analytical assessment and accordingly no basis for setting reference points as described above. Also in these cases ICES uses a precautionary approach, but alternative models are applied, with reference points referring to properties of the stock or fishery that can be estimated, for example catch per unit of effort instead of biomass.

The ICES advice is primarily risk-averse, i.e. it aims at reducing the risk of something undesirable happening to the stocks. Biological target reference points are also part of the Precautionary Approach, but setting targets for fisheries management involves identifying desired socio-economic considerations. Therefore, ICES does not propose values for Target Reference Points, and at least until

now Management Agencies have not identified management targets based on socio-economic benefits. Hence Target Reference Points have not been directly used in the advice. **This means that even if the ICES advice is followed and therefore the stock should be protected from impaired productivity, exploitation of most stocks is likely to be sub-optimal, i.e. the long-term yield is lower than it could be.**

Managers are invited to develop targets and associated management strategies. ICES will comment on these and consider if they are consistent with the precautionary approach. If they are, ICES will frame the advice to be consistent with the adopted management targets.

Framework for advice

When an assessment estimates that the spawning biomass is below B_{pa} ICES classifies the stock as being 'outside safe biological limits', regardless of the fishing mortality rate. In that case ICES will provide advice to increase spawning biomass above B_{pa} , which may involve reducing fishing mortality to levels below F_{pa} possibly by a large amount. If B_{pa} cannot be achieved in the short-term, ICES will recommend the development of a recovery plan specifying measures to increase SSB above B_{pa} in an appropriate time scale depending on the biological characteristics of the stock and other relevant factors

When an assessment shows that the stock is above B_{pa} but that the fishing mortality is above F_{pa} , the stock is classified as 'harvested outside safe biological limits'. ICES will then recommend that the fishing mortality be reduced below F_{pa} in the short term.

Most ICES reference points in current use were set in 1998 using the stock and fishery data then available, as a provisional step in the implementation of the precautionary approach. In some cases, it has been necessary to change these reference point values as a result of changes in the data or the productivity of the stock, in order to im-

prove consistency with the framework described above, and take advantage of new biological and fisheries information acquired on many stocks.

The framework for reference points is presently under review in order to include yield based considerations. (See section 2.5)

ICES 1997. Report of the Precautionary Approach to Fisheries Management. Copenhagen, 5–11 February 1997. ICES CM 1997/Assess:7.

ICES 1998. Report of the Precautionary Approach to Fisheries Management. Copenhagen, 3–6 February 1998. ICES CM 1998/ACFM:10.

ICES 2002. Report of the Study Group on the Further Development of the Precautionary Approach to Fisheries Management. Lisbon, 4–8 March 2002. ICES CM 2002/ACFM:10

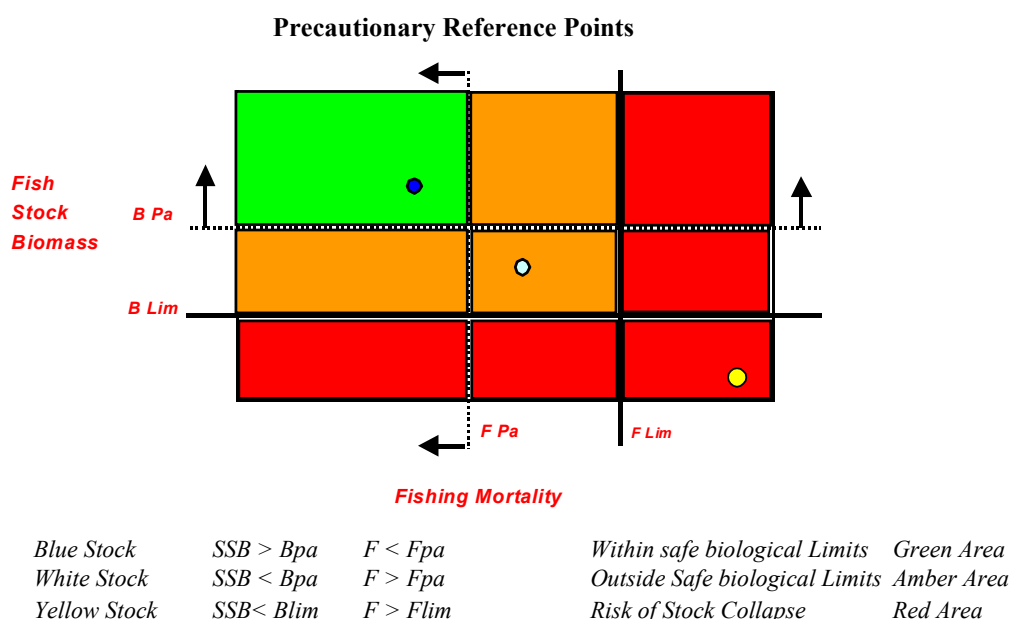
ICES 2003a. Report of the Study Group on the Further Development of the Precautionary Approach to Fisheries Management. Copenhagen 2–6 December 2002. ICES CM 2003/ACFM:09

ICES 2003b. Report of the Study Group on Precautionary Reference Points for Advice on Fisheries Management. Copenhagen 24–26 February 2003. ICES CM 2003/ACFM:15

Serchuk, F M. and Grainger, J. R. 1992. Development of the basis and form of ICES Fisheries Management Advice; Historical background (1976–1990) and the new form of ACFM Advice (1991 - ?). ICES CM 1992/Assess:20.

Report of the 11th Dialogue Meeting Nantes January 1999, ICES Coop. Res. Rep. 228 (1999).

Report of the Follow-up meeting of the 11th Dialogue Meeting, February 2000.



Some Key Issues in Fisheries Science

FISHERIES MANAGEMENT

Historically, the main objective of **fisheries management** has been the conservation of fish stocks. The broad objectives of fisheries management may therefore include the aims of maximizing yield (weight or revenue), maintaining a particular level of stock in order to provide a buffer against poor recruitment years or maintain a minimum spawning stock. Modern fisheries management has been extended to address additional economic, social and environmental objectives such as fishers welfare, economic efficiency, the allocation of resources and ecosystem protection. Underpinning all these objectives is the need to ensure that fisheries are exploited on an ecologically sustainable basis. As fisheries management must often address social, political, legal, economic and biological factors, establishing overall objectives of fisheries management will almost always involve compromise. Once the objectives or policy aims of managing a particular fishery have been defined, the range of management strategies capable of achieving these objectives can be considered. Management objectives may be achieved by placing limitations on catches (output controls) or by restrictions applied to the amount of fishing effort (input controls). Once management objectives have been defined for a fishery, a management plan can be devised that includes a description of:

- the present state of development and exploitation of the fishery
- the policy aims, or objectives of managing the fishery
- the management strategies which would achieve these objectives
- the regulations which may be applied to the fishery under various strategies

A **management plan** proposed for a fishery must then be framed in terms of an acceptable level of risk of deleterious effects. For a certain stock, it may be estimated that recruitment overfishing will not occur as long as the stock remains above 50,000 tonnes. In this case, a TAC can be set at such a level that there is less than a 10% risk that the stock will be reduced to below 50,000 tonnes in any one year. Repeated runs of a stochastic simulation model can be used in risk assessment (eg. to determine the number of times that the stock will drop below 50,000 tonnes per 1,000 simulations).

There are no explicit management objectives for the majority of EU fish stocks presented in the stock book. However, in recent years, with the advent of recovery plans, management objectives have been established for some stocks, mainly in terms of rebuilding targets (biomass) over time. FSS stress that management objectives must be established for all stocks and fisheries in a broader con-

text. These plans should initially focus on maintaining a particular level of stock in order to provide a buffer against poor recruitment years and/or maintain a minimum spawning stock. However longer term objectives should be framed in terms of limiting fishing effort, limiting the efficiency and types of gear, closures (seasonal and area), other technical measures (e.g. minimum mesh size, escape grids, size limits), TAC's and enforcement of regulations.

A key concept in any management plan for a fishery is the notion of **sustainability**. In 1992, the UN defined sustainable development at Rio (Earth Summit on Sustainable Development) as "*development which does not destroy or undermine the ecological, economic or social basis on which continued development depends*". In terms of fisheries, the concept of sustainability now requires the rebuilding of many depleted fish stocks. At the Johannesburg earth summit in 2002, one of the outcomes was the recognition of a need to rebuild certain depleted fish stocks by 2015



MIXED FISHERIES – ICES APPROACH

Many fisheries harvest several quota species simultaneously and this poses at least two management problems. Firstly managers must keep catches of all species within their TACs while secondly, they must try not to forego catches of species whose TACs are taken up more slowly. When several fisheries all take a species in common, whether as a target species or as by-catch, managers must also allocate the safe harvest of the shared species among those fisheries in ways that allow the fisheries to take their allowable harvest of their various target species, without exceeding the total allowable catch of the shared species.

Experience of fisheries-based management in other parts of the world indicate that provision of **fishery-based advice** is possible, but that it requires well-defined fisheries that are based on complete and reliable catch data. In the ICES case, model development has outpaced the compilation of appropriate data, both for defining fisheries and providing mixed fishery advice. Specifically, the lack of data on discards for most species is a principal concern. Although this is a weakness of many single-stock fore-

casts it becomes a short coming in a mixed fisheries context. The absence of discard data will lead to inappropriate advice being given, thereby misinforming managers about the appropriate allocation of effort among fisheries consistent with desired levels of fishing mortality by species. For example, for a species under a recovery plan advice would be provided that would restrict fisheries reporting landings or by-catches of the species, but would ignore entirely fisheries that catch and discard that species, possibly at rates high enough to preclude recovery.

ICES is concerned that any approach to managing mixed fisheries that assumes constant species compositions over time implicitly discourages adaptive fishing behaviour. In many jurisdictions fishermen have demonstrated the ability to reduce by-catch of critical species, through season, area or gear modifications, or changes in their short-term fishing patterns. There is a danger that the allocation of fishing opportunities for different species based on past catch compositions will lock fisheries into their historical context, and provide no incentive for industry to find ways to fish without catching species that are restrictive on fleet activities. Such adaptive changes in fishing behaviour are difficult to predict but to the extent that they occur, they will limit the realism of mixed fishery forecasts.



ICES has previously advised that where industry-initiated programs can be demonstrated (with independent and credible methods) to bring their catch rates of species under recovery plans down to near zero, then such programs could be considered in management of those fisheries. The pre-requisite for such programs to be successful includes a high rate of independent observer coverage, or other fully transparent method for ensuring that catches are fully and credibly reported. This pre-requisite is not considered to be met in NE Atlantic fisheries.

It is not currently possible to provide analytical forecasts for input into mixed fishery evaluation models. The main obstacle is that ICES does not have access to discard data for most fisheries. Development of such capability furthermore requires better catch monitoring, fishery analyses, and management decisions. The lack of such mixed fishery forecasts necessitates the development of complementary processes that do not require analytical short-term forecasts.

In 2003, ICES has taken a first step towards the formulation of advice in a mixed fisheries context. Such consid-

erations are introduced for demersal stocks where the problem is most prominent. Formulating advice in relation to mixed fisheries is a two step procedure. First, ICES establishes limits for the exploitation of each species on basis of its status, consistent with the Precautionary Approach. The second step is to identify which species within mixed fisheries have the most restrictive catch limits, because these constraints, when applied across all species in mixed fisheries, further limit the fishing possibilities. This latter step involves allocation keys amongst fisheries which is clearly management's prerogative. ICES acknowledges that defining relevant allocation scenarios places difficult demands on managers and that mixed fishery advice in particular will require interactive communication between scientists and managers. EC DG Fish has indicated to ICES some scenarios that would be of interest for managers. However, mainly because discard data for most fleets are not available, ICES is unable to provide the required scenarios at this time.

For the demersal fisheries in the North Sea and in the area west of Scotland the advice for 2004 is stringent, but simple. ICES recommends a zero catch of cod until the cod SSB has increased above B_{lim} . However, as the cod stock SSB rebuilds, more complex fishery advice will be needed. A recovery plan should be implemented to ensure a safe and rapid recovery of the SSB to B_{pa} . ICES recommends that the impact of other demersal fisheries on cod recovery should be considered when managing these fisheries. Furthermore, in the process of cod recovery, the need to rebuild other stocks outside biological limits (e.g., North Sea plaice and sole) should also be given high priority in mixed fishery advice.

Comments by STECF on ICES Advice for mixed fisheries.

STECF notes that most ICES advice is based on single species stock assessments and forecasts. ICES now has a very clear policy described in the ACFM report detailing how it provides catch advice dependent on the status of a stock. This description is very useful in understanding the reasoning behind how ICES arrives at the single species advice based on the current estimate of stock status and exploitation. ICES has attempted to provide mixed fishery area based advice, but indicates that it has found difficulty in providing advice due primarily to poor data on catch by fleet. Currently there is a need for improved mixed fishery advice. ICES acknowledges the presence of mixed species and fisheries interactions and provides advice in a mixed fishery context in a qualitative manner.

Where there is conflicting single species advice in the presence of a mixed fishery or international management agreement, ICES has chosen to consider that primacy should be given to the single species advice that is most restrictive. However, without appropriate decision rules within a management context ICES has little alternative. STECF considers that this approach may not be the most appropriate

Managers should consider the ranking or weighting of the relative importance of the conflicting requirements for

mixed species fisheries. For example issues which need to be resolved include:

- The rate with which it is necessary for stocks to recover to B_{lim} or to B_{pa} .
- The importance of the recovery of one species relative to others in a fishery.
- Where international agreements on exploitation exist, the weight to be given to each if they are in apparent conflict.
- The balance between economic and social needs and those of stock conservation.

If this type of guidance was communicated to ICES, or built into a management plan, it will aid the provision of mixed fishery advice. In the absence of such guidance or clear management objectives it will be difficult for ICES to provide more pertinent advice in the future.

The longer term solution to these issues could be to develop an operational management model that can be populated annually with data on fisheries, the ICES advice on single species basis, and the economic data currently used in the EIAA model. Such a model could provide the functionality to allow managers to enter their priorities and to provide facilities to explore and understand the possibilities for compromise among the conflicting priorities.



ECOSYSTEM CONSIDERATIONS

Interactions between fishing activities and the marine ecosystem are many and varied and can be classified as direct and indirect interactions. The main direct effect of fisheries on the marine ecosystem is fishing mortality which reduces marine population levels and changes their demographic composition. Certain fishing techniques can alter sea beds and have considerable impact on bottom dwellers. Some fishing activities disturb various species of marine birds, reptiles or mammals and involuntary catches can present a serious threat to endangered species. Indirect effects arise from the direct effects and can lead to changes in ecosystem structure in particular to food chains, or even to a threat to the renewal capacities of populations be they of commercial interest or not.

Marine ecosystems may also be negatively affected not only by fishing activities but also through effects caused

by other human activities, such as pollution by hazardous or radioactive substances, eutrophication through nutrient input and physical disturbances caused by dredging and exploration for oil.

The reproduction of fish stocks is variable and the reasons for this variation are incompletely known. The environment is important in determining the survival of fish eggs and the survival and growth of fish larvae and juvenile fish. A multitude of environmental factors may be involved. For some fish stocks specific hydrographic conditions are known to be important and the composition and density of the plankton, which is the food source of fish larvae and juveniles, is known to be critical for growth and survival. The abundance of predators is also an important factor in juvenile survival. One of the best understood cases is the Baltic Sea where a linkage between the reproductive success of cod and hydrographic conditions has been demonstrated.

For a number of North Sea species (cod, whiting, plaice) recruitment in most recent years has been lower than in previous decades. Some stocks, notably North Sea plaice, have shown a reduction of growth. On the other hand, other species like sea bass and red mullet with more southern distributions have increased in abundance and/or growth rates, and have at times attracted a fishery. There are also indications of changes in distribution for some stocks. There is considerable speculation on the reasons for the observed changes. Changes in the environment may have played a role in the reduced productivity of several North Sea stocks. In the last 10 years mean temperatures in the sea have increased and changes in the sea currents have also been observed.

The state of the fish stocks themselves is an important factor in determining recruitment. For several stocks a relationship between recruitment and the size of the spawning stock is apparent for low spawning stock sizes. The composition of the spawning stock may also be important because studies with some species, particularly cod, have shown that young and small spawners produce a reduced quantity of eggs which are of a reduced quality. A spawning stock dominated by young spawners could therefore have less reproductive capacity than a spawning stock of comparable size with many older spawners. Spawning stock size should therefore be supplemented with information on its composition when the reproductive capacity is evaluated.

Fishing leads to a reduction in the spawning stock and to a higher proportion of young spawners in the spawning stock. The high fishing mortalities which have been prevalent for many fish stocks have resulted in reduced spawning stocks which are dominated by first time spawners. High fishing mortalities have thus lead to low reproductive capacity independently of the environmental conditions. If climate change or other environmental changes have also played a role in the reduced productivity of fish stocks, it therefore becomes even more essential that exploitation rates on these stocks be reduced, to sustain the

stocks under conditions of lower productivity.

Interactions between fisheries and the marine ecosystem will be integrated into the Common Fisheries Policy. As fisheries management, environmental management and nature conservation in the marine environment pursue common objectives there is a need to integrate sustainable exploitation of living marine resources and environmental concerns within an ecosystem management framework..



FUTURE DIRECTIONS OF SCIENTIFIC ADVICE

EU fish stocks are managed by the EU under the Common Fisheries Policy (CFP). Under the new framework regulation governing the operation of the CFP, the Commission will continue to be responsible for proposals for Community measures for the conservation and management of resources. In particular, there is an obligation to put in place a decision making process based on sound scientific advice and delivering timely results.

The challenges in European fisheries management have substantially increased demand for up to date scientific assessment and advice. Additionally, increased reliance on scientific advice as the principal grounds for identifying and addressing problems has highlighted areas where the advice should be made clearer, more reliable and more credible.

Scientific advice should be objective and impartial, prepared in accordance with the most recent accepted scientific methods, provided in a timely manner and be easily available and well explained. It should be formulated with respect to precautionary criteria.

Scientific advice should identify a recommended course of action (but also provide consequences of taking other courses of action). It may be based on formal analyses, on expert opinion or on a combination of the two. However, the advice should be transparent and clear about what are the roles of expert opinion and of numerical analyses. It should be accompanied by statements about the impact and risk of alternative options.

The procedures for the formulation of advice should be in the public domain and relevant scientific aspects should be reviewed by independent scientific and technical experts. Advice should in general be prepared in a spirit of openness to public scrutiny. Consultation mechanisms should be developed with due attention to costs and benefits and in a proportionate manner to the issues at stake.

Within the constraints of good scientific practice, advice should be practical, in that it can be implemented with a minimum of subsequent interpretation or evaluation.

Advice should also be formulated on the basis of a wide scientific participation and should allow that several alternative testing scenarios of the available information in order to produce the best possible advice.

The main concerns expressed by the managers about the current delivery and format of scientific advice are in the following areas;

- 1) Data - concerns about data provision and particularly about the accuracy of catch data have led to concerns about the credibility of the advice based on such data and so to a lessening of the credibility of such advice
- 2) Transparency – the lack of review procedures in the public domain has sometimes given the impression that provision of advice is a ‘closed shop’ and that the lack of openness may hide fundamental weaknesses in the science.
- 3) Timing - Existing advisory systems were not designed to provide a rapid response to urgent management questions and are not very effective in this role. Because the conservation measures which are needed are now urgent and therefore need to be implemented quickly, there is a need for scientific advice which is more comprehensive and detailed and can also respond quickly to management questions.
- 4) Inflexibility in Advice – The adoption of standard criteria for provision of fisheries advice has helped greatly in providing advice in a consistent way across different fisheries but in particular circumstances concerning specific fisheries issues have not always been taken properly into account

There is a broad consensus on the need for improvements in the current delivery and form of scientific advice. This has opened a great debate between scientists, managers and industry. As the main provider of scientific advice to the EU, the results of this debate represent a major challenge for ICES in the coming years.

Pelagic Fisheries Review

Pelagic fisheries are of great importance to Ireland. In 2002 total landings were almost 180,000 t and were valued at €66 million. Pelagic fishing, processing and associated support and service industries contribute enormously to the economic and social well being of Irish coastal communities.

The main pelagic fisheries exploited by Irish vessels can be defined as:

- The mackerel fishery prosecuted off the south and west coasts of Ireland, off the west coast of Scotland, and in the North Sea.
- The herring fishery in the Celtic Sea and off the south west coast in ICES divisions VIIaS, VIIg and VIIj.
- The herring fishery off the North and West coasts in ICES divisions VIaS and VIb.
- The Norwegian Spring spawning herring fishery in the Norwegian Sea.
- The horse mackerel fishery prosecuted off the northwest and north coast of Ireland, in the English Channel and off the north coast of France.
- The blue whiting fishery prosecuted off the continental edge between Ireland and the Faeroe Islands.
- The sprat fishery along the south and west coasts of Ireland.
- The albacore tuna fishery prosecuted along the continental edge between Ireland and the Bay of Biscay and in international waters south and west of Ireland.
- The Mauritanian freezer trawler pelagic fisheries.
- Pilchard fishery in the English Channel.
- There have also been target fisheries for argentine (see overview of Deepwater Fisheries).

HERRING

Overview

There are a number of herring stocks, or stock components around Ireland and the west of Scotland. These stocks are considered to be biologically separate, having been studied for many years. For the purposes of assessment and management, the following are the areas around Ireland: -

- West of Scotland - Div. VIa (North)
- Stock in the Irish Sea Div. VIIa (North)
- West and North of Ireland Div. VIa (South) and Div. VIb
- Celtic Sea and South West of Ireland (Div VIIa (South); Div. VIIg and Div. VIIj).

The stock structure of herring around Ireland is the subject of a new EU-funded project, entitled WESTHER. The project will conclude its work in 2005, by which time it is hoped to clarify the stock identity of herring around the Irish coast.

Irish fisheries

Only the herring stocks in the Celtic Sea and VIIj and in Divisions VIa South and VIIb,c have been consistently exploited by Ireland in recent years and these are the most important fisheries for Ireland. Some catches have however, been taken from Division VIa (North) and from Division VIIa (North) and also from the fishery for Norwegian Spring Spawning herring. Ireland has around 90% of the TACs in both of the main fisheries and has taken its full share of the TACs in recent years. Ireland also has potentially valuable quotas in the fishery to the west of Scotland i.e. Div. VIa (North) and in the Irish Sea i.e. Div. VIIa (North) – neither of which have been fully utilised in recent years. These fisheries could be of considerable potential income to the Irish industry.



The catches taken by Irish vessels in the fishery for Norwegian Spring Spawning herring have decreased since the Irish fleet first participated in this fishery in 1995. The catches in 2000 and in 2001 were approximately 9,000 t and 4,400 t respectively compared to over 19,000 t in 1996, and in 2002, only 1,700 t was landed from this stock. Difficulties in marketing and in locating herring have discouraged vessels from participating in the fishery.

Management measures

All the fisheries exploited by the Irish fleets are subject to overall TACs, imposed by the EU. In general the catching potential of the Irish fleet greatly exceeds the total national quota. This has presented severe problems in managing the fisheries – particularly since a large number of very efficient vessels of various sizes have to share a small quota. Consequently all the Irish fisheries are controlled by the imposition of catch quota per vessel that restrict catches on a nightly or on a weekly basis. Quota are dependent on the size and type of vessel. Licensing restrictions regulate the number of boats, the distance they can fish from shore, when they can land their catches and the ports into which landings can be made.

Pelagic Management Committees have been established in 2000 and 2001, and these deal with managing both main

herring fisheries. These committees have a number of functions which include increasing the involvement of the local industry (processors and fishermen) in the assessment and management of the fisheries, ensuring that data required to carry out accurate scientific assessments is adequate and establishing long term targets for stock biomass and catches.

There are two closed area regimes in place in the Celtic Sea fishery. The first is a rotational closing of one of three boxes aimed at affording protection to the spawning grounds. This is enshrined in Regulations of the Council of the European Union and was. This measure was introduced when targeting of spawning herring to obtain roe, were in operation. The second such closure was established by domestic law and designates the area east of Mine Head to protect first-time spawning fish. This was first introduced at the request of the local management committee in 2001.

Herring biology and assessment

Herring fisheries of interest to Ireland are assessed in two separate working groups. The Herring Assessment Working Group for the area south of 62° N deals with herring stocks around Ireland, Britain and in the North Sea. A separate working group for “Northern Pelagic and Blue Whiting” deals with the Norwegian spring-spawning herring.

The Marine Institute has responsibility for the collation of data for both main herring stocks of interest to Ireland. For both of these stocks, the Marine Institute conducts acoustic surveys to estimate stock biomass and most importantly provide tuning indices for use in the VPA-type assessments. In the case of the Celtic Sea, the acoustic survey programme has been in operation since 1989 and the results from the acoustic surveys are used in the assessment. For the stock in VIaS and VIIb, c, the acoustic survey has not yet been incorporated into the assessment. This presents a problem, because an estimate of fishing mortality in the most recent year is a requirement in the assessment process.

Currently, a review of Irish herring acoustic surveys is being carried out. This will assist in the future planning of these surveys. With the arrival of the Celtic Explorer, there is considerable scope for extending and improving these surveys, and the review will aid in this work. It is hoped to have the review finished by June 2004. In addition, the Marine Institute is investigating other complimentary datasets that could be used as tuning indices. In particular, the catches of juvenile herring in the demersal ground fish surveys (see Demersal Fisheries Overview) are likely to be of benefit. This would provide an indication of recruitment for these herring stocks.

The TAC for the Celtic SEA stock had been stable in recent years but uncertainty about the size of the stock led to a recommendation for a precautionary TAC for the first half of 2002. This TAC was later increased in September 2002 but the figure (13,000 t) is still considerably below the level of recent years (ca 20,000 t). The stock off the northwest and west coast continues to remain at a low level despite the reduction in catches in recent years. Recruitment has been very poor in the stock for a number of years and the

available advice predicts that the stock will not increase until recruitment improves. The stock in the Irish Sea has been stable at a low level for a number of years even though it is not heavily exploited.

No Irish vessels participate in the herring fishery in the North Sea, where the stock has recovered slowly in recent years and is predicted to increase substantially in 2003.

Herring catches

The preliminary total Irish landing figure for herring in 2002 amounted to 30,000 t and was valued at over €6.4 million. The corresponding figures for 2000 and 2001 were 42,000 t valued at €9.95 million 40,000 t, valued at €9.95 million.

Prices per tonne in the autumn of 2001 were approximately three times higher than in the autumn of 2000. However, this improved market demand was short lived and prices in 2002 have again been very depressed. Thus the decline in 2002 is partly a response to the low market value of these fish. The TAC for herring in the North Sea has a huge bearing on the prices that can be obtained for Irish landed herring. A ready supply of herring on the European market from the North Sea and the Norwegian fisheries and also supplies of poor quality Irish herring landed during the 2001/2002 season remaining in cold storage have contributed to these problems of marketing.

Although the value of the Irish herring catch has decreased in 2002 and the number of vessels involved has declined, herring fisheries continue to be one of the most important components of the Irish fishing industry. There are a large number of vessels and processing factories that continue to be heavily dependent on herring and also on the number of jobs that are created in the shore based industries. These fisheries need to be continually assessed and carefully managed in order to prevent any collapse in the stocks and the consequential effect that this would have on the general industry. Herring prices are volatile, therefore the Irish herring stocks present potential opportunities of enormous value to the catching and processing sectors.

MACKEREL

Overview

Until recently, three separate mackerel stocks were considered to exist;

- North Sea Stock
- Western Stock
- Southern Stock.

However, in recent years it has become increasingly difficult to assess the stocks separately and since 1998 ICES has carried out a combined assessment of all stocks. This combined stock is called the **North East Atlantic mackerel stock**

The North Sea stock was heavily exploited in the 1960's - mainly by the Norwegian purse-seine fleet and at one stage annual catches of over 1 million tonnes were recorded.

However the stock collapsed in the late 1960s and the fishery has never subsequently recovered. Catches at the moment are believed to be about 10,000 t-20,000 t.

The western stock, which was not heavily exploited at the time of the large fisheries on the North Sea stock, dramatically changed its migration pattern and distribution in the 1980's and moved into the Norwegian Sea and North Sea. The shoals over-winter in the Norwegian Sea and in the northern part of the North Sea and in the late 1990s this component remained in these areas until late January or early February. However in recent years the migration from these over-wintering areas appears to have commenced earlier than previously and some shoals are believed to have left the area as early as mid December. This migration brings the shoals to the spawning grounds which are located along the continental shelf from the north coast of Spain to the west coast of Scotland and as far west as the Porcupine Bank. After spawning is completed the shoals migrate northwards towards the summer feeding grounds in the Norwegian Sea and in the northern North Sea and then they return to the over-wintering grounds. The juveniles do not make these extensive migrations and for the first one or two years remain in the southern areas and in inshore waters.



This total catch in 2001 included about 92,000 t, which were taken in the "international" fishery west of Norway. The Southern stock inhabits the area off the north and west coasts of Spain and the coast of Portugal. It is only subjected to a direct fishery in the early part of the year. The catches from this fishery were over 43,000 t in 2001 compared with 36,000 t in 2000.

The total catch taken from all mackerel fisheries in 2002 was about 718,000 t. This was nearly 40,000 t higher than in 2002.

Irish mackerel fishery

The Irish fleet began exploiting mackerel in the late seventies when the herring fisheries collapsed. In the early years the shoals were exploited inshore by Killybegs boats during autumn and winter. Gradually the location of the fisheries changed as the stock changed its migration pattern. Since the late 1980s the fleet has concentrated on the over-wintering concentrations in the North Sea and on the shoals as they migrate to and from the spawning grounds that are situated off the southwest and west of Ireland. Prior to 1989 the Irish fleet was not permitted to fish east of 4°W Long.

(i.e. in the North Sea) at any time. Subsequently fishing has been permitted in this area in the fourth quarter but restrictions were imposed on the amount that could be taken. These restrictions affected the fishing pattern of the Irish fleet, particularly as in recent years the annual migrations of shoals from the over-wintering grounds have been delayed. Restrictions were relaxed in 2000 and limited catches have since been permitted east of 4° Long until 15th February. The migrations from the over wintering grounds commenced earlier in recent years than previously and Irish vessels exploited the shoals west of Scotland in mid December in both years.

Because of the prohibition on fishing in Div IVa in the early years the Irish fleet in 1994 developed a local fishery for mackerel off the north west coast of Donegal during autumn in which substantial quantities of small mackerel between 1 and 3 years old were taken. A similar fishery, which developed off Cornwall in the seventies, led to the introduction of the 'Cornwall box' in which fishing for mackerel is prohibited. The fishery off Cornwall had an adverse effect on the stock and the mortality on juveniles was greatly increased during the time of its existence. However the catches taken in this "local" fishery have decreased considerably since 1996 although survey data and incidental catches from herring boats indicate that large quantities of small mackerel still appear to be present from around the Irish coast, particularly during the autumn.

Management measures

Apart from the management measures introduced by EU, such as the overall TAC, a limited numbers of days at sea and restrictions on fishing east of 4°W there are a number of local management measures imposed on the Irish fleet. These include - seasonal closures, area closures restricted landing places and boat quota. The fishery prosecuted by vessels based in Killybegs in 2001 and 2002 has been managed by the North West Pelagic Management Committee.

Mackerel assessments

This species is assessed by the ICES Working Group on the Assessment of Mackerel, Horse Mackerel, Sardine and Anchovy. Assessment of the mackerel stock has been uncertain and there have been major revisions to stock estimates and TACs. The difficulties are created by a number of factors:

- The very large area over which the stock is distributed
- The uncertainty about stock structure
- The international egg surveys, on which the assessments are based, are only carried out every three years
- Uncertainty surrounding the estimates of recruitment
- The changes that have taken place in the mackerel migrations
- The poor quality of the international catch statistics.

This assessment was again carried out at the 2003 meeting of the working group.

Mackerel catches

The official catch recorded by Ireland for 2002 was 72,085 t and was valued at over €39 million. The Irish quota in 2002 was 66,300 t. The total Irish mackerel catch in 2001 was over 70,000 t valued at €33.48 million. The corresponding catch in 2000 was also about 70,000 t and the value was €28.77 million.

A large portion of the Irish mackerel catch is landed outside Ireland, either in the United Kingdom, (mainly Scotland), in France, the Netherlands and Norway. Most of these catches are frozen for export to Russian or Japanese markets. Large mackerel (>600 gm.) can fetch very high prices on the Japanese market. This means that large quantities of small mackerel are often discarded at sea by the freezer trawlers in order to ensure that the major portion of their catch is composed of large mackerel. Catches that are landed at home ports are usually frozen whole or filleted and then frozen for export to a number of countries in Africa, Europe and Asia.

HORSE MACKEREL

Overview

ICES recognise three horse mackerel stocks – each of which is assessed separately. The stocks areas are:

- North Sea
- Western
- Southern

The identities of the different stocks were investigated by an EU-funded project “HOMSIR” that has recently been completed. The results suggested that the North Sea population is different to the population of the western area, but paradoxically, more similar to that from the southern area. Differences between the western and southern area were less defined, but there was some evidence that the southern stock has very different parasites to the western area and this may indicate that it is a separate stock. The southern boundary of the southern stock is difficult to determine and may extend to the African coast, but it appears that this stock is significantly different to that in the Mediterranean Sea.

The Irish fishery

The Irish fishery for horse mackerel is a comparatively recent one and the fishery has only developed since the early 1980's, no landings were reported before then. The Irish pelagic fleet, (the RSW vessels and one freezer trawler) mainly exploit the Western stock but also take small catches from the North Sea stock. This is a major fishery for the pelagic fleet based in Killybegs, and Ireland is one of the major horse mackerel catching countries. The main catches are taken during the autumn from off the north west coast but catches are also taken during Spring when fish are spawning along the west and southwest coasts. The fishery since 1999 has been hampered by a decrease in the stock and also by a lack of demand due to the unsuitability of the fish for the Japanese market. Catches have as a result declined considerably. The sale of the catch for human consumption is largely dependent on Japanese markets and in some years substantial quantities have been reduced to fishmeal.

Management measures

There is no overall management of the horse mackerel stocks. However, the fishery on the Western stock, exploited by EU fleets, is now managed by a TAC. This TAC was divided into national quota for the first time in 1998. The Irish share of the total EU TAC was 23.6%. The TACs prior to 1997 were often grossly exceeded but the EU fishery was closed for the first time in 1998 when the TAC was reached. In addition to the EU imposed management measures Irish authorities also impose additional measures similar to those in the mackerel fishery. As in the herring and mackerel fisheries the horse mackerel fishery off the north west is managed by the North West Pelagic Management committee that was established in 2000.



Horse mackerel assessments

The assessments of the horse mackerel stocks are uncertain because of lack of sampling programmes, lack of survey data and difficulties in interpreting the biological data. The assessments are heavily reliant on the triennial egg surveys. In 2002 Ireland carried out a special egg survey on this species, funded by the North West Pelagic Management Committee. Ireland commenced a sampling programme on horse mackerel in 1998 that was part funded by the Processing industry. This programme was continued and expanded in 2001 by the Marine Institute and it has enabled Ireland to make a much more substantial contribution to the overall assessment of the stock. The Netherlands, Spain, Portugal, Ireland and Norway are the only countries that carry out comprehensive sampling programmes on horse mackerel.

Horse mackerel catches

The total Irish catch in 2002 was about 36,000 t and was valued at over €11 million. The corresponding landing for 2001 was about 55,000 t and was valued at nearly €17 million. The major portion of the horse mackerel catch is landed at Killybegs and is processed for the Japanese market. The price fluctuates considerably and is very dependent on the success of other horse mackerel fisheries that supply this market and on the quality of the fish in Killybegs.

BLUE WHITING

Overview

Blue whiting is a small pelagic species that inhabits deep waters in the northeast Atlantic. The total European catch of this species has risen dramatically from about 640,000 t in 1997 to about 1.5 million t in 2002. The main catches are taken by Norway, Iceland, Russia and the Faroe Islands. Since 1999 Russia, Iceland and Faroe Islands have increased their catches considerably. A large proportion of the total catch is taken from deep waters to the west and

north west of Ireland on the spawning concentrations. Other major fisheries take place in the northern European waters between Norway and Iceland.

The Irish fishery

Irish interest in blue whiting began in the late 1980's when larger RSW vessels took part in exploratory fishing. In the early and mid 1990's there was little Irish interest in blue whiting, but interest was revived in 1996 when over 1,000 t was landed, and landings reached 45,000 t in 1998. Recent catches have been lower, because a TAC was imposed on EU vessels in 1999. The Irish share of this TAC in the areas in which the Irish fleet operates is 24%. The catch in 2002 was 17,825 t, valued at €1.7 million. The fishery in 2002 was relatively brief. The fishery is a potentially very valuable source of income to the large vessels fishing out of Killybegs, particularly because of restrictive quota on the other pelagic stocks. Most of the Irish catch has been reduced to fishmeal. However, in recent years BIM, together with the North and West Pelagic Management Committee have been investigating the possibility of processing blue whiting for human consumption and in 2001 about 500 t were successfully graded and frozen for this purpose.

Blue whiting assessment

The assessment of blue whiting assumes that there is only one stock that inhabits a large area extending from the Strait of Gibraltar to the Barents Sea. The assessment is imprecise due to difficulties in interpreting conflicting signals between the surveys and catch data. Improvement of surveys is considered to be very important to provide a better dataset for the assessments.

SPRAT

Sprat fisheries have taken place in many areas around the Irish coast without any recognizable pattern. In the 1970s sprat fishery largely supported the industrial fishery in the Irish Sea and there have also been important localized fisheries along the south coast and in Galway Bay. In recent years fisheries have developed in Donegal Bay and in the Shannon estuary. The fisheries have assumed considerable importance because they have provided a valuable alternative to the smaller pelagic and white fish vessels that traditionally have been dependent on herring during the autumn and winter. They have also helped to reduce the fishing effort on white fish stocks that are under tight quota.

The total catch in 2002 was 1,728 t that was valued at about €600,000. The comparable figure in 2001 was over 455 t valued at €84,000. Most of this catch was frozen whole for export to continental markets. The markets are very dependent on sprat catches in the North Sea and in the Baltic Sea.

Sprat is a short-lived species and the stocks fluctuate very much because of the variations that take place in recruitment. The fluctuations that occur in the stock sizes make assessment very difficult and no stock assessments are carried out in Ireland. However, various surveys carried out particularly the herring acoustic surveys indicate that considerable sprat stocks are present around the Irish coasts

and they are a potentially valuable resource that should be developed further. The abundance of the stocks is unpredictable and it is not possible to provide management advice other than that the stocks should be harvested as they become available.

PILCHARD

In previous times, pilchards (sardines) have been of importance in Irish fisheries along the south coast. These fisheries appeared and disappeared from time to time. In 2002 about 12,000 t of pilchards were reported as being caught by Irish vessels. This catch was valued at €4.1 million and was mainly landed into France. The catch in 2001 was about 8,000 t valued at about €2.7 million. Most of the Irish catch was taken by vessels fishing in the English Channel. Pilchards are usually present in the Celtic Sea during the autumn and winter and this stock is a potentially valuable resource if the fish can be landed and marketed in good condition

ALBACORE TUNA

The Irish fishery for albacore tuna takes place off the southwest coast, in the Bay of Biscay and further offshore. Albacore tuna is a temperate species widely distributed throughout the Atlantic Ocean and the Mediterranean Sea. On the basis of available biological information three separate stocks are distinguished - Northern and Southern Atlantic stocks (separated at 5°N.Lat.) and the Mediterranean stock. However, it is acknowledged that the biological basis on which this differentiation is made is very limited. Albacore spawn in the subtropical areas of both hemispheres in the Atlantic and spawning takes place during spring-summer. Maturity is thought to occur in the northern albacore when they reach about 90 cm. Before the onset of sexual maturity juvenile tuna are mainly found in surface waters, where they are targeted by surface gears. Some adult albacore are also taken in surface gears but as a result of their deeper distribution, they are mainly caught using deeper set longlines. Young tuna are also caught by longlines in temperate waters.

The fishery for North Atlantic albacore tuna is dominated by Spain, France and Ireland. The total international catch in 2002 was 22,465 t compared with 25,000 t in 2001 and was the lowest in the series. The main international catches in 2002 were taken by trolling, bait boats, mid-water trawl and long lines. Prior to 2001 an increasing amount of albacore tuna was taken by drift nets but this method of fishing is now prohibited in EU waters. There is now increased use of mid-water trawls to target this species. The total Irish albacore tuna catch in 2002 was about 1,100 t, which was about 1,000 t lower than that taken in 2001. The total landing in 2002 was valued at €1.6 million. While the fishery remains valuable, especially to the ports on the southwest coast, both the quantity and the value of the catch have decreased in 2002.

The Irish fishery for albacore tuna developed in the early 1990s and catches reached a peak in 1999 of over 4,800 t. Most of the catches are landed at the ports of Castletownbere and Dingle where the fishery provides a valuable alter-

native to the traditional demersal and pelagic fisheries. The season for the Irish fishery extends from July through to September.

The main gear used by the Irish had been drifting gill nets. In an effort to develop alternative methods of catching albacore tuna, other than with drift nets, BIM and the Marine Institute investigated the commercial possibilities of using alternative gears (paired midwinter trawls and trolls) during the 1998 and 1999 seasons. These investigations were funded by the EU and involved Irish and French fishermen.



In addition to experiments with gear, investigations were also carried out on the use of satellite imagery to provide information on water temperatures and locations of shoals and also on the use of sophisticated echo sounders to detect tuna shoals. During these investigations observers were placed on as many vessels as possible, to collect biological information on catches and on fishing operations. In 2002 almost the total Irish catch was taken by midwater trawls, and this gear was used almost exclusively in 2003. The location of the catches depends very much on the migrations of the tuna shoals which themselves are influenced by water temperatures. Catches are taken over a large area extending from approximately 100 miles west of Kerry to the southern parts of the Bay of Biscay.

The fisheries for tuna species, including albacore tuna, are regulated by the International Commission for the Conservation of Atlantic Tuna (ICCAT). Scientific advice on tuna is formulated by the Standing Committee on Research and Statistics (SCRS) of ICCAT. Prior to 2001 there were no catch restrictions on albacore despite recommendations made by SCRS. However, in 2001 the EU introduced a TAC for albacore and Ireland was allocated share of 11%. These figures were again adopted for 2002. Biological sampling of the catches taken in the experimental fisheries and from the commercial catches was continued throughout the 2001, 2002 and 2003 seasons. The data from these sampling programmes are submitted to ICCAT for stock assessment.

BLUEFIN TUNA

Under EU legislation Ireland is not permitted to have a directed fishery for bluefin tuna (*Thunnus thynnus*). However, incidental catches of bluefin tuna and swordfish are taken as in fisheries for albacore tuna and also in the directed fisheries for other pelagic species and by some recreational sea angling vessels. Most of these catches are taken during autumn off the north west coast.

For 2002 ICCAT imposed a TAC for blue fin for the Atlantic and the Mediterranean of 32,000 t of which the EU is permitted to take 19,231.7 t. The EU has no quota for bluefin tuna but is permitted to take a by catch of 65 t. The total catch of bluefin recorded by Ireland for 2002 was 15 t valued at about €94,000 compared with 8.8 t in 2001 that was valued at €75,000.

Some information on the location of blue fin tuna was obtained by BIM in 1997 and 1998. A further study, which was part funded by the Marine Institute, was carried out by a private company, *Gulfstream Sportfishing Ltd*, in 2000. The BIM study was carried out with fishing vessels using longlines while the second study used an angling vessel and employed rods and reels. Both studies indicated that quantities of blue fin tuna are available along the west and northwest coasts during late summer and autumn. Work currently being carried out by BIM, is investigating the movements of bluefin tuna, in conjunction with partners in the United States.

According to ICCAT, the present fisheries for Atlantic bluefin tuna are distributed from the Gulf of Mexico to Newfoundland in the west Atlantic and from the Canary Islands to the south of Iceland in the east Atlantic and also throughout the Mediterranean. Management areas in the Atlantic are separated by a line based on discontinuities in the distribution of the catches and limited biological information. Tagging evidence indicates that movement of bluefin occurs across the current east/west management boundary of the Atlantic. Bluefin tuna can grow to over 3 m and weigh more than 650 kg. The oldest reliable age group is 20 years. Bluefin are characterised by a late age at maturity and have a large number of juvenile age classes and a long life span. This makes the stock well adapted to variations in recruitment success but more vulnerable to fishing pressure than species that grow rapidly. Bluefin are opportunistic feeders with fish, squid and crustacea common in their diet. In the east Atlantic, bluefin tuna generally spawn from late May to July, depending on the spawning area. This spawning area is mainly in those parts of the Mediterranean where the sea surface temperature is around 24°C. In recent years increasing amounts of juvenile bluefin tuna are caught and then fattened and matured into adults on fish farms throughout the Mediterranean. This has created concerns for the over exploitation of the juvenile component of the stock.

North Sea Herring

(Sub-area IV, Division VIIId-e and Div IIIa (autumn spawners))

No ACFM information has been included for this stock

For latest information, see: <http://www.ices.dk>

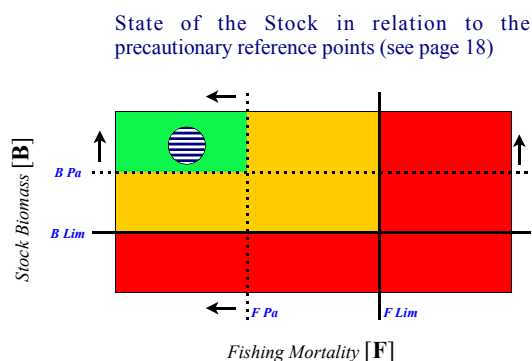


Fisheries Science Services

FSS – ADVICE

FSS agrees with the ICES and STECF advice that catches in 2004 should be within the constraints on fishing mortality agreed by the EC and Norway. This means that $F_{2-6} = 0.25$ and $F_{0-1} = 0.12$. Several options consistent with the EU-Norway agreement, will result in a TAC in the range of 612,000 t to 628,000 t.

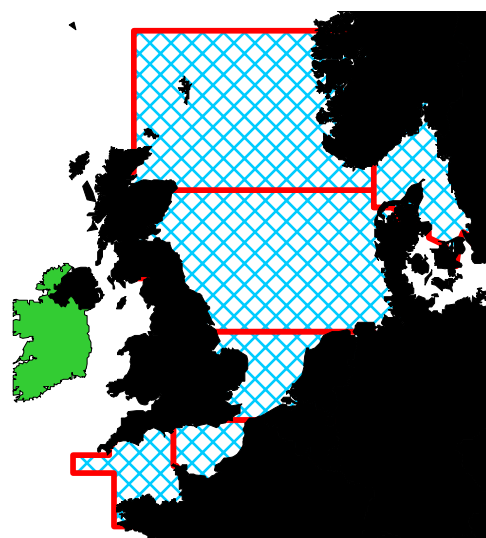
STATE OF THE STOCK



- This stock is now considered to be within safe biological limits.
- The total catch in 2002 was 353,000 t and were was very similar to those from 1998 to 2001. In the last 8 years, landings have been about half those of the preceding five years.
- In 2002 the fishing mortality on the adult part of the stock $F_{2-6} = 0.24$, is below $F_{pa} = 0.25$. Fishing mortality on juveniles has remained below 0.1 since 1996, and is below $F_{pa} = 0.12$. (there are separate precautionary reference points for F on adult and juvenile fish).
- Both the 1998 year class and the 2000 year class appear to be very strong in all surveys, but the 2002 year class is estimated to be one of the weakest in the series.
- The SSB in 2002 was estimated at 1.6 million tonnes and is expected to increase to 2.2 million tonnes in 2003, which is above the B_{pa} of 1.3 million tonnes. The SSB collapsed in the sixties and remained very low during the next twenty years. The stock size in the 1950s and 1960s was in excess of 2 million tonnes.
- The short term projections involve analysis of exploitation rates for juveniles and adults and show a rise in SSB.

CURRENT MANAGEMENT

- The TAC is shared between EU and Norway and divided between a number of different fleets operating in the North Sea, the English Channel and Division IIIa. The assessment covers the TAC areas. There is a separate allocation by EU in operation for Divisions IVc and VIIId (Southern North Sea and English Channel). The overall split of the TAC is 29% to Norway and 71% to the EU.



Red Boxes-TAC/Management Areas Blue Shading- Assessment Area

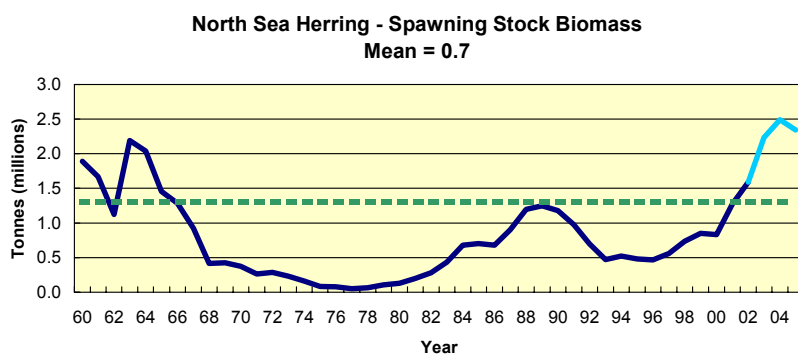
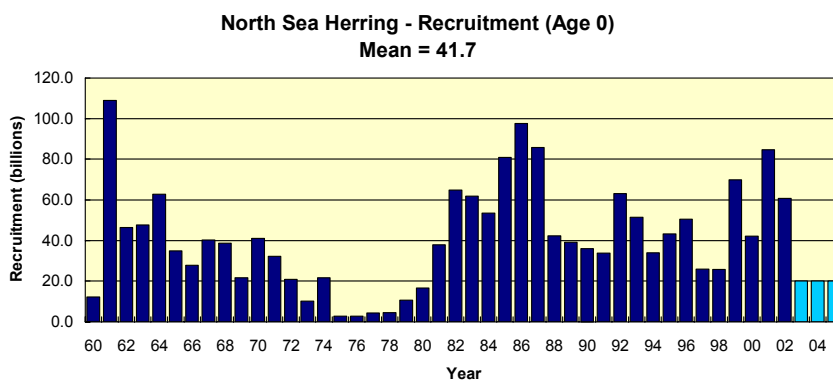
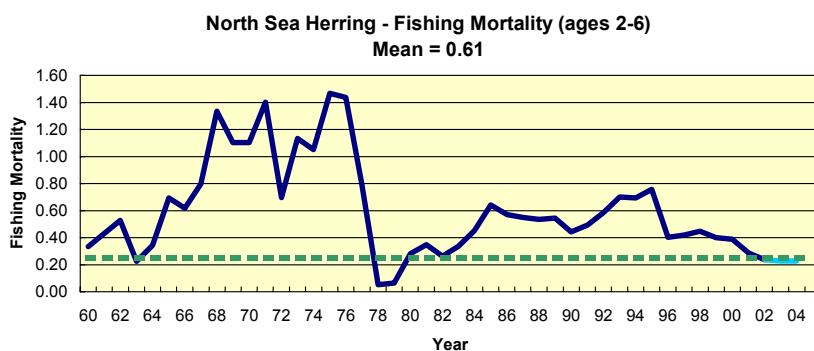
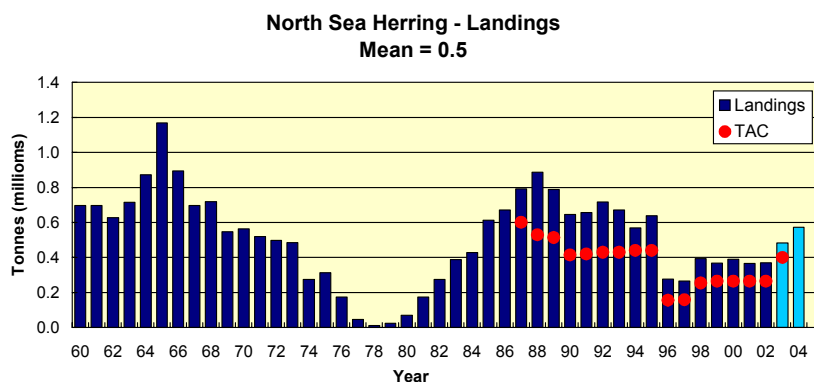
- There is an international agreement between EU and Norway. This is considered by ICES to be consistent with the precautionary approach.
- Ireland does not take part in this fishery and has no quota.
- The agreed TAC for the fishery for 2003 is 400,000 t (including landings from the industrial fisheries and some landings taken under TACs from other ICES areas). The EU share of the TAC is 284,910 t.

FSS – ECONOMIC COMMENTS

- There is no Irish quota, but the catch of North Sea herring has a direct effect on the profitability of Irish herring fisheries.
- A high stock level in the North Sea and a high TAC will have an adverse effect on the market for Irish herring. This is already the situation in 2003.
- The TAC for human consumption may increase and this could affect the price of Irish herring.

ADDITIONAL INFORMATION

1. The catches are mainly taken by Denmark, Norway, Netherlands, and United Kingdom.
2. Misreporting continues to be a major problem in the fishery, resulting in overshooting of the TAC.
3. FSS notes that the TAC in IVc and VIIId should not increase faster than that for the North Sea as a whole.
4. The international management measures agreed between EU and Norway for this stock continue to operate.
5. The management of the fishery is difficult because it must take into consideration catches taken by the many different international fleets that fish for human consumption and the large industrial fisheries mainly conducted by Denmark.



West of Scotland Herring

(Division VIa (North))

For latest information, see: <http://www.ices.dk>



Fisheries Science Services

FSS – ADVICE

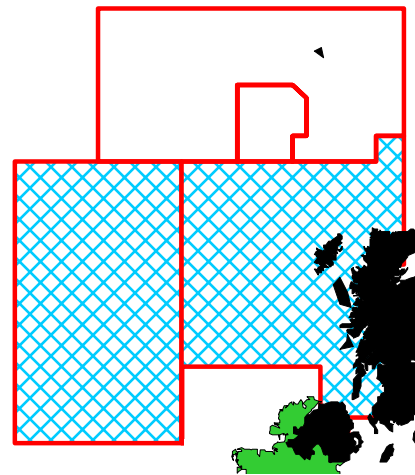
FSS agrees with the ICES and STECF advice that the fishing mortality should not increase above F_{sq} , corresponding to a catch in 2004 not exceeding 30,000 t, consistent with the historic productivity of this stock and expected medium-term yield. This catch would translate to an Irish quota of 4,432 t, the same as in 2003.

STATE OF THE STOCK

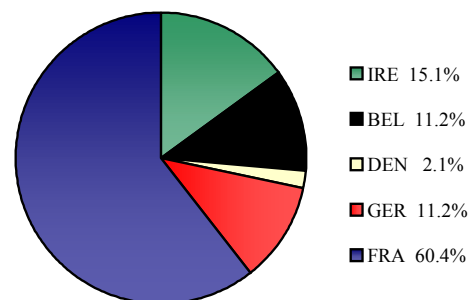
- The status of this stock is unknown relative to safe biological limits, because reference points have not yet been adopted
- Catches have been stable at around 30,000 t since 1991. In 2002 the catches were in line with the TAC for the first time.
- Fishing mortality is considered to have been low in recent years. The current F is about 0.2.
- Recruitment of the 1999 year class appears to have been strong.
- The assessment and results from the Scottish acoustic surveys suggest that the stock has increased significantly in recent years because of good recruitment, continuing low fishing mortality and a revision of the maturity ogive. The SSB is around 144,800 t in 2003.
- There are strong indications that at the present rate of fishing mortality the stock will continue to increase.

CURRENT MANAGEMENT

- The assessment is carried out over Division VIa North and VIb while the TAC is set for Divisions Vb, VIa North, and VIb. Very little catches are taken in any area other than Div. VIa North.
- The agreed TACs continue to be above the actual catches taken from the stock and have no effect as a conservation measure.
- The overall TAC in 2003 was 30,000 t. The EU share of the total TAC is 29,340 t while the Irish share of the EU quota was 4,432 t.
- There is no management plan or management objective for this fishery.



Red Boxes-TAC/Management Areas Blue Shading- Assessment Area



FSS – ECONOMIC COMMENTS

- The Irish catch in 2002 was about 4,239 t which was worth over €882,000.
- While demand for herring may be low this fishery continues to be potentially important to the Ireland.

ADDITIONAL INFORMATION

1. The assessment of this stock has improved in recent years and is now a lot less uncertain than previously and can be used as the basis for management advice. Catch statistics have improved due to increased monitoring and satellite vessel surveillance. The total reported landing in 2002 was 36,283 t, 4,500 t of which are believed to have been misreported from other areas.
2. The actual landing in 2002 was approximated to 32,000 t. The reported Irish landing was 4,239 t.
3. Until 2002 the TACs for this stock had not been restrictive because they have been set on the basis of average official catches that are far higher than actual catches. The TAC for 2002 was in line with the catch.
4. The major landings are taken by the U.K (Scotland)

- purse seine and midwater trawl fleets. Ireland, Netherlands, Germany and France also report landings.
5. In recent years a small number of Scottish and Northern Irish vessels have landed herring from this stock into Derry in August and September. These herring were processed in Donegal and Dublin.
 6. The relationship between stocks in VIaN and VIaS is being investigated through the framework of the WESHER project.
 7. Catches reported from this area which are taken in adjoining area VIaS will have a negative effect on the rebuilding of the stock in VIaS and VIIb.
 8. Irish sampling for this stock is supported through the EU funded sampling programme, which is required under the Data Collection Regulation 1543/2000 and 1639/2001.
 9. The age distribution of the Irish samples from this fishery was dominated by three year old herrings. This year class appears to be the strongest to enter the fishery for a number of years.
 10. The length distribution of the Irish samples was dominated by fish between 23.5 cm – 26 cm.

ICES ADVICE

3.7.8.a

State of stock/exploitation:

The status of this stock is unknown relative to safe biological limits, because reference points have not been determined. Although the estimates of SSB and F are uncertain in the most recent 2-3 years, the assessment indicates that SSB has been increasing strongly since the late 1990s, and is currently high, and fishing mortality is low. The recent increase in SSB is due to a good year class that entered the fishery in 2001 and an increase in the proportion mature.

Management objectives:

There are no explicit management objectives for this stock.

Advice on management:

ICES recommends that the fishing mortality should not increase above F_{SQ} , corresponding to a catch in 2004 not exceeding 30, 000, which is consistent with the historic productivity of this stock and expected medium term yield from the stock.

Relevant factors to be considered in management:

In recent years TACs have not been restrictive, presumably because of low effort and a weak market. There has been substantial misreporting of catches into this area from the North Sea and Division VIa(S). Medium term predictions suggest that increasing effort in this fishery is not expected to increase yield substantially in the medium term.

Historically, there have been periods with substantial misreporting into this area, producing high reported catches and consequently high TACs from assessments based on these catches. Any increase in TAC in this stock should be accompanied by measures to ensure catch reporting is reliable, and opportunities to misreport catches from adjacent stocks do not occur.

Catch forecast for 2004:

Basis: $F(2003) = F_{sq} = F(00-02) = 0.21$, scaled = 1 ; Landings(2003) = 29; SSB(2003) = 145.

F(2004 and 2005)	Basis	SSB(2004)	Landings(2004)	SSB(2005)
0.21	$F = F(00-02) = F_{sq}$	147	30	149
0.25	$F = F_{sq} * 1.2$	144	35.3	141
0.30	$F = F_{sq} * 1.45$	139	41.7	130
0.35	$F = F_{sq} * 1.7$	134	47.8	122
0.40	$F = F_{sq} * 1.95$	131	52.5	116

Weights in '000 t.

Shaded scenarios not consistent with the advice.

Comparison with previous assessment and advice:

The perception of the state of the stock is unchanged but the improvements in confidence in the assessment and reference points allows less restrictive management advice.

Elaboration and special comment:

Catches are taken from this area by three fisheries. The Scottish domestic pair trawl fleet and the Northern Irish fleet operate in shallower, coastal areas, principally fishing in the Minches and around the Island of Barra in the south; younger herring are found in these areas. The Scottish and Norwegian purse seine fleets target herring mostly in the northern North Sea, but also operate in the northern part of VIa (N). An international freezer-trawler fishery has historically operated in deeper water near the shelf edge where older fish are distributed; these vessels are mostly registered in the Netherlands, Germany, France and England.

Misreporting of the catches has decreased in recent years. Better information on the catches has been obtained and biological sampling of catches has improved over the last 4-5 years. Satellite surveillance data has improved knowledge of vessel behaviour. The assessment in 2003 is less uncertain than in previous years reflecting the stability of the input data over the last two or three years. Estimates of F are reasonably reliable and suggest that F is well below candidate F_{pa} . Estimates of SSB are more uncertain but suggest the stock is well above any candidate B_{pa} . Analyses in recent years have consistently pointed towards the stock be-

ing exploited at a sustainable rate. The assessment SSB estimate is an increase from the 2002 WG assessment. The large recruitment of 2 ringers to the population in 2001 is seen as a peak in numbers of 3 ringers in 2002 in both the catch and acoustic survey data. Maturity at age for 2 ringers is again one of the highest values in the time series, adding to the increase in SSB.

The instability in selectivity patterns over time in the assessment is a concern. It could be caused by fishing patterns of the fleets operating in the area in different periods, or by different misreporting rates over time. Either source makes the assessment more uncertain, but the proper way to address the uncertainty depends on the causes, which need to be understood.

Source of information:

Report of the Herring Assessment Working Group for the Area South of 62°N, March 2003 (ICES CM 2003/ACFM:17).

Yield and spawning biomass per Recruit

F-reference points:

	Fish Mort Ages 3-6	Yield/R	SSB/R
Average Current	0.209	0.035	0.170
F_{max}	N/A		
$F_{0.1}$	0.165	0.033	0.202
F_{med}	0.295	0.037	0.129

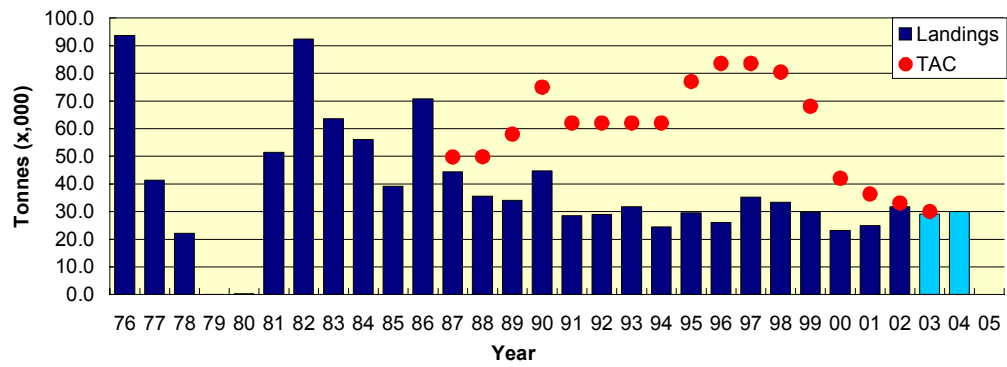
Catch data (Tables 3.7.8.a.1-2):

Year	ICES Advice	Predicted catch corresp. to advice	Agreed TAC	Disc. slip.	ACFM Catch ¹
1987	Reduce F to $F_{0.1}/status quo F$	38-55	49.7		44
1988	TAC	46	49.8		36
1989	TAC	58	58	1.6	34
1990	TAC	61	75	1.3	45
1991	TAC	57	62	1.2	29
1992	TAC	62	62	0.2	29
1993	Catch at <i>status quo F</i>	54-58	62	0.8	32
1994	Catch at <i>status quo F</i>	50-60	62	0.7	24
1995	No specific advice	60 ²	77		30
1996	No advice because of misreporting	-	83.57		26
1997	Catch at <i>status quo F</i>		83.57	0.1	33 ³
1998	Catch at <i>status quo F</i>	59	80.37	0.9	33
1999	Average catches, 1991-1996	28	68		30
2000	Average catches, 1991-1996	28	42		23
2001	Average catches, 1991-1999	30	36.36		25
2002	Average catches, 1991-1999	30	33		32
2003	Catch at <i>status quo F</i>	30	30		
2004	$F=F_{sq} = 0.21$	30			

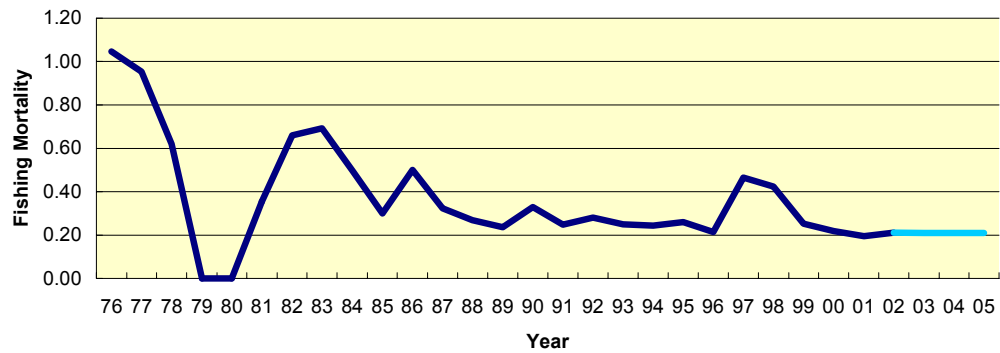
¹Adjusted for misreporting. ²Catch at *status quo F*. Weights in '000 t.

³Revised down from 60 in 1999.

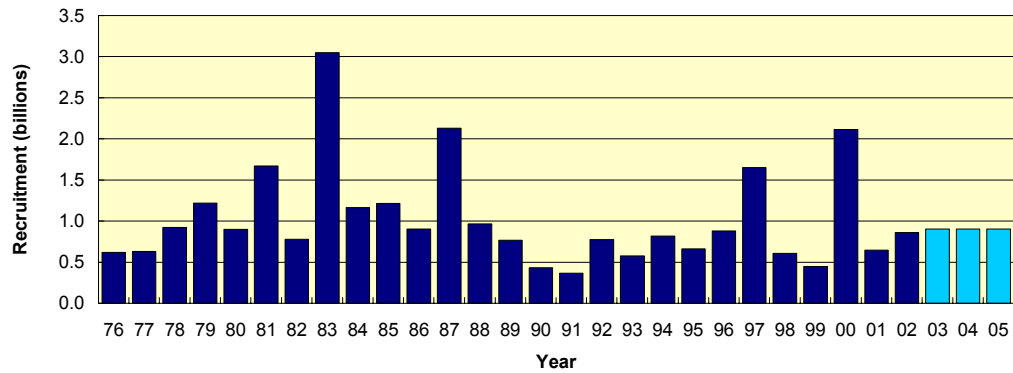
Herring Via North - Landings
Mean = 38.4



Herring Via North - Fishing Mortality (ages 3-6)
Mean = 0.37



Herring Via North - Recruitment (Age 0)
Mean = 1



Herring Via North - Spawning Stock Biomass
Mean = 111.8

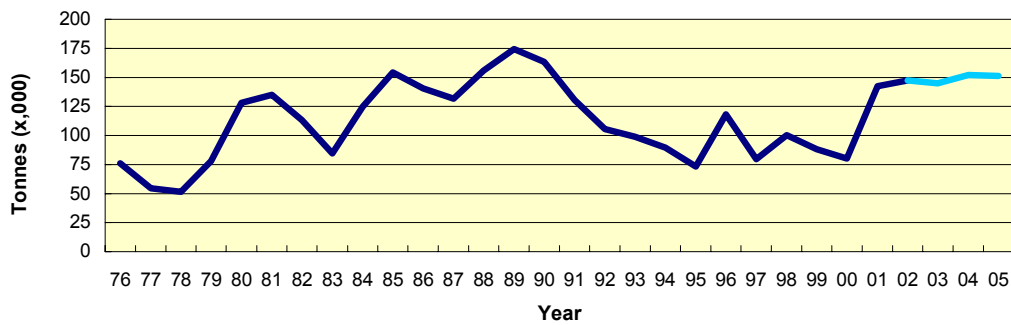


Table 3.7.8.a.1. Herring in VIa(N). Catch in tonnes by country, 1982-2002. These figures do not in all cases correspond to the official statistics and cannot be used for management purposes

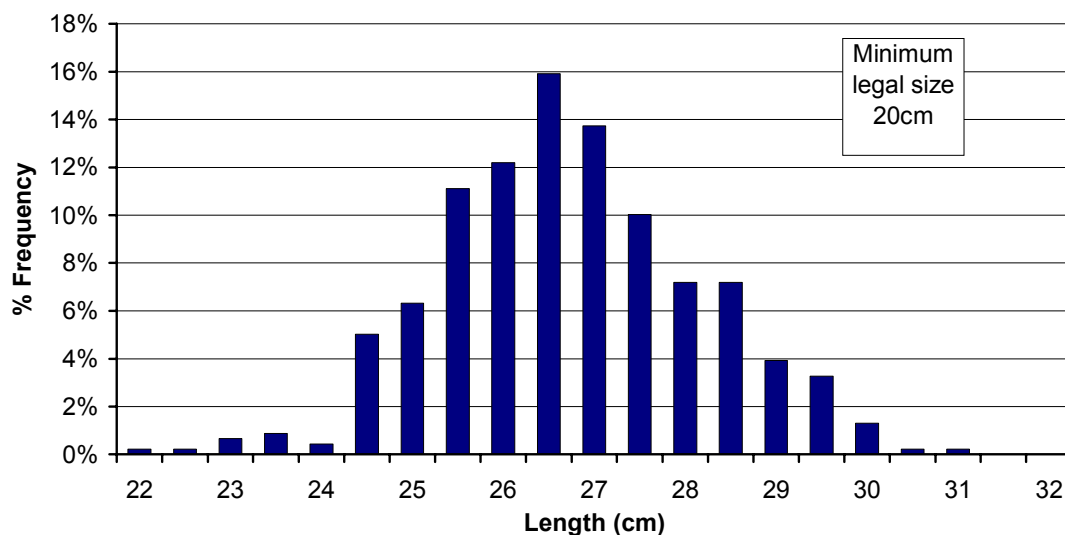
Country	1982	1983	1984	1985	1986	1987	1988
Denmark			96				
Faroes	74	834	954	104	400		
France	2069	1313		20	18	136	44
Germany	8453	6283	5564	5937	2188	1711	1860
Ireland					6000	6800	6740
Netherlands	11317	20200	7729	5500	5160	5212	6131
Norway	13018	7336	6669	4690	4799	4300	456
UK	38471	31616	37554	28065	25294	26810	26894
Unallocated	18958	-4059	16588	-502	37840	18038	5229
Discards							
Total	92360	63523	75154	43814	81699	63007	47354
Area-Misreported			-19142	-4672	-10935	-18647	-11763
WG Estimate	92360	63523	56012	39142	70764	44360	35591
Source (WG)	1984	1985	1986	1987	1988	1989	1990
Country	1989	1990	1991	1992	1993	1994	1995
Denmark							
Faroes		326	482				
France	1342	1287	1168	119	818	274	3672
Germany	4290	7096	6450	5640	4693	5087	3733
Ireland	8000	10000	8000	7985	8236	7938	3548
Netherlands	5860	7693	7979	8000	6132	6093	7808
Norway		1607	3318	2389	7447	8183	4840
UK	29874	38253	32628	32730	32602	30676	42661
Unallocated	2123	2397	-10597	-5485	-3753	-4287	-4541
Discards	1550	1300	1180	200		700	
Total	53039	69959	50608	51578	56175	54664	61271
Area-Misreported	-19013	-25266	-22079	-22593	-24397	-30234	-32146
WG Estimate	34026	44693	28529	28985	31778	24430	29575
Source (WG)	1991	1992	1993	1994	1995	1996	1997
Country	1996	1997	1998	1999	2000	2001	2002
Denmark							
Faroes							800
France	2297	3093	1903	463	870	760	1340
Germany	7836	8873	8253	6752	4615	3944	3810
Ireland	9721	1875	11199	7915	4841	4311	4239
Netherlands	9396	9873	8483	7244	4647	4534	4612
Norway	6223	4962	5317	2695			
UK	46639	44273	42302	36446	22816	21862	20604
Unallocated	-17753	-8015	-11748	-8155			878
Discards		62	90				
Total	64359	64995	65799	61514	37789	35411	36283
Area-Misreported	-38254	-29766	-32446	-23623	-14626	-10437	-4496
WG Estimate	26105	35233*	33353	29736	23163	24974	31787
Source (WG)	1997	1998	1999	2000	2001	2002	2003

*WG estimate for 1997 has been revised according to the Bayesian assessment (see text section 5.1.3).

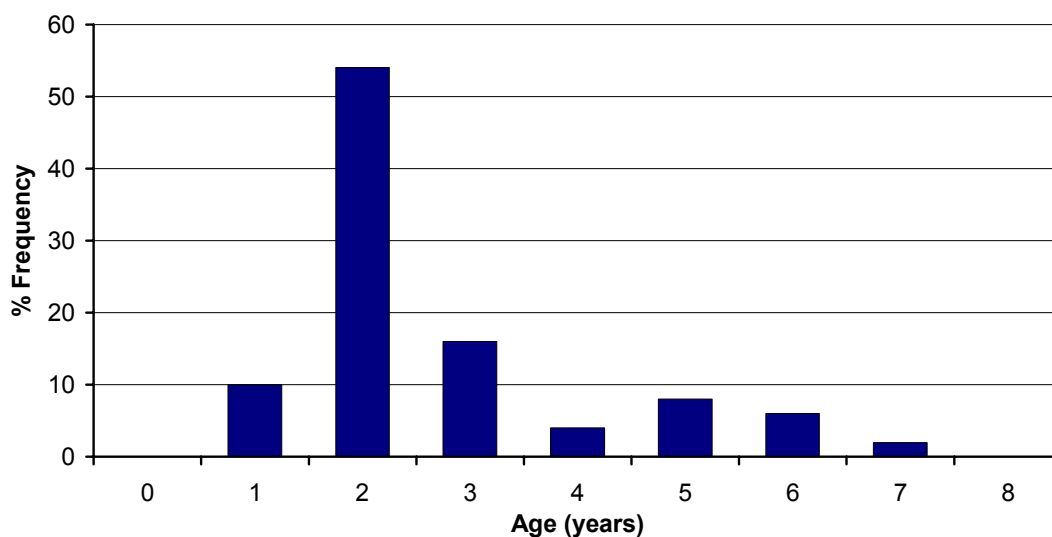
Table 3.7.8.a.2 Herring in Division VIa (North)

Year	Recruitment Age 1 thousands	SSB tonnes	Landings tonnes	Mean F Ages 3-6
1976	620600	75940	93640	1.0460000
1977	631500	54570	41340	0.9526000
1978	923800	51550	22160	0.6193000
1979	1220000	78000	60	0.0006582
1980	898500	128000	306	0.0003520
1981	1670000	135100	51420	0.3543000
1982	778000	113200	92360	0.6596000
1983	3049000	84530	63520	0.6914000
1984	1166000	124600	56010	0.4983000
1985	1214000	154300	39140	0.2994000
1986	905200	140400	70760	0.5012000
1987	2132000	131600	44360	0.3245000
1988	965000	156000	35590	0.2698000
1989	767400	174300	34030	0.2364000
1990	433600	163400	44690	0.3298000
1991	367800	130400	28530	0.2487000
1992	773900	105400	28990	0.2807000
1993	576200	98940	31780	0.2499000
1994	817600	89410	24430	0.2434000
1995	664000	72980	29580	0.2614000
1996	881900	118200	26110	0.2147000
1997	1650000	79500	35230	0.4658000
1998	605300	100200	33350	0.4236000
1999	448100	88140	29740	0.2536000
2000	2115000	80100	23160	0.2190000
2001	645300	142400	24970	0.1954000
2002	861900	147300	31790	0.2115000
2003	900800	144800		
Average	1024371	112974	38409	0.3664254

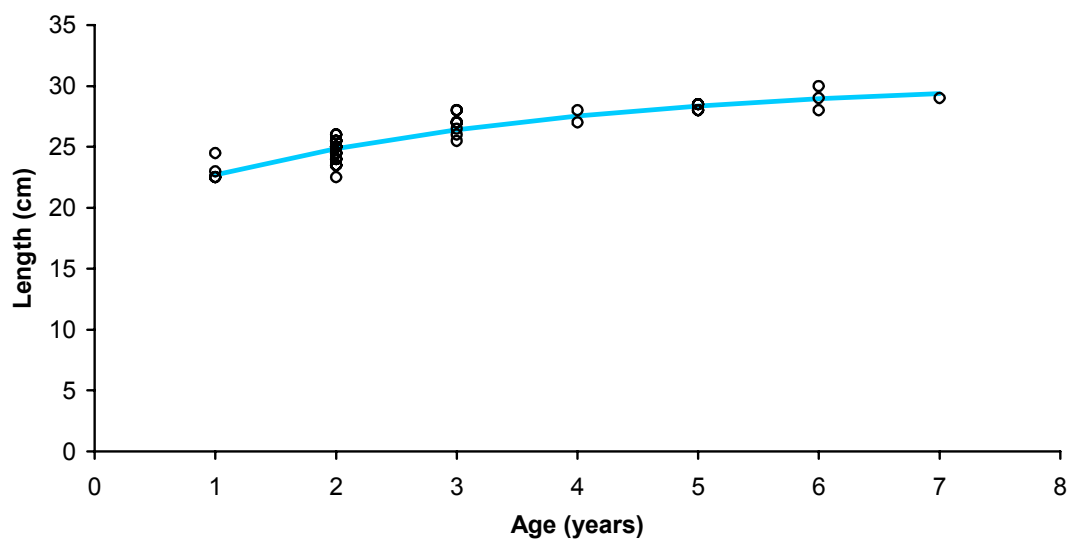
2002 Length Distribution: Irish Sampling, Herring in 6AN



2002 Age Distribution: Irish Sampling, Herring in 6AN



2002 Size at Age: Irish Sampling, Herring in 6AN



North West of Ireland Herring

(Divisions VIa South and VIIb,c)

For latest information, see: <http://www.ices.dk>



Fisheries Science Services

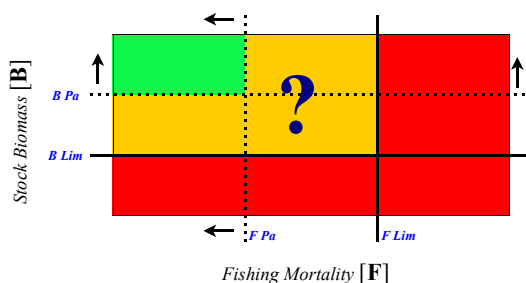
FSS – ADVICE

FSS agrees with ICES advice that catches do not exceed those of the past two years, corresponding to a catch of less than 14,000 t in 2004. This is expected to allow SSB to increase at the current productivity. This would translate to an Irish quota of 12,727 t.

FSS supports the local management committee in their efforts to rebuild this stock and to assist in the collection of adequate scientific data for stock assessment. FSS advises that actions, which perturb herring spawning beds or increase turbidity after spawning are likely to have a negative affect on recruitment to the stock.

STATE OF THE STOCK

State of the Stock in relation to the precautionary reference points (see page 18)

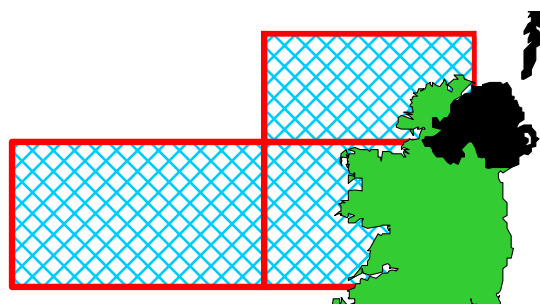


- The state of this stock is uncertain.
- The landings in 2002 were 13,587 t, slightly lower than in 2001 (14,061 t) and are the lowest recorded from the fishery since before 1970.
- There is no tuned assessment for this stock. However trial assessments suggest that F may have declined in recent years. This may indicate that management measures have been successful in reducing effort. F_{pa} has been set at 0.22.
- There are no fishery independent methods of estimating recruitment for this stock at present. Recent recruitments may be low.
- The SSB declined continually since 1988 when it was estimated to be around 293,000 t. and has remained at a low level in recent years. However the size is not precisely known but is still probably below the $B_{pa} = 110,000$ t.

- Because of the uncertainty in the present stock size, the short term predictions were not used for management advice.

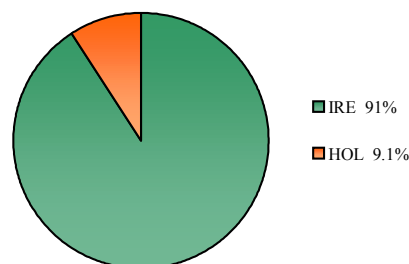
CURRENT MANAGEMENT

- The assessment area is for Divisions VIa South and VIIb-c, which is the same as the TAC area.



Red Boxes-TAC/Management Areas Blue Shading- Assessment Area

- The TAC is set by the EU and for 2003 is 14,000 t. The Irish share in 2003 is 12,727 t (90.9%)



- There are no internationally agreed management objectives or plan for this stock.
- In 2000 the Irish Northwest Pelagic Management Committee was established for this stock. This committee has a stated aim to rebuild this stock to above the B_{pa} level of 110,000 t. The time period over which this can be achieved will depend on the annual catches and recruitment. In the longer term it is the policy of the committee to further rebuild the stock to the level at which it can sustain annual catches of around 25,000 t. The committee have also continued the imposition of closed seasons for the fishery. The Irish quota is controlled by a number of catch restriction measures.

FSS – ECONOMIC COMMENTS

- The Irish catch in 2002 was 13,072 t valued at about €2.7 million.
- The value of the 2003 quota is €1.7 million.

- Although the present demand for herring is low, this fishery is important to the Irish pelagic industry.

ADDITIONAL INFORMATION

1. The state of this stock is uncertain, and no assessment was presented by the HAWG. Recent changes to the management of the fishery may have reduced the impact of misreporting and under-reporting of catches in the area. These changes are adding to the reliability of the catch data. A time series of fishery independent data for this stock is required to produce an estimate of SSB.
2. ACFM included only one assessment scenario in its advice based on a selection of terminal $F = 0.60$. FSS includes alternative scenarios ($F = 0.4$, $F = 0.2$) in its graphical presentation of the stock summary.
3. The total catch estimated to have been taken from this stock in 2002 was over 13,587 t compared with about 14,000 t in 2001. This catch is the lowest recorded from the fishery since before 1970.
4. Irish landings from this stock have decreased sharply since 1999. Low demand for herring from this stock has led reduced fishing effort. Additionally, the availability of more valuable species has reduced fishing effort on the stock. The main catches (over 96 %) are taken by Ireland.
5. In the past there has been large scale misreporting of catches for this fishery and large catches taken in Div. VIa South were reported as having been taken in adjoining Div. VIa North. This presented considerable difficulties for the accurate assessment of this stock.
6. Irish sampling on this stock is supported by the EU funded sampling programme and is required under Data Collection Regulation 1543/200 and 1639/2001.
7. Because of the spasmodic nature of the fishery, catch at age data may not give a reliable indication of the abundance of different year classes.
8. A new series of acoustic surveys was started in 1999

in this area using the *RV Celtic Voyager*. The surveys in 2002 and in February 2003 have been carried out using commercial vessels.

9. The stock in this area has declined and may have stabilized at a low level. The decline is particularly evident in Division VIIb where there has almost been a complete absence of herring from the traditional spawning grounds off Galway and Mayo.

ICES ADVICE

3.10.3

State of stock/exploitation:

The state of the stock is unknown with respect to safe biological limits, because estimates of SSB and fishing mortality are highly uncertain in the recent 2-3 years. Current SSB is unknown, but is likely to be less than B_{pa} . For SSB to be above B_{lim} , there would have to have been very strong recruitment in recent years, but there is no evidence of such year-classes. F appears to have risen sharply in the late 1990s and although management measures since then have reduced F , the current F is unknown. Catches in the last three years have been the lowest observed due to restrictive TACs.

Management objectives:

A local Irish management committee has been established for this stock. It has developed a management plan that includes an objective to rebuild the stock to above B_{pa} .

Advice on management:

ICES recommends that catches not exceed those of the past two years, corresponding to a catch of less than 14 000t in 2004, which is expected to allow SSB to increase at current productivity

Precautionary Approach reference points (changed in 1999):

ICES considers that:	ICES proposes that:
B_{lim} is 81 000 t	B_{pa} be set at 110 000 t
F_{lim} is 0.33	F_{pa} be set at 0.22

Technical basis:

B_{lim} : Lowest reliable estimated SSB	B_{pa} : Approximately 1.4 B_{lim}
F_{lim} : F_{loss}	F_{pa} : $= F_{med}(98)$

Rebuilding plan:

A local management and rebuilding plan for this stock is currently in place by the nation taking about 95% of the total catch. The plan appears to be effective at constraining catches to not exceed the TAC and providing reliable catch data, but it is uncertain if the catch limitations are sufficient to rebuild the stock.

Relevant factors to be considered in management:

14 000 t is approximately 50% of the average catches taken in the 1970s, when productivity of the stock was comparable to that seen through the 1990s, so there is some biological basis to expect SSB to be increasing. Monitoring and control of the fishery is effective, and it should be possible within another couple of years to deter-

mine if SSB is recovering at such catches. If SSB is found not to be increasing reliably, further catch reductions will be necessary.

From the historic series, recruitment to this stock appears to be consistently poor at low SSB, which makes rebuilding difficult.

Recent changes to the management of the fisheries on this stock are likely to have reduced the impact of misreporting and under-reporting of catches in this area. These changes add to the reliability of the catch data and should improve the assessment, which is solely based on catch-at-age data. However, in addition to consistent data some form of tuning index is needed before it will be possible to produce reliable estimates of SSB and review the appropriateness of the reference points.

Changes to the management of this stock, including provisions of the recovery plan, have changed the way that the fishery is prosecuted in space and time. As a consequence, although the catch data are now thought to be more reliable, they may not be comparable with the historic commercial catch-at-age data, when used as a basis for evaluating stock status and reference points.

The management plan currently in place is strictly monitoring catches and operates a closed season from March to October. The high stock levels observed from 1984 to 1992 were the result of two abundant year classes in 1982 and 1986. No similarly strong recruiting year classes have been observed in the catches in recent years.

Comparison with previous assessment and advice:

The assessment reviewed in 2003 was considered to be only illustrative of trends. It does give a substantial change in perception from last year, suggesting a much lower SSB and greater F. This inconsistency reflects the instability and imprecision of stock size estimates from the assessments.

Elaboration and special comment:

In the absence of tuning data the assessments have been carried out by assuming various terminal F values on the catch-at-age data. These assessments appear to have poorly estimated F, but general trends in stock develop-

ment are similar over a range of F values. Tuning indices are necessary to gain precision in estimates.

Total catches have decreased since 1998 and have been in line with the TAC since 2000. An acoustic survey has been resumed on the stock, and commercial vessels have been equipped with data loggers to obtain information on the distribution of the stocks.

The Irish fishery, which constitutes over 95% of the catch, is operated on a closed season basis, and individual boat quotas are applied. The Irish fishery was closed early in February 2002 by the Irish Northwest Pelagic Management Committee (NWPMC), based on scientific advice and reopened from October to December. The Irish NWPMC has stated the following management objectives: *“As regards the herring stock in this area the management policy of the Northwest Pelagic Management Committee is to rebuild the stock to above the B_{pa} level of 110 000 t. The time period over which this rebuilding process can be achieved will depend on annual catches and recruitment. In the longer term it is the policy of the committee to further rebuild the stock to the level at which it can sustain annual catches of around 25,000 t. This rebuilding process will be based on scientific advice. In the event of the stock remaining below the required level additional conservation measures will be implemented. It is the policy of the committee to ensure that adequate research is carried out, including sampling and surveys, to enable an accurate assessment of the stock”.*

The fishery exploits a mixture of autumn- and winter/spring-spawning fish, which spawn from October to March. The winter/spring-spawning component is distributed in the northern part of the area. The main decline in the overall stock appears to have taken place on the autumn-spawning component, and this is particularly evident on the traditional spawning grounds in Division VIIb.

Source of information:

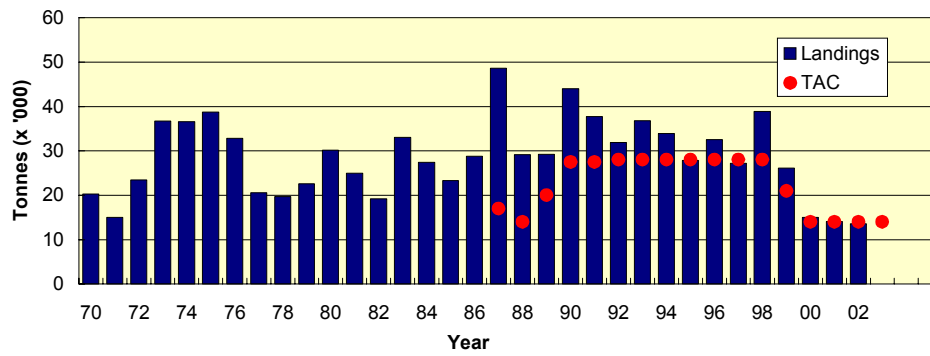
ACFM Working Document and Report of the Herring Assessment Working Group for the Area South of 62°N, March 2003 (ICES CM 2003/ACFM:17).

Catch data (Tables 3.10.3.1-2):

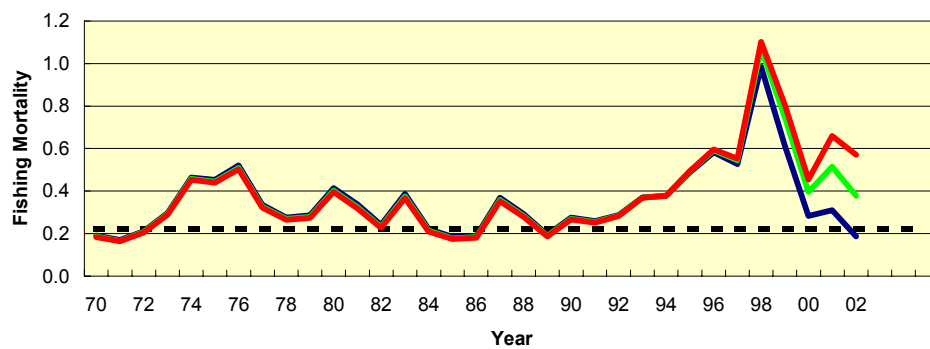
Year	ICES Advice	Predicted catch corresp. to advice	Agreed TAC	Official Landings	Disc. slip.	ACFM Catch
1987	TAC	18	17	17	-	49
1988	TAC depending on whether 1987 TAC is taken	11–18	14	15	-	29
1989	TAC	15	20	21	1.0	29
1990	TAC depending on whether 1989 TAC is taken	25–27	27.5	28	2.5	44
1991	TAC	< 26	27.5	23	3.4	38
1992	TAC (including discards)	29	28	27	0.1	32
1993	Precautionary TAC (including discards)	29	28	30	0.3	37
1994	Precautionary TAC	28	28	27	0.7	34
1995	Precautionary TAC (including discards)	36	28	27	-	28
1996	If required, precautionary TAC	34	28	25	-	33
1997	Catches below 25	< 25	28	28	0.1	27
1998	Catches below 25	< 25	28	28	-	39
1999	F 70% of F(97)	19	21	18	-	26
2000	F 40% of F(98) = Proposed F_{pa}	14	14	10	-	15
2001	F 40% of F(99) F = 0.2	14	14	13	-	14
2002	No increase in catches	14	14	14	-	13.6
2003	No increase in catches	14	14			
2004	No increase in catches	14				

¹Weights in '000 t.

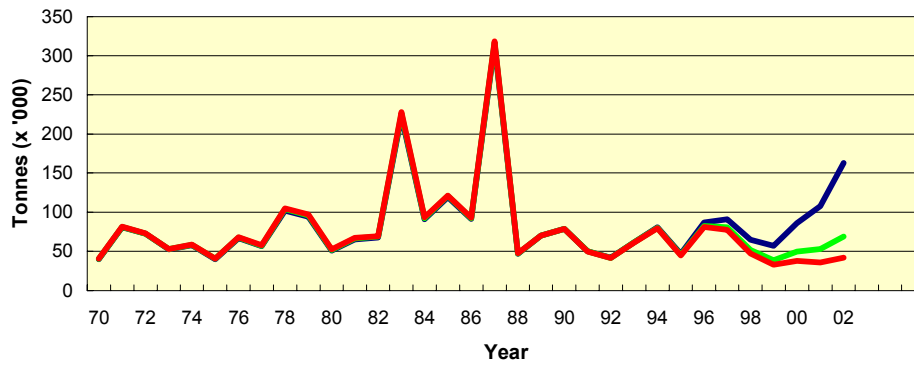
Herring VIaS & VIIb,c - Landings
Mean = 28.5



Herring VIaS & VIIb,c - Fishing Mortality (ages 3-6)



Herring VIaS & VIIb,c - Recruitment (Age 1)



Herring VIaS & VIIb,c - Spawning Stock Biomass

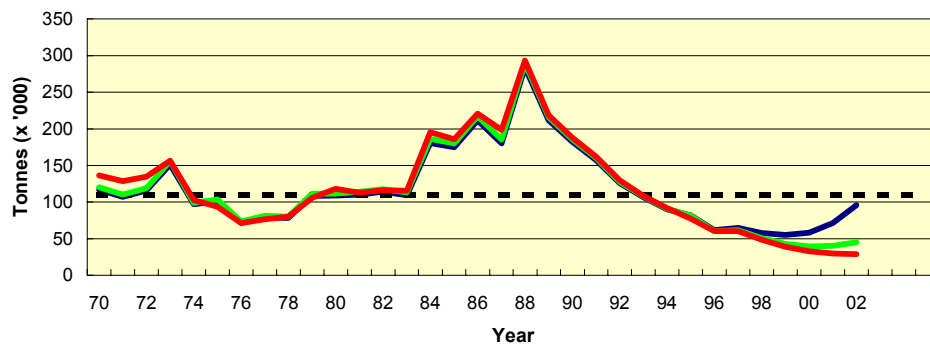


Table 3.10.3.1 VIa(S) & VIIb,c. Estimated Herring catches in tonnes, 1988–2002. These figures do not in all cases correspond to the official statistics and cannot be used for management purposes.

Country	1988	1989	1990	1991	1992	1993
France	-	-	+	-	-	-
Germany, Fed.Rep.	-	-	-	-	250	-
Ireland	15,000	18,200	25,000	22,500	26,000	27,600
Netherlands	300	2,900	2,533	600	900	2,500
UK (N.Ireland)	-	-	80	-	-	-
UK (England + Wales)	-	-	-	-	-	-
UK Scotland	-	+	-	+	-	200
Unallocated	13,800	7,100	13,826	11,200	4,600	6,250
Total landings	29,100	28,200	41,439	34,300	31,750	36,550
Discards	-	1,000	2,530	3,400	100	250
Total catch	29,100	29,200	43,969	37,700	31,850	36,800

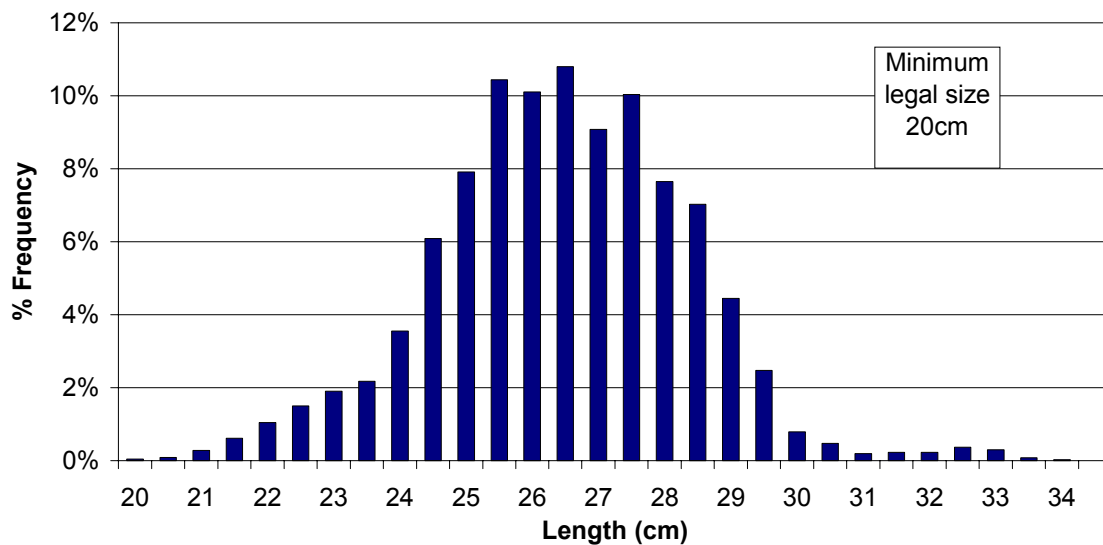
Country	1994	1995	1996	1997	1998	1999
France	-	-	-	-	-	-
Germany, Fed.Rep.	-	11	-	-	-	-
Ireland	24,400	25,450	23,800	24,400	25,200	16,325
Netherlands	2,500	1,207	1,800	3,400	2,500	1,868
UK (N.Ireland)	-	-	-	-	-	-
UK (England + Wales)	50	24	-	-	-	-
UK (Scotland)	-	-	-	-	-	-
Unallocated	6,250	1,100	6,900	-700	11,200	7,916
Total landings	33,200	27,792	32,500	27,100	38,900	26,109
Discards	700	-	-	50	-	-
Total catch	33,900	27,792	32,500	27,150	38,900	26,109

Country	2000	2001	2002
France	-	-	515
Germany	-	-	-
Ireland	10,164	11,278	13,072
Netherlands	1,234	2,088	366
UK	-	-	-
Unallocated	3,607	695	366
Total landings	15,005	14,060	13586.9
Discards	-	-	-
Total catch	15,005	14,060	13586.9

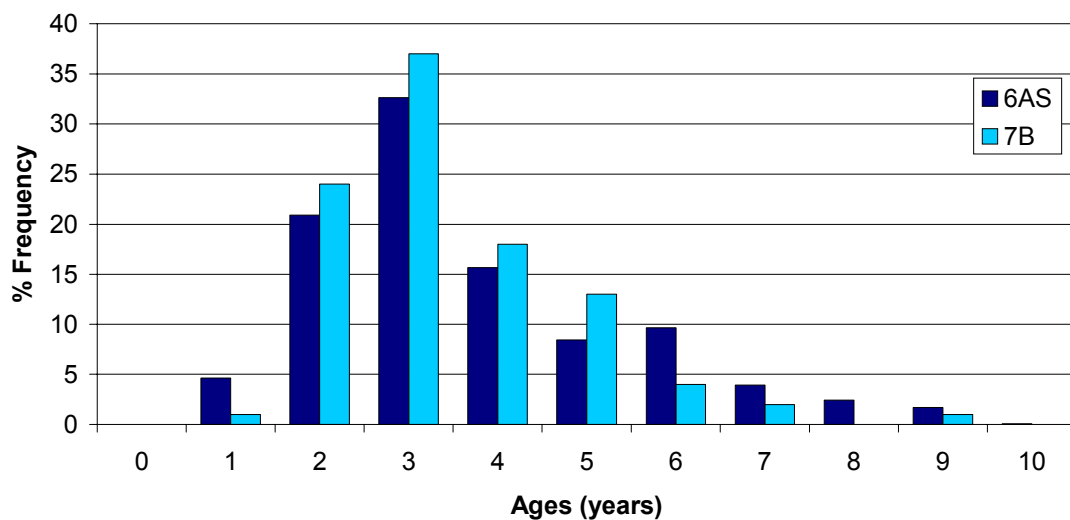
Table 3.10.3.2 Herring in Divisions VIa (South) and VIIb,c

Year	Recruitment Age 1 thousands	SSB tonnes	Landings tonnes	Mean F Ages 3-6,
1970	404220	122111	20306	0.1843
1971	815433	111646	15044	0.1644
1972	731904	120672	23474	0.2058
1973	531097	158692	36719	0.2891
1974	587402	100271	36589	0.4533
1975	406755	104973	38764	0.4396
1976	682108	74733	32767	0.5032
1977	576506	82435	20567	0.3218
1978	1048542	81449	19715	0.2654
1979	969944	112817	22608	0.2741
1980	524410	113549	30124	0.3958
1981	672025	115972	24922	0.3177
1982	695118	119713	19209	0.2280
1983	2280065	115843	32988	0.3672
1984	932298	189375	27450	0.2090
1985	1214000	182914	23343	0.1756
1986	930759	220699	28785	0.1813
1987	3182784	188444	48600	0.3524
1988	474482	293464	29100	0.2787
1989	704331	218832	29210	0.1873
1990	786743	188292	43969	0.2669
1991	498421	161753	37700	0.2515
1992	413379	129118	31856	0.2829
1993	612421	108970	36763	0.3679
1994	796460	91586	33908	0.3778
1995	449691	81305	27792	0.4940
1996	809540	60035	32534	0.5954
1997	773755	60426	27225	0.5520
1998	473884	48427	38895	1.1012
1999	327498	38738	26109	0.8021
2000	376793	32810	15005	0.4547
2001	357721	29954	14061	0.6594
2002	416976	28798	13587	0.5708
2003	689732	35162		
Average	769035	115411	28475	0.3848

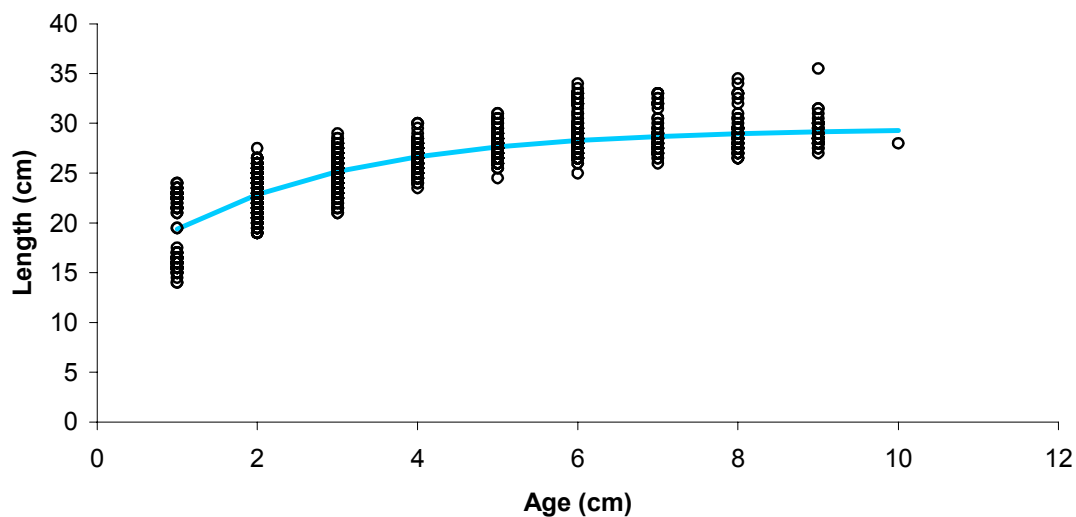
2002 Length Distribution: Irish Sampling, HER in 6AS



2002 Age Distribution: Irish Sampling, HER in 6AS 7B



2002 Size at Age: Irish Sampling, HER in 6AS 7B



Irish Sea Herring

(Division VIIa North)

For latest information, see: <http://www.ices.dk>



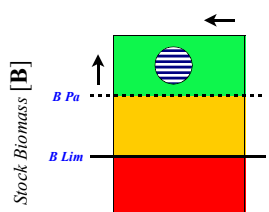
Fisheries Science Services

FSS – ADVICE

FSS agrees with the ICES and STECF advice that the catches in 2004 should not be allowed to increase above the advised 2003 catch (4,800 t). The likely Irish quota in 2003 would be 1,250 t.

STATE OF THE STOCK

State of the Stock in relation to the precautionary reference points (see page 18)

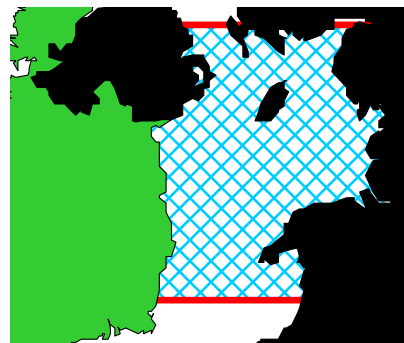


F_{pa} & F_{lim} not defined

- The state of this stock is uncertain.
- Landings have been at a low level in the last 20 years. The 2002 catch was about 2,400 t.
- Fishing mortality is uncertain but may have declined but it is not possible to estimate the values for recent years. The F_{pa} has not yet been defined.
- There are no reliable recruitment indices for this stock.
- The current value is uncertain but may be above B_{pa} (9,500 t.).
- No catch forecasts are available for the stock.

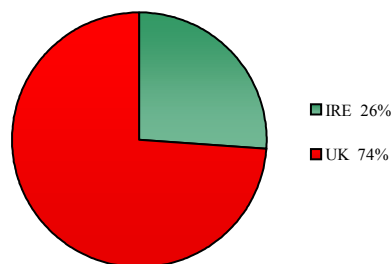
CURRENT MANAGEMENT

- The assessment area (Div.VIIa North) is the same as the TAC area.
- The TAC for this fishery is set by EU and was 4,800 t for 2003. The Irish share of the TAC is 1,250 t (26%).
- There is no overall management objective or management plan for this stock.
- There are a number of closed areas in operation to protect the spawning stock during part of the spawning season and to prevent exploitation of juveniles. The latter measure was introduced during the period



Red Box-TAC/Management Area Blue Shading- Assessment Area

of the industrial fishery in the Irish Sea (1969 – 1979).



FSS – ECONOMIC COMMENTS

- The potential value of the Irish quota in 2003 is about €150,000.
- Although Ireland has a potentially important quota in this fishery Irish vessels did not participate in the fishery for a number of years prior to 2001.

ADDITIONAL INFORMATION

1. The assessment carried out in 2003 is more stable but is not considered to be reliable enough to be used as the basis for management advice.
2. The total catch taken from this fishery in 2002 was estimated to be 2,393 t.
3. The quality of catch statistics is poor.
4. The main catches in recent years have been taken by a small number of Northern Irish trawlers.
5. Prior to 2001 Ireland did not participate in this fishery for a number of years – mainly because of a poor demand for the type of herring that would be landed. The Irish fleet is not permitted to fish on the spawning grounds on the Douglas Bank to the east of the Isle of Man and this has meant that it has not been able to exploit the shoals during the spawning season.
6. Irish sampling for this stock is supported through the

EU funded sampling programme which is required under Data Collection Regulation 1543/2000 and 1639/2001.

7. Tagging experiments carried out by FSS in 1990 have demonstrated that young herring in the Irish Sea recruit to the adult population in the Celtic Sea. Therefore the state of this stock has an effect on the well being of the important Celtic Sea fishery and all relevant conservation measures should be supported.
8. Productivity in this stock appears to have declined since the 1970s.

ICES ADVICE

3.8.7

State of stock/exploitation:

The state of the stock is uncertain with respect to safe biological limits, as estimates of SSB and fishing mortality for recent years are highly uncertain. However, the trend in SSB has been relatively stable or increasing since the late 1990s. The stock appears to be moderately exploited. There are no recruitment indices for this stock.

Management objectives:

There are no explicit management objectives for this stock. However, for any management objective to meet precautionary criteria, spawning stock biomass should be greater than the proposed B_{pa} .

Precautionary Approach reference points (established in year 2000):

ICES considers that:	ICES proposes that:
B_{lim} is 6 000t	B_{pa} = 9 500t
F_{lim} is not defined	F_{pa} is not defined

Technical basis:

B_{lim} : lowest observed SSB	B_{pa} : $B_{lim} * 1.58$;
F_{lim} : not defined	F_{pa} : not defined

Advice on management:

ICES advises that the catch in 2004 should not be allowed to increase above the advised 2003 catch (4 800 t).

Relevant factors to be considered in management:

Areas closed to herring fishing around the east coast of Ireland and west coast of Britain were put in place to protect juveniles when an industrial fishery operated. A closed area exists to the east of the Isle of Man to protect the spawning aggregations.

Catches in the 1990s were near the current TAC, and over that period the stock did not show significant growth. Therefore there does not seem to be scope for increased exploitation of this stock.

Catch forecast for 2004 –

Not available.

Medium- and long-term projections:

Not available.

Comparison with previous assessment and advice:

The update of the assessment gave a similar perception of trends in SSB and F as assessments in the last two years (2001 and 2002).

Elaboration and special comment:

The inclusion of data prior to 1972 indicates that the stock was at similar levels to the present state prior to the high recruitment and large stock size in the early 1970s (the beginning of the time series previously). Fishing mortality was high during the 1970s due to a transfer of effort from other closed herring fisheries and the operation of an industrial fleet. Since 1981 the size of the exploiting fleets in this area has declined and the industrial fishery has closed.

Over the years the survey indices have been revised, but the assessments were thought to be dominated by unreliable catch data, with additional survey data series providing more information on recruitment and the age structure of the stock. Recent analyses of the catch data suggest that these data are no more uncertain than catches from other adjacent herring stocks, but the catch and survey data are

still too noisy to provide reliable estimates of SSB and F.

Many aspects of the biological and fisheries data changed rapidly in the mid-1980s, affecting assessment results. These changes require further investigations and depending on the causes of the changes, reference points may be affected. If the changes are a result of stock components being exploited differently by the fishery, any similar changes in the future could cause serious problems for producing reliable assessments. The productivity of this stock seemed to be much higher in the 1960s and early 1970s, although it is uncertain if the differences were biologically based. These observations of SSB and recruits affect the estimates of reference points strongly, and the causes of the apparent differences in productivities over time need to be understood before more appropriate reference points can be determined for this stock.

Source of information:

Report of the Herring Assessment Working Group for the Area South of 62°N, March 2003 (ICES CM 2003/ACFM:17).

Yield and spawning biomass per Recruit F-reference points:

	Fish Mort Ages 2-6	Yield/R	SSB/R
Average last 3 years	0.211	0.031	0.121
F_{\max}	N/A		
$F_{0.1}$	0.155	0.029	0.157
F_{med}	0.413	0.035	0.062

Catch data (Tables 3.8.7.1-2):

Year	ICES Advice	Predicted catch corresp. to advice	Agreed TAC	ACFM Catch
1987	TAC	4.3	4.5	5.8
1988	TAC (Revised advice in 1988)	10.5 (5.6)	10.5	10.2
1989	TAC	5.5	6.0	5.0
1990	Precautionary TAC	5.7	7.0	6.3
1991	TAC	5.6	6.0	4.4
1992	TAC	6.6	7.0	5.3
1993	TAC	4.9-7.4	7.0	4.4
1994	Precautionary TAC	5.3	7.0	4.8
1995	Precautionary TAC	5.1	7.0	5.1
1996	If required, precautionary TAC	5.0	7.0	5.3
1997	No advice given	-	9.0	6.6
1998	<i>Status quo</i> F	6.5	9.0	4.9
1999	F=Proposed $F_{\text{pa}}=0.36$	4.9	6.6	4.1
2000	F=90% F(98)=0.31	3.9	5.4	2
2001	<i>Status quo</i> F= 0.26	5.1	6.9	5.5
2002	Average catch of 1996-2000	4.8	4.8	2.4
2003	2002 TAC	4.8	4.8	
2004	Advice 2003 catch	4.8		

Weights in '000 t.

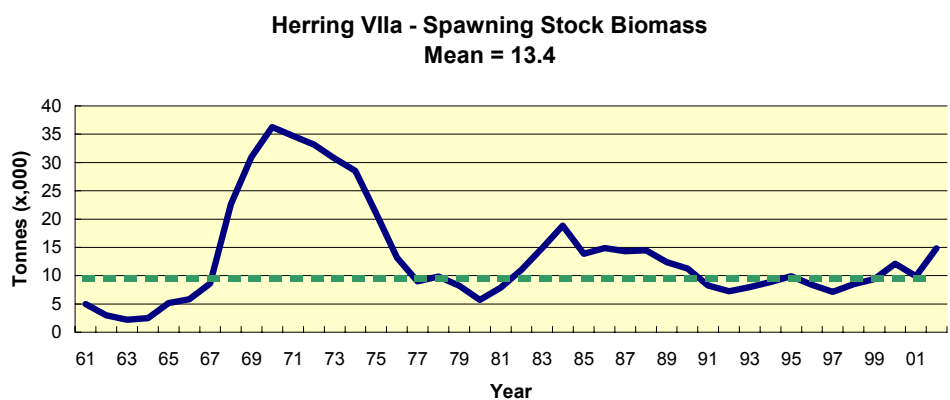
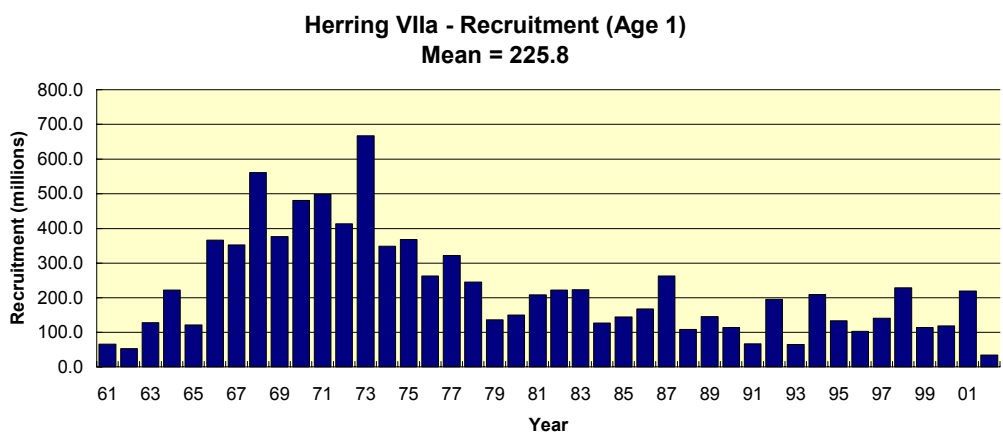
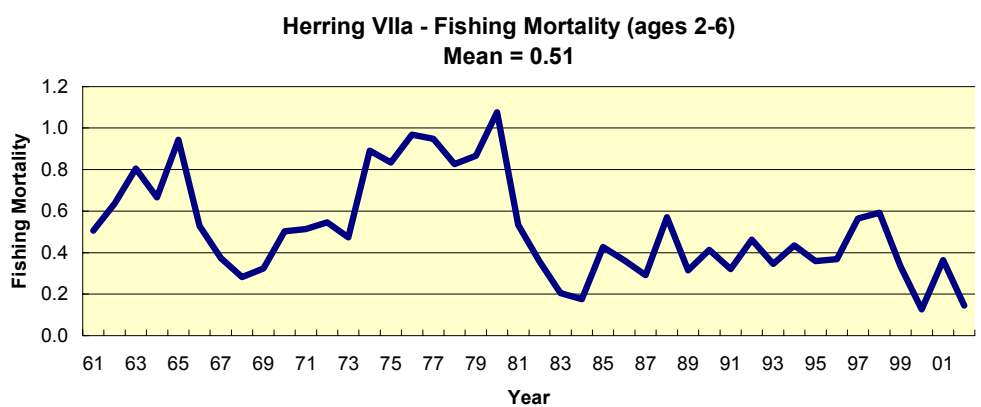
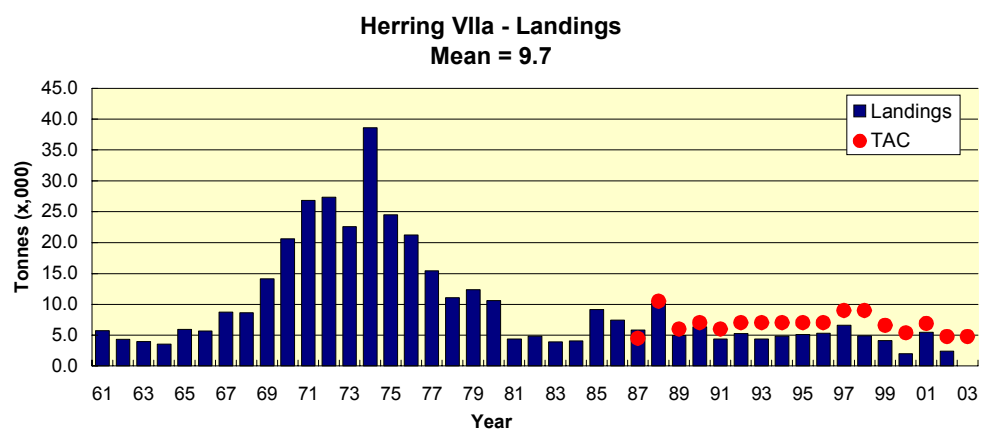


Table 3.8.7.1 Irish Sea herring Division VIIa(N). Official catch in tonnes by country, 1985-2002. The total catch does not in all cases correspond to the official statistics and cannot be used for management purposes.

Country	1985	1986	1987	1988	1989	1990	1991	1992	1993
Ireland	1,000	1,640	1,200	2,579	1,430	1,699	80	406	0
UK	4,077	4,376	3,290	7,593	3,532	4,613	4,318	4,864	4,408
Unallocated	4,110	1,424	1,333	-	-	-	-	-	-
Total	9,187	7,440	5,823	10,172	4,962	6,312	4,398	5,270	4,408

Country	1994	1995	1996	1997	1998	1999	2000	2001	2002
Ireland	0	0	100	0	0	0	0	862	286
UK	4,828	5,076	5,180	6,651	4,905	4,127	2002	4599	2107
Unallocated	-	-	22	-	-	-	-	-	-
Total	4,828	5,076	5,302	6,651	4,905	4,127	2,002	5,461	2,393

Table 3.8.7.2 Irish Sea herring (Division VIIa)

Year	Recruitment Age 1 thousands	SSB tonnes	Landings tonnes	Mean F Ages 2-6
1961	65770	5005	5710	0.5065
1962	52910	2988	4343	0.6370
1963	127500	2227	3947	0.8043
1964	222200	2499	3593	0.6658
1965	121400	5120	5923	0.9445
1966	365700	5847	5666	0.5289
1967	351800	8600	8721	0.3732
1968	560600	22630	8660	0.2823
1969	375600	30960	14140	0.3237
1970	481000	36290	20620	0.5018
1971	498000	34670	26810	0.5136
1972	413600	33170	27350	0.5462
1973	667200	30740	22600	0.4729
1974	348800	28540	38640	0.8910
1975	368200	21020	24500	0.8341
1976	262400	13230	21250	0.9685
1977	321900	8994	15410	0.9475
1978	245700	9827	11080	0.8265
1979	136100	8224	12340	0.8671
1980	149300	5750	10610	1.0770
1981	208100	7854	4377	0.5331
1982	221300	11060	4855	0.3590
1983	223200	14880	3933	0.2044
1984	126600	18830	4066	0.1750
1985	144200	13870	9187	0.4278
1986	166900	14880	7440	0.3624
1987	263400	14320	5823	0.2913
1988	107800	14470	10170	0.5693
1989	145400	12360	4949	0.3151
1990	113400	11230	6312	0.4131
1991	66650	8267	4398	0.3203
1992	194600	7257	5270	0.4626
1993	65300	7924	4409	0.3452
1994	208300	8885	4828	0.4339
1995	133700	9922	5076	0.3599
1996	102400	8360	5301	0.3692
1997	140500	7104	6651	0.5646
1998	228800	8458	4905	0.5912
1999	113800	9417	4127	0.3336
2000	118900	12070	2002	0.1258
2001	219500	9897	5461	0.3632
2002	34420	14810	2393	0.1450
2003	139400	14560		0.2679
Average	223773	13419	9711	0.5080

Celtic Sea Herring

(Divisions VIIaS, VIIg-k)

For latest information, see: <http://www.ices.dk>



Fisheries Science Services

FSS – ADVICE

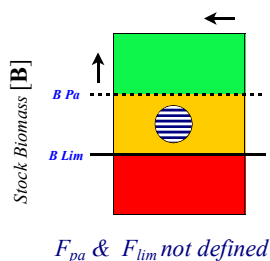
FSS agrees with ICES and STECF that catches in 2004 should not exceed 60% of the average catches in 1997-2000, corresponding to catches less than 11,000 t. This is expected to allow SSB to increase. This advice has been the same for the past three years. MI endorses all the current conservation measures aimed at protecting first time spawners in this stock.

STECF commented on the need for clarification of the basis of the ICES catch advice for 2004 (60% of average catches 1997-2000). In response, FSS notes that 40% was the percentage reduction which, in the opinion of ICES in 2002, was considered to represent a significant reduction in recent catches in the period 1997 - 2001 (ACFM advised for a significant reduction in catches in 2002). The ICES and FSS advice in 2003 is based on no increase in catches, as SSB is uncertain and may still be below B_{pa} .

FSS advises that actions, which perturb herring spawning beds or increase turbidity after spawning are likely to have a negative affect on recruitment to the stock.

STATE OF THE STOCK

State of the Stock in relation to the precautionary reference points (see page 18)



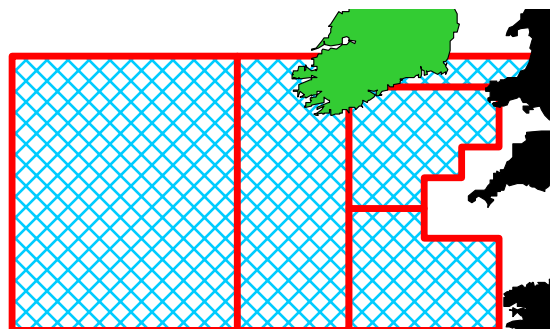
- The state of this stock is uncertain. Estimates of SSB and fishing mortality are uncertain in most recent 2-3 years.
- Landings from the stock had been very stable from the mid 1980s to 2000 and had been around 18,000 t - 20,000 t each year. In 2001 landings declined to 17,800 t and in 2002 fell further to 10,500 t the low-

est since 1978 (official catches)

- Fishing mortality appears to have declined sharply since 2000. F_{pa} is not defined.
- Recruitment has been very variable over the time series. In the mid - to late 1990s, the catch data suggested a weak year class in 1998, and there have been no very strong year classes since 1995.
- The spawning stock biomass increased to about 67,000 t in 1995, and declined again in the late 1990s and the current SSB is unknown. However SSB may have been below B_{pa} in the recent past, (B_{pa} = 44,000 t).
- Because of the uncertainty in the present stock size, the short term predictions were not used for management advice.

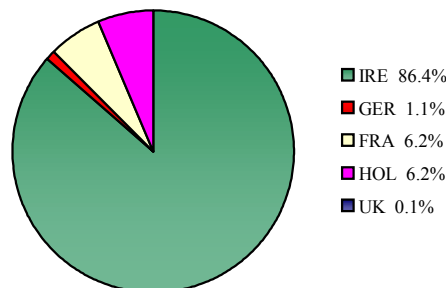
CURRENT MANAGEMENT

- The TAC area and the assessment area cover all of ICES Divisions VIIg, h j, and k and Div. VIIaS.



Red Boxes-TAC/Management Areas Blue Shading- Assessment Area

- The TAC is set on an annual basis but the assessments have always been carried out on a seasonal basis (1 April – 31 March).
- The TAC in 2003 is 13,000 t, with an Irish quota of 11,235 t



- There is no internationally agreed management plan for this fishery. However in 2001 the Irish South and West Pelagic Management Committee was set up to;

“maintain the stock at a level whereby it can sustain annual catches of around 20,000 t. In the event of the stock falling below the level at which these catches can be sustained, the Committee will take appropriate rebuilding measures. The Committee will also introduce such measures as are necessary to prevent landings of small first time spawning herring, including closed areas, and/or appropriate time closures.”

- The Committee has a management plan and the objective of rebuilding the stock to a sustainable level in accordance with scientific advice. The committee has involved fishermen and processors in the collection of data for assessment purposes. One of the committee's objectives is the protection of first time spawning fish, to be enforced by area closures.
- The Irish quota is controlled by a number of measures that include licences, closed seasons, closed areas, and boat and weekly quotas.

FSS – ECONOMIC COMMENTS

- The total catch taken by Ireland from the fishery in 2002 was about 10,550 t.
- The value of the Irish catch taken in 2002 was about €2.2 million which is about the value of the quota.
- The fishery continues to be of importance to the south and west coast ports. The prices for herring have decreased and the immediate market prospects for the fishery may be poor given the increased availability of North Sea fish. The fishery also supports a number of processing factories throughout the country. The proportion of the catch that is now consigned to the Japanese “roe” market has declined.

ADDITIONAL INFORMATION

1. Uncertainty in the assessment is compounded by the lack of an available recruitment index, making short-term forecasts very uncertain for this stock.
2. The total landing taken from this fishery in 2002 was 10,500 t, corresponding to the Irish catch.
3. The main catches are taken by Irish pair trawlers. Most of the catch is taken from inshore waters in Divs, VIIj,g and VIIa South.
4. There are some misreporting problems for this fishery. Some small catches that are taken by continental fleets in adjoining areas (Div.VIIe) and in the North Sea have been reported as having been taken in the Celtic Sea.
5. Historically large catches have been taken from this fishery by the Dutch fleet but in recent years only negligible catches are reported. These catches appear to be mainly as a by catch in horse mackerel fishery.
6. The Irish fleet exploiting this stock had decreased in recent years and in the 2002/2003 season a maximum of 10 vessels participated in the fishery. Most of these come from the south-west coast ports and the main landings are made at Cobh, Castletownbere and Din-

gle. In the 2003 4,500 t have been taken between July and October.

7. Irish sampling for this stock is supported through the EU funded sampling programme which is required under the Data Collection Regulation 1543/2000 and 1639/2001. The length distributions of the Irish landings during 2001/2002 were dominated by fish between 23 cm and 27 cm. The Management Committee organised a comprehensive system whereby catches in 2001/2002 were measured by processors working with the Marine Institute and fishery officers throughout the season. It was decided that fishing would not be allowed in areas that contained significant numbers (>50%) of herring under 23 cm. Prior to 2000/2001, there was a greater proportion of older fish. However, the age distribution in 2001 and 2002 has been dominated by very young herring with over 80% of the total catch composed of 1, 2 and 3 ring fish.
8. An acoustic survey on the stock was carried out in 2002, using a commercial vessel. The biomass estimate was lower than that derived from the previous survey. Less than 12% of the biomass estimate was composed of 1-ringers. It should be noted that these data are not used in the assessment as an estimate of biomass, but as a relative index of numbers at age.
9. There is no information on discarding in this fishery.
10. Selected spawning grounds are closed each year in this fishery on a rotational basis. These closures, see map in appendix III, are designed to provide some protection for the spawning shoals and should be maintained.
11. This stock collapsed in the mid 1970s because recruitment declined sharply over a short period. This period also coincided with a period of high effort in the fishery. The fishery was as a result closed for approximately five years.

ICES ADVICE 3.9.9

State of the stock/exploitation:

The state of the stock is uncertain with respect to safe biological limits, as estimates of SSB and fishing mortality are uncertain in the most recent 2-3 years. Fishing mortality appears to have declined sharply since 2000. Information from the catch and surveys suggests some years of poor recruitment in the mid- to late- 1990s. SSB may have been below B_{pa} in the recent past, and the proportion of older fish in the catch increased in 2002.

Management objectives:

A local Irish management committee has been established for this stock. One of its objectives is the protection of first time spawning fish, which is enforced by an area closure (by Irish statute).

Precautionary Approach reference points (unchanged since 1999):

ICES considers that:	ICES proposes that:
B_{lim} is 26 000 t	B_{pa} be set at 44 000 t
F_{lim} : not defined	F_{pa} : not defined

Technical basis:

B_{lim} : The lowest stock observed	B_{pa} : Low probability of low recruitment
F_{lim} : not defined	F_{pa} : not defined

Advice of management:

ICES recommends that catches in 2004 should not exceed 60% of the average catches in 1997-2000, corresponding to catches less than 11,000, which is expected to allow SSB to increase.

Relevant factors to be considered in management:

50% of the recruits are mature and make a significant contribution the SSB.

Management measures in addition to the TAC implemented in the Irish fishery in 2002 appear to be reducing fishing mortality and changing the age profile of the catches. These measures seem to have arrested a declining trend in SSB, but it is too soon to know that they are adequate to allow SSB to increase. They should be kept in place until there is reason to be confident SSB is increasing and has reached a size where strong year-classes have been produced more frequently.

The current management regime has resulted in catch data which are reliable.

Comparison with previous assessment and advice:

In 2002 the status of this stock was also considered to be unknown. Estimates of SSB and F appear to be less uncertain than in last year's assessment, and are indicative of the stock trend. Fishery independent information, particularly on recruitment, and several years of consistent catch data will be necessary for a reliable analytical assessment of this stock.

Elaboration and special comment:

The recent information on stock status and the fishery suggests that fishing mortality has decreased significantly in the past year, but it has not been possible to estimate F consistently over the last several years. This may be due in part to strong year effects in the only available tuning index.

Changes in the distribution of fishing activities in space and time over the past few years, in part in response to the new management measures, also make the commercial catch data an uncertain basis for assessment. The catches in the 2002/2003 season were the lowest ever recorded.

The reduction in SSB from the mid nineties to 2001 appears to have been due to poor recruitment in 1993, 1996 and 1998, and unsustainable fishing mortality resulting from catches remaining around 20,000t. Because of the general age profile of the catches, such poor recruitments can cause an acute rise in F in the following years. Recruitment since 1999 appears to have been about average. This is reflected in an increased abundance of 3, 4 and 5 ringer fish in the catches.

SSB estimates are strongly influenced by recruitment of 1 ringers, so that without a recruitment index it is not possible to estimate the current SSB precisely. This underlines the need for an index of recruitment, if a reliable assessment is to be developed. If the fishery continues to alter its fishing activities in response to any new management measures that are introduced, the commercial catch-at-age data will also remain uncertain with regard to assessing stock status.

Source of information:

Report of the Herring Assessment Working Group for the Area South of 62°N, March 2003 (ICES CM 2003/ACFM:17).

Yield and spawning biomass per Recruit F-reference points:

	Fish Mort Ages 2-7	Yield/R	SSB/R
Average last 3 years	0.626	0.036	0.102
F_{max}	N/A		
$F_{0.1}$	0.174	0.030	0.217
F_{med}	0.275	0.033	0.165

Catch data (Tables 3.9.9.1–3):

Year	ICES Advice	Predicted catch corresp. to advice	Agreed TAC	Official Landings	Discards	ACFM Catch ¹
1987	Precautionary TAC	18	18	18	4.2	27.3
1988	TAC	13	18	17	2.4	19.2
1989	TAC	20	20	18	3.5	22.7
1990	TAC	15	17.5	17	2.5	20.2
1991	TAC (TAC excluding discards)	15 (12.5)	21	21	1.9	23.6
1992	TAC	27	21	19	2.1	23.0
1993	Precautionary TAC (including discards)	20–24	21	20	1.9	21.1
1994	Precautionary TAC (including discards)	20–24	21	19	1.7	19.1
1995	No specific advice	-	21	18	0.7	19.0
1996	TAC	9.8	16.5 – 21 ²	21	3.0	21.8
1997	If required, precautionary TAC	< 25	22	20.7	0.7	18.8
1998	Catches below 25	< 25	22	20.5	0.0	20.3
1999	F = 0.4	19	21	19.4	0.0	18.1
2000	F < 0.3	20	21	18.8	0.0	18.3
2001	F < 0.34	17.9	20	17.8	0.0	17.7
2002	Precautionary TAC for 1 st half of 2002 ³	6.0	11	11.3	0.0	10.5
2003	Substantially less than recent catches	-	13			
2004	60% of average catch 1997-2000	11				

¹By calendar year. ²Revised during 1996 after ACFM May meeting. Weights in '000 t. ³ICES advised 11,000t (in year TAC) before ACFM gave advice in 2002

Table 3.9.9.1 Celtic Sea and Division VIIj herring landings by calendar year (t), 1988–2002. (Data provided by Working Group members.) These figures may not in all cases correspond to the official statistics and cannot be used for management purposes.

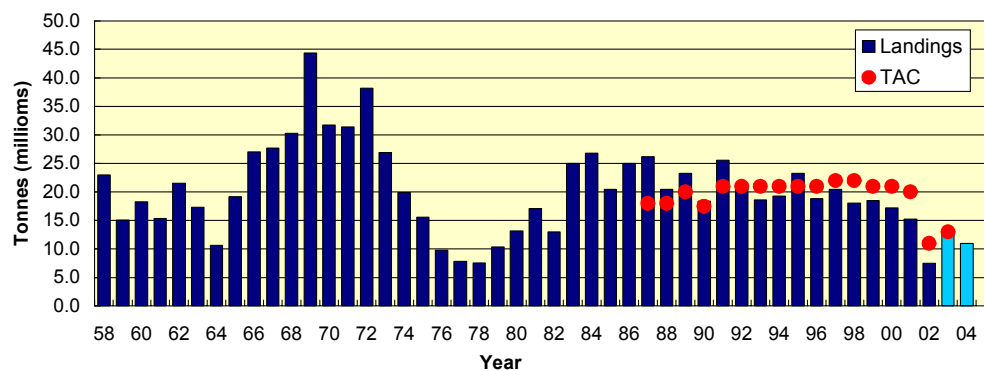
Year	France	Germany	Ireland	Netherlands	U.K.	Unallocated	Discards	Total
1988	-	-	16,800	-	-	-	2,400	19,200
1989	+	-	16,000	1,900	-	1,300	3,500	22,700
1990	+	-	15,800	1,000	200	700	2,500	20,200
1991	+	100	19,400	1,600	-	600	1,900	23,600
1992	500	-	18,000	100	+	2,300	2,100	23,000
1993	-	-	19,000	1,300	+	-1,100	1,900	21,100
1994	+	200	17,400	1,300	+	-1,500	1,700	19,100
1995	200	200	18,000	100	+	-200	700	19,000
1996	1,000	0	18,600	1,000	-	-1,800	3,000	21,800
1997	1,300	0	18,000	1,400	-	-2,600	700	18,800
1998	+	-	19,300	1,200	-	-200	-	20,300
1999		200	17,900	1300	+	-1300	-	18,100
2000	573	228	18,038	44	1	-617	-	18,267
2001	1,359	219	17,729	-	-	-1578	-	17,729
2002							-	
	734	-	10,550	257	-	-991		10,550

Table 3.9.9.2 Celtic Sea & Division VIIj herring landings (t) by season (1 April–31 March) 1988/1989-2002/2003. (Data provided by Working Group members.) These figures may not in all cases correspond to the official statistics and cannot be used for management purposes.

Year	France	Germany	Ireland	Netherlands	U.K.	Unallocated	Discards	Total
1988/1989	-	-	17,000	-	-	-	3,400	20,400
1989/1990	+	-	15,000	1,900	-	2,600	3,600	23,100
1990/1991	+	-	15,000	1,000	200	700	1,700	18,600
1991/1992	500	100	21,400	1,600	-	-100	2,100	25,600
1992/1993	-	-	18,000	1,300	-	-100	2,000	21,200
1993/1994	-	-	16,600	1,300	+	-1,100	1,800	18,600
1994/1995	+	200	17,400	1,300	+	-1,500	1,900	19,300
1995/1996	200	200	20,000	100	+	-200	3,000	23,300
1996/1997	1,000	-	17,900	1,000	-	-1,800	750	18,800
1997/1998	1,300	-	19,900	1,400	-	-2100	-	20,500
1998/1999	+	-	17,700	1,200	-	-700	-	18,200
1999/2000		200	18,300	1300	+	-1300	-	18,500
2000/2001	573	228	16,962	44	1	-617	-	17,191
2001/2002	-	-	15,236	-	-	-	-	15,236
2002/2003	734	-	7,465	257	-	-991	-	7,465

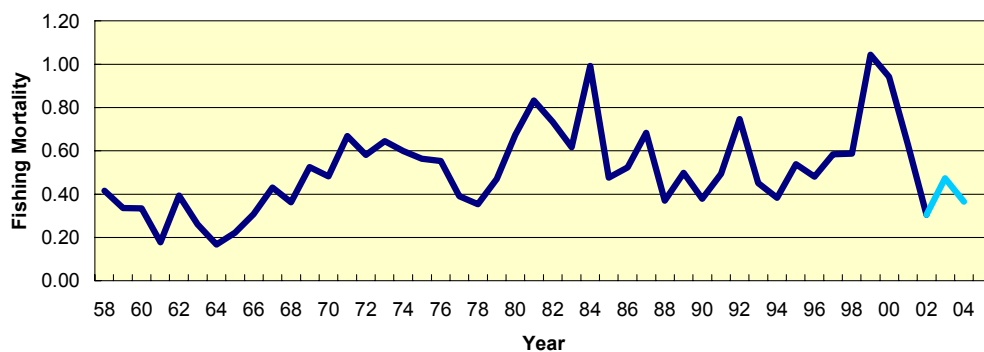
Herring Celtic Sea & VIIj - Landings

Mean = 20.5



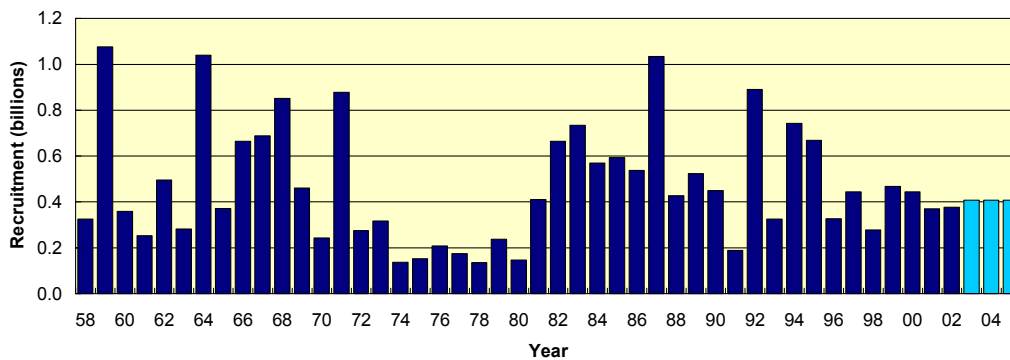
Herring Celtic Sea & VIIj - Fishing Mortality (ages 2-7)

Mean = 0.52



Herring Celtic Sea & VIIj - Recruitment (Age 1)

Mean = 0.5



Herring Celtic Sea & VIIj - Spawning Stock Biomass

Mean = 65.9

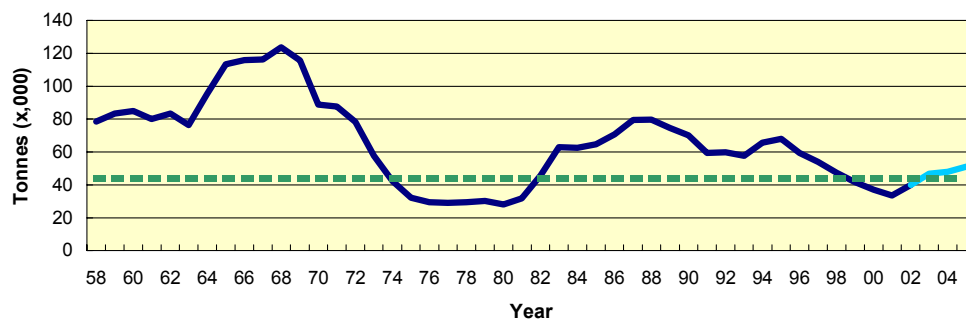
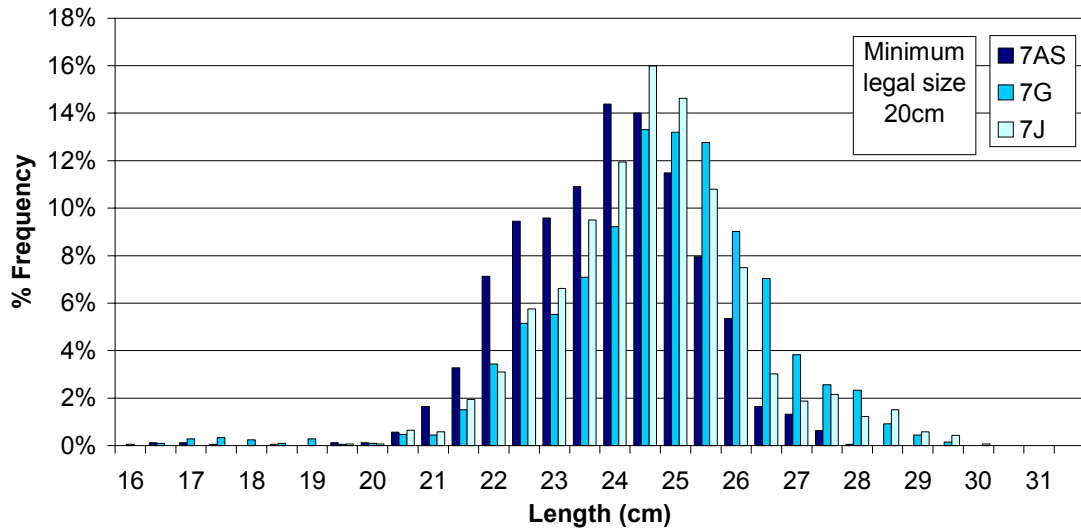


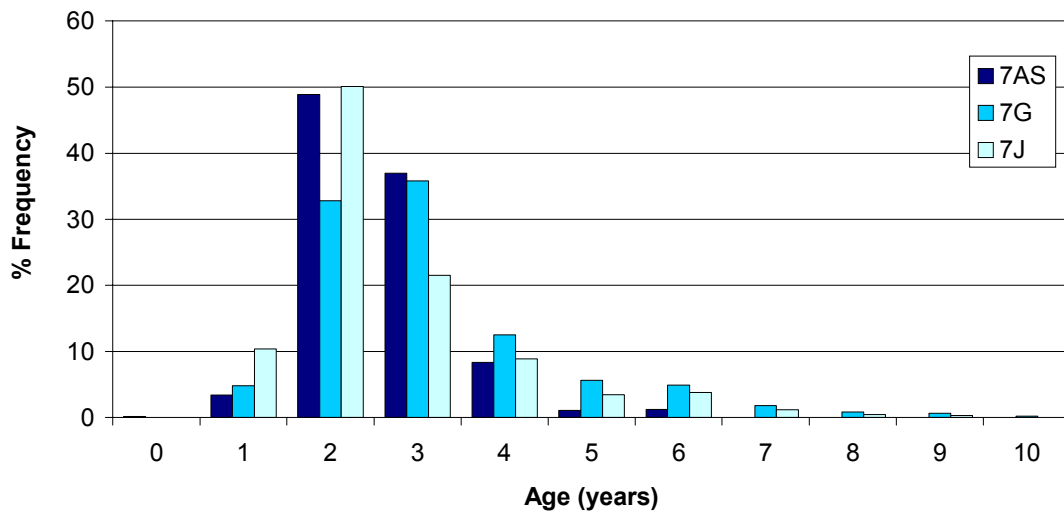
Table 3.9.9.3 Celtic Sea and Division VIIj herring

Year	Recruitment Age 1 thousands	SSB tonnes	Landings tonnes	Mean F Ages 2-7
1958	325200	78500	22980	0.4153
1959	1075000	83410	15090	0.3360
1960	358400	84970	18280	0.3335
1961	252600	79990	15370	0.1786
1962	495700	83300	21550	0.3938
1963	281600	76330	17350	0.2609
1964	1039000	95580	10600	0.1680
1965	371400	113500	19130	0.2220
1966	663700	116000	27030	0.3073
1967	687400	116300	27660	0.4304
1968	851100	123700	30240	0.3636
1969	460600	115700	44390	0.5265
1970	242900	88830	31730	0.4818
1971	876700	87710	31400	0.6689
1972	274900	78270	38200	0.5817
1973	317800	57760	26940	0.6452
1974	137900	42300	19940	0.5987
1975	153000	32190	15590	0.5640
1976	208100	29520	9771	0.5525
1977	174100	29200	7833	0.3917
1978	135800	29480	7559	0.3531
1979	237400	30200	10320	0.4701
1980	146200	27990	13130	0.6741
1981	410300	31790	17100	0.8317
1982	663400	45730	13000	0.7338
1983	734000	62920	24980	0.6175
1984	569400	62500	26780	0.9929
1985	592000	64600	20430	0.4763
1986	537500	70680	25020	0.5234
1987	1034000	79590	26200	0.6839
1988	427100	79650	20450	0.3707
1989	524100	74600	23250	0.4979
1990	449700	70240	18400	0.3785
1991	187400	59420	25560	0.4949
1992	890800	59830	21130	0.7470
1993	325300	57830	18620	0.4507
1994	741500	65670	19300	0.3834
1995	667900	67960	23310	0.5384
1996	327200	59290	18820	0.4805
1997	443100	53980	20500	0.5848
1998	277500	47340	18040	0.5875
1999	467200	41800	18490	1.0430
2000	443600	36950	17190	0.9426
2001	370200	33560	15270	0.6297
2002	377500	38660	7465	0.3044
2003	407500	46870		
Average	470320	65482	20475	0.5112

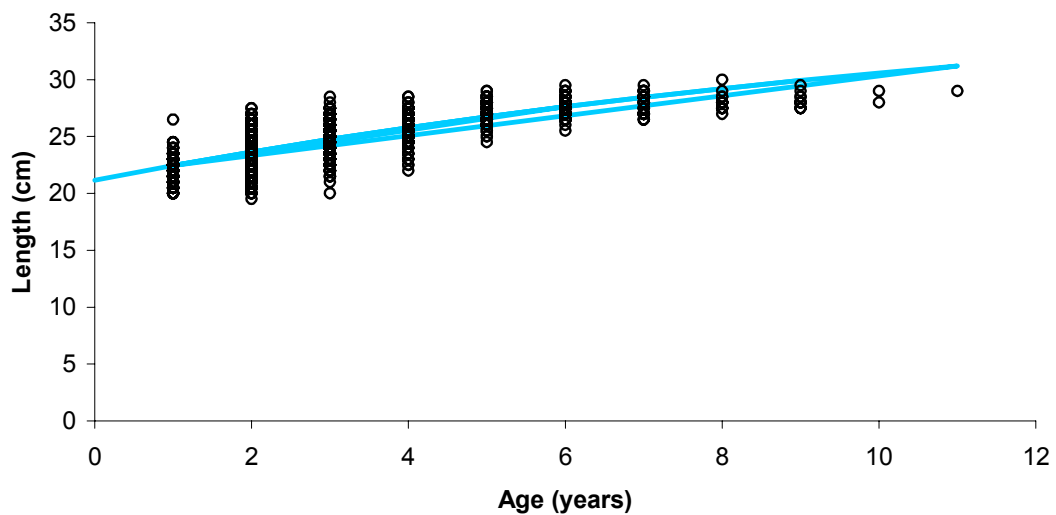
2002 Length Distribution: Irish Sampling, Herring in 7AS 7G 7J



2002 Age Distribution: Irish Sampling, Herring in 7AS 7G 7J



2002 Size at Age: Irish Sampling, Herring in 7AS 7G 7J



Norwegian Spring Spawning Herring

Sub-areas I and II

For latest information, see: <http://www.ices.dk>



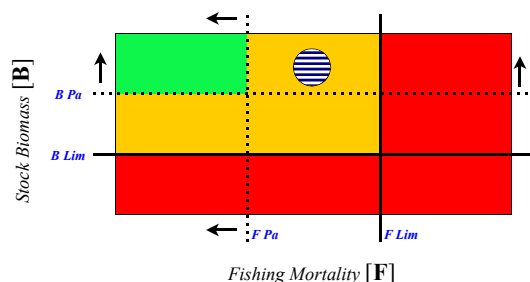
Fisheries Science Services

FSS – ADVICE

FSS agrees with the ICES and STECF advice that this stock be managed according to the agreed management plan with a fishing mortality of no more than $F = 0.125$, corresponding to landings in 2004 of less than 825,000 t. This would translate to an Irish quota of 6,460 t in 2004.

STATE OF THE STOCK

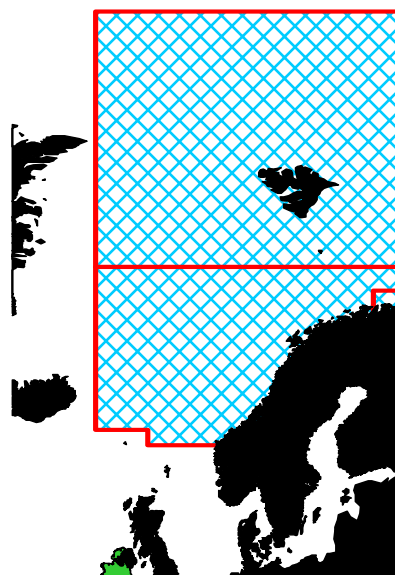
State of the Stock in relation to the precautionary reference points (see page 18)



- This stock is within safe biological limits.
- The fishery was closed for a long time in the 1960s and 1970s and only very small catches were permitted in the 1980s. The estimated landings for 2002 were about 806,000 t and in 2001 were 770,000 t. Catches of over 1 million tonnes have been taken from the stock from 1996 – 2000.
- Fishing mortality in 2002 is around $F_{pa} = 0.15$, and has declined from 0.23 since 2000. This decline was a result of the very big decrease in the total catch taken in 2001.
- Recruitment of the 1998 and 1999 year classes appear to be relatively strong. Recruitment over the last decade has been strong in comparison with the 1970s and 1980s.
- In 2002 the SSB was estimated to be about 5 million tonnes compared with around 8 million tonnes in 1997. The SSB increased dramatically from 1987 to 1997 and has fluctuated around 5 million tonnes since 2000.

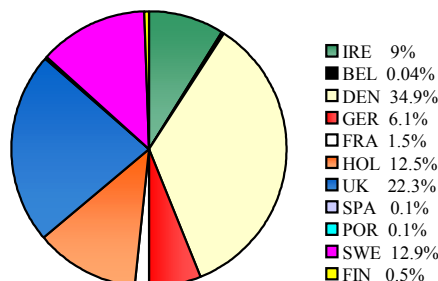
CURRENT MANAGEMENT

- The TAC area (Sub-areas I and II) corresponds with the assessment area.



Red Boxes-TAC/Management Areas Blue Shading- Assessment Area

- In 2003, there was no agreement on an overall final TAC and its allocation, at the Fisheries Consultation on the management of this stock. However the sum of allocated autonomous quotas amounted to 711,500 t for 2003.



- There are restrictions on the amounts of the Irish catch that can be taken in different fishing zones.
- A long term management plan has been agreed for this fishery since 1999 between the EU, Faroe Is., Iceland, Norway and Russia. The plan aims at preventing SSB falling below 2.5 million tonnes, and setting TACs consistent with producing a fishing mortality less than 0.125. Provisions are also made to adjust this F, should the SSB fall below 5 million tonnes.

FSS – ECONOMIC COMMENTS

- The Irish catch in 2002 of 1,699 t was landed into Norway.
- In 1996 Ireland participated in this fishery for the first time and landed nearly 20,000 t of herring, much of

which went for fish meal. Because of the remoteness of fishing grounds and the summer condition of the fish, landing this catch in good condition in Ireland has been problematical. However in 2001 and 2002 the RSW vessels fished in the first quarter and landed into Norway. This fishery is a valuable potential source of income for the Irish fleet, because of the restrictions on other pelagic fisheries and on blue whiting. However, at present this potential is not being fulfilled.

ADDITIONAL INFORMATION

1. The assessment is similar to last year, and the catch forecast for 2004 is more optimistic due to good recruitment in 1998 to 1999. The total landings taken from this fishery in 2002 increased to 806,000 t compared with 770,000 t in the previous year.
2. The Irish catch in 2002 was 1,699 t. compared with 6,070 t in 2001.
3. Misreporting is not thought to be a problem in this fishery.
4. The main catches are taken by Norway, Iceland and Russia. Substantial catches are also taken by Faroe Is. and Denmark. Since 1994, 11 nations have joined Norway and Russia in this fishery.
5. Ireland participated in this fishery for the first time in 1996 with landings of nearly 20,000 t. Landings declined in 1997 and 1998 and the total catch in 1998 and 1999 was only about 2,500 t. The landings in 2000 increased substantially to over 8,900 t, most of which was taken by one freezer trawler but decreased again in 2001 and 2002.
6. Irish sampling for this stock is supported through the EU funded sampling programme which is required under Data Collection Regulation 1543/2000 and 1639/2001. In 2004 the Marine Institute will provide a full set of Irish catch at age data to ICES for this stock. Only a small number of samples were obtained from this fishery.
7. In 2004 the Marine Institute will participate in an EU acoustic survey of this stock.
8. There is no information on discarding in this fishery.
9. This stock is characterised by extreme fluctuations in recruitment and collapsed in the 1970s and did not recover until the mid 1990s.

ICES ADVICE

3.1.7.a

State of stock/exploitation:

Based on the most recent estimate of SSB and fishing mortality ICES classifies the stock as being inside safe biological limits. The stock is harvested around $F_{pa} = 0.15$. The recruitment of the very strong 1992 year class led to an increase in SSB in 1997 to approximately 8 million t, but SSB has since declined to just over 5 million t in 2002. The incoming year classes 1998 and 1999 are estimated to be relatively strong.

Management objectives:

EU, Faroe Islands, Iceland, Norway, and Russia agreed to implement a long-term management plan. This plan consists of the following elements:

1. *Every effort shall be made to maintain a level of Spawning Stock Biomass (SSB) greater than the critical level (B_{lim}) of 2 500 000 t.*
2. *For the year 2001 and subsequent years, the Parties agreed to restrict their fishing on the basis of a TAC consistent with a fishing mortality rate of less than 0.125 for appropriate age groups as defined by ICES, unless future scientific advice requires modification of this fishing mortality rate.*
3. *Should the SSB fall below a reference point of 5 000 000 t (B_{pa}), the fishing mortality rate, referred to under paragraph 2, shall be adapted in the light of scientific estimates of the conditions to ensure a safe and rapid recovery of the SSB to a level in excess of 5 000 000 t. The basis for such an adaptation should be at least a linear reduction in the fishing mortality rate from 0.125 at B_{pa} (5 000 000 t) to 0.05 at B_{lim} (2 500 000 t).*
4. *The Parties shall, as appropriate, review and revise these management measures and strategies on the basis of any new advice provided by ICES.*

ICES considers that the objectives of this agreement are consistent with the precautionary approach.

Precautionary Approach reference points (established in 1998):

ICES considers that:	ICES proposes that:
B_{lim} is 2.5 million t	B_{pa} be set at 5.0 million t
F_{lim} is not considered relevant for this stock	F_{pa} be set at $F = 0.15$

Technical basis:

B_{lim} : MBAL	B_{pa} : $B_{pa} = B_{lim} * \exp(0.4 * 1.645)$ (ICES Study Group 1998)
F_{lim} : —	F_{pa} : ICES Study Group 1998

Catch forecast for 2004:

Basis: Landings (2003) = 710¹⁾; $F_w(2003)^2 = F_{sq} = 0.105$; SSB(2003)=5200; SSB (2004) = 6400.

F_w 2004	Basis	Catch (2004)	Landings (2004)	SSB (2005)
0.114	$1.09 * F_{sq}$	757	757	5724
0.125	$1.19 * F_{sq}$	825	825	5655
0.128	$1.22 * F_{sq}$	846	846	5634
0.143	$1.36 * F_{sq}$	933	933	5545
0.150	$1.43 * F_{sq}$	977	977	5501
0.157	$1.50 * F_{sq}$	1020	1020	5458
0.171	$1.63 * F_{sq}$	1105	1105	5372

Weights in '000 t.

Shaded options are considered inconsistent with the Precautionary Approach.

¹⁾ There was no agreement on the TAC in 2003, but the sum of autonomous allocations from most of the individual Parties amount to 711 500 tonnes.

²⁾ F_w = Fishing mortality weighted by population numbers.

Advice on management:

ICES advises that this fishery should be managed according to the agreed management plan with a fishing mortality of no more than $F=0.125$, corresponding to landings in 2004 of less than 825 000 t..

Comparison with previous assessment and advice:

Last year the spawning stock estimate for 2002 was 5.3 million t. This year's estimate of the spawning stock in 2002 is 5.1 million t. The catch forecasted for 2004 is higher than last year's catch forecast for 2003. This is due to recruitment of the year classes 1998 and 1999.

Relevant factors to be considered in management:

This stock has shown large dependency on the occasional very strong year class. In recent years the stock has tended to produce strong year classes more regularly. However, if the recruitment in the immediate future should get low again, the stock is expected to decline.

Elaboration and special comment:

The main catches from the fishery in 2002 were taken by Norway (487 000 t), Iceland (127 000 t), Russia (114 000 t), and Faroe Islands (32 000 t). Lesser catches were taken by a number of EU fleets (45 000 t). The fisheries in general follow the migration of the stock closely as it moves from the wintering and spawning grounds along the Norwegian coast to the summer feeding grounds in the Jan Mayen, Svalbard, and international areas. The Norwegian fishery exploits the stock as it migrates to and remains at the wintering areas and during the spawning period. The Icelandic fishery takes place mainly in May and June, and most catches are taken in international waters and in the Jan Mayen EEZ. The main Russian catches are taken along the shelf region of the Norwegian EEZ in spring as the stock moves from the spawning grounds, and also in August and

September in the eastern part of the international area and in the Norwegian zone. The Faroese catches, taken mainly in spring and early summer, are from the Norwegian zone and from the Jan Mayen area. Most of the EU catches are taken in the international area and in the Norwegian zone. In 2002 the non-Norwegian fleets fished more young herring than Norway. This was due to the emigration from the Barents Sea of the 1998 and 1999 year classes. These year classes did not appear to any great extent in the area where the main Norwegian fishery took place (fjord areas in northern Norway).

A large increase in fishing effort, new technology, and environmental changes contributed to the collapse of this stock around 1970. Recruitment failed when the SSB was reduced below 2.5 million t. In the years following the collapse the aim was to rebuild the spawning stock above this minimum limit. In order to reach this goal, fishing mortality was kept low. However, recruitment remained poor and SSB increased only slowly until a very strong year class occurred in 1983. As this year class recruited, management between 1985 and 1993 aimed at restricting the fishing mortality to 0.05, although the actual F was much higher in some years. Year classes after 1983 were on average more than four times stronger than those produced between 1970 and 1982, and SSB continued to increase. Starting in 1989 a succession of above-average to very strong year classes were produced, promoting full recovery of the SSB and allowing expansion of fisheries. Up to 1994, the fishery was almost entirely confined to Norwegian coastal waters. Since 1992 the coastal fishery has increased sharply. During the summer of 1994 there were also catches in the offshore areas of the Norwegian Sea for the first time in 26 years. The geographical extent of this fishery increased in 1995, with nine nations participating and a total catch exceeding 900 000 t. The fishery expanded further in 1996 and the annual level of the fishery was in the order of 1.2-1.5 million t in the period 1996-2000. An international management

agreement includes a TAC consistent with a maximum fishing mortality of $F=0.125$ from 2002. A pre-agreed stock recovery strategy was introduced to the management agreement in 2001. There was no agreement on the allocation of the TAC for 2003.

Juveniles and adults of this stock form an important part of the ecosystem in the Barents Sea and the Norwegian Sea. The herring has an important role as transformer of the plankton production to higher trophic levels (cod, seabirds, and marine mammals).

A report based on the distribution of herring over the summer feeding areas in 2003 by an international ICES coordinated survey will be available in September 2003.

Data and assessment:

The advice is based on an analytical assessment, which takes into consideration catch data, acoustic surveys of adults and juveniles, larval survey, and tagging data.

Different model formulations have been applied to assess this stock. The main difference between these formulations is that one relies more on the survey data to estimate incoming recruitment whereas the other relies more on the catch data. Therefore, when a new strong year class enters the fishery, it is more appropriate to use the model formulation that relies predominantly on the survey data, which are of good quality for this stock. Nevertheless, ICES considers that more effort is needed on developing a unified approach towards assessing the state of this stock (see answer to Special Request in Section 3.1.7.b).

Source of information:

Report of the Northern Pelagic and Northern Pelagic and Blue Whiting Fisheries Working Group, 29 April – 8 May 2003 (ICES CM 2003/ACFM:23)

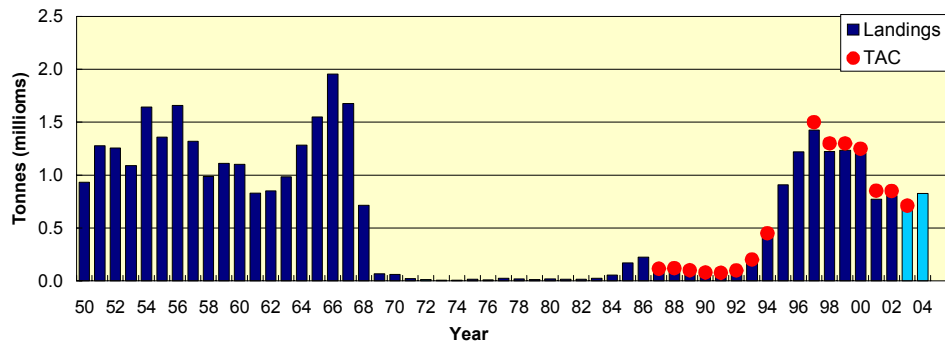
Catch data (Tables 3.1.7.a.1–2).

Year	ICES Advice	Predicted catch corresp. to advice	Agreed TAC	ACFM Catch
1987	TAC	150	115	127
1988	TAC	120–150	120	135
1989	TAC	100	100	104
1990	TAC	80	80	86
1991	No fishing from a biological point of view	0	76	85
1992	No fishing from a biological point of view	0	98	104
1993	No increase in F	119	200	232
1994	Gradual increase in F towards $F_{0.1}$; TAC suggested	334	450	479
1995	No increase in F	513	None ¹	906
1996	Keep SSB above 2.5 million t	-	None ²	1 217
1997	Keep SSB above 2.5 million t	-	1 500	1 420
1998	Do not exceed the harvest control rule	-	1 300	1 223
1999	Do not exceed the harvest control rule	1 263	1 300	1 235
2000	Do not exceed the harvest control rule	Max 1 500	1 250	1 207
2001	Do not exceed the harvest control rule	753	850	770
2002	Do not exceed the harvest control rule	853	850	809
2003	Do not exceed the harvest control rule	710	711 ³⁾	
2004	Do not exceed the harvest control rule	825		

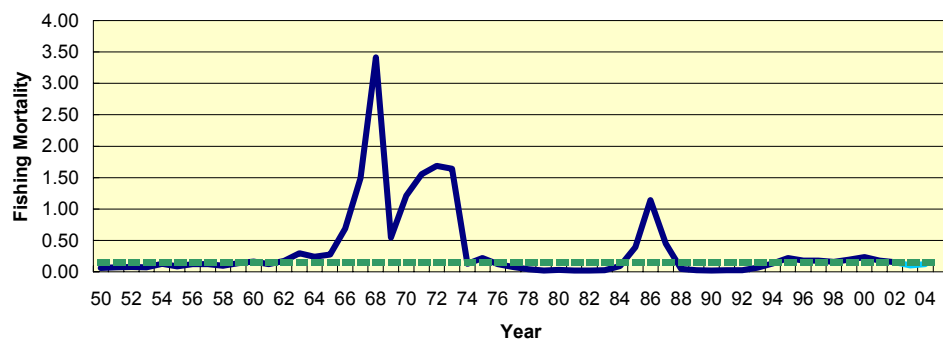
¹Autonomous TACs totalling 900 000 t; ²Autonomous TACs totalling 1 425 000 t were set by April 1996.

³There was no agreement on the TAC, the number is the sum of autonomous allocations from most of the individual Parties. Weights in '000 t.

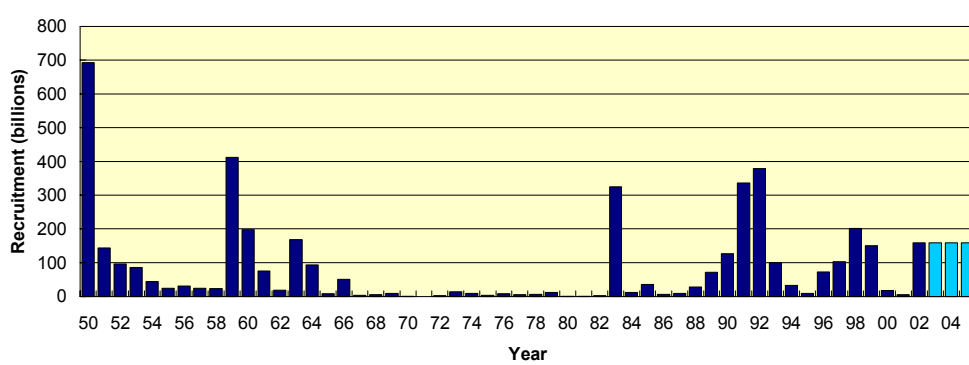
Norwegian Spring Spawning Herring - Landings
Mean = 0.7



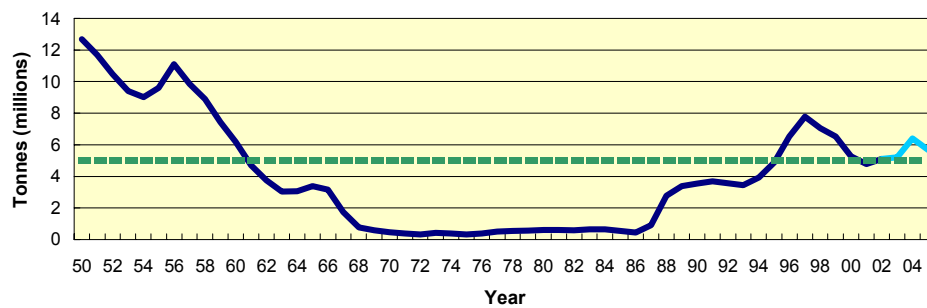
Norwegian Spring Spawning Herring - Fishing Mortality (ages 5-14)
Mean = 0.36



Norwegian Spring Spawning Herring - Recruitment (Age 0)
Mean = 84.1



Norwegian Spring Spawning Herring - Spawning Stock Biomass
Mean = 4



* no agreed TAC, sum of allocations

Table 3.1.7.a.1 Total catch of Norwegian spring-spawning herring (tonnes) since 1972. Data provided by Working Group members.

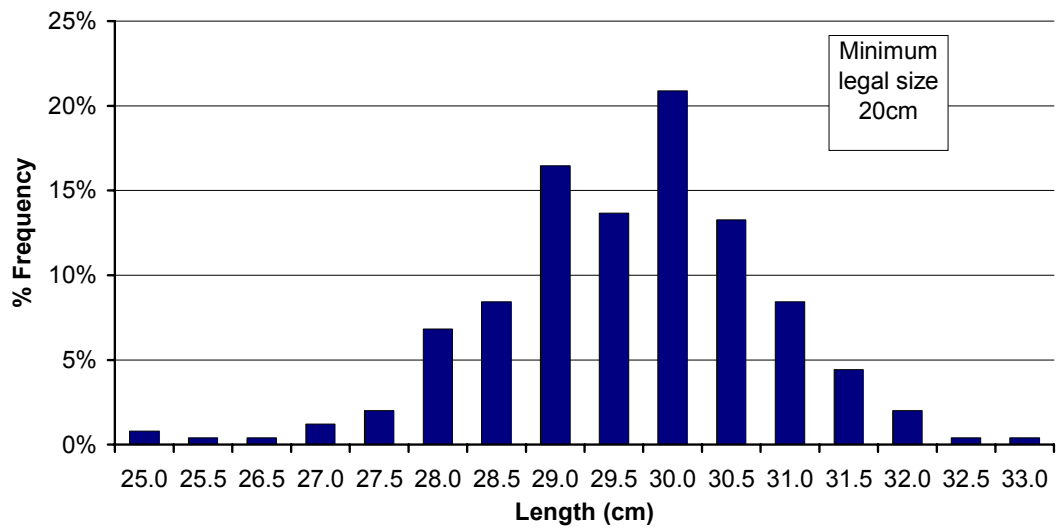
Year	Norway	USSR/ Russia	Denmark	Faroes	Iceland	Ireland	Nether- lands	Green- land	UK	Germany	France	Poland	Sweden	Total
1972	13,161	-	-	-	-	-	-	-	-	-	-	-	-	13,161
1973	7,017	-	-	-	-	-	-	-	-	-	-	-	-	7,017
1974	7,619	-	-	-	-	-	-	-	-	-	-	-	-	7,619
1975	13,713	-	-	-	-	-	-	-	-	-	-	-	-	13,713
1976	10,436	-	-	-	-	-	-	-	-	-	-	-	-	10,436
1977	22,706	-	-	-	-	-	-	-	-	-	-	-	-	22,706
1978	19,824	-	-	-	-	-	-	-	-	-	-	-	-	19,824
1979	12,864	-	-	-	-	-	-	-	-	-	-	-	-	12,864
1980	18,577	-	-	-	-	-	-	-	-	-	-	-	-	18,577
1981	13,736	-	-	-	-	-	-	-	-	-	-	-	-	13,736
1982	16,655	-	-	-	-	-	-	-	-	-	-	-	-	16,655
1983	23,054	-	-	-	-	-	-	-	-	-	-	-	-	23,054
1984	53,532	-	-	-	-	-	-	-	-	-	-	-	-	53,532
1985	167,272	2,600	-	-	-	-	-	-	-	-	-	-	-	169,872
1986	199,256	26,000	-	-	-	-	-	-	-	-	-	-	-	225,256
1987	108,417	18,889	-	-	-	-	-	-	-	-	-	-	-	127,306
1988	115,076	20,225	-	-	-	-	-	-	-	-	-	-	-	135,301
1989	88,707	15,123	-	-	-	-	-	-	-	-	-	-	-	103,830
1990	74,604	11,807	-	-	-	-	-	-	-	-	-	-	-	86,411
1991	73,683	11,000	-	-	-	-	-	-	-	-	-	-	-	84,683
1992	91,111	13,337	-	-	-	-	-	-	-	-	-	-	-	104,448
1993	199,771	32,645	-	-	-	-	-	-	-	-	-	-	-	232,457
1994	380,771	74,400	-	2,911	21,146	-	-	-	-	-	-	-	-	479,228
1995	529,838	101,987	30,577	57,084	174,109	-	7,969	2,500	881	556	-	-	-	905,501
1996	699,161	119,290	60,681	52,788	164,957	19,541	19,664	-	46,131	11,978	-	-	22,424	1,220,283
1997	860,963	168,900	44,292	59,987	220,154	11,179	8,694	-	25,149	6,190	1,500	-	19,499	1,426,507
1998	743,925	124,049	35,519	68,136	197,789	2,437	12,827	-	15,971	7,003	605	-	14,863	1,223,131
1999	740,640	157,328	37,010	55,527	203,381	2,412	5,871	-	9,207	-	-	-	14,057	1,235,433
2000	713,500	163,261	34,968	68,625	186,035	8,939	-	-	14,096	3,298	-	-	14,749	1,207,201
2001	495,036	109,054	24,038	34,170	77,693	-	6,439	-	12,230	1,588	-	-	9,818	770,066
2002 ¹	487,233	113,763	18,998	32,302	127,197	-	9,392	-	3,482	3,017	-	1,226	9,486	806,086

¹ Preliminary, as provided by Working Group members.

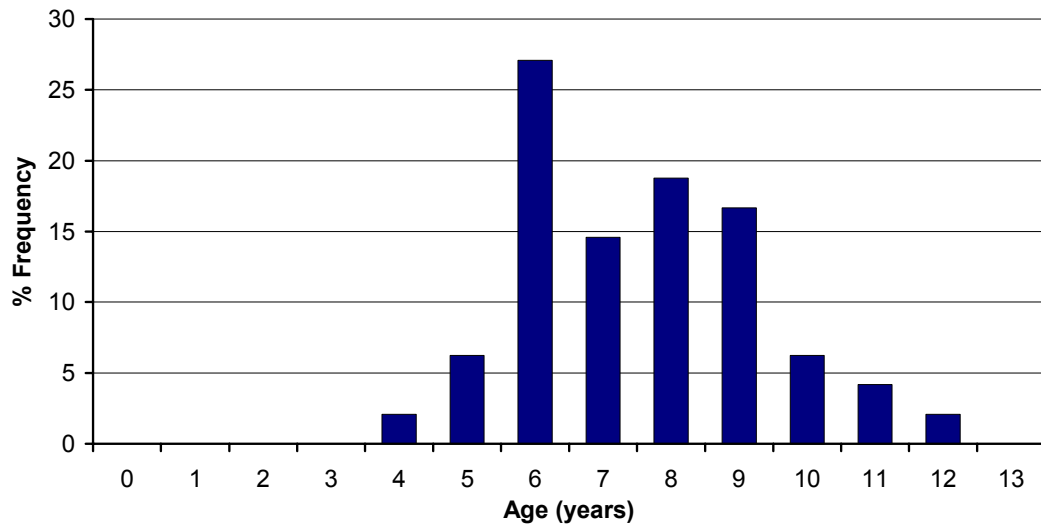
Table 3.1.7.a.2 Norwegian spring-spawning herring.

Year	Recruitment Age 0 millions	SSB 1000 tonnes	Landings 1000 tonnes	F weighted Ages 5-14
1950	693000	12684	933	0.060
1951	144000	11696	1278	0.073
1952	96000	10468	1255	0.078
1953	86000	9400	1091	0.073
1954	44000	9009	1644	0.129
1955	25000	9599	1360	0.088
1956	31000	11121	1659	0.124
1957	25000	9842	1320	0.126
1958	23000	8895	987	0.096
1959	412000	7438	1111	0.137
1960	198000	6173	1102	0.166
1961	76000	4693	830	0.126
1962	19000	3738	849	0.172
1963	169000	3035	984	0.299
1964	94000	3054	1282	0.241
1965	8000	3386	1548	0.277
1966	51000	3159	1955	0.690
1967	4000	1731	1677	1.496
1968	5000	747	712	3.414
1969	9000	580	68	0.547
1970	1000	456	62	1.211
1971	0	374	21	1.554
1972	2000	313	13	1.689
1973	14000	412	7	1.645
1974	9000	363	8	0.130
1975	3000	322	14	0.217
1976	8000	365	10	0.124
1977	5000	497	23	0.077
1978	6000	551	20	0.039
1979	12000	557	13	0.022
1980	1000	603	19	0.032
1981	1000	593	14	0.022
1982	2000	584	17	0.021
1983	325000	639	23	0.030
1984	12000	645	54	0.093
1985	36000	539	170	0.393
1986	6000	432	225	1.139
1987	9000	908	127	0.447
1988	28000	2782	135	0.045
1989	71000	3383	104	0.028
1990	127000	3542	86	0.022
1991	336000	3681	85	0.025
1992	379000	3557	104	0.029
1993	100000	3440	232	0.066
1994	33000	3928	479	0.134
1995	9000	4873	906	0.222
1996	73000	6522	1220	0.182
1997	103000	7778	1427	0.176
1998	202000	7038	1223	0.156
1999	150000	6525	1235	0.194
2000	18000	5259	1207	0.235
2001	5000	4773	770	0.181
2002	159000	5098	806	0.152
2003	159000	5200		
Average	84094	3996	651	0.361

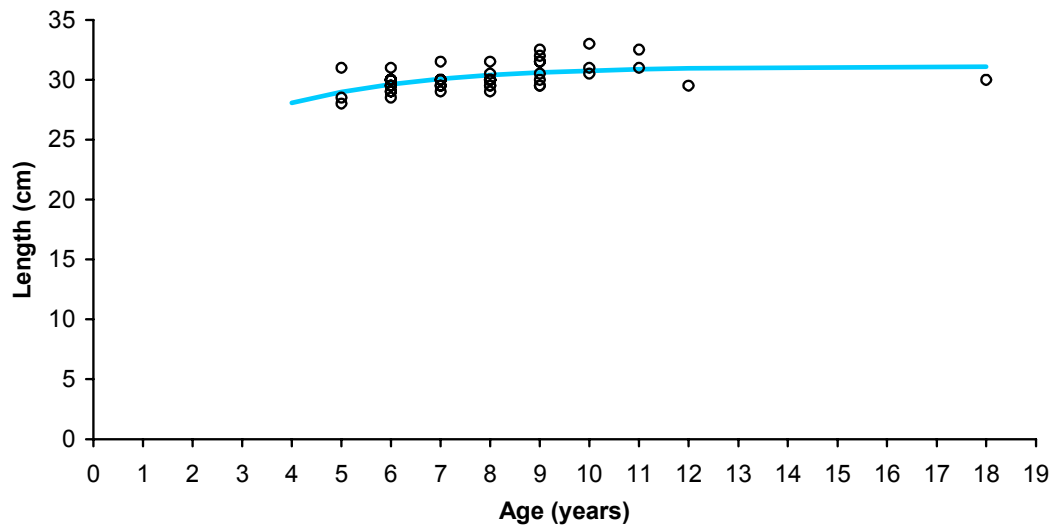
2002 Length Distribution: Irish Sampling, Atlanto Scandian Herring in 2A



2002 Age Distribution: Irish Sampling, Atlanto Scandian Herring in 2A



2002 Size at Age: Irish Sampling, Atlanto Scandian Herring in 2A



North East Atlantic Mackerel

(combined Southern, Western and North Sea spawning components)

For latest information, see: <http://www.ices.dk>



Fisheries Science Services

FSS – ADVICE

The management strategy for this stock is given in the EU Norway agreement, which states that the TAC for this stock can be based on a fishing mortality in the range of 0.15-0.20. The corresponding TAC's range from 485,000 t to 632,000 t.

FSS considers that F_{pa} is suitable as a long term harvesting strategy for this stock. FSS endorses the ICES advice for this stock states that the fishing mortality in 2004 should be no more than F_{pa} (0.17) this corresponds to landings in 2004 of no more than 545,000 t, which would give a corresponding Irish quota of about 61,000 t.

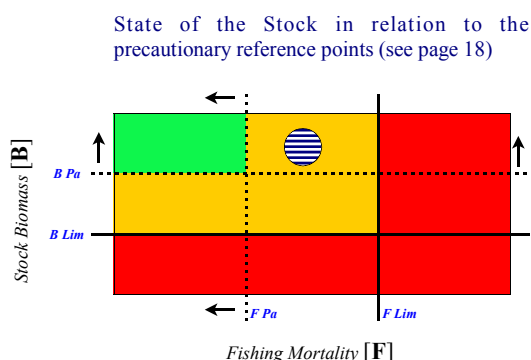
Harvesting levels within the bounds of the EU Norway agreement are consistent with maintaining the SSB above B_{pa} , in the short term. However FSS reminds managers that the mackerel assessment is only calibrated every three years (next egg survey 2004), and this can cause periodic adjustments in the perception of the recent level of SSB. FSS suggests therefore that this stock is a suitable candidate for a multi-annual TAC. FSS also suggests that the level of any multi annual TAC would be best advised in the year when the Egg survey results can be incorporated into the assessment.

FSS agrees with the following ICES & STECF advice that:

- The NEA mackerel stock should be considered for a multi annual TAC in order to avoid large changes in TAC advice which can occur following the inclusion of fishery independent data every third year.
- The North Sea spawning component still needs the maximum possible protection;
- There should be no fishing for mackerel in Divisions IIIa and IVb,c at any time of the year;
- There should be no fishing for mackerel in Division IVa during the period 15 February-31 July;
- The 30 cm minimum landing size at present in force in Sub-area IV should be maintained;
- There should be observers placed on board all vessels in fisheries where discarding of mackerel is perceived to be a problem.

FSS also point out that discarding of small mackerel may become an important consideration if the indications of strong recruiting year classes prove correct.

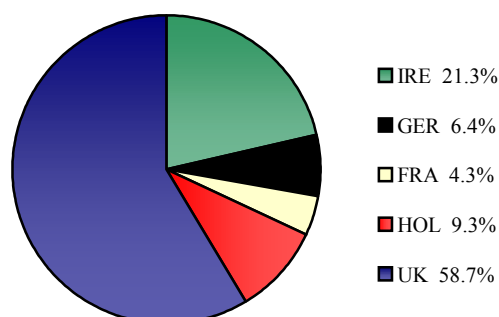
STATE OF THE STOCK



- There is no concern about the state of this stock at present, however as F is above F_{pa} , ICES classifies this stock as being harvested outside safe biological limits. This year's update assessment indicated that the recent level of the stock is very similar to the perception from last years assessment.
- Catches in 2002 were over 718,000 t, (estimated) which was over 40,000 t higher than the catch taken in 2001. Half of this increase was due to discards. Catches since 1989 have fluctuated between 585,900 t and 825,000 t.
- In 2002 fishing mortality was estimated to be about 0.2 which is above the proposed $F_{pa} = 0.17$. Fishing mortality on the stock was high in the early 1990s but has decreased since 1994 when it was at the highest value (0.32). Fishing mortality has been stable at about 0.2 for the past 4 years.
- The 2000 year class appears to be very weak and may be less than half the average. However the 1999 and 2001 year classes are estimated to be above average.
- The current assessment shows that SSB may be declining from an all time high in 2001. The level of SSB in the most recent years may be overestimated by the current assessment.
- The short term prediction shows that the stock will decline to 3 million tonnes at the current level of fishing mortality.
- Medium term simulations show that catches of less than 600,000 t have a low risk of reducing SSB below B_{pa} .

CURRENT MANAGEMENT

- There are 3 agreements that produce the overall TAC for this stock 1)-Coastal states agreement. 2)-NEAFC agreement and 3)-EU-Norway agreement in which Swedish quota in IIIa is agreed. In addition the EU produces an autonomous TAC for VIIIc and IXa from the EU quota. Since 2001 these agreements cover all the areas in which mackerel is fished.
- There is a defined management strategy for the stock between EU, Norway and Faroe Is. In 1999 it was agreed that *“For 2000 and subsequent years the parties agreed to restrict their fishing on the basis of a TAC consistent with a fishing mortality in the range 0.15 – 0.20 for appropriate age groups as defined by ICES unless future scientific advice requires modification of the fishing mortality rate”*
“Should the SSB fall below the reference point of 2,300,000 tonnes (B_{pa}), the fishing mortality rate, referred to under paragraph 1, shall be adapted in the light of scientific estimates of the conditions prevailing. Such adaptations shall ensure a safe and rapid recovery of the SSB to a level in excess of 2,300,000 tonnes.”
The Parties shall, as appropriate, review and revise these management measures and strategies on the basis of any new advice provided by ICES”.
- The total TAC set for 2003 was 582,509 t. The EU TAC was 345,808 t including the southern areas and the Irish share of the EU quota was 66,300 t (19 %) of which only 19,890 t may be fished from 1 October to 15 February in EU waters of ICES Division IVa.



- The Cornwall box remains closed to directed trawling for mackerel.

FSS – ECONOMIC COMMENTS

- The Irish catch in 2002 was about 72,200 t which was valued at about €35 million.
- The value of the Irish quota in 2003 is just over €32 million.
- In terms of economics this is the most important fishery for many of the pelagic trawlers operating from ports from Donegal to Cork. It is also extremely important to the processing industry in these areas. In recent years a large proportion of the catches are landed in Norwegian and Scottish ports. Increasing amounts of mackerel are also landed into France.

Large mackerel (>600 g) continue to command very high prices.

ADDITIONAL INFORMATION

1. There is concern that the estimates of SSB in recent years may be biased upwards. There was insufficient information available in the 2003 assessment to overcome this.
2. The triennial egg survey will be carried out in 2004, and it is hoped that an estimate of SSB will be available to the WGMHSA by September.
3. If sufficient information is available in 2004 ICES may advise on a 3-year TAC.
4. The total catch in 2002 was over 718,000 t while the Irish catch was about 72,200 t
5. The fishery is dominated by Norway, United Kingdom (Scotland), Ireland and Russia. The main Irish catches are taken by refrigerated sea water (RSW) vessels.
6. Some catches continue to be misreported– mainly between Divisions IVa and VIa,. The reasons for this may be due to separate quota restrictions on vessels operating in IVa and VIa. There is very little information on “unallocated catches” (i.e. catches above the quota).
7. The quantity of discards reported in 2002 increased sharply. The discards from IVa were comprised mainly of the 2001 year class and in VIa where they were comprised mainly of the 1999 and 2001 year classes. Groundfish surveys indicate a very large 2002 year class. If this comes through to the fishery there is concern that mackerel discarding may lower the productivity of the stock.
8. Discards were not reported by the Irish fleet which fishes in similar areas and with similar gears to the Scottish fleet (which reported about 20,000 t of discards). There have also been reports of discards of mackerel by freezer trawlers operating off the west and south west of Ireland during the horse mackerel fishery. Little is known about mackerel discards from the horse mackerel fishery in the English channel, and North Sea. The ICES estimate of catch may therefore be an underestimate.
9. Irish sampling of this stock is supported through the EC funded sampling programme that is required under the Data Collection Regulation 1543/2000 and 1639/2001.
10. There are very large differences in the length composition and the age compositions of the catches that come from the different fisheries exploited by Irish vessels. Catches from IVa and offshore in VIa and VIIb usually contain larger and older fish than those closer to the Irish coast and in the English Channel. In 2002 the catches in IVa and offshore in VIa and VIIb were dominated by 3-7 year old but fish as old as 15 were also present. Most of these fish were between 31 cm and 39 cm. On the other hand mackerel from the coastal catches were mainly 2-3 year old and between 31 cm to 34 cm but some 1 year old fish are also caught.

11. The results of the 2002 Irish West coast ground fish survey were included in the examination of recruitment.
12. Medium term simulations show that TAC's lower than 600,000 t have a low risk of reducing SSB below B_{pa} . The stock has been stable and above B_{pa} for a long period, many age classes are well represented in the stock and recruitment fluctuations have been moderate. Under these conditions and given that a fishery independent index becomes available only once every three years, the NEA mackerel stock is considered to be a suitable candidate for a multi-annual TAC.

ICES ADVICE

3.12.3.a

State of stock/exploitation:

Based on the most recent estimates of fishing mortality and SSB, ICES classifies the stock as being harvested outside safe biological limits. The spawning stock biomass in 2003 is estimated to be well above B_{pa} , but the fishing mortality in 2002 is above F_{pa} . The North Sea component remains severely depleted since the 1970s.

Management objectives:

The agreed record of negotiations between Norway, Faroe Islands, and EU in 1999, states:

"For 2000 and subsequent years, the Parties agreed to restrict their fishing on the basis of a TAC consistent with a fishing mortality in the range of 0.15 - 0.20 for appropriate age groups as defined by ICES, unless future scientific advice requires modification of the fishing mortality rate."

"Should the SSB fall below a reference point of 2 300 000 tonnes (B_{pa}), the fishing mortality rate, referred to under paragraph 1, shall be adapted in the light of scientific estimates of the conditions prevailing. Such adaptation shall ensure a safe and rapid recovery of the SSB to a level in excess of 2 300 000 tonnes."

"The Parties shall, as appropriate, review and revise these management measures and strategies on the basis of any new advice provided by ICES."

The rationale for ICES proposing $F_{pa} = 0.17$ is to have a high probability of avoiding exploiting the stock above F_{lim} . In addition, projections indicate that $F = 0.17$ will optimise long-term yield and at the same time result in a low risk for the stock to decrease below B_{pa} . If F on average is kept below 0.17, ICES regards the management plan as meeting precautionary criteria.

Precautionary Approach reference points (established in 1998):

ICES considers that:	ICES proposes that:
There is no biological basis for defining B_{lim} .	B_{pa} be set at 2.3 million t.
F_{lim} is 0.26, the fishing mortality estimated to lead to potential stock collapse.	F_{pa} be set at 0.17. This F is considered to provide approximately 95% probability of avoiding F_{lim} , taking into account the uncertainty in the assessments.

Technical basis:

	$B_{pa} = B_{loss}$ in Western stock raised by 15%: = 2.3 million t.
$F_{lim} = F_{loss} = 0.26$.	$F_{pa} = F_{lim} \times 0.65$.

Advice on management:

ICES advises a fishing mortality in 2004 of no more than F_{pa} (0.17), corresponding to landings in 2004 of less than 545 000 t. ICES advises that any agreed TAC should cover all areas where Northeast Atlantic mackerel are fished.

ICES advises that the existing measures to protect the North Sea spawning component remain in place. These are:

- There should be no fishing for mackerel in Divisions IIIa and IVb,c at any time of the year.
- There should be no fishing for mackerel in Division IVa during the period 15 February–31 July.

- The 30 cm minimum landing size at present in force in Subarea IV should be maintained.

Relevant factors to be considered in management:

The advised TAC for 2004 is very close to the advice for 2003.

Before the late 1960s the North Sea supported a spawning biomass of mackerel of at least 2 million tonnes. Recruitment has failed since 1969 leading to a decline in the stock. The North Sea spawning component has not recovered since then. The measures advised by ACFM aim at setting the conditions for making a recovery possible.

The closure of the mackerel fishery in Divisions IVb,c and IIIa throughout the whole year is designed to protect the North Sea component in this area and also the juvenile Western mackerel which are numerous, particularly in Division IVb,c during the second half of the year. This closure has unfortunately resulted in increased discards of mackerel in the non-directed fisheries (especially horse mackerel fisheries) in these areas as vessels at present are permitted to take only 10% of their catch as mackerel by-catch. No data on the actual amount of mackerel by-caught are available, but the reported landings of mackerel in Divisions IIIa and IVb,c from 1997 onwards might seriously under-estimate catches due to discarded bycatch.

The advised closure of Division IVa for fishing during the first half of the year is based on the perception that the western mackerel enter the North Sea in July/August, and stay there until December before migrating back to their

spawning areas. Updated observations taken in the late 1990s suggested that this return migration actually started in mid- to late February. This was believed to result in large-scale misreporting from the Northern part of the North Sea (Division IVa) to Division VIa. It was recommended that the closure date for IVa be extended to the 15th February and not the 1st February, as stated in the advice in 2002. This was adopted for the 1999/2000 fishing season onwards. Misreporting from IVa to VIa occurred again in 2002. The reasons for the misreporting in 2002 are unclear but are not thought to be linked to a change in the timing of the migration to spawning areas.

Several sources of information indicate that the 2001 year class may be well above average. There are some indications from surveys that the 2002 year class may be strong as well. The appearance of such strong year classes in the fishery may lead to increased discarding.

Catch forecast for 2004:

Basis: $F(2003) = F(00-02, \text{unscaled}) = F_{sq} = 0.20$; Landings (2003) = 646; SSB(2003) = 3091

F (2004)	Basis	SSB (2004)	Landings (2004)	Landings (2004) N	Landings (2004) S	SSB (2005)
0.15	Lower level of agreement by EU, Norway and Faroese	3111	485	454	31	3231
0.17	$F = F_{pa}$	3090	545	510	35	3164
0.18	intermediate step	3080	573	537	36	3131
0.19	$F_{0.1}$	3069	603	565	38	3098
0.20	F_{sq} = upper level of agreement by EU, Norway and Faroese	3059	632	592	40	3066

Weights in '000 t.

N: Northern area comprising the Western areas, North Sea, Skagerrak and Norwegian Sea (I, IIa, IIIa, IVa, Vb, VI, VII, VIIIa,b,d,e); catches in the international zone in IIa are included.

S: Southern area (VIIIc, IXa).

Shaded scenarios considered inconsistent with the precautionary approach.

The prediction is based on the assumption that the 2001 year class is above average and the 2002 year class is average.

The catches are allocated to areas according to the proportion of catch-at-age by area in recent years (2000-2002). This forecast is based on the assumption of no change in the spatial distribution of the population and stable fishing mortality levels.

Medium- and long-term projections:

Stochastic medium-term projections indicate that there is a low risk of SSB falling below B_{pa} if catches are kept below 600 000 t annually.

Comparison with previous assessment and advice:

This year's assessment was carried out using the same procedure as last year, and the results are in line with last

year's assessment. Comparative assessments performed with different models gave similar results.

Elaboration and special comment:

For mackerel, fishery-independent data of the stock size becomes available only once every 3 years from egg-surveys. In the 2 years following the most recent egg-survey, the assessment is an extrapolation based on catch-at-age and landing data only. Inclusion of a new independent data point may result in quite large revisions of the stock size, fishing mortality, and consequently catch predictions and TAC advice. The spawning stock has been stable and well above B_{pa} over a long period. Also many age classes are well represented in the stock and annual fluctuations in recruitment are moderate. In order to avoid unnecessary changes in TAC advice, ICES considers NE Atlantic mackerel as a suitable candidate to be managed by a multi-annual TAC. ICES has investigated a number

of candidate harvest control rules. This year ICES has deferred from providing multi-annual advice because the mackerel egg survey next year will provide a more precise starting point for a multi-annual advice.

Little is known about discards in the mackerel fishery; however, sampling for discards has improved. ICES continues to recommend that observers should be placed on vessels in order to estimate discards in those fisheries where discarding of mackerel is perceived to be a problem.

The Mackerel Box

Last year a review of the utility of the mackerel box was undertaken. The review concluded that the loss of potential yield and the increased risk to the spawning stock of the NEA mackerel resulting from an opening of the box should be avoided. Consequently, the mackerel box should remain closed to targeted mackerel fishing. This is consistent with previous advice. For further comments see answer to special request from UK on the utility of the Western Mackerel Box.

ICES is aware that juvenile fish are sometimes taken in large quantities in other areas of the NEA mackerel stock distribution and is continually monitoring the situation. ICES will recommend management measures for those areas if appropriate.

Stock components:

ICES currently uses the term “North East Atlantic Mackerel” to define the mackerel present in the area extending from ICES Division IXa in the south to Division IIa in the north, including mackerel in the North Sea and Division IIIa. The spawning areas of mackerel are widely spread, and only the area in the North Sea is sufficiently distinct to be clearly identified as a separate spawning component. Tagging experiments have demonstrated that after spawning, fish from Southern and Western areas migrate to feed in the Norwegian Sea and the North Sea during the second half of the year. In the North Sea they mix with the North Sea component. Since it is at present impossible to allocate catches to the stocks previously considered by ICES, they are at present, for practical reasons, considered as one stock: the North East Atlantic Mackerel Stock. Catches cannot be allocated specifically to spawning area components on biological grounds, but by convention the catches from the Southern and Western components are separated according to the area where they are taken.

In order to be able to keep track of the development of the spawning biomasses in the different spawning areas, the North East Atlantic mackerel stock is divided into three area components: the Western Spawning Component, the North Sea Spawning Component, and the Southern Spawning Component:

Northeast Atlantic Mackerel			
Distributed and fished in ICES Subareas and Divisions IIa, IIIa, IV, Vb, VI, VII, VIII and IXa			
Spawning component	Western	Southern	North Sea
Spawning Areas	VI, VII, VIIIa,b,d,e.	VIIIc, IXa.	IV, IIIa.

The Western Component is defined as mackerel spawning in the western area (ICES Divisions and Subareas VI, VII, VIII a,b,d,e). This component currently comprises 85% of the entire North East Atlantic Stock. Similarly, the Southern Component is defined as mackerel spawning in the southern area (ICES Divisions VIIIc and IXa). Although the North Sea component has been at an extremely low level since the early 1970s, ACFM regards the North Sea Component as still existing. This component spawns in the North Sea and Skagerrak (ICES Subarea IV and Division IIIa). Current knowledge of the state of the spawning components is summarised below:

Western Component:

The catches of this component were low in the 1960s, but increased to more than 800 000 t in 1993. The main catches are taken in directed fisheries by purse seiners and mid-water trawlers. Large catches of the western component are taken in the northern North Sea and in the Norwegian Sea. The 1996 catch was reduced by about 200 000 t, compared with 1995, because of a reduction in the TAC. The catches since 1998 have been stable. The SSB of the Western Com-

ponent declined in the 1970s from above 3.0 million t to 2.2 million t in 1994, but was estimated to have increased to 2.7 million t in 1999. A separate assessment for this stock component is no longer required, as a recent extension of the time-series of NEA mackerel data now allows the estimation of the mean recruitment from 1972 onwards. Estimates of the spawning stock biomass, derived from egg surveys, indicate a decrease of 14% between 1998 and 2001.

North Sea Component:

Very large catches were taken in the 1960s in the purse seine fishery, reaching a maximum of about 1 million t in 1967. The component subsequently collapsed and catches declined to less than 100 000 t in the late 1970s. Catches during the last five years have been assumed to be about 10 000 t. The 2002 egg survey in the North Sea with limited spatial and temporal coverage indicates a higher egg production in the North Sea area than in 1999, due to a relatively strong 1999 year class. However, this component is still considered to be severely depleted and outside safe biological limits.

Southern Component:

Mackerel is a target species for the hand line fleet during the spawning season in Division VIIIc, during which about one-third of the total catches are taken. It is taken as a by-catch in other fleets. The highest catches (87%) from the Southern Component are taken in the first half of the year, mainly from Division VIIIc, and consist of adult fish. In the second half of the year catches consist of juveniles and are mainly taken in Division IXa. Catches from the Southern Component increased from about 20 000 t in the early 1990s to 44 000 t in 1998, and are currently at close to 50 000 t. Estimates of the spawning stock biomass, derived from egg surveys, indicate a decrease of about 50% between 1998 and 2001. However, the SSB estimated in 2001 is similar to the survey estimates in 1995.

Combined assessment:

The analytic ICA assessment is based on catch numbers-at-age for the period 1972–2002 and egg survey estimates of SSB from 1992, 1995, 1998, and 2001. Exploratory assessments using different assessment models gave comparable results.

Source of information:

Report of the Working Group on the Assessment of Mackerel, Horse Mackerel, Sardine and Anchovy, 9-18 September 2003 (ICES CM 2004/ACFM:08).

Yield and spawning biomass per recruit

F-reference points:

	Fish Mort Ages 4-8	Yield/R	SSB/R
Average last 3 years	0.205	0.150	0.716
F_{\max}	0.662	0.173	0.298
$F_{0.1}$	0.190	0.147	0.751
F_{med}	0.215	0.152	0.696

Catch data for combined area

Year	ICES Advice	Predicted catch corresp. to advice	Total Agreed TAC ³	Official landings	Disc. ¹ slip	ACFM catch ^{2,4}
1987	Given by stock component		442	589	11	655
1988	Given by stock component		610	621	36	680
1989	Given by stock component		532	507	7	590
1990	Given by stock component		562	574	16	628
1991	Given by stock component		612	599	31	668
1992	Given by stock component		707	723	25	760
1993	Given by stock component		767	778	18	825
1994	Given by stock component		837	792	5	821
1995	Given by stock component		645	660	8	756
1996	Significant reduction in F	-	452	493	11	564
1997	Significant reduction in F	-	470	434	19	570
1998	F between 0.15 and 0.2	498	549	647	8	667
1999	F of 0.15 consistent with PA	437	562	595	n/a	609
2000	F=0.17: F_{pa}	642	612	579	2	667
2001	F=0.17: F_{pa}	665	670	620	1	678
2002	F=0.17: F_{pa}	694	683	688	24	718
2003	F=0.17: F_{pa}	542	593			
2004	F=0.17: F_{pa}	545				

¹Data on discards and slipping from only two fleets. ²Landings and discards from IIa, IIIa, IV, Vb, VI, VII, VIII, and IXa. ³All areas except some catches in international waters in II. ⁴Catches updated in 2003 with revisions from SGDRAMA in 2002. n/a=not available. Weights in '000 t.

Catch data for western component

Year	ICES Advice	Predicted catch corresp. to advice	Agreed TAC ¹	Disc. slip	ACFM catch ^{2,4}
1987	SSB = 1.5 mill. t; TAC	380	405	11	633
1988	F = F _{0.1} ; TAC; closed area; landing size	430	573 ¹	36	656
1989	Halt SSB decline; TAC	355	495 ¹	7	571
1990	TAC; F = F _{0.1}	480	525 ¹	16	606
1991	TAC; F = F _{0.1}	500	575 ¹	31	647
1992	TAC for both 1992 and 1993	670	670 ¹	25	742
1993	TAC for both 1992 and 1993	670	730 ¹	18	805
1994	No long-term gains in increased F	831 ³	800 ¹	5	796
1995	20% reduction in F	530	608 ¹	8	728
1996	No separate advice	-	422 ¹	11	529
1997	No separate advice	-	416 ¹	19	529
1998	No separate advice	-	514 ¹	8	623
1999	No separate advice	-	520 ¹	0	565
2000	No separate advice	-	573 ¹	2	631
2001	No separate advice	-	630 ¹	1	635
2002	No separate advice	-	642 ¹	24	668
2003	No separate advice	-			
2004	No separate advice	-			

¹TAC for mackerel taken in all areas VI, VII, VIIIa,b,d, Vb, IIa, IIIa, IVa. ²Landings and discards of Western component; includes catches of North Sea component. ³Catch at *status quo* F. ⁴ Catches updated in 2003 with revisions from SGDRAMA in 2002. Weights in '000 t.

Catch data for North Sea component

Year	ICES Advice	Predicted catch corresp. to advice ¹	Agreed TAC ²	ACFM catch ³
1987	Lowest practical level	LPL	55	3
1988	Closed areas and seasons; min. landing size; by-catch regulations	LPL	55	6
1989	Closed areas and seasons; min. landing size; by-catch regulations	LPL	49.2	7
1990	Closed areas and seasons; min. landing size; by-catch regulations	LPL	45.2	10
1991	Closed areas and seasons; min. landing size; by-catch regulations	LPL	65.5	- ⁴
1992	Closed areas and seasons; min. landing size; by-catch regulations	LPL	76.3	⁴
1993	Maximum protection; closed areas and seasons; min landing size	LPL	83.1	- ⁴
1994	Maximum protection; closed areas and seasons; min landing size	LPL	95.7	- ⁴
1995	Maximum protection; closed areas and seasons; min landing size	LPL	76.3	- ⁴
1996	Maximum protection; closed areas and seasons; min landing size	LPL	52.8	- ⁴
1997	Maximum protection; closed areas and seasons; min landing size	LPL	52.8	- ⁴
1998	Maximum protection; closed areas and seasons; min landing size	LPL	62.5	- ⁴
1999	Maximum protection; closed areas and seasons; min landing size	LPL	62.5	- ⁴
2000	Maximum protection; closed areas and seasons; min landing size	LPL	69.7	- ⁴
2001	Maximum protection; closed areas and seasons; min landing size	LPL	71.4	- ⁴
2002	Maximum protection; closed areas and seasons; min landing size	LPL	72.9	- ⁴
2003	Maximum protection; closed areas and seasons; min landing size	LPL	62.5	
2004	Maximum protection; closed areas and seasons; min landing size	LPL		

¹Subarea IV and Division IIIa. ²TAC for Subarea IV, Divisions IIIa, IIIb,c,d (EU zone), and Division IIa (EU zone).

³Estimated landings of North Sea component. ⁴No information. Weights in '000 t.

Catch data for southern component

Year	ICES Advice	Predicted catch corresp. to advice	Agreed TAC ¹	ACFM catch ²
1987	Reduce juvenile exploitation	-	36.57	22
1988	Reduce juvenile exploitation	-	36.57	25
1989	No advice	-	36.57	18
1990	Reduce juvenile exploitation	-	36.57	21
1991	Reduce juvenile exploitation	-	36.57	21
1992	No advice	-	36.57	18
1993	No advice	-	36.57	20
1994	No advice	-	36.57	25
1995	No advice	-	36.57	28
1996	No separate advice	-	30	34
1997	No separate advice	-	30	41
1998	No separate advice	-	35	44
1999	No separate advice	-	35	44
2000	No separate advice	-	39.2	36
2001	No separate advice	-	40.18	43
2002	No separate advice	-	41.1	50
2003	No separate advice	-	35	
2004	No separate advice	-		

¹Division VIIIc, Subareas IX and X, and CECAF Division 34.1.1 (EU waters only). ² Catches updated in 2003 with revisions from SGDRAMA in 2002. Weights in '000 t.

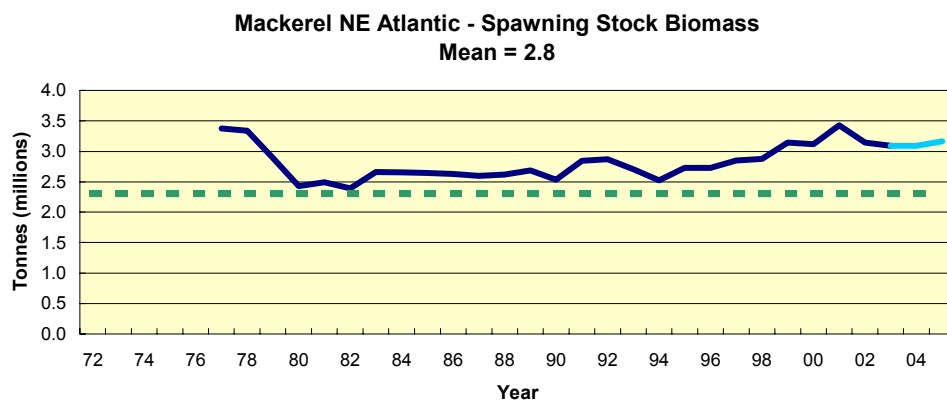
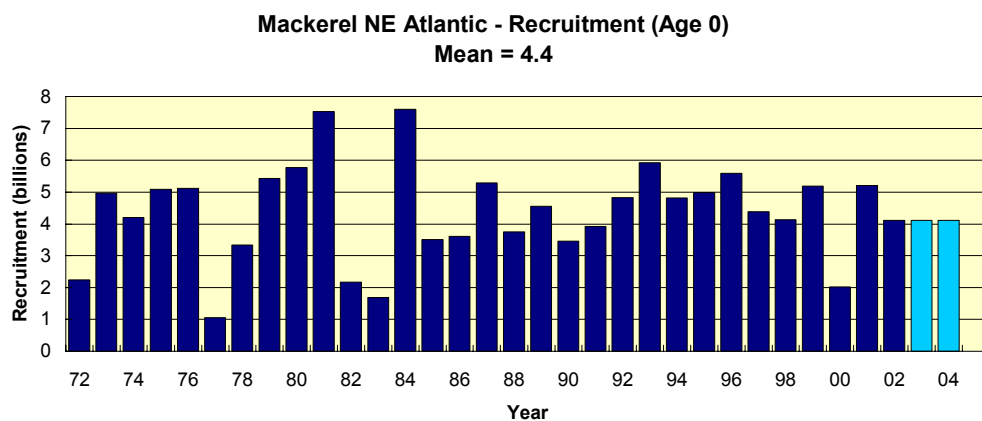
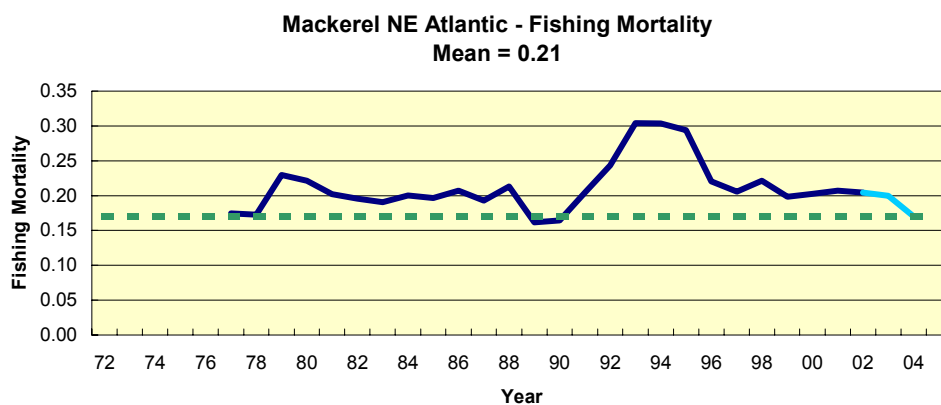
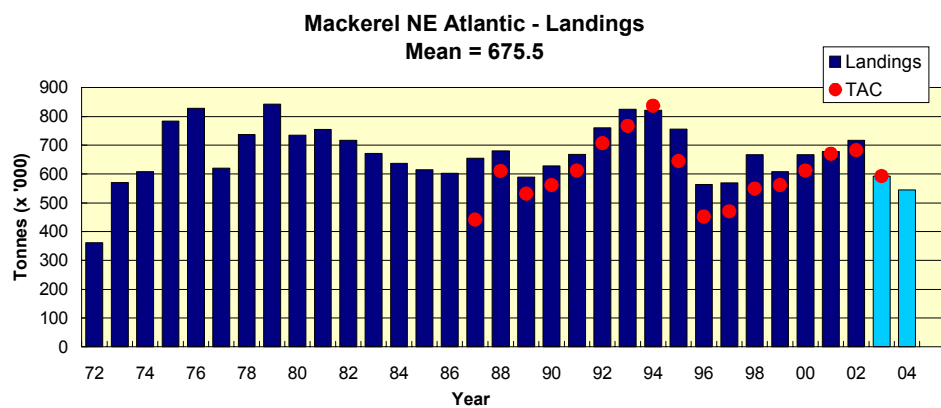


Table 3.12.3.a.1 Catches of MACKEREL by area. Discards not estimated prior to 1978. (Data submitted by Working Group members.)

Year	Subarea VI			Subarea VII and Divisions VIIIa,b,d,e			Subarea IV and III			Subarea I,II & Divs.Vb ¹	Divs. VIIIc, IXa	Total		
	Landings	Discards	Catch	Landings	Discards	Catch	Landings	Discards	Catch	Landings		Landings	Discards	Catch
1969	4,800		4,800	47,404		47,404	739,175		739,175	7		42,526	833,912	0 833,912
1970	3,900		3,900	72,822		72,822	322,451		322,451	163		70,172	469,508	0 469,508
1971	10,200		10,200	89,745		89,745	243,673		243,673	358		32,942	376,918	0 376,918
1972	13,000		13,000	130,280		130,280	188,599		188,599	88		29,262	361,229	0 361,229
1973	52,200		52,200	144,807		144,807	326,519		326,519	21,600		25,967	571,093	0 571,093
1974	64,100		64,100	207,665		207,665	298,391		298,391	6,800		30,630	607,586	0 607,586
1975	64,800		64,800	395,995		395,995	263,062		263,062	34,700		25,457	784,014	0 784,014
1976	67,800		67,800	420,920		420,920	305,709		305,709	10,500		23,306	828,235	0 828,235
1977	74,800		74,800	259,100		259,100	259,531		259,531	1,400		25,416	620,247	0 620,247
1978	151,700	15,100	166,800	355,500	35,500	391,000	148,817		148,817	4,200		25,909	686,126	50600 736,726
1979	203,300	20,300	223,600	398,000	39,800	437,800	152,323	500	152,823	7,000		21,932	782,555	60600 843,155
1980	218,700	6,000	224,700	386,100	15,600	401,700	87,931		87,931	8,300		12,280	713,311	21600 734,911
1981	335,100	2,500	337,600	274,300	39,800	314,100	64,172	3,216	67,388	18,700		16,688	708,960	45516 754,476
1982	340,400	4,100	344,500	257,800	20,800	278,600	35,033	450	35,483	37,600		21,076	691,909	25350 717,259
1983	320,500	2,300	322,800	235,000	9,000	244,000	40,889	96	40,985	49,000		14,853	660,242	11396 671,638
1984	306,100	1,600	307,700	161,400	10,500	171,900	43,696	202	43,898	98,222		20,208	629,626	12302 641,928
1985	388,140	2,735	390,875	75,043	1,800	76,843	46,790	3,656	50,446	78,000		18,111	606,084	8191 614,275
1986	104,100		104,100	128,499		128,499	236,309	7,431	243,740	101,000		24,789	594,697	7431 602,128
1987	183,700		183,700	100,300		100,300	290,829	10,789	301,618	47,000		22,187	644,016	10789 654,805
1988	115,600	3,100	118,700	75,600	2,700	78,300	308,550	29,766	338,316	120,404		24,772	644,926	35566 680,492
1989	121,300	2,600	123,900	72,900	2,300	75,200	279,410	2,190	281,600	90,488		18,321	582,419	7090 589,509
1990	114,800	5,800	120,600	56,300	5,500	61,800	300,800	4,300	305,100	118,700		21,311	611,911	15600 627,511
1991	109,500	10,700	120,200	50,500	12,800	63,300	358,700	7,200	365,900	97,800		20,683	637,183	30700 667,883
1992	141,906	9,620	151,526	72,153	12,400	84,553	364,184	2,980	367,164	139,062		18,046	735,351	25000 760,351
1993	133,497	2,670	136,167	99,828	12,790	112,618	387,838	2,720	390,558	165,973		19,720	806,856	18180 825,036
1994	134,338	1,390	135,728	113,088	2,830	115,918	471,247	1,150	472,397	72,309		25,043	816,025	5370 821,395
1995	145,626	74	145,700	117,883	6,917	124,800	321,474	730	322,204	135,496		27,600	748,079	7721 755,800
1996	129,895	255	130,150	73,351	9,773	83,124	211,451	1,387	212,838	103,376		34,123	552,196	11415 563,611
1997	65,044	2,240	67,284	114,719	13,817	128,536	226,680	2,807	229,487	103,598		40,708	550,749	18864 569,613
1998	110,141	71	110,212	105,181	3,206	108,387	264,947	4,735	269,682	134,219		44,164	658,652	8012 666,664
1999§	98,666		98,666	93,821		93,821	299,798		299,798	72,848		43,796	608,929	0 608,929
2000*	150,927	1	150,928	113,520	1,918	115,438	271,997	165	272,162	92,557		36,074	665,075	2084 667,159
2001*	113,234	83	113,317	141,012	1,081	142,093	311,979	24	312,003	67,097		43,198	676,520	1,188 677,708
2002*	109,170	12,931	122,101	101,028	2,260	103,288	360,405	8,583	368,988	73,929		49,576	694,108	23,774 717,882

*Preliminary.

¹For 1976–1985 only Division IIa, Subarea I, and Division IIb included in 2000 only.

§ Discards reported as part of unallocated catches.

Table 3.12.3.a.2 Catches (t) of MACKEREL in the Norwegian Sea (Division IIa) and off the Faroes (Division Vb).
(Data submitted by Working Group members.)

Country	1984	1985	1986	1987	1988	1989	1990	1991	1992	1993	1994
Denmark	11,787	7,610	1,653	3,133	4,265	6,433	6,800	1,098	251		
Estonia									216		3,302
Faroe Islands	137				22	1,247	3,100	5,793	3,347	1,167	6,258
France		16				11		23	6	6	5
Germany, Fed. Rep.			99		380						
German Dem. Rep.			16	292		2,409					
Iceland											
Ireland											
Latvia									100	4,700	1,508
Lithuania											
Netherlands											
Norway	82,005	61,065	85,400	25,000	86,400	68,300	77,200	76,760	91,900	110,500	141,114
Russia									42,440	49,600	28,041
United Kingdom			2,131	157	1,413		400	514	802		1,706
USSR	4,293	9,405	11,813	18,604	27,924	12,088	28,900	13,631 ²			
Poland											
Sweden											
Misreported (IVa)											-109,625
Misreported (VIa)											
Discards							2,300				
Total	98,222	78,096	101,112	47,186	120,404	90,488	118,700	97,819	139,062	165,973	72,309

Country	1995	1996	1997	1998	1999	2000	2001	2002
Denmark	4,746	3,198	37	2,090	106	1,375	7	1
Estonia	1,925	3,741	4,422	7,356	3,595	2,673	219	
Faroe Islands	9,032	2,965	5,777**	2,716	3,011	5,546	3,272	4,730
France	5	0	270					
Germany		1						
Iceland		92	925	357				53
Ireland					100			
Latvia	389	233						
Lithuania						2,085		
Netherlands		561			661			569
Norway	93,315	47,992	41,000	54,477	53,821	31,778	21,971	22,670
Russia	44,537	44,545	50,207	67,201	51,003	49,100*	41,566	45,811
United Kingdom	194	48	938	199	662		54	665
USSR ²								
Poland			22					
Sweden							8	
Misreported (IVa)	-18,647			-177	-40,011			
Misreported (VIa)					-100			
Misreported (unknown)								-570
Discards								
Total	135,496	103,376	103,598	134,219	72,848	92,557	67,097	73,929

²Russia.

*Includes small bycatches in Subareas I & IIb.

** Faroese catch revised from previously reported 7,628.

Table 3.12.3.a.3 Catch (t) of MACKEREL in the North Sea, Skagerrak, and Kattegat (Subarea IV and III). (Data submitted by Working Group members).

Country	1987	1988	1989	1990	1991	1992	1993	1994
Belgium	14	20	37		125	102	191	351
Denmark	28,217	32,588	26,831	29,000	38,834	41,719	42,502	47,852
Estonia						400		
Faroe Islands			2,685	5,900	5,338		11,408	11,027
France	2,146	1,806	2,200	1,600	2,362	956	1,480	1,570
Germany, Fed. Rep.	474	177	6,312	3,500	4,173	4,610	4,940	1,479
Iceland								
Ireland			8,880	12,800	13,000	13,136	13,206	9,032
Latvia						211		
Netherlands	2,761	2,564	7,343	13,700	4,591	6,547	7,770	3,637
Norway	108,250	59,750	81,400	74,500	102,350	115,700	112,700	114,428
Sweden	3,162	1,003	6,601	6,400	4,227	5,100	5,934	7,099
United Kingdom	19857	1,002	38,660	30,800	36,917	35,137	41,010	27,479
USSR (Russia from 1990)								
Romania								2,903
Misreported (IIa)								109,625
Misreported (VIa)	117,000	180,000	92,000	126,000	130,000	127,000	146,697	134,765
Unallocated	8,948	29,630	6,461	-3,400	16,758	13,566	-	-
Discards	10,789	29,776	2,190	4,300	7,200	2,980	2,720	1,150
Total	301,618	338,316	281,600	305,100	365,875	367,164	390,558	472,397

Country	1995	1996	1997	1998	1999	2000 ¹	2001	2002
Belgium	106	62	114	125	177	146	97	22
Denmark	30,891	24,057	21,934	25,326	29,353	27,720	21,680	34,375
Estonia			-	-				
Faroe Islands	17,883	13,886	3,288 ²	4,832	4,370	10,614	18,571	12,548
France	1,599	1,316	1,532	1,908	2,056	1,588	1,981	2,152
Germany, Fed. Rep.	712	542	213	423	473	78	4,514	3,902
Iceland					357			
Ireland	5,607	5,280	280	145	11,293	9,956	10,284	20,715
Latvia			-	-				
Netherlands	1,275	1,996	951	1,373	2,819	2,262	2,441	11,044
Norway	108,890	88,444	96,300	103,700	106,917	142,320	158,401	161,621
Sweden	6,285	5,307	4,714	5,146	5,233	4,994	5,090	5,232
United Kingdom	21,609	18,545	19,204	19,755	31,578	57,110	50,165	58,876
Russia			3,525	635	345	1,672	2	
Romania			-	-				
Misreported (IIa)	18,647	-	-	-	40,000			
Misreported (VIa)	106,987	51,781	73,523	98,432	59,882	8,591	39,024	49,918
Unallocated	983	236	1,102	3,147	4,946	3,197	-272	
Discards	730	1,387	2,807	4,753		1,912	24	8,583
Total	322,204	212,839	229,487	269,700	299,799	272,160	312,004	368,988

¹Includes small catches in IIIb & IIIc.

²Faroe catches revised from previously reported 1,367.

Table 3.12.3.a.4 Catch (t) of MACKEREL in the Western area (Subareas VI and VII and Divisions VIIIa,b,d,e).
(Data submitted by Working Group members).

Country	1985	1986	1987	1988	1989	1990	1991	1992	1993
Denmark	400	300	100		1,000		1,573	194	
Faroe Islands	9,900	1,400	7,100	2,600	1,100	1,000			
France	7,400	11,200	11,100	8,900	12,700	17,400	4,095		2,350
Germany	11,800	7,700	13,300	15,900	16,200	18,100	10,364	9,109	8,296
Ireland	91,400	74,500	89,500	85,800	61,100	61,500	17,138	21,952	23,776
Netherlands	37,000	58,900	31,700	26,100	24,000	24,500	64,827	76,313	81,773
Norway	24,300	21,000	21,600	17,300	700		29,156	32,365	44,600
Poland									600
Spain				1,500	1,400	400	4,020	2,764	3,162
United Kingdom	205,900	156,300	200,700	208,400	149,100	162,700	162,588	196,890	215,265
USSR									
Unallocated	75100	49299	26000	4700	18900	11,500	-3,802	1,472	0
Misreported (Iva)		-148,000	-117,000	-180,000	-92,000	-126,000	-130,000	-127,000	-146,697
Discards	4,500			5,800	4,900	11,300	23,550	22,020	15,660
Grand Total	467,700	232,599	284,100	197,000	199,100	182,400	183,509	236,079	248,785

Country	1994	1995	1996	1997	1998	1999	2000	2001	2002
Denmark	2,239	1,443	1,271	-	-	552	82	835	
Estonia		361		-	-				
Faroe Islands	4,283	4,248	-	2,448 ¹	3,681	4,239	4,863	2,161	2,490
France	9,998	10,178	14,347	19,114	15,927	14,311	17,857	18,975	19,726
Germany	25,011	23,703	15,685	15,161	20,989	19,476	22,901	20,793	22,630
Ireland	79,996	72,927	49,033	52,849	66,505	48,282	61,277	60,168	51,457
Netherlands	40,698	34,514	34,203	22,749	28,790	25,141	30,123	33,654	21,831
Norway	2,552			-	-			223	
Spain	4,126	4,509	2,271	7,842	3,340	4,120	4,500	4,063	3,483
United Kingdom	208,656	190,344	127,612	128,836	165,994	127,094	126,620	139,589	131,599
USSR									
Unallocated	4,632	28,245	10,603	4,577	8,351	9,254	0	12,807	
Misreported (IVa)	-134,765	-106,987	-51,781	-73,523	-98,255	-59,982	-3,775	-39,024	-43,339
Discards	4,220	6,991	10,028	16,057	3,277		1,920	1,164	15,191
Grand Total	251,646	270,476	213,272	196,110	218,599	192,486	266,367	255,408	225,389

¹Faroe catches revised from 2,158.

Table 3.12.3.a.5 Landings (tonnes) of mackerel in Divisions VIIIc and IXa, 1977–2002. Data submitted by Working Group members.

Country	1977	1978	1979	1980	1981	1982	1983	1984	1985	1986	1987	1988	1989
Spain ¹	19,852	18,543	15,013	11,316	12,834	15,621	10,390	13,852	11,810	16,533	15,982	16,844	13,446
Portugal ²	1,743	1,555	1,071	1,929	3,108	3,018	2,239	2,250	4,178	6,419	5,714	4,388	3,112
Spain ²	2,935	6,221	6,280	2,719	2,111	2,437	2,224	4,206	2,123	1,837	491	3,540	1,763
Poland ²	8	-	-	-	-	-	-	-	-	-	-	-	-
USSR ²	2,879	189	111	-	-	-	-	-	-	-	-	-	-
Total ²	7,565	7,965	7,462	4,648	5,219	5,455	4,463	6,456	6,301	8,256	6,205	7,928	4,875
TOTAL	27,417	26,508	22,475	15,964	18,053	21,076	14,853	20,308	18,111	24,789	22,187	24,772	18,321

¹Division VIIIc. ²Division IXa.

Country	1990	1991	1992	1993	1994	1995	1996	1997	1998	1999	2000	2001	2002
Spain ¹	16,086	16,940	12,043	16,675	21,146	23,631	28,386	35,015	36,174	37,631	30,061	38,205	38,703
Portugal ²	3,819	2,789	3,576	2,015	2,158	2,893	3,023	2,080	2,897	2,002	2,253	3,119	2,934
Spain ²	1,406	1,051	2,427	1,027	1,741	1,025	2,714	3,613	5,093	4,164	3,760	1,874	7,938
Total ²	5,225	3,840	6,003	3,042	3,899	3,918	6,737	5,693	7,990	6,165	6,013	4,993	10,873
TOTAL	21,311	20,780	18,046	19,719	25,045	27,549	34,123	40,708	44,164	43,796	36,074	43,198	49,575

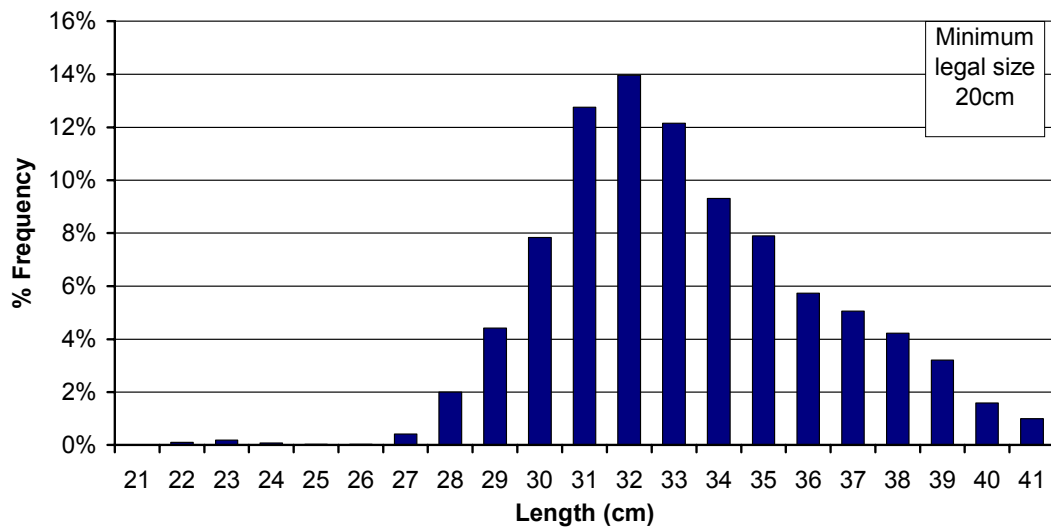
¹Division VIIIc. ²Division IXa.

Table 3.12.3.a.6 Mackerel (combined Southern, Western & N. Sea spawn. comp.).

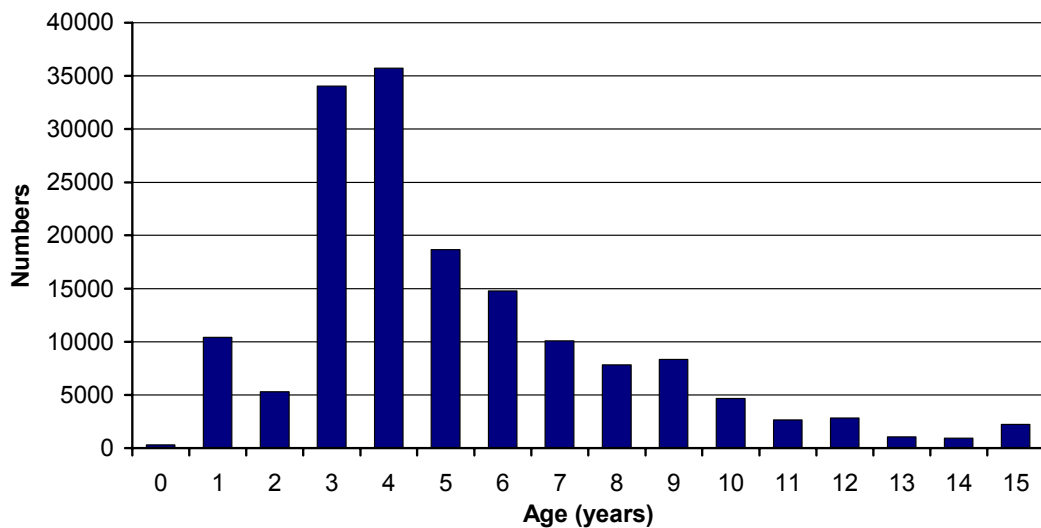
Year	Recruitment Age 0 thousands	SSB tonnes	Landings tonnes	Mean F Ages 4-8
1972	2243000		361200	
1973	4969000		571000	
1974	4208000		607600	
1975	5093000		784100	
1976	5117000		828200	
1977	1057000	3373000	620300	0.17430
1978	3337000	3337000	736800	0.17250
1979	5424000	2884000	843200	0.22970
1980	5771000	2430000	735000	0.22150
1981	7529000	2492000	754400	0.20250
1982	2176000	2393000	717300	0.19560
1983	1690000	2659000	671600	0.19050
1984	7599000	2654000	637600	0.20020
1985	3509000	2643000	614400	0.19650
1986	3612000	2627000	602200	0.20720
1987	5289000	2598000	655000	0.19320
1988	3750000	2618000	680500	0.21340
1989	4561000	2684000	589500	0.16150
1990	3458000	2533000	627500	0.16450
1991	3924000	2842000	667900	0.20460
1992	4828000	2873000	760400	0.24340
1993	5916000	2707000	825000	0.30430
1994	4814000	2522000	821400	0.30360
1995	4987000	2729000	755800	0.29390
1996	5588000	2729000	563600	0.22060
1997	4385000	2851000	569600	0.20590
1998	4132000	2875000	666700	0.22130
1999	5184000	3147000	608900	0.19840
2000	2026000	3117000	667200	0.20280
2001	5210000 ¹	3428000	677700	0.20750
2002	4115000 ¹	3147000	717900	0.20440
2003	4115000 ¹	3091000		
Average	4363000	2995781	675468	0.20408

¹ Assumed

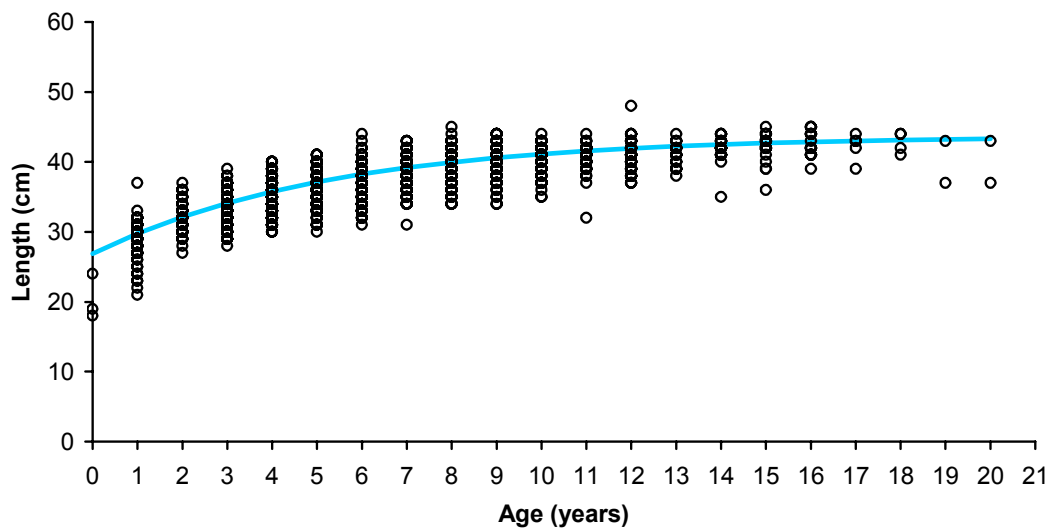
2002 Length Distribution: Irish Sampling, Mackerel in NEA



2002 Age Distribution: Irish Landings, Mackerel in NEA



2002 Size at Age: Irish Sampling, Mackerel in NEA



Western Horse Mackerel

(Divisions IIa, IVa, Vb, VIa, VIIa–c,e–k, VIIId,b,d,e)

For latest information, see: <http://www.ices.dk>



Fisheries Science Services

FSS – ADVICE

ICES and STECF advice states that catches in 2004 should be less than 130,000 t. FSS considers that this advice is consistent with long term sustainable harvest levels at the current level of recruitment. In addition FSS advises that measures to protect juveniles should be introduced in all areas where horse mackerel is fished. This would include a prohibition on fishing horse mackerel in VIIId throughout the year and in VIIef in the third and fourth quarters. The recommended TAC of 130,000 t would translate into an Irish quota of about 29,300 t.

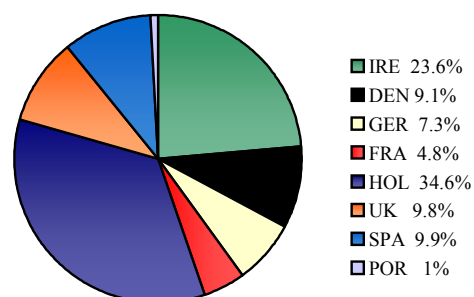
FSS advises that a management strategy similar to that for North Sea herring, in which both adult and juvenile mortality are independently restricted, should be explored for this stock. FSS considers that the short term predictions carried out by ICES for adult and juvenile areas are not informative as the areas for adult and juvenile catches are not well defined.

STATE OF THE STOCK

- The status of the stock uncertain. Reference points have not yet been agreed for the stock.
- Landings increased rapidly from the mid 1980s to 1995 (513,000 t) and have since decreased to 172,000 t in 2002 (estimates).
- The average fishing mortality is now given over ages 1-10, this value has shown a decreasing trend over the past 6 years. However the fishing mortality on the youngest ages (1-3) had increased but also appears to have decreased in the past few years. No value has yet been proposed for F_{pa} .
- There has been no recruitment to the stock of comparable strength to the outstanding 1982 year class which recruited to the adult stock in the mid 1980s. There is tentative evidence that the 2002 year class is very strong.
- The current SSB is not precisely known but appears to have continuously declined since 1988.
- In the absence of outstanding year classes sustainable yield is unlikely to be higher than about 130,000 t.
- No short term forecasts were presented for this stock.

CURRENT MANAGEMENT

- The TAC area (Divisions Vb, (EU waters); Sub-areas VI and VII, and Divisions VIIId,b,d,e.) does not correspond to the assessment area (Divisions IIa, IIIa (western part), Vb, VIa, VIIa-c, e-k and VIIId,b,d,e).
- The TAC only applies to EU and Faroese fleets. In the past there have been unregulated fisheries outside the TAC areas mainly by Norwegian vessels. Catches in these unregulated fisheries increased again in 2002.
- The total horse mackerel catch in 2002 was 172,000 t (estimate). The TAC was 150,000 t. The TAC for 2003 is 137,000 t. The Irish quota is 30,693 t.



- There is no management plan or management objective for this fishery. FSS suggests the current proposal to close areas where juveniles are caught is a suitable measure to protect this stock, provided that the closures relates to the areas where most of the juveniles are being caught.
- The Northwest Pelagic Management Committee manages the Irish fishery.

FSS – ECONOMIC COMMENTS

- The value of the Irish landings and quota in 2002 were estimated at €10.5 million.
- The value of the 2003 quota is about €10 million.
- In 2002 21% of the catch was landed as frozen product and this represented almost 30% of the landed value. This continues the trend of an increasing proportion of the catch being landed outside Ireland as frozen product. However over half of the total catch of horse mackerel is still landed in the north west and the fishery is still extremely important to the Irish refrigerated sea water (RSW) pelagic fleet and the processing industry in Donegal.

ADDITIONAL INFORMATION

1. The assessment was again carried out using the separable Adapt model (SAD) that continues to give a more realistic representation of the state of the stock in the historic period. However the assessment is currently un-

stable for the most recent years due to an increased abundance of juveniles in the catch. Biological data remains very poor and there is a lack of sampling data for many important horse-mackerel fishing countries. The maturity ogive is poorly estimated.

2. The Irish catch in 2002 was about 36,500 t.
3. Area mis-reporting is not considered to be a serious problem in this fishery but doubts persist about the accuracy of the total catch figures recorded by some countries.
4. The main catches are taken by the Dutch and French freezer trawler fleet and the Irish refrigerated sea water (RSW) vessels. Considerable Danish catches are taken for industrial purposes - mainly in the Channel area. Irish vessels also take catches from this area and landings are made into French ports.
5. Reports from Irish fishermen suggest that adult horse mackerel are now much less abundant than in the mid nineties.
6. There are reports of high numbers of juvenile horse mackerel from surveys around Ireland and in the Dutch catches in the Channel area in 2002, but the strength of this year class has yet to be confirmed. As horse mackerel is a slow growing species a strong year class would not be apparent in the adult fishery for about 5 years.
7. If the strength of the 2001 year class is confirmed, this should result in high catches of three year old fish in 2004. This may necessitate the rapid development of a management strategy which will optimise yield.
8. Irish sampling of this stock is supported through the EC funded sampling programme that is required under the Data Collection Regulation 1543/2000 and 1639/2001.
9. The length distribution of the Irish catches in 2002 were dominated by fish between 26 cm and 29 cm (6 to 8 year old fish).
10. For this stock the reference F is now calculated across all ages that are fully selected (1-10).
11. The short term prediction presented by ICES purports to show the trade off of fishing in adult and juvenile areas under two recruitment scenarios. FSS consider that this analysis is not informative as the areas classed as "juvenile" contain almost 50% of the catches of adult fish.

ICES ADVICE

3.12.4

State of stock/exploitation:

The state of the stock is uncertain. This year's assessment is considered only indicative of trends in biomass and fishing mortality. The spawning stock biomass has decreased compared to the mid-1980s and is estimated to continue to decline at all levels of fishing mortality, unless a strong year class enters the fishery.

Management objectives:

There are no explicit management objectives for this stock.

Precautionary Approach reference points:

No reference points have been defined for this stock

Advice on management:

ICES advises that catches in 2004 be limited to less than 130 000 t. ICES also recommends that the TAC for this stock should apply to all areas in which Western horse mackerel are fished, i.e., Divisions IIa, IIIa (western part), IVa, Vb, VIa, VIIa-c, VIIe-k, and VIIa,b,d,e.

Relevant factors to be considered in management:

In the absence of outstanding year classes, sustainable yield is unlikely to be higher than about 130 000 t, dependent on the exploitation pattern. Exploitation at $F_{0.1}$ will produce yields of this order on basis of average recruitment excluding the extremely large year classes. It is therefore clear that catches will have to be reduced unless another outstanding year class is produced.

There are some indications that the 2001 year class might be strong, but the current evidence for this is sparse. As there are no recruitment indices available, the strength of this year class can only be determined when it fully enters the fishery, which may take several years. Therefore, fishing should be kept at a low level in the next years. However, such a decision should be kept under review and modified as evidence of the strength of the 2001 year class becomes available. Major discarding of juvenile horse mackerel may be an early sign of the strength of this year class and if this occurs it will necessitate rapid management decisions

Recently fisheries have taken large catches of mainly juvenile horse mackerel from the western stock. ICES expresses concern that catches of juvenile fish are high at a time when the recruitment is low, and the spawning stock size is reducing. ICES recommends that a management strategy is developed that takes into account fisheries both for juveniles and adults. So far, the juvenile fishery has mainly taken place in Divisions VIIe,f,g,h and VIIa,b,d. This may change if juveniles become targeted in other areas, or if a new large year class appears.

The spawning stock has been dominated by an outstanding 1982 year class and reached a maximum in 1988. This year class has been gradually fished out and since then no other outstanding year classes have appeared, while the spawning biomass has slowly declined.

The TAC is set for parts of the western distribution area by EU and was overshot considerably during the period 1989–1997 and again in 2002. However, the TAC has only been given for parts of the distribution and fishing areas (EU waters), and also includes areas where the horse mackerel belongs to the North Sea stock (i.e. Division VIIId). ICES advises that if a TAC is set for this stock, it should apply to all areas where western horse mackerel are caught, i.e., Divisions IIa, IIIa (western part), IVa, Vb, VIa, VIIa-c, VIIe-k, and VIIa,b,d,e.

Catch forecasts for 2003:

Deterministic forecasts are not appropriate as the stock assessment is highly uncertain. A forecast is furthermore extremely sensitive to assumptions regarding the 2001 year class, the size of which is poorly estimated presently. The sensitivity of forecasts to assumptions regarding recruitment and the area distribution of fisheries is illustrated in the elaboration section below.

Comparison with previous assessment and advice:

The perception of stock trends is consistent with last year's estimates, with the exception of fishing mortalities on juveniles in the last two years. Total fishing mortalities are not comparable to the ones of last year's assessment as the reference ages have been changed. The assessment is, however, regarded to be uncertain, as the absolute level of stock parameters seems to be largely driven by model assumptions.

Elaboration and special comment:

Western horse mackerel is taken in a variety of fisheries, exploiting juvenile fish for the human consumption market in southern Europe, mid-aged fish mostly for the Japanese market, and older fish either for human consumption purposes (mostly for the African market) or for industrial purposes.

The distributional range of this stock increased when the exceptional 1982 year class entered the fishery. This resulted in the development of unregulated fisheries outside the TAC area in the Northern North Sea. Catches outside the area covered by a TAC have been reduced in recent years. At present, the TAC for the Western areas includes Division Vb (EU waters only), Subareas VI and VII and Divisions VIIIa,b,d,e. A separate TAC includes EU waters in Division IIa and Subarea IV. ICES allocates horse mackerel to the Western stock which is taken in Divisions IIa, IIIa (western part), IVa, Vb, VIa, VIIe-k, and VIIIa,b,d,e. Preliminary results from recent research suggest that the Southern boundary of the Western stock may have to be redefined in the future.

The history of this stock reflects the development of a single large year class within the period of 21 years for which data are available. The frequency of the occurrence of such large year classes cannot be evaluated on the basis of the short time-series.

As in previous years some countries with major catches did not carry out biological sampling programmes. Though this has improved since 1998, the lack of biological data severely hampered the assessment in earlier years. It is important to note that a sufficient sampling coverage is a prerequisite for the timely detection of a strong recruiting year class, explicitly the verification of the possibly strong 2001 year class. Only this would allow for the implementation of management measures early enough to protect such a year class from being overexploited or discarded.

The assessment of this stock uses the results of the international horse mackerel egg surveys. Due to uncertainties about whether horse mackerel is a determinate or indeterminate spawner, only the estimated egg productions have been used in the assessment.

Stock boundaries of Western horse mackerel may have to be revised in the near future in the light of the results of an EU-Project, which provided new understanding of the borders between the Southern and the Western stock.

Catch predictions are sensitive to both assumptions about recruitment and to the distribution of fisheries exploiting juvenile and adult horse mackerel in different ways. This sensitivity is illustrated below by two tables covering the range of possible assumptions, especially on the strength of the 2001 year class. As the basis for predictions in the assessment is considered to be uncertain, the sensitivity is illustrated in relative terms. The basis (100%) is given in the headers of the tables.

To demonstrate the need for the development of an area-based management, two "fleets" have been defined, exploiting juvenile and adult fish:

1. "Adult area", corresponding to the exploitation of adult fish, being Divisions IIa, IIIa(west), IVa,VIab, VIIbcjk;
2. "Juvenile area", corresponding to the exploitation of juvenile fish, being Divisions VIIefgh, VIIIabd.

Sensitivity of forecasts for 2004 to recruitment assumptions and areal distribution of fisheries:

1: assuming 2001 year class strength is geometric mean of weak recruitment (1983-2000):

Basis: $F(2003) = F_{sq}(00-02, \text{unscaled}) = F_{sq}$; Landings (2003): 100%: juv. area = 55%, adult area = 45%;
SSB(2002) = 100%, SSB(2003) = 98%.

F (2004)	Distribution of F	SSB (2004) %	Landings (2004) %	Landings (2004) A %	Landings (2004) J %	SSB (2005) %
F_{sq}	No fishery in juvenile area	99	101	101	0	96
F_{sq}	20% of F(1-10) in juv. area	99	99	82	17	96
F_{sq}	40% of F(1-10) in juv. area	99	98	62	35	96
F_{sq}	60% of F(1-10) in juv. area (<i>current fishery</i>)	100	95	41	54	97
F_{sq}	80% of F(1-10) in juv. area	100	92	21	71	97
F_{sq}	100% of F(1-10) in juv. area	100	88	0	88	98

2. assuming 2001 year class is exceptionally strong:

Basis: $F(2003) = F_{sq}(00-02, \text{unscaled}) = F_{sq}$; Landings (2003): 183% of precautionary scenario
above: juv. area = 137%, adult area = 46%; SSB(2002) precautionary scenario above = 100%; SSB(2003) = 109%.

F (2004)	Distribution of F	SSB (2004) %	Landings (2004) %	Landings (2004) A %	Landings (2004) J %	SSB (2005) %
F_{sq}	No fishery in juvenile area	174	116	116	0	299
F_{sq}	20% of F(1-10) in juv. area	173	148	94	54	293
F_{sq}	40% of F(1-10) in juv. area	173	180	71	108	287
F_{sq}	60% of F(1-10) in juv. Area (<i>current fishery</i>)	172	210	47	163	282
F_{sq}	80% of F(1-10) in juv. area	172	238	24	213	277
F_{sq}	100% of F(1-10) in juv. area	164	265	0	265	273

J: Juvenile area: Divisions VIIe,f,g,h and VIIa,b,d.

A: Adult area: Divisions IIa, IIIa(west), IVa, VIa,b, and VIIb,c,j,k.

The catches are allocated to areas according to the proportion of catch-at-age by area in recent years (2000-2002). This forecast is based on different assumptions of the spatial distribution of the fishery, but assuming a constant distribution of the population and stable fishing mortality levels (at $F_{sq}(2000-2002)$).

Source of information:

Report of the Working Group on the Assessment of Mack-

erel, Horse Mackerel, Sardine and Anchovy, 9–18 September 2003 (ICES CM 2004/ACFM:08).

Catch data (Tables 3.12.4.1-6):

Year	ICES Advice	Predicted catch corresp. to advice	Agreed TAC ¹	ACFM landings	Disc. Slip	ACFM catch
1987	Not assessed	-	155	157	-	157
1988	No increase in catches	102	169	184	4	188
1989	If sustained catches required; TAC	100	153	267	1	269
1990	TAC	~200	203	363	10	373
1991	Within safe biological limits	-	230	328	5	334
1992	Within safe biological limits	-	250	369	2	371
1993	Within safe biological limits	-	250	424	9	433
1994	Prudent not to increase F	-	300	385	4	389
1995	Reduction in catch	-	300	509	2	511
1996	Reduction in catch	-	300	379	17	397
1997	Reduction in F	173	300	440	3	443
1998	Reduction in F to 0.15	150	320	296	1	304
1999	Effectively limit catches to 200 000 t	<200	265	274	-	274
2000	Effectively limit catches to 200 000 t	<200	240	175	-	175
2001	Effectively limit catches to 224 000 t	<224	233	191	-	191
2002	Effectively limit catches to 98 000 t	<98	150	172	-	172
2003	Effectively limit catches to 113 000 t	<113	137			
2004	Limit catches to less than 130 000 t	<130				

¹Division Vb (EU waters only), Subareas VI and VII, Divisions VIIa,b,d,e. Weights in '000 t.

Table 3.12.4.1 Landings (t) of HORSE MACKEREL in Subarea II. (Data as submitted by Working Group members.)

Country	1980	1981	1982	1983	1984	1985	1986	1987
Denmark	-	-	-	-	-	-	-	39
France	-	-	-	-	1	1	- ²	- ²
Germany, Fed.Rep	-	+	-	-	-	-	-	-
Norway	-	-	-	412	22	78	214	3,272
USSR	-	-	-	-	-	-	-	-
Total	-	+	-	412	23	79	214	3,311
	1988	1989	1990	1991	1992	1993	1994	1995
Faroe Islands	-	-	9643	1,115	9,157 ³	1,068	-	950
Denmark	-	-	-	-	-	-	-	200
France	-2	-	-	-	-	-	55	-
Germany, Fed. Rep.	64	12	+	-	-	-	-	-
Norway	6,285	4,770	9,135	3,200	4,300	2,100	4	11,300
USSR / Russia (1992 -)	469	27	1,298	172	-	-	700	1,633
UK (England + Wales)	-	-	17	-	-	-	-	-
Total	6,818	4,809	11,414	4,487	13,457	3,168	759	14,083
	1996	1997	1998	1999	2000	2001	2002 ¹	
Faroe Islands	1,598	799 ³	188 ³	132 ³	250 ³	-	-	
Denmark	-	-	1,755 ³			-		
France	-	-	-			-		
Germany	-	-	-			-		
Norway	887	1,170	234	2,304	841	44	1,321	
Russia	881	648	345	121	84 ³	16	3	
UK (England + Wales)	-	-	-			-		
Estonia	-	-	22					
Total	3,366	2,617	2,544	2557	1175	60	1,324	

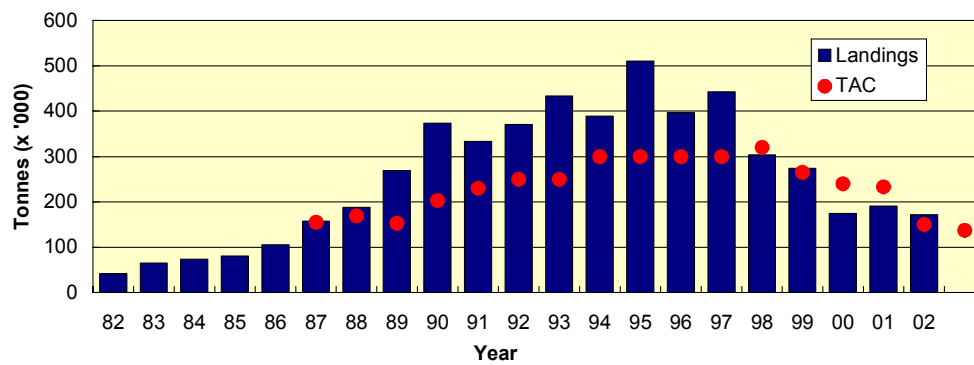
¹Preliminary.

²Included in Subarea IV.

³Includes catches in Division Vb.

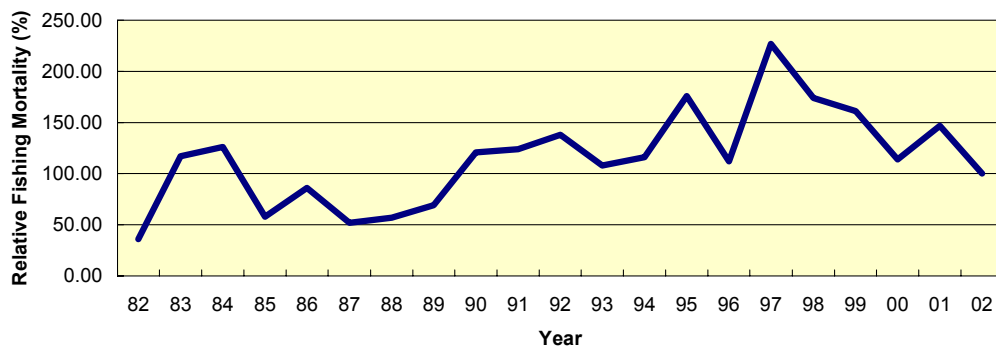
Western Horse Mackerel - Landings

Mean = 254.6



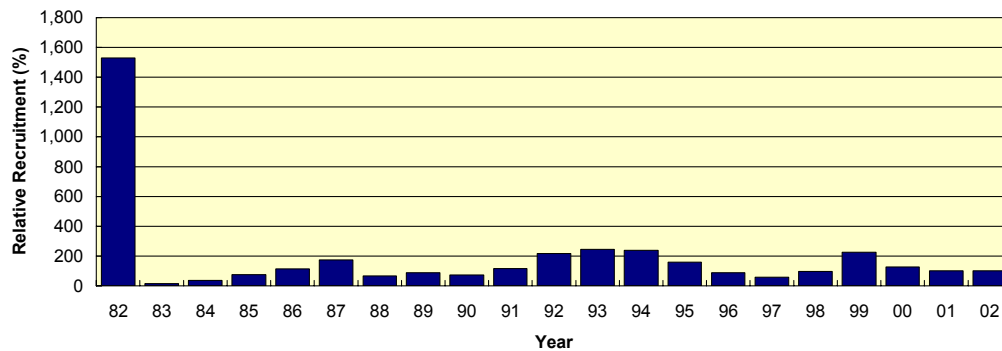
Western Horse Mackerel - Relative Fishing Mortality

Mean = 115.19



Western Horse Mackerel - Relative Recruitment (Age 0)

Mean = 187.6



Western Horse Mackerel - Relative Spawning Stock Biomass

Mean = 145.7

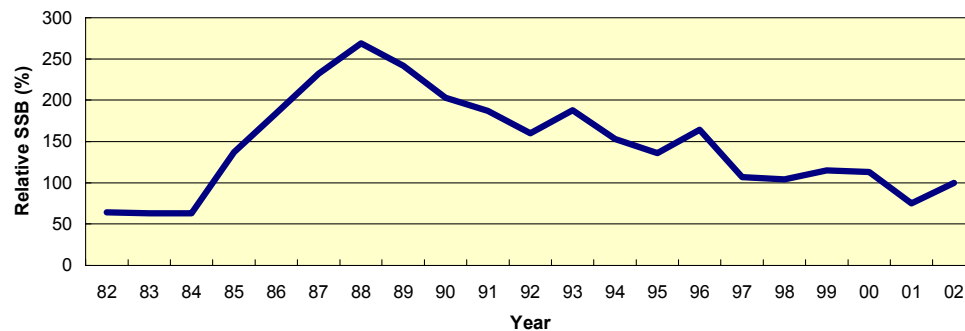


Table 3.12.4.2 Landings (t) of HORSE MACKEREL in Subarea IV and Division IIIa by country.
(Data submitted by Working Group members).

Country	1980	1981	1982	1983	1984	1985	1986	1987	1988
Belgium	8	34	7	55	20	13	13	9	10
Denmark	199	3,576	1,612	1,590	23,730	22,495	18,652	7,290	20,323
Faroe Islands	260	-	-	-	-	-	-	-	-
France	292	421	567	366	827	298	231 ²	189 ²	784 ²
Germany, Fed.Rep.	+	139	30	52	+	+	-	3	153
Ireland	1,161	412	-	-	-	-	-	-	-
Netherlands	101	355	559	2,029 ³	824	160 ³	600 ³	850 ⁴	1,060 ³
Norway ²	119	2,292	7	322	³	203	776	11,728 ⁴	34,425 ⁴
Poland	-	-	-	2	94	-	-	-	-
Sweden	-	-	-	-	-	-	2	-	-
UK (Engl. + Wales)	11	15	6	4	-	71	3	339	373
UK (Scotland)	-	-	-	-	3	998	531	487	5,749
USSR	-	-	-	-	489	-	-	-	-
Total	2,151	7,253	2,788	4,420	25,987	24,238	20,808	20,895	62,877

Country	1989	1990	1991	1992	1993	1994	1995	1996	1997
Belgium	10	13	-	+	74	57	51	28	-
Denmark	23,329	20,605	6,982	7,755	6,120	3,921	2,432	1,433	648
Estonia	-	-	-	293	-	-	17	-	-
Faroe Islands	-	942	340	-	360	275	-	-	296
France	248	220	174	162	302	-	-	-	-
Germany, Fed.Rep.	506	2,469 ⁵	5,995	2,801	1,570	1,014	1,600	7	7,603
Ireland	-	687	2,657	2,600	4,086	415	220	1,100	8,152
Netherlands	14,172	1,970	3,852	3,000	2,470	1,329	5,285	6,205	37,778
Norway	84,161	117,903	50,000	96,000	126,800	94,000	84,747	14,639	45,314
Poland	-	-	-	-	-	-	-	-	-
Sweden	-	102	953	800	697	2,087	-	95	232
UK (Engl. + Wales)	10	10	132	4	115	389	478	40	242
UK (N. Ireland)	-	-	350	-	-	-	-	-	-
UK (Scotland)	2,093	458	7,309	996	1,059	7,582	3,650	2,442	10,511
USSR / Russia (1992 -)	-	-	-	-	-	-	-	-	-
Unallocated + discards	12,482 ⁴	-317 ⁴	-750 ⁴	-278 ⁶	-3,270	1,511	-28	136	-31,615
Total	112,047	145,062	77,904	114,133	140,383	112,580	98,452	26,125	79,161

Country	1998	1999	2000	2001	2002 ¹
Belgium	19	21	19	19	1,004
Denmark	2,048	8,006	4,409	2,288	1,393
Estonia	22	-	-	-	-
Faroe Islands	28	908	24	-	699
France	379	60	49	48	-
Germany	4,620	4,071	3,115	230	2,671
Ireland	-	404	103	375	72
Netherlands	3,811	3,610	3,382	4,685	6,612
Norway	13,129	44,344	1,246	7,948	35,368
Russia	-	-	2	-	-
Sweden	3,411	1,957	1,141	119	575
UK (Engl. + Wales)	2	11	15	317	1,191
UK (Scotland)	3,041	1,658	3,465	3,161	255
Unallocated + discards	737	-325	14613	649	-149
Total	31,247	64,725	31583	19,839	49,691

¹Preliminary. ²Includes Division IIa. ³Estimated from biological sampling. ⁴Assumed to be misreported.

⁵Includes 13 t from the German Democratic Republic. ⁶Includes a negative unallocated catch of -4000 t.

Table 3.12.4.3 Landings (t) of HORSE MACKEREL in Subarea VI by country.
(Data submitted by Working Group members).

Country	1980	1981	1982	1983	1984	1985	1986	1987	1988
Denmark	734	341	2,785	7	-	-	-	769	1,655
Faroe Islands	-	-	1,248	-	-	4,014	1,992	4,450 ³	4,000 ³
France	45	454	4	10	14	13	12	20	10
Germany, Fed. Rep.	5,550	10,212	2,113	4,146	130	191	354	174	615
Ireland	-	-	-	15,086	13,858	27,102	28,125	29,743	27,872
Netherlands	2,385	100	50	94	17,500	18,450	3,450	5,750	3,340
Norway	-	5	-	-	-	-	83	75	41
Spain	-	-	-	-	-	-	- ²	- ²	- ²
UK (Engl. + Wales)	9	5	+	38	+	996	198	404	475
UK (N. Ireland)	-	-	-	-	-	-	-	-	-
UK (Scotland)	1	17	83	-	214	1,427	138	1,027	7,834
USSR	-	-	-	-	-	-	-	-	-
Unallocated + disc.	-	-	-	-	-	-19,168	-13,897	-7,255	-
Total	8,724	11,134	6,283	19,381	31,716	33,025	20,455	35,157	45,842

Country	1989	1990	1991	1992	1993	1994	1995	1996	1997
Denmark	973	615	-	42	-	294	106	114	780
Faroe Islands	3,059	628	255	-	820	80	-	-	-
France	2	17	4	3	+	-	-	-	52
Germany, Fed. Rep.	1,162	2,474	2,500	6,281	10,023	1,430	1,368	943	229
Ireland	19,493	15,911	24,766	32,994	44,802	65,564	120,124	87,872	22,474
Netherlands	1,907	660	3,369	2,150	590	341	2,326	572	498
Norway	-	-	-	-	-	-	-	-	-
Spain	-2	-2	1	3	-	-	-	-	-
UK (Engl. + Wales)	44	145	1,229	577	144	109	208	612	56
UK (N.Ireland)	-	-	1,970	273	-	-	-	-	767
UK (Scotland)	1,737	267	1,640	86	4,523	1,760	789	2,669	14,452
USSR/Russia (1992-)	-	44	-	-	-	-	-	-	-
Unallocated + disc.	6,493	143	-1,278	-1,940	-6,960 ⁴	-51	-41,326	-11,523	837
Total	34,870	20,904	34,456	40,469	53,942	69,527	83,595	81,259	40,145

Country	1998	1999	2000	2001	2002 ¹
Denmark	-	-	-	-	-
Faroe Islands	-	-	-	-	-
France	221	25,007	-	428	55
Germany	414	1,031	209	265	149
Ireland	21,608	31,736	15,843	20,162	12,341
Netherlands	885	1,139	687	600	450
Spain	-	-	-	-	-
UK (Engl. + Wales)	10	344	41	91	-
UK (N.Ireland)	1,132	-	-	-	-
UK (Scotland)	10,447	4,544	1,839	3,111	1,192
Unallocated +disc.	98	1,507	2,038	-21	3
Total	34,815	65,308	20,657	24,636	14,190

¹Preliminary.

²Included in Subarea VII.

³Includes Divisions IIIa, IVa,b and VIb.

⁴Includes a negative unallocated catch of -7000 t.

Table 3.12.4.4 Landings (t) of HORSE MACKEREL in Subarea VII by country.
Data submitted by the Working Group members).

Country	1980	1981	1982	1983	1984	1985	1986	1987	1988
Belgium	-	1	1	-	-	+	+	2	-
Denmark	5,045	3,099	877	993	732	1,477 ²	30,408 ²	27,368	33,202
France	1,983	2,800	2,314	1,834	2,387	1,881	3,801	2,197	1,523
Germany, Fed.Rep.	2,289	1,079	12	1,977	228	-	5	374	4,705
Ireland	-	16	-	-	65	100	703	15	481
Netherlands	23,002	25,000	27,500 ²	34,350	38,700	33,550	40,750	69,400	43,560
Norway	394	-	-	-	-	-	-	-	-
Spain	50	234	104	142	560	275	137	148	150
UK (Engl. + Wales)	12,933	2,520	2,670	1,230	279	1,630	1,824	1,228	3,759
UK (Scotland)	1	-	-	-	1	1	+	2	2,873
USSR	-	-	-	-	-	120	-	-	-
Total	45,697	34,749	33,478	40,526	42,952	39,034	77,628	100,734	90,253

Country	1989	1990	1991	1992	1993	1994	1995	1996	1997
Faroe Islands	-	28	-	-	-	-	-	-	-
Belgium	-	+	-	-	-	1	-	-	18
Denmark	34,474	30,594	28,888	18,984	16,978	41,605	28,300	43,330	60,412
France	4,576	2,538	1,230	1,198	1,001	-	-	-	27,201
Germany, Fed.Rep.	7,743	8,109	12,919	12,951	15,684	14,828	17,436	15,949	28,549
Ireland	12,645	17,887	19,074	15,568	16,363	15,281	58,011	38,455	43,624
Netherlands	43,582	111,900	104,107	109,197	157,110	92,903	116,126	114,692	81,464
Norway	-	-	-	-	-	-	-	-	-
Spain	14	16	113	106	54	29	25	33	-
UK (Engl. + Wales)	4,488	13,371	6,436	7,870	6,090	12,418	31,641	28,605	17,464
UK (N.Ireland)	-	-	2,026	1,690	587	119	-	-	1,093
UK (Scotland)	+	139	1,992	5,008	3,123	9,015	10,522	11,241	7,931
USSR / Russia (1992-)	-	-	-	-	-	-	-	-	-
Unallocated + discards	28,368	7,614	24,541	15,563	4,0103	14,057	68,644	26,795	58,718
Total	135,890	192,196	201,326	188,135	221,000	200,256	330,705	279,100	326,474

Country	1998	1999	2000	2001	2002 ¹
Faroe Islands	-	-	550	-	-
Belgium	18	-	-	-	1
Denmark	25,492	19,223	13,946	20,574	10,094
France	24,223	-	20,401	11,049	6,466
Germany	25,414	15,247	9,692	8,320	10,812
Ireland	51,720	25,843	32,999	30,192	23,366
Netherlands	91,946	56,223	50,120	46,196	37,605
Spain	-	-	50	7	0
UK (Engl. + Wales)	12,832	8,885	2,972	8,901	5,525
UK (N.Ireland)	-	-	-	-	-
UK (Scotland)	5,095	4,994	5,152	1,757	1,461
Unallocated + discards	12,706	31,239	1,884	11,046	2,576
Total	249,446	161,654	137,766	138,042	97,906

¹Provisional.

²Includes Subarea VI.

Table 3.12.4.5 Landings (t) of HORSE MACKEREL in Subarea VIII by country.
(Data submitted by Working Group members).

Country	1980	1981	1982	1983	1984	1985	1986	1987	1988
Denmark	-	-	-	-	-	-	446	3,283	2,793
France	3,361	3,711	3,073	2,643	2,489	4,305	3,534	3,983	4,502
Netherlands	-	-	-	-	²	²	²	²	-
Spain	34,134	36,362	19,610	25,580	23,119	23,292	40,334	30,098	26,629
UK (Engl. + Wales)	-	+	1	-	1	143	392	339	253
USSR	-	-	-	-	20	-	656	-	-
Total	37,495	40,073	22,684	28,223	25,629	27,740	45,362	37,703	34,177

Country	1989	1990	1991	1992	1993	1994	1995	1996	1997
Denmark	6,729	5,726	1,349	5,778	1,955	-	340	140	729
France	4,719	5,082	6,164	6,220	4,010	28	-	7	8,690
Germany, Fed. Rep.	-	-	80	62	-	-	-	-	-
Netherlands	-	6,000	12,437	9,339	19,000	7,272	-	14,187	2,944
Spain	27,170	25,182	23,733	27,688	27,921	25,409	28,349	29,428	31,081
UK (Engl. + Wales)	68	6	70	88	123	753	20	924	430
USSR/Russia (1992 -)	-	-	-	-	-	-	-	-	-
Unallocated + discards	-	1,500	2,563	5,011	700	2,038	-	3,583	-2,944
Total	38,686	43,496	46,396	54,186	53,709	35,500	28,709	48,269	40,930

Country	1998	1999	2000	2001	2002 ¹
Denmark	1,728	4,818	2,584	582	-
France	1,844	74	7	5,316	13,676
Germany	3,268	3,197	3,760	3,645	2,249
Ireland	-	-	6,485	1,483	704
Netherlands	6,604	22,479	11,768	36,106	12,538
Russia	-	-	-	-	-
Spain	23,599	24,190	24,154	23,531	22,110
UK (Engl. + Wales)	9	29	112	1,092	157
UK (Scotland)	-	-	249	-	-
Unallocated + discards	1,884	-8658	5,093	4,365	1,705
Total	38,936	46,129	54,212	76,120	54,560

¹Preliminary.

²Included in Subarea VII.

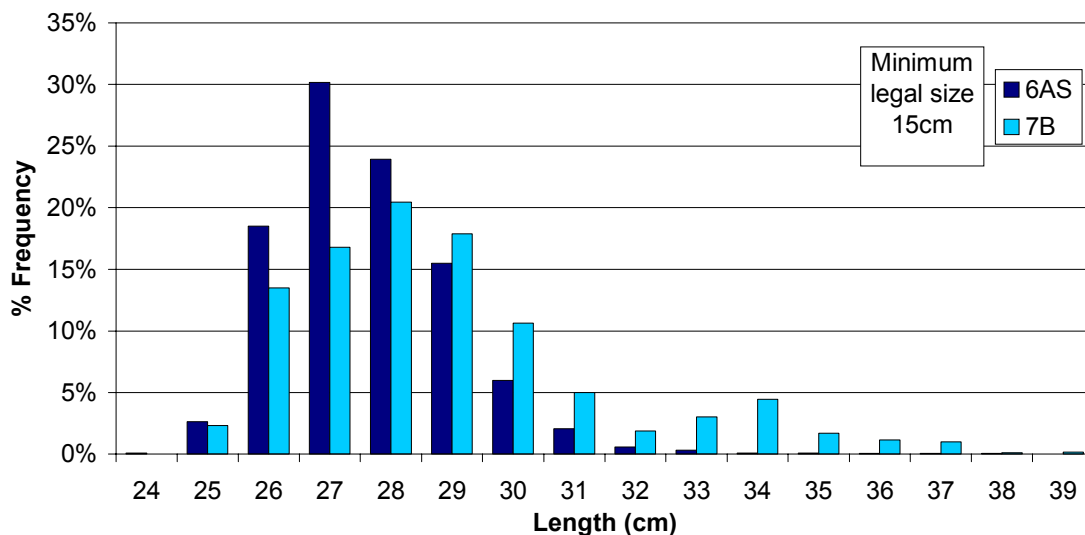
Table 3.12.4.6 Western horse mackerel (IIa, IVa, Vb, VIIa-c,e-k, VIIIabde): Stock summaries.

Apart from Landings, values are given in relative terms to account for the uncertainty of the absolute level from the recent assessment. Basis: F(1-10) and SSB: 2002 = 100%, Geometric mean recruitment (1983-2000) = 100%.

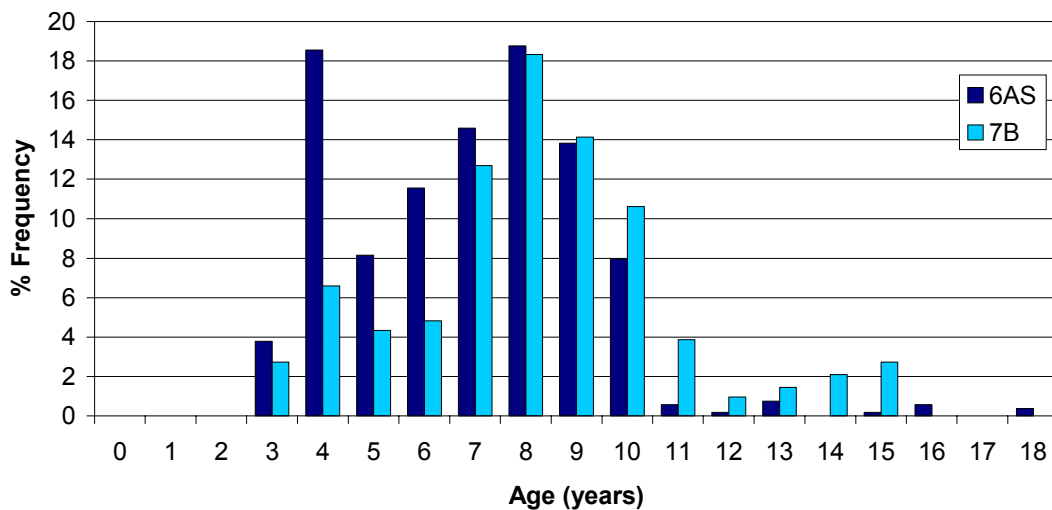
*Note that F(1-3) have been removed from 2000 and the recruitment figure for 2001 is given as a range as these values were considered highly uncertain. Recruitment 2002: geometric mean over weak year classes 1983-2000.

year	Recruitment age 0 (%)	SSB (%)	Landings (t)	mean F(1-3) (%)	mean F(4-10) (%)	mean F(1-10) (%)
1982	1529	64	41587	19	44	36
1983	14	63	64862	8	163	117
1984	36	63	73625	5	178	126
1985	74	137	80551	11	78	58
1986	114	184	105665	2	122	86
1987	174	232	157240	0	75	52
1988	68	269	188100	3	80	57
1989	87	242	268867	3	97	69
1990	72	203	373463	27	162	121
1991	115	187	333555	16	170	124
1992	217	160	370550	30	184	138
1993	244	188	433145	15	148	108
1994	239	153	388875	85	130	116
1995	160	136	510597	75	219	176
1996	89	164	396652	124	107	112
1997	57	107	442571	116	274	227
1998	97	104	303543	115	199	174
1999	225	115	273888	52	208	161
2000	128	113	174927	*	148	114
2001	100-2105*	75	191193	*	189	147
2002	100	100	172181	*	129	100

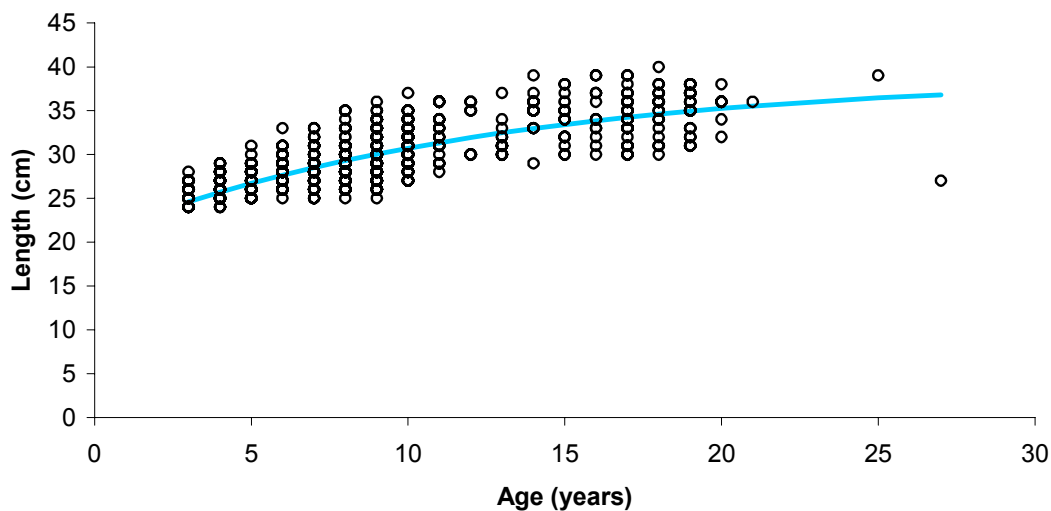
2002 Length Distribution: Irish Sampling, Horse Mackerel in 6AS 7B



2002 Age Distribution: Irish Sampling, Horse Mackerel in 6AS 7B



2002 Size at Age: Irish Sampling, Horse Mackerel in 6AS 7B



North Sea Horse Mackerel

(Division IIa (eastern part), Divisions IVb,c, VIId)

For latest information, see: <http://www.ices.dk>



Fisheries Science Services

FSS – ADVICE

FSS agrees with the ICES and STECF advice for this stock that catches should be limited to 18,000 t (based on the average catches from 1982-1997) in order to avoid an expansion of the fishery until there is further information about the structure of horse mackerel stocks. This translates to an associated Irish quota of about 690 t.

FSS express concern that, given the fundamental change in the North Sea fishery in recent years, a TAC based on the average catches over the period 1982-1997 will result in a much higher than expected juvenile mortality rate. FSS further advise that recruitment to the North Sea and Western horse mackerel stocks are strongly linked and that measures to protect juveniles should be applied to both stocks.

FSS agree with the STECF recommendation that Division VIId be transferred from the Western horse mackerel management area to the North Sea horse mackerel management area.

STATE OF THE STOCK

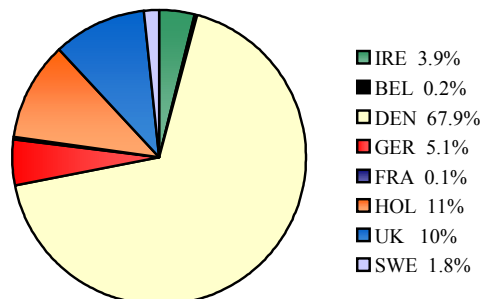
- The state of this stock is unknown. There are no reference points because of lack of data.
- Catches have increased in recent years but the 2002 catch of 23,000 t (estimate) was half the 2001 catch.
- The exploitation rate of juvenile fish may be increasing because of the change in the fishery from industrial by-catch to a targeted fishery on juveniles for human consumption.
- SSB estimates from egg surveys carried out in the early 1990s are no longer considered valid as horse mackerel is now believed to be an indeterminate spawner.

CURRENT MANAGEMENT

- The agreed TAC only applies to EU waters in Division IIa and Sub-area IV and does not correspond with the distribution of the stock. The stock and fishery extends over a greater area and includes the additional areas Divisions IIIa, and VIId.
- The 2003 TAC is 50,000 t. The EU quota is 41,667 t and the Irish quota is 1,641 t. The TAC has been set

consistently above the catch and the advice.

- There is no management plan for the fishery.



FSS – ECONOMIC COMMENTS

- The Irish landings from this stock in 2002 were 82 t worth about €33,000.
- Ireland did not take its full quota from this fishery in 2002 which was worth about €780,000.

ADDITIONAL INFORMATION

1. An attempted assessment of this stock in 2003 was not presented due to uncertainty and instability arising from conflicts in the catch and IBTS survey data, and model misspecification.
2. The total catch taken from this stock in 2002 was estimated to be around 23,000 t. This was half the catch taken in 2001 of 46,000 t. Ireland recorded only 82 t of horse mackerel from this fishery in 2002 compared with over 8,100 t for 1997.
3. Large Norwegian catches in IVa (estimated at 35,000 t) were included in the western catches.
4. The catches in the North Sea, which are attributed to either North Sea or western stock, are spatially contiguous. As the boundary between the two stocks is not precisely known, there may be errors in the allocation of catches to stock.
5. The TAC in 2002 was 58,000 t. This more than 2.5 times the catch. The high TAC (which has no scientific basis) allowed the fishery to expand in recent years.
6. Discarding of horse mackerel in the directed fishery is not a problem but catches of juvenile and adult mackerel are discarded.
7. The stock is exploited in a directed fishery for human consumption and in a fishery for industrial purposes. In earlier years the majority of the catch was taken as a by-catch in the small-mesh industrial fishery. In recent years most of the catch has come from a directed fishery for human consumption, mainly in Division VIId.
8. There has been a change in the directed fishery in recent years. The catch is now composed of large numbers juvenile fish (1-4 years old). These juvenile fish are exported to the Japanese market.

9. The stock mixes with the Western horse mackerel stock at certain times of the year. Preliminary results from the HOMSIIR project suggest that the North Sea Horse mackerel stock is distinct from the Western Stock.

ICES ADVICE

3.5.11

State of stock/exploitation:

The state of the stock is unknown. Catches have been increasing in recent years except for 2002 which was 50% lower than the highest catch on record in 2001.

Management objectives:

No explicit management objectives have been established for this stock.

Precautionary Approach Reference points: No precautionary reference points have been proposed for this stock.

Advice on management: ICES recommends that catches in 2004 be no more than the 1982-1997 average of 18 000 t, in order to avoid an expansion of the fishery until there is more information about the structure of horse mackerel stocks, and sufficient information to facilitate an adequate assessment. The TAC for this stock should apply to all areas in which North Sea horse mackerel are fished, i.e., Divisions IIIa, (eastern part), IVbc, and VIId.

Relevant factors to be considered in management:

ICES advice is the same as last year. The advice is aimed at constraining an expansion of the fishery until there is a scientific basis for advice. High catch rates can be maintained in pelagic fisheries even when the stock is in decline. Catches and TAC in recent years have been substantially higher than the advice.

These fish migrate out of the North Sea to areas where they mix with the western horse mackerel stock. The present agreed TAC is for the North Sea and Division IIIa and this area does not correspond to the distribution area of the stock. The TAC should apply to all those areas where the North Sea horse mackerel are fished, i.e. Divisions IIIa, IVb,c and VIId.

In recent years there has been a change in the age composition of the landings with a higher proportion of younger age groups.

Catch forecast for 2003:

Not available.

Medium- and long-term projections:

Not available.

Elaboration and special comment:

In earlier years the majority of the catch was taken as by-catch in the small-mesh industrial fishery. In recent years most of the catch has come from a directed fishery for human consumption, mainly in Division VIId.

The allocation of catches to the different horse mackerel stocks is based on the temporal and spatial distribution of the fishery. It is therefore important that the fishing nations report their catches by ICES rectangle and by quarter.

Independent data on the development of the stock are not available. The quality of the biological data is poor. No assessment is possible.

Source of information:

Report of the Working Group on the Assessment of Mackerel, Horse Mackerel, Sardine and Anchovy, 9 – 18 September 2003 (ICES CM 2004/ACFM:08).

Catch data (Tables 3.5.11.1-2):

Year	ICES Advice	Predicted catch corresp. To advice	Agreed TAC ¹	ACFM landings ²
1987	Not assessed	-	30	12
1988	No advice	-	50	24
1989	No advice	-	45	33
1990	No advice	-	40	19
1991	No advice	-	45	12
1992	No advice	-	55	15
1993	No advice	-	60	14
1994	No advice	-	60	6
1995	No advice	-	60	17
1996	No advice	-	60	19
1997	No advice	-	60	20
1998	Develop and implement management plan	-	60	31
1999	Develop and implement management plan	-	60	37
2000	Develop and implement management plan	-	51	48
2001	No increase in catch	-	51	46
2002	No increase in catch from 1982-1997 average	<18	58	23
2003	No increase in catch from 1982-1997 average	<18	50	
2004	No increase in catch from 1982-1997 average	<18		

¹Division IIa and Subarea IV (EU waters only). ²Catch of North Sea stock (Divisions IIIaE, IVb,c & VIId). Weights in '000 t.

Table 3.5.11.1 Landings and discards of HORSE MACKEREL (t) by year and division, for the North Sea, Western and Southern horse mackerel. (Data submitted by Working Group members.)

Year	North Sea horse mackerel					Western horse mackerel					Southern horse mackerel			Total All stocks		
	IIIa	IVb,c	Discards	VIIId	Total	IIa	IVa	VIa,b	VIIa-c-k	VIIIa,b,d,e	Discards	Total	VIIIc		IXa	Total
1982	-	2,788 ³	-	1,247	4,035	-	-	6,283	32,231	3,073	-	41,587	19,610	39,726	59,336	104,958
1983	-	4,420 ³	-	3,600	8,020	412	-	24,881	36,926	2,643	-	64,862	25,580	48,733	74,313	147,195
1984	-	25,893 ³	-	3,585	29,478	23	94	31,716	38,782	2,510	500	73,625	23,119	23,178	46,297	149,400
1985	1,138	22,897		2,715	26,750	79	203	33,025	35,296	4,448	7,500	80,551	23,292	20,237	43,529	150,830
1986	396	19,496		4,756	24,648	214	776	20,343	72,761	3,071	8,500	105,665	40,334	31,159	71,493	201,806
1987	436	9,477		1,721	11,634	3,311	11,185	35,197	99,942	7,605	-	157,240	30,098	24,540	54,638	223,512
1988	2,261	18,290		3,120	23,671	6,818	42,174	45,842	81,978	7,548	3,740	188,100	26,629	29,763	56,392	268,163
1989	913	25,830		6,522	33,265	4,809	85,304 ²	34,870	131,218	11,516	1,150	268,867	27,170	29,231	56,401	358,533
1990	14,872 ¹	17,437		1,325	18,762	11,414	112,753 ²	20,794	182,580	21,120	9,930	373,463	25,182	24,023	49,205	441,430
1991	2,725 ¹	11,400		600	12,000	4,487	63,869 ²	34,415	196,926	25,693	5,440	333,555	23,733	21,778	45,511	391,066
1992	2,374 ¹	13,955	400	688	15,043	13,457	101,752	40,881	180,937	29,329	1,820	370,550	24,243	26,713	50,955	436,548
1993	850 ¹	3,895	930	8,792	13,617	3,168	134,908	53,782	204,318	27,519	8,600	433,145	25,483	31,945	57,428	504,190
1994	2,492 ¹	2,496	630	2,503	5,689	759	106,911	69,546	194,188	11,044	3,935	388,875	24,147	28,442	52,589	447,153
1995	240	7,948	30	8,666	16,756	13,133	90,527	83,486	320,102	1,175	2,046	510,597	27,534	25,147	52,681	580,034
1996	1,657	7,558	212	9,416	18,843	3,366	18,356	81,259	252,823	23,978	16,870	396,652	24,290	20,400	44,690	460,185
1997	2,037 ⁴	15,504 ⁵	10	5,452	19,540	2,617	63,647	40,145	318,101	11,677	2,921	442,571	29,129	27,642	56,771	518,882
1998	3,693	10,530	83	16,194	30,500	2,540 ⁶	17,011	35,043	232,451	15,662	830	303,543	22,906	41,574	64,480	398,523
1999	2,095 ⁴	9,335		27,889	37,224	2,557 ⁷	47,316	40,381	158,715	22,824		273,888	24,188	27,733	51,921	363,033
2000	1,105 ⁴	25,954		22,471	48,425	1,169 ⁸	4,524	20,657	115,245	32,227		174,927	21,984	27,160	49,144	272,496
2001	157 ⁹	8,157		38,114	46,425	60	11,525 ¹⁰	24,636	100,676	54,293		191,193	20,828	24,911	45,739	283,357
2002	179 ⁴	12,636	20	10,723	23,379	1,324	36,855	14,190	86,878	32,450	305	172,182	22,110	23,665	45,775	241,336

¹Norwegian and Danish catches are included in the Western horse mackerel.

²Norwegian catches in Division IVb included in the Western horse mackerel.

³Divisions IIIa and IVb,c combined.

⁴Included in Western horse mackerel.

⁵Norwegian catches in IVb (1,426 t) included in Western horse mackerel.

⁶Includes 1937 t from Vb.

⁷Includes 132 t from Vb.

⁸Includes 250 t from Vb.

⁹Includes 72 t allocated to western horse mackerel.

¹⁰Includes 69 t allocated to North Sea horse mackerel.

Table 3.5.11.2 Landings (t) of HORSE MACKEREL in Subarea IV and Division IIIa by country.
(Data submitted by Working Group members).

Country	1980	1981	1982	1983	1984	1985	1986	1987	1988
Belgium	8	34	7	55	20	13	13	9	10
Denmark	199	3,576	1,612	1,590	23,730	22,495	18,652	7,290	20,323
Faroe Islands	260	-	-	-	-	-	-	-	-
France	292	421	567	366	827	298	231 ²	189 ²	784 ²
Germany, Fed.Rep.	+	139	30	52	+	+	-	3	153
Ireland	1,161	412	-	-	-	-	-	-	-
Netherlands	101	355	559	2,029 ³	824	160 ³	600 ³	850 ⁴	1,060 ³
Norway ²	119	2,292	7	322	³	203	776	11,728 ⁴	34,425 ⁴
Poland	-	-	-	2	94	-	-	-	-
Sweden	-	-	-	-	-	-	2	-	-
UK (Engl. + Wales)	11	15	6	4	-	71	3	339	373
UK (Scotland)	-	-	-	-	3	998	531	487	5,749
USSR	-	-	-	-	489	-	-	-	-
Total	2,151	7,253	2,788	4,420	25,987	24,238	20,808	20,895	62,877

Country	1989	1990	1991	1992	1993	1994	1995	1996	1997
Belgium	10	13	-	+	74	57	51	28	-
Denmark	23,329	20,605	6,982	7,755	6,120	3,921	2,432	1,433	648
Estonia	-	-	-	293	-	-	17	-	-
Faroe Islands	-	942	340	-	360	275	-	-	296
France	248	220	174	162	302	-	-	-	-
Germany, Fed.Rep.	506	2,469 ⁵	5,995	2,801	1,570	1,014	1,600	7	7,603
Ireland	-	687	2,657	2,600	4,086	415	220	1,100	8,152
Netherlands	14,172	1,970	3,852	3,000	2,470	1,329	5,285	6,205	37,778
Norway	84,161	117,903	50,000	96,000	126,800	94,000	84,747	14,639	45,314
Poland	-	-	-	-	-	-	-	-	-
Sweden	-	102	953	800	697	2,087	-	95	232
UK (Engl. + Wales)	10	10	132	4	115	389	478	40	242
UK (N. Ireland)	-	-	350	-	-	-	-	-	-
UK (Scotland)	2,093	458	7,309	996	1,059	7,582	3,650	2,442	10,511
USSR / Russia (1992 -)	-	-	-	-	-	-	-	-	-
Unallocated + discards	12,482 ⁴	-317 ⁴	-750 ⁴	-278 ⁶	-3,270	1,511	-28	136	-31,615
Total	112,047	145,062	77,904	114,133	140,383	112,580	98,452	26,125	79,161

Country	1998	1999	2000	2001	2002 ¹
Belgium	19	21	19	19	1,004
Denmark	2,048	8,006	4,409	2,288	1,393
Estonia	22	-	-	-	-
Faroe Islands	28	908	24	-	699
France	379	60	49	48	-
Germany	4,620	4,071	3,115	230	2,671
Ireland	-	404	103	375	72
Netherlands	3,811	3,610	3,382	4,685	6,612
Norway	13,129	44,344	1,246	7,948	35,368
Russia	-	-	2	-	-
Sweden	3,411	1,957	1,141	119	575
UK (Engl. + Wales)	2	11	15	317	1,191
UK (Scotland)	3,041	1,658	3,465	3,161	255
Unallocated + discards	737	-325	14613	649	-149
Total	31,247	64,725	31583	19,839	49,691

¹ Preliminary. ² Includes Division IIa. ³ Estimated from biological sampling. ⁴ Assumed to be misreported.

⁵ Includes 13 t from the German Democratic Republic. ⁶ Includes a negative unallocated catch of -4,000 t.

Blue Whiting Combined Stock

(Sub-areas I-IX, XII and XIV)

For latest information, see: <http://www.ices.dk>



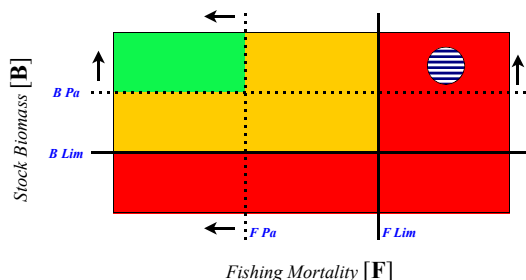
Fisheries Science Services

FSS – ADVICE

FSS agrees with ICES advice that catches should be less than 925,000 t in 2004, in order to achieve a 50% probability that the fishing mortality is less than F_{pa} (= 0.32). This will also assure a high probability that the spawning stock biomass in 2005 will be above B_{pa} .

STATE OF THE STOCK

State of the Stock in relation to the precautionary reference points (see page 18)



- The state of this stock is uncertain. ICES classifies this stock as being likely to be harvested outside safe biological limits.
- The landings in 2002 were over 1.5 million tonnes, a decrease from 2001. Landings from 1998 to 2001 have been more than double those of the previous four years.
- The fishing mortality has increased dramatically since the late 1990s. Fishing mortality is estimated to be = 0.51. ICES considers the current exploitation rate is not sustainable, with a high probability that F is close to F_{lim} . The current precautionary reference points may not be appropriate because the current assessment suggests that the stock has been at a higher level in the historic period than previously thought.
- A number of very strong year classes have recruited to the stock in recent years – particularly those of 1997, 1998, 2000 and 2001. A few recent year classes support the fishery.
- The spawning stock biomass increased substantially in the late 1990s as a result of the strong recruitment. SSB is expected to decline at the current level of fishing mortality.

- Current SSB is estimated to be greater than 3 million tonnes which is above the B_{pa} of 2.25 million tonnes.
- A probabilistic forecast was presented in 2003 which shows that at a (median) fishing mortality of F_{pa} in 2004 SSB is likely to remain above B_{pa} in 2005.

CURRENT MANAGEMENT

- There is no TAC that is applied to the total fishery for this stock. The agreed management plan has not been implemented yet. In its absence, the coastal states and the Russian Federation implemented unilateral catch limits for 2002 and 2003.
- Ireland has a share (16%) of the EU catch limit.
- In June 2003 the EU set a 250,000 t TAC for EU vessels in international waters. No Irish vessels availed of this allocation because there was no opportunity to fish the stock in the international waters west of Ireland.
- The assessment of the stock includes all catches taken over the entire area of the distribution. The assessment therefore includes catches taken in
 - Norwegian Sea fishery (Subareas I+II and Divisions Va, XIVa-b)
 - Fishery in the spawning area (Divisions Vb, VIa, VIb, VIIb-c)
 - Industrial mixed fishery (Divisions IVa-c, Vb, and IIIa)
 - Southern fishery (Subareas VIII+IX, Divisions VIId, e, g-k).
- The EU, Faroe Islands, Iceland and Norway agreed in 2001 to implement a long term management plan for the fisheries. This is aimed at maintaining the stock within safe biological limits. The plan, outlined in the ICES summary sheet below, is aimed at preventing the stock falling below B_{lim} (1.5 million tonnes) and permitting catches in 2003 and subsequent years that would generate a fishing mortality less than 0.32. If the stock should fall below B_{pa} (2.25 million tonnes) then the fishing mortality rate should be adjusted accordingly

FSS – ECONOMIC COMMENTS

- The Irish catch in 2002 was 17,825 t, valued at about €1.7 million.
- The value of the Irish quota in 2003 is about €1.7 million.
- A large proportion of the total catch prior to 2001 has been reduced for fishmeal at Killybegs. However considerable efforts have been made by BIM and the North West Pelagic Management Advisory

Committee to increase the amount of catch that is suitable for human consumption. The fishery may become much more profitable in future if these efforts are successful.

- 20% of the catch was landed as frozen product for human consumption in 2002. 44% of the catch was landed outside Ireland.
- Although the Irish catch is restricted because of a reduced quota, the fishery still remains a valuable resource to the Irish fleet. The spawning grounds are off the west coast of Ireland and the main spawning occurs during the period February to April. It is therefore possible for the Irish fleet to land a better quality fish from easily accessible grounds. It is important that the efforts of BIM and the processing industry continue.

ADDITIONAL INFORMATION

1. The assessment of this stock is considered to be uncertain because of conflicting signals between the catch and survey data. The current instability in the assessment means that any revision of the SSB reference points will have to await a more stable assessment.
2. The total catch taken from this stock during 2002 was over 1.5 million tonnes. There was no agreed TAC for 2002.
3. The Irish catch in 2002 was 17,825 t compared with 29,900 t in 2001 and 25,000 t in 2000. The Irish catch in recent years has been limited because of the small quota.
4. Area misreporting may be a problem in this fishery. Catches taken by some countries within the EU zone are believed to be reported as having been taken outside the zone.
5. The main catches are taken by Norway, Russia, Faroe Is and Iceland. Catches by Russia, Iceland and the Faroe Is have doubled over recent years. The vast bulk of the catch with the exception of that taken by Russia and the Netherlands is reduced for fish meal.
6. The Irish fishery for blue whiting has developed since 1997. This was mainly because of the reduced quota on mackerel and horse mackerel and because of the increased prices for fishmeal in 1998. The fishery has considerable potential for the larger Killybegs vessels.
7. Irish sampling of this stock is supported through the EC funded sampling programme which is required under the Data Collection Regulation 1543/2000 and 1639/2001. Ireland commenced a sampling programme on blue whiting in 1998 as a result of a joint programme between the processing industry at Killybegs and the Marine Institute. Irish scientists have participated in the Norwegian acoustic surveys on the stock each spring since 1999 and in 2003 submitted data to the Northern Pelagic Assessment Working Group. The age distribution of the Irish samples in 2002 was dominated by 3 year old and 4 year old fish (the 1998 and 1999 year class). The length distribution of the Irish catches in 2002 was dominated by fish between 24 cm. and 30 cm.
8. ICES has stated that joint surveys are needed to achieve a better assessment. Acoustic surveys, carried out by Norway and Russia play a very important role

in the assessment of this stock. Ireland plans to participate in this survey programme in 2004, for the first time.

9. Iceland, EC, Norway, Faroe Islands, Greenland and Russia asked ICES to provide information on age/size composition and to evaluate possible measures to reduce exploitation of juveniles in this fishery. It was recommended that minimum sizes be extended to other areas where significant numbers of juvenile fish are taken in directed fisheries. ICES concluded that the introduction of a minimum size may limit the exploitation of juveniles, but lead to increased discarding.
10. There was a change in the distribution of catches in 2001 and 2002 whereby large catches are now taken in Div Va in quarter 3. These catches are mainly taken in Icelandic waters and comprise mainly juvenile fish.
11. ICES was requested to provide medium term projections using scenarios as considered appropriate, by NEAFC. However, given the uncertainty in stock size and the recent change in recruitment, such a forecast is not considered informative. A previous analysis suggested that a fishing mortality somewhat below the current F_{pa} appeared to imply a low risk of SSB dropping below B_{lim} .
12. ICES commented that increases in mesh size were unlikely to reduce the exploitation of juvenile blue whiting. ICES further commented that the Icelandic measures taken in Va should be extended to Vb, IVa and IIa, to reduce the heavy exploitation of juvenile fish. This measure closed the fishery when 50% of the catch was smaller than 25 cm.

ICES ADVICE

3.12.5.a

State of stock/exploitation

The current estimates of SSB and fishing mortality are uncertain. Nevertheless, the spawning stock biomass in 2003 is likely to be above B_{pa} . Therefore, based on the most recent estimates of fishing mortality and SSB, ICES classifies the stock as likely to be harvested outside safe biological limits ($F > F_{lim}$). Total landings in 2002 were almost 1.6 million t. The incoming year classes seem to be strong.

Management objectives:

EU, Faroe Islands, Iceland, and Norway agreed to implement a long-term management plan for the fisheries of the blue whiting stock, which is consistent with a precautionary approach, aimed at constraining the harvest within safe biological limits and designed to provide for sustainable fisheries and a greater potential yield. The plan shall consist of the following:

1. *Every effort shall be made to prevent the stock from falling below the minimum level of Spawning Stock Biomass (SSB) of 1 500 000 tonnes.*
2. *For 2003 and subsequent years, the Parties agreed to restrict their fishing on the basis of a TAC consistent with a fishing mortality less than 0.32 for appro-*

appropriate age groups as defined by ICES, unless future scientific advice requires modification of the fishing mortality rate.

3. Should the SSB fall below a reference point of 2 250 000 tonnes (B_{pa}) the fishing mortality rate, referred to under paragraph 1, shall be adapted in the light of scientific estimates of the conditions then prevailing. Such an adaptation shall ensure a safe and rapid recovery of the SSB to a level in excess of 2 250 000 tonnes.
4. In order to enhance the potential yield, the Parties shall implement appropriate measures, which will reduce catches of juvenile blue whiting.

5. The Parties shall, as appropriate, review and revise these management measures and strategies on the basis of any new advice provided by ICES.

The agreed management plan has not been implemented yet. In the absence of agreements on a TAC for 2002 and 2003, the Coastal States and the Russian Federation implemented unilateral catch limits for these years.

ICES has not been able to evaluate the management plan with respect to its conformity to the precautionary approach, because of the large uncertainties in the estimates of the current stock size

Precautionary Approach reference points (proposed in 1998):

ICES considers that:	ICES proposes that:
B_{lim} is 1.5 mill t	B_{pa} be set at 2.25 million t
F_{lim} is 0.51	F_{pa} be set at 0.32

Technical basis

$B_{lim} \cdot B_{loss}$	$B_{pa} = B_{lim} \exp(1.645 \cdot \sigma) \sigma = 0.25$
$F_{lim} \cdot F_{loss} (0.51)$	$F_{pa} \cdot F_{med} (1998)$

Advice on management:

ICES recommends that catches should be less than 925 000 tonnes in 2004 in order to achieve a 50% probability that the fishing mortality in 2004 is less than F_{pa} (=0.32). This will also assure a high probability that the spawning stock biomass in 2005 will be above B_{pa} .

Relevant factors to be considered in management:

The current estimate of stock size is uncertain. This is caused by conflicting signals in the catch and survey data, which can be interpreted in different ways by different model formulations. The increase in the catches observed in recent years can be explained by increases in recruitment, increases in fishing mortality or a combination of the two. ICES considers that developing joint surveys is essential to improve the basis for this assessment.

Even considering the uncertainties in the stock parameters ICES considers that the current exploitation rate is not sustainable with a high probability that F is above F_{pa} . The advice implies a reduction in fishing mortality; however, the absolute magnitude of the decrease cannot be ascertained from the current assessment. The spawning stock biomass reached a peak in 1999 due to the strong year classes 1995, 1996, and 1997. Even though the 1999, 2000, and 2001 year classes seem to be strong, the SSB is expected to decline at the present level of fishing mortality.

The current estimates of exploitation rate and pattern

means that few recent year classes support the fishery. The estimate of year class strength for such young age groups is uncertain. The shift in dominance to younger ages in the stock in recent years can be caused by an overall increase in fishing mortality and increased recruitment or by a change in the fishing pattern.

The proposed precautionary approach reference points for this stock may not be appropriate because the current assessment suggests that the stock has been at a higher level over a historical period than in previous assessments. However, biological reference points should only be revised once a reliable analytical assessment of the stock is available.

Blue whiting is widely distributed in the eastern North Atlantic. Its distribution extends from the Strait of Gibraltar to the Barents Sea. It consists of several populations with genetic "leakage" between them, but it is treated as one stock since it has so far not been possible to define an unambiguous border between populations.

Catch forecast for 2004:

A probabilistic forecast is presented for this stock. The probabilistic forecast assumes a *status quo* fishing mortality for 2003. Given a certain catch being taken in 2004, the probabilities of the realised fishing mortality in 2004 and the SSB in 2004 and 2005 are presented. The median value is considered to be the most likely estimate and the 25 and 75 percentiles are considered to be the appropriate confidence intervals around the estimates.

$F_{2003}=F_{2002}=0.49$ (0.41-0.60)¹, Median catch 2003=1513 (1471-1557)¹, SSB 2003 = 3382 (2840-3921)¹.

Catch 2004	F2004		SSB2004		SSB 2005	
	median	Confidence interval	median	Confidence interval	median	Confidence interval
500	0.16	(0.13 - 0.20)	3029	(2433 - 3697)	3148	(2583 - 3722)
600	0.20	(0.16 - 0.25)	3003	(2410 - 3673)	3067	(2496 - 3636)
700	0.23	(0.19 - 0.30)	2977	(2386 - 3648)	2977	(2408 - 3547)
800	0.27	(0.22 - 0.35)	2951	(2364 - 3622)	2889	(2322 - 3463)
900	0.31	(0.25 - 0.40)	2923	(2337 - 3596)	2801	(2236 - 3378)
925	0.32	(0.26 - 0.41)	2917	(2333 - 3589)	2778	(2215 - 3357)
1000	0.35	(0.28 - 0.45)	2897	(2318 - 3569)	2711	(2152 - 3289)
1100	0.39	(0.31 - 0.51)	2870	(2292 - 3541)	2619	(2068 - 3201)
1200	0.43	(0.35 - 0.57)	2840	(2262 - 3512)	2529	(1980 - 3115)
1300	0.48	(0.38 - 0.63)	2808	(2231 - 3482)	2442	(1897 - 3024)
1400	0.53	(0.42 - 0.70)	2779	(2198 - 3452)	2357	(1814 - 2943)
1500	0.58	(0.46 - 0.77)	2745	(2169 - 3421)	2272	(1726 - 2860)
1600	0.63	(0.49 - 0.84)	2718	(2135 - 3390)	2191	(1645 - 2772)
1700	0.68	(0.53 - 0.92)	2684	(2102 - 3360)	2108	(1562 - 2691)
1800	0.74	(0.57 - 1.00)	2656	(2069 - 3329)	2023	(1485 - 2602)
1900	0.79	(0.62 - 1.09)	2623	(2032 - 3297)	1939	(1418 - 2517)
2000	0.86	(0.66 - 1.19)	2585	(1993 - 3264)	1853	(1342 - 2428)

Weights in '000 tonnes. ¹⁾ Median value and between brackets the 25 and 75 percentiles.

Confidence intervals refer to 25 and 75 percentiles of the probability distribution of the forecast.

Shaded scenarios have a higher than 50% probability that the fishing mortality in 2004 is above F_{pa} (=0.32).

Comparison with previous assessment and advice:

Although the current assessment is uncertain, the median value of the distribution of spawning stock biomass trajectories suggests an overall higher estimate of the stock abundance in the historical period compared to the assessments made in 1999 to 2002. Furthermore, the assessment has a tendency to underestimate stock size and overestimate fishing mortality in the most recent years. The 2002 and 2003 surveys on the spawning grounds found most age classes to be more abundant than was indicated by earlier surveys. These surveys also suggest that recruitment continues to be at a higher level than it was before 1995.

Last year the advice was to limit catches to 600 000 tonnes in order to achieve a fishing mortality less than $F_{pa}=0.32$. This year the advice is on the same basis and corresponds to predicted landings of 925 000 tonnes. The increase in predicted landings is due to high recruitment in recent years.

Elaboration and special comment:

Most of the catches are taken in the directed pelagic trawl fishery in the spawning and post-spawning areas (Divisions Vb, VIa,b, and VIIb,c). Catches are also taken in a directed and a mixed fishery in Subarea IV and Division IIIa and in the pelagic trawl fishery in the Subareas I and II, and in Divisions Va and XIVa,b. These fisheries in the northern areas have taken 340 000–1 390 000 t per year in the last decade, while catches in the southern areas (Subarea VIII, IX, Divisions VIId,e and g-k) have been stable in the range of 25 000–34 000 t. In Division IXa

blue whiting is mainly taken as by-catch in mixed trawl fisheries.

The analytical assessment is based on catch data and acoustic surveys, but point estimates of stock size and fishing mortality are considered uncertain. Therefore the catch forecast is based on a methodology, which addresses the uncertainty and the interdependence between estimates of SSB and F. The results of the stock assessment and catch forecast are presented in terms of median estimates together with appropriate confidence intervals (**Figure 3.12.5.a.1**).

The technical background is that a stochastic simulation was carried out using a non-parametric bootstrap of the residuals of the model fit to the catch and survey data. The results of the stochastic simulation in terms of SSB against fishing mortality in 2002 are presented in Figure 3.12.5. a.2 and indicate the interdependence in F and SSB in the current assessment and also the starting condition for the short-term forecast. The confidence intervals estimated by the model are likely to be underestimates of the true uncertainty because the recruitment estimates for the 2000 and 2001 year classes have been assumed to be without uncertainty.

Source of information:

Report of the Northern Pelagic and Blue Whiting Fisheries Working Group, 29 April – 8 May 2003 (ICES CM 2003/ACFM:23)

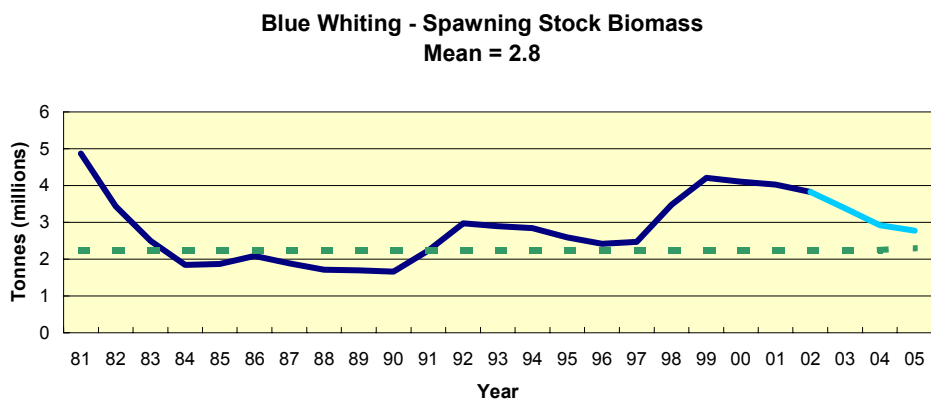
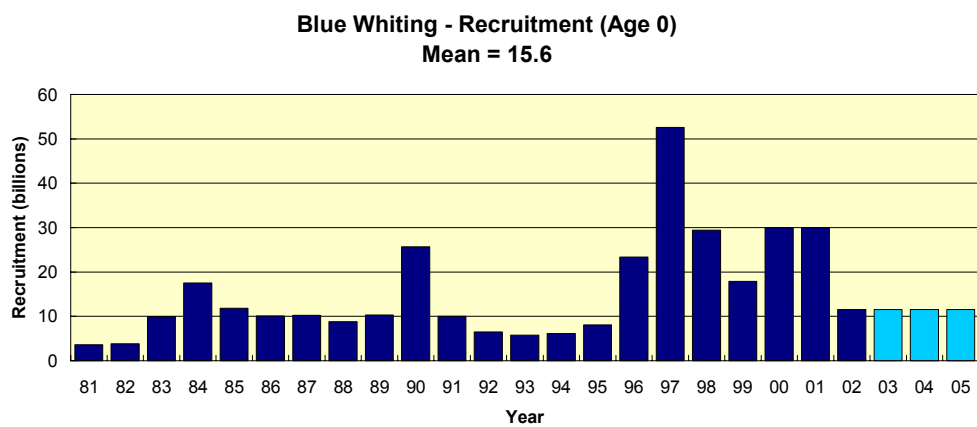
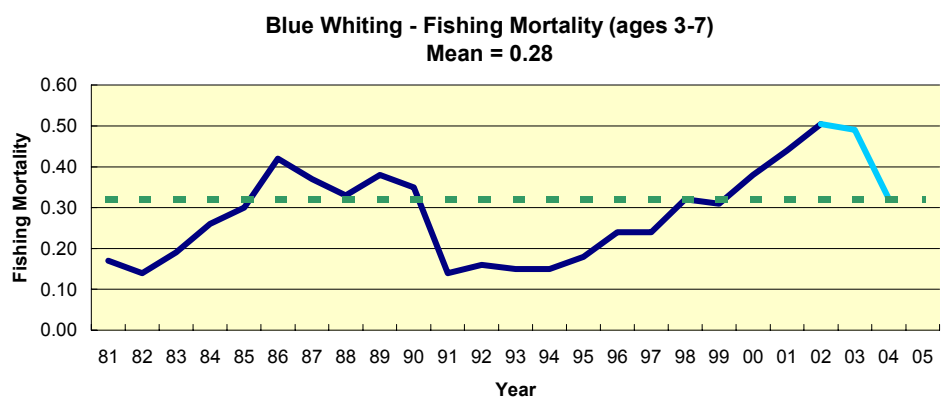
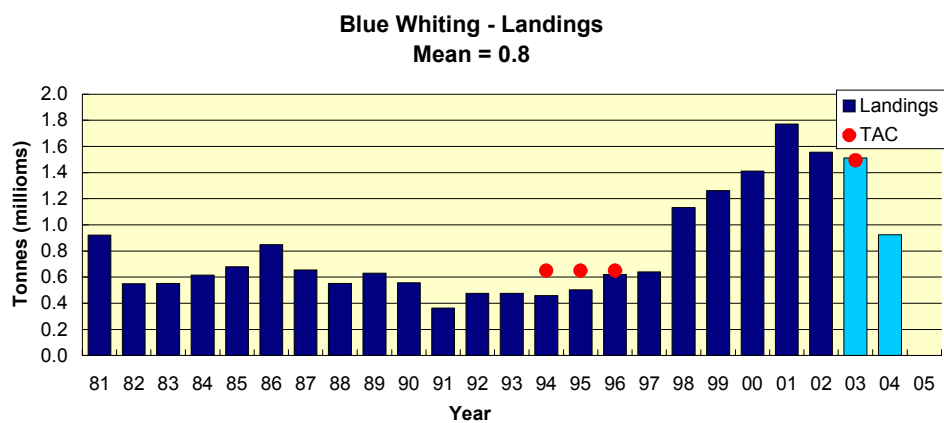
Catch data (Tables 3.12.5.a.1–9):

Year	ICES Advice	Predicted catch corresp. to advice	Agreed TAC	ACFM catch
1987	TAC for northern areas; no advice for southern areas	950	-	665
1988	TAC for northern areas; no advice for southern areas	832	-	558
1989	TAC for northern areas; no advice for southern areas	630	-	627
1990	TAC for northern areas; no advice for southern areas	600	-	562
1991	TAC for northern areas; no advice for southern areas	670	-	370
1992	No advice	-	-	475
1993	Catch at <i>status quo</i> F (northern areas); no assessment for southern areas	490	-	481
1994	Precautionary TAC (northern areas); no assessment for southern areas	485	650 ¹	459
1995	Precautionary TAC for combined stock	518	650 ¹	579
1996	Precautionary TAC for combined stock	500	650 ¹	646
1997	Precautionary TAC for combined stock	540		672
1998	Precautionary TAC for combined stock	650		1125
1999	Catches above 650 000 t may not be sustainable in the long run	650		1256
2000	F should not exceed the proposed F_{pa}	800		1412
2001	F should not exceed the proposed F_{pa}	628		1780
2002	Rebuilding plan	0		1555
2003	F should be less than the proposed F_{pa}	600		
2004	Achieve 50% probability that F will be less than F_{pa}	925		

¹NEAFC proposal for NEAFC regions 1 and 2. Weights in '000 t.

Table 3.12.5.a.1 Landings (tonnes) of BLUE WHITING from the main fisheries, 1987–2002, as estimated by the Working

Are	Norwegian Sea (Subareas 1+2 Divisions Va, XIVa-	Fishery in the area (Divisions Vb, VIb and VIIb-	Directed- and fisheries (Divisions and IV	Total northern	Total southern (Subareas VIII and IX Divisions VIIId, e, g-	Grand
1987	123,042	446,287	62,689	632,018	32,819	664,837
1988	55,829	426,037	45,143	527,009	30,838	557,847
1989	42,615	475,179	75,958	593,752	33,695	627,447
1990	2,106	463,495	63,192	528,793	32,817	561,610
1991	78,703	218,946	39,872	337,521	32,003	369,524
1992	62,312	318,081	65,974	446,367	28,722	475,089
1993	43,240	347,101	58,082	448,423	32,256	480,679
1994	22,674	378,704	28,563	429,941	29,473	459,414
1995	23,733	423,504	104,004	551,241	27,664	578,905
1996	23,447	478,077	119,359	620,883	25,099	645,982
1997	62,570	514,654	65,091	642,315	30,122	672,437
1998	173,676	827,194	94,881	1,095,751	29,400	1,125,151
1999	182,436	940,881	106,609	1,229,926	26,402	1,256,328
2000	276,545	996,577	114,477	1,387,599	24,654	1,412,253
2001	591,583	1,045,100	118,523	1,755,206	24,964	1,780,170
2002	539,670	830,471	145,652	1,515,793	39,202	1,554,995



(Figure 3.12.5.a.1).

Table 3.12.5.a.2 Landings (tonnes) of BLUE WHITING from the directed fisheries (Sub-areas I and II, Division Va, XIVa and XIVb) 1987–2002, as estimated by the Working Group.

Country	1987	1988	1989 ³⁾	1990	1991	1992	1993	1994 ²⁾	1995 ³⁾	1996	1997	1998	1999	2000	2001	2002
Denmark													15	7,721	5,723	13,608
Estonia	-	-	-	-	-	-	-	-	-	377	161	904	-	-	-	-
Faroes	9,290	-	1,047	-	-	-	-	-	-	345	-	44,594	11,507	17,980	64,496	82,977
Germany	1,010	3	1,341	-	-	-	-	2	3	32	-	78	-	-	3117	1,072
Greenland	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Iceland	-	-	4,977	-	-	-	-	-	369	302	10,464	64,863 ⁴⁾	99,092	146,903	245,814	193,686
Latvia	-	-	-	-	-	-	-	422	-	-	-	-	-	-	-	-
Netherlands	-	-	-	-	-	-	-	-	72	25	-	63	435	-	5180	906
Norway ⁵⁾															64,581	100,922
Norway ⁶⁾	-	-	-	566	100	912	240	-	-	58	1,386	12,132	5,455	-	28,812	-
Poland	56	10	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Sweden	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	850
USSR/Russia ¹⁾	112,686	55,816	35,250	1,540	78,603	61,400	43,000	22,250	23,289	22,308	50,559	51,042	65,932	103,941	173,860	145,649
Total	123,042	55,829	42,615	2,106	78,703	62,312	43,240	22,674	23,733	23,447	62,570	173,676	182,436	276,545	591,583	539,670

¹⁾ From 1992 only Russia

²⁾ Includes Vb for Russia.

³⁾ Icelandic mixed fishery in Va.

⁴⁾ include mixed in Va and directed in Vb.

⁵⁾ Directed fishery

⁶⁾ By-catches of blue whiting in other fisheries.

Table 3.12.5.a.3 Landings (tonnes) of BLUE WHITING from directed fisheries (Division Vb,Vla,b, VIIb,c, VIIg-k and Sub-area XII) 1987–2002, as estimated by the Working Group.

Country	1987	1988	1989	1990	1991	1992	1993	1994	1995	1996	1997	1998 ¹⁾	1999	2000	2001	2002
Denmark	2,655	797	25	-	-	3,167	-	770	-	269	-	5051	19,625	11,856	18,110	2,141
Estonia	-	-	-	-	-	6,156	1,033	4,342	7754	10,605	5,517	5,416	-	-	-	-
Faroes	70,625	79,339	70,711	43,405	10,208	12,731	14,984	22,548	26,009	18,258	22,480	26,328	93,234	129,969	188,464	115,127
France	-	-	2,190	-	-	-	1,195	-	720	6,442	12,446	7,984	6,662	13,481	13,480	14,688
Germany	3,850	5,263	4,073	1,699	349	1,307	91	-	6,310	6,844	4,724	17,891	3,170	12,655	15,862	15,378
Iceland	-	-	-	-	-	-	-	-	-	-	-	-	61,438	113,280	119,287	91,853
Ireland	3,706	4,646	2,014	-	-	781	-	3	222	1,709	25,785	45,635	35,240	25,200	29,854	17,723
Japan	-	-	-	-	-	918	1,742	2,574	-	-	-	-	-	-	-	-
Latvia	-	-	-	-	-	10,742	10,626	2,160	-	-	-	-	-	-	-	-
Lithauen	-	-	-	-	-	-	2,046	-	-	-	-	-	-	-	-	-
Netherlands ²⁾	5,627	800	2,078	7,280	17,359	11,034	18,436	21,076	26,703	17,644	23,676	27,884	35,408	46,128	68,415	33,365
Norway	191,012	208,416	258,386	281,036	114,866	148,733	198,916	226,235	261,272	337,434	318,531	519,622	475,004	460,274	399,932	385,495
UK (Scotland)	3,315	5,071	8,020	6,006	3,541	6,849	2,032	4,465	10,583	14,325	33,398	92,383	98,853	42,478	50,147	26,403
Sweden	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	10
USSR/Russia ³⁾	165,497	121,705	127,682	124,069	72,623	115,600	96,000	94,531	83,931	64,547	68,097	79,000	112,247	141,257	141,549	144,419
Total	446,287	426,037	475,179	463,495	218,946	318,018	347,101	378,704	423,504	478,077	514,654	827,194	940,881	996,578	1,045,100	846,602

¹⁾ Including some directed fishery also in Division IVa.

²⁾ Revised for the years 1987, 1988, 1989, 1992, 1995,1996,1997

³⁾ From 1992 only Russia

Table 3.12.5.a.4 Landings (tonnes) of BLUE WHITING from directed fisheries and by-catches caught in other fisheries in Divisions IIIa, IVa 1987–2002, as estimated by the WG.

Country	1987	1988	1989	1990	1991	1992	1993 ³⁾	1994	1995	1996	1997	1998 ²⁾	1999	2000	2001	2002
Denmark ⁴⁾			3,632	10,972	5,961	4,438	25,003	5,108	4,848	29,137	9,552	40,143	36,492	30,360	21,995	35,530
Denmark ⁵⁾	28,541	18,144	22,973	16,080	9,577	26,751	16,050	14,578	7,591	22,695	16,718	16,329	8,521	7,749	7,505	
Faroes ^{4) 6)}															60	
Faroes ^{5) 6)}	7,051	492	3,325	5,281	355	705	1,522	1,794	-	6,068	6,066	296	265	42	6,741	7,317
Germany ¹⁾	115	280	3	-	-	25	9	-	-	-	-	-	-	-	81	
Ireland	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	4
Netherlands	-	-	-	20	-	2	46	-	-	-	793	-	-	-	-	50
Norway ⁴⁾															21,804	
Norway ⁵⁾	24,969	24,898	42,956	29,336	22,644	31,977	12,333	3,408	78,565	57,458	27,394	28,814	48,338	73,006	58,182	85,062
Russia															69	
Sweden	2,013	1,229	3,062	1,503	1,000	2,058	2,867	3,675	13,000	4,000	4,568	9,299	12,993	3,319	2,086	17,689
UK	-	100	7	-	335	18	252	-	-	1	-	-	-	-	-	
Total	62,689	45,143	75,958	63,192	39,872	65,974	58,082	28,563	104,004	119,359	65,091	94,881	106,609	114,476	118,523	145,652

¹⁾ Including directed fishery also in Division IVa.

²⁾ Including mixed industrial fishery in the Norwegian Sea

³⁾ Imprecise estimates for Sweden: reported catch of 34265 t in 1993 is replaced by the mean of 1992 and 1994, i.e. 2,867 t, and used in the assessment.

⁴⁾ Directed fishery

⁵⁾ By-catches of blue whiting in other fisheries.

⁶⁾ For the periode 1987-2000 landings figures also include landings from mixed fisheries in Division Vb.

Table 3.12.5.a.5 Landings (tonnes) of BLUE WHITING from the Southern areas (Sub-areas VIII and IX and Divisions VIIg-k and VIId,e) 1987–2002, as estimated by the Working Group.

Country	1987	1988	1989	1990	1991	1992	1993	1994	1995	1996	1997	1998	1999	2000	2001	2002
Germany	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	600
Ireland																98
Netherlands	-	-	-	450	10	-	-	-	-	-	-	10 ¹⁾	-	-	-	3,208
Norway	4	-	-	-	-	-	-	-	-	-	-	-	-	-	-	
Portugal	9,148	5,979	3,557	2,864	2,813	4,928	1,236	1,350	2,285	3,561	2,439	1,900	2,625	2,032	1,746	1,659
Spain	23,644	24,847	30,108	29,490	29,180	23,794	31,020	28,118	25,379	21,538	27,683	27,490	23,777	22,622	23,218	17,506
UK	23	12	29	13	-	-	-	5	-	-	-	-	-	-	-	
France	-	-	1	-	-	-	-	-	-	-	-	-	-	-	-	
Total	32,819	30,838	33,695	32,817	32,003	28,722	32,256	29,473	27,664	25,099	30,122	29,390	26,402	24,654	24,964	23,071

¹⁾ Directed fisheries in VIIIda

Table 3.12.5.a.6 Catches of immature fish expressed as a percentage of the total catch by fishery and as a proportion of the total immature catch from all fisheries combined.

Fishery	Total catch	Immature catch	% immature in fishery	% of overall immature catch
Directed	1,406,686	286,585	20%	79%
Mixed industrial	136,345	68,715	50%	19%
Southern	18,837	9,224	49%	3%
Total	1,561,867	364,524		

Table 3.12.5.a.7 Proportion of total catch-at-age by area from the directed fishery.

Age	immature	mean length	IIa	Va	Vb	Other areas combined
0	100%	16.9	0%	97%	3%	0%
1	89%	21.6	34%	28%	17%	21%
2	60%	23.6	49%	13%	17%	21%
3	18%	25.9	31%	12%	17%	39%
4	14%	28.1	23%	15%	18%	45%
5	9%	29.0	20%	14%	17%	49%
6	6%	31.0	11%	8%	8%	73%
7+	0%	33.9	9%	7%	6%	78%
SOP catch (t)			331,894	189,840	196,865	688,016
% of directed catch			24%	13%	14%	49%

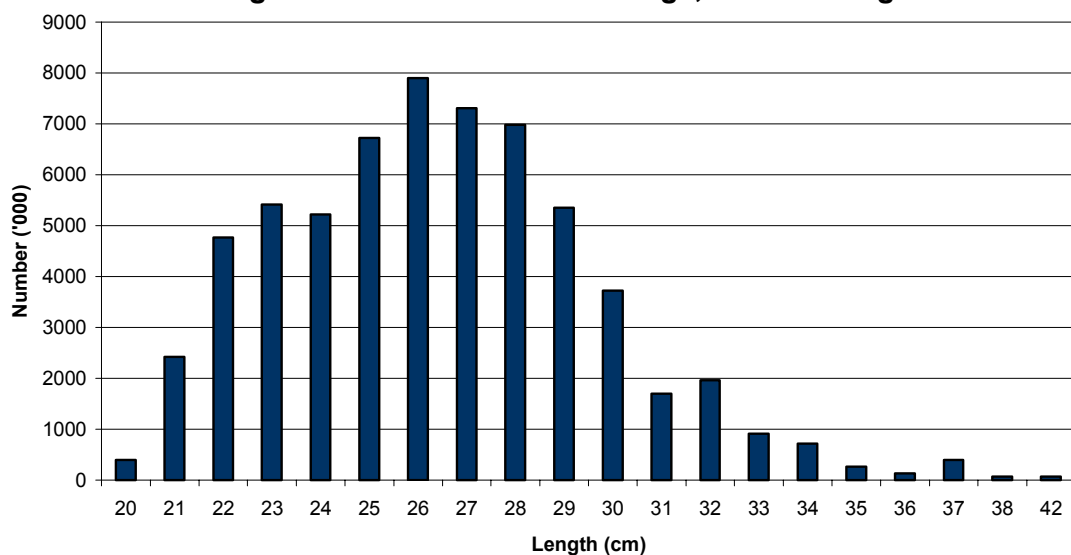
Table 3.12.5.a.8 Proportion of catch-at-age for each area from the directed fishery.

Age	immature	mean length	Ila	Va	Vb	Other areas combined
0	100%	16.9	0%	1%	0%	0%
1	89%	21.6	11%	18%	10%	4%
2	60%	23.6	34%	18%	21%	9%
3	18%	25.9	26%	21%	25%	21%
4	14%	28.1	13%	18%	19%	17%
5	9%	29.0	10%	15%	16%	16%
6	6%	31.0	5%	7%	7%	21%
7+	0%	33.9	2%	3%	2%	11%
		SOP catch (t)	331,894	189,840	196,865	688,016
		% of directed catch	24%	13%	14%	49%

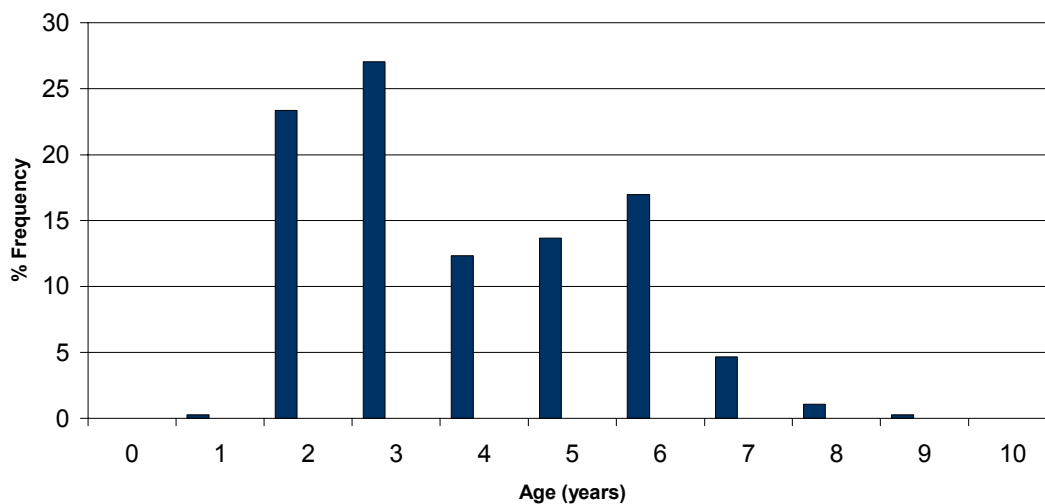
Table 3.12.5.a.9 Summary of the blue whiting assessment.

Year	Recruitment age 1 millions		SSB 000 tonnes		Landings 000 tonnes	Fishing mortality Ages 3-7	
	Median	(25 - 75 perc.)	Median	(25 - 75 perc.)		Median	(25 - 75 perc.)
1981	3631	(3428 - 3865)	4874	(4363 - 5784)	923	0.17	(0.16 - 0.19)
1982	3844	(3588 - 4075)	3434	(3164 - 3812)	551	0.14	(0.13 - 0.15)
1983	9965	(9376 - 10645)	2500	(2350 - 2674)	553	0.19	(0.18 - 0.21)
1984	17498	(16385 - 18634)	1842	(1763 - 1935)	616	0.26	(0.25 - 0.28)
1985	11807	(11052 - 12568)	1873	(1808 - 1948)	678	0.30	(0.29 - 0.32)
1986	10046	(9334 - 10758)	2090	(2018 - 2165)	847	0.42	(0.39 - 0.44)
1987	10215	(9573 - 10902)	1885	(1823 - 1953)	655	0.37	(0.35 - 0.39)
1988	8832	(8249 - 9475)	1711	(1653 - 1778)	552	0.33	(0.31 - 0.35)
1989	10313	(9569 - 11102)	1697	(1633 - 1770)	630	0.38	(0.35 - 0.40)
1990	25658	(24116 - 27718)	1665	(1593 - 1745)	558	0.35	(0.33 - 0.38)
1991	9987	(9324 - 10717)	2238	(2127 - 2358)	364	0.14	(0.13 - 0.16)
1992	6506	(6052 - 6946)	2974	(2814 - 3150)	475	0.16	(0.14 - 0.17)
1993	5737	(5362 - 6159)	2899	(2731 - 3064)	475	0.15	(0.14 - 0.16)
1994	6081	(5729 - 6491)	2845	(2684 - 3017)	458	0.15	(0.14 - 0.16)
1995	8102	(7649 - 8586)	2592	(2458 - 2753)	505	0.18	(0.17 - 0.19)
1996	23415	(21804 - 25225)	2423	(2286 - 2569)	621	0.24	(0.23 - 0.26)
1997	52603	(48253 - 57296)	2470	(2343 - 2624)	640	0.24	(0.22 - 0.25)
1998	29458	(26450 - 33020)	3478	(3281 - 3722)	1132	0.32	(0.29 - 0.35)
1999	17865	(15857 - 20161)	4210	(3929 - 4560)	1261	0.31	(0.28 - 0.33)
2000	29998	(26429 - 34173)	4102	(3772 - 4524)	1412	0.38	(0.34 - 0.42)
2001	30000	(30000 - 30000)	4030	(3646 - 4500)	1772	0.44	(0.39 - 0.50)
2002	11500	(11500 - 11500)	3824	(3380 - 4329)	1557	0.50	(0.41 - 0.60)
2003	11500	(11500 - 11500)	3258	(2774 - 3791)			
Average	15416	(14373 - 16588)	2822	(2626 - 3066)	783	0.28	(0.25 - 0.30)

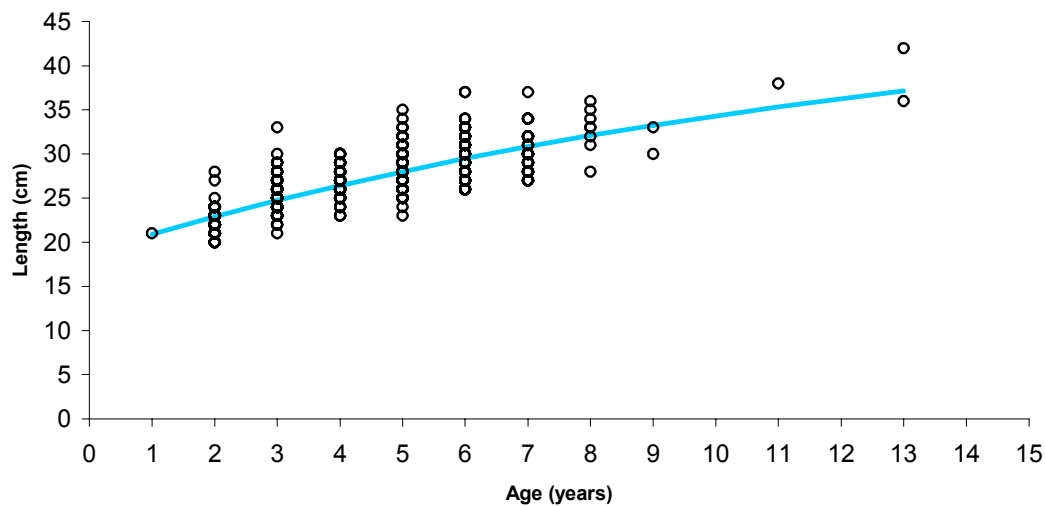
2002 Length Distribution: Irish Landings, Blue Whiting in VIIc



2002 Age Distribution: Irish Landings, Blue Whiting in VIIc



2002 Size at Age: Irish Sampling, Blue Whiting in VIIc



Albacore Tuna - North Atlantic



Fisheries Science Services

The Standing Committee on Research and Statistics (SCRS) of the International Commission for the Conservation of Atlantic Tunas (ICCAT) is responsible for the assessment of the albacore tuna stocks and provides management advice to ICCAT.

FSS – ADVICE

SCRS and STECF advise that in order to maintain a stable SSB in the near future catches should not exceed 34,500 t, the approximate level of catches in 1999. FSS notes that if SSB is to increase to 40,000 t, the value associated with MSY, then catches should not exceed 31,000 t in the period 2001 to 2005. FSS advise that a TAC of 34,500 t is not restrictive and that catches in 2001 and 2002 have been well below 31,000 t. Therefore FSS advise a 2004 TAC of 31,000 t until new data becomes available to the assessment.

North Atlantic Albacore TACs, Catches and Advice

Year	TAC	Catch	FSS Advice
2000	No TAC	33,754	
2001	34,500	25,186	
2002	34,500	22,465	
2003	34,500		Catches in 2004 not to exceed 31,000 t

STATE OF THE STOCK

- The state of the stock is unknown and was last assessed in 2000
- Catches have declined from about 60,000 t in 1964 to 22,000 t in 2002, the lowest in the series.
- CPUE trends in the Bay of Biscay troll fisheries have declined since the mid 1980s.
- Fishing mortality for 1 year olds has increased since 1987, and for 2-4 year olds has shown an increasing trend throughout the series. Fishing mortality for ages 5 and over peaked in 1986, but declined until 1989, increasing to 1995 and decreasing again to 1998. The most recent data are unavailable. In 2000 F_{current} (0.57) was above F_{MSY} (0.51).

- In 2000 SSB was estimated to be about 30% below B_{MSY} .
- Recruitment has shown a downward trend from 1978 to 1994, the lowest estimate in the series. Estimates for 1996 onwards are not presented by SCRS.
- Projections carried out in 2000 indicated that F_{current} 0.57 was below F_{max} 0.8.

CURRENT MANAGEMENT

- The management area and the assessment area for North Atlantic albacore tuna cover the whole of the Atlantic, north of 5° N.
- Prior to 2001 no TAC had been set by ICCAT for albacore tuna. A TAC of 28,712 t was subsequently agreed for the EU for 2001 and Ireland was allocated a quota of 3,158 t (11%).
- In 1998 a management measure was introduced limiting fishing capacity to the average number of vessels prosecuting the fishery in the period 1993 to 1995.
- In 2002 the EU introduced a complete ban on the use of drift nets for albacore in EU waters.

ECONOMIC COMMENTS

The albacore tuna fishery is important to the fishing ports of the south and west coast of Ireland. The total albacore catch in 2001 of 2,093 t was valued at over €5.2 million. This made it one of the most important commercial species landed by the Irish fleet. The ban on the use of gill nets diminished the economic contribution of albacore to fishing communities of the west and southwest coasts. In 2002 10 pairs of trawlers landed 1,100 t (preliminary data).

ADDITIONAL INFORMATION

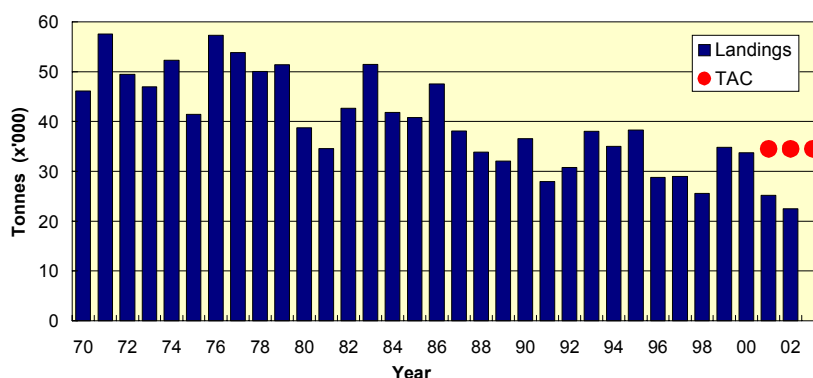
1. The ICCAT Albacore Species Group met in September 2003. Complete data sets were not available and no assessment was carried out. The most recent assessment was in 2000. Current advice is based on the 2000 assessment, and CPUE series and catch data submitted since then.
2. The total catch taken from the fishery during 2002 was 22,465 t, compared to 25,186 t, and 33,754 t in 2001 and 2000 respectively. Since 2000 the Irish catch has declined from 3,464 t to 1,100 t in 2002. This is mainly due to the ban of drift nets, the preferred gear for Irish vessels. Though the 2003 season has not yet finished there are strong indications from the fishery that Irish catches will exceed those of 2002.
3. The main albacore tuna catching countries in 2002

were Spain (8,952 t), Chinese Taipei (4,305 t), France (4,290 t), Portugal (1,953 t) and Ireland (1,100 t). The main gear types used are, bait boats, trolling, drift nets, long lines and paired mid water trawls. In 2001 and 2002 there were large decreases in catches in the Biscay Fisheries. In 2001 and 2002, the numbers of 2 and 3 year olds declined in the Biscay catch.

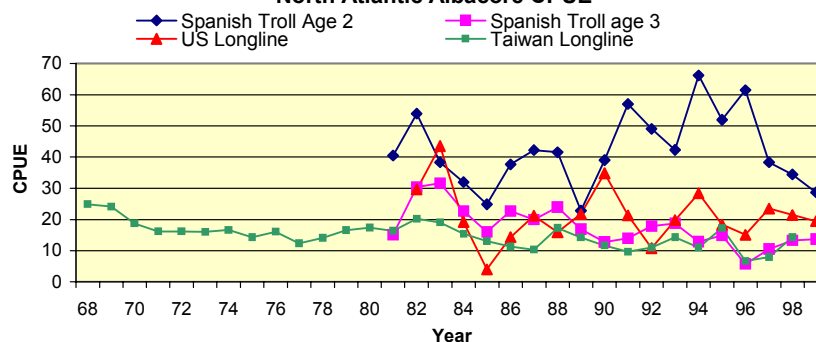
4. The paired mid water trawl fishery operates along the edge of the continental shelf from the Bay of Biscay to the south west coast of Ireland. The season begins in July and lasts until November. In 2002 and 2003 the most important landings were made into the French Ports of La Rochelle, Lorient and Douarnez.
5. French and Irish Boats carried out gear trials with purse seines and long lines respectively in 2003.
6. The use of “pingers” is being investigated by BIM as a means of preventing by-catches of cetaceans.

7. Sampling of Irish catches are supported by the EC funded sampling programme, which is required under Data Collection Regulation 1543/2000 and 1639/2001. In 2002, Irish catches were of a size range of 46 cm to 120 cm and of an age range of 1 to greater than 5 years old.
8. Biological information on albacore tuna caught by Irish vessels is obtained from port sampling and on-board observer programmes.
9. Results from the Marine Institute’s ongoing sampling programme show that catches from the paired midwater trawl fishery taken in July and August in the Bay of Biscay are composed primarily of juvenile fish. This contrasts with the catch taken in the late season between Brittany and Ireland where the majority of the fish are greater than 90 cm and mature.

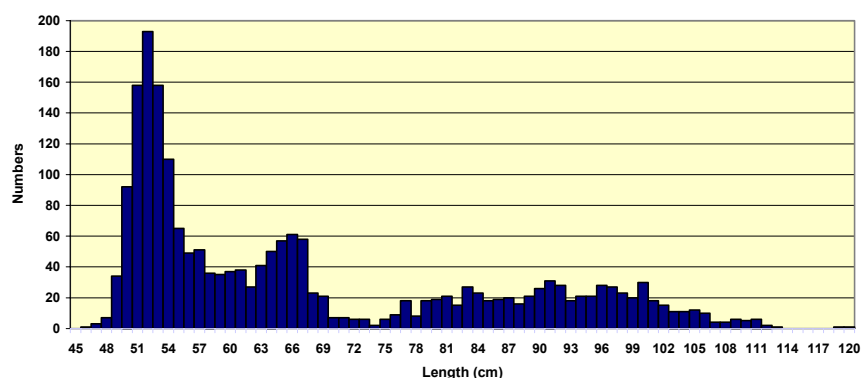
North Atlantic Albacore Estimated Landings 1970 to 2002



North Atlantic Albacore CPUE



**Length Frequency Distribution for Biscay Albacore from 20/7/02 to 10/10/02
N=2171**



Bluefin Tuna

(East Atlantic and Mediterranean)



Fisheries Science Services

FSS – ADVICE

FSS is concerned that this stock is depleted. STECF agrees with the 2002 ICCAT advice that a TAC of 32,000 t should apply until 2006. FSS advises that under current levels of recruitment, fishing mortality and fishing selectivity, that catches over 26,000 t cannot be sustained in the long term.

ICCAT has adopted a complex suite of measures aimed at reducing fishing pressure on juvenile fish and recommends that contracting parties make every effort to ensure that these measures are adhered to. FSS notes that in the context of ICCAT and STEFC comments on the proliferation of bluefin fattening units in the Mediterranean that measuring the success of these measures may be difficult.

Bluefin Tuna TACs, Catches and Advice 2000-2004

Year	TAC	Catch	FSS Advice
2000	29,500	33,752	
2001	29,500	34,562	
2002	29,500	30,343	
2003	32,000		
2004	32,000		Catches greater than 26,000 t not sustainable in long term

STATE OF THE STOCK

- There is concern that this stock that is depleted. There are no precautionary reference points.
- The stock was last assessed in 2002, but this assessment only included landings data up to 2000.
- Catches increased from about 14,000 t in 1971 to about 51,000 t in 1996. Catches have since declined to about 30,000 t in 2002.
- CPUE series for fisheries targeting juveniles show declining values in the five years up to the 2000 assessment. The CPUE series for the Japanese longline fishery targeting adult fish show a declining trend since 1975.
- Fishing mortality on juveniles has increased from

about 0.2 in 1995 to almost 0.5 in 2000. Fishing mortality on fish aged 8 and over, reached the highest value in the series in 1997, about 0.35, but declined to about 0.2 in 2000.

- Recruitment increased to the highest value in the series in 1996, and then declined until 2000. There are no more recent estimates of recruitment.
- The SSB declined from a peak in 1973 (about 225,000 t) to 1984, when it was estimated to be the lowest in the series at about 125,000 t. SSB increased from 1985 to 1993, but has since declined and in 2000 is estimated to be 86% of the 1970 level.
- Long term projections were made in 2002, with results similar to those formulated in 1996 and 1998. These projections showed that the 2000 catch (33,752 t) catch levels were unsustainable, based on current selection pattern and fishing mortality.

CURRENT MANAGEMENT

- There is no Irish quota, but the EU has a bycatch allocation to which Ireland is entitled.
- The Assessment and management areas are similar and cover the east Atlantic and the Mediterranean Sea. It is recognised mixing takes place between fish from the east and west Atlantic and this affects the accuracy of the stock assessment.
- The EU allocation of the TAC for 2003 and 2004 is 18,582 t and 18,450 t respectively.
- There is an unallocated EU bycatch quota of 65 t.
- In 2002 ICCAT increased the TAC to 32,000 t, from 29,500 t.
- In 2002 ICCAT increased the Mediterranean minimum size limit from 3.2 kg to 4.8 kg.
- In the Atlantic a minimum size limit of 6.4kg with a 15% tolerance level applies; the retention on board of fish less than 4.8 kg is prohibited in the Mediterranean.
- Closed periods in the Mediterranean are in place for long line vessels over 24m; closed periods are in place for purse seines in the Mediterranean and a prohibition on the use of spotter planes or helicopters in the Mediterranean applies for part of each year.
- No increase of catch by large scale tuna longline vessels in the Atlantic north of 10°N and between 30°W and 45°W.

FSS – ECONOMIC COMMENTS

- The Irish catch of the Irish bluefin catch in 2002 was 15 t.
- Although no directed fishery is allowed for bluefin

tuna, bluefin are caught by charter angling vessels off the North and West coasts of Ireland. Experimental trials to establish the economic viability of big game fishing were sponsored by BIM and MI in 2001 and 2002. Charter vessel skippers have identified big game angling as a lucrative new product to offer their customers.

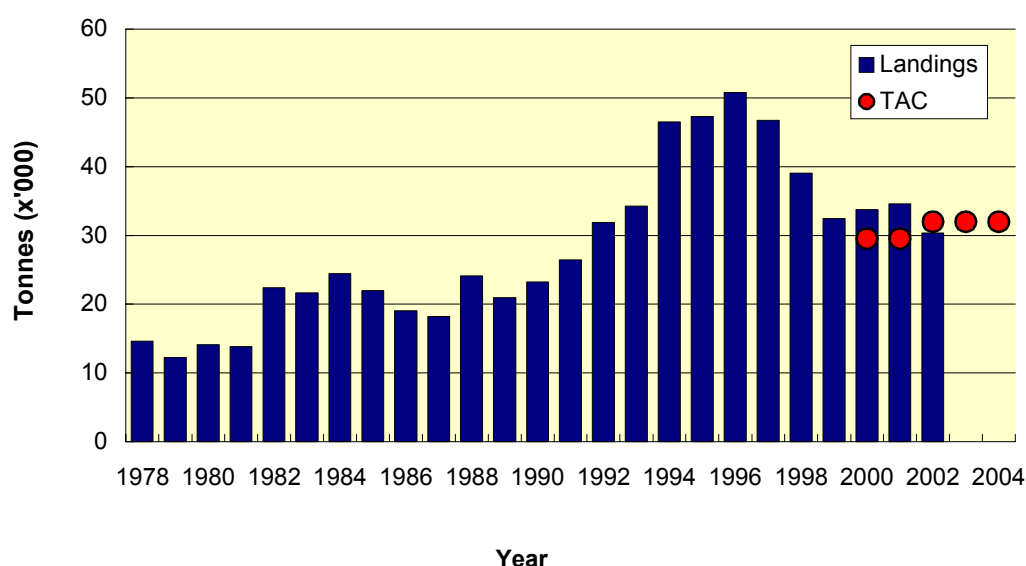
- Large investments have been made in recent years in the Mediterranean in the fattening and on-growing of bluefin tuna. Bluefin tuna caught in purse seines are towed to fattening pens where they are kept and fed until they reach marketable size.

ADDITIONAL INFORMATION

1. The assessment carried out in 2002 was uncertain. Although there are considerable doubts about input data the 2002 assessment is considered to be the best available estimate of the status of the stock.
2. ICCAT has expressed concern that fattening units in the Mediterranean are undermining the effectiveness of data collection from Mediterranean fisheries. Monitoring of the rate of removal of fish from the stock by purse seiners supplying the fattening units is required.
3. Catches, particularly in the Mediterranean are misreported and the catch data is being revised. SCRS suspects that there was over-reporting of catches between 1993 and 1997, but that there was underreporting since 1998.
4. SCRS is concerned that the introduction of purse seines and longlines for albacore in the Bay of Biscay in 2003, may lead to increased bycatches of juvenile bluefin in this area.

5. The main catches taken from the East Atlantic and Mediterranean bluefin tuna stock in 2002 were taken by Spain (6,565 t), France (6,304 t), Italy (4,628 t), Morocco (2,986 t), Japan (2,926 t), and Algeria (2,330 t).
6. Bluefin tuna caught by Irish vessels are taken as bycatch in directed fisheries for other pelagic species and accounted for by the EU bycatch quota. In the last three years a small number of fish have been caught each year by angling vessels. In 2002 25 bluefin were caught by Irish anglers between July and November.
7. The main gears used to catch bluefin tuna are purse seines, longlines, traps and bait boats. An estimated 1673 t were caught in sport fisheries in 2002.
8. Biological information on bluefin tuna in Irish waters consists of a record of lengths and gutted weights of bycatch from the mainstream pelagic fisheries supplemented by data from anglers. This data has been compiled and collated by *Gulfstream Sports Fishing Ltd* with funding from the Marine Institute and Gael-Saoire.
9. In 2003 Stanford University and BIM with the assistance of the Marine Institute engaged in tagging research using charter angling vessels as tagging platforms. Three fish were tagged with pop up satellite tags. Tagging bluefin in Irish waters has the potential to establish the length of residency of bluefin in Irish waters and their destinations when they leaving. Development of an Irish tagging programme would triangulate with existing tagging programmes in the Mediterranean and off the west coast of North America and advance understanding of bluefin migration and stock mixing.

East Atlantic and Mediterranean Bluefin Estimated Landings



Sprat

(around Ireland)



Fisheries Science Services

FSS – ADVICE

FSS advises that there may be potential to develop fisheries on this species. FSS further advise that the fishery for sprat should not be allowed to expand until reliable assessments show that increased harvest levels are sustainable.

STATE OF THE STOCK

- No assessments have been carried out on sprat stock(s) around Ireland and the status of the stock(s) is not known.

CURRENT MANAGEMENT

- There are no management regulations for sprat fisheries around Ireland.
- There are no TACs for sprat in Irish waters

FSS ECONOMIC COMMENTS

- The Irish catch in 2002 was 1,728 t. This is a large increase from the catches in 2001 (455 t) but is still less than a third of the catches taken in 2000 (6,000 t).
- The value of the Irish catch in 2002 was €607,000.
- The sprat fishery has in some years proved to be an important source of revenue for white fish and small pelagic boats at a time when these sections of the fleet would normally be dependent on other species.

ADDITIONAL INFORMATION

1. A number of vessels using mid water trawls take part in the fishery. The fishery takes place in very shallow inshore areas mainly during autumn.
2. Most of the catch is frozen whole for export to the continental markets.
3. Sampling was carried out during 2002.
4. In the North Sea juvenile herring are caught in the industrial sprat fishery. Irish sprat catches in Donegal which were monitored in 2000 did not show any significant bycatch of juvenile herring.

Capelin in the Iceland, East Greenland, Jan Mayen area (Sub-areas V and XIV and Division IIa west of 5°W)



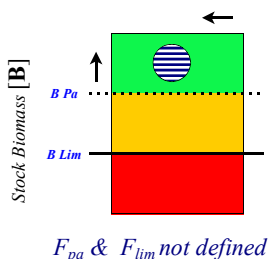
Fisheries Science Services

FSS – ADVICE

FSS agree with the ICES and STECF advice for this stock. This states that the preliminary TAC should not exceed 550,000 t for the first half of 2003/2004 season. This is two thirds of the total TAC of 835,000 t predicted for the whole season. ICES advise that, while the 2003 summer/autumn season could be opened on 20th of June, areas of high juvenile abundance should be closed to commercial fishery in order to prevent harvesting a high proportion of juveniles.

STATE OF THE STOCK

State of the Stock in relation to the precautionary reference points (see page 18)



- There are no concerns for this stock as it is within safe biological limits.
- The landings fluctuate considerably. Over 1.5 million tonnes were recorded in 1996 but landings in 2000 and 2001 have decreased.
- Fishing mortality estimates are not calculated for the stock because of the very short life span.
- The recruitment has been high in recent years
- The SSB is highly variable due to its dependence on only two year classes. The SSB fell below the minimum biological safe limits in the 1989/90 and 1990/91 seasons. The stock recovered quickly due to good recruitment. The current SSB is 410,000 t, which is slightly above the spawning stock biomass required to be left by the end of the fishing season.
- There are no proposed reference points for this short lived species.

CURRENT MANAGEMENT

- The fishery is managed according to a two part harvest control rule which ensures a minimum SSB of 400,000 t at the end of the fishing season.
- The TAC is set in two parts. The first part of the TAC, which applies for the only first half of the season, is limited to 2/3 of the total advised TAC for the entire season. The TAC for the remainder of the season is reviewed to ensure that the SSB at the end of the season will be above 400,000 t.

FSS – ECONOMIC COMMENTS

Ireland has not participated in this fishery although there is a EU quota available of around 121,000 t.

ADDITIONAL INFORMATION

1. The assessment is based on acoustic surveys only.
2. The total catch in 2002 was 985,000 t.
3. The main catches are taken by Iceland and Norway.
4. Most of the catches are reduced to fishmeal and are taken by purse seiners.

Advice and Overview For Irish Sea Mixed Demersal Fisheries



Fisheries Science Services

Advice on demersal fish stocks in the Irish Sea

FSS ADVICE

FSS advise that mixed fisheries characteristics be taken into account when managing demersal fisheries in the Irish Sea. Cod, whiting and sole are outside safe biological limits and are the overriding concerns in the management advice.

ICES has advised that only demersal fisheries that can demonstrate that they fish without catch or discards of cod and whiting may be permitted. All other stocks in the Irish Sea should be fished within precautionary limits. FSS recognise that the 'zero catch option' for cod and whiting would effectively mean a closure of the mixed demersal and *Nephrops* fisheries in the Irish Sea. FSS agrees with ICES that a closure of all fisheries catching cod or whiting will provide the highest probability of recovery for these stocks. However, ICES has previously advised for zero catch of cod and managers, because of social and economic considerations, never implemented this advice. Therefore FSS considers that the zero catch advice is not helpful to managers since is unlikely to be implemented in the current management framework.

STECF evaluated a tool to carry out mixed fisheries forecasts. Despite several concerns about the appropriateness of the inputs and the fact the TAC should be allocated at the fleet level STECF and FSS consider that advice based on this method is preferable to traditional single species forecasts that ignore the mixed nature of Irish Sea fisheries.

FSS has used the STECF mixed fisheries model to consider several mixed fisheries management scenarios that place a range of weightings on achieving various management objectives. These scenarios are presented in the table on the next page. In all scenarios the management objective for whiting is a reduction in fishing mortality of 65% and, for cod, the European Commission's proposed recovery plan objective of a 30% increase in cod SSB by 2005 (also equivalent to a 65% reduction in fishing mortality). The relative weighting given to achieving these objectives as opposed to the ICES management advice for other species is shown for each scenario as a percentage. FSS notes that these are not the only possible management targets and other choices based on biological, economic and social criteria could also be evaluated.

FSS reiterates the STECF concern that the multi-species TACs supplied by the STECF mixed fisheries model will not deliver the desired fishing mortality unless the distribution of implied TACs is fully implemented across the fleets. A failure to implement the implied allocation key at the fleet level is likely to considerably reduce or negate the effectiveness of the management. FSS considers that this concern is particularly true for scenarios such as those shown in Panel 2 which require implementation of mixed fisheries TACs by country and individual fleet. FSS considers that implementation of such TACs is unlikely under the current management regime.

FSS notes that some scenarios would result in a large reduction in the *Nephrops* TAC, and the economic consequences of this have not been evaluated. FSS therefore recommends evaluation of mixed fisheries management scenarios that place less emphasis on achieving rapid recovery of whiting and are more reliant on technical conservation measures. FSS considers that current high levels of discarding of whiting means that restricting landings of whiting alone will not achieve the necessary increase in whiting SSB. FSS stress that the cornerstone of any rebuilding plan for whiting should be measures that significantly reduce the discarding of whiting in the *Nephrops* fishery. If effective measures were put in place FSS considers that the productivity of the whiting stock would be substantially increased.

Irish Sea Mixed Fisheries Management Scenarios:

FSS consideration of several mixed fisheries management scenarios calculated using the STECF mixed fisheries model. The weighting given to achieving various management objectives is given as a percentage. The input data are those used by STECF (November 2003 Plenary) and Scenarios C and D were evaluated by STECF (Panel 1: equivalent to STECF Irish Sea Scenarios 7 & 8, Panel 2: equivalent to STECF Irish Sea Scenarios 5 & 6). In all scenarios the management objective for whiting is a reduction in fishing mortality of 65% and, for cod, the European Commission's proposed recovery plan objective of a 30% increase in cod SSB by 2005 (also equivalent to a 65% reduction in fishing mortality).

Mixed fisheries analysis TACs calculated using various decision weightings:

	STECF Single species objective	ICES Single species advice	ICES Mixed fisheries advice	A: Cod 100%	B: Cod 95% Others 1%	C: Cod 50% Whiting 50%	D: Cod 48% Whiting 48% Others 1%	E: Cod 41% Whiting 32% Haddock 16% Nephrops 5% Plaice 3% Sole 3%	F: Cod 32% Whiting 32% Nephrops 32% Others 1.3%	G: Cod 48% Nephrops 48% Others 1%	H: Nephrops 95% Others 1%	I: Nephrops 100%
--	---	-------------------------------------	--------------------------------------	----------------	----------------------------	------------------------------	---	--	---	--	---------------------------------	---------------------

Panel 1: Mixed fishery TACs allocated proportional to species composition of all fleet catches combined:

	2149	2237	2133	2231	2521	2913	2909	3760	4338
Cod	1547	1328	1204	1264	1452	1725	1758	2155	2351
Haddock	9550	5720	2759	3528	5960	8449	9140	9527	9550
Nephrops	1683	942	914	957	1065	1152	1148	1427	1412
Plaice	786	591	592	623	685	680	646	905	837
Sole	583	865	590	669	907	1145	1205	1276	1279
Whiting									

Panel 2: Mixed fishery TACs allocated proportional to species composition within a fleet:

	2149	2187	1837	1927	2298	2574	2657	3629	4338
Cod	1547	1353	980	1031	1225	1448	1613	1989	2351
Haddock	9550	7986	5330	5765	7267	8744	9287	9530	9550
Nephrops	1683	1016	909	947	1051	1130	1168	1401	1412
Plaice	786	664	651	675	725	720	703	901	837
Sole	583	1044	723	771	937	1095	1184	1231	1279
Whiting									

FSS Review of Irish Demersal Fisheries in The Irish Sea during 2002

Landings of demersal fish species have continued to decrease in the Irish Sea as stocks have declined. There are four Irish main fleets operating in the Irish Sea. Of these the *Nephrops* directed otter trawl fleet is the largest with around 45 vessels in 2002. This fleet had a by-catch of both quota and non-quota demersal species including cod, haddock, plaice anglerfish and rays in 2002. The otter trawl fleet targeted rays, cod and haddock mainly also with a by-catch of other demersal species in 2002. This fleet consisted of about 30 vessels of which 11 vessels switch seasonally between targeting finfish and *Nephrops*. The beam trawl fleet, consisting of 11 vessels in 2002, targeted rays, plaice and sole but have a by catch of cod and anglerfish. The gill net fleet consisted of 11 vessels in 2002 and targeted cod with by catches of pollock.

The otter trawl fishery for *Nephrops* and whitefish mainly takes place in the western Irish Sea and the main ports are Howth, Clogherhead, Kilmore Quay and Dunmore East. The beam trawl fleet operates mainly in the eastern Irish Sea, in Morecambe, Liverpool Bay and south of the Isle of Man. The beam trawl fishery for black sole closes during the second and third quarters and many vessels land directly into the UK. Although the quota for black sole is small it remains a very valuable fishery. In the late 1990s there was a substantial increase in the abundance of haddock in the Irish Sea. This resulted in an additional TAC allocation for haddock which was introduced for Division VIIa in 1998. The main by-catch species from the Irish Sea fishery are monk, rays, pollock, dogfish, saithe, and lemon sole. A large amount of whiting are discarded on the nursery grounds of the Western Irish Sea by the *Nephrops* fleet. The Irish Sea demersal fleet is generally made up of older vessels that spend 1-4 days at sea. The Irish Sea beam trawl fleet is made up of newer high-powered large vessels up to 40m, these are mainly second-hand North Sea beamers.

A major feature of the Irish Sea fisheries in since 2000 has been the introduction of the Irish Sea cod recovery plan. A description of the cod recovery plan is given in the key issues in fisheries management section.

ICES 3.8 Stocks in the Irish Sea (Division VIIa)

ICES description of International fisheries in the Irish Sea

The majority of vessels in the Irish Sea target *Nephrops* with either single or twin-rig otter trawls. These vessels use either 70 mm diamond mesh with a 80 mm square mesh panel or an 80 mm diamond mesh in their cod-ends and their catch must consist of at least 35% *Nephrops* by live weight. These vessels have bycatches of whiting (most of which are discarded), haddock, cod and plaice. Twin-rig otter trawl were first introduced in the early nineties.

Recent studies show that use of twin-rigs increases the proportion of round fish bycatch in *Nephrops* fisheries compared with single rig otter trawls. In recent years effort for the Northern Irish and Irish *Nephrops* vessels has remained relatively constant. *Nephrops* catches are highly seasonal with highest *Nephrops* catches in the summer months. Catch rates are also dependent on tidal conditions with higher catches during periods of weak tide.

The roundfish fisheries in the Irish Sea are conducted primarily by vessels from the bordering countries (UK and Ireland). A Northern Irish semi-pelagic trawling for cod and whiting developed in the early 1980s. As the availability of whiting declined this fleet switched to mainly targeting for cod and haddock. Irish, Northern Irish and English and Welsh otter trawlers target plaice, haddock, whiting and cod with smaller bycatches of anglerfish, hake, and sole. Some Irish vessels participate in a fishery for rays in the southern Irish Sea. Since 2001, these trawlers have adopted mesh sizes of 100–120 mm, and other gear modifications, depending on the requirements of recent EU technical conservation regulations and national legislation.

Fishing effort in the semi-pelagic effort increased rapidly between the early 1980s and early 1990s before decreasing somewhat in the mid 1990s. Fishing effort in the England and Wales otter trawl vessels longer than 12 m declined rapidly after 1989, and over 1992–1995 was about 40% of the effort reported in the 1980s, although it has increased slightly in recent years. There has been a declining trend in fishing effort for Northern Irish otter trawlers also since the early 1990s. Fishing effort for Irish otter trawlers has declined in recent years as many vessels switched from targeting roundfish to *Nephrops*.

There is also a beam trawl fishery which mainly takes place in the eastern Irish Sea with vessels from Belgium, Ireland and the UK. This fishery mainly catches sole with important bycatches of plaice, rays, brill, turbot, anglerfish and cod. The fishing effort of the Belgian beam-trawl fleet varies according to the catch-rates of sole in the Irish Sea compared with other areas in which the fleet operates. Fishing effort peaked in the late 1980s following a series of strong year classes of sole, but is presently only about 60% of the peak value.

The other gears employed to catch demersal species are gillnets and tangle nets, notably by inshore boats targeting cod, bass, grey mullet, sole, and plaice.

The main pelagic fishery in the Irish Sea is for herring. In recent years, it has been predominantly operated by pair trawlers from Northern Ireland. The size of this fleet has declined to a very low level in recent years.

There are also a number of inshore fisheries in the Irish Sea that target stocks not currently assessed by ICES. These include pot fisheries for crab, lobster and whelk hydraulic dredge fisheries for razor fish and dredge fisheries for scallops.

Data

The biological data available from scientific sources for the assessment of roundfish, flatfish, herring and *Nephrops* are relatively good. The level of biological sampling of most of the commercial landings has been maintained or improved with the introduction of the Data Collection Regulation (EC 1543/2001). Discard data are only used directly in assessments for *Nephrops* and whiting. Discard data are available for some UK and Irish fleets but are currently not used in many assessments because of short or incomplete time-series and concerns about precision of the estimates.

Data on landings, fishing effort, and species composition are available for most fleets in the Irish Sea. However it is uncertain how reliably these data reflect trends in effective effort, i.e. nominal effort after corrections for technological improvements. Restrictive management measures (TAC's) have also resulted in changes in the fishing practice of some fleets and redirected their effort to other species. In a number of cases this has led to abandoning the use of time-series of commercial CPUE data in the assessments (cod, haddock, whiting). In some recent years there was misreporting of roundfish landings associated with restrictive quotas. The landings of one nation have been corrected for mis-reporting and the extent of mis-reporting by other countries is uncertain.

Several series of research vessel survey indices are available for most species. Otter-trawl surveys are presently undertaken in Division VIIa by UK(NI), UK (Scotland) and Ireland. The Scottish and Irish surveys in Division VIIa are extensions of surveys covering Divisions VI and VIIb-k, respectively, and data for VIIa are only available for a few years. Survey data are available for UK (E&W) September beam trawl survey and the UK(NI) MIK net survey. The UK NI also undertake an acoustic survey for herring in VIIa and a trawl survey for *Nephrops*.

Analytical assessments were performed on cod, haddock, whiting, plaice, sole, *Nephrops* and herring. Multispecies considerations are not incorporated in the assessments or the forecasts for the Irish Sea stocks.

ICES Overview of the resources

In the last ten years the state of the Irish Sea cod and whiting stocks has deteriorated further. Fishing mortality has remained well above the reference levels and the spawning stock biomasses have declined to the lowest in the time-series in recent years. Stocks of *Nephrops* plaice remained relatively stable close to or above biologically acceptable limits. The sole stock has been low during the 1990s and fishing mortality is close to reference levels. The herring stock has increased in recent years from low levels in the early 1990s. The haddock stock increased during the 1990s following some strong recent recruitment but the biomass has been lower in recent years with high fishing mortalities.

The stock of **cod** is outside safe biological limits. The spawning biomass is below B_{lim} and fishing mortality above F_{lim} . Fishing mortality on cod increased progressively throughout the 1980s and has been close to or above F_{lim} since 1987. As with stocks of cod to the west of Scotland and in the North Sea, the high rate of fishing mortality has caused a long-term decline in spawning stock biomass, slowed or reversed only temporarily by occasional strong year classes. During the early 1990s, the spawning stock declined rapidly and recruitment has since varied around a lower average than in earlier decades. Two of the weakest year classes on record were formed in 1997 and 1998 and caused the spawning stock biomass to decline sharply in 2000 to a historic low well below F_{lim} . The EU introduced an emergency spawning closure in 2000 to try to maximise the egg production from the severely depleted spawning stock (Council Regulation (EC) No. 304/2000) and subsequently established additional technical measures to improve the selectivity of towed gears (Council Regulation (EC) No. 2549/2000). The spawning closure covered known cod spawning grounds in the Irish Sea from 14 February to 30 April 2000. Within the closure it was prohibited to use any demersal trawl, seine, or similar towed net, any gillnet, trammel net, tangle net, or similar static net or any fishing gear incorporating hooks. Derogations were permitted for *Nephrops* trawlers within defined areas, and for certain beam trawls, and some limited experimental fisheries were permitted with observers to examine bycatch of cod in fisheries for haddock and flatfish. The closure was continued in 2001, 2002 and 2003, but was restricted to the western Irish Sea west of 4°50'W on the evidence that the abundance of adult cod in the eastern Irish Sea was too low to justify the restrictions on fishing for other species. Derogations for *Nephrops* fishing were continued also in 2003. Although certain areas of the *Nephrops* grounds close to the centres of cod spawning were closed to all fishing, *Nephrops* vessels with observers were permitted provided the nets were fitted with recently developed inclined separator panels that had been shown to markedly reduce the bycatch of cod.

Global warming is often cited as a reason for the decline of cod stocks around Ireland and in the North Sea. The link between recruitment levels and sea temperature is however weak, due to the complex and often indirect patterns with which environmental changes influence the biology of the species. A change in temperature affects the timing and area of spawning, which in turn causes different prevalent feeding conditions and altered ocean current transport routes between spawning grounds and nursery areas. Studies have shown that the effect of temperature on cod recruitment is less pronounced when spawning stock biomass is low, as the likelihood of good recruitment is diminished *per se*. It can therefore be concluded that high fishing pressure resulting in low spawning stock biomass is the primary cause of decline in recruitment in the Irish Sea and changes in the environment, such as global warming, were probably secondary factors.

Landings and catches of **whiting** in the main otter trawl fisheries, which now operate mostly in the western Irish Sea, have declined precipitously over time. This decline reflects lower abundance and with a low biomass and fishing mortalities above reference levels the stock is outside safe biological limits. Total international landings in 2003 were only 400 t compared with to over 10 000 t in the 1980s. The proportion of the catch which is discarded has been increasing in recent years to over 60% of the total catch in the last three years. Research surveys commencing in the early 1990s show this substantial decline to be a phenomenon mainly of the western Irish Sea, whereas average catch-rates of whiting above the commercial minimum landing size are not only higher in the eastern Irish Sea throughout this period, but show little trend over time. The Irish Sea whiting fishery has been characterised by high levels of fishing mortality throughout the 1980s and 1990s. At such high fishing mortalities, the spawning stock contains few age classes and is vulnerable to poor recruitment. Discarding of whiting is considered a major problem in the *Nephrops* directed fishery, which continues to use 70 mm and 80 mm meshes. The increases in mesh size to 100 mm or more in the roundfish fisheries, required under recent EU and national legislation, should reduce discard rates in these fisheries.

A notable phenomenon in the Irish Sea, and also in the Celtic Sea, during the 1990s has been a growth in the stocks of **haddock**. Very strong 1994 and 1996 year classes caused a substantial increase in stock size in the Irish Sea leading to the development of targeted haddock fisheries using pelagic and demersal trawls. The fish are confined mainly to the western Irish Sea where established roundfish and *Nephrops* fisheries take place. This concentration of the stock may be responsible for the very high rates of fishing mortality observed in the 1990s, three times higher than the F_{pa} and the stock is harvested outside safe biological limits. Due to the TAC arrangements for Subarea VII, some national quotas proved limiting in the 1990s, causing substantial misreporting as the stock and fishery expanded. To alleviate this problem, a separate TAC allocation for Irish Sea haddock has operated since 1999. Substantial discarding of small haddock has been observed in the otter trawl fisheries. The stock should benefit from the recent increases in mesh size in the roundfish fisheries. Due to the poor quality of landings data for this stock, and the absence of complete data on discards, the recent trends in abundance and fishing mortality are relatively poorly defined, although there is evidence that fishing mortality may have reduced in recent years it remains above F_{pa} and the stock size is reduced to intermediate levels.

The stock of **plaice** is within safe biological limits. The landings declined in the 1990s. This resulted from a combination of declining fishing effort and a succession of below-average year classes recruited since 1987. The spawning stock is currently above B_{pa} and the fishing mortality since 1998 has been below F_{pa} . The stock is expected to increase and will have a low probability of falling outside safe biological limits in the medium-term.

The **sole** stock is outside safe biological limits. It has benefited several times since 1970 from very strong year classes, and as a consequence has sustained fishing mortalities that are considered high for a sole stock. Fishing mortality in the last three years has been reduced and is around F_{pa} . SSB has recently increased from the historic low in 1997 to close to B_{pa} . The frequency of strong year classes has decreased since the mid-1980s. The 2000 year class is estimated to be the lowest on record.

The stocks of *Nephrops* in the Irish Sea are considered to be fully exploited. There is some concern that fishing mortality may rise from the current high level if the use of twin trawls expands. Account should also be taken of the impact of this fishery on the stocks of protected species. There has been no assessment in recent years of the effects on *Nephrops* of predation by cod, but the low abundance of the latter has probably reduced its impact.

The stock of Irish Sea **herring** is presently subject to low fishing mortality exerted by a small fleet of trawlers from Northern Ireland. The stock has recovered from a collapse that followed high fishing mortalities in the 1970s. However, its present state is uncertain because the series of survey estimates remains too short to establish the recent trends in biomass.

The official landings of **Hake** from Division VIIa are less than 500t.

ICES ADVICE

3.8.1

Demersal fisheries in the area are mixed fisheries, with many stocks exploited together in various combinations in different fisheries. In these cases management advice must consider both the state of individual stocks and their simultaneous exploitation in demersal fisheries. Stocks in the poorest condition, particularly those outside safe biological limits, necessarily become the overriding concern for the management of mixed fisheries where these stocks are exploited either as a targeted species or as a bycatch.

Four main fishery units can be described in the Irish Sea: these are *Nephrops* otter trawlers, round fish otter trawlers, semi-pelagic trawlers, and beam trawlers. As trends in stocks of various species are generally not in synchrony, advice provided on the basis of the status of individual species may result in advised fishing mortalities for a group of co-harvested species that cannot be realized simultaneously within the context of mixed fisheries. Stocks in need of special conservation efforts, such as those affected by recovery plans, present particularly difficult challenges. For instance, the reduction of fishing mortality (and effort) required for cod, makes it very unlikely that TACs which would be sustainable for healthier stocks in the mixed fisheries could be taken. The needs of the stock(s) under recovery plans could be met most directly by simply setting the TACs for all species in mixed fisheries to correspond to the fishing mortality

intended for the species under recovery plans, which would result in large foregone yields in many healthier stocks. The foregone yield could be reduced somewhat if effort could be adjusted on a fleet-by-fleet basis to comply with the total fishing mortality in the proposed recovery plan, while allowing as much harvesting of other species as possible. However, such an approach requires reliable information on the catch-at-age for all species in all fisheries, and is still likely to leave substantial potential harvestable biomass of several species unavailable to any fishery.

Formulating advice in relation to mixed fisheries is a two-

step procedure. First, ICES establishes limits for the exploitation of each species on the basis of its status, consistent with the Precautionary Approach. The second step is to identify the major constraints within which mixed fisheries should operate and through this analysis identify the additional constraints that further limit the fishing possibilities.

The state and the limits to exploitation of the individual stocks are presented in the stock sections (Sections 3.8.2-3.8.6). ICES considers limits to the exploitation of single stocks as in the table below.

ICES Advice regarding the management of demersal fisheries in the Irish Sea:

Stock	State of the stock	ICES considerations regarding single-stock exploitation boundaries	Upper limit corresponding to the exploitation limit (Landings in 2004, t)
Cod in Division VIIa	Outside safe biological limits	A recovery plan that must include a provision for zero catch until the estimate of SSB is above B_{lim} or other strong evidence of recovery is observed.	0
Haddock VIIa	Harvested outside of safe biological limits	Fishing mortality in 2004 should be reduced to less than F_{pa} .	1 500
<i>Nephrops</i> FU 15 & FU 14 (Management area J)	Exploited at sustainable levels	The TAC from this Management Area in 2004 and 2005 be kept at the level recommended in 2001.	9 550
Plaice VIIa	Inside safe biological limits	Fishing mortality in 2004 should be less than F_{pa} .	1 600
Sole VIIa	Outside safe biological limits	Fishing mortality in 2004 should be reduced by 10%.	790
Whiting in Division VIIa	Outside of safe biological limits	A recovery plan that must include a provision for zero catch until the estimate of SSB is above B_{lim} or other strong evidence of recovery is observed.	0

The table above identifies the stocks outside safe biological limits, i.e. cod, whiting, and sole, which are the overriding concerns in the management advice. The advice for the stocks outside safe biological limits (cod, whiting, and sole) therefore determines the advice for management of all demersal fisheries:

- for cod the advice is for zero catch until SSB has been rebuilt above B_{lim} ;
- for whiting the advice is for zero catch until SSB has been rebuilt above B_{lim} ;
- for sole the advice is to reduce fishing mortality by at least 10% to increase SSB above B_{pa} in the short term.

ICES recommends that mixed fisheries characteristics be taken into account when managing demersal fisheries in

the Irish Sea. Only demersal fisheries which can demonstrate that they fish without catch or discards of cod and whiting may be permitted.

The demersal fisheries in the Irish Sea should therefore be managed such that the following three rules apply simultaneously:

1. The fishing of each species should be restricted within precautionary limits as indicated in the table of individual stock limits above;
2. The catch of cod and whiting is zero;
3. The total catch of sole is less than 790 t.

Furthermore, unless ways can be found to harvest species caught in a mixed fisheries within precautionary

limits for all those species individually then fishing should not be permitted.

ICES notes that a recovery plan for cod is in preparation. ICES evaluated a recovery plan proposal from the European Commission (Chapter 10). The starting point for these evaluations was the stock data resulting from the current assessment (with further evaluations of possible bias in estimated stock numbers but no error in the inputs). The results of these evaluations indicate that SSB can be recovered over a time frame of 7-8 years. These simulations assume 100% implementation efficiency which has not been seen in the past management of the stock and hence are likely to underestimate the time needed for recovery.

Relevant factors:

ICES notes that this advice presents a strong incentive to fisheries to avoid catching species outside safe biological limits. If industry-initiated programs aim at reducing catches of species outside safe biological limits to levels close to zero in mixed fisheries, then these programs could be considered in management of these fisheries. Industry-initiated programs to pursue such incentives should be encouraged, but must include a high rate of independent observer coverage, or other fully transparent methods for ensuring that their catches of species outside safe biological limits are fully and credibly reported.

On a single-species basis reductions in fishing mortality have been advised for all stock in the Irish Sea with the exception of *Nephrops* and plaice, where no increase in fishing mortality has been advised. The observed decline in SSB below the precautionary level is a clear indication of excessive effort. This, and the poor performance of TACs, as implemented, in reducing fishing mortality, leads ICES to reiterate that the required reductions in fishing mortality can only be achieved if reductions in effort are included in management, and effective deterrents to discarding are implemented. Discarding occurs in *Nephrops*, roundfish and flatfish fisheries in the Irish Sea. These discards are largely small and juvenile fish. They always result in foregone potential yield, and for depleted stocks they are a serious impediment to rebuilding.

Possibly the strongest mixed fishery interaction in the Irish Sea is between the *Nephrops* fishery and the whiting stock. In recent years (1999-2001) vessels targeting *Nephrops* account for around two-thirds of the whiting landings in the Irish Sea. Although discard estimates for fleets targeting *Nephrops* are incomplete and considered imprecise, recent estimates suggest that around 60% of the total catch of whiting in *Nephrops* fisheries is discarded. The use of square mesh panels for vessels targeting *Nephrops* with 70 mm cod-end mesh have been obligatory since 1994. Despite this technical conservation measure the proportion of small whiting caught and discarded in this fishery has continued to increase. ICES points out that in addition to effort restrictions further technical measures (e.g. increased cod-end and square mesh panel mesh sizes, separator panels, and fixed grids) should be investigated and may

substantially reduce bycatch and discarding of whiting in this *Nephrops* fishery. However, unless such technical measures are found to be completely effective in reducing the catch of whiting, implementing technical measures in the *Nephrops* fishery will not be adequate to implement the ICES advice for a zero catch of whiting.

The cod fishery was traditionally carried out by otter trawlers targeting spawning cod in spring and juvenile cod in autumn and winter. Activities of these vessels have decreased, whilst a fishery for cod and haddock using large pelagic trawls increased substantially during the 1990s. In recent years (1999-2001) the mixed otter trawl fleets accounted for 20% of the total VIIa cod, haddock and whiting and 43% of the plaice landings. In recent years (1999-2001) the semi-pelagic fishery has also targeted cod during the summer. The semi-pelagic fleet accounted for around 44% of the cod and 43% of the haddock landings in recent years. Cod are also taken as a bycatch in the *Nephrops* directed fishery which accounted for around 22% of recent landings (1999-2001). Although discard estimates for cod in the Irish Sea are not available discard rates are not thought to be substantial. However, misreporting and under-reporting of cod is thought to occur in some VIIa fisheries. Estimates of mis-reporting for some nations are included in the assessment, but the scientific advice for zero catch of cod stock requires that the practice be terminated.

Beam trawl fisheries in the Irish Sea account for around 91% of the sole, 47% of the plaice and 7% of the cod landings in recent years (1999-2001).

Catch Options

The catch options that would apply if single stocks could be exploited independently of others are presented in the single stock sections on individual stocks (Sections 3.8.2-3.8.6).

However, for the mixed demersal fisheries catch options must be based on the expected catch in specific combinations of effort in the various fisheries taking into consideration the advice given above. The distributions of effort across fisheries should be responsive to objectives set by managers, but must also result in catches that comply with the scientific advice presented above.

The information on the mix of species observed caught in demersal fisheries in this area is not complete. An evaluation of the effects of any combination of fleet effort on depleted stocks would require that the catch data on which such estimates were based included discard information for all relevant fleets. Such data are not available to ICES. ICES is therefore not in a position to present scenarios of the effects of various combinations of fleet effort. If data including discards were be available it would be possible to present a forecast based on major groupings of fleet/fisheries.

Irish Sea Cod

(Division VIIa)

For latest information, see: <http://www.ices.dk>



Fisheries Science Services

FSS – SINGLE STOCK CONSIDERATIONS

(See Irish Sea Overview for Mixed Fishery Advice)

Given the very low stock size, the recent poor recruitments and continued high fishing mortality, ICES has classified this stock as outside safe biological limits.

FSS considers that a recovery plan which ensures a safe and rapid rebuilding of SSB to levels above B_{pa} must be implemented. A closure of all fisheries targeting cod or with a cod by-catch will provide the highest probability of recovery. Simulations on the recovery plan proposed by the EU with a 30% SSB rebuild target per year, suggest that SSB can be recovered to over B_{pa} over a time frame of 7 to 8 years. These simulations assume 100% implementation efficiency.

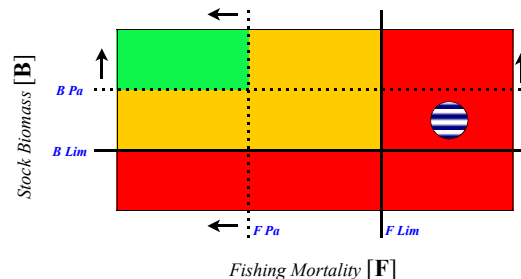
FSS recognise that the 'zero catch option' for cod and whiting would effectively mean a closure of the mixed demersal fishery in the Irish Sea. FSS considers that an industry initiated programme aimed at reducing cod and whiting catches to 'close to zero' should be considered in the management of Irish Sea fisheries. Industry initiated programmes should be encouraged but must include a high rate of independent observer coverage or other totally transparent methods for ensuring that their catches of species outside safe biological limits are fully and credibly reported.

FSS consider that a well defined 'management plan' is necessary to recover the cod stock and to fish it sustainably once it has recovered. FSS considers that such a plan requires clearly defined objectives that will ensure a high probability of recovery to agreed levels within a specified time frame. FSS considers that the proper definition and evaluation of all métiers involved in the fishery is crucial to this management plan.

STATE OF THE STOCK

- There are very serious concerns about the state of this stock and its capacity to rebuild.
- The total international landings estimated by the WG were 4,419 t in 2002. This was well in excess of the agreed TAC of 3,200 t. Total international landings have declined steadily since 1980s reaching a historic low in 2000.

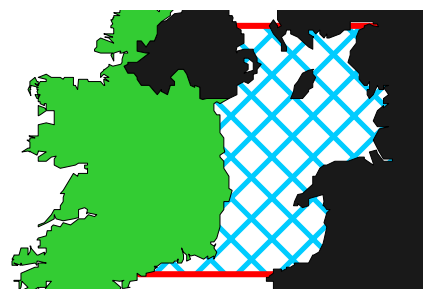
State of the Stock in relation to the precautionary reference points (see page 18)



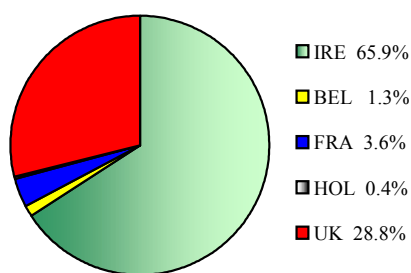
- Fishing mortality, while fluctuating, has increased progressively over time and has been above F_{pa} since 1980 and close to or above F_{lim} since 1987. F remains high ($F = 1.23$ in 2002) and is above the F_{pa} of 0.72 and F_{lim} of 1.0.
- The probability of good recruitment appears to have been reduced at the low SSBs observed since 1990: the six weakest year classes on record were produced since 1992, and the second weakest year class was produced in 2002. The absence of good recruitment since 1991 and the evidence of reduced recruitment at SSB levels below 10,000 t, means that there remains a high risk of continuous, serious decline in SSB.
- A general decline in SSB since the early 1980s was reversed temporarily only by the strong 1986 year-class. SSB has increased slightly since 2000 due to reduced influence of the weak 1997 and 1998 year classes. SSB in 2003 (6,460 t) is far below the B_{pa} of 10,000 t and close to B_{lim} of 6,000 t.
- Short-term catch predictions indicate that, at current fishing mortality, landings in 2004 will be about 4,200 t and that SSB will return below B_{lim} . There is a high probability of SSB remaining below B_{lim} in the medium term.

CURRENT MANAGEMENT

- The TAC Area covers Division VIIa and corresponds to the assessment area.



Red Box-TAC/Management Area Blue Shading- Assessment Area



- The TAC Area covers Division VIIa and corresponds to the assessment area.
- The 2003 TAC was 1,950 t with an associated Irish quota of 1,284 t.
- To rebuild the SSB of the stock, a spawning closure was introduced in 2000 for ten weeks from mid-February to maximise the reproductive output of the stock (EU Regulations 304/2000 and 2549/2000). The measures have since been revised annually, involving a continued, but smaller spawning ground closure, coupled with changes in net design to improve selectivity and protect juvenile fish.
- FSS recommends that management objectives be established and that a management plan be developed and implemented for fisheries catching cod.

FSS – ECONOMIC COMMENTS

- The value of the 2002 Irish quota was about €4.6m.
- The value of the 2002 Irish landings was about €2.2m.
- This was a very valuable fishery during the 1980s but since then the economic importance has declined due to the poor state of the stock.

ADDITIONAL INFORMATION

1. This assessment is based on landings at age and recruitment indices from surveys. Commercial fleet CPUE data are now considered unreliable and are not included in the assessment.
2. Irish landings in 2002 were estimated to be 953 t (up 308 t from 645 t in 2001).
3. Whilst mis-reporting is a problem in this fishery for those countries with restrictive quotas, corrections have been included in WG assessments from 1991 onwards.
4. The main fleets targeting cod in the Irish Sea include whitefish and *Nephrops* otter trawlers operating out of ports in UK(NI), UK(E&W) and Ireland, and mid-water trawlers operating out of UK(NI). The fishery was traditionally carried out by otter trawlers targeting spawning cod in spring and juvenile cod in autumn and winter. Activities of these vessels have decreased, whilst a fishery for cod and haddock using large pelagic trawls increased substantially during the 1990s. In recent years the pelagic fishery has also targeted cod during the summer.
5. Otter trawlers from Howth have traditionally carried out the Irish Sea cod fishery. However, in recent years there has been a marked decline in the number of vessels operating from that port. A small proportion (10%) of the Irish landings are now taken by

Irish vessels either targeting *Nephrops* or switching between targeting *Nephrops* and whitefish. Otter trawl vessels targeting whitefish accounted for 35% of the landings the remainder were taken by beamers 10% and other gears. In 2001 usage of inclined separator trawls was around 25%, however in 2002 usage is thought to have increased to around 80%.

6. Irish Sampling of this stock is supported through the EC funded sampling programme which is required under Data Collection Regulations 1543/2000 and 1639/2001. FSS sampling indicates that 2 year-old fish, most of which are immature, comprise over half of the Irish landings. 3 year-old fish account for 32% of the Irish landings. The distinct lack of older fish in the landings confirms the poor state of the stock.
7. The FSS commenced a groundfish survey in the Irish Sea on the *RV Celtic Voyager* in 1997. The survey has consistently produced very poor catches of juvenile and adult cod.
8. FSS data indicates that discarding of cod is negligible in the Irish Sea.
9. There has been a tendency for the fishing mortality estimates for adult cod in the final year of the assessment to be revised upwards, and SSB revised downwards, when new catch and survey data for the following year are added. The previously strong retrospective bias in SSB in this assessment has diminished; the current assessment revised 2001 SSB downwards by 9%. F in 2001 was revised upwards by 60%.
10. The closure of the spawning grounds during spring from 2000 onwards has mainly affected pelagic trawlers and whitefish otter trawlers, causing displacement of effort into surrounding regions and in some cases switching to *Nephrops* trawl gear to take advantage of the derogation for *Nephrops* fishing within the closure.
11. The seasonal migration of cod between the Irish Sea and the Celtic Sea was investigated by the FSS cod tagging programme. A special STECF meeting was held in Dublin in 2000 to evaluate available tagging data. The results indicated that, while some cod move from the Irish Sea into the Celtic Sea, they constitute a very small proportion of the Celtic Sea cod stock. Furthermore cod tagged in the Celtic Sea were not recovered in the Irish Sea.
12. A notable feature of the Irish Sea mixed gadoid fishery has been the increased targeting of haddock by the traditional cod fleet operating in the western Irish Sea in the last number of years. Haddock abundance has increased substantially in the Irish Sea due to some very large year-classes. These have become the target of a directed fishery by UK (NI) and the Irish fleet.
13. A consideration of the maximum possible benefits to the stock of recent vessel decommissioning was considered in the latest assessments. The benefits of the improved selectivity would translate as a 10% reduction in total fishing mortality in short term forecasts. If fully effective, this would result in:
 - A reduction in predicted landings in 2003 of 9% compared to the status quo forecast,

- An increase in predicted landings in 2004 of 5% compared to the status quo forecast, and,
 - A 22% increase in SSB in 2005 to 3,900t (compared to the status quo forecast).
14. It is not yet possible to measure the effects that the emergency measures for cod in Division VIIa has had on the stock and fishery for cod in Division VIIa. However, any resulting benefits were considered to have been incorporated within the short-term forecasts made in the most recent assessment.

ICES ADVICE

3.8.2

State of stock/exploitation:

Based on the most recent estimate of the biomass ICES classifies the stock as being outside safe biological limits.

Fishing mortality has been above F_{pa} since 1980 and close to, or above F_{lim} since 1989. SSB is below B_{pa} and has been below or close to B_{lim} since 1995, and is projected to be below B_{lim} in 2004. In the last fifteen years, only one year class has been above average and the 2002 year class is the second lowest on record. The stock is thus estimated to decline below B_{lim} in the short-term. At the average rate of exploitation estimated for recent years, SSB will remain at sizes where the risk of continued poor recruitment is high.

Management objectives:

To rebuild the SSB of the stock, a spawning closure was introduced in 2000 for ten weeks from mid-February which was argued to maximize the reproductive output of the stock (EU Regulations 304/2000 and 2549/2000). The measures were revised in 2001, 2002 and 2003, involving a continued, but smaller spawning ground closure, coupled with changes in net design to improve selectivity.

Precautionary Approach reference points (established in 1998):

ICES considers that:	ICES proposes that:
B_{lim} is 6 000 t.	B_{pa} be set at 10 000 t. This is the previously agreed MBAL and affords a high probability of maintaining the SSB above B_{lim} , taking into account the uncertainty of assessments. Below this value the probability of below-average recruitment increases.
F_{lim} is 1.0. This is the fishing mortality above which there is a reduced probability that the stock can sustain itself.	F_{pa} be set at 0.72. This F is considered to have a high probability of avoiding F_{lim} . Fishing mortalities above F_{pa} have been associated with observed stock decline.

Technical basis:

$B_{lim} = B_{loss}$	$B_{pa} =$ Previous MBAL with signs of reduced recruitment
$F_{lim} = F_{med}$	$F_{pa} = F_{med} * 0.72$

Single Stock Exploitation Boundaries:

Given the very low stock size, the recent poor recruitments, and the continued high fishing mortality, a recovery plan which ensures a safe and rapid rebuilding of SSB to levels above B_{pa} should be implemented. Such a recovery plan must include a provision for zero catch until the estimate of SSB is above B_{lim} or other strong evidence of recovery is observed. The stock was close to B_{lim} at the start of 2003, but is expected to decrease to below B_{lim} at the start of 2004. Therefore, in 2004 such a recovery plan would imply zero catch.

The advice on the exploitation of this stock in 2004 is presented in the context of mixed fisheries and is found in Section 3.8.1.

Recovery Plan:

ICES evaluated a recovery plan proposal from the European

Commission (Chapter 9). The starting point for these evaluations was the stock data resulting from the current assessment (with further evaluations of possible bias in estimated stock numbers but no error in the inputs). The results of these evaluations indicate that SSB can be recovered above B_{pa} over a time frame of 7-8 years. These simulations assume 100% implementation efficiency, which has not been seen in the past management of the stock and hence these simulations are likely to underestimate the time needed for recovery.

Relevant factors to be considered in management:

The current assessment estimates SSB to have increased to just above B_{lim} in 2003. However, the two incoming weak year classes and continued high F mean that the SSB is estimated to fall below B_{lim} in 2004 and the advice for zero catch has therefore been continued.

Catch forecast for 2004:

Basis: $F(2003) = F(2000-2002) = 1.47$;
 Landings (2003) = 6.1; SSB(2004) = 4.6.

F (2004) Onwards	Basis	Landings (2004)	SSB (2005)
0	$0 * F_{sq}$	0	8.8
0.29	$0.2 * F_{sq}$	1.4	7.0
0.59	$0.4 * F_{sq}$	2.4	5.6
0.72	F_{pa}	2.7	5.1
0.89	$0.6 * F_{sq}$	3.2	4.6
1.18	$0.8 * F_{sq}$	3.7	3.9
1.47	F_{sq}	4.2	3.3

Weights in '000 t.

Shaded scenarios considered inconsistent with the precautionary approach applied in a single-species context.

Comparison with previous assessment and advice:

The estimate of mean fishing mortality-at-ages 2 to 4 in recent years are very unreliable since it is influenced by a record-low year class (1998) that may be very poorly sampled in the catch. The estimate of fishing mortality in 2001 is 65% higher and SSB in 2002 16% higher in this year's assessment compared to last year's assessment.

Elaboration and special comment:

Given the precision of the assessment and the tendency to underestimate F in the final year, it is not yet possible to

determine if the emergency and *ad hoc* measures from 2000 onwards have been successful in reducing fishing mortality and increasing SSB and recruitment.

However, any effects of such measures are considered to be included within the *status quo* forecasts.

The analytical assessment is based on landings-at-age and recruitment indices from surveys in Division VIIa. Estimates of misreported landings are included from 1991 onwards. There has been a tendency for the fishing mortality estimates for adult cod in the final year of the assessment to be revised upwards, and SSB revised downwards, when new catch and survey data for the following year are added.

Source of information:

Report of the Working Group on the Assessment of Northern Shelf Demersal Stocks, May 2003 (ICES CM 2004/ACFM:01).

Yield and spawning biomass per recruit**F-reference points:**

	Fish Mort Ages 2-4	Yield/R	SSB/R
Average last 3 years	1.470	1.385	1.382
F_{max}	0.300	1.906	6.393
$F_{0.1}$	0.157	1.752	10.369
F_{med}	1.253	1.452	1.629

Catch data (Tables 3.8.2.1-2):

Year	ICES Advice	Single-stock exploitation boundaries	Predicted catch corresp. to advice	Predicted catch corresponding to single-stock boundaries	Agreed TAC	Official landings	ACFM Landings
1987	No increase in F; interaction with <i>Nephrops</i>		10.3		15.0	13.2	12.9
1988	No increase in F; interaction with <i>Nephrops</i>		10.1		15.0	15.8	14.2
1989	No increase in F		13.4		15.0	11.3 ¹	12.8
1990	F at F_{med} ; TAC		15.3		15.3	9.9 ¹	7.4
1991	Stop SSB decline; TAC		6.0		10.0	7.0 ¹	7.1 ²
1992	20% of $F(90) \sim 10\,000$ t		10.0		10.0	7.4	7.7 ²
1993	$F_{med} \sim 10\,200$ t		10.2		11.0	5.9	7.6 ²
1994	60% reduction in F		3.7		6.2	4.5	5.4 ²
1995	50% reduction in F		3.9		5.8	4.5	4.6 ²
1996	30% reduction in F		5.4		6.2	5.30	4.96 ²
1997	30% reduction in F		5.9		6.2	4.44	5.86 ²
1998	No increase in F		6.2		7.1	4.96	5.31 ²
1999	Reduce F below F_{pa}		4.9		5.5	2.96	4.78 ²
2000	Lowest possible F		0		2.1	1.42	2.18 ²
2001	Lowest possible F		0		2.1	2.03 ²	3.60 ²
2002	Establish recovery plan		-		3.2	1.59 ²	4.42 ²
2003	Closure of all fisheries for cod		-		1.95		
2004	Zero catch	Zero catch	0	0			

¹Preliminary. ²Incomplete data. Weights in '000 t.

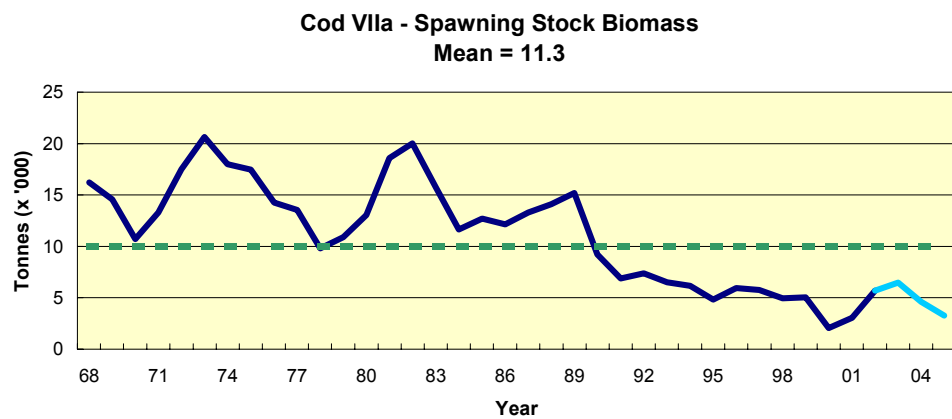
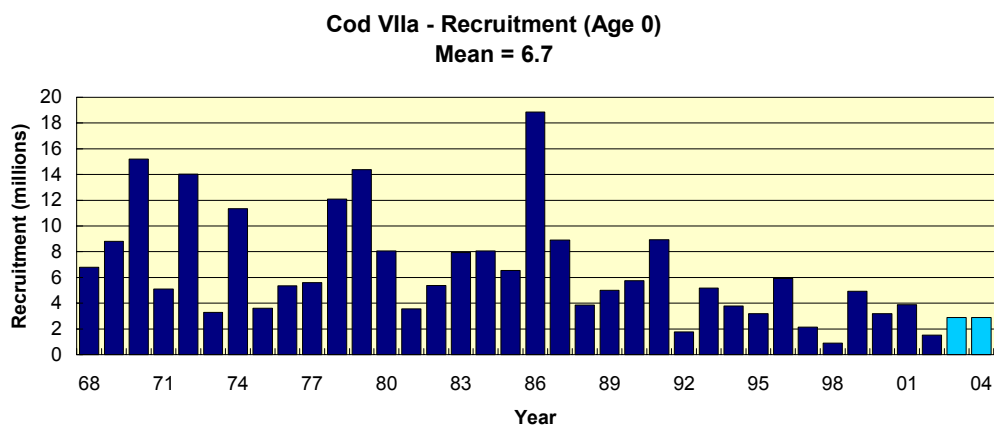
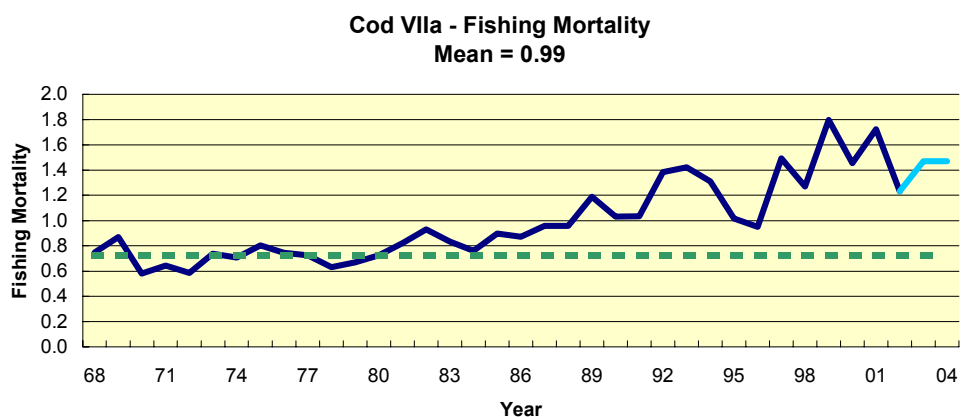
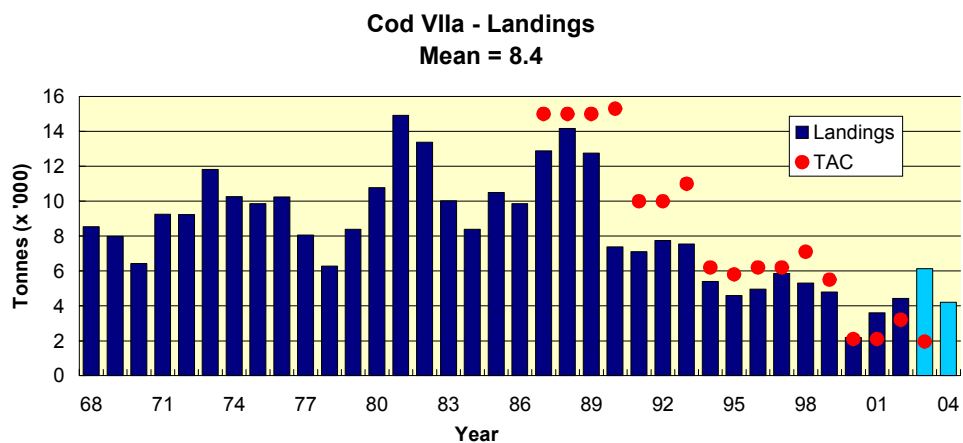


Table 3.8.2.1 Nominal catch (t) of COD in Division VIIa as officially reported to ICES, and Working Group estimates of annual landings.

Country	1986	1987	1988	1989	1990	1991	1992	1993
Belgium	222	344	269	467	310	78	174	169
France	1,480	1,717	2,406	352 ¹	201 ¹	320 ¹	916	686
Ireland	3,991	5,017	5,821	3,656	2,800	2,364	2,260	1,328
Netherlands	-	-	-	-	-	-	-	-
UK (England & Wales) ³	847	1,922	2,667	6,320	4,752	3,562	3,529	3,244
UK (Isle of Man)	80	44	118	39	48	175	129	57
UK (N. Ireland)	2,992	3,565	4,080	...	...	...	...	...
UK (Scotland)	446	574	472	465	1,767	515	393	453
Total	10,058	13,183	15,833	11,299	9,878	7,014	7,401	5,937
Unallocated	-206	-289	-1,665	1,452	-2,499	81	334	1,618
Total figures used by Working Group for stock assessment	9,852	12,894	14,168	12,751	7,379	7,095	7,735	7,555

Country	1994	1995	1996	1997	1998	1999	2000	2001	2002
Belgium	129	187	142	183	316	150	60	283	318
France	208	166	148	268	269 ¹	85 ¹	53 ²	74	116
Ireland	1,506	1,414	2,476	1,492	1,739	966	455	751 ²	n/a
Netherlands	-	-	25	29	20	5	1	- ¹	- ¹
UK (England & Wales) ³	2,274	2,330	2,359	2,370	2,517	1,665	799	885	1160
UK (Isle of Man)	26	22	27	19	34	9	11	1	n/a
UK (N. Ireland) ³	...	...	...	...	...	...	...	...	...
UK (Scotland)	326	414	126	80	67	80	38	32 ²	n/a
Total	4,469	4,533	5,303	4,441	4,962	2,960	1,417	2,026	1,594
Unallocated	933	54	-339	1,418	348	1,824	762	1,572	2,825
Total figures used by Working Group for stock assessment	5,402	4,587	4,964	5,859	5,310 ²	4,784 ²	2,179 ²	3,598	4,419

¹Preliminary.

²Revised.

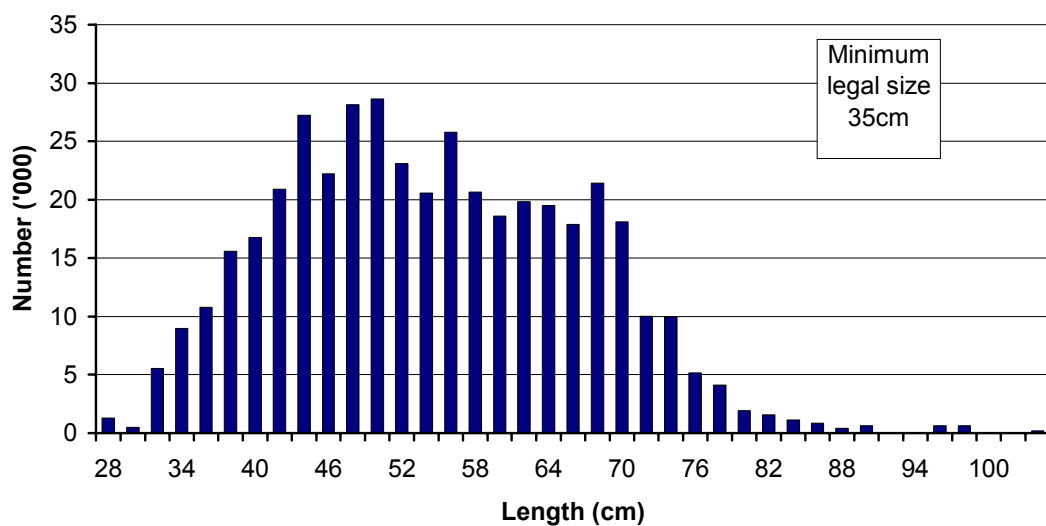
³1989–2000 N. Ireland included with England and Wales.

n/a = not available.

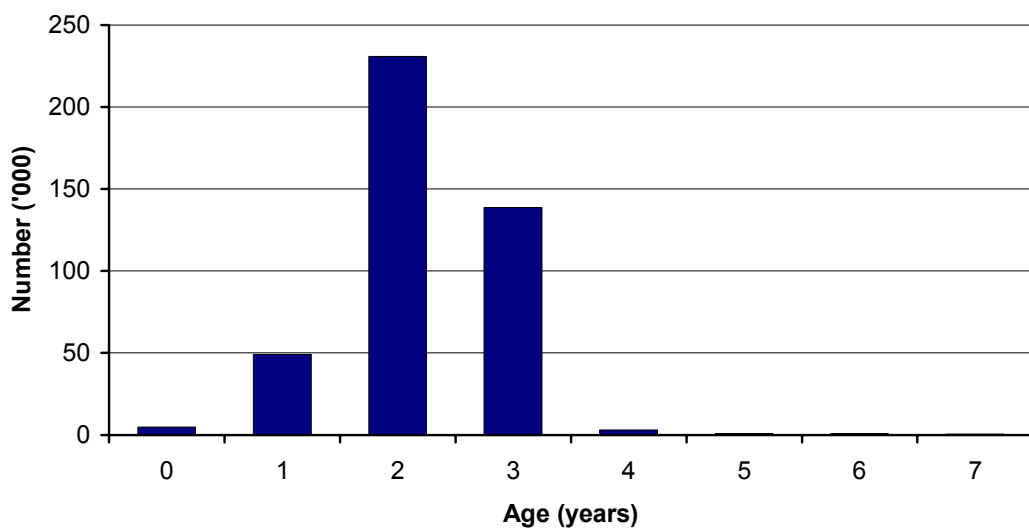
Table 3.8.2.2 Cod in Division VIIa (Irish Sea).

Year	Recruitment Age 0 thousands	SSB tonnes	Landings tonnes	Mean F Ages 2-4
1968	6790	16226	8541	0.7487
1969	8803	14570	7991	0.8688
1970	15209	10719	6426	0.5783
1971	5085	13313	9246	0.6432
1972	14035	17507	9234	0.5858
1973	3285	20667	11819	0.7367
1974	11350	17998	10251	0.7067
1975	3615	17464	9863	0.8035
1976	5355	14270	10247	0.7433
1977	5593	13553	8054	0.7237
1978	12093	9801	6271	0.6304
1979	14374	10897	8371	0.6686
1980	8074	13056	10776	0.7238
1981	3578	18573	14907	0.8192
1982	5364	20014	13381	0.9278
1983	7951	15741	10015	0.8345
1984	8071	11652	8383	0.7593
1985	6548	12716	10483	0.8970
1986	18860	12143	9852	0.8704
1987	8901	13303	12894	0.9583
1988	3864	14096	14168	0.9593
1989	4987	15214	12751	1.1871
1990	5737	9226	7379	1.0319
1991	8928	6888	7095	1.0338
1992	1774	7382	7735	1.3825
1993	5169	6523	7555	1.4219
1994	3782	6159	5402	1.3096
1995	3183	4849	4587	1.0166
1996	5920	5947	4964	0.9505
1997	2138	5786	5859	1.4932
1998	895	4972	5310	1.2695
1999	4929	5062	4784	1.7961
2000	3197	2038	2179	1.4548
2001	3879	3055	3598	1.7240
2002	1523	5706	4419	1.2313
2003	2888	6462		
Average	6548	11210	8423	0.9854

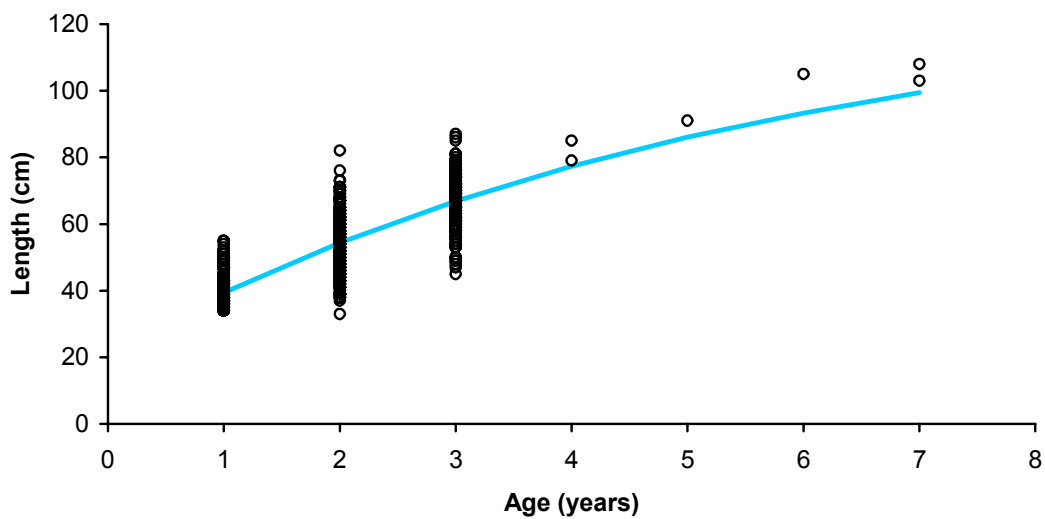
2002 Length Distribution: Irish Landings, Cod in Vlla



2002 Age Distribution: Irish Landings, Cod in Vlla



2002 Size at Age: Irish Sampling, Cod in Vlla



Irish Sea Whiting

(Division VIIa)

For latest information, see: <http://www.ices.dk>



Fisheries Science Services

FSS – SINGLE STOCK CONSIDERATIONS

(See Irish sea Overview for Mixed Fishery Advice)

ICES have classified this stock as outside safe biological limits based on the most recent estimates of biomass, recent poor recruitments and declining catches.

FSS considers that a recovery plan which ensures a safe and rapid rebuilding of SSB to above B_{pa} must be implemented. Such a recovery plan must include the provision of zero catch until SSB rises above B_{lim} .

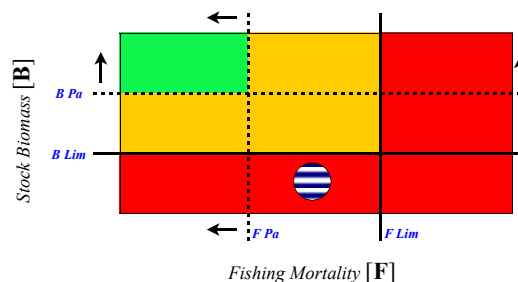
FSS considers that current high levels of discarding mean that restricting landings alone will not achieve the necessary increase in SSB. FSS stress that the cornerstone of any rebuilding plan should be measures that significantly reduce the discarding of whiting in the *Nephrops* fishery. Such measures would contribute substantially to the reduction in fishing mortality recommended for whiting.

FSS recognise that the 'zero catch option' for cod and whiting would effectively mean a closure of the mixed demersal fishery in the Irish Sea. FSS considers that an industry initiated programme aimed at reducing cod and whiting catches to 'close to zero' should be considered in the management of Irish Sea fisheries. Industry initiated programmes should be encouraged but must include a high rate of independent observer coverage or other totally transparent methods for ensuring that their catches of species outside safe biological limits are fully and credibly reported.

FSS consider that a well defined 'management plan' is necessary to recover the cod and whiting stocks and to fish them sustainably once they have recovered. FSS considers that such a plan requires clearly defined objectives that will ensure a high probability of recovery to agreed levels within a specified time frame. FSS considers that the proper definition and evaluation of all métiers involved in the mixed fishery is crucial to this management plan.

STATE OF THE STOCK

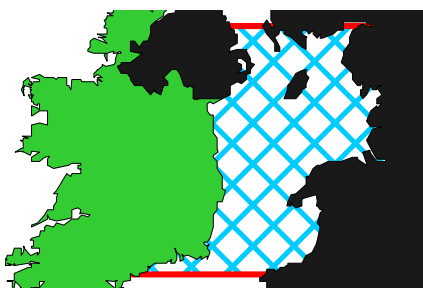
State of the Stock in relation to the precautionary reference points (see page 18)



- There are very serious concerns about the state of this stock. There has been a severe decline in abundance in the western Irish Sea where the bulk of the catch is taken.
- Landings have declined since 1985, and the proportion of the catch discarded has increased. The 2002 catch of about 1,500 t is the lowest on record. The 2002 human consumption landings are estimated to be 750 t, near the lowest in the time series and less than 20% of the average.
- Fishing mortality is very high in the western Irish Sea. Historical estimates of fishing mortality have been above the F_{pa} of 0.65. F has remained above F_{pa} since 1980 (the start of the assessment period).
- Overall, SSB in this stock has been in a continuous state of decline since 1993. SSB fell below the B_{pa} of 7,000 t and the B_{lim} of 5,000 t in the mid 1990s and remains near the lowest in the time series.
- There has been a period of below average recruitment since 1992. The relatively strong recruitment in 1999 is only slightly higher than the long-term geometric mean. There is evidence of reduced recruitment at SSB levels below B_{pa} .
- At current F , the stock is estimated to decline further in the short term.

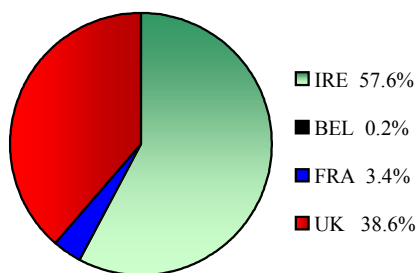
CURRENT MANAGEMENT

- The TAC area covers Divisions VIIa and corresponds to the assessment area.
- The TAC in 2003 was 500 t with an associated Irish quota of 288 t.
- There are no explicit management objectives or a management plan for this stock. A recovery plan that will reduce F below F_{pa} and increase SSB above B_{pa} is consistent with the precautionary approach.



Red Box-TAC/Management Area Blue Shading- Assessment Area

- FSS recommends that management objectives be established and that a management plan be developed and implemented for fisheries catching whiting.



FSS – ECONOMIC COMMENTS

- The value of the 2002 Irish quota was about €0.2m.
- The value of the 2002 Irish landings was about €0.2m.
- In the past this fishery yielded landings of up to 20,000 t and was economically very important to all fleets operating in the Irish Sea. However, in recent years the stock has declined and this fishery is of minor economic importance to the Irish fleet.

ADDITIONAL INFORMATION

- The assessment is based on catch-at-age commercial CPUE and survey indices. There are however, considerable uncertainties in this assessment due to the high levels of discarding and mis-reporting and strong conflicts between abundance indices from the Eastern and Western Irish Sea.
- The estimated Irish landings of about 260 t in 2002 were about two-thirds those in 2001. Most of these landings were from the Southern Irish Sea and may in fact be fish from the Celtic Sea stock.
- There is evidence of mis-reporting of haddock as whiting by some countries, during the haddock outburst in recent years. The landings data used in the assessment have been adjusted for mis-reporting.
- Most of the landings are taken by UK (Northern Ireland), Ireland and UK (England and Wales). UK (Northern Ireland) fleets are take most of their landings from the Western Irish Sea, while the UK (England) fleet takes most of its landings from the Eastern Irish Sea. Whiting is taken mainly as by-catch in the mixed otter trawl fisheries for *Nephrops*, cod and other demersal species and in the Northern Ireland pelagic fishery for cod.

- Vessels operating out of Dunmore East, Clogherhead and Howth take most of the Irish catches.
- Irish Sampling of this stock is supported through the EC funded sampling programme that is required under Data Collection Regulations 1543/2000 and 1639/2001. FSS sampling indicates that 2 and 3 year-old whiting comprise over 80% of whiting landings from Divisions VIIa. The absence of older fish in the landings confirms the seriously depleted state of this stock.
- FSS conducts an annual ground fish survey in VIIa and catches of whiting in recent years indicates the seriously depleted state of the stock. These data were not included in the assessment as the survey does not cover the entire distribution of the stock.
- Discarding of whiting from the *Nephrops* fishery operating on the main whiting nursery area of the Irish Sea is a major problem in this stock and increases the susceptibility of the stock to overexploitation. Full protection of juvenile whiting will require minimising discards of juvenile whiting in the *Nephrops* fishery.
- Ireland has a high quota for this stock (58%) due to the Hague preference agreement.

ICES ADVICE

3.8.4

State of stock/exploitation:

Based on the most recent estimate of the biomass ICES classifies the stock as being outside safe biological limits. The current assessment indicates that fishing mortality has been around or above F_{lim} since 1985. SSB has declined since 1980 to a very low level, and has been below B_{lim} since 1997. Catches have declined progressively since the early 1980s, but the proportion discarded has increased.

Management objectives:

No explicit management objectives are set for this stock. However, for any management objectives to meet precautionary criteria, their aim should be to reduce or maintain F below F_{pa} and to increase or maintain spawning stock biomass above B_{pa} .

Precautionary Approach reference points (unchanged since 1999):

ICES considers that:	ICES proposes that:
B_{lim} is 5 000 t, the lowest observed spawning stock biomass as estimated in previous assessment. There is no clear evidence of reduced recruitment at the lowest observed SSB's.	B_{pa} be set at 7 000 t, which is considered to be the minimum SSB required to ensure a high probability of maintaining SSB above its lowest observed value, taking into account the uncertainty of assessments.
F_{lim} is 0.95. This is the fishing mortality estimated to lead to a potential stock collapse.	F_{pa} be set at 0.65. This F is considered to have a high probability of avoiding F_{lim} and is consistent with a high probability of remaining above B_{pa} in the long run.

Technical basis:

$B_{lim} = B_{loss}$	$B_{pa} = B_{loss} * 1.4$
$F_{lim} = F_{loss}$ as estimated in an earlier assessment.	$F_{pa} = 0.65$, implies an equilibrium SSB of 10.6 kt, and a relatively low probability of $SSB < B_{pa}$ (= 7 kt), and is within the range of historic Fs.

Single stock exploitation boundaries:

Given the very low stock size, the recent poor recruitments and the continued substantial catch, a recovery plan which ensures a safe and rapid rebuilding of SSB to levels above B_{pa} should be implemented. Such a recovery plan must include a provision for zero catch until the estimate of SSB is above B_{lim} or other strong evidence of rebuilding is observed. In 2004 such a recovery plan would imply zero catch.

The current high levels of discarding means that measures restricting landings alone will not be sufficient to allow recovery of this stock. The cornerstone of any recovery plan should therefore be measures that significantly reduce the discarding of whiting in the *Nephrops* fishery.

The advice on the exploitation of this stock in 2004 is presented in the context of mixed fisheries and is found in Section 3.8.1.

Relevant factors to be considered in management:

The closure of the western Irish Sea to whitefish fishing from mid-February to the end of April, designed to protect cod, was continued in 2002, but is unlikely to have affected whiting catches, which are mainly bycatch in the derogated *Nephrops* fishery.

Medium- and long-term projections:

No medium-term projections have been carried out because of the uncertainties in the assessment.

Comparison with previous assessment and advice:

No analytical assessment and forecast was provided last year due to conflicting signals in survey data from the eastern and western part of the Irish Sea. The advice this year is based on a revised assessment using survey data only for the western Irish Sea where the bulk of the whiting catch has been taken in recent years. The stock trends provided in last year's provisional assessment is similar to this year's assessment, confirming the present estimate of the stock status.

Catch forecast for 2004:

Basis $F(2003) = F_{sq} = F(2000-2002) = 1.16$; Catch(2003) = 2.4; Landings(2003) = 0.9 ; SSB(2004) = 1.6.

F(2003)	Basis	Catch (2004)	Discards (2004)	Landings (2004)	SSB (2005)
0	$0.0 * F_{sq}$	0.0	0.0	0.0	4.7
0.73	$0.62 * F_{sq}$	1.5	1.5	0.0	2.2
0.82	$0.70 * F_{sq}$	1.7	1.4	0.3	2.0
0.90	$0.78 * F_{sq}$	1.9	1.4	0.5	1.8
0.99	$0.85 * F_{sq}$	2.1	1.4	0.7	1.7
1.08	$0.93 * F_{sq}$	2.2	1.4	0.9	1.6
1.16	$1.0 * F_{sq}$	2.4	1.4	1.0	1.5

Weights in '000 t. (Fishing mortality on discards assumed constant at $F=0.73$)

Shaded scenarios considered inconsistent with the precautionary approach applied in a single-species context.

Elaboration and special comment:

It is not known if the severe decline of the population of adult whiting in the western Irish Sea represents a localised depletion of a more broadly distributed stock, or the depletion of a local sub-population. Survey catch-rates of whiting above the MLS of 27 cm have declined continuously in the western region since 1992, reflecting the rapid decline in commercial landings, whilst survey catch-rates in the eastern region are much higher and show little or no trend over time. The commercial fishery has become more concentrated in the western region in recent years as the English and Welsh fleets, which operate mainly in the east, have declined over time.

Source of information:

Report of the Working Group on the Assessment of Northern Shelf Demersal Stocks, May 2003 (ICES CM 2004/ACFM:01).

Yield and spawning biomass per recruit

F-reference points:

	Fish Mort Ages 1-3	Yield/R	SSB/R
Average last 3 years	1.162	0.143	0.112
$F_{0.1}$	0.122	0.120	0.410
F_{med}	2.013	0.143	0.085

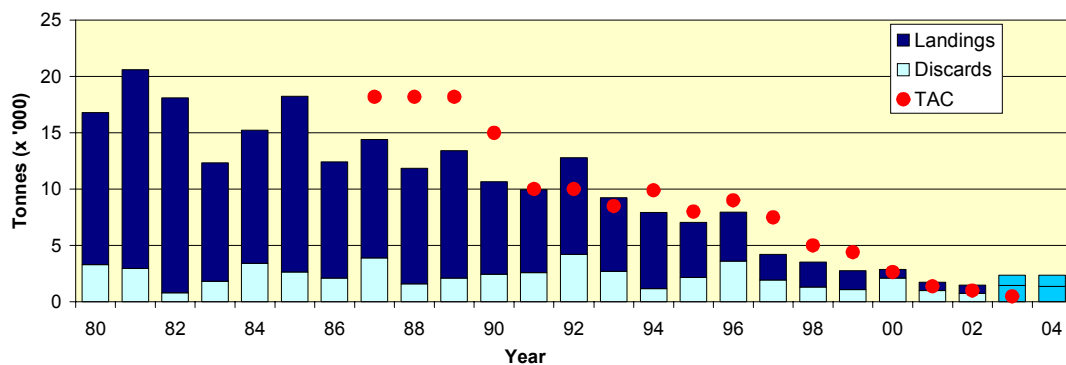
Catch data (Tables 3.8.4.1-2):

Year ICES Advice	Single-stock exploitation boundaries	Predicted catch corresp. To advice	Predicted catch corresponding to single-stock boundaries	Agreed TAC	Official Landings	Disc. ²	ACFM Catch
1987 Reduce F		16.0		18.2	11.7	3.8	14.4
1988 No increase in F; enforce mesh regulations		12.0		18.2	11.5	1.9	11.9
1989 F = F_{high} ; enforce mesh regulations		11.0		18.2	11.3	2.0	13.4
1990 No increase in F; TAC		8.3 ¹		15.0	8.2	2.7	10.7
1991 Increase SSB to SSB(89); TAC		6.4 ¹		10.0	7.4	2.7	9.9
1992 80% of F(90)		9.7 ¹		10.0	7.1	4.3	12.8 ³
1993 70% of F(91) ~ 6 500 t		6.5		8.5	6.0	2.7	9.2 ³
1994 Within safe biological limits		-		9.9	5.6	1.2	7.9 ³
1995 No increase in F		8.3 ¹		8.0	5.5	2.2	7.0 ³
1996 No increase in F		9.8 ¹		9.0	5.6	3.5	8.0 ³
1997 No advice given		-		7.5	4.5	1.9	4.2 ³
1998 20% reduction in F		3.8 ⁴		5.0	3.4	1.3	3.5 ³
1999 Reduce F below F_{pa}		3.5 ⁴		4.41	2.0	1.1	2.8 ³
2000 Reduce F below F_{pa}		<1.6 ⁴		2.64	1.1	2.1	2.9 ³
2001 Lowest possible F		~0		1.39	1.1	1.0	1.7 ³
2002 Lowest possible F		~0		1.00	0.4	0.7	1.5 ³
2003 Lowest possible F		~0		0.50			
2004 Zero catch	Zero catch	0	0				

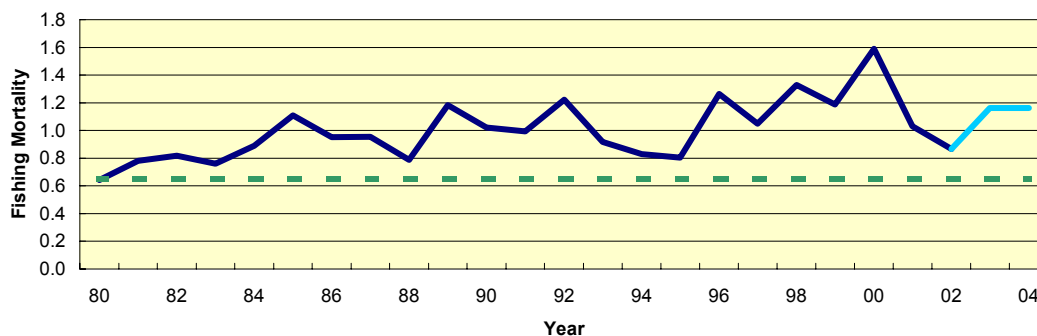
¹Not including discards from the *Nephrops* fishery. ²From *Nephrops* fishery. ³Including estimates of misreporting.

⁴Landings only, no discards included. Weights in '000 t.

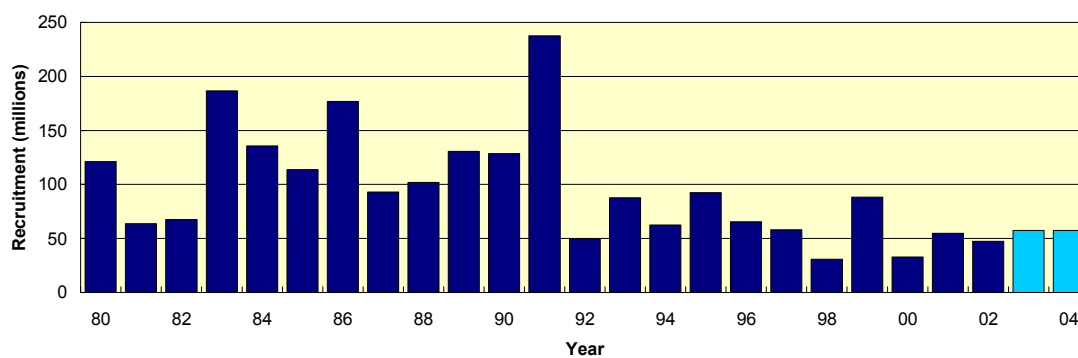
Whiting VIIa - Landings & Discards
Mean = 8



Whiting VIIa - Fishing Mortality
Mean = 1



Whiting VIIa - Recruitment (Age 0)
Mean = 96.8



Whiting VIIa - Spawning Stock Biomass
Mean = 9.9

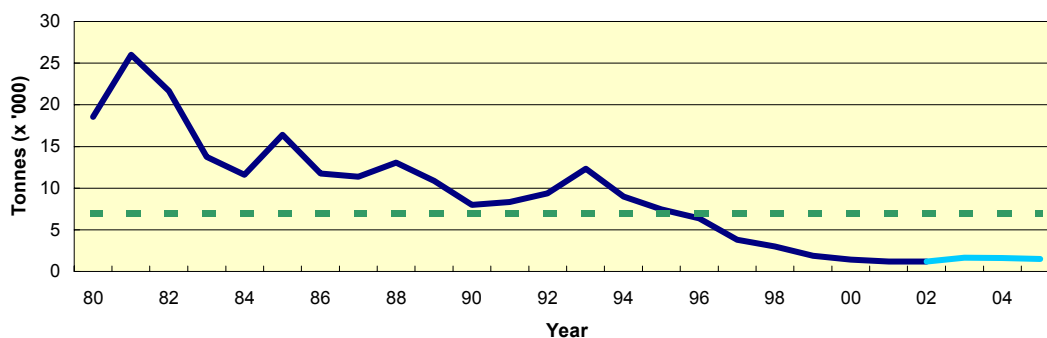


Table 3.8.4.1 Nominal catch (t) of WHITING in Division VIIa, 1987-2002, as officially reported to ICES, and Working Group estimates of human consumption and discards.

Country	1987	1988	1989	1990	1991	1992	1993	1994	1995	1996	1997	1998	1999	2000	2001	2002*
Belgium	109	90	92	142	53	78	50	80	92	80	47	52	46	30	27	22
France	826	1,063	533	528	611	509	255	163	169	78	86	81*	150*	59	25*	33
Ireland	4,067	4,394	3,871	2,000	2,200	2,100	1,440	1,418	1,840	1,773	1,119	1,260	509	353	482	
Netherlands										17	14	7	6	1		
UK(Engl. & Wales) ^a	1,529	1,202	6,652	5,202	4,250	4,089	3,859	3,724	3,125	3,557	3,152	1,900	1,229	670	506	
UK (Isle of Man)	14	15	26	75	74	44	55	44	41	28	24	33	5	2	1	
UK (N.Ireland)	4,858	4,621														
UK (Scotland)	281	107	154	236	223	274	318	208	198	48	30	22	44	15	25	
UK																311
Total human consumption	11,684	11,492	11,328	8,183	7,411	7,094	5,977	5,637	5,465	5,581	4,472	3,355	1,989	1,130	1,066	366
Estimated Nephrops fishery discards used	3,899	1,611	2,103	2,444	2,598	4,203	2,707	1,173	2,151	3,631	1,928	1,304	1,092	2,118	1,012	740
Estimated landings used by the WG	10,519	10,245	11,305	8,212	7,348	8,588	6,523	6,763	4,893	4,335	2,277	2,229	1,670	762	733	747
Unallocated human consumption	-1,165	-1,247	-23	29	-63	1,494	546	1,126	-572	-1,246	-2,195	-1,126	-319	-368	-333	381
Total catch figures used by the WG	14,418	11,856	13,408	10,656	9,946	12,791	9,230	7,936	7,044	7,966	4,205	3,533	2,762	2,880	1,745	1,487

^a 1989-2001 Northern Ireland included with England and Wales.

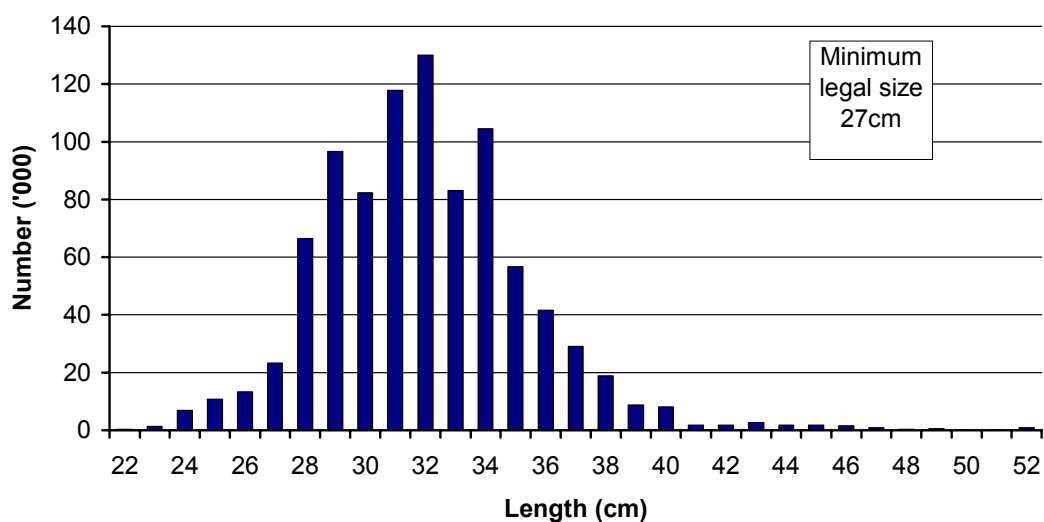
^b Based on UK(N. Ireland) and Ireland data.

* Preliminary.

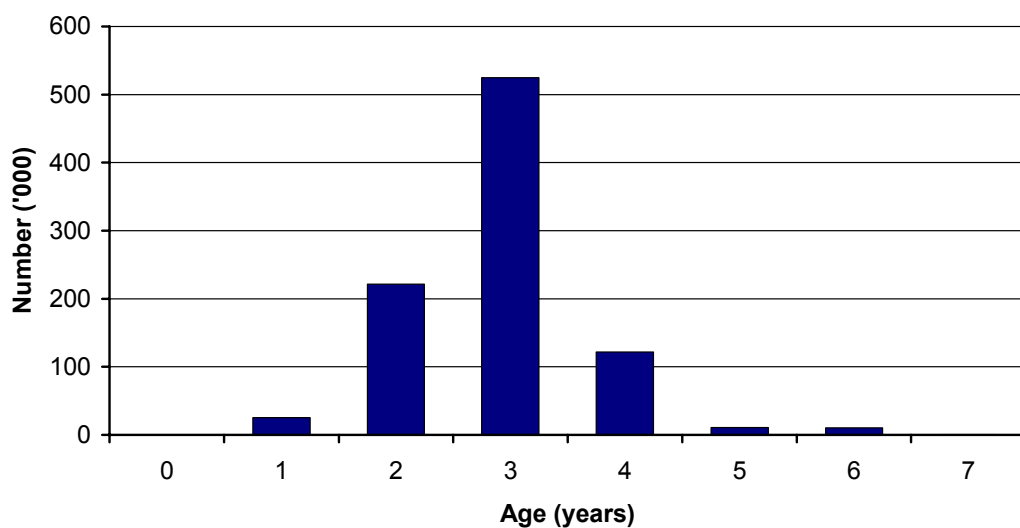
Table 3.8.4.2 Whiting in Division VIIa (Irish Sea).

Year	Recruitment Age 0 thousands	SSB tonnes	Landings tonnes	Mean F Ages 1-3
1980	121108	18578	16785	0.6422
1981	63565	25984	20606	0.7809
1982	67631	21670	18112	0.8175
1983	186532	13761	12345	0.7606
1984	135506	11579	15235	0.8899
1985	113698	16412	18236	1.1084
1986	176769	11748	12415	0.9514
1987	92964	11363	14418	0.9544
1988	101819	13050	11856	0.7877
1989	130789	10851	13408	1.1834
1990	128650	8004	10656	1.0205
1991	237433	8349	9946	0.9927
1992	49441	9390	12791	1.2233
1993	87557	12335	9230	0.9179
1994	62473	8995	7936	0.8280
1995	92389	7477	7044	0.8031
1996	65475	6371	7966	1.2641
1997	58000	3804	4205	1.0496
1998	30571	2968	3533	1.3273
1999	88190	1880	2762	1.1877
2000	32660	1404	2880	1.5877
2001	54859	1194	1745	1.0319
2002	47329	1187	1486	0.8658
2003	57259	1662		
Average	95111	9584	10243	0.9990

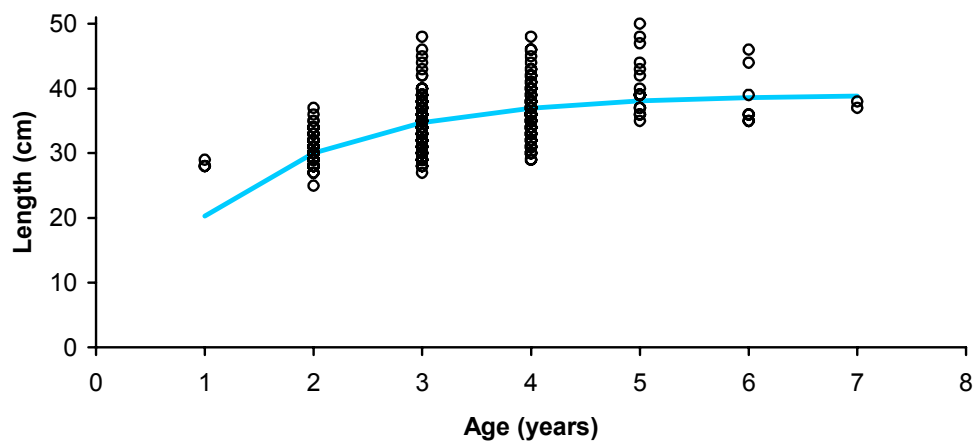
2002 Length Distribution: Irish Landings, Whiting in Vlla



2002 Age Distribution: Irish Landings, Whiting in Vlla



2002 Size at Age: Irish Sampling, Whiting in Vlla



Irish Sea Haddock

(Division VIIa)

For latest information, see: <http://www.ices.dk>



Fisheries Science Services

FSS – SINGLE STOCK CONSIDERATIONS

(See Irish sea Overview for Mixed Fishery Advice)

ICES considers this stock as harvested outside safe biological limits based on the most recent estimates of fishing mortality.

FSS recognise that the 'zero catch option' for cod and whiting would effectively mean a closure of the mixed demersal fishery in the Irish Sea. FSS considers that an industry initiated programme aimed at reducing cod and whiting catches to 'close to zero' should be considered in the management of Irish Sea fisheries. Industry initiated programmes should be encouraged but must include a high rate of independent observer coverage or other totally transparent methods for ensuring that their catches of species outside safe biological limits are fully and credibly reported.

FSS agrees with the ICES recommendation that, if fishing for haddock is permitted despite the advice for cod and whiting, then fishing mortality in 2004 should be reduced to less than F_{pa} , corresponding to catches no higher than 1,500 t.

FSS consider that a well defined 'management plan' is necessary for Irish Sea mixed fisheries. FSS considers that such a plan requires clearly defined objectives that will ensure a high probability of recovery to within safe biological limits. FSS considers that the proper definition and evaluation of all métiers involved in the mixed fishery is crucial to this management plan.

TAC Area	TAC 2003	Irish quota 2003	Proposed TAC 2004	Proposed Irish quota 2004
VII,VIII,IX,X	8185	1819	9,600	2,133
Of which no more than X can be taken in VIIa	585	253	1,500	650

STATE OF THE STOCK

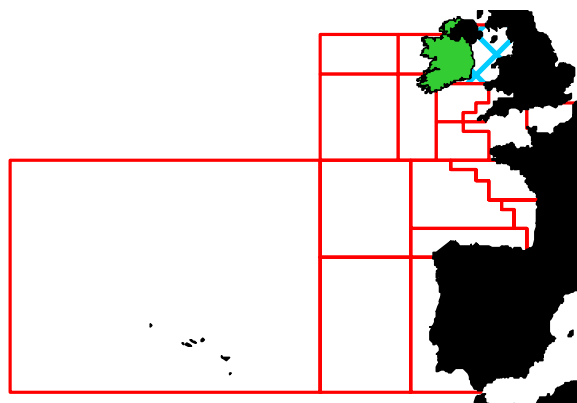
- International landings in 2002 amounted to about 1,970 t (Working Group estimate). This is about 80% of the 2001 landings of 2,500 t.
- Occasional pulses of strong recruitment have in the

past resulted in opportunistic fisheries lasting only for relatively short periods.

- The fishery was relatively unimportant in the 1980s. Landings increased in the early to mid 1990s following two strong recruitment outbursts. The strong 1999 and 2001 recruitments have sustained recent landings.
- A relatively long period of productivity in the 1990s indicates that a more sustained population existed.
- B_{pa} is not defined for this stock. F_{pa} is set at 0.5 by analogy with other haddock stocks.

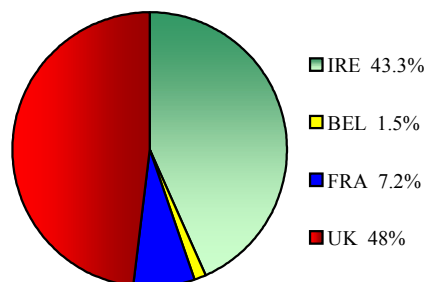
CURRENT MANAGEMENT

- The TAC Area traditionally covers Sub Areas VII, VIII, IX and X.
- The assessment area covers Division VIIa only.



Red Boxes-TAC/Management Areas Blue Shading-Assessment Area

- The 2003 TAC for haddock of 8,185 t was set for the whole of Divisions VII to X, with an additional allocation of no more than 585 t made for landings from Division VIIa.
- This translates to an Irish quota of 1,819 t, plus no more than 253 t fished from VIIa.



- There are no explicit management objectives or a management plan for this stock.

- FSS recommend that management objectives be established and that a management plan be developed and implemented for fisheries catching haddock.

FSS – ECONOMIC COMMENTS

- The value of the 2002 Irish haddock quota in VIIa was about €0.3m.
- The value of the 2002 Irish haddock landings from Division VIIa was about €0.5m.
- Compared to the *Nephrops* fishery this fishery is of minor economic importance to the Irish fleet. However with the decline of cod and whiting it will probably be the main catch in the Irish Sea mixed demersal fisheries.

ADDITIONAL INFORMATION

- 1 The assessment is based on only ten years of catch at age and survey data. There is no biological basis for defining reference points in this stock and ACFM has proposed a precautionary F_{pa} of 0.5 in view of the rapid expansion of this fishery. The true exploitation pattern of this stock is not well estimated and may be obscured by the exclusion of discards from the assessment.
- 2 Irish landings in 2002 were 405 t (estimated) a 25% decrease on the 2001 landings of 540 t.
- 3 The fishery is dominated by the UK (NI) and Irish fleets. The haddock stock is mainly confined to the western Irish Sea where important mixed species fisheries for *Nephrops*, haddock, whiting and cod take place.
- 4 Irish catches are mainly made by otter trawl vessels operating out of Howth and targeting whitefish or switching between targeting whitefish and *Nephrops*. There is also some by-catch in the *Nephrops* and to a lesser extent seine and beam trawl fisheries.
- 5 Irish Sampling of this stock is supported through the EC funded sampling programme, which is required under Data Collection Regulations 1543/2000 and 1639/2001.
- 6 FSS sampling indicates that age groups 2 and 3 dominate Irish landings. Haddock reach full maturity at age group 3.

- 7 A study of discards from the midwater trawl, single *Nephrops* and twin trawl fleet indicates that almost all fish younger than 2 years old and on the order of 50% of the fish at age 2 are discarded.
- 8 The extent to which the cod-haddock fisheries are linked has not been quantified. This linkage is not one-to-one, but it is evident and likely to be highly variable, particularly in response to variable year-class strength.
- 9 FSS believes that there are no known biological reasons why haddock production could not be sustained in the Irish Sea. However the large fluctuations in recruitment characteristic of haddock stocks may mean that landings will fluctuate greatly with the strength of incoming year-classes. FSS therefore recommends that strong year-classes should be allowed to grow, mature and reproduce. This can only occur if fishing mortality is reduced substantially.
- 10 The present high availability of haddock in Division VIIa has resulted in substantial misreporting and/or discarding due to large by-catches of haddock taken by fleets with restrictive allocations available to them. To alleviate this problem, a separate TAC allocation has been made for Division VIIa in 1999 to 2002. In 2003 a TAC allocation was included in the VII TAC.

ICES ADVICE 3.8.3

State of stock/exploitation:

Based on the most recent estimate of fishing mortality ICES classifies the stock as being harvested outside safe biological limits. Fishing mortality has been well above F_{pa} since 1993. No biomass reference points have been defined. Spawning stock biomass increased substantially as a result of the strong 1994 and 1996 year classes. The SSB has declined in the past year and remains dependent on the strength of the recruiting year classes.

Management objectives:

No explicit management objectives are set for this stock.

Precautionary Approach reference points (established in 1998):

ICES considers that:	ICES proposes that:
B_{lim} not defined	B_{pa} not set
F_{lim} not defined	F_{pa} be set at 0.5

Technical basis:

B_{lim} = not defined	B_{pa} = not set
F_{lim} = not defined	F_{pa} adopted by analogy with other haddock stocks

Single Stock Exploitation Boundaries:

Fishing mortality in 2004 should be reduced to less than F_{pa} , corresponding to catches no higher than 1500 t.

The advice on the exploitation of this stock in 2004 is presented in the context of mixed fisheries and is found in Section 3.8.1.

Relevant factors to be considered in management:

A TAC is set for haddock for the whole of Subareas VII, VIII, IX, and X. The present high availability of haddock in Division VIIa has resulted in substantial misreporting and/or discarding due to large by-catches of haddock taken by fleets with restrictive allocations available to them. To alleviate this problem, a separate TAC allocation has been made for Division VIIa since 1999.

Catch forecast for 2004:

Basis: $F(2003) = F_{sq} = F(2000-2002) = 0.91$; Landings (2003) = 2.3; SSB(2004) = 2.6.

F (2003) Onwards	Basis	Landings (2004)	SSB (2005)
0.18	$0.2 * F_{sq}$	0.7	3.9
0.36	$0.4 * F_{sq}$	1.2	3.3
0.50	$F_{pa} = 0.55 * F_{sq}$	1.5	3.0
0.73	$0.8 * F_{sq}$	2.0	2.5
0.91	$1.0 * F_{sq}$	2.3	2.2
1.09	$1.2 * F_{sq}$	2.6	1.9

Weights in '000 t.

Shaded scenarios considered inconsistent with the precautionary approach applied in a single-species context.

Comparison with previous assessment and advice:

No analytical assessment and forecast was provided last year due to sensitivity towards various model settings. The advice last year was based on the average catch of the last two years. The advice this year is based on a revised assessment using settings that gave the most robust retrospective forecast predictions.

Elaboration and special comment:

The *status quo* catch forecast implies a catch in 2003 that is well in excess of the TAC. Information from the fishery indicates that this TAC may be very restrictive, implying an increased incentive to misreporting or discard catches.

Occasional pulses of strong recruitment have resulted in opportunistic fisheries lasting only for comparatively short periods. Haddock production in the Irish Sea has been irregular, with one productive period in the late 1950s, two in the early 1970s, and a recent one since the latter half of the 1990s. Production in the 1990s has exceeded that in the ear-

lier periods and also coincided with increased abundance of haddock in the Celtic Sea. Previous productive periods, other than the recent one, are believed to have coincided with strong year classes in Subarea VI. Whilst the 1994 year class was relatively strong in Divisions VIa, VIIa, and VIIb-k, patterns of recruitment in subsequent years have differed markedly between areas. Growth rates of individual haddock also differ between areas, and haddock grow fastest in the Irish Sea.

The haddock stock in the Irish Sea could be sustained if recent year classes indicated by surveys are allowed to realise their potential for growth, and contribute to SSB. This would only occur if fishing mortality is reduced substantially from the high values recorded in the 1990s.

A study of discards from the midwater trawl, single *Nephrops* and twin trawl fleet indicates that almost all fish younger than 2 years old and around 50% of the fish at age 2 are discarded.

The current directed fishery for haddock in the Irish Sea is likely to generate by-catches of cod in the same area. Experimental haddock fisheries with observers were permitted inside the cod closure by the European Commission in spring 2000 and 2001, and yielded by-catches of cod of approximately 15 - 20% by weight.

Source of information:

Report of the Working Group on the Assessment of Northern Shelf Demersal Stocks, May 2003 (ICES CM 2004/ACFM:01).

Yield and spawning biomass per recruit F-reference points:

	Fish Mort	Yield/R	SSB/R
	Ages 2-4		
Average last 3 years	0.907	0.439	0.573
F_{max}	0.345	0.523	1.494
$F_{0.1}$	0.188	0.483	2.407
F_{med}	1.038	0.421	0.499

Catch data (Tables 3.8.3.1-2):

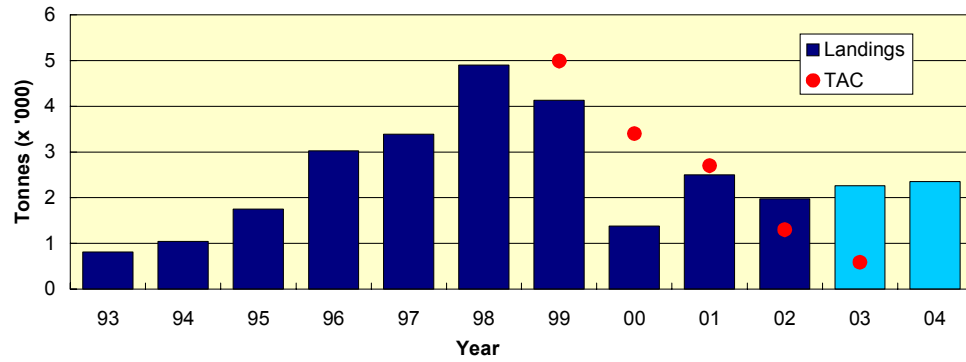
Year	ICES Advice	Single-stock exploitation boundaries	Predicted catch corresp. To advice	Predicted catch corresponding to single-stock boundaries	Agreed TAC	Official Landings ²	ACFM landings
1987	Not dealt with					1.287	1.287
1988	Not dealt with					0.747	0.747
1989	Not dealt with					0.560	0.560
1990	Not dealt with					0.582	0.582
1991	Not dealt with					0.616	0.616
1992	Not dealt with					0.656 ⁶	0.703
1993	Not dealt with					0.730	0.813
1994	Not dealt with					0.681	1.043
1995	Not dealt with				6 ¹	0.841	1.753
1996	No advice				7 ¹	1.453	3.023
1997	Means of setting catch limits required				14 ¹	1.925	3.391
1998	Catch limit for VIIa		3.0		20 ¹	3.015	4.902
1999	No increase in F; Catch limit for VIIa		7.0		4.99 ²	2.370	4.129
2000	Reduce F below F_{pa}		<2.8		3.4 ²	2.447	1.380
2001	Reduce F below F_{pa}		<1.71		2.7 ²	2.228 ³	2.498
2002	Reduce F below F_{pa}		<1.20		1.3 ²	0.711 ³	1.972
2003	No cod catches		-		0.6 ²		
2004	⁴	$F < F_{pa}$	⁴	<1.5			

¹ Precautionary TAC for VII, VIII, IX, X. ² VIIa allocation of precautionary TAC. ³ Incomplete data. ⁴ Single-stock boundary and the exploitation of this stock should be conducted in the context of mixed fisheries protecting stocks outside safe biological limits. Weights in '000 t.

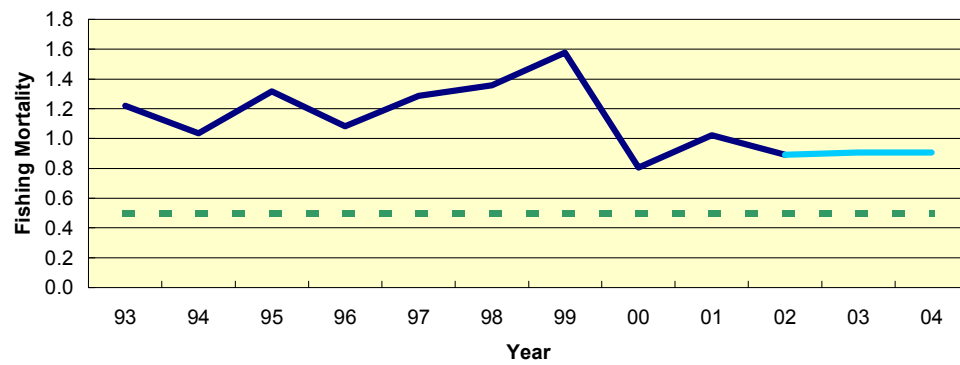
Table 3.8.3.2 Haddock in Division VIIa (Irish Sea).

Year	Recruitment Age 0 thousands	SSB tonnes	Landings tonnes	Mean F Ages 2-4
1993	4339	1341	813	1.2213
1994	15895	1473	1043	1.0352
1995	2029	1732	1753	1.3169
1996	22765	4766	3023	1.0824
1997	1747	4255	3391	1.2869
1998	4676	5240	4902	1.3584
1999	10215	3981	4129	1.5779
2000	2804	1705	1380	0.8047
2001	8531	2743	2498	1.0227
2002	3710	2324	1971	0.8921
2003	5461	2729		
Average	7470	2935	2490	1.1599

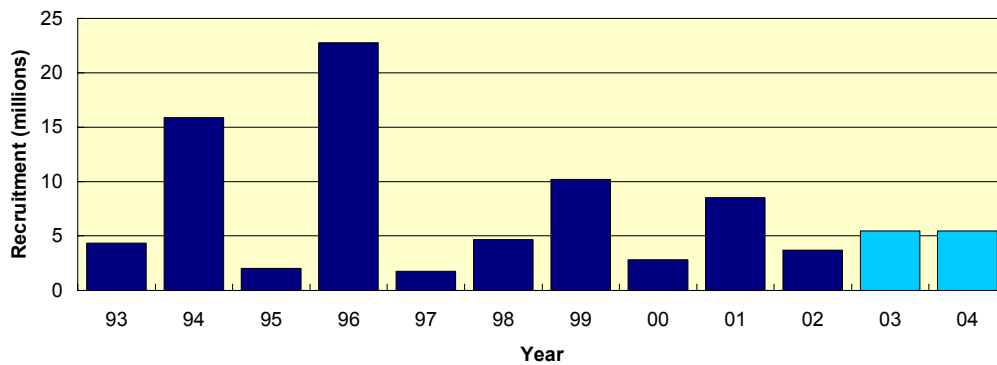
Haddock VIIa - Landings
Mean = 2.5



Haddock VIIa - Fishing Mortality
Mean = 1.16



Haddock VIIa - Recruitment (Age 0)
Mean = 7.7



Haddock VIIa - Spawning Stock Biomass
Mean = 3

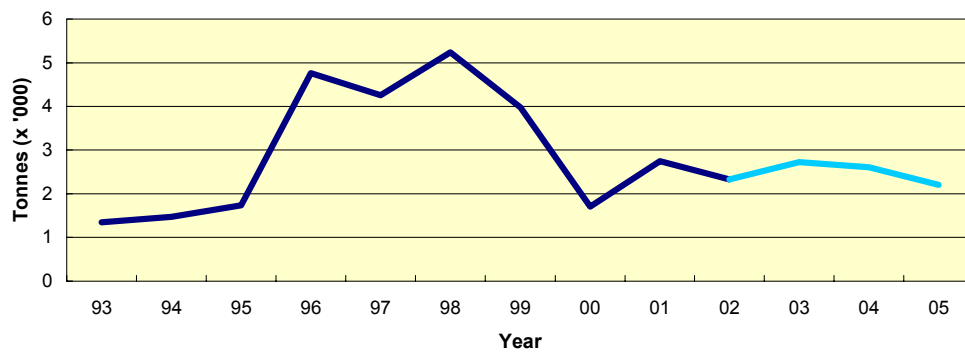


Table 3.8.3.1 Nominal landings (t) of HADDOCK in Division VIIa, 1984–2000, as officially reported to ICES.

Country	1984	1985	1986	1987	1988	1989	1990	1991
Belgium	3	4	5	10	12	4	4	1
France	38	31	39	50	47	n/a	n/a	n/a
Ireland	199	341	275	797	363	215	80	254
Netherlands	-	-	-	-	-	-	-	-
UK (England & Wales) ¹	29	28	22	41	74	252	177	204
UK (Isle of Man)	2	5	4	3	3	3	5	14
UK (N. Ireland)	38	215	358	230	196	...	...	...
UK (Scotland)	78	104	23	156	52	86	316	143
Total	387	728	726	1,287	747	560	582	616
Unallocated	0	0	0	0	0	0	0	0
Total figures used by Working Group	387	728	726	1,287	747	560	582	616

Country	1992	1993	1994	1995	1996	1997	1998	1999	2000
Belgium	8	18	22	32	34	55	104	53	22
France	26	41	22	58	105	74	86	n/a	49
Ireland	251	252	246	320	798	1,005	1,699	759	1,238
Netherlands	-	-	-	-	1	14	10	5	2
UK (England & Wales) ¹	244	260	301	294	463	717	1,023	1,479	1,061
UK (Isle of Man)	13	19	24	27	38	9	13	7	19
UK (N. Ireland)	...	...	...	...	...	...	...	...	...
UK (Scotland)	114	140	66	110	14	51	80	67	56
United Kingdom									
Total	656	730	681	841	1,453	1,925	3,015	2,370	2,447
Unallocated	47	83	362	912	1,570	1,466	1,887	1,759	-1,067
Total figures used by Working Group	703	813	1,043	1,753	3,023	3,391	4,902	4,129	1,380

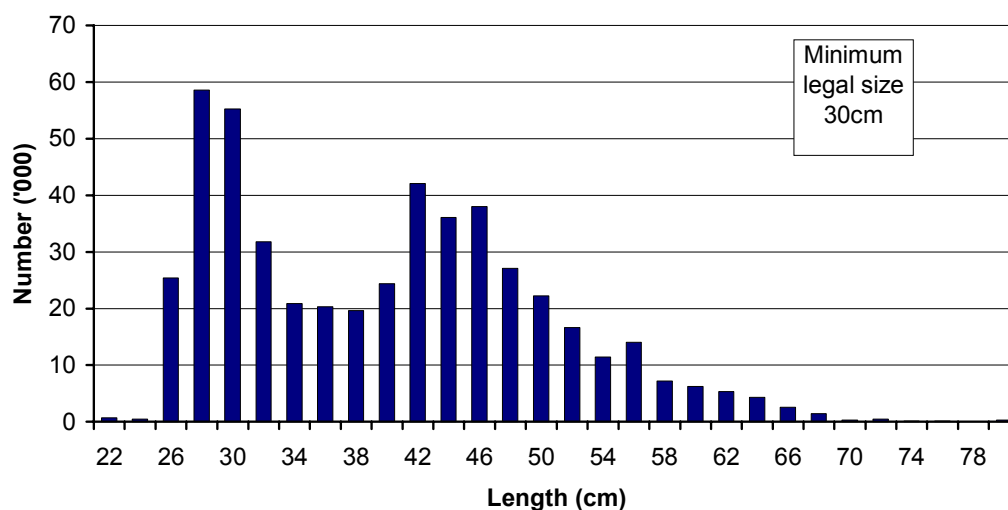
Country	2001	2002
Belgium	68	44*
France	183*	72*
Ireland	652	
Netherlands	-	-
UK (England & Wales) ¹	1,238	
UK (Isle of Man)	1	
UK (N. Ireland)	...	
UK (Scotland)	86	
United Kingdom		595*
Total	2,228	711*
Unallocated	270	1,261
Total figures used by Working Group	2,498	1972

*Preliminary.

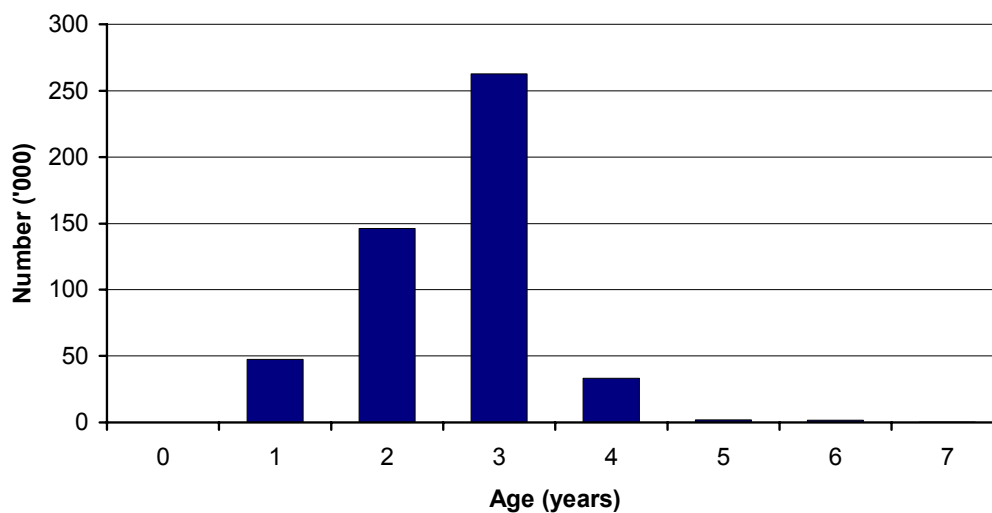
¹1989–2001 Northern Ireland included with England and Wales.

n/a = not available.

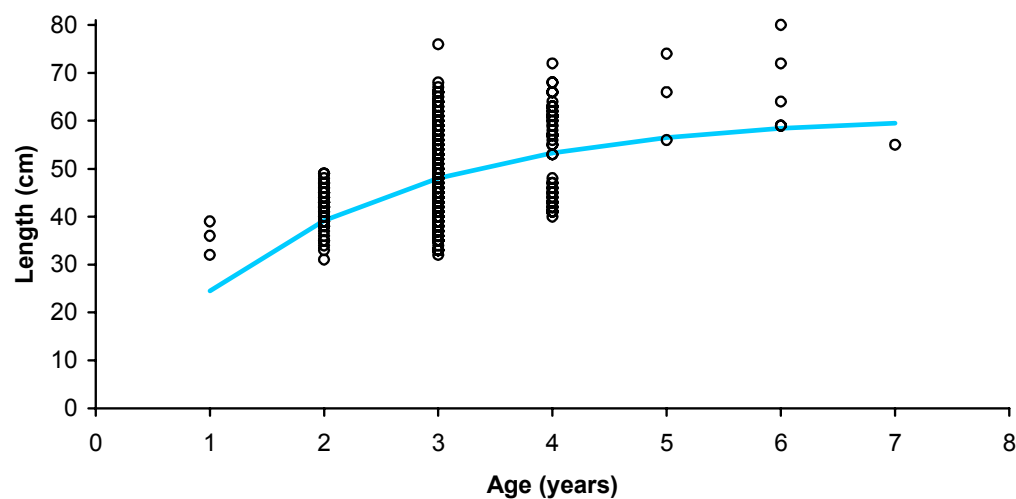
2002 Length Distribution: Irish Landings, Haddock in Vlla



2002 Age Distribution: Irish Landings, Haddock in Vlla



2002 Size at Age: Irish Sampling, Haddock in Vlla



Irish Sea *Nephrops*

(WG - MA J = Division VIIa excluding Rectangles 33E2-E5 and 34E3-E5)

For latest information, see: <http://www.ices.dk>



Fisheries Science Services

FSS – SINGLE STOCK CONSIDERATIONS

(See Irish Sea Overview for Mixed Fishery Advice)

ICES considers that the *Nephrops* stocks in this Management Area appear to be exploited at sustainable levels.

FSS recognise that the ‘zero catch option’ for cod and whiting would effectively mean a closure of the *Nephrops* fishery in the Irish Sea. FSS considers that an industry initiated programmes aimed at reducing cod and whiting catches to ‘close to zero’ should be considered in the management of Irish Sea *Nephrops* fisheries. Industry initiated programmes should be encouraged but must include a high rate of independent observer coverage or other totally transparent methods for ensuring that their catches of species outside safe biological limits are fully and credibly reported.

For the Irish Sea *Nephrops* stocks there is no basis to revise the advice given previously of a TAC from this Management Area in 2004 and 2005 be kept at the level recommended in 2001, i.e. 9,550 t. This translates to a 2004 TAC of 17,450 t and associated Irish quota of 6,436 t for Sub-area VII (see Table). However, the mixed fisheries advice given for *Nephrops* fisheries in the Irish Sea and particularly in relation to stocks outside safe biological limits will determine the TAC for *Nephrops*.

FSS point out that the current management system where a TAC is applied to Sub-area VII may lead to unbalanced exploitation of *Nephrops* stocks and may also hinder management of *Nephrops* fisheries in a mixed fisheries context. FSS considers that individual *Nephrops* stocks should be managed and effort be con-

trolled on a more appropriate geographical scale i.e. the Functional Unit level. As a first step FSS endorsed the STECF recommendation that effective management of Irish Sea fisheries would be facilitated by the introduction of a TAC applicable only to the Irish Sea

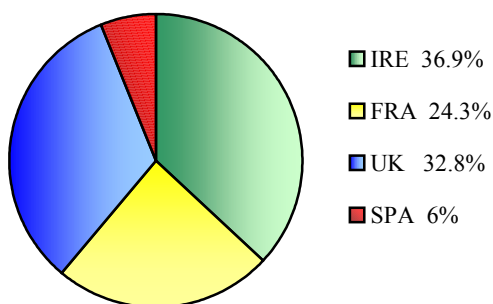
STATE OF THE STOCK

- There are no concerns about the status of *Nephrops* in this area. However these *Nephrops* stocks in this area are fully exploited.
- International landings in 2002 were 7,493 t. This was the lowest annual landings observed for the last ten years.
- Fishing mortality for Male *Nephrops* in FU 15 is declining since 1999 and the 2002 estimate is the lowest in the time series; F on Female *Nephrops* has also declined to the lowest in the time series in 2002.
- Recruitment in both sex has been relatively stable throughout the time series. The most recent recruitment estimates are low but rather uncertain.
- Male biomass has increased since 1994; female biomass has remained very stable.
- Reference points for stocks in this area have not been defined.

CURRENT MANAGEMENT

- A ‘precautionary’ TAC area covers Sub-area VII. ICES have suggested a separate TAC for Division VIIa since the current large TAC area may result in unbalanced exploitation.
- The 2003 agreed TAC for all of Sub-area VII was 17,790 t, of which Ireland’s quota was 6,561 t.
- WG-MA J contains two fisheries in the east (FU 14) and the west (FU 15). Analytical assessments are carried out for both of these stocks.
- There are no explicit management objectives or a management plan for this stock. FSS recommend that management objectives be established and that a management plan be developed and implemented for fisheries catching *Nephrops*.

Management Area	Functional Units	Landings advice	Basis
WG-MA J	14, 15	9,550	Average landings 1995-1999
WG-MA L	16, 17, 18, 19	3,300	Landings for FU 16 constrained to recent low (2000-2002 = 1,100 t) Average Landing 1995-2002 for other FUs = 2,200 t
WG-MA M	20-22	4,600	Average landings 1993-2002
Sub-Area VII	14 to 22	17,450	
Irish Quota 2004		6,436	37% of VII TAC



- Management of *Nephrops* fisheries in this area needs to be considered in the context of mixed fisheries.
- The following TCMs are in place for *Nephrops* in VIIa after EC 850/98: *Minimum Landing Sizes (MLS)*; total length >70 mm, carapace length >20 mm, tail length >37 mm. *Mesh Size Restrictions*; Towed gears targeting *Nephrops* having at least 35% by weight of this species on board will require 70 mm diamond mesh plus an 80 mm square mesh panel as a minimum or having at least 30% by weight of *Nephrops* on board will require 80 mm diamond mesh.

FSS – ECONOMIC COMMENTS

- The value of the 2003 Irish quota in Sub-area VII was €25.4m.
- The value of the 2002 Irish landings from Division VIIa was €11.1m.
- This is the most economically important fishery in the Irish Sea supporting the vast majority of the Irish Sea vessels.

ADDITIONAL INFORMATION

1. ICES do analytical assessments for these stocks on a biannual basis a new assessment was carried out in 2003. However the advice is based on average landings rather than forecasted landings from this analytical assessment. This is because of concerns about whether the assessment method is appropriate for a stock where the age structure is modelled rather and measured annually. Multiple lines of evidence (CPUE trends, mean size, assessment) suggest that this stock remains in a healthy state therefore recent catch levels are considered sustainable by ICES.
2. The provisional international landings were 7,500 t in 2002, this represents a significant decrease from the highest landings observed in 1999 (11,400 t).
3. Irish landings in 2002 were estimated to be 2,500 t, approximately 43% were landed as tails.
4. There is no information on misreporting in this stock.
5. The UK (mainly Northern Ireland) caught 61% and Ireland caught 39 % of the 2002 landings respectively.
6. In 2002, 48 Irish vessels reported *Nephrops* landings from this FU of these 42 reported annual landings in excess of 10 t. This *Nephrops* fleet is by far the largest fleet segment in the Irish Sea.
7. Vessels operating out of Howth, Clogherhead and Skerries take most of the Irish landings. Irish activity is concentrated on FU 15 the western Irish Sea.
8. Irish sampling of this stock is supported through the

EC funded sampling programme that is required under Data Collection Regulations 1543/2000 and 1639/2001.

9. The Marine Institute and Department of Agriculture and Rural Development (Northern Ireland) carried out the first systematic underwater television survey of the western Irish Sea *Nephrops* grounds in 2003. The results should provide a fishery independent estimate of stock size.
10. The western Irish Sea *Nephrops* fishery is concentrated on an area that is also a whiting nursery ground. Discarding of juvenile whiting in the *Nephrops* fishery has contributed significantly to the reduction of the VIIa whiting stock.
11. There is also considerable discarding of small *Nephrops* in this fishery. In 2002 Irish vessels discarded an estimated 1,061 t (32% of catch by weight) of small *Nephrops* or 47% of the total numbers caught by the Irish fleet. High *Nephrops* discard rates have been sustained in this fishery for many years and the discards component of the catch is well sampled and included in the assessment.
12. Separator trawls were introduced in the Irish fishery in 2000 in an attempt to reduce cod by-catches. Information from BIM suggests that uptake of separator trawls has increased in recent years to around 80% of vessels in 2002.
13. There are some concerns about hake (which is outside safe biological limits) discarding in *Nephrops* fisheries within this TAC area. FSS sampling suggest discarding of hake by Irish *Nephrops* vessels in the Irish Sea is negligible.

ICES ADVICE 3.15.2.j

There are two Functional Units in this Management Area: a) Irish Sea East (FU 14) and b) Irish Sea West (FU 15).

State of the stock/exploitation:

The stocks in this Management Area appear to be exploited at sustainable levels.

- a) Irish Sea East: Annual LPUEs fluctuating, but generally lower in the 1990s and 2000s than in the late 1970s and early 1980s. Landings fairly stable since the mid-1980s. Tentative age-based assessment suggests fairly stable biomass and recruitment, but owing to the short time-series and uncertainties about discarding in some years this assessment is considered uncertain. Age-based Y/R analysis indicates that the current F is at or above F_{max} for males, and length-based Y/R analysis indicates that the current F is above F_{max} for females.
- b) Irish Sea West: CPUEs and LPUEs for the Northern Ireland fleet have remained relatively constant since 1995, with the slight drop in 2000 and 2001 being recovered in 2002. Republic of Ireland CPUE data available from 1995 showed a steady increase followed

by a slight drop since 1999. Age-based assessment indicates a relatively stable biomass in both males and females. Recruitment appears to have been relatively high in 2000. Recruitment levels in more recent years are uncertain. F_{bar} of both sexes is the lowest of the time-series. Age-based Y/R analysis indicates a flat-topped curve with the current F above F_{max} for both sexes.

Management objectives:

There are no management objectives set for this fishery.

Single Stock Exploitation Boundaries:

There is no basis to revise the advice given previously of a TAC from this Management Area in 2004 and 2005 be kept at the level recommended in 2001, i.e. 9 550 t.

Advice on the exploitation of this stock in 2004 is presented in the context of mixed fisheries and is found in section 3.7.1.

ICES also notes that this Management Area is within a much larger TAC area (Subarea VII), and that a single TAC set for the whole Subarea will not result in balanced exploitation. In an attempt to resolve this problem, ICES suggests a separate *Nephrops* TAC for Division VIIa, as is done for several fin-fish stocks (such as cod, whiting, plaice, and sole).

Relevant factors to be considered in management:

Although exploited throughout the year, increased effort in

the Irish Sea West generally occurs during the summer months, when females are available for capture after hatching their eggs. This results in higher annual fishing mortality rates on females than in most other northern FUs. The high F values on both sexes in the Irish Sea West suggest that the situation should be very carefully monitored.

Comparison with previous assessment and advice:

The results of this year's assessments are in agreement with the 1999 and 2001 assessments.

Elaboration and special comments:

Most of the landings from this Management Area are taken by the UK and Ireland. Irish Sea East landings and effort increased to a peak in the late 1970s and early 1980s, and have now stabilised at about 60% of that level. In the Irish Sea West, both landings and effort have declined in recent years.

LPUE and mean size data are available for both FUs, CPUE data for the Irish Sea West only. Landings length composition data are collected on a regular basis for both FUs. Catch and discard length composition data are collected regularly for FU 15. Catch and discard length compositions were not collected regularly for FU 14 from 1995 to 1998, but a new programme of regular catch sampling was initiated in 1999.

Source of information:

Report of the Working Group on *Nephrops* Stocks, 19 – 27 March 2003 (ICES CM 2003/ACFM:18).

Catch data (Tables 3.15.2.j.1-2):

Year	ICES advice	Recommended TAC	Agreed TAC ¹	ACFM Landings ²
1987				9.9
1988				9.1
1989				8.5
1990				8.9
1991				10.3
1992		8.9	20.0	8.0
1993		9.4	20.0	8.7
1994		9.4	20.0	8.1
1995		9.4	20.0	8.4
1996		9.4	23.0	7.8
1997		9.4	23.0	10.6
1998		9.4	23.0	9.5
1999		9.4	23.0	11.4
2000		9.4	21.0	8.9
2001		9.4	18.9	7.9
2002	<i>Set TAC in line with 1995-99 landings</i>	9.55	17.79	7.5
2003	<i>Set TAC in line with 1995-99 landings</i>	9.55	17.79	
2004	<i>Set TAC in line with 1995-99 landings</i>	9.55		
2005	<i>Set TAC in line with 1995-99 landings</i>	9.55		

(Weights in '000 t) ¹⁾ Subarea VII; ²⁾ Does not include discards.

Table 3.15.2.j.1 *Nephrops* landings (tonnes) by Functional Unit plus Other rectangles in Management Area J (VIIa, North of 53°N).

Year	FU 14	FU 15	Other	Total
1993	582	8112	7	8701
1994	513	7618	4	8134
1995	637	7799	3	8438
1996	511	7257	6	7774
1997	597	9979	44	10619
1998	389	9145	4	9538
1999	625	10786	2	11413
2000	567	8370	0	8937
2001	532	7378	2	7913
2002*	577	6914	2	7493
* provisional				

Table 3.15.2.j.2 *Nephrops* landings (tonnes) by country in Management Area J (VIIa, North of 53°N).

Year	Belgium	France	Rep. of Ireland	Isle of Man	UK	Total
1993	0	8	2750	32	5911	8701
1994	0	17	1797	16	6304	8134
1995	2	7	2413	23	5993	8438
1996	1	2	1641	10	6120	7774
1997	2	0	3404	7	7207	10619
1998	1	0	3127	17	6393	9538
1999	0	0	4735	6	6672	11413
2000	2	0	3547	0	5388	8937
2001	0	0	2715	3	5195	7913
2002*	1	0	2487	0	5005	7493
* provisional						

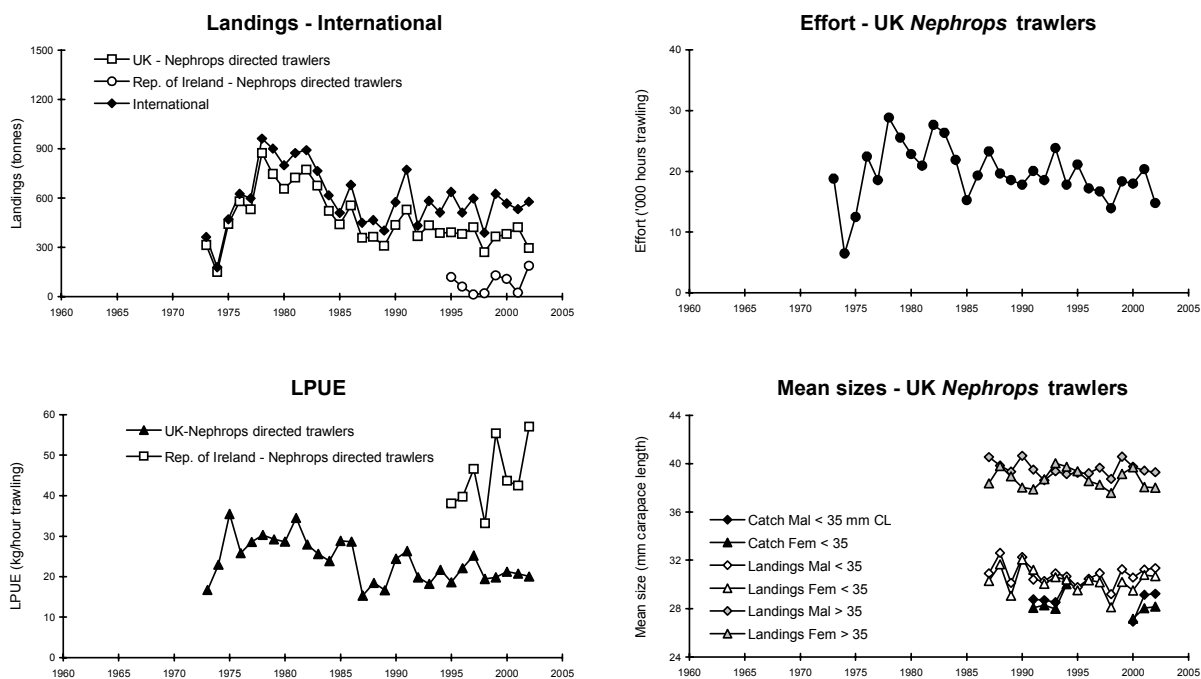


Figure 3.15.2.j.1 Irish Sea East (FU 14): Long-term trends in landings, effort, LPUEs, and mean sizes of *Nephrops*.

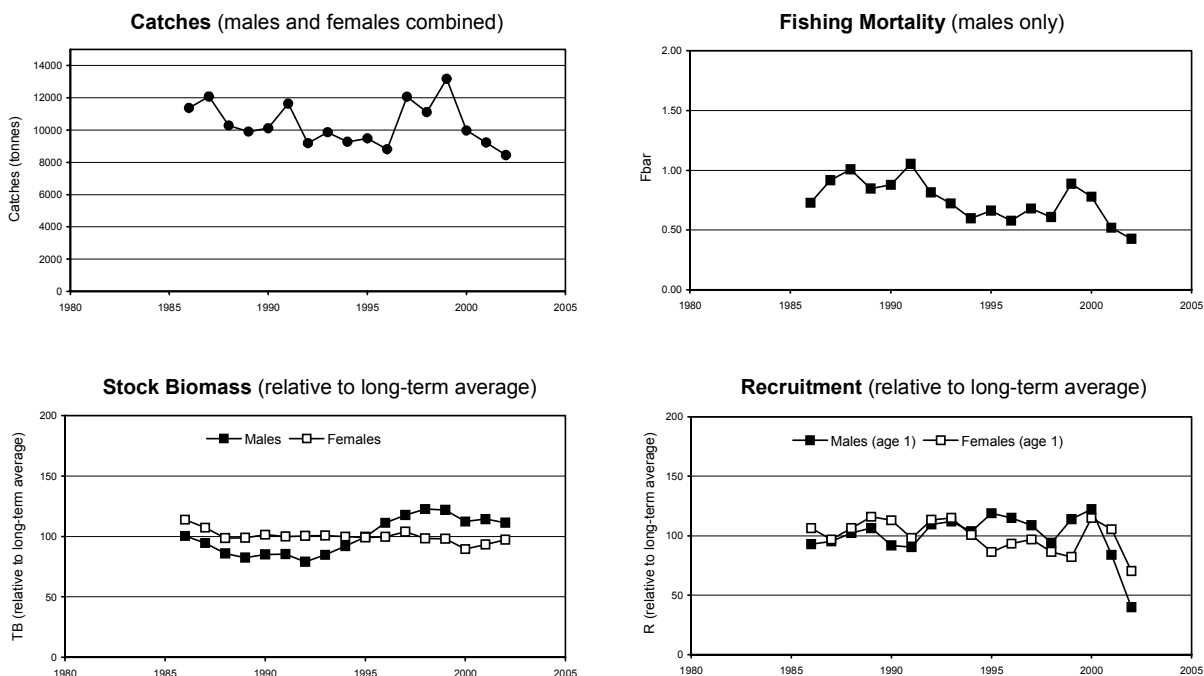


Figure 3.15.2.j.2 Irish Sea West (FU 15): Output VPA: Trends in Catches, F_{bar} , Stock Biomass, and Recruitment.

Irish Sea Plaice

(Division VIIa)

For latest information, see: <http://www.ices.dk>



Fisheries Science Services

FSS – SINGLE STOCK CONSIDERATIONS

(See Irish Sea Overview for Mixed Fishery Advice)

ICES have classified this stock as within safe biological limits based on the most recent estimates of SSB and fishing mortality.

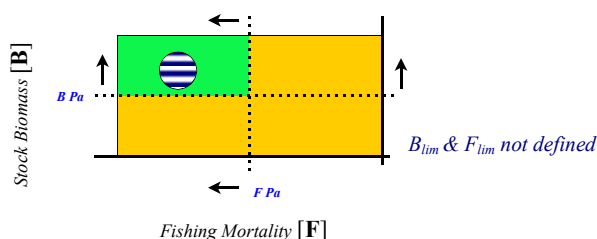
FSS recognise that the 'zero catch option' for cod and whiting would effectively mean a closure of the mixed demersal fishery in the Irish Sea. FSS considers that an industry initiated programme aimed at reducing cod and whiting catches to 'close to zero' should be considered in the management of Irish Sea fisheries. Industry initiated programmes should be encouraged but must include a high rate of independent observer coverage or other totally transparent methods for ensuring that their catches of species outside safe biological limits are fully and credibly reported.

Preliminary investigations suggest that a considerable proportion of the plaice catch is discarded. Discard estimates are not included in the assessment and this may lead to a more optimistic perception of the stock.

FSS considers that if any fisheries on plaice are permitted, despite the advice on cod and whiting, fishing mortality on plaice in 2004 should not be allowed to increase above the current level, corresponding to landings of less than 1,600 t in 2004. This translates to an Irish quota of about 1,200 t in 2004.

STATE OF THE STOCK

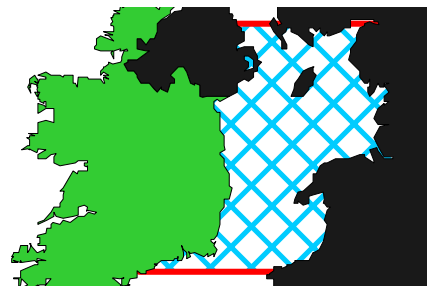
State of the Stock in relation to the precautionary reference points (see page 18)



- There are no concerns about the state of this stock.
- Landings remained low at 1,620 t (estimate) in 2002, marginally higher than the 2001 landings of 1,470 t for this stock.
- Fishing mortality, estimated to be 0.46 in 2002, has been below the F_{pa} of 0.45 in the last three years. Fishing mortality on this stock was above F_{pa} in most years between 1967 and 1997, but declined through the 1990s.
- Recruitment between 1964 and 1987 was variable and included some high values. Since 1988, recruitment has been less than average.
- The SSB estimated in 2002 of 3,890 t is above the B_{pa} of 3,100 t. SSB was relatively high in the mid-1980s following a series of good year-classes. It has remained relatively stable since the mid-1990s and has been above B_{pa} for the entire time series.
- Short-term predictions suggest that, at current levels of fishing mortality, SSB will remain relatively stable at around 3,720 t by 2005.

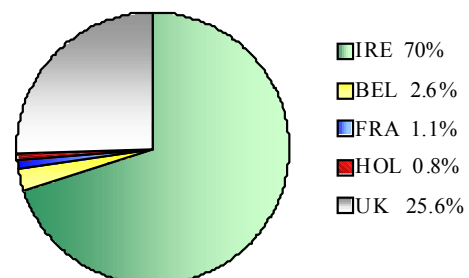
CURRENT MANAGEMENT

- The TAC area (Division VIIa) corresponds to the assessment area.



Red Box-TAC/Management Area Blue Shading- Assessment Area

- The TAC for 2003 was 1,675 t with an associated Irish quota of 1,173 t. The Hague preference agreement enables Ireland to claim an enhanced share of the TAC.



- There are no explicit management objectives or a management plan for this stock.

- FSS recommend that management objectives be established and that a management plan be developed and implemented for fisheries catching plaice.

FSS – ECONOMIC COMMENTS

- The value of the 2002 Irish quota was about €3.2m.
- The value of the 2002 Irish landings was about €1m.
- This fishery is an economically important by-catch species in the mixed demersal trawler from operating from Howth and the beam-trawl fleet (many of which land into the UK).

ADDITIONAL INFORMATION

- The assessment for this stock tends to over-estimate SSB, under estimate fishing mortality and provide poor consistency in estimation of recent recruitment. These tendencies probably result from poor data at younger ages (discard estimates are not included in the assessment).
- Irish landings in 2002 were about 370 t (close to the 2001 landings of about 360 t). The 2002 Irish landings were only 32% of the quota mainly because quota uptake by the Irish fleet was very low.
- Misreporting is not considered a problem in this fishery.
- UK (England) usually takes over 40% of the total landings. The Irish and Belgian fleets each traditionally take about a quarter of the landings. Effort in the UK and Belgian beam trawl fleets increased in the late 1980s, but declined in the early 1990s. Belgian beam trawl effort has increased markedly over the last three years.
- The Irish landings of this stock are taken mainly by otter trawl, targeting mixed species such as cod, whiting and *Nephrops*, but also by beam trawlers targeting sole in quarters 1 and 4. Vessels operating out of Howth, Kilmore Quay, Waterford and Clogherhead take most of the Irish catch.

- Irish Sampling of this stock is supported through the EC funded sampling programme, which is required under Data Collection Regulations 1543/2000 and 1639/2001. FSS sampling indicates that age groups 4 to 6 comprise about 70% of Irish landings of plaice from Divisions VIIa.
- The non-inclusion of discard information may represent a major deficiency in the assessment since preliminary investigations suggest that a considerable proportion of the catch may be discarded (approximately 90% at ages 1 and 2, 45% at age 3 and 10% at age 4). Measures to reduce discarding would therefore be beneficial to the stock.
- Yield per recruit analyses indicate that no long-term gain in yield would be achieved by fishing this stock at higher than current levels of fishing mortality.

ICES ADVICE 3.8.5

State of stock/exploitation:

Based on the most recent estimate of SSB and fishing mortality ICES classifies the stock as being inside safe biological limits. The SSB in 2002 was above B_{pa} and fishing mortality in the last three years has been below or at F_{pa} . Fishing mortality on this stock was above F_{pa} in most years between 1967 and 1997, but declined through the 1990s. SSB has been above B_{pa} throughout the period of assessment.

Management objectives:

No explicit management objectives are set for this stock.

Precautionary Approach reference points (established in 1998):

ICES considers that:	ICES proposes that:
There is no biological basis for defining B_{lim} or F_{lim} .	B_{pa} be set at 3 100 t. There is evidence of high recruitment at the lowest biomass observed and B_{pa} can therefore be set equal to the lowest observed SSB.
	F_{pa} be set at 0.45. This is considered to provide a high probability that SSB remains above B_{pa} in the long-term.

Technical basis:

B_{lim} and F_{lim} : stock-recruitment data uninformative; F_{loss} poorly defined.	$B_{pa} = B_{loss}$.
	$F_{pa} = F_{med}$ in a previous assessment, and long-term considerations.

Single Stock Exploitation Boundaries:

Fishing mortality in 2004 should remain below F_{pa} corresponding to landings of 1600 t.

The advice on the exploitation of this stock in 2004 is presented in the context of mixed fisheries and is found in Section 3.8.1.

Relevant factors to be considered in management:

ICES notes that there are no long-term gains from increasing the fishing mortality.

Catch forecast for 2004:

Basis: $F(2003) = F_{sq} = F(2000-2002) = 0.37$;

Landings(2003) = 1.4; SSB(2004) = 3.6.

F(2003) onwards	Basis	Landings (2004)	SSB (2005)
0	$0 \cdot F_{sq}$	0	4.9
0.37	$1.0 \cdot F_{sq}$	1.4	3.7
0.47	$F_{pa} (= 1.3 \cdot F_{sq})$	1.7	3.4

Weights in '000 t.

Medium- and long-term projections:

At current F , and assuming that the pattern of reduced recruitment observed since the late 1980s continues into the future, SSB is expected to remain stable at around 4000 t in the medium-term. The probability of SSB falling below B_{pa} remains very small for fishing mortality rates at F_{pa} and below.

Comparison with previous assessment and advice:

The estimate of fishing mortality in 2001 is 18% higher and SSB in 2002 25% lower in this year's assessment compared to last year's assessment. The basis for the advice is the same as last year. The survey indices, which have been relatively consistent in the past show totally opposite trends in 2002. This has resulted in substantial revision of recent recruitment estimates and has made the assessment more uncertain than in previous years.

Elaboration and special comment:

Plaice are taken mainly in long-established UK and Irish otter trawl fisheries for demersal fish. They are also taken as a by-catch in the beam trawl fishery for sole. The main fishery is concentrated in the Northeast Irish Sea. Effort in the UK and Belgian beam trawl fleets increased in the late 1980s, but declined in the early 1990s.

The analytical assessment is based on a tuned catch-at-age analysis with CPUE data from three commercial fleets and three surveys, and does not include estimates of discarded fish.

Reported landings in recent years are likely to be more accurate than in the past.

Source of information:

Report of the Working Group on the Assessment of Northern Shelf Demersal Stocks, May 2003 (ICES CM 2004/ACFM:01).

Yield and spawning biomass per recruit**F-reference points:**

	Fish Mort Ages 3-6	Yield/R	SSB/R
Average last 3 years	0.365	0.215	0.555
$F_{0.1}$	0.127	0.193	1.367
F_{med}	0.421	0.214	0.485

Catch data (Tables 3.8.5.1-2):

Year	ICES Advice	Single-stock exploitation boundaries	Predicted catch corresp. To advice	Predicted catch corresponding to single-stock boundaries	Agreed TAC	Official landings	ACFM Landings
1987	F high; no long-term gains in increasing F		5.0		5.0	5.6	6.2
1988	No increase in F		4.8		5.0	4.4	5.0
1989	80% of $F(87)$; TAC		5.8		5.8	4.2	4.4
1990	Halt decline in SSB; TAC		5.1		5.1	4.0	3.3
1991	Rebuild SSB to SSB(90); TAC		3.3		4.5	2.8	2.6
1992	70% of $F(90)$		3.0		3.8	3.2	3.3
1993	$F = 0.55 \sim 2\ 800\ t$		2.8		2.8	2.0	2.0
1994	Long-term gains in decreasing F		<3.7		3.1	2.1	2.1
1995	Long-term gains in decreasing F		2.4 ¹		2.8	2.0	1.9
1996	No long-term gain in increasing F		2.5		2.45	1.9	1.7
1997	No advice		-		2.1	2.0	1.9
1998	No increase in F		2.4		2.4	1.8	1.8
1999	Keep F below F_{pa}		2.4		2.4	1.6	1.6
2000	Keep F below F_{pa}		<2.3		2.4	1.5	1.4
2001	Keep F below F_{pa}		<2.4		2.0	1.5	1.5
2002	Keep F below F_{pa}		<2.8		2.4	1.2 ²	1.6
2003	No increase in F		1.9		1.675		
2004	³	$F < F_{pa}$	³	1.6			

Weights in '000 t. ¹Catch at *status quo* F . ²Incomplete statistics. ³Single-stock boundary and the exploitation of this stock should be conducted in the context of mixed fisheries protecting stocks outside safe biological limits.

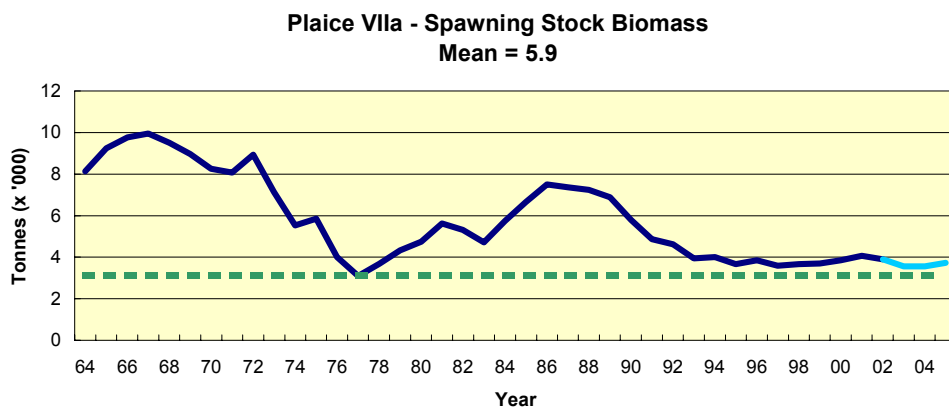
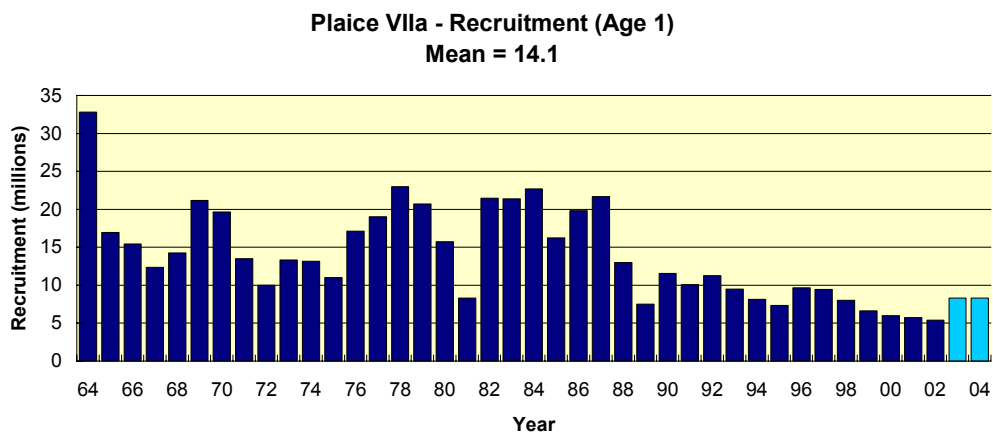
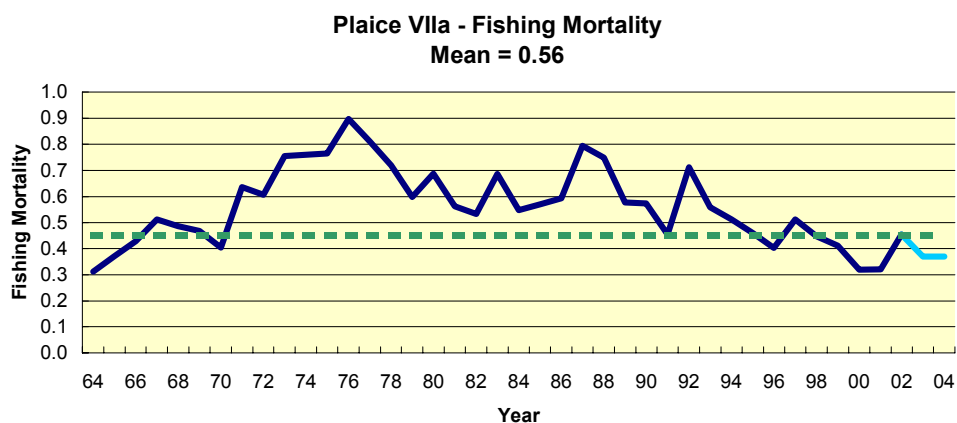
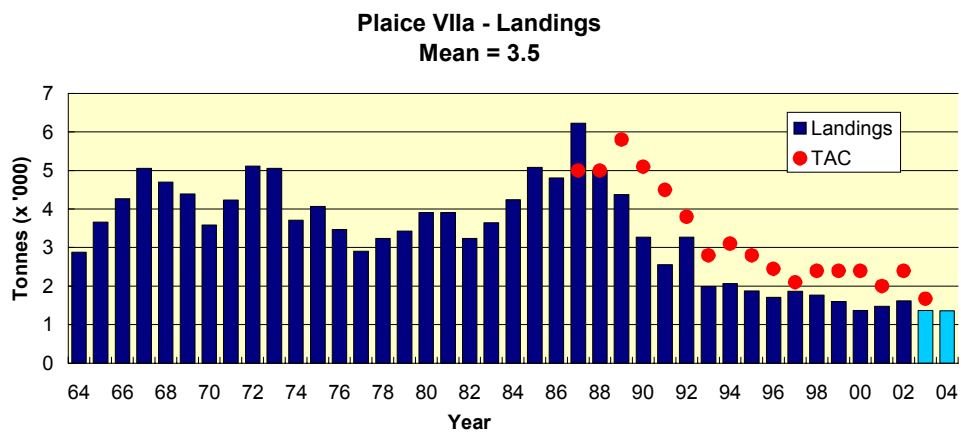


Table 3.8.5.1 Nominal landings (t) of PLAICE in Division VIIa as officially reported to ICES.

Country	1989	1990	1991	1992	1993	1994	1995	1996	1997	1998	1999	2000	2001	2002 ¹
Belgium	265	301	138	321	128	332	327	344 ³	459	327	275	325	482	637
France	11	105	20	42	19	13	10	11	8	8	5	14	9 ¹	9
Ireland	1,406	1,350	900	1,355	654	547	557	538	543	730	541	420	378	n/a
Netherlands	-	-	-	-	-	-	-	69	110	27	30	47	-	- ¹
UK (Eng.&Wales) ²	2,409	1,959	1,584	1,381	1,119	1,082	1,050	878	798	679	687	610	607	
UK (Isle of Man)	18	27	51	24	13	14	20	16	11	14	5	6	1	
UK (N. Ireland)	...	...	...	...	...	...	...	...	...	...	...	...	...
UK (Scotland)	76	219	104	70	72	63	60	18	25	18	23	21	11	
UK (Total)														576
Total	4,185	3,961	2,797	3,193	2,005	2,051	2,024	1,874	1,954	1,803	1,566	1,443	1,488	1,222
Discards	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Unallocated	187	-686	-243	74	-9	15	-150	-167	-83	-38	34	-72	15	398
Total figures used by the Working Group for stock assessment	4,372	3,275	2,554	3,267	1,996	2,066	1,874	1,707	1,871	1,765	1,600	1,371	1,473	1,620

¹Provisional.²1989–1999 Northern Ireland included with England and Wales.³Final Statlant 27a data.

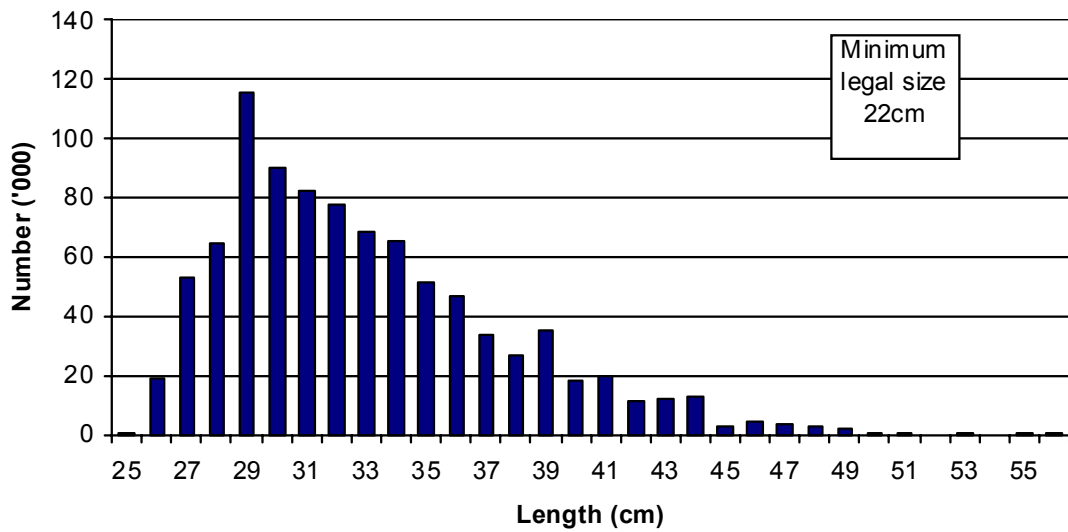
{UK (Total) excludes Isle of Man data}.

n/a = not available.

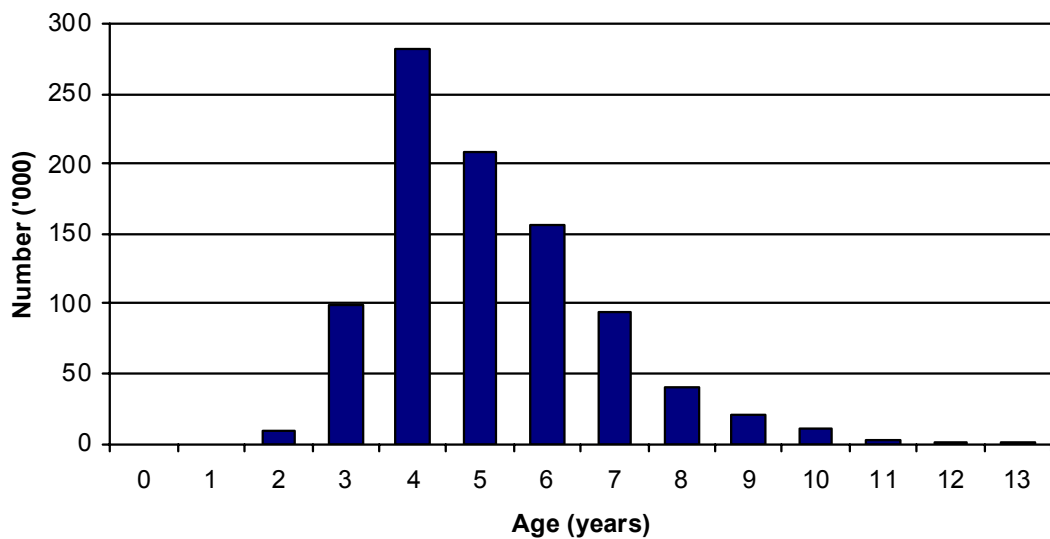
Table 3.8.5.2 Plaice in Division VIIa (Irish Sea).

Year	Recruitment Age 1 thousands	SSB tonnes	Landings tonnes	Mean F Ages 3-6
1964	32801	8128	2879	0.3117
1965	16941	9246	3664	0.3709
1966	15435	9757	4268	0.4288
1967	12377	9950	5059	0.5122
1968	14252	9492	4695	0.4857
1969	21154	8962	4394	0.4677
1970	19664	8255	3583	0.4041
1971	13481	8064	4232	0.6362
1972	9987	8920	5119	0.6066
1973	13337	7129	5060	0.7552
1974	13141	5529	3715	0.7602
1975	11006	5862	4063	0.7640
1976	17122	4007	3473	0.8976
1977	19020	3095	2904	0.8124
1978	22950	3691	3231	0.7196
1979	20700	4331	3428	0.5979
1980	15750	4754	3903	0.6871
1981	8314	5614	3906	0.5625
1982	21460	5315	3237	0.5327
1983	21376	4707	3639	0.6863
1984	22654	5753	4241	0.5475
1985	16256	6649	5075	0.5697
1986	19811	7491	4806	0.5926
1987	21662	7358	6220	0.7944
1988	12998	7238	5005	0.7489
1989	7474	6884	4372	0.5772
1990	11568	5802	3275	0.5732
1991	10101	4876	2554	0.4552
1992	11262	4624	3267	0.7116
1993	9508	3940	1996	0.5586
1994	8149	4004	2066	0.5120
1995	7336	3662	1874	0.4592
1996	9668	3862	1707	0.4029
1997	9413	3593	1871	0.5125
1998	8020	3658	1765	0.4466
1999	6617	3702	1600	0.4110
2000	5976	3853	1371	0.3195
2001	5758	4068	1473	0.3207
2002	5375	3892	1620	0.4551
2003	8330	3549		
Average	14029	5832	3452	0.5633

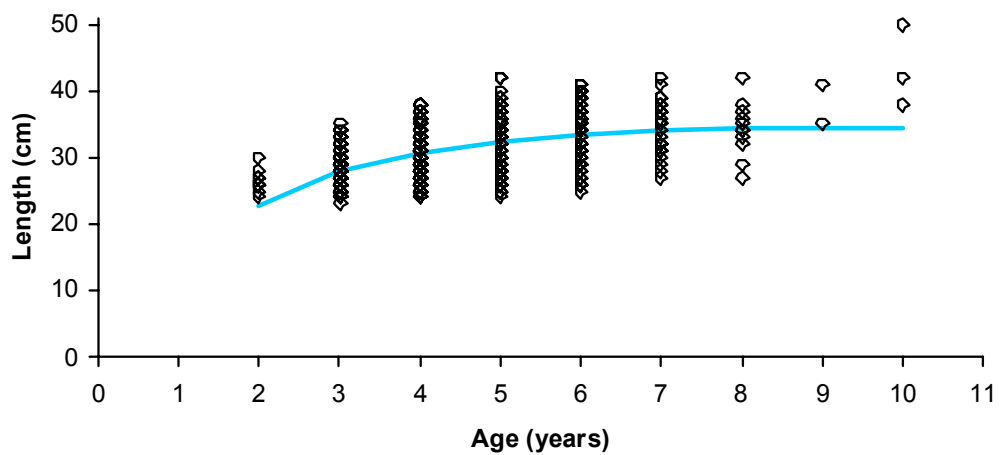
2002 Length Distribution: Irish Landings, Plaice in VIIa



2002 Age Distribution: Irish Landings, Plaice in VIIa



2002 Size at Age: Irish Sampling, Plaice in VIIa



Irish Sea Sole

(Division VIIa)

For latest information, see: <http://www.ices.dk>



Fisheries Science Services

FSS – SINGLE STOCK CONSIDERATIONS

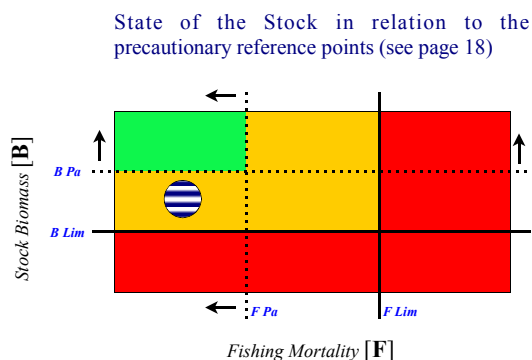
(See Irish Sea Overview for Mixed Fishery Advice)

ICES classifies this stock as outside safe biological limits based on recent estimates of biomass and fishing mortality.

FSS recognise that the 'zero catch option' for cod and whiting would effectively mean a closure of the mixed demersal fishery in the Irish Sea. FSS considers that an industry initiated programme aimed at reducing cod and whiting catches to 'close to zero' should be considered in the management of Irish Sea fisheries. Industry initiated programmes should be encouraged but must include a high rate of independent observer coverage or other totally transparent methods for ensuring that their catches of species outside safe biological limits are fully and credibly reported.

FSS agrees with the ICES recommendation that if any fisheries on sole are permitted, despite the advice on cod and whiting, fishing mortality in 2004 should be reduced by 10%, corresponding to landings in 2004 of 790 t. This translates to an Irish quota of 96 t in 2004. This will keep F below F_{pa} , and allow SSB to increase above B_{pa} in the short term.

STATE OF THE STOCK

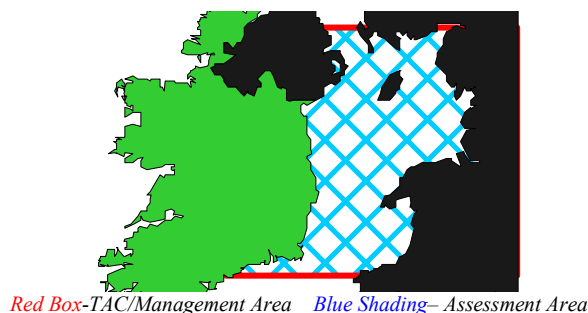


- There are concerns about the state of this stock.
- Landings have remained relatively stable in recent years at around 1,000 t.

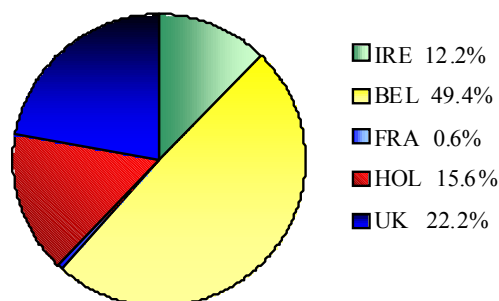
- Fishing mortality in the last three years has been below or at F_{pa} . The estimated fishing mortality in 2002 of 0.31 is around the F_{pa} of 0.3. F has remained above F_{pa} for the entire time series, except for 2001. Fishing mortality varied around F_{lim} from 1970 to 1998.
- Recruitment in this stock has occurred in pulses. The 1993 and 1994 year class were the lowest on record while the 1995 and 1996 year-class were above average. Recent year-classes have been below average and the 2000 year-class is estimated to be the lowest on record.
- The estimated SSB in 2002 of 3,945 t is greater than the B_{pa} of 3,800 t. SSB had fluctuated around B_{pa} since 1990 but rebuilding of the SSB from the historic lows of 1996 and 1997 continued until 2001.
- Short-term predictions indicate that, at current levels of fishing mortality, SSB will fall slightly below B_{pa} to about 3,750 t in 2005.

CURRENT MANAGEMENT

- The TAC area (Division VIIa) corresponds to the assessment area.



- The TAC in 2003 was 1,010 t with an Irish quota of 123 t.



- There are no explicit management objectives or a management plan for this stock.
- FSS recommend that management objectives be established and that a management plan be developed and implemented for fisheries catching sole.

FSS – ECONOMIC COMMENTS

- The value of the 2002 Irish quota was about €1.4m.
- The value of the 2002 Irish landings was about €1.3m.
- This fishery is an extremely important, high economic value fishery. Particularly to the beam trawl fleet which target sole in the eastern Irish Sea and often land in the UK. Sole are also a valuable by-catch for otter trawl vessels operating out of Howth and other east coast ports.

ADDITIONAL INFORMATION

- 1 Irish landings were about 110 t in 2002.
- 2 Although misreporting of sole catches by area is suspected, and fleets constrained by quotas are likely to have been declaring landings only in line with expected quota uptake, there is no information on whether this constitutes a serious problem for the assessment of this stock.
- 3 Beam trawlers from Belgium traditionally take up to two-thirds of the landings. The UK (England and Wales) and Ireland each take about 15% of the landings. Landings from the UK fleet have decreased in recent years.
- 4 The Irish Sole fishery in VIIa is mainly undertaken by beam trawlers in quarter 1 and 4. Sole are also a by-catch in demersal otter trawl fisheries. Management options for sole therefore need to consider the interactions with other species in the fishery.
- 5 Irish Sampling of this stock is supported through the EC funded sampling programme, which is required under Data Collection Regulations 1543/2000 and

1639/2001. FSS sampling indicates that fish in 5 different age groups are well represented in the landings, confirming the relatively good state of the stock.

- 6 Limited observations on discarding of sole indicate that rates of discarding are relatively low.
- 7 Because of the cod closure in 2000 Belgian beam trawl effort was displaced from the first quarter to April, May and October. The UK beam trawl effort in 2000 decreased in April but increased in May. The total UK Beam effort decreased by 40% in 2000 compared to 1999. Since the closed area has been restricted to the west of the Irish Sea from 2001 on, it is unlikely that the closure has continued to influence effort distribution.

ICES ADVICE

3.8.6

State of stock/exploitation:

Based on the most recent estimate of the biomass ICES classifies the stock as being outside safe biological limits. The SSB in 2002 was above and SSB in 2003 is now below B_{pa} and fishing mortality in the last three years has been above or at F_{pa} . Fishing mortality varied around F_{lim} from 1970 to 1998. SSB has recently increased from the historic low in 1997 to about B_{pa} . The 2000 year class is estimated to be the lowest on record.

Management objectives:

No explicit management objectives are set for this stock.

Precautionary Approach reference points (established in 1998):

ICES considers that:	ICES proposes that:
B_{lim} is 2 800 t, the lowest observed spawning stock in an earlier assessment.	B_{pa} be set at 3 800 t, which is considered to be the minimum SSB required to ensure a high probability of maintaining SSB above its lowest observed value, taking into account the uncertainty of assessments.
F_{lim} is 0.4. Although poorly defined, there is evidence that fishing mortality in excess of 0.4 has led to a general stock decline and is only sustainable during periods of above-average recruitment.	F_{pa} be set at 0.30. This F is considered to have a high probability of avoiding F_{lim} .

Technical basis:

$B_{lim} = B_{loss}$	$B_{pa} \sim B_{lim} * 1.4$
$F_{lim} = F_{loss}$ poorly defined; based on historical considerations	$F_{pa} = \text{see above}$

Single Stock Exploitation Boundaries:

Fishing mortality in 2004 should be reduced by 10%, corresponding to landings of 790 t. This will allow SSB to increase above B_{pa} in the short-term.

The advice on the exploitation of this stock in 2004 is presented in the context of mixed fisheries and is found in Section 3.8.1.

Catch forecast for 2004:

Basis: $F(2003) = F_{sq} = F(2000-2002) = 0.29$; Landings (2003) = 0.91; SSB (2004) = 3.48.

F(2003) onwards	Basis	Landings (2004)	SSB (2005)
0	$0 * F_{sq}$	0	4.60
0.06	$0.2 * F_{sq}$	0.19	4.41
0.12	$0.4 * F_{sq}$	0.37	4.23
0.17	$0.6 * F_{sq}$	0.54	4.06
0.26	$0.9 * F_{sq}$	0.79	3.82
0.29	$1 * F_{sq}$	0.86	3.75
0.30	$F_{pa} = 1.04 * F_{sq}$	0.89	3.72
0.32	$1.1 * F_{sq}$	0.94	3.68
0.35	$1.2 * F_{sq}$	1.01	3.60

Weights in '000 t.

Shaded scenarios considered inconsistent with the precautionary approach applied in a single-species context alone.

Comparison with previous assessment and advice:

The estimate of fishing mortality in 2001 is the same, and SSB in 2002 is 2% higher in this year's assessment

compared to last year's assessment. The basis for a single-stock fishery advice is a 10% reduction of fishing mortality compared to the 2002 advice which called for a 5% increase in fishing mortality of the *status quo* prediction. This may be largely attributed to a revised estimate of the 2000 year class, which is now estimated to be the lowest on record.

Elaboration and special comment:

Limited observations on discarding of sole indicate that the rates of discarding are relatively low.

Sole are taken mainly in a beam trawl fishery and are also taken as a by-catch in other trawl fisheries.

The analytical assessment is based on a tuned catch-at-age analysis with CPUE data from two commercial beam trawl fleets and two surveys.

Source of information:

Report of the Working Group on the Assessment of Northern Shelf Demersal Stocks, May 2003 (ICES CM 2004/ACFM:01).

Yield and spawning biomass per recruit**F-reference points:**

	Fish Mort Ages 4-7	Yield/R	SSB/R
Average last 3 years	0.290	0.190	0.762
$F_{0.1}$	0.159	0.172	1.265
F_{med}	0.292	0.190	0.756

Catch data (Tables 3.8.6.1-2):

Year	ICES Advice	Single-stock exploitation boundaries	Predicted catch corresp. to advice	Predicted catch corresponding to single-stock boundaries	Agreed TAC	Official landings	ACFM landings ²
1987	No increase in F		1.9		2.1	2.0	2.8
1988	80% of F(86); TAC		1.6		1.75	1.9	2.0
1989	80% of F(87); TAC		< 1.48		1.48	1.8	1.8
1990	Interim advice		1.05 ³		1.5	1.6	1.6
1991	90% of F(89); TAC		1.3		1.5	1.2	1.2
1992	No long-term gains in increased F		1.2 ¹		1.35	1.2	1.3
1993	F = F(91) ~ 920 t		0.92		1.0	1.0	1.0
1994	No long-term gains in increased F		1.51 ¹		1.5	1.4	1.4
1995	20% reduction in F		0.8		1.3	1.3	1.3
1996	20% reduction in F		0.8		1.0	1.0	1.0
1997	20% reduction in F		0.8		1.0	1.0	1.0
1998	20% reduction in F		0.85		0.9	0.9	0.9
1999	Reduce F below F_{pa}		0.83		0.9	0.8	0.9
2000	Reduce F below F_{pa}		< 1.08		1.08	0.8	0.8
2001	Reduce F below F_{pa}		< 0.93		1.1	1.0	1.1
2002	Keep F below F_{pa}		< 1.10		1.1	1.0	1.1
2003	Keep F below F_{pa}		< 1.01		1.01		
2004	⁴	Maintain SSB above B_{pa}	⁴	< 0.79			

¹Catch at *status quo* F. ² Not including misreporting. ³Revised in 1990 to 1.5. ⁴Single-stock boundary and the exploitation of this stock should be conducted in the context of mixed fisheries protecting stocks outside safe biological limits. Weights in '000 t.

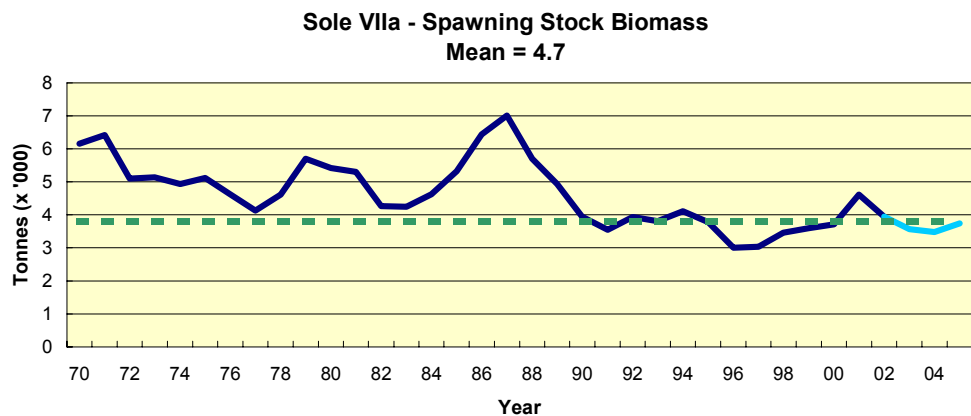
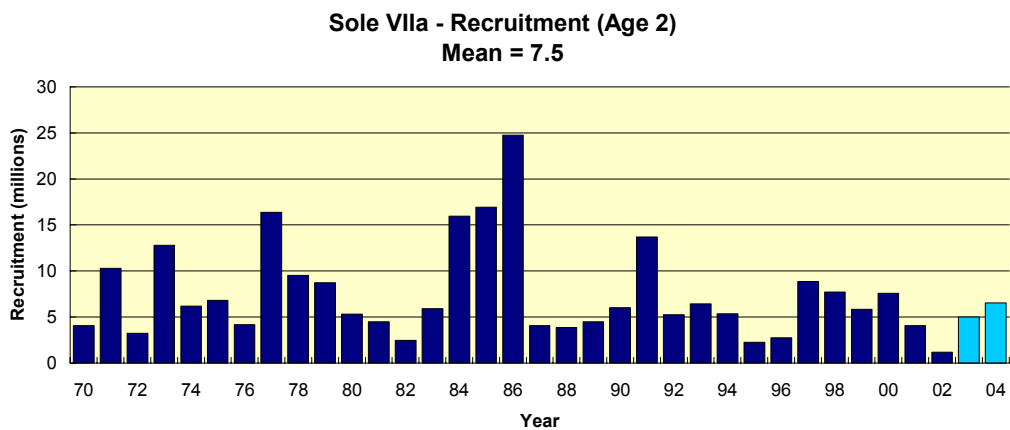
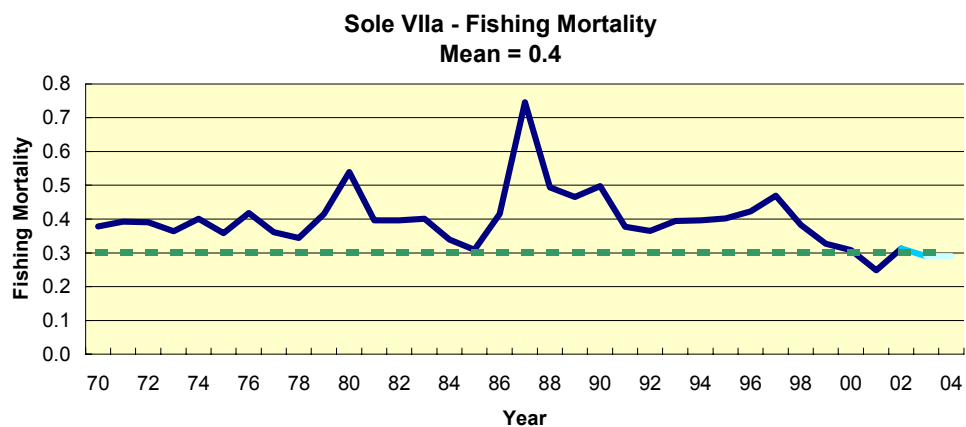
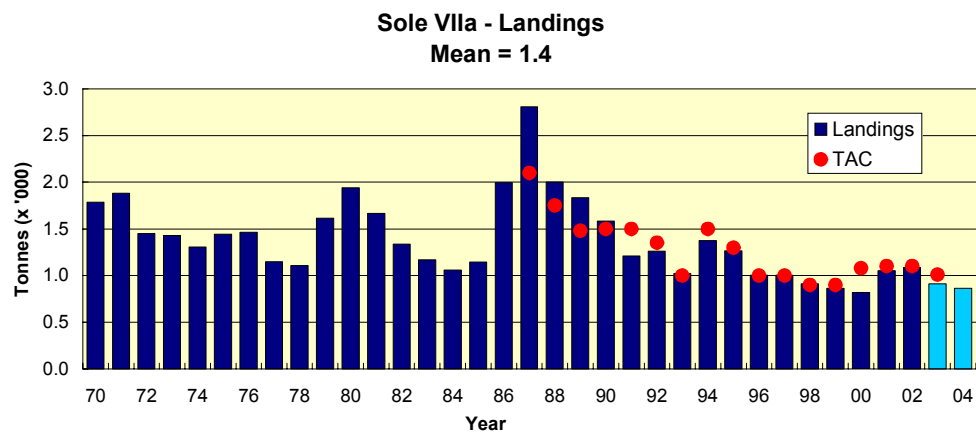


Table 3.8.6.1 Irish Sea Sole. Nominal landings (tonnes) as officially reported by ICES.

Country	1986	1987	1988	1989	1990	1991	1992	1993	1994
Belgium	930	987	915	1010	786	371	531	495	706
France	17	5	11	5	2	3	11	8	7
Ireland	235	312	366	155	170	198	164	98	226
Netherlands	-	-	-	-	-	-	-	-	-
UK (Engl.& Wales) ¹	637	599	507	613	569	581	477	338	409
UK (Isle of Man)	1	3	1	2	10	44	14	4	5
UK (N. Ireland) ¹	50	72	47						
UK (Scotland)	46	63	38	38	39	26	37	28	14
United Kingdom									
Total	1,916	2,041	1,885	1,823	1,576	1,223	1,234	971	1,367
Unallocated	79	767	114	10	7	-9	25	52	2
Total used by Working Group in Assessment	1,995	2,808	1,999	1,833	1,583	1,214	1,259	1,023	1,369

Country	1995	1996	1997	1998	1999	2000	2001	2002
Belgium	675	533	570	525	469	493	674	817
France	5	5	3	5*	1*	3	4*	4
Ireland	176	133	130	134	120	135	135	
Netherlands	-	149	123	60	46	60	-	-
UK (Engl.& Wales) ¹	424	194	189	161	165	133	...	...
UK (Isle of Man)	12	4	5	3	1	1	+	
UK (N. Ireland) ¹								
UK (Scotland)	8	5	7	9	8	8	4	...
United Kingdom							195	168
Total	1,300	1,023	1,027	897	810	833	1,012	989
Unallocated	-34	-21	-24	14	50	-15	41	98
Total used by Working Group in Assessment	1,266	1,002	1,003	911	859	818	1,053	1,087

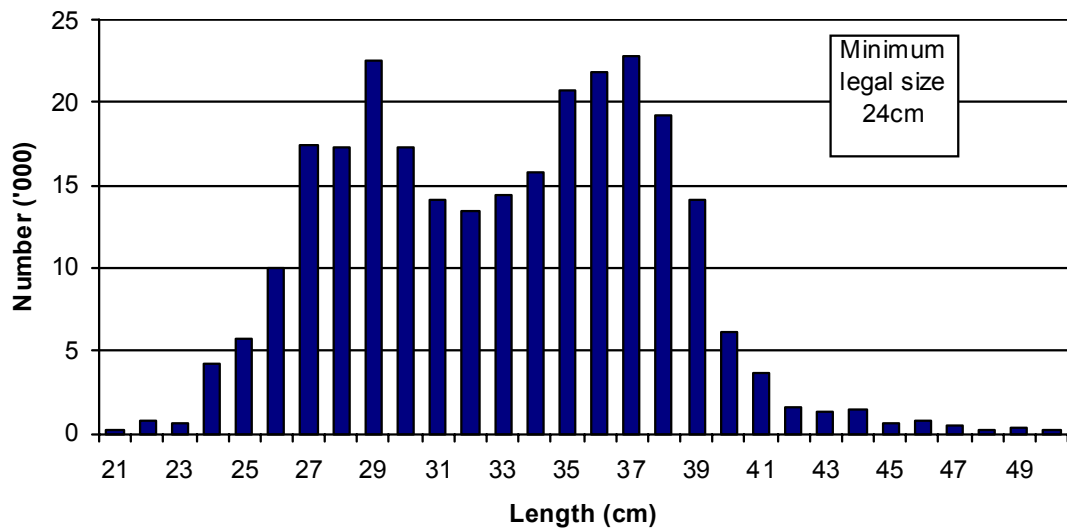
* Preliminary

¹ 1989 onwards: N. Ireland included with England & Wales

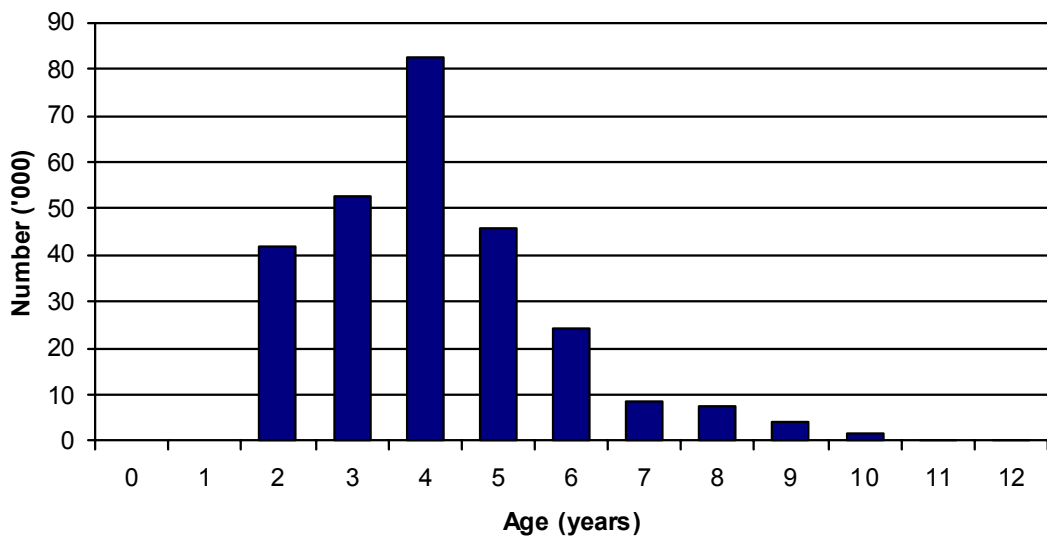
Table 3.8.6.2 Sole in Division VIIa (Irish Sea).

Year	Recruitment Age 2 thousands	SSB tonnes	Landings tonnes	Mean F Ages 4-7
1970	4046	6158	1785	0.3783
1971	10294	6418	1882	0.3927
1972	3219	5104	1450	0.3903
1973	12777	5139	1428	0.3638
1974	6195	4940	1307	0.4009
1975	6795	5115	1441	0.3584
1976	4177	4621	1463	0.4176
1977	16393	4133	1147	0.3609
1978	9531	4615	1106	0.3447
1979	8720	5699	1614	0.4158
1980	5317	5420	1941	0.5396
1981	4487	5301	1667	0.3961
1982	2481	4262	1338	0.3956
1983	5917	4250	1169	0.4009
1984	15943	4619	1058	0.3397
1985	16951	5324	1146	0.3092
1986	24737	6431	1995	0.4149
1987	4066	7006	2808	0.7454
1988	3852	5701	1999	0.4939
1989	4480	4940	1833	0.4656
1990	6033	3948	1583	0.4974
1991	13688	3548	1212	0.3775
1992	5259	3938	1259	0.3648
1993	6430	3805	1023	0.3946
1994	5371	4109	1374	0.3965
1995	2251	3781	1266	0.4020
1996	2755	3008	1002	0.4227
1997	8866	3030	1003	0.4694
1998	7719	3455	911	0.3833
1999	5844	3597	863	0.3271
2000	7590	3712	818	0.3077
2001	4092	4609	1053	0.2485
2002	1207	3945	1087	0.3133
2003	5003	3564		
Average	7426	4625	1395	0.4009

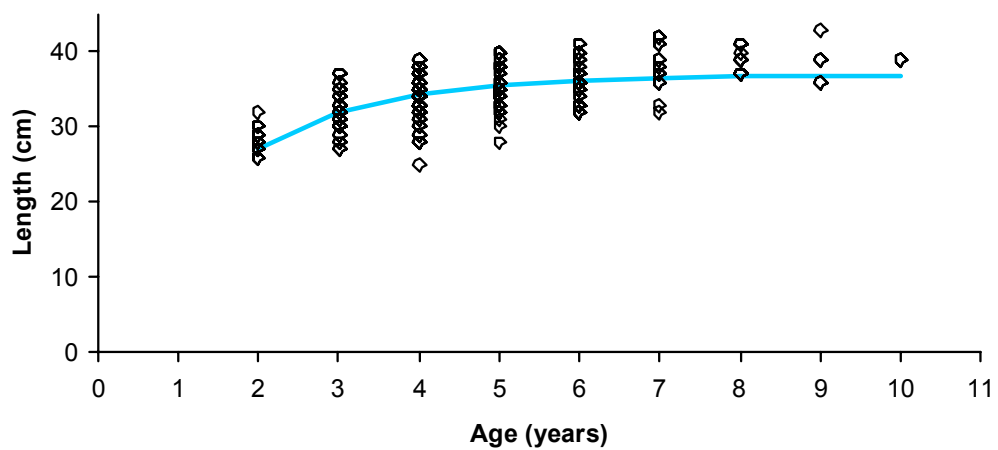
2002 Length Distribution: Irish Landings, Sole in VIIa



2002 Age Distribution: Irish Landings, Sole in VIIa



2002 Size at Age: Irish Sampling, Sole in VIIa



Advice and Overview For West of Scotland and Rockall Mixed Demersal Fisheries



Fisheries Science Services

Advice on demersal fish stocks in Divisions VIa and VIb

FSS ADVICE

FSS advise that mixed fisheries characteristics be taken into account when managing demersal fisheries in the west of Scotland and Rockall (Sub-area VI).

Stocks of cod VIa, Northern hake, and whiting VIa are outside safe biological limits. Furthermore anglerfish is harvested outside safe biological limits and haddock at Rockall is close to historic low levels. These stocks are the over-riding concerns in the management advice for mixed demersal fisheries in Sub-area VI.

FSS recognise that the ICES advice for 'zero catch' of cod (VIa) and lowest possible catches of Rockall haddock would effectively mean a closure of the mixed demersal and *Nephrops* fisheries west of Scotland and at Rockall. FSS agrees with ICES that a closure of all fisheries catching cod (VIa) or haddock (VIb) will provide the highest probability of recovery for these stocks. However, ICES has previously advised for 'zero catch' of cod and managers, because of social and economic considerations, never implemented this advice. Although the zero catch advice is not helpful to managers the extremely depleted state of the cod stock in this area warrants stringent management action.

Therefore in the absence of a mixed fishery analysis for Sub-area VI FSS advise that two general rules should be followed in the management of mixed fisheries west of Scotland and at Rockall.

- 1) Once the TAC is exhausted for a particular stock then all fisheries which catch that stock should be closed.
- 2) Fisheries should only be permitted when they demonstrate that they take zero catch of stocks where the TAC is exhausted.

Following consideration of both the ICES and STECF advice FSS advises on the following 2004 catches for these critical stocks;

Cod in Division VIa – Catches in 2004 of zero.

Northern Hake –Landings in 2004 of less than 28,100 t

Whiting in VIa – Restrict fishing mortality to below F_{pa} .

Anglerfish in Sub-area VI - Restrict fishing mortality to below F_{pa} .

Haddock in VIb – Catches should be reduced to the lowest possible levels.

All other stocks should be exploited within precautionary limits. FSS advise that industry initiated programmes aimed at reducing catches of species outside safe biological limits should be considered in the management of west of Scotland and Rockall mixed demersal fisheries. Industry initiated programmes should be encouraged but must include a high rate of independent observer coverage or other totally transparent methods for ensuring that their catches of species outside safe biological limits are fully and credibly reported. FSS point out that an evaluation of the benefits of improved selectivity resulting from changes in mesh size are insufficient to rebuild the cod stock but do benefit the whiting and haddock stocks in VIa.

FSS advise that a well defined 'management plan' is necessary to recover the cod stock and to fish it sustainably once it has recovered. FSS advise that such a plan should aim to manage properly defined métiers with clearly defined objectives that will ensure a high probability of recovery to agreed levels within a specified time frame.

FSS would also point out that industrial fisheries for Norway pout continue in VIa and sampling of their catch composition is required under the data collection regulation. Despite this, these fisheries are not currently assessed or effectively managed. FSS consider that these fisheries may have a negative impact on already depleted stocks in VIa and advise that continuing to exploit them without an assessment of their status or impacts on other stocks is not consistent with the precautionary approach.

Stock	State of the stock	FSS considerations regarding single-stock exploitation boundaries	FSS maximum advised catch from TAC area shown in bold. (Maximum advised catch from assessment area in brackets)
Cod West of Scotland	Outside safe biological limits	A recovery plan that must include a provision for zero catch until the estimate of SSB is above B_{lim} or other strong evidence of recovery is observed.	Zero
Hake – Northern stock (Division IIIa, Sub-areas IV, VI and VII, and Divisions VIIa, b, d)	Outside safe biological limits	Reducing F by 36% would increase SSB in 2005 by 10%. This would imply landings of in 2004 which are consistent with the EU Recovery Plan aims of an annual TAC variation of < 15%.	15 736 t (28 100 t)
Cod in Division VIb (Rockall)	No information	No assessment.	630 t (630 t)
Haddock West of Scotland	Inside safe biological limits	Fishing mortality in 2004 should be less than F_{pa} .	12, 200t
Haddock in Division VIb (Rockall)	Uncertain	Catches in 2004 should be reduced to the lowest possible level.	Lowest possible level
Whiting West of Scotland	Outside safe biological limits	Total fishing mortality in 2004 should be below 0.31 in order to bring SSB above B_{pa} in 2005.	2 100 t
Whiting in Division VIb (Rockall)	No information	No assessment.	2 100 t (0 t)
Megrim in Sub-area VI (West of Scotland and Rockall)	Uncertain	Catches in 2004 be no more than the recent (1999-2001) landings in Divisions VIa and VIb and unallocated landings in IV.	3 600 t
Anglerfish in Division IIIa, Sub-area IV, and Sub-area VI	Harvested outside safe biological limits	Fishing mortality in 2004 should be reduced to less than F_{pa} .	3 520 t (8 800 t)
Norway pout West of Scotland	No information	No assessment.	N/A
North Sea and West of Scotland Saithe	Inside safe biological limits	F less than F_{pa} , corresponding to landings of less than 232,000 t.	20 595 t (232 000 t)
West of Scotland and Rockall Pollack	No information	Catches in local areas be limited to recent averages	N/A
West of Scotland and Rockall Plaice	No information	Adjust 'precautionary TAC' downwards in line with recent landings	1 100 t
West of Scotland and Rockall Sole	No information	Adjust 'precautionary TAC' downwards in line with recent landings	54 t
Sandeel in Division VIa	No information	No assessment. Maintain current management plan.	N/A
<i>Nephrops</i> in Division VIa (Management Area C)	Exploited at sustainable levels	A Management Area TAC of 11,300 t for 2004 and 2005.	11 300 t

FSS Review of Irish Demersal Fisheries in Divisions VIa and VIb during 2002

The Irish otter trawl fleet in VIa can be divided into two main métiers; the light otter trawl and the roundfish otter trawl. In 2002 the Irish light otter trawl fleet Division VIa targeted megrim, anglerfish, hake and other gadoids on the Stanton Bank. The roundfish otter trawlers target haddock, whiting, cod and squid in harder ground mainly in the south of Division VIa. Over the last five years there has been an increase in the number of vessels using twin rigs in both métiers. There have also been changes to the fleet composition in the last two years with ten vessels decommissioned and four new vessels joining the fleet. Otter trawl effort in VIa has shown a declining trend since 1997 and the 2002 is around 43% less than the 2002 level.

The Irish fleet otter trawl in Division VIb primarily target haddock on the Rockall Bank with by-catches of megrim and anglerfish. The fleet targeting haddock uses 100 mm mesh and twin rig trawls. The fleet composition changed in 2001 when four vessels were decommissioned and one new vessel joined the fleet. In 2002 only 2 vessels accounted for the majority of the landings an otter trawl effort declined by 64% from the 2001 level.

Recent Changes to technical measures affecting the Irish Fleet in 2002 and 2003

The minimum mesh size for vessels fishing for roundfish in the mixed demersal fishery in EC Zones 1 and 2 (West of Scotland and North Sea excluding Skagerrak) was changed to from 100 mm 120 mm from the start of 2002 under EU regulations regarding the cod recovery plan (Commission

Regulation EC 2056/2001), with a one-year derogation of 110 mm for vessels targeting other species such as whiting and haddock (not cod). This derogation was not extended beyond the end of 2002.

Vessels using trawls with mesh size of >90 mm and targeting roundfish are limited to 16 days at sea per month have been since February 2003 (EU 2003/0090). Vessels using gear with mesh size of between 70-90 mm can spend 25 days at sea per month. FSS note that the effect of these management measure in 2003 and 2004 if implemented are not considered in the ICES stock forecast. These factors will act as F multipliers on the catch forecasts for 2003 and 2004. Therefore if these were determined their impact on catch forecast could readily be evaluated.

During 2002 there was also an area closed to fishing at Rockall.

ICES 3.7 Stocks West of Scotland and Rockall

ICES description of International fisheries in Divisions VIa and VIb

The main fleets operating in Division VIa include the mixed roundfish otter trawl fleet, the *Nephrops* otter trawl fleet, the otter trawl fleet targeting anglerfish, megrim and hake and the fleet targeting saithe and/or deep sea species. To a large extent, the roundfish fishery in Division VIa is an extension of the similar fishery in the North Sea. The demersal fisheries in Division VIa are predominantly conducted by otter trawlers fishing for cod, haddock, anglerfish, and whiting, with bycatches of saithe, megrim, and lemon sole.

The cod stock has been declining for some time and various stringent measures have been introduced to reduce fishing pressure on the cod stock. These measures include technical regulations of minimum mesh sizes, closed areas decommissioning schemes for UK demersal vessels in 2001 and 2003. The 2001 scheme removed approximately 11% of the UK gross tonnage as recorded over 1998-2000 and 10% of the UK KW days fished. Figures corresponding to the 2003 scheme are not yet available.

Square mesh panels were introduced in UK fisheries in 2000 in an attempt to improve selectivity. The minimum mesh size for vessels fishing for cod in the mixed demersal fishery in EC Zones 1 and 2 (West of Scotland and North Sea excluding Skagerrak) was changed from 100 mm to 120 mm from the start of 2002 under EU regulations regarding the cod recovery measures (Commission Regulation EC 2056/2001), with a one-year derogation of 110 mm for vessels targeting other species, including whiting. If implemented effectively, these measures should help to improve gear selectivity and reduce discarding of whiting.

Emergency EU measures were established in the first half

of 2001 and led to short-term area closures from 6 March – 30 April 2001 in the north of the Division and on a smaller scale in the Clyde Sea area. The regulations sought to minimise cod catches, but also to minimise the effect of the measures on certain pelagic and shellfish fisheries. Consequently, derogations existed for: purse seine and pelagic trawls targeting pelagic fish species; dredges, pots and creels; and for the inner Clyde area, *Nephrops* trawls. The aim of the controlled areas was to allow as many cod as possible to spawn before the end of April when the spawning season finishes (Commission Regulation (EC) No. 456/2001). Consequently, the regulation targeted areas where high catch rates of cod are usually experienced during March and April. The controlled areas were not defined for the purposes of regulating fishing effort on the cod stock in this area. No measures were applied to regulate effort displaced during the period of the control. Since 2001, these trawlers have adopted mesh sizes of 100–120 mm and other gear modifications depending on the requirements of recent EU technical conservation regulations and national legislation. The otter trawl vessels are now required to use gear with meshes of 120 mm in 2002 and 2003. These measures are aimed at reducing the considerable rates of discarding of young fish, particularly cod that have been observed on vessels using 100 mm mesh trawls.

The majority of the vessels in the demersal fishery are locally-based Scottish trawlers using 'light-trawls', but trawlers from Ireland, Northern Ireland, England, France, and Germany also participate in this fishery. The importance of Scottish seiners essentially targeted at haddock has been declining in recent years as many of these vessels have been converted to trawlers. A part of the fleet of light trawlers has diversified into a fishery for anglerfish that has been expanding into deeper water off the northern coast of Scotland. Bycatches in this fishery include megrim ling and tusk.

200 Scottish trawlers also take part in fisheries for *Nephrops* on inshore grounds. In recent years Irish vessels have also been targeting *Nephrops* in Division VIa mainly on offshore grounds. Some *Nephrops* vessels use 70 mm mesh with an 80 mm square mesh panel, but others use 100 mm mesh to avoid the bycatch limitations associated with the smaller mesh size. These boats also land smaller quantities of haddock, cod, whiting, and small saithe, but discard large amounts of whiting and haddock.

The development of a directed fishery for anglerfish has led to considerable changes in the way the Scottish fleet operates. Part of this is a change in the distribution of fishing effort; the development of a directed fishery having led to effort shifting away from traditional round-fish fisheries in inshore areas to more offshore areas and deeper waters. The expansion in area and depth range fished has been accompanied by the development of specific trawls and vessels to exploit the stock. These vessels mainly use large twin-rig otter trawls with >100 mm mesh. A smaller Irish fleet also target anglerfish, megrim and hake on the Stanton bank with 90-100 mm mesh. This fleet has declined in numbers in recent years.

The larger Scottish trawlers and Irish trawlers fish for haddock at Rockall when opportunities arise for good catches from the Division VIIb stock. Vessels from the Russian Federation have fished for haddock and other demersal species at Rockall since 1999 when part of the Bank was designated as being in international waters. Although young saithe are caught by coastal trawlers in Sub-area VI, the fishery for saithe essentially takes place on the shelf edge to the west and northwest of Scotland. Traditionally, this fishery has largely been operated by the larger deep-sea French trawlers. However, the number of these vessels has declined in recent years. Since the late 1980s, some of these vessels diverted their activity toward deep-sea species, notably orange roughy, and some medium-sized trawlers also participate in the fishery for deep-sea species during summer in some years.

The pelagic fishery for herring is mainly operated by UK, Dutch, and German vessels in the north, and by Irish vessels in the south. Substantial misreporting of catches from the North Sea and between the northern and southern stocks occurred in the past, but UK licensing regulations are thought to have reduced misreporting since 1997. In recent years TACs for the northern stock have not been restrictive, presumably because of low effort and a weak market. The Clyde herring fishery has declined sharply in recent years as the stock has suffered from a series of low recruitments. Recent TACs have not been taken and the catches have been less than 1 000 t since 1991.

There is a directed trawl fishery for mackerel and horse mackerel in the area. The mackerel fishery mainly takes place in the fourth and first quarter of the year, when the mackerel is returning from the feeding area to the spawning area. The horse mackerel is mainly fished in the second half of the year. In addition, there are fisheries for blue whiting in the area.

The industrial fisheries in Division VIa are much smaller than in the North Sea. The Scottish sandeel fishery started in the early 1980s, peaking in 1986 and 1988. It is irregular, depending on the availability of the resource and of processing facilities at Shetland, Denmark, and the Faroes. Bycatches in this fishery are very small. The Norway pout fishery is conducted mainly by Danish vessels.

Data

The biological data available from scientific sources for the assessment of roundfish, flatfish, herring, mackerel and *Nephrops* in Division VIa are relatively good. The level of biological sampling of most of the commercial landings has been maintained or improved with the recent introduction of the Data Collection Regulation (EC 1543/2001). Discard data are only used directly in assessments for *Nephrops* and whiting. Discard data are available for some UK and Irish fleets but are currently not used in many assessments because of short or incomplete time-series and concerns about precision of the estimates.

Several series of research vessel survey indices are available for most species. Otter-trawl surveys are presently

undertaken in Division VIa by UK(Scotland) and Ireland. The UK(Scotland) also conduct a number of underwater television surveys for *Nephrops* in VIa. A survey is also conducted at Rockall by UK(Scotland) every two years. Analytical assessments were performed on cod, haddock, whiting, *Nephrops* and herring. Multispecies considerations are not incorporated in the assessments or the forecasts for the stocks in Subarea VI. The advice for many of the demersal stock is given in a mixed fisheries context, see below.

Overview of the resources

The assessments of demersal and herring stocks in Subarea VI continued to be hampered by the poor quality of catch data due to mis- and non-reporting. Quantities misreported during 1992-1995 were estimated for Division VIa cod, and estimates of area misreporting since 1987 were made for anglerfish and megrim. The distribution of reported catch data were also examined to estimate the likely extent of misreporting of herring between the North Sea and Division VIa North.

It is likely that the stocks of **haddock, saithe, anglerfish, and megrim** in Division VIa are closely related to those of the same species in the North Sea. The saithe stock is assessed as part of the North Sea stock, and the pattern of haddock recruitment in the two areas is very similar. The assessment of anglerfish now treats the catches from Division VIa and the North Sea as coming from a single stock.

Cod and whiting in Subarea VIa are outside safe biological limits and ICES advice that no fishing on the cod should be allowed.

The stock of **cod** is outside safe biological limits and the spawning stock sizes in 2001 and 2002 are the smallest recorded. Analysis indicates that with the current rates of exploitation it is very unlikely to achieve safe limits in the medium-term.

The **haddock** spawning stock in Division VIa fell below B_{pa} in 1999 and 2000, but has increased above B_{pa} from 2001 onwards because of a very strong 1999 year class. Fishing mortality has been above F_{pa} in every year since 1987, but has declined in recent years and is in 2002 estimated to be below F_{pa} . The spawning biomass in Division VIIb, as measured by survey based indices, indicate that the stock was at a historical low in 2002, but may have increased in 2003.

The **whiting** stock in Division VIa is outside safe biological limits. Spawning biomass has been below B_{pa} since 1995 whilst fishing mortality has been above F_{pa} in all years since 1983.

The **Northern hake** stock is discussed fully in Section 3.12.2. It is important to note that this species is taken by most of the demersal fleets in this area. This hake stock is outside safe biological limits, and a rebuilding plan is needed in order to rebuild the SSB.

Fishing mortality on **anglerfish** is above F_{pa} . The fish are exploited at an early age due to their size and shape, and are subject to considerable fishing mortality prior to first maturity. The expansion of this fishery has been further accelerated by the diversion of fishing effort from other stocks subject to more restrictive quotas in recent years and by market opportunities. Trends in fishing mortality on megrim are poorly defined, and high rates of discarding have been observed in some fisheries. Megrim is taken as a bycatch in the anglerfish fishery and show similar trends in landings to anglerfish. Recent studies have shown that male megrims attain a much smaller maximum size than females which consequently make up the bulk of the landed catch.

The assessment of the stock of **herring** in Division VIa North is less uncertain than in previous years, reflecting the stability of the input data over the last two or three years. The fishing mortality is at present considered to be low. SSB is believed to have risen recently due to a good year class that entered the fishery in 2001 and an increase in the proportion mature. However, reference points have not been set so far. The state of the herring stock in Division VIa South is uncertain and the fishery appears to be dependent on occasional strong year classes. There are indications that this stock may have declined considerably in recent years, and that levels of fishing mortality may be comparatively high. There is evidence that the Clyde herring stock remains low.

When last assessed (in 1996) the level of exploitation on **sandeel** was moderate and the SSB of this stock appears to be high. The stock is, however, subject to large variations depending on recruitment. Precautionary management has been put in place on a three-year basis, including a TAC and fishery closures after 31 July each year, in order to reduce the interaction with breeding seabirds.

The fisheries for **mackerel** and **horse mackerel** exploit the southern and western components of mackerel and the western horse mackerel stock. Information on these widely distributed stocks is presented in Section 3.12. The mackerel stock is harvested outside safe biological limits: the spawning biomass is well above B_{pa} , but fishing mortality is above F_{pa} . Following the outstanding 1982 year class of horse mackerel, which for more than a decade contributed a significant part of the catches, recruitment of horse mackerel has been weak. SSB is bound to be low as this year class is fished out, and the sustainable yield is unlikely to be higher than about 130 000 t per year.

The **Nephrops** stocks are assessed every two years. The overall catches of **Nephrops** from Division VIa North have remained stable since the mid-1980s, and catch-rates of the different stocks have fluctuated without trend.

ICES ADVICE

3.7.1

Advice on demersal fish stocks in Division VIa

(Cod, Whiting, Haddock, *Nephrops*, Plaice, and Sole)

ICES first establishes limits for the exploitation of each species on basis of its status, consistent with the Precautionary Approach. However, demersal fisheries in the Irish Sea are mixed fisheries, with many stocks exploited together in various combinations in different fisheries. In these cases management advice must consider both the state of individual stocks and their simultaneous exploitation in demersal fisheries. Stocks in the poorest condition, particularly those outside safe biological limits, necessarily become the overriding concern for the management of mixed fisheries where these stocks are exploited whether as a targeted species or as a bycatch.

As trends in stocks of various species are generally not in synchrony, advice provided on the basis of the status of individual species may result in advised fishing mortalities for a group of co-harvested species that cannot be realized simultaneously within the context of mixed fisheries. Stocks in need of special conservation efforts, such as those affected by recovery plans, present particularly difficult challenges. For instance, the reduction of fishing mortality (and effort) required for cod, makes it very unlikely that TACs which would be sustainable for healthier stocks in the mixed fisheries could be taken. The needs of the stock (s) under recovery plans could be met most directly by simply setting the TACs for all species in mixed fisheries to correspond to the fishing mortality intended for the species under recovery plans, which would result in large foregone yield in many healthier stocks. The foregone yield could be reduced somewhat if effort could be adjusted on a fleet-by-fleet basis to comply with the total fishing mortality in the proposed recovery plan while allowing as much harvesting of other species as possible. However, such an approach requires reliable information on the catch-at-age for all species in all fisheries, and is still likely to leave substantial potential harvestable biomass of several species unavailable to any fishery.

ICES Advice regarding the management of demersal fisheries in the Subarea VI:

The above table identifies the stocks outside safe biological limits, i.e. cod in Division VIa, Northern Hake and whiting in Division VIa. Also, anglerfish in Subarea IV and Subarea VI is harvested outside safe biological limits. Furthermore, Haddock in Division VIb is at a historical low level. These stocks are the overriding concerns in the management advice of all demersal fisheries:

- for cod stock in Division VIa ICES recommends a zero catch;
- for hake the fishing should be restricted within a recovery plan. Such a plan should cover all areas and fisheries in which Northern hake is fished;
- for anglerfish and whiting the fishing mortality stocks fishing should be restricted within F_{pa} ;

- for haddock in VIb the catches should be reduced to the lowest possible level.

Demersal fisheries in Subarea VI should in 2004 be managed according to the following rules which should be applied simultaneously:

They should fish:

- **without catch and discards of cod in Subarea VI;**
- **in accordance with a recovery plan for northern hake or within an effectively implemented TAC for hake covering all areas where northern hake is caught;**
- **within the biological exploitation limits for all other stocks (see table above);**
- **no directed fishery for haddock in Division VIb;**
- **substantially reduce catches of hake in accordance with a recovery plan or such that the total catch of hake is less than 13 800 t over the distributional area of the stock.**

Furthermore, unless ways can be found to harvest species caught in a mixed fisheries within precautionary limits for all those species individually then fishing should not be permitted.

ICES notes that a recovery plan for cod is in preparation. ICES evaluates this proposal in Chapter 9.

Relevant factors for management:

ICES notes that this advice presents a strong incentive to fisheries to avoid catching species outside safe biological limits. Industry-initiated programs to pursue such incentives should be encouraged, but must include a high rate of independent observer coverage, or other fully transparent methods for ensuring that their catches of species outside safe biological limits are fully and credibly reported. Such programs could be considered in management of these fisheries.

On a single-species basis, reductions in fishing mortalities have been advised for several stocks which are outside safe biological levels. Fishing mortality is generally high and reached in recent years for most stocks their highest recorded values. The observed declines in SBB below precautionary levels are a clear indication of excessive effort. This, and the poor performance of TACs, as implemented, in reducing fishing mortality, leads ICES to reiterate that the required reductions in fishing mortality can only be achieved if significant reductions in effort are included in management, and effective deterrents to discarding are implemented. Extensive discarding occurs in most fisheries on roundfish, anglerfish and *Nephrops* in the west of Scotland. These discards are largely small and juvenile fish. They always result in foregone potential yield, and for depleted stocks they are a serious impediment to rebuilding.

Roundfish are caught in otter trawl and seine fisheries, with a 120 mm minimum mesh size that comprise mixed demersal fisheries with more specific targeting of

individual species in some areas and/or seasons. Cod, haddock and whiting form the predominant roundfish catch in the mixed fisheries, although there can be important bycatches of other species, notably saithe and anglerfish in the in deeper water and of *Nephrops* on the more inshore *Nephrops* grounds. Static gear fisheries with mesh sizes generally in excess of 140 mm are also used to target cod. Saithe are mainly taken in a directed trawl fishery in deeper water along the shelf in Subarea VI. There is thought to be little bycatch of other demersal species associated with the directed fishery.

Large *Nephrops* fisheries take place in discrete areas that comprise appropriate muddy seabed sediment. Targeted *Nephrops* fisheries on these grounds are taken predominantly in trawls with mesh sizes of less than 100 mm using single- or multiple-rig trawls. *Nephrops* fishing grounds are mainly inshore grounds although there are smaller offshore fisheries at Stanton Bank and west of the Hebrides. The bycatch and discarding of other demersal species associated with *Nephrops*, the general nature of these fisheries and their bycatch can vary widely.

There are trawl and gillnet fisheries targeting hake and anglerfish and otter trawl fisheries targeting hake, megrim and anglerfish in Subarea VI. The catch of other demersal species associated in these fisheries is uncertain. Management of these fisheries needs to include provisions to substantially reduce catches of hake such that the total catch of hake is less than 13 800 t over the distributional area of the stock.

There is an international fishery targeting haddock, grey gurnards and other species at Rockall using small mesh. Management of this fishery should take into account the stringent advice for haddock in VIb.

West of Scotland Cod

(Division VIa)

For latest information, see: <http://www.ices.dk>



Fisheries Science Services

FSS - SINGLE STOCK CONSIDERATIONS

(See West of Scotland and Rockall Overview for mixed fishery advice).

ICES classifies this stock as being outside safe biological limits based on the most recent estimates of biomass, fishing mortality and recruitments.

FSS considers that a recovery plan which ensures a safe and rapid rebuilding of SSB to levels above B_{pa} should be implemented. Such a recovery plan must include a provision for zero catch until the estimate of SSB is above B_{lim} or other strong evidence of rebuilding is observed.

In 2004 such a recovery plan would imply zero catch. FSS recognise that the 'zero catch option' for cod would effectively mean a closure of the mixed demersal fishery in the west of Scotland. FSS considers that an industry initiated programme aimed at reducing cod catches to 'close to zero' should be considered in the management of West of Scotland fisheries. Industry initiated programmes should be encouraged but must include a high rate of independent observer coverage or other totally transparent methods for ensuring that their catches of species outside safe biological limits are fully and credibly reported.

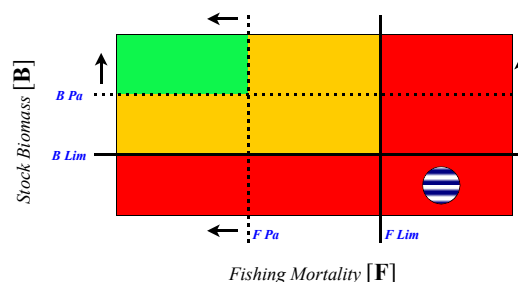
FSS consider that time and area closures (in line with the Greencastle project) may be a tool in rebuilding this stock.

FSS consider that a well defined 'management plan' is necessary to recover the cod stock and to fish it sustainably once it has recovered. FSS note that this stock has declined to such a low state that recruitment has been impaired and the dynamics of the stock is now unknown. It is not possible to predict a recovery time frame with any degree of acceptable uncertainty. FSS considers that the proper definition and evaluation of all métiers involved in the fishery is crucial to this management plan.

FSS consider that the required reductions in F can only be achieved if reductions in effort and effective deterrents to discarding are implemented in the management of west of Scotland fisheries. FSS note that ICES have consistently advised for reductions in effort since 1991.

STATE OF THE STOCK

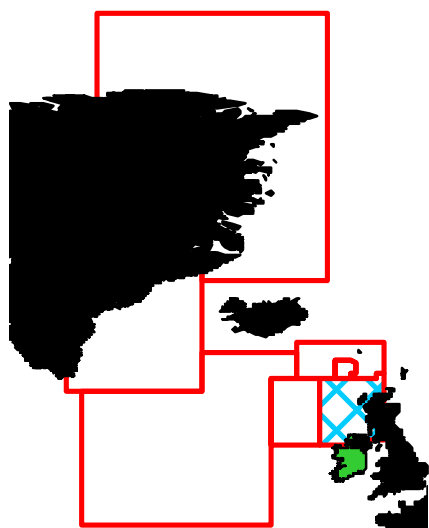
State of the Stock in relation to the precautionary reference points (see page 18)



- There are very serious concerns about the state of this stock which is below B_{lim} and at the lowest observed level.
- Fishing mortality has been above F_{pa} in all years since 1976 and above F_{lim} from 1983 to 2002.
- SSB has been declining since the early 1980s and the estimate for 2002 is the lowest recorded, well below B_{pa} (22,000 t) and B_{lim} (14,000 t).
- In the last 11 years, all year classes have been below average and the seven poorest year classes have been produced since 1995. At the rate of exploitation estimated for recent years, SSB will remain at sizes where the risk of continued poor recruitment is high. At levels of SSB less than B_{lim} there is evidence of reduced recruitment.
- Short-term predictions indicate a decline in SSB (for status quo F during 2003 & 2004, SSB is predicted to decline to 1,800 t).

CURRENT MANAGEMENT

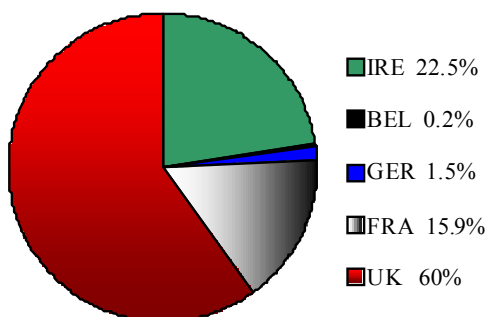
- The TAC Area covers Sub-areas Vb, VI, XII and XIV, with a further restriction on the TAC in Vb and VIa. The assessment covers VIa only. FSS considers that the management area should correspond to the assessment area.
- The 2003 TAC was 1,808 t for Sub-areas Vb, VI, XII and XIV (within which no more than 1,575 t may be taken in Vb and VIa. The Irish quota was 407 t for Sub Areas Vb, VI, XII and XIV (further restricted to no more than 354 t in Vb and VIa).
- Emergency measures (closed area and season) were enacted by the EU in 2001. Some of these have been continued through 2002 and 2003, while new measures have been added.
- In addition, an effort reduction to 16 days at sea per month has been imposed since February 2003.
- FSS recommends that management objectives be established and that a management plan be developed and



Red Boxes-TAC/Management Areas Blue Shading- Assessment Area

implemented for fisheries catching cod.

- Mesh size and days at sea management regulations are summarised in the west of Scotland and Rockall overview for mixed fishery advice.
- The minimum landing size for cod in the human consumption fishery in this area is 35-cm.



FSS – ECONOMIC COMMENTS

- The value of the 2002 Irish quota was about €0.9m.
- The value of the 2002 Irish landings was about €0.5m.
- This was a very valuable fishery during the 1980s but since then the economic importance has declined.

ADDITIONAL INFORMATION

1. The assessment is based on catch-at-age (landings and discards) and survey CPUE data and is considered to be reasonable.
2. The Irish landings in 2002 of 210 t (estimated), is the lowest in the long time series. 350 t. International landings have declined since 1988 to an all-time low of 2,230 t in 2002. From 1966-1989 the stock sustained landings averaging about 17,000 t.
3. The quantities of fish mis-reported during 1992-1995 are estimated in the assessment, but the true quantities caught in those years remain uncertain. The level of misreporting since then is unknown.
4. The fishery is dominated by the UK (Scotland) fleet using towed gears and by the Irish and French bottom trawl fleets. Scottish trawl effort declined to a very

low level in 1994 but has since risen to levels of the late 1980s and early 1990s. A considerable increase in effort was observed in the late 1990's as new larger vessels capable of fishing deeper waters have entered the fleet. The French fishery is a saithe directed fishery with a by-catch of cod.

5. Demersal trawlers from Killybegs and Greencastle have traditionally undertaken the Irish cod fishery. There have been considerable changes in the fleet composition in recent years.
6. Irish Sampling of this stock is supported through the EC funded sampling programme that is required under Data Collection Regulations 1543/2000 and 1639/2001. FSS sampling indicates that 1 and 2 year old fish, most of which are immature, comprise about three-quarters of the Irish landings. The lack of older fish in the landings is interpreted as a further indication of the poor state of the stock.
7. FSS commenced a groundfish survey off Donegal in 1993. The survey has produced very poor catches of cod, indicating the poor state of the stock. FSS groundfish survey data was used by the 2002 Working Group and was found to perform consistently with other survey data.
8. The proportion of fish discarded has been high. Regulations to improve the exploitation pattern of cod have been taken in 2002 and 2003. It is currently too early to evaluate their actual benefit of these measures to the stock and fishery.
9. Emergency measures have been in place over the period for which *status quo* fishing mortality is calculated, and are therefore considered to be included within *status quo* forecasts.
10. FSS are concerned that the controlled areas were not defined for the purposes of regulating fishing effort on the cod stock in this area and that no measure was applied to regulate effort displaced during the period of the control. It is unlikely that the controlled areas in Division VIa will significantly have affected fishing mortality on cod.
11. FSS are also concerned that industrial fisheries which are largely unregulated continue to operate in Division VI with the potential to take large numbers of juvenile cod.
12. In 2003, FSS commenced a project in Greencastle to examine seasonal closures of juvenile cod areas as a means of protecting juvenile cod. The project will also tag cod to examine the movement of juvenile cod in the area. In May 2003, FSS carried out a larval survey in the southern part of Division VIa. This project specifically examined the abundance and distribution of larval cod. The results will be available in late 2003.

ICES ADVICE

3.7.2.a

State of stock/exploitation:

Based on the most recent estimate of the biomass ICES classifies the stock as being outside safe biological limits. Fishing mortality has been above F_{pa} in all years since 1976

and above F_{lim} from 1983 to 2000. SSB has been declining since the early 1980s and the estimate for 2002 is the lowest recorded, well below B_{pa} and B_{lim} . At the rate of exploitation estimated for recent years, SSB will remain at sizes where the risk of continued poor recruitment is high. In the last ten years, only one year class has been above average and the seven poorest year classes have been produced since 1995.

Management objectives:

Due to the poor state of the cod stock in Division VIa, emergency measures (closed area and season) were enacted by the EU in 2001. Some of these have been continued through 2002 and 2003, while new measures have been added. In addition, an effort reduction to 16 days at sea per month has been imposed since February 2003.

Precautionary Approach reference points (established in 1998):

ICES considers that:	ICES proposes that:
B_{lim} is 14 000 t.	B_{pa} be set at 22 000 t. This is considered to be the minimum SSB required to ensure a high probability of maintaining SSB above B_{lim} , taking into account the uncertainty of assessments. This also corresponds with the lowest range of SSB during the earlier, more productive, historical period.
F_{lim} is 0.8. Fishing mortalities above this have historically led to stock decline.	F_{pa} be set at 0.60. This F is considered to have a high probability of avoiding F_{lim} .

Technical basis:

B_{lim} = smoothed estimate of B_{loss} (as enumerated in 1998).	B_{pa} = previously set at 25 000 t at which good recruitment is probable. Reduced to 22 000 t due to an extended period of stock decline.
F_{lim} = F 's above 0.8 have led to stock decline in the early 1980s.	F_{pa} consistent with B_{pa} .

Single-Stock Exploitation Boundaries:

Given the very low stock size, the recent poor recruitments and the continued high fishing mortality, a recovery plan which ensures a safe and rapid rebuilding of SSB to levels above B_{pa} should be implemented. Such a recovery plan must include a provision for zero catch until the estimate of SSB is above B_{lim} or other strong evidence of rebuilding is observed. In 2004 such a recovery plan would imply zero catch.

The advice on the exploitation of this stock in 2004 is presented in the context of mixed fisheries and is found in Section 3.7.1.

Recovery Plan:

ICES evaluated a recovery plan proposal from the European Commission (Chapter 10).

Relevant factors to be considered in management:

Although large short-term losses will be incurred in many Division VIa fisheries, the advised measures are required if the cod stock is to reach a level where it can regain historic productivity. The advice will likely result in greatly reduced harvesting of other stocks where the fisheries take cod as

part of a mixed species fisheries, particularly haddock and whiting. However, the current state of the cod stock, and the failure of past measures to bring fishing mortality down to rates that allow rebuilding, mean that more stringent action is required.

Time and area closures for particular fisheries may be a tool in rebuilding this stock. The consequence of displacing effort, caused by the closures, needs to be considered in determining the role of such measures in the recovery plan. Emergency EU measures were established in the first half of 2001 and led to short-term area closures in the north of the Division and, on a smaller scale, in the Clyde Sea area. The Clyde closure continued in 2002 and 2003 under national UK legislation. These measures have been in place over the period for which *status quo* F is calculated, and are therefore considered to be included within *status quo* forecasts.

The proportion of discarded fish has been high. Regulations to improve the exploitation pattern of cod have been taken in 2002 and 2003. It is currently too early to evaluate the actual benefit of these measures to the stock and fishery.

Even with no directed harvest or bycatch of cod in 2003, SSB is forecasted in the short term to remain below B_{pa} and B_{lim} . All possible measures should be considered for implementation in the recovery plan. Fishing effort displaced due to the cod recovery plan in Division VIIa, should not be permitted to target cod in Division VIa, or any other stocks considered to be outside safe biological limits.

Cod is taken with whiting and haddock in a mixed demersal fishery. *Nephrops* trawlers take a bycatch of cod. Management needs to take this into account.

Catch forecast for 2004:

Basis: $F(2003) = F_{sq} = F(2002) = 1.01$; Catch (2003) = 2.239; Landings (2003) = 2.085; SSB(2004) = 2.17.

F(2004 onwards)	Basis	Catch (2004)	Landings (2004)	Discard (2004)	SSB (2005)
0	$0 * F_{sq}$	0	0	0	4.6
0.20	$0.2 * F_{sq}$	0.533	0.503	0.030	3.8
0.40	$0.4 * F_{sq}$	0.973	0.917	0.056	3.1
0.60	$F_{pa}=0.6 * F_{sq}$	1.337	1.258	0.079	2.6
1.01	$1.0 * F_{sq}$	1.893	1.775	0.118	1.8

Weights in '000 t.

Shaded scenarios considered inconsistent with the precautionary approach.

Medium- and long-term projections:

Short-term projections indicate little chance of improvement in SSB. Medium-term analyses indicate that with the current rates of exploitation, there remains a high probability that it will remain below B_{lim} .

Comparison with previous assessment and advice:

The estimate of F for 2001 is 74% higher, and SSB in 2002 66% lower, than that given in last year's assessment. The previous assessment was based on landings only, this year discard estimates have been included. Previous assessments of this stock have shown a tendency to underestimate fishing mortality and overestimate SSB, and the inclusion of discards has not eliminated this problem. The basis for the advice is the same as last year.

Elaboration and special comment:

Short-term projections assuming a reduction of fishing mortality in recent years also indicate that with zero catches the stock will still remain below B_{lim} .

The cod in Division VIa are not fully mature until at age 4. Taken together with high fishing mortality this means that a low proportion of fish survive to maturity, which increases the likelihood of poor recruitment.

The analytical assessment is based on landings-at-age, discards-at-age, and survey CPUE data. The quantities of fish mis-reported during 1992–1995 are estimated in the assessment, but the true quantities caught in those years remain uncertain. The quality and reliability of the landings-at-age data are uncertain, and there are conflicting signals in survey and landings data. Since effort data are unreliable commercial CPUE data are not used as tuning inputs.

Source of information:

Report of the Working Group on the Assessment of Northern Shelf Demersal Stocks, May 2003 (ICES CM 2004/ACFM:01).

Yield and spawning biomass per recruit

F-reference points:

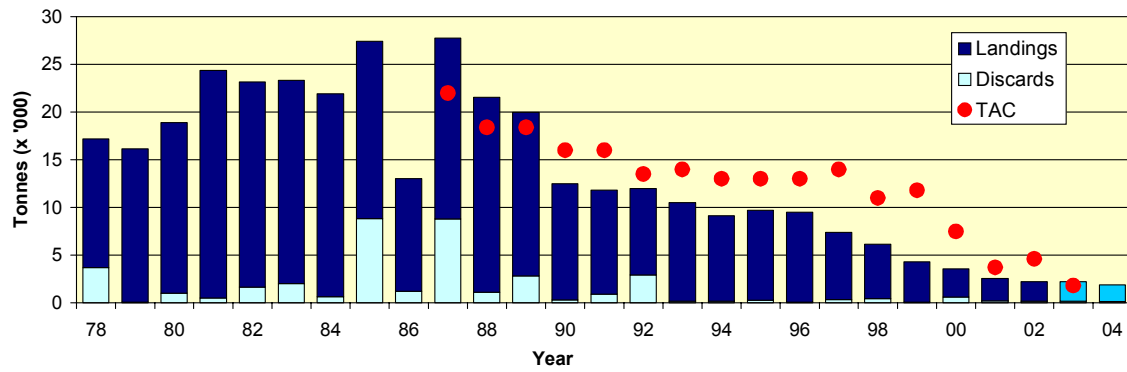
	Fish Mort	Yield/R	SSB/R
	Ages 2-5		
Average last 3 years	1.069	0.751	0.787
F_{max}	0.233	1.445	7.192
$F_{0.1}$	0.151	1.368	10.407
F_{med}	0.761	0.951	1.437

Catch data (Tables 3.7.2.a.1-2):

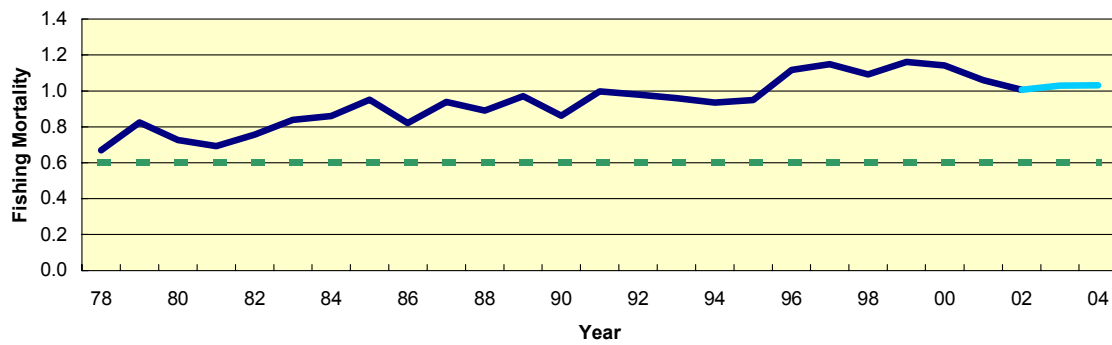
Year	ICES advice	Single-stock exploitation boundaries	Predicted catch corresp. to advice	Predicted catch correspondin g to single- stock boundaries	Agreed TAC ¹	Official landings	ACFM landings
1987	Reduce F towards F_{max}		18.0		22.0	19.2	19.0
1988	No increase in F; TAC		16.0		18.4	19.2	20.4
1989	80% of F(87); TAC		16.0		18.4	15.4	17.2
1990	80% of F(88); TAC		15.0		16.0	11.8	12.2
1991	70% of effort (89)		-		16.0	10.6	10.9 ²
1992	70% of effort (89)		-		13.5	9.0	9.7 ³
1993	70% of effort (89)		-		14.0	10.5	11.8 ³
1994	30% reduction in effort		-		13.0	9.1	10.8 ³
1995	Significant reduction in effort		-		13.0	9.7	9.6 ³
1996	Significant reduction in effort		-		13.0	9.6	9.4
1997	Significant reduction in effort		-		14.0	7.0	7.0
1998	20% reduction in F		9.5 ⁵		11.0	5.7	5.7
1999	F reduced to below F_{pa}		<9.7 ⁵		11.8	4.3	4.2
2000	Recovery plan, 60 % reduction in F		<4.2		7.48	2.8 ⁴	3.0
2001	Lowest possible F, recovery plan		-		3.7	2.5	2.3
2002	Recovery plan or lowest possible F		-		4.6	2.0	2.1
2003	Closure		-		1.81		
2004	⁶	Zero catch	⁶	0			

¹TAC is for the whole of Subareas Vb1, VI, XII and XIV. ²Not including misreporting. ³Including ACFM estimates of misreporting. ⁴Incomplete data. ⁵For VIa only. ⁶Single-stock boundary and the exploitation of this stock should be conducted in the context of mixed fisheries protecting stocks outside safe biological limits. Weights in '000 t.

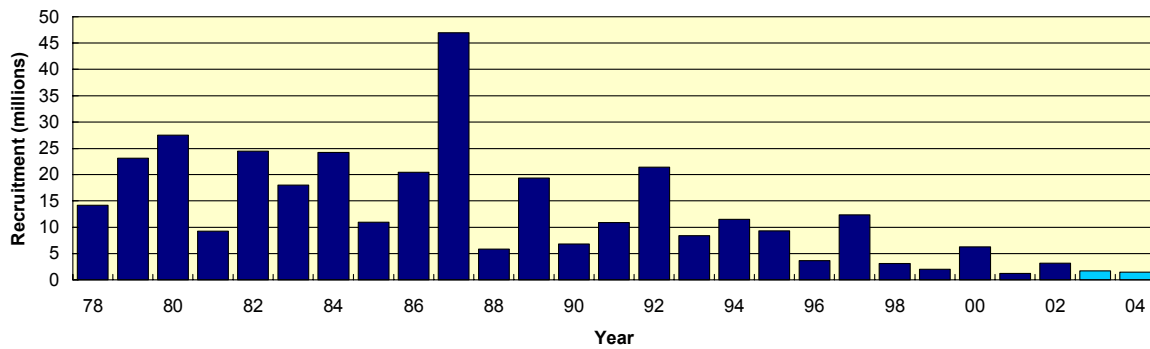
Cod V1a - Landings & Discards
Mean = 12.7



Cod V1a - Fishing Mortality
Mean = 0.93



Cod V1a - Recruitment (Age 1)
Mean = 13.8



Cod V1a - Spawning Stock Biomass
Mean = 18.1

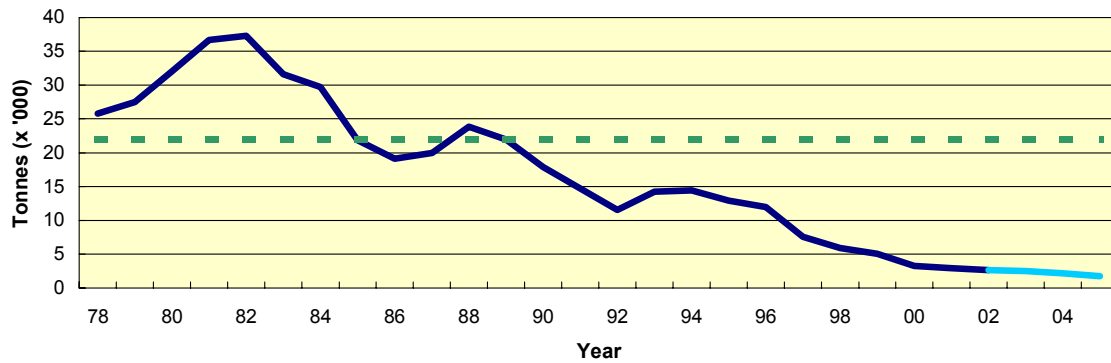


Table 3.7.2.a.1. Cod in Division VIa. Official catch statistics in 1984–2002, as reported to ICES.

Country	1984	1985	1986	1987	1988	1989	1990	1991	1992	1993
Belgium	22	48	88	33	44	28	-	6	-	22
Denmark	-	-	-	4	1	3	2	2	3	2
Faroe Islands	-	-	-	-	11	26	-	-	-	-
France	7,637	7,411	5,096	5,044	7,669	3,640	2,220	2,503	1,957	3,047
Germany	75	66	53	12	25	281	586	60	5	94
Ireland	2,316	2,564	1,704	2,442	2,551	1,642	1,200	761	761	645
Netherlands	-	-	-	-	-	-	-	-	-	-
Norway	231	204	174	77	186	207	150	40	171	72
Spain	64	28	-	-	-	85	-	-	-	-
UK (E., W., N.I.)	724	260	160	444	230	278	230	511	577	524
UK (Scotland)	9,483	8,032	4,251	11,143	8,465	9,236	7,389	6,751	5,543	6,069
UK										
Total landings	20,552	18,613	11,526	19,199	19,182	15,426	11,777	10,634	9,017	10,475
Unallocated landings	720	-6	294	-229	1,231	1,743	399	293	69	-161
Discards as used by W.G.	636	8,825	1,200	8,788	1,133	2,818	314	910	2,902	185
Landings as used by W.G.	21,272	18,607	11,820	18,971	20,413	17,169	12,176	10,927	9,763 ¹	11,778 ¹
Total catches as used by W.G.	21,907	27,432	13,020	27,758	21,546	19,987	12,490	11,836	11,989	10,499

Country	1994	1995	1996	1997	1998	1999	2000	2001	2002
Belgium	1	2	+	11	1	+	+	2	+
Denmark	+	4	2	-	-	+	-	-	-
Faroe Islands	-	-	-	-	-	-	-	-	-
France	2,488	2,533	2,253	956	714*	842* ²	236	424*	234
Germany	100	18	63	5	6	8	6	4	+
Ireland	825	1,054	1,286	708	478	223	357	319	
Netherlands	-	-	-	2	1	-	-	-	-
Norway	51	61	137	36	36	79	114*	40*	89
Spain	-	16	+	6	42	45	14	3	
UK (E., W., N.I.)	419	450	457	779	474	381	280	138	...
UK (Scotland)	5,247	5,522	5,382	4,489	3,919	2,711	2,057	1,544	...
UK									1,704
Total landings	9,131	9,660	9,580	6,992	5,671	4,289	2,767	2,474	2,027
Unallocated landings	-203	-222	-153	42	43	-88	210	-127	36
Discards as used by W.G.	186	258	86	354	418	88	605	209	167
Landings as used by W.G.	10,806	9,600 ¹	9,427	7,034	5,714	4,201	2,977	2,347	2,063
Total catches as used by W.G.	9,114	9,697	9,513	7,387	6,131	4,289	3,582	2,556	2,230

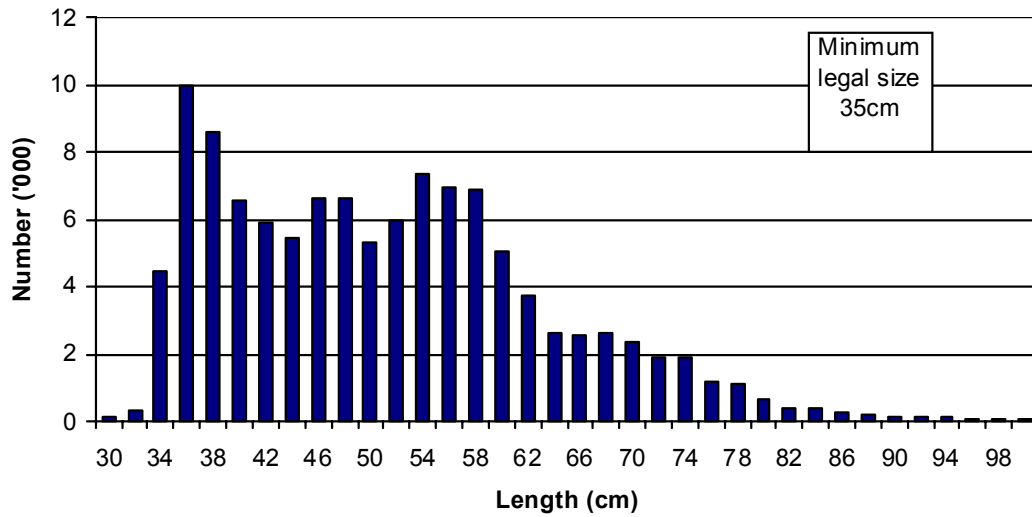
* Preliminary.

¹ Estimated by TSA (2003 Working Group meeting).² Preliminary data taken from EU reporting form.

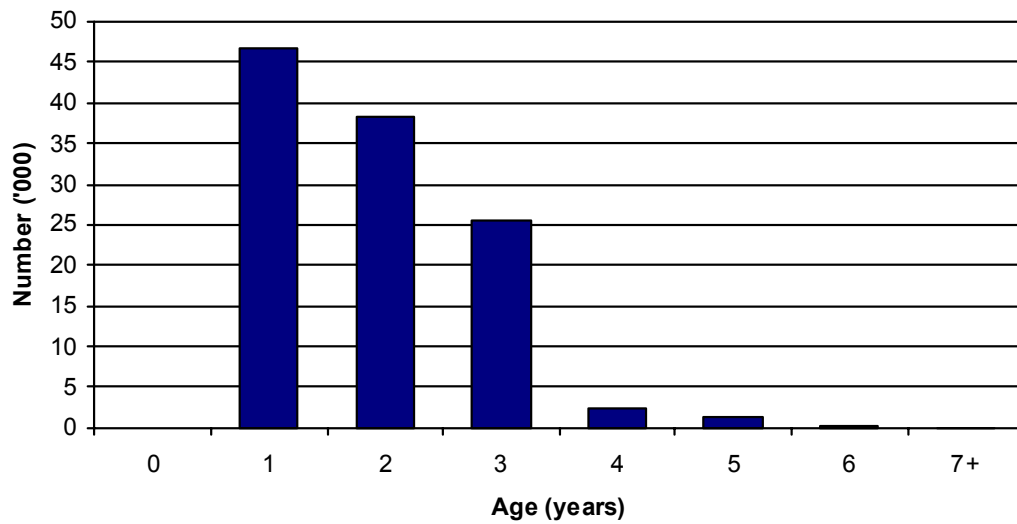
Table 3.7.2.a.2 Cod in Division VIa (West of Scotland).

Year	Recruitment Age 1 thousands	SSB tonnes	Landings tonnes	Mean F Ages 2-5
1978	14172.9	25780	17201.3	0.6692
1979	23075.3	27497	16142.7	0.8238
1980	27541.1	32048	18874.7	0.7258
1981	9305	36690	24384.3	0.6919
1982	24464.9	37294	23164.7	0.7568
1983	17994.5	31647	23324.7	0.8389
1984	24221.7	29720	21907.1	0.8596
1985	10945.8	21852	27431.7	0.9508
1986	20434.8	19124	13019.9	0.8207
1987	46975	19983	27758	0.9381
1988	5844	23848	21546	0.8914
1989	19342.4	21973	19987.3	0.9713
1990	6829	17877	12490	0.8621
1991	10900	14707	11836	0.9965
1992	21422.5	11538	11988.6	0.9804
1993	8401	14273	10499	0.9595
1994	11502	14436	9114	0.9357
1995	9329	12921	9697	0.9488
1996	3634	11989	9513	1.1153
1997	12359	7538	7387	1.1504
1998	3146	5915	6131	1.0918
1999	2056	5044	4289	1.1606
2000	6276	3263	3582	1.1408
2001	1226	2930	2556	1.0590
2002	3180	2624	2230	1.0064
2003	1729	2471		
Average	13319	17499	14242	0.9338

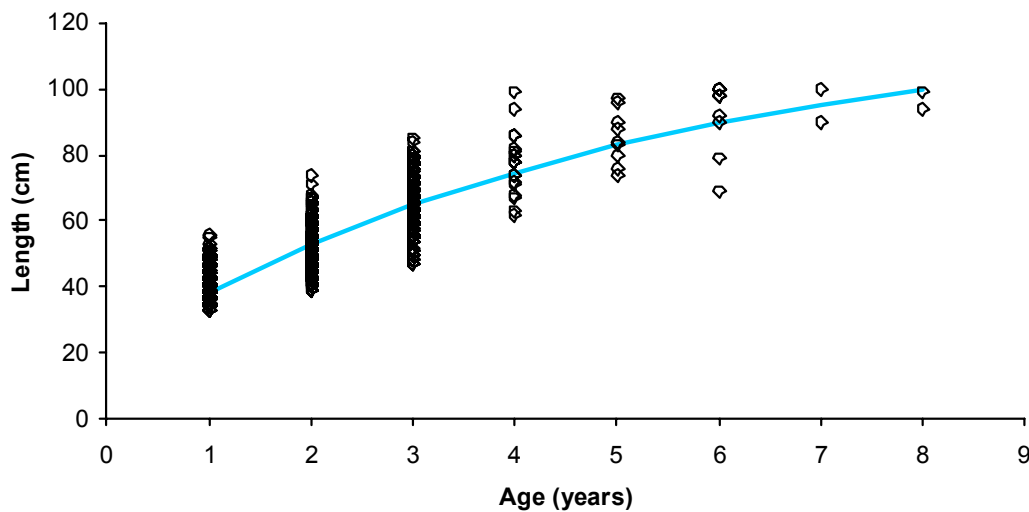
2002 Length Distribution: Irish Landings, Cod in Vla



2002 Age Distribution: Irish Landings, Cod in Vla



2002 Size at Age: Irish Sampling, Cod in Vla



Rockall Cod

(Division VIb)

For latest information, see: <http://www.ices.dk>



Fisheries Science Services

FSS – SINGLE STOCK CONSIDERATIONS

(See West of Scotland and Rockall Overview for Mixed Fishery Advice)

The status of the cod population in this area is unknown.

FSS notes that the STECF and ICES advice for Rockall and West of Scotland fisheries is predicated primarily on the need to rebuild haddock and cod stocks. FSS endorses this approach as being consistent with the precautionary approach to fisheries management.

FSS point out that Irish vessels catch cod at Rockall in mixed fisheries mainly targeting haddock. FSS point out that an industry initiated programmes aimed at reducing catches of Haddock (VIb) should be considered in the management of mixed fisheries at Rockall. Industry initiated programmes should be encouraged but must include a high rate of independent observer coverage or other totally transparent methods for ensuring that their catches of species outside safe biological limits are fully and credibly reported.

FSS considers that the precautionary TAC for VIb Cod should be set close to recent average landings. This translates to a TAC of 630 t (based on average landings 1999-2001) and an Irish quota of 142 t. Since the TAC is set for Sub-area VI and any catches of cod set for Division VIb should not jeopardise a rebuilding plan for cod in Division VIa. However, the mixed fisheries advice given for fisheries at Rockall and particularly in relation to the Haddock stock will determine the TAC for Cod.

FSS considers that a separate TAC, applicable only to Division VIb, and including international waters, is required to improve management of the fishery in Division VIb. FSS notes that the implementation of its advice is complicated by the international nature of the fishery and therefore suggests that management of this stock should be by international agreement.

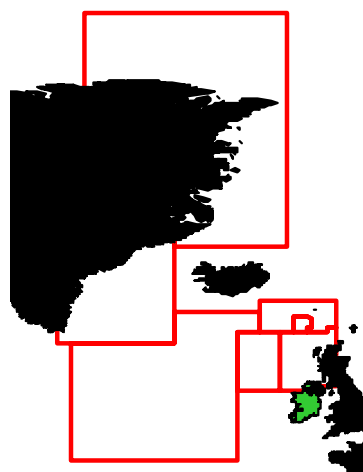
TAC Area	TAC 2003	Proposed TAC 2004	Basis
VIa		0	Assessment
VIb		630*	Average landings (1999-2001)
Total TAC	1,808	630	
Irish quota	407	142	

STATE OF THE STOCK

- There is no ICES assessment for this stock.
- There is no information on the status of Division VIb cod.
- Landings have been less than 1,000 t since 1996. Landings in 2001 the last year with complete data were estimated to be 409 t.

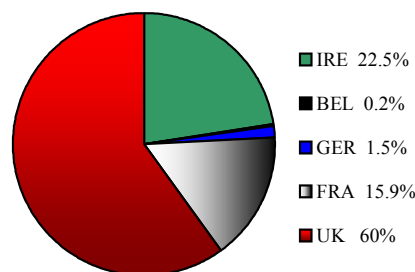
CURRENT MANAGEMENT

- The TAC Area covers Sub-areas, VI, XII, and XIV and division VIb.



Red Boxes-TAC/Management Areas

- Due to the rapid decline in cod catches in Division VIa the official landings reported from VIb now accounts for about 25 % of the catch in Sub-area VI.
- The TAC allocated to this stock in 2003 was 1,808 t. The Irish quota was 407 t.



- There are no explicit management objectives or plans for this stock.
- FSS advises that management objectives be established and that a management plan be developed and implemented for the fishery catching cod.

FSS – ECONOMIC COMMENTS

- The value of the 2002 Irish quota was about €2.4m.
- The value of the 2002 Irish landings was about €41,000.
- Cod are an economically important by-catch in the Rockall haddock fishery for larger otter trawl vessels from Killybegs and Greencastle.

ADDITIONAL INFORMATION

1. There is no assessment for this stock.
2. Estimated landings in VIb by the Irish fleet were 18 t in 2002.
3. Mis-reporting and under-reporting are considered to be a problem in this fishery.
4. The fishery is dominated by the UK (Scotland), with 58% of the 2002 official landings. Norwegian landings comprise of 24% of the total landings for cod in VIb. Norway has reported longline landings of between 50-150 t in recent years. Irish bottom trawl landings were 15% of the total.
5. The fishery is important to the larger Irish vessels that target mainly haddock and megrim. Otter trawlers from Killybegs have traditionally carried out the Rockall cod fishery.
6. Irish sampling for this stock is supported through the EC funded sampling programme which is required under Data Collection Regulation 1543/2000 and 1639/2001.

7. Levels of cod discarding at Rockall are considered to be low.

ICES ADVICE

3.7.2b

Catch data are given in Table 3.7.2.b.1.

Special comments:

There is no information on the status of cod in Division VIb. Official catch data are incomplete.

Relevant factors to be considered in management:

Due to the rapid decline in cod catches in Division VIa the official landings reported from this area now account for about 25% of the catch in Subarea VI. TAC set for Division VIb cod should not jeopardise a rebuilding plan for cod in Division VIa nor management measures for haddock in this area.

Source of information:

Report of the Working Group on the Assessment of Northern Shelf Demersal Stocks, May 2003 (ICES CM 2004/ACFM:01).

Table 3.7.2.b.1. **Cod in Division VIb (Rockall). Official catch statistics.**

Country	1984	1985	1986	1987	1988	1989	1990	1991	1992
Faroes Islands	18	-	1	-	31	5	-	-	-
France	9	17	5	7	2	-	-	-	-
Germany	-	3	-	-	3	-	-	126	2
Ireland	-	-	-	-	-	-	400	236	235
Norway	373	202	95	130	195	148	119	312	199
Portugal	-	-	-	-	-	-	-	-	-
Russia	-	-	-	-	-	-	-	-	-
Spain	241	1200	1219	808	1345	-	64	70	-
UK (E. & W. & N.I.)	161	114	93	69	56	131	8	23	26
UK (Scotland)	221	437	187	284	254	265	758	829	714
Total	1,023	1,973	1,600	1,298	1,886	549	1,349	1,596	1,176

Country	1993	1994	1995	1996	1997	1998	1999	2000	2001	2002*
Faroes Islands	1	-	-	-	-	-	-	n/a	n/a	n/a
France	-	-	-	-	-	-	-	+	+	1
Germany	-	-	-	10	22	3	11	1	-	-
Ireland	472	280	477	436	153	227	148	119	n/a	-
Norway	199	120	92	91	55*	51*	85*	152*	164*	28
Portugal	-	-	-	-	5	-	-	-	-	-
Russia	-	-	-	-	-	-	-	7	26	-
Spain	-	-	2	5	1	6	4	3	-	-
UK (E. & W. & N.I.)	103	25	90	23	20	32	22	4	2	...
UK (Scotland)	322	236	370	210	706	341	389	286	176	...
UK										69
Total	1,097	661	1,031	775	962	660	659	572	358	98*

* Preliminary.

West of Scotland Haddock

(Division VIa)

For latest information, see: <http://www.ices.dk>



Fisheries Science Services

FSS - SINGLE STOCK CONSIDERATIONS

(See West of Scotland and Rockall Overview for mixed fishery advice).

ICES classifies this stock as being inside safe biological limits based on the most recent estimates of biomass, fishing mortality and recruitments.

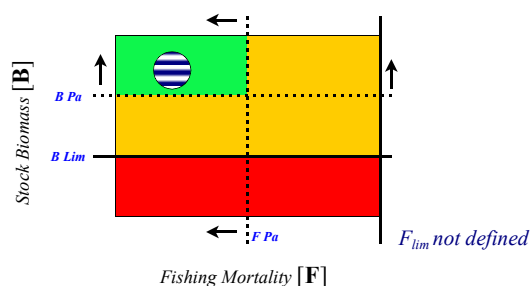
FSS recognise that the 'zero catch option' for cod would effectively mean a closure of the mixed demersal fishery in the west of Scotland. FSS considers that an industry initiated programme aimed at reducing cod catches to 'close to zero' should be considered in the management of West of Scotland fisheries. Industry initiated programmes should be encouraged but must include a high rate of independent observer coverage or other totally transparent methods for ensuring that their catches of species outside safe biological limits are fully and credibly reported.

FSS consider that if fishing for haddock is permitted in 2004, fishing mortality should be less than F_{pa} , corresponding to landings of 12,200 t with an associated Irish quota of 1,328 t.

However the mixed fisheries associations for the West of Scotland and in particular for those stocks outside safe biological limits will ultimately determine the 2004 TAC for haddock.

STATE OF THE STOCK

State of the Stock in relation to the precautionary reference points (see page 18)



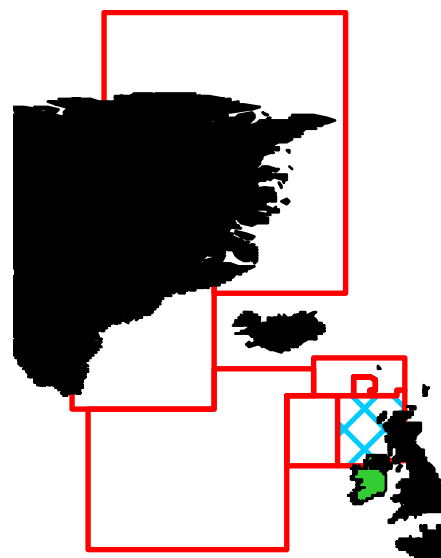
- There are no concerns about the state of this stock.
- The 2002 total international catch was estimated to be

about 15,250 t of which 8,580 t was discarded (Working Group estimates). Landings have declined markedly since 1993 and are now at an historic low.

- Fishing mortality is estimated to be 0.44 in 2002, below the F_{pa} of 0.50. Fishing mortality has been above F_{pa} in every year since 1987 except for 2002.
- SSB in 2002 is estimated to be 42,400 t and is well above the B_{pa} of 30,000 t. SSB varied around B_{pa} during the 1990s, and reached a historic low at 54% of B_{pa} in 2000. The very strong 1999 year class has caused SSB to increase rapidly above B_{pa} in 2001 and 2002.
- This stock displays a typical haddock recruitment pattern with occasional very strong year classes. The 1999 year class is estimated to be the 3rd largest since 1978.
- SSB is predicted to remain above B_{pa} at current levels of fishing mortality.

CURRENT MANAGEMENT

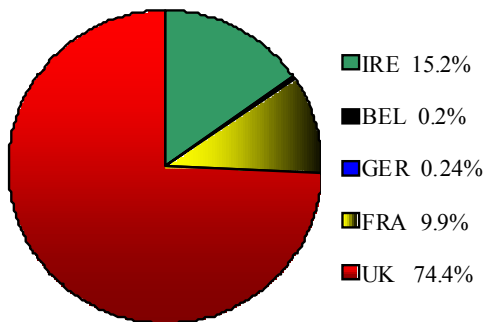
- The TAC Area covers Sub-areas VI, Vb, VI, XII and XIV.
- The assessment area covers Division VIa only.



Red Boxes-TAC/Management Areas Blue Shading-Assessment Area

- The 2003 TAC allocated to this stock was 8,675 t. The Irish component of the quota was 1,321 t of which no more than 1,214 t may be fished in Vb and VIa.
- There are no explicit management objectives or a management plan for this stock.
- FSS recommends that management objectives be established and that a management plan be developed and implemented for fisheries catching haddock.

- Mesh size and days at sea management regulations are summarised in the west of Scotland and Rockall overview for mixed fishery advice.
- The minimum landing size for haddock in the human consumption fishery in this area is 30-cm.



FSS – ECONOMIC COMMENTS

- The value of the 2002 Irish quota was about €1.7m.
- The value of the 2002 Irish landings was about €0.8m.
- This fishery is extremely important to the white fish fleets operating out of Killybegs and Greencastle.

ADDITIONAL INFORMATION

- 1 The assessment used landings and discards at age data. It includes research vessel surveys and is considered reasonable.
- 2 Irish landings in 2002 were about 660 t (estimates), a decline of 30% on 2001 landings.
- 3 Mis-reporting was once a serious problem in the fishery for those countries with restrictive quotas. Corrections have been made for misreporting during 1992-1994. Some misreporting of landings has occurred in recent years, but no quantitative information was provided on possible large-scale misreporting for the period 1995-2001, so no adjustments were made to the landings data.
- 4 Scottish light trawlers dominate the fishery. Effort by Scottish seiners and heavy trawlers has declined since 1976. Ireland, France and England take most of the remaining landings.
- 5 Otter trawlers from Killybegs and Greencastle have traditionally carried out the Irish haddock fishery. This is generally a mixed fishery targeting haddock, cod, whiting, megrim and monkfish. In recent years there has been a decline there has been a decline in effort in VIa due to decommissioning and displacement of effort to Sub-area VII.
- 6 Irish Sampling of this stock is supported through the EC funded sampling programme that is required under Data Collection Regulations 1543/2000 and 1639/2001. FSS sampling indicates that fish in 7 different age groups are well represented in the landings, confirming the relatively good state of the stock.
- 7 FSS commenced a groundfish survey off Donegal in 1993. This survey was used by the Working Group and confirmed the very strong 1999 year-class. Despite the Irish survey data performing well, these data

were not used in the final Working Group assessment due to limitations of the chosen assessment model.

- 8 Haddock in Division VIa are fully exploited by age group 3, but do not reach full maturity until this age. Immature fish are subject to comparatively high fishing mortality, and comprise a large fraction of the discarded catch. High fishing mortality on immature haddock Reduces the productivity of the stock.
- 9 It is not yet possible to measure the effects that the recovery plan for cod in Division VIa has had on the stock and fishery for haddock in Division VIa. However, any resulting benefits were considered to have been incorporated within the short-term forecasts made in the most recent assessment.

ICES ADVICE

3.7.3.a

State of stock/exploitation:

Based on the most recent estimate of SSB and fishing mortality ICES classifies the stock as being inside safe biological limits. Fishing mortality has been above F_{pa} in every year since 1987 except for 2002. SSB varied around B_{pa} during the 1990s. The very strong 1999 year class, the fourth largest since 1965, has caused SSB to increase rapidly from its historic low in 2000 to above B_{pa} in 2001 and 2002.

Management objectives:

No explicit management objectives are set for this stock.

Single Stock Exploitation Boundaries:

Fishing mortality should be less than F_{pa} (= 0.50). This would correspond to landings of less than 12 200 t in 2004.

The advice on the exploitation of this stock in 2004 is presented in the context of mixed fisheries and is found in Section 3.7.1.

Relevant factors:

ICES notes that there are no long-term gains from increasing the fishing mortality.

Precautionary Approach reference points (established in 1998):

ICES considers that:	ICES proposes that:
$B_{lim} = 22\ 000\ t.$	B_{pa} be set at 30 000 t.
F_{lim} = not defined.	F_{pa} be set at 0.50.

Technical basis:

B_{lim} = lowest observed SSB.	$B_{pa} = B_{lim} * 1.4.$
F_{lim} = not defined.	F_{pa} = high probability of avoiding $SSB < B_{pa}$ in the long term.

Catch forecast for 2004:

Basis: $F(2003) = F_{sq} = F(2002) = 0.44$; $Catch(2003) = 17.7$; $Landings(2003) = 12.0$; $SSB(2004) = 40.9$.

F(2004 onwards)	Basis	Catch (2004)	Discards (2004)	Landings (2004)	SSB (2005)
0	$0 * F_{sq}$	0	0	0	55.9
0.09	$0.2 * F_{sq}$	3.8	1.2	2.6	51.7
0.13	$0.4 * F_{sq}$	7.3	2.3	5.0	47.8
0.27	$0.6 * F_{sq}$	10.6	3.3	7.3	44.2
0.36	$0.8 * F_{sq}$	13.6	4.3	9.3	40.9
0.44	$1.0 * F_{sq}$	16.3	5.2	11.1	37.9
0.50	$1.13 * F_{sq} = F_{pa}$	17.9	5.8	12.2	36.1
0.53	$1.2 * F_{sq}$	18.8	6.1	12.7	35.1

Weights in '000 t.

Shaded scenario considered inconsistent with the precautionary approach applied in a single-species context alone.

Comparison with previous assessment and advice:

The basis for a single-stock fishery advice is the same as last year. The assessment of this stock shows a tendency for the fishing mortality estimates for the final year to be revised upwards when additional catch and survey data for the following year are included. The F for 2001 was estimated last year to be 0.52, and has been revised to 0.63 by the current assessment. The SSB estimate for 2002 has been revised downwards by 33%.

Elaboration and special comment:

Haddock in Division VIa are fully exploited by age group 3, and also reach full maturity at that age. Immature fish are subject to comparatively high fishing mortality, and comprise a large fraction of the discarded catch. High fishing mortality on immature haddock increases the susceptibility of the stock to over-exploitation.

The analytical age-based assessment uses landings-at-age data, discard-at-age data, and indices from research vessel surveys. Some misreporting of landings has occurred in recent years. Since effort data are unreliable commercial CPUE data are not used as tuning inputs.

Source of information:

Report of the Working Group on the Assessment of Northern Shelf Demersal Stocks, May 2003 (ICES CM 2004/ACFM:01).

**Yield and spawning biomass per recruit
F-reference points:**

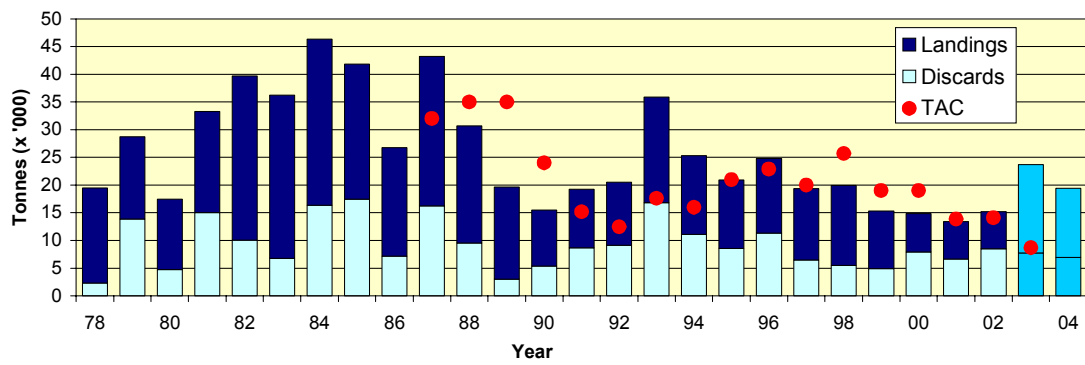
	Fish Mort Ages 2-6	Yield/R	SSB/R
Average last 3 years			
F_{max}	0.600	0.093	0.332
$F_{0.1}$	0.213	0.133	0.880
F_{med}	0.137	0.126	1.184
	0.445	0.111	0.457

Catch data (Tables 3.7.3.a.1-2):

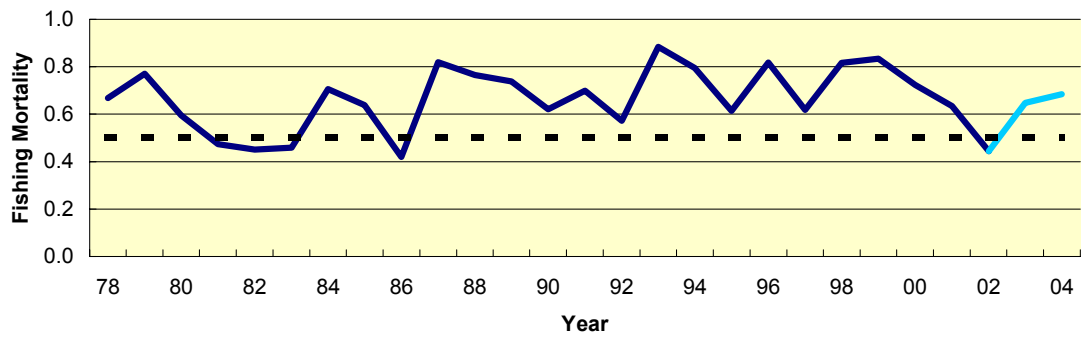
Year	ICES Advice	Single-Stock Exploitation Boundaries	Predicted catch corresp. to advice	Predicted catch corresp. to Single-Stock Exploitation Boundaries	Agreed TAC ¹	Official Landings	ACFM Landings	Discard Slip.	ACFM Catch
1987	Reduce F towards F_{\max}		20.0		32.0	27	27.0	16.2	43.2
1988	No increase in F; TAC		25.0		35.0	21	21.1	10.2	31.3
1989	80% of F(87); TAC		15.0		35.0	24	16.7	3.2	19.9
1990	80% of F(88); TAC		14.0		24.0	13	10.1	5.4	15.5
1991	70% of effort (89)		-		15.2	10	10.6	9.2	19.8
1992	70% of effort (89)		-		12.5	7	11.4 ²	9.4 ²	20.8 ²
1993	70% of effort (89)		-		17.6	13	19.1 ²	16.9 ²	36.0 ²
1994	30% reduction in effort		-		16.0	9	14.2 ²	11.2 ²	25.4 ²
1995	Significant reduction in effort		-		21.0	13	12.4	8.8	21.2
1996	Significant reduction in effort		-		22.9	13	13.4	11.8	25.3
1997	Significant reduction in effort		-		20.0	13	12.9	6.6	19.5
1998	No increase in F		20.8 ³		25.7	14	14.4	5.7	20.1
1999	F reduced to F_{pa}		14.3 ³		19.0	11	10.4	5.1	15.6
2000	Maintain F below F_{pa}		<14.9 ³		19.0	7	6.9	8.2	15.2
2001	Reduce F below F_{pa}		<11.2 ³		13.9	7	6.7	7.2	14.0
2002	Reduce F below F_{pa}		<14.1 ³		14.1	6	6.7	8.6	15.2
2003	No cod catches		-		8.7				
2004	⁴	F_{pa}	⁴	12.2					

¹TAC is set for Divisions VIa and VIb (plus Vb1, XII & XIV) combined with restrictions on quantity that can be taken in VIa from 1990. ²Adjusted for misreporting. ³ For VIa only. ⁴ Single-stock boundary and the exploitation of this stock should be conducted in the context of mixed fisheries protecting stocks outside safe biological limits. Weights in '000 t.

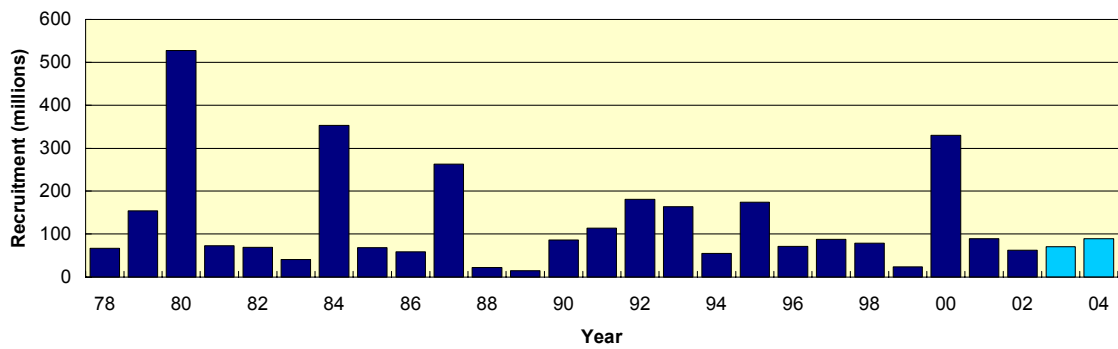
Haddock VIa - Landings & Discards
Mean = 16.4



Haddock VIa - Fishing Mortality
Mean = 0.66



Haddock VIa - Recruitment (Age 1)
Mean = 129.1



Haddock VIa - Spawning Stock Biomass
Mean = 45.2

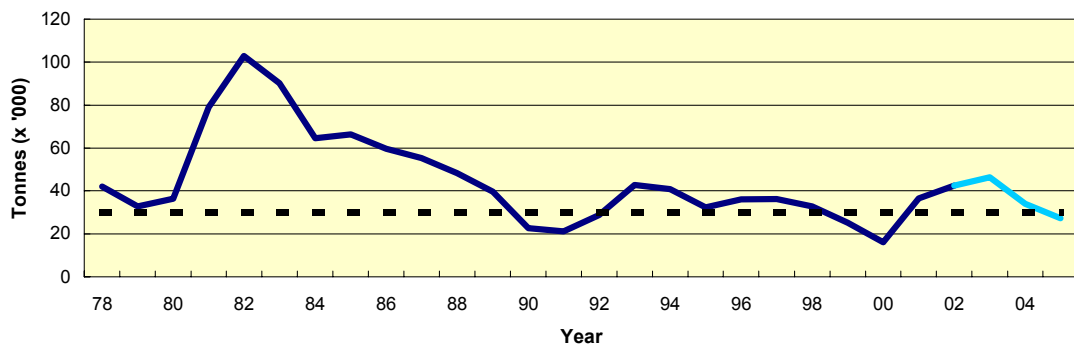


Table 3.7.3.a.1 Haddock, Division VIa. Nominal catch (tonnes) of haddock, 1986–2001, as officially reported to ICES.

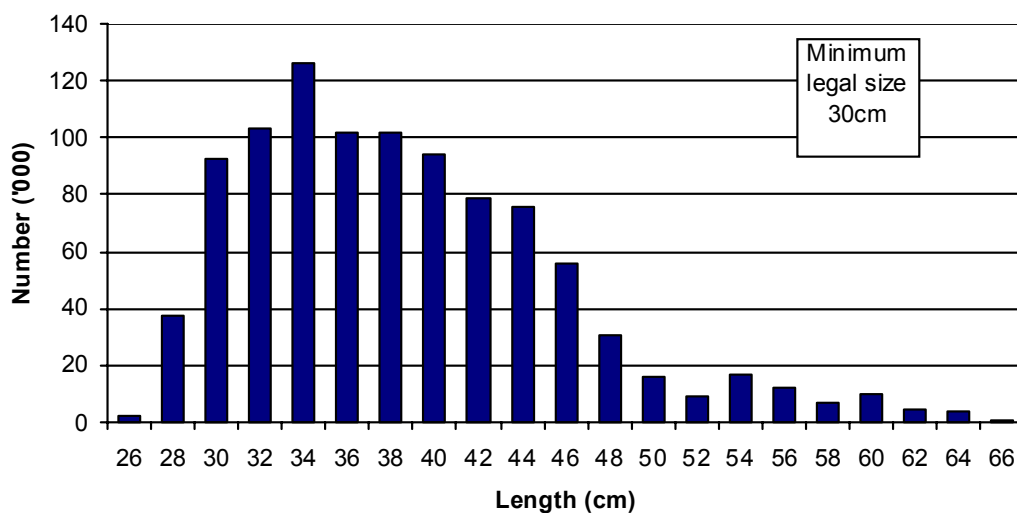
Country	1986	1987	1988	1989	1990	1991	1992	1993	1994	1995	1996	1997	1998	1999	2000	2001	2002
Belgium	-	29	8	9	-	9	1	7	1	+	1	3	2	2	1	2	+
Denmark	+	+	+	+	+	+	1	1	-	1	1	-	+	-	-	-	-
Faroe Islands	1	-	-	13	-	1	-	-	-	-	-	-	-	-	n/a	n/a	-
France	4,956	5,456	3,001	1,335 ^{1,2}	863 ^{1,2}	761 ^{1,2}	761	1,132	753	671	445	270	394 ¹	788	282	159 ¹	181
Germany, Fed.Rep.	25	21	4	4	15	1	2	9	19	14	2	1	1	2	1	1	+
Ireland	2,026	2,628	2,731	2,171	773	710	700	911	746	1,406	1,399	1,447	1,352	1,054	677	744	+
Norway	45	13	54	74	46	12	72	40	7	13	16 ¹	21 ¹	28	18	70 ¹	33 ¹	31
Spain	-	-	-	-	-	-	-	-	-	-	-	-	2	4	9	4	-
UK (E & W) ³	222	425	114	235	164	137	132	155	254	322	448	493	458	315	199	201	-
UK (N. Ireland)	155	1	35	-	-	-	-	-	-	-	-	-	-	-	-	-	-
UK (Scotland)	12,955	18,503	15,151	19,940	10,964	8,434	5,263	10,423	7,421	10,367	10,790	10,352	12,125	8,630	5,933	5,886	...
UK (total)																	6,223
Total	20,385	27,076	21,098	23,781	12,825	10,065	6,932	12,678	9,201	12,794	13,102	12,587	14,360	10,813	7,163	7,030	6,435
Landings as used by WG	19,574	27,004	21,137	16,693	10,136	10,560	11,353	19,067	14,243	12,372	13,452	12,866	14,401	10,426	6,949	6,731	6,672
Discards	7,352	16,218	10,164	3,178	5,406	9,192	9,398	16,904	11,192	8,794	11,838	6,623	5,712	5,131	8,207	7,247	8,576
Unallocated landings	-811	-72	39	-7,088	-2,689	495	4,421	6,389	5,042	-423	350	279	41	-387	-299	-299	237
Total as used by WG	26,926	43,222	31,301	19,871	15,542	19,752	20,752	35,971	25,435	21,166	25,290	19,489	20,114	15,557	15,156	13,978	15,248

¹Preliminary. ²Includes Divisions Vb(EC) and VIb. ³1989–2001 N. Ireland included with England and Wales. n/a = Not available.

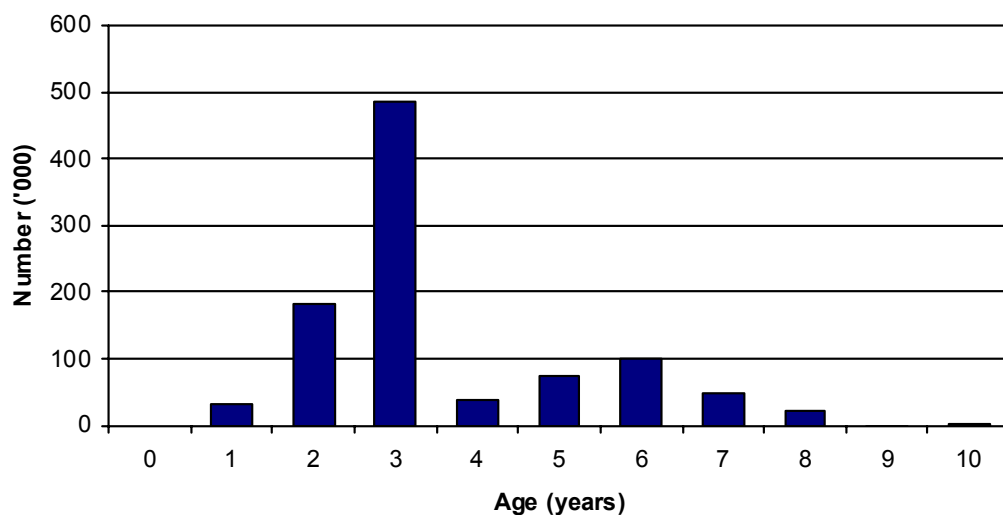
Table 3.7.3.a.2 Haddock in Division VIa (West of Scotland).

Year	Recruitment Age 1 thousands	SSB tonnes	Landings tonnes	Mean F Ages 2-6
1978	67032	42020	17178	0.6670
1979	153764	32839	14820	0.7703
1980	527607	36289	12759	0.5953
1981	73251	78949	18233	0.4738
1982	68988	102823	29635	0.4505
1983	40371	90151	29405	0.4583
1984	353436	64541	30012	0.7048
1985	68176	66276	24393	0.6375
1986	58433	59653	19561	0.4192
1987	262921	55182	27012	0.8184
1988	22038	48234	21136	0.7656
1989	14566	39622	16688	0.7381
1990	86353	22666	10135	0.6199
1991	113855	21199	10557	0.6987
1992	180799	28851	11350	0.5724
1993	164143	42777	19060	0.8831
1994	55163	40841	14243	0.7947
1995	174572	32339	12368	0.6136
1996	70974	36002	13453	0.8175
1997	87474	36126	12874	0.6180
1998	78284	32778	14401	0.8170
1999	23407	25232	10430	0.8339
2000	329911	16134	6952	0.7224
2001	89278	36543	6731	0.6329
2002	62197	42404	6668	0.4433
2003	70516	46019		
Average	126827	45250	16402	0.6626

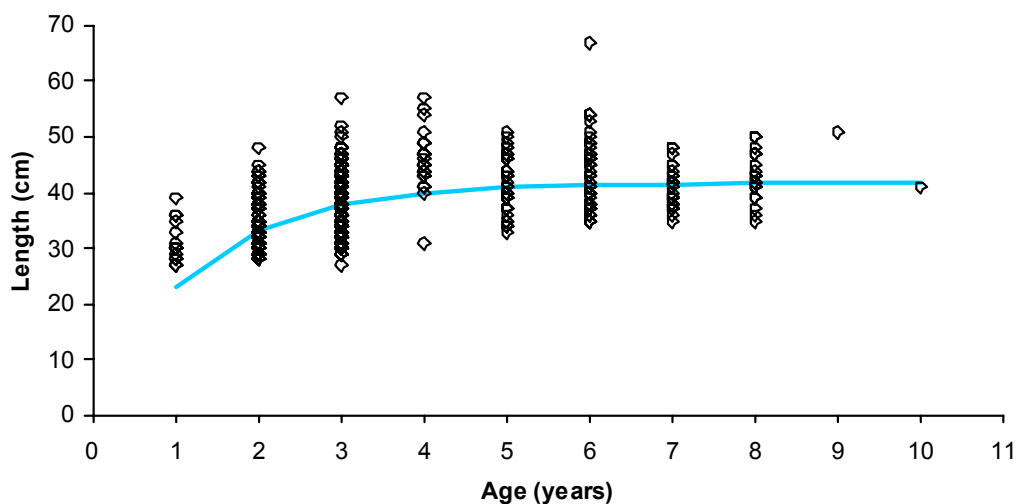
2002 Length Distribution: Irish Landings, Haddock in VIa



2002 Age Distribution: Irish Landings, Haddock in VIa



2002 Size at Age: Irish Sampling, Haddock in VIa



Rockall Haddock

(Division VIb)

For latest information, see: <http://www.ices.dk>



Fisheries Science Services

FSS – SINGLE STOCK CONSIDERATIONS

(See West of Scotland and Rockall Overview for Mixed Fishery Advice)

FSS agrees with the ICES recommendation that fishing mortality in 2004 should be reduced to the lowest possible level. Furthermore, FSS advises that a rebuilding plan should be introduced.

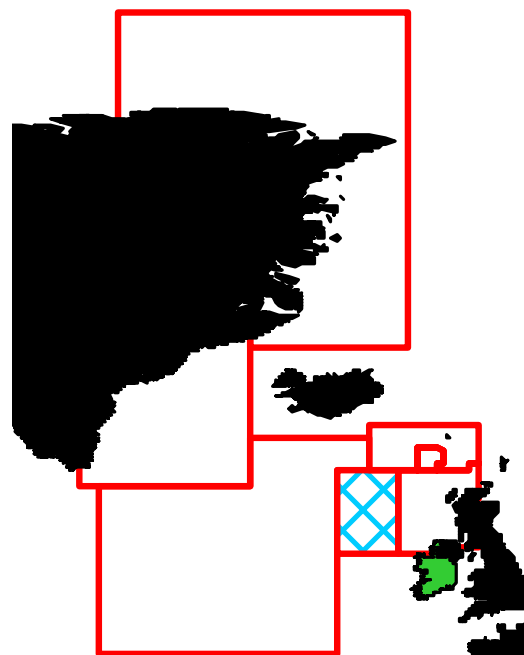
FSS considers that a separate TAC, applicable only to Division VIb, and including international waters, is required to improve management of the fishery in Division VIb. FSS notes that the implementation of its advice is complicated by the international nature of the fishery and therefore

STATE OF THE STOCK

- The state of this stock is uncertain..
- No assessment as possible in 2003 because no biological samples were available from the fleet that accounts for 70% of the catch.
- The only indication of stock status is a research survey index. This index shows some improvements in the most recent year but stronger confirmation of substantial improvements in stock status is needed before it can be concluded that the stock is recovering.
- Total international landings in 2002 were estimated at 2,571 t (estimate) 1,920 t. Landings appear to have been relatively stable since 1997 but fell markedly in 2001 and 2002.

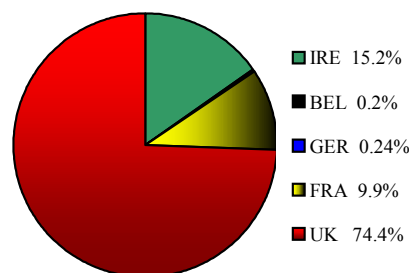
CURRENT MANAGEMENT

- The TAC Area covers EC waters in Sub-areas Vb, VI, XII, XIV.
- The assessment area covers Division VIb only.
- The 2003 TAC was 8,700 t. The associated Irish quota was 1,321 t, of which no more than 1,214 t could be fished by Ireland in Vb and VIa.
- There are no explicit management objectives or a management plan for this stock.
- In March 2001 a NEAFC agreement prohibited fishing for haddock in international waters to the south-east of Rockall, an area important for juvenile haddock.



Red Boxes-TAC/Management Areas Blue Shading- Assessment Area

- Part of Division VIb now falls within international waters where non EU vessels are not subject to TAC. This allows for a unregulated fishery in the Rockall area.
- FSS recommends that management objectives be established and that a management plan be developed and implemented for fisheries catching haddock.



FSS – ECONOMIC COMMENTS

- The value of the 2002 Irish quota was about €1.7m.
- The value of the 200 Irish landings from Division VIb was about €0.7m.
- This fishery is important to the larger white fish vessels operating out of Killybegs.

ADDITIONAL INFORMATION

- 1 FSS has serious concerns about inadequacies in the data, and the significant changes in the fleets fishing at Rockall (accompanied by changes in the spatial

and temporal distribution of their effort), possible mis-reporting of landings, considerable discarding and high-grading in this fishery.

- 2 Ireland took about 199 t in 2002 .
- 3 Mis-reporting and under-reporting are considered to be problems in this fishery. Non-EU vessels are now allowed to fish around Rockall and the fishery is currently unregulated.
- 4 The fishery was traditionally dominated by UK Scotland). Russia has displaced UK and now dominates the fishery (about 70% landings in 2002). There has been a general increase in the amount of Scottish light trawl effort but trawl and seine effort have fallen to a very low level in recent years.
- 5 5 – 7 otter trawlers from Killybegs and Greencastle have traditionally carried out the Irish haddock fishery. In recent years this has declined to only 2 vessels. This is generally a mixed fishery targeting haddock, megrim and monkfish.
- 6 Irish sampling of this stock is supported through the EC funded sampling programme, which is required under Data Collection Regulations 1543/2000 and 1639/2001. FSS sampling indicates that age groups 2 to 4 dominate Irish landings. Haddock do not reach full maturity until age group 3.
- 7 FSS do not conduct a groundfish survey at Rockall. The Scottish research vessel survey takes place only every two years, most recently in 2001.
- 8 Although no discard data are available, there is likely to be substantial discarding of younger fish. Limited FSS discard data indicates that some Irish vessels also carry out high grading.
- 9 Russian catch length compositions include fish below the EU minimum landing size (30 cm). However, discard data are not available from the EU fleets. Russian length-compositions were truncated at 30 cm to produce a “landings-equivalent” age com-

position for analysis. The unsatisfactory nature of this process is recognised in the assessment but discard data are required from the EU fleets if catches are to be quantified more appropriately.

- 10 Fishing mortality on young fish is likely to be extremely high. Russian vessels operating in international waters catch and retain haddock below the EU minimum landing size of 30 cm and some of the large Russian vessels are reportedly using 40-mm mesh nets.
- 11 It is too early to quantify the effect the NEAFC agreed closed area has had on the haddock stock. It is difficult to predict actual fishing mortality as fleet behaviour will depend on fishing opportunities elsewhere.
- 12 There have been substantial recent changes in targeting practices in the fishery. In recent years the peak in landings by the Irish and Scottish fleet was in the spring (April) and from deeper waters to the west of the Rock. The fishery, which was once almost exclusively a summer fishery, is now a year-round fishery.

ICES ADVICE

3.7.3.b

State of stock/exploitation:

The state of the stock is uncertain. Historical perspectives of fishing mortality indicate that they have been high, but the current exploitation rate is unknown. Survey-based indices of SSB indicate that the stock was at a historical low in 2002, but may have increased in 2003.

Management objectives:

No explicit management objectives are set for this stock.

Precautionary Approach reference points (established in 1999):

ICES considers that:	ICES proposes that:
B_{lim} is 6 000 t, the lowest observed spawning stock.	B_{pa} be set at 9 000 t. This is considered to be the minimum SSB required to have a high probability of maintaining SSB above B_{lim} , taking into account the uncertainty of assessments.
F_{lim} is not defined.	F_{pa} be set at 0.4. This F provides a small probability that SSB will fall below B_{pa} in the long term.

Technical basis:

$B_{lim} = B_{loss}$ as estimated in a previous assessment.	$B_{pa} = B_{loss} * 1.4$.
F_{lim} = could not be defined, due to uninformative stock recruitment data.	F_{pa} = adopted by analogy with other haddock stocks.

Single Stock Exploitation Boundaries:

Catches in 2004 should be reduced to the lowest possible level.

The advice on the exploitation of this stock in 2004 is presented in the context of mixed fisheries and is found in Section 3.7.1.

Relevant factors to be considered in management:

The TAC applies to Subarea VI, with a limit on how much of the catch may be taken in Division VIa, but no such limit for Division VIb. In addition, part of Division VIb now falls within international waters where non-EU vessels are not subject to TAC. This allows for an unregulated fishery in the Rockall area. A separate TAC applicable only to Division VIb, including international waters, would ensure a sustainable fishery in Division VIb.

Following the NEAFC agreement in March 2001, an area of the NEAFC zone around Rockall was closed to fishing. It is too early to quantify the effect this closure has had on the haddock stock. An analytical assessment was not possible this year, primarily because no biological samples were available from the fleet that accounted for over 70% of the reported catch. Despite the absence of an analytical assessment, evaluation of the benefits of the area closure will remain difficult for several reasons. It is necessary to know that there is effective compliance with the closed area regulations, and that the closed area continues to encompass a sufficient proportion of the population of young fish. It is also necessary to establish that the selection pattern of the fishery has improved, or the overall effort has been reduced, and that improved survival of young fish has occurred as a result.

ICES considers that the successful implementation of technical measures such as closures and more selective fishing methods, and the collection of adequate survey and catch data at appropriate time and space scales to evaluate their outcome, would benefit from the establishment of an internationally agreed management plan. Such a plan should involve extensive collaboration between stakeholders, scientists and responsible management authorities in both the design and the monitoring of conservation measures. ICES notes that this is a mixed fishery that currently includes substantial catches of blue whiting and non-assessed species such as grey gurnard. There is an urgent requirement for well-designed scientific monitoring programmes capable of delivering accurate data on trends in abundance and composition of the fish fauna throughout the area, in a form that can support the development and implementation of a management plan for Rockall Bank.

Deterministic projections based on simulations for haddock in the North Sea assuming 100% mesh escape survival, showed that a 10 mm increase in mesh size resulted in a long-term increase in landings of 120% (ICES 2002), indicating that an increase in mesh size could have positive results. However, Russian studies indicate that traumatism and mortality of fish going through the mesh increases when using larger mesh (ICES 2001; Vinnichenko et al. 2001).

The only indication of stock status currently available is a research survey index. This index shows some improvement in the most recent year, but stronger confirmation of substantial improvement in stock status is needed before it can be concluded that the stock is recovering.

Comparison with previous assessment and advice:

The advice last year was based on an analytical assessment. Such an analysis was not possible this year, primarily because no biological samples were available for 2002 from the fleet that accounted for over 70% of the reported catch.

Elaboration and special comment:

The Scottish research vessel survey covers only part of the currently known distributional area of haddock. Any change in the distributional patterns of haddock over time are thus not reflected in the survey indices. An annual survey covering the whole of the distributional area would give a more reliable foundation for appropriate advice on the exploitation of the stock.

Source of information:

Report of the Working Group on the Assessment of Northern Shelf Demersal Stocks, May 2003 (ICES CM 2004/ACFM:01).

References:

V.I. Vinnichenko, K.V. Gorchinsky, V.N. Khlivnoy, and N. M. Timoshenko (2001). Russian research on haddock (*Melanogrammus aeglefinus* L.) on the Rockall Bank (Division VIb). Working Document: ICES Working Group on Rockall Haddock, Aberdeen, January 2001.

ICES (2001). Report of the ICES Advisory Committee on Fisheries Management 2001. ICES Co-operative Research Report No. 246(2).

ICES (2002). Report of the ICES Advisory Committee on Fisheries Management 2002. ICES Co-operative Research Report No. 255.

Catch data (Tables 3.7.3.b.1):

Year	ICES Advice	Single-stock exploitation boundaries	Predicted catch corresp. to advice	Predicted catch corresponding to single-stock boundaries	Agreed TAC ¹	Official Landings	ACFM Landings
1987	Precautionary TAC		10.0			8.0	8.4
1988	Precautionary TAC		10.0			7.6	7.9
1989	Status quo F; TAC		18.0			6.6	6.7
1990	Precautionary TAC		5.5			8.2	3.9
1991	Precautionary TAC		5.5			5.9	5.7
1992	Precautionary TAC		3.8			4.5	5.3
1993	80% of F(91)		3.0			4.1	4.8
1994	If required, precautionary TAC		-			3.7	5.7 ²
1995	No long-term gain in increasing F		5.1 ³			5.5	5.6
1996	No long-term gains in increasing F		6.9 ³			6.8	7.1
1997	No advice given		4.9 ³			5.2	5.2
1998	No increase in F		4.9			5.1	5.0
1999	Reduce F below F _{pa}		3.8			6.0	5.2 ⁵
2000	Reduce F below F _{pa}		< 3.5			5.5 ⁴	4.6 ⁵
2001	Reduce F below F _{pa}		< 2.7			2.2 ⁴	1.9 ⁵
2002	Reduce F below 0.2		< 1.3			2.8	2.6
2003	Lowest possible F		-				
2004	⁶	Lowest possible catch	⁶	-			

¹TAC is set for Divisions VIa and VIb (plus Vb1, XII & XIV) combined with restrictions on quantity that can be taken in VIa from 1990. ²Including misreporting. ³Landings at status quo F. ⁴Incomplete data. ⁵Russian data adjusted to exclude fish below MLS of 30 cm. ⁶ Single-stock boundary and the exploitation of this stock should be conducted in the context of mixed fisheries protecting stocks outside safe biological limits. Weights in '000 t.

Table 3.7.3.b.1 Nominal catch (tonnes) of HADDOCK in Division VIb, 1986–2002, as officially reported to ICES.

Country	1988	1989	1990	1991	1992	1993	1994	1995	1996	1997	1998	1999	2000	2001	2002 ¹
Faroe Islands	5	-	-	-	-	-	-	-	-	-	-	-	n/a	n/a	
France	5	... ²	... ²	... ²	... ²	... ²	... ²	... ²	-	-	-*		5	2*	+
Germany, Fed. Rep.	4	1	-	-	-	-	-	-	-	-	-	-	-	-	
Iceland	-	-	-	-	-	-	-	-	-	+	-	167	-	-	-
Ireland	-	-	620	640	571	692	956	677	747	895	704	1,021	824	357	n/a
Norway	20	47	38	69	47	68	75	29	24	24	40	61	152*	70*	49
Portugal	-	-	-	-	-	-	-	-	-	-	4	-	-	-	
Russia	-	-	-	-	-	-	-	-	-	-	-	458	2,154	630	1,746
Spain	245	337	178	187	51	-	-	28	1	22	21	25	47	51	
UK (E, W & NI)	753	272	238	165	74	308	169	318	293	165	561	288	36	+	...
UK (Scotland)	6,542	5,986	7,139	4,792	3,777	3,045	2,535	4,439	5,753	4,114	3,768	3,970	2,470	1,205	1,145 ³
Total	7,574	6,643	8,213	5,853	4,520	4,113	3,735	5,491	6,818	5,220	5,098	5,990	5,536	2,243	2,824
Unallocated catch	355	85	4,329	-198	800	671	1,998	96	257	-54	-114	-769	-1,127	-326	-253
WG estimate	7,929	6,728	3,884	5,655	5,320	4,784	5,733	5,587	7,075	5,166	4,984	5,221 ⁴	4,559 ⁴	1,917 ⁴	2,571 ⁴

¹Preliminary.

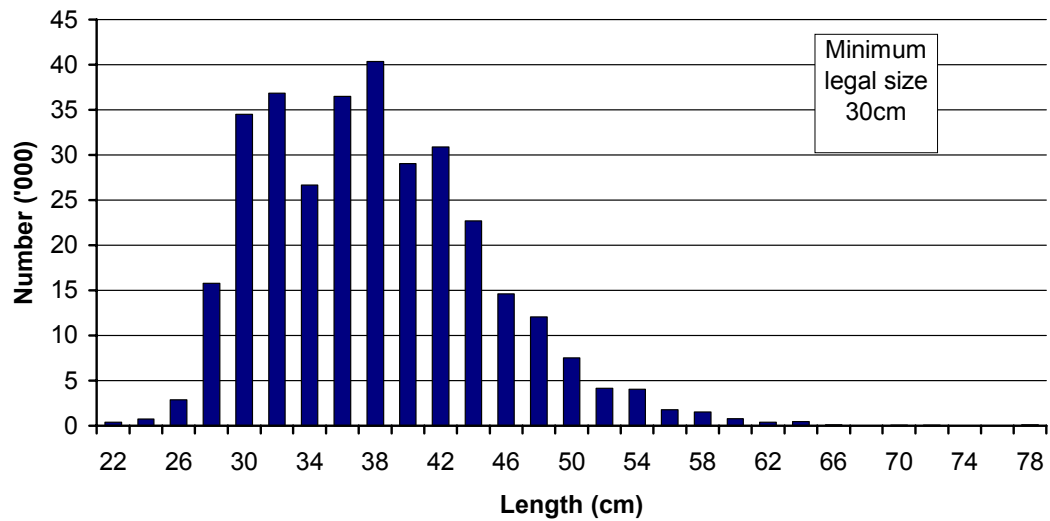
²Included in Division VIa.

³Includes UK England, Wales and NI Landings.

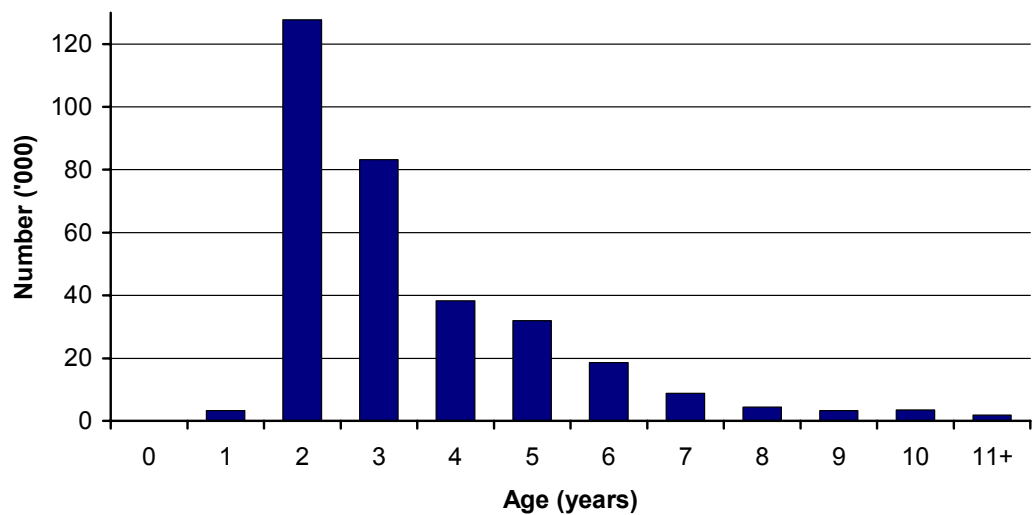
⁴Includes a reduction in Russian catch data to approximate to “landings-equivalent values (see Section 4.2.3).

n/a = Not available.

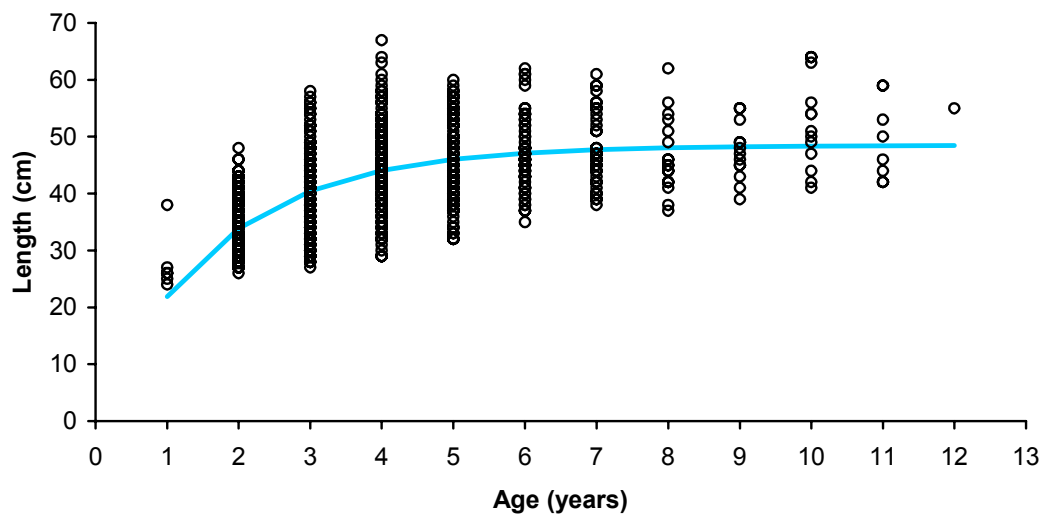
2002 Length Distribution: Irish Landings, Haddock in VIb



2002 Age Distribution: Irish Landings, Haddock in VIb



2002 Size at Age: Irish Sampling, Haddock in VIb



West of Scotland Whiting

(Division VIa)

For latest information, see: <http://www.ices.dk>



Fisheries Science Services

FSS - SINGLE STOCK CONSIDERATIONS

(See West of Scotland and Rockall Overview for mixed fishery advice).

ICES classifies this stock as being outside safe biological limits based on the most recent estimates of biomass and fishing mortality.

FSS recognise that the 'zero catch option' for cod would effectively mean a closure of the mixed demersal fishery in the west of Scotland. FSS considers that an industry initiated programme aimed at reducing cod catches to 'close to zero' should be considered in the management of West of Scotland fisheries. Furthermore, discarding of whiting is very high (50% of total catch) is discarded and appears to have increased in recent years. Industry initiated programmes which reduce whiting discarding and cod catch should be encouraged, but must include a high rate of independent observer coverage or other totally transparent methods for ensuring that their catches of species outside safe biological limits are fully and credibly reported.

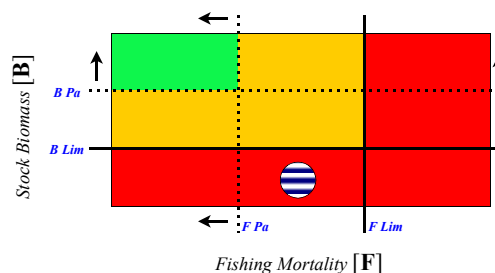
FSS consider that a well defined 'management plan' is necessary to rebuild recover the whiting stock and to fish it sustainably once it has recovered. FSS considers that such a plan requires clearly defined objectives that will ensure a high probability of recovery to agreed levels within a specified time frame. FSS considers that the proper definition and evaluation of all métiers involved in the fishery is crucial to this management plan.

FSS considers that if fishing for whiting is permitted, then in order to bring SSB above B_{pa} in 2005, total fishing mortality in 2004 should be below 0.31. This translates to a TAC of less than 2,100 t in 2004 with an associated Irish quota of 618 t.

However the mixed fisheries associations for the West of Scotland and in particular for those stocks outside safe biological limits will ultimately determine the 2004 TAC for whiting.

STATE OF THE STOCK

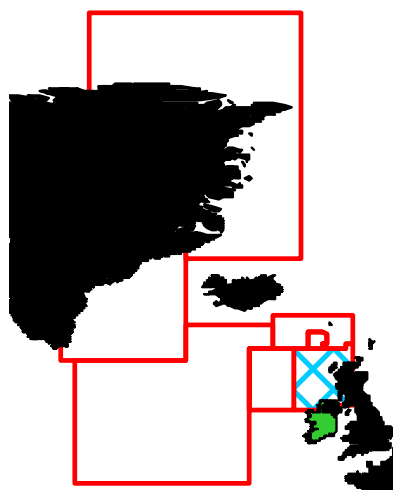
State of the Stock in relation to the precautionary reference points (see page 18)



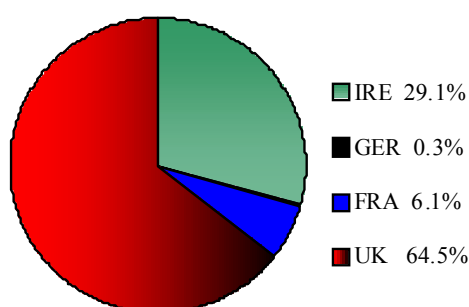
- There are serious concerns about the state of this stock.
- The 2002 total international catch was estimated to be 3,850 t of which 2,140 t was discarded. Landings have declined markedly since the mid-1980s and are now at an historic low.
- F has declined sharply in the last 2 years and is estimated to be at F_{pa} .
- There has been a general decline in recruitment since the mid-1980s, and the 1996, 1998 and 2000 year-classes are the three weakest on record. Strong year-classes have not occurred during the 1990s.
- The estimated Spawning stock biomass in 2002 of 9,950 t is well below the B_{pa} of 22,000 t and the B_{lim} of 16,000 t. Spawning stock, which has been in decline since 1981, has exceeded B_{pa} in only one year since 1988 and has been below B_{lim} since 1998.
- The SSB is expected to increase to 17,800 t by 2005. At status quo F, which is above B_{lim} . A 50% reduction in F is required to bring the stock above B_{pa} in 2005.

CURRENT MANAGEMENT

- The TAC area covers EC waters in Divisions Vb and Sub-areas VI, XII and XIV.
- The assessment area covers Division VIa only but landings from other areas are negligible.
- The TAC in 2003 was 2,000 t with an associated Irish quota of 582 t.
- There are no explicit management objectives or a management plan for this stock.
- FSS recommends that management objectives be established and that a management plan be developed and implemented for fisheries catching whiting.
- Whiting is taken with cod and haddock in mixed demersal fisheries and management advice should be considered in that context.
- Mesh size and days at sea management regulations are summarised in the west of Scotland and Rockall overview for mixed fishery advice.



Red Boxes-TAC/Management Areas Blue Shading-Assessment Area



- The minimum landing size for whiting in the human consumption fishery in this area is 27-cm.

FSS – ECONOMIC COMMENTS

- The value of the 2002 Irish quota was about €0.5m.
- The value of the 2002 Irish landings was about €0.5m.
- The economic importance of whiting in VIa has declined in recent years.

ADDITIONAL INFORMATION

- 1 The assessment uses landings-at-age data, discard-at-age data and indices from research vessel surveys. Concerns over the quality of commercial catch-at-age data have been increasing in recent years, due largely to declining stocks, restrictive TACs, and the consequently greater likelihood of discarding, misreporting and high-grading.
- 2 The Irish landings of about 580 t (estimate) in 2002 are estimated to be the lowest ever recorded.
- 3 No corrections were applied for misreporting in the assessment. While some degree of misreporting is still suspected to have occurred, particularly during 1992–1995, it is now considered to have been less of a problem with this stock than had previously been thought.
- 4 The fishery is dominated by the UK-Scotland (70–75% of landings) and Irish (15–20% of landings) fleets. French whiting landings have declined considerably since the late 1980s.

- 5 Otter trawl vessels fishing out of Killybegs and Green-castle take most of the Irish catch of this stock. There has been a significant reduction in the number of Irish vessels targeting the mixed gadoid fishery in VIa in recent years. Most of these landings are taken from the Donegal Bay, Tory and Aran and Stanton Banks grounds.
- 6 Irish sampling of this stock is supported through the EC funded sampling programme, which is required under Data Collection Regulations 1543/2000 and 1639/2001. FSS sampling indicates that almost 90% of the landings are 2–3 year old whiting. The lack of older fish in the landings confirms the very poor state of the stock and provides a consistent abundance index for this stock.
- 7 FSS's annual West Coast Groundfish Survey in Division VIa was shown to perform consistently with the Scottish groundfish survey. Unfortunately, the current implementations of the assessment model do not allow for the combination of disaggregated landings and discards with multiple survey indices. To maintain consistency with previous assessments, the Scottish survey was used exclusively in the assessment.
- 8 The proportion of whiting discarded is very high and appears to have increased in recent years. FSS discard data is limited but discard rates of 50% by weight and 60–70% by number have been reported (ICES SGDBI, 2002). Due to low market demand, there is likely to be considerable discarding of small whiting. This may present a major impediment to stock rebuilding.
- 9 A consideration of the maximum possible benefits of regulatory changes in mesh size was considered in the latest assessments. The benefits of the improved selectivity would translate as a 29% reduction in total fishing mortality in short term forecasts. If fully effective, this would result in:
 - A reduction in predicted landings in 2003 of 23% compared to the status quo forecast,
 - A reduction in predicted landings in 2004 of 12% compared to the status quo forecast, and,
 - A 20% increase in SSB in 2005 to 21,300 t (compared to the status quo forecast).
- 10 It is not yet possible to measure the effects that the recovery plan for cod in Division VIa has had on the stock and fishery for whiting in Division VIa. However, any resulting benefits were considered to have been incorporated within the short-term forecasts made in the most recent assessment.

ICES ADVICE

3.7.4.a

State of stock/exploitation:

Based on the most recent estimate of the biomass ICES classifies the stock as being outside safe biological limits. Fishing mortality has exceeded F_{pa} in all years since 1983, but may have declined in recent years. The spawning stock,

which has been in decline since 1981, has exceeded B_{pa} in only two years since 1988 and has been below B_{lim} since 1998. Recruitment since 1993 has been below the long-term average.

Management objectives:

No explicit management objectives are set for this stock.

Precautionary Approach reference points (established in 1998):

ICES considers that:	ICES proposes that:
B_{lim} is 16 000 t, the lowest observed spawning stock estimated in previous assessments.	B_{pa} be set at 22 000 t. This is considered to be the minimum SSB required to have a high probability of maintaining SSB above B_{lim} , taking into account the uncertainty of assessments.
F_{lim} is 1.0, above which stock decline has been observed.	F_{pa} be set at 0.6. This F is considered to have a high probability of avoiding F_{lim} .

Technical basis:

$B_{lim} = B_{loss}(1998) = 16\ 000\ t.$	$B_{pa} = B_{lim} * 1.4.$
$F_{lim} = \text{see above.}$	$F_{pa} = 0.6 * F_{lim}.$

Single Stock Exploitation Boundaries:

To bring SSB above B_{pa} in 2005, total fishing mortality in 2004 should be below 0.31, corresponding to human consumption landings of less than 2100 t.

The advice on the exploitation of this stock in 2004 is presented in the context of mixed fisheries and is found in Section 3.7.

annual catch weight comprises undersized or low-value whiting which are discarded. Measures to reduce discards and to improve the exploitation pattern would be beneficial to the stock and to the fishery. The more widespread use of 110 mm mesh nets in 2002 as well as the requirement to fit square mesh panels to certain towed gears since late 2000, may improve the selection pattern for whiting.

Over 50% of the SSB in 2005 is expected to be comprised of the 2003 year class for which short-term geometric mean recruitment has been assumed. Retrospective analysis indicates that the overestimation of the stock may not be fully accounted for in the current assessment and catch forecast.

Relevant factors to be considered in management:

The proportion of fish discarded is very high and appears to have increased in recent years. Approximately half of the

Catch forecast for 2004:

Basis $F(2003) = F_{sq} = F(2002) = 0.61$; Catch(2003) = 6.0; Landings(2003) = 2.9 ; SSB(2004) = 15.2.

F(2003 onwards)	Basis	Catch (2004)	Discards (2004)	Landings (2004)	SSB (2005)
0	$0 * F_{sq}$	0	0	0	28.3
0.12	$0.2 * F_{sq}$	1.8	0.9	0.9	25.7
0.25	$0.4 * F_{sq}$	3.4	1.8	1.7	23.4
0.31	$0.5 * F_{sq}$	4.2	2.1	2.1	22.4
0.37	$0.6 * F_{sq}$	4.9	2.5	2.4	21.4
0.49	$0.8 * F_{sq}$	6.2	3.2	3.0	19.5
0.61	$1 * F_{sq} \sim F_{pa}$	7.4	3.9	3.6	17.8

Weights in '000 t.

Shaded scenarios considered inconsistent with the precautionary approach applied in a single-species context alone.

Comparison with previous assessment and advice:

Recruitment and fishing mortality estimates in recent years have been revised upwards compared to last year's assessment. The estimates of SSB are the same as last year. The basis for the single-stock fishery advice is the same as last year.

Elaboration and special comment:

Whiting in Division VIa are caught mainly by Scottish trawlers. Since 1976, Scottish heavy trawl and seine effort has declined, whilst that of light trawlers has generally increased. Approximately 50% of the total catch in weight is discarded, so restricted landings alone will not achieve the necessary increase in SSB. The analytical age-based assessment is based on landings-at-age data, discard-at-age data, and indices from research vessel surveys.

Source of information:

Report of the Working Group on the Assessment of Northern Shelf Demersal Stocks, May 2003 (ICES CM 2004/ACFM:01).

Yield and spawning biomass per recruit

F-reference points:

	Fish Mort Ages 2-4	Yield/R	SSB/R
Average last 3 years	0.855	0.183	0.366
F_{max}	N/A		
$F_{0.1}$	0.157	0.151	0.884
F_{med}	2.255	0.186	0.239

Catch data (Tables 3.7.4.a.1-2):

Year	ICES Advice	Single-stock exploitation boundaries	Predicted catch corresp. To advice	Predicted catch corresponding to single-stock boundaries	Agreed TAC ¹	Official Landings	ACFM Landings	Discards slip	ACFM catch
1987	No increase in F		15.0		16.4	12.4	11.5	6.9	18.4
1988	No increase in F; TAC		15.0		16.4	11.9	11.4	11.8	23.1
1989	No increase in F; TAC		13.0		16.4	7.7	7.5	4.1	11.6
1990	No increase in F; TAC		11.0		11.0	6.0	5.6	4.4	10.0
1991	70% of effort (89)	-	-		9.0	6.9	6.7	5.3	12.0
1992	70% of effort (89)	-	-		7.5	6.0	6.0	9.4	15.4 ⁴
1993	70% of effort (89)	-	-		8.7	6.8	6.9	8.5	15.4 ⁴
1994	30% reduction in effort	-	-		6.8	5.8	5.9	8.9	14.8 ⁴
1995	Significant reduction in effort	-	-		6.8	6.3	6.1	7.6	13.7 ⁴
1996	Significant reduction in effort	-	-		10.0	6.6	7.2	6.9	14.1
1997	Significant reduction in effort	-	-		13.0	6.2	6.3	4.9	11.2
1998	No increase in F	6.5			9.0	4.7	4.6	5.8	10.5
1999	Reduce F below F_{pa}	4.3			6.3	4.7	4.6	3.1	7.7
2000	Reduce F below F_{pa}	<4.3			4.3	3.2	3.0	6.7	9.7
2001	Reduce F below F_{pa}	<4.2			4.0	2.5	2.4	2.4	4.9
2002	SSB > B_{pa} in short term	<2.0			3.5	1.2	1.7	2.1	3.8
2003	No cod catches	-			2.0				
2004	²	SSB > B_{pa} in short term	²	<2.1					

¹TAC is set for Divisions VIa and VIb combined. ²Single-stock boundary and the exploitation of this stock should be conducted in the context of mixed fisheries protecting stocks outside safe biological limits. Weights in '000 t.

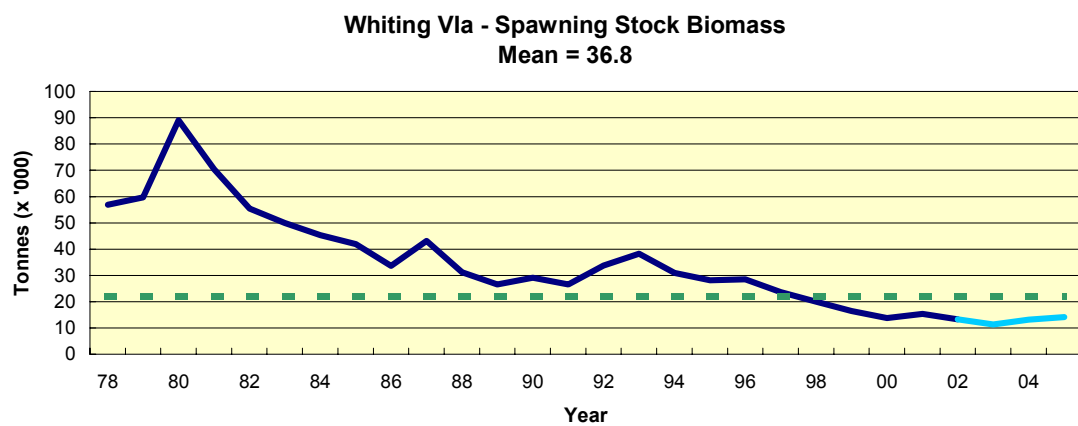
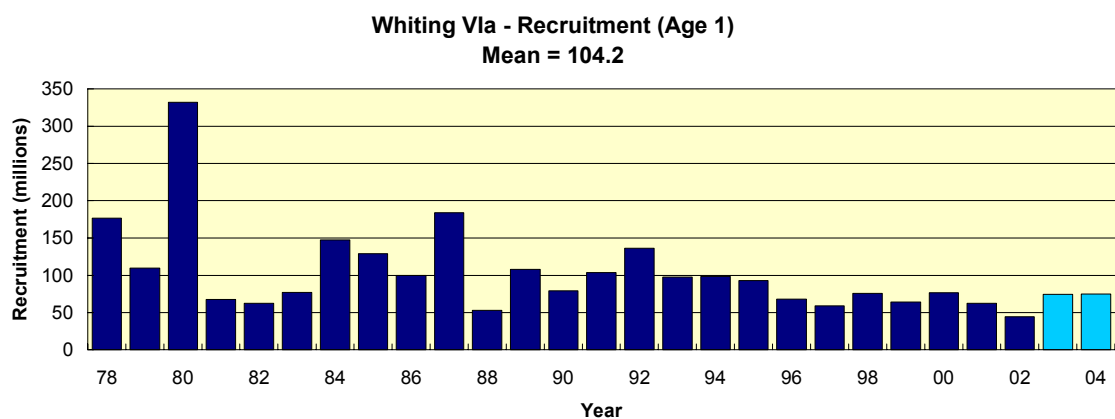
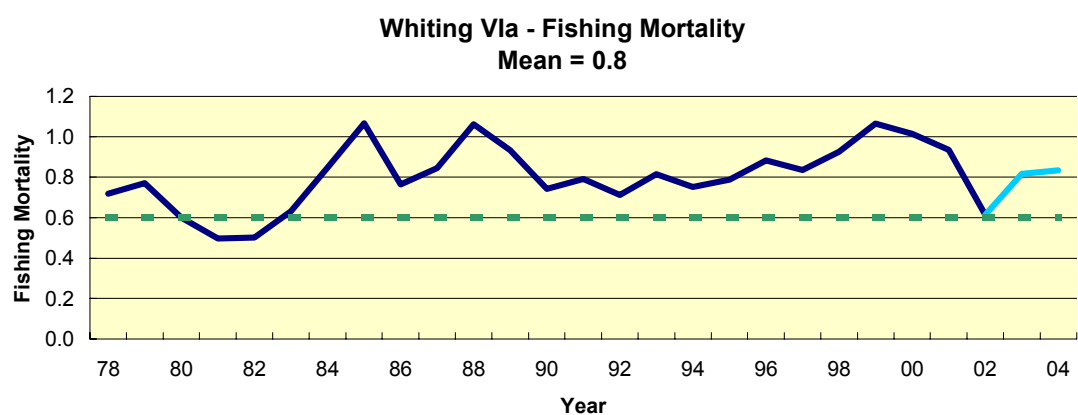
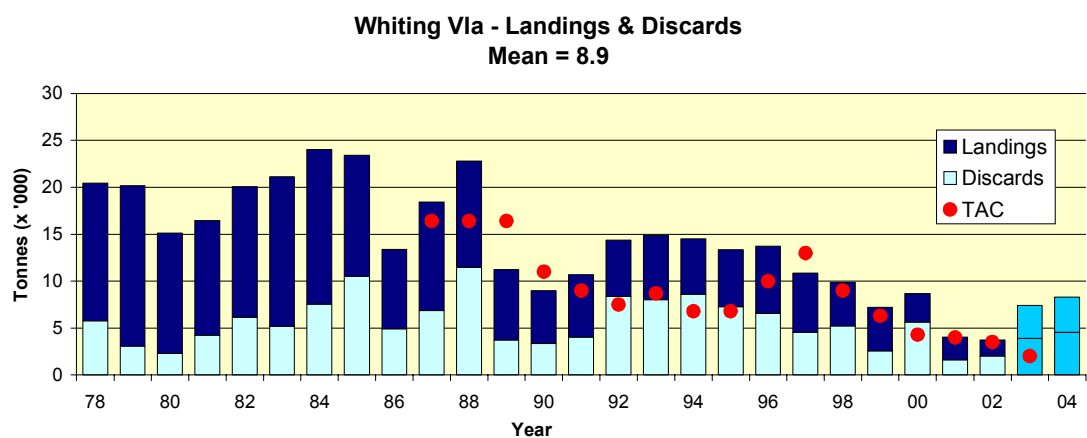


Table 3.7.4.a.1 Nominal catch (t) of WHITING in Division VIa, 1986–2002, as officially reported to ICES.

Country	1988	1989	1990	1991	1992	1993	1994	1995	1996	1997	1998	1999	2000	2001	2002 ¹
Belgium	3	1	-	+	-	+	+	+	-	1	1	+	+	-	-
Denmark	-	1	+	3	1	1	+	+	+	+	-	-	-	-	-
France	1,249	199 ^{1,2}	180	352 ^{1,2}	105	149	191	362	202	108	82 ¹	300 ¹	48	54 ¹	56
Germany	4	+	+	+	1	1	+	-	+	-	-	+	-	-	+
Ireland	2,640	1,315	977	1,200	1,377	1,192	1,213	1,448	1,182	977	952	1,121	793	764	n/a
Netherlands	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Spain	-	-	-	-	-	-	-	1	-	1	2	+	-	2	n/a
UK (E&W) ³	30	44	50	218	196	184	233	204	237	453	251	210	104	71	...
UK (N.I.)	89	...	...	...	...	...	...	...	...	...	...	...	...	...	...
UK (Scot.)	7,864	6,109	4,819	5,135	4,330	5,224	4,149	4,263	5,021	4,638	3,369	3,046	2,258	1,654	...
UK (total)															1,137
Total landings	11,879	7,669	6,026	6,908	6,010	6,751	5,786	6,278	6,642	6,178	4,657	4,677	3,203	2,545	1,193
Unallocated landings	-528	-138	-383	-248	-6	121	115	-202	514	107	-26	-64	-193	-107	516
Discards as used by W.G.	11,784	4,068	4,393	5,346	9,392	8,501	8,870	7,581	6,902	4,907	5,845	3,121	6,705	2,412	2,139
Landings as used by W.G.	11,351	7,531	5,643	6,660	6,004	6,872	5,901	6,076	7,156	6,285	4,631	4,613	3,010	2,438	1,709
Total catches as used by W.G.	23,135	11,598	10,036	12,006	15,396	15,373	14,771	13,657	14,057	11,193	10,476	7,734	9,714	4,850	3,848

¹Preliminary.

²Includes Divisions Vb (EC) and VIb.

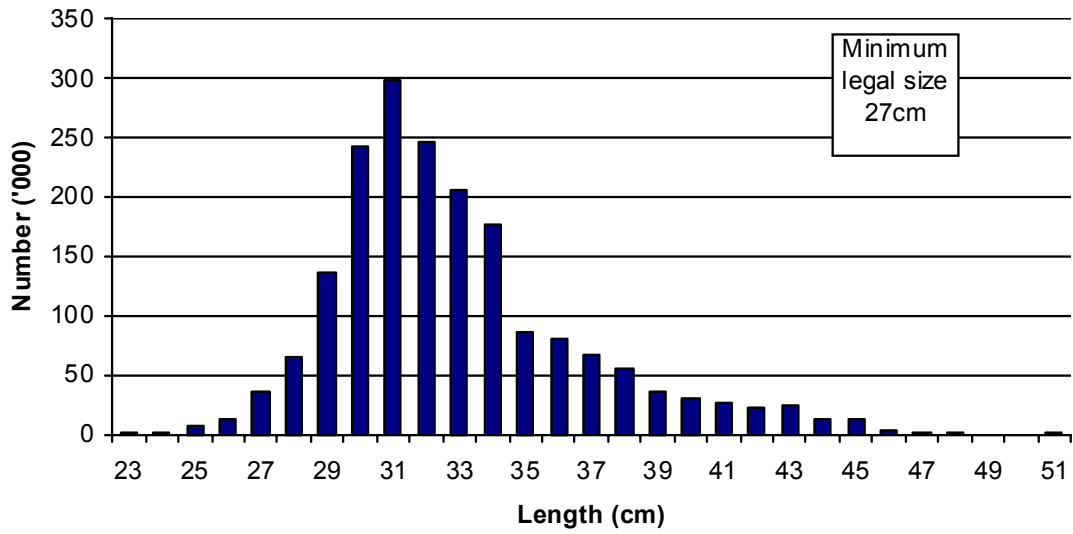
³1989–2002 N. Ireland included with England and Wales.

n/a = Not available.

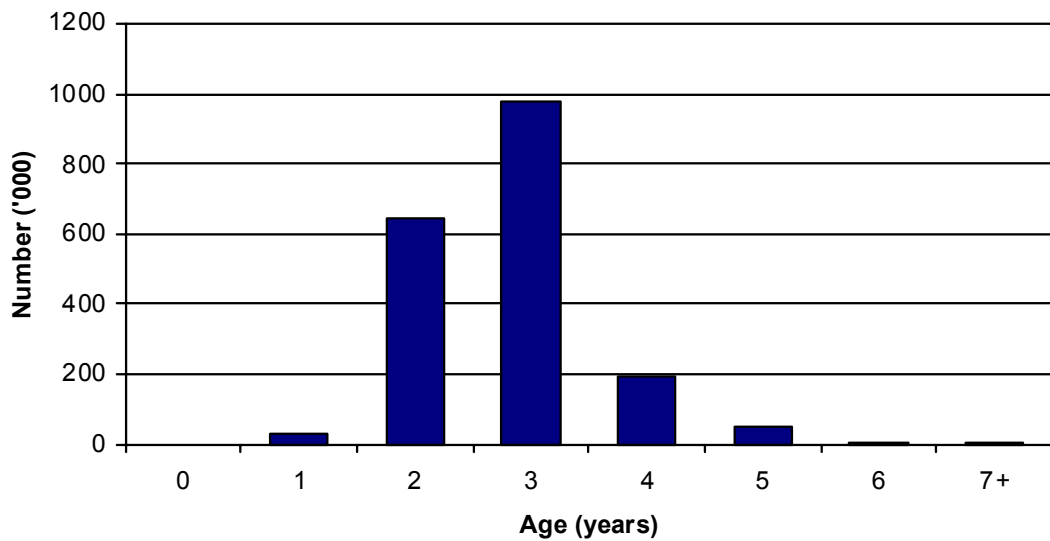
Table 3.7.4.a.2 Whiting in Division VIa (West of Scotland).

Year	Recruitment Age 1 thousands	SSB tonnes	Landings tonnes	Mean F Ages 2-4
1978	176737	28633	14669	0.7185
1979	109603	37525	17084	0.7719
1980	332143	33798	12819	0.6006
1981	67645	58697	12194	0.4961
1982	62467	48622	13880	0.5011
1983	77020	37956	15962	0.6309
1984	147391	30679	16459	0.8470
1985	129037	27988	12879	1.0663
1986	99874	22695	8458	0.7653
1987	184090	25133	11542	0.8455
1988	53025	26930	11349	1.0610
1989	107657	14901	7523	0.9346
1990	78880	18018	5642	0.7428
1991	103523	16506	6658	0.7917
1992	136284	18198	6005	0.7118
1993	97421	26354	6872	0.8147
1994	98643	22214	5901	0.7529
1995	92673	21151	6078	0.7873
1996	68053	21891	7158	0.8818
1997	59021	16718	6290	0.8356
1998	75572	12375	4627	0.9251
1999	64365	11029	4613	1.0646
2000	76625	8001	3011	1.0142
2001	62679	9100	2439	0.9357
2002	44535	9953	1709	0.6139
2003	74588	11290		
Average	103060	23706	8873	0.8044

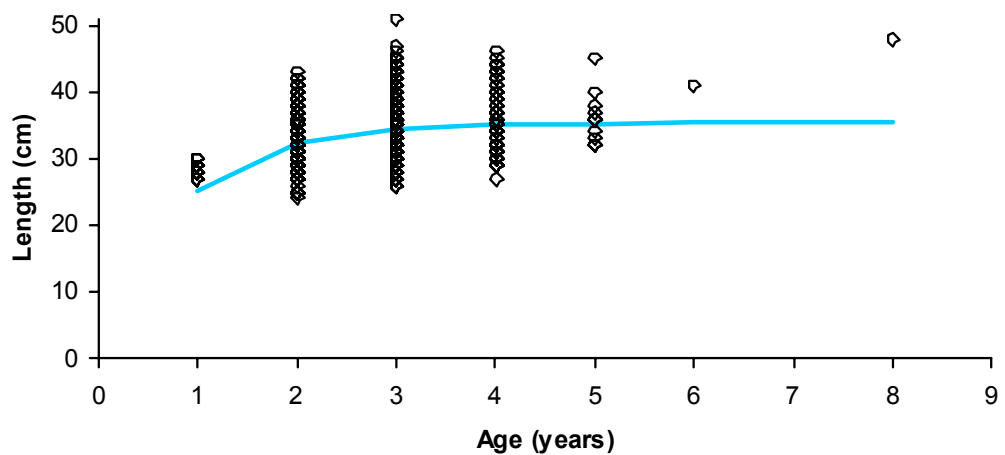
2002 Length Distribution: Irish Landings, Whiting in Vla



2002 Age Distribution: Irish Landings, Whiting in Vla



2002 Size at Age: Irish Sampling, Whiting in Vla



Rockall Whiting

(Division VIb)



Fisheries Science Services

FSS – SINGLE STOCK CONSIDERATIONS

(See West of Scotland and Rockall Overview for Mixed Fishery Advice)

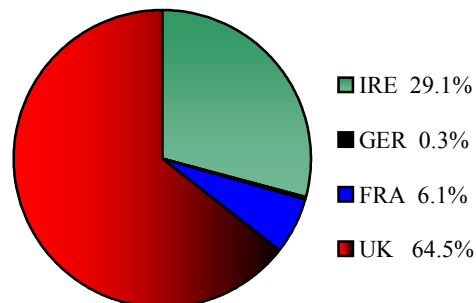
FSS considers that whiting catches from VIb are so insignificant that there is no merit in providing scientific advice for this area.

STATE OF THE STOCK

- There is no ICES assessment for this stock.
- Catches of whiting from VIb are negligible. Hence only the VIa whiting are assessed.

CURRENT MANAGEMENT

- The TAC area covers Sub-areas Vb, VI, XII and XIV.
- The TAC in 2003 was 2,000 t with an associated Irish quota of 582 t.



ADDITIONAL INFORMATION

- 1 Irish vessels reported landings of 0.1 t of whiting in Division VIb in 2002.
- 2 It is likely that whiting caught at Rockall are migrants from the VIa rather than a discrete VIb stock.
- 3 It is likely that the UK Scottish landings during the early 1990s are probably linked to area misreporting of other species such as haddock and anglerfish into Division VIb.

Table 3.7.4.b.1 Nominal catch (t) of WHITING in Division VIb, 1989–2002, as officially reported to ICES.

Country	1989	1990	1991	1992	1993	1994	1995	1996	1997	1998	1999	2000	2001	2002*
France	... ²	... ²	... ²	... ²	... ²	... ²	... ²	-	-	-	-	-	+	+
Ireland	-	-	-	-	32	10	4	23	3	1	-	-	10	
Spain	-	-	-	-	-	n/a	n/a	-	-	-	+	-	-	
UK (E/W/Ni)	16	6	1	5	10	2	5	26	49	20	+	+	-	...
UK (Scotland)	18	482	459	283	86	68	53	36	65	23	44	58	4	...
United Kingdom														7
Total	34	488	460	288	128	80	62	85	117	44	44	58	14	

*Preliminary.

²Included in Division VIa.

n/a = not available.

West of Scotland and Rockall Megrin

(Sub-area VI)

For latest information, see: <http://www.ices.dk>



Fisheries Science Services

FSS - SINGLE STOCK CONSIDERATIONS

(See West of Scotland and Rockall Overview for mixed fishery advice).

The state of this stock is uncertain. The historical perspective of SSB, fishing mortality, and recruitment is not well estimated for this stock.

FSS notes that the STECF and ICES advice for other West of Scotland and Rockall stocks is predicated primarily on the need to rebuild cod, hake and haddock stocks. FSS endorses this approach as being consistent with the precautionary approach to fisheries management.

FSS point out that megrim are caught in mixed fisheries which may include catches of species outside safe biological limits in Sub-area VI. FSS point out that an industry initiated programmes aimed at reducing catches of Cod (VIa), Northern Hake and Haddock (VIb) should be considered in the management West of Scotland and Rockall fisheries. Industry initiated programmes should be encouraged but must include a high rate of independent observer coverage or other totally transparent methods for ensuring that their catches of species outside safe biological limits are fully and credibly reported.

FSS would point out that there is a declining trend in landings for this stock and exploratory assessments suggest that the stock may be in decline. Therefore the 'precautionary TAC' should be adjusted downwards in line with recent landings. FSS considers that catches in 2004 should be no more than the recent (1999-2001) landings in Divisions VIa and VIb and unallocated landings in Sub-area IV of about 3,600 t. This translates into an Irish quota of 467 t. However, the mixed fisheries advice given for mixed fisheries west of Scotland and at Rockall particularly in relation to stocks outside safe biological limits will determine the TAC for megrim.

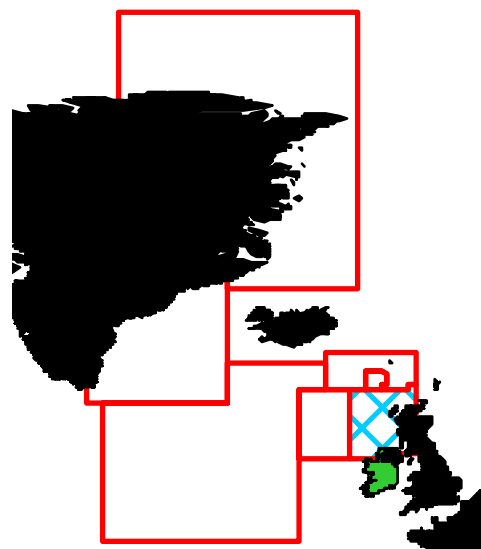
STATE OF THE STOCK

- The state of this stock in relation to biological reference points is not known.

- The estimated 2001 Sub-area VI landings were 3,300 t (Note: 2002 landings are incomplete). The landings from VIa have shown a marked increase from 1991 to 1996 (4,400 t) but have subsequently fallen to the recent low of 2,350 t in 2001.
- There are indications that fishing mortality has declined in recent years from a high in 1995.
- There is evidence that recruitment was above average in 1992 and 1993. Recruitment in recent years is poorly estimated.
- Spawning stock biomass may have declined in this stock since the early 1990s.
- The preliminary assessment carried out this year is not a sufficient basis to predict future stock development.

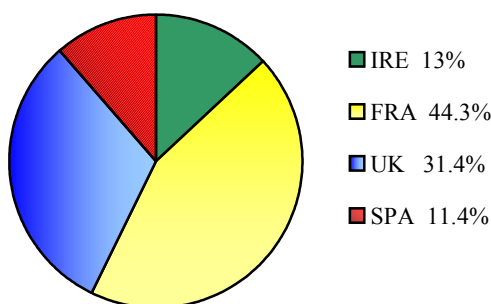
CURRENT MANAGEMENT

- The assessment area is currently Division VIa while the TAC is based on a larger area (Sub-areas VI, XII, XIV and Division Vb).



Red Boxes-TAC/Management Areas Blue Shading- Assessment Area

- The 2003 TAC was set at 4,360 t with an Irish quota of 565 t (13%).
- There are no explicit management objectives or a management plan for this stock.
- FSS advise that management objectives be established and that a management plan be developed and implemented for the mixed fisheries catching megrim.
- The minimum landings size for megrim is 20 cm.



FSS – ECONOMIC COMMENTS

- The value of the 2002 Irish quota was about €1.7m.
- The value of the 2002 Irish landings was about €1.1m.
- This is an economically important by-catch species in the mixed demersal fisheries off Donegal and at Rockall.

ADDITIONAL INFORMATION

- 1 A preliminary assessment was carried out for VIa megrim in 2002. This assessment is hampered by the lack of catch and effort data from both the main fleet exploiting megrim and research surveys.
- 2 Estimated Irish landings in 2002 were 368 t (281 t and 87 t, for VIa and VIb, respectively).
- 3 Irish landings in Sub-area VI are mainly taken by otter trawlers fishing at the Stanton, Rockall and in Donegal Bay. Megrim and anglerfish fish landings on a trip-by-trip basis are correlated for Irish otter trawl vessels fishing at Rockall. However, this correlation is not apparent in Division VIa.
- 4 Mis-reporting of anglerfish landings in the past, into Sub-area IV has led to an associated mis-reporting of the megrim component of the catch for some fleets. This has led to serious concerns about the accuracy of the landings data and large unallocated catches in the Working Group estimates of landings. No information is available on mis-reporting by the Irish fleet.
- 4 Scottish and Irish vessels dominate the fishery. French landings declined in the early 1990s and remain low. Spain reports the highest landings of megrim from VIb.
- 5 Irish sampling for this stock is supported through the EC funded sampling programme, which is required under Data Collection Regulation 1543/2000 and 1639/2001.
- 6 Irish landings are dominated by 4-6 year old megrim in VIa and 6-9 year old megrim in VIb. Differences in age structure and growth rates of the population suggest that megrim from these two Divisions should be assessed as different stocks.
- 7 FSS have carried out a groundfish survey in the southern part of VIa however this survey is targeted at gadoids and does not provide a reliable index for this stock.
- 8 Two species of megrim are caught. The majority of landings are *Lepidorhombus whiffiagonis*. Landings of *L. boscii* are negligible.

- 9 Irish discard sampling between 1995-2000 suggest that between 30-50% of the megrim catch by number and between 8-21% by weight are discarded. Male megrim grow to a smaller maximum size than females, and as a consequence the majority of males in the catches are discarded and the bulk of fish landed comprise of females. Improving the selection pattern by increasing the mesh size in this fishery would probably result in higher longer-term yields.
- 10 An EU funded research project (with the Marine Laboratory Aberdeen & Scottish Association for Marine Science) to investigate the biology and distribution of monkfish and megrim in Sub-area VI was concluded in 2001.

ICES ADVICE

3.7.6

State of stock/exploitation:

The absence of a time-series of abundance indices and discards estimates means that the historical perspective of SSB, fishing mortality, and recruitment is not well estimated for this stock.

Management objectives:

No explicit management objectives are set for this stock.

Reference points:

There is not sufficient information to estimate appropriate reference points.

Single stock exploitation boundaries:

Catches in 2004 should be no more than the recent (1999-2001) landings in Divisions VIa and VIb and unallocated landings in Subarea IV of about 3 600 t.

The advice on the exploitation of this stock in 2004 is presented in the context of mixed fisheries and is found in Section 3.7.1.

Relevant factors to be considered in management:

Although it is not possible to provide management advice for this stock based on an analytical assessment, preliminary assessments have been carried out for this stock in the last two years. These analyses provide inconsistent indications of trends in fishing mortality.

The megrim in Subarea VI consists of two species, *Lepidorhombus whiffiagonis* and *L. boscii*. The large majority of the landings are *L. whiffiagonis*. Male megrim grow to a smaller maximum size than females, and as a consequence the majority of males in the catches are discarded and the bulk of fish landed comprise females.

Although total landings are less than the TAC, some national quotas are restrictive and this may have led to under-

reporting of catches. Area misreporting has been prevalent as megrim catches were misreported from Subarea VI into Subarea IV due to restrictive quotas for anglerfish (i.e. vessels targeting anglerfish misreported all landings including megrim from Subarea VI into Subarea IV). In order to avoid misreporting by area the TAC should include Subarea IV.

Elaboration and special comment:

In the past management of the megrim stock has been linked to that for anglerfish on the assumption that landings were correlated in the fishery. It was assumed that the anglerfish management would also constrain fishing mortality on megrim. This may no longer be true due to recent

changes in the fishing pattern in the Scottish and Irish fleets, and the dynamics of the species are probably not linked.

Landings in Division VIa peaked at 4400 t in 1996 and have subsequently declined. The 2002 landings data are incomplete.

Source of information:

Report of the Working Group on the Assessment of Northern Shelf Demersal Stocks, May 2003 (ICES CM 2004/ACFM:01).

Catch data (Table 3.7.6.1)

Year	ICES Advice	Single-stock exploitation boundaries	Predicted catch corresp. to advice	Predicted catch corresponding to single-stock boundaries	Agreed TAC ¹	Official Landings ³	ACFM landings ⁴
1987	Not assessed	-	-	-	4.4	3.9	-
1988	Not assessed	-	-	-	4.84	4.5	-
1989	Not assessed	-	-	-	4.84	2.7	-
1990	Not assessed	-	-	-	4.84	2.7	3.7
1991	No advice	-	-	-	4.84	3.2	3.7
1992	No advice	-	-	-	4.84	3.2	4.8
1993	No long-term gain in increased F	-	-	-	4.84	3.0	4.3
1994	No long-term gain in increased F	-	-	-	4.84	3.0	4.3
1995	No advice	-	-	-	4.84	3.3	4.6
1996	No advice	-	-	-	4.84	2.9	5.3
1997	No advice	-	-	-	4.84	2.8	4.6
1998	Adequate catch controls	-	-	-	4.84	2.7	4.2
1999	Maintain current TAC	-	4.84	-	4.84	2.5	3.8
2000	Maintain current TAC	-	4.84	-	4.84	2.4	3.6
2001	Maintain current TAC	-	4.84	-	4.36	2.4	3.3
2002	Maintain current TAC	-	4.36	-	4.36	1.0 ²	1.3 ²
2003	Maintain current TAC	-	4.36	-	4.36	-	-
2004	⁵	Reduce TAC to recent landings	⁵	3.60	-	-	-

¹Vb(EC), VI, XII and XIV. ²Incomplete data. ³VIa and VIb ⁴Landings in VIa and VIb and unallocated landings from IV. Landings in Vb (EC), XII, and XIV are negligible. ⁵Single-stock boundary and the exploitation of this stock should be conducted in the context of mixed fisheries protecting stocks outside safe biological limits. Weights in '000 t.

Table 3.7.6.1

Nominal catch (t) of MEGRIM in Subarea VI (West of Scotland and Rockall), as officially reported to ICES and WG best estimates of landings for Division VIa.

Megrim in Division VIa (West of Scotland)

	1988	1989	1990	1991	1992	1993	1994	1995	1996	1997	1998	1999	2000	2001	2002*
Belgium	1	1	-	1	-	-	1	-	-	-	-	-	+	-	-
Denmark	-	1	-	-	-	-	-	-	-	-	-	-	-	-	-
France	1,295	457	398	455	504	517	408	618	462	192	172	203	135	244	80
Germany	2	-	-	-	-	-	-	-	-	-	-	-	-	-	+
Ireland	685	474	317	260	317	329	304	535	460	438	433	438	417	509	n/a
Spain	121	43	91	48	25	7	1	24	22	87	111	83	98	92	n/a
UK(E&W&NI)	354	122	25	167	392	298	327	322	156	123	65	42	20	7	
UK(Scotland)	1,068	1,169	1,093	1,223	887	896	866	952	944	954	841	831	754	770	
UK															657
Total	3,526	2,267	1,924	2,154	2,125	2,047	1,907	2,451	2,044	1,794	1,622	1,597	1,424	1,622	737
Unallocated			1,000	518	1,595	1,356	1,373	1,375	2,381	1,795	1,522	1,338	1,266	843	311
As used by WG			2,924	2,672	3,720	3,403	3,280	3,826	4,425	3,589	3,144	2,935	2,690	2,465	1,048

Megrim in Division VIb (Rockall)

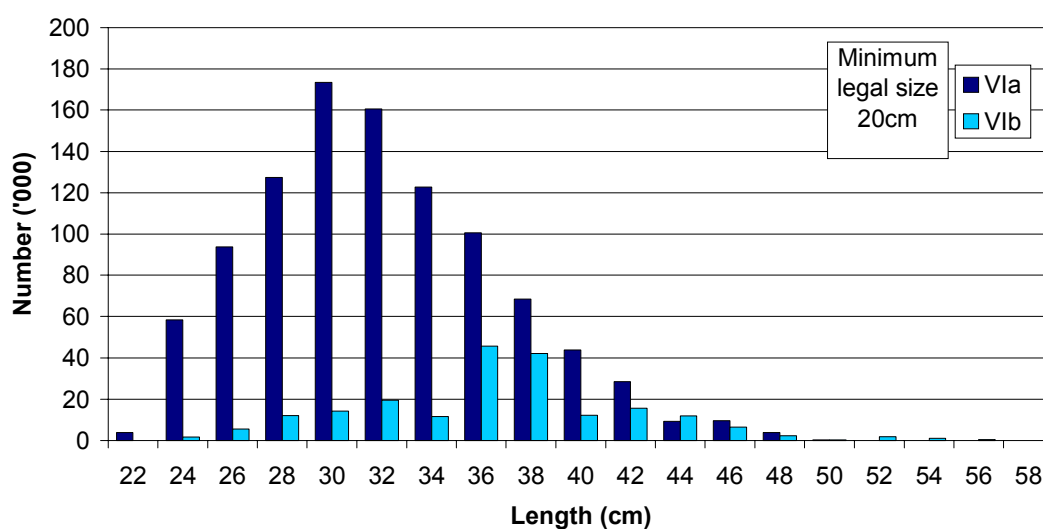
	1988	1989	1990	1991	1992	1993	1994	1995	1996	1997	1998	1999	2000	2001	2002*
France	1	-	-	-	-	-	-	-	-	-	-	-	4	1	1
Ireland	-	-	196	240	139	128	176	117	124	141	218	127	167	176	n/a
Spain	751	205	363	587	683	594	574	520	515	628	549	404	427	370	n/a
UK(E&W&NI)	77	18	19	14	53	56	38	27	92	76	116	57	57	42	
UK(Scotland)	185	178	226	204	198	147	258	152	112	164	208	278	309	236	
UK															248
Total	1,014	401	804	1,045	1,073	925	1,046	816	843	1,009	1,091	866	964	825	249

Total Megrim in Subarea VI (West of Scotland and Rockall)

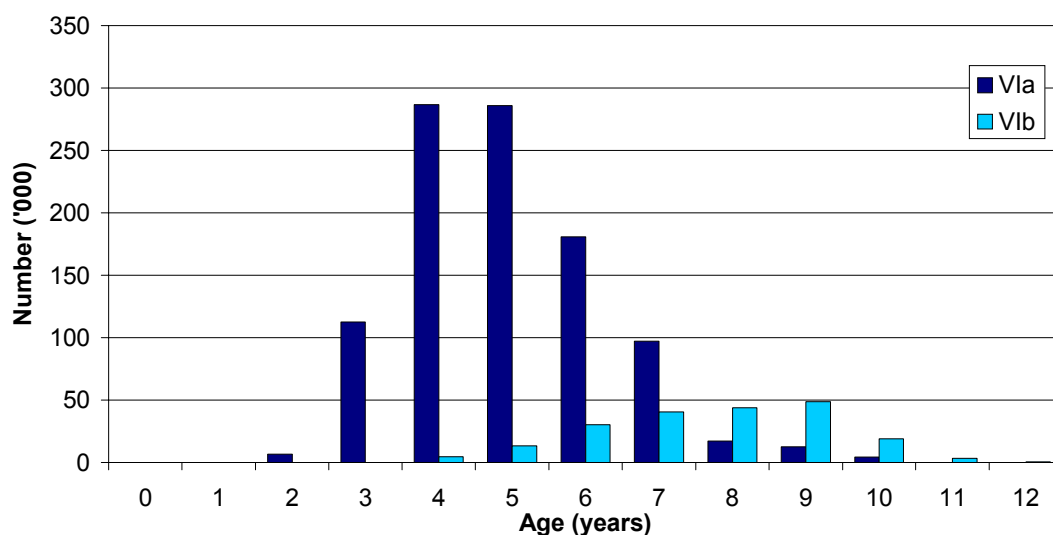
Year	1988	1989	1990	1991	1992	1993	1994	1995	1996	1997	1998	1999	2000	2001	2002*
Total	4,540	2,668	2,728	3,199	3,198	2,972	2,953	3,267	2,887	2,803	2,613	2,204	2,230	1,668	560
As used by WG			3,728	3,717	4,793	4,328	4,326	4,642	5,268	4,598	4,235	3,801	3,654	3,290	1,297

* Preliminary.

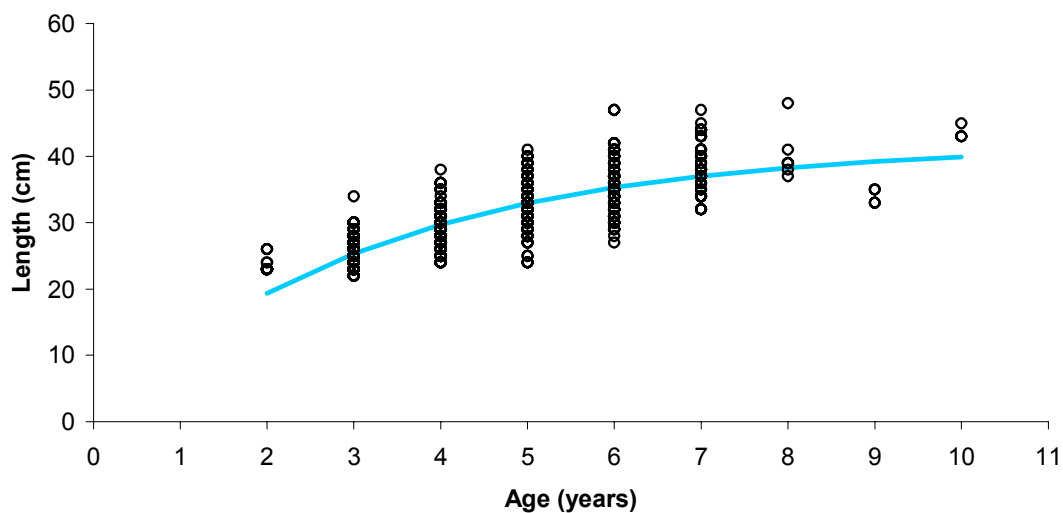
2002 Length Distribution: Irish Landings, Megrim in V1a V1b



2002 Age Distribution: Irish Landings, Megrim in V1a V1b



2002 Size at Age: Irish Sampling, Megrim in V1a



West of Scotland Rockall and North Sea Anglerfish

(Sub-areas IV and VI)

For latest information, see: <http://www.ices.dk>



Fisheries Science Services

FSS - SINGLE STOCK CONSIDERATIONS

(See West of Scotland and Rockall Overview for mixed fishery advice).

Based on the most recent estimate of the fishing mortality, ICES classifies the stock as being harvested outside safe biological limits.

FSS notes that the STECF and ICES advice for other West of Scotland and Rockall stocks is predicated primarily on the need to rebuild cod, hake and haddock stocks. FSS endorses this approach as being consistent with the precautionary approach to fisheries management.

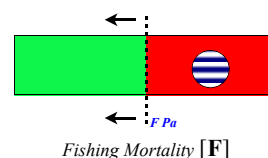
FSS point out that anglerfish are caught in mixed fisheries which may include catches of species outside safe biological limits in Sub-area VI. FSS point out that an industry initiated programmes aimed at reducing catches of Cod (VIa), Northern Hake and Haddock (VIb) should be considered in the management West of Scotland and Rockall fisheries. Industry initiated programmes should be encouraged but must include a high rate of independent observer coverage or other totally transparent methods for ensuring that their catches of species outside safe biological limits are fully and credibly reported.

FSS considers that for the anglerfish stock fishing mortality in 2004 should be reduced to less than F_{pa} . This implies landings of less than 8,800 t in 2004 for the combined Division IIIa, Sub-area IV, and Divisions VIa and VIb. This translates into a TAC for Sub-areas VI, XII, XIV and Division Vb of 3,520 t and an Irish quota of 352 t. However, the mixed fisheries advice given for mixed fisheries west of Scotland and at Rockall particularly in relation to stocks outside safe biological limits will determine the TAC for anglerfish.

TAC Area	TAC 2003	Proposed TAC 2004	Basis
Ila and Sub-Area IV	7,000	5,280	$F < F_{pa}$
Sub-areas VI, XII, XIV and Division Vb	3,180	3,520	$F < F_{pa}$
Total TAC	10,180	8,800	
Irish quota	318	352	

STATE OF THE STOCK

State of the Stock in relation to the precautionary reference points (see page 18)

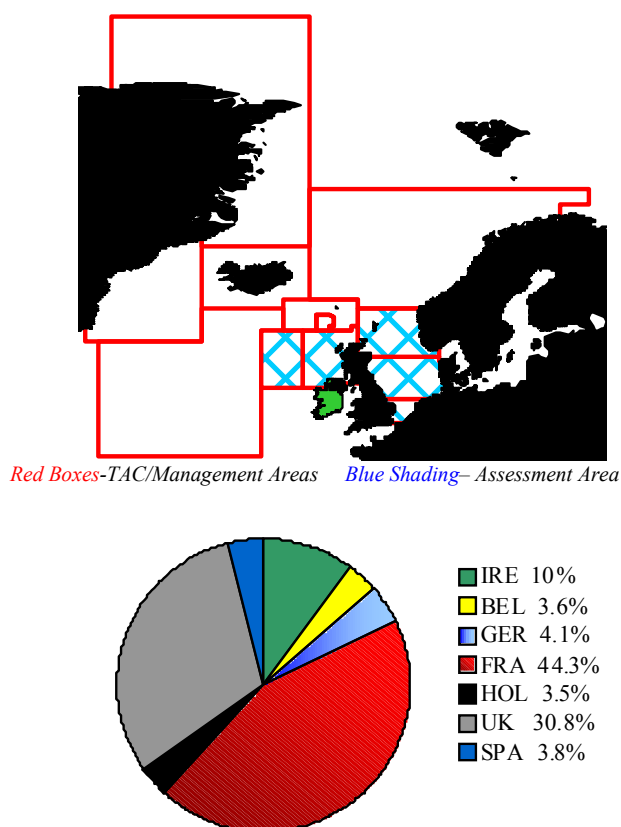


$B_{pa}, B_{lim} \text{ \& } F_{lim} \text{ not defined}$

- There are concerns about the state of this stock even though the historical perspective of SSB, fishing mortality, and recruitment is not well estimated.
- International landings in 2002 amounted to 12,400 t. This is a combined working group estimate for Sub-areas IV and VI. This is a decrease on the 2001 landings of 15,950 t. During the 1970s landings were fairly stable at around 9,000 t but from 1991 they increased steadily with the spatial expansion of the fishery to a peak of 34,400 t in 1996. Landings have declined steadily since 1996.
- An assessment for the combined area indicates that the recent F 's have been well above the F_{pa} of 0.3. It is likely that fishing mortality has increased since the 1980s as the fishery has expanded into deeper water, although F has declined since 1997. All analyses indicate that F is well above what may be considered sustainable.
- Lack of biological information prevents the estimation of SSB with certainty but SSB appears to have declined recently to a relatively low level. There is no proposed B_{pa} .

CURRENT MANAGEMENT

- Due to previous problems with mis-reporting catches from Sub-Area IV into VI the assessment area has been extended and combines anglerfish from Sub-areas IV, Divisions VIa and IIa. The latest assessment was further extended to include Division VIb.
- There are two TACs covering the assessment area in 2003: 7,000 t for Division IIa (EC waters), North Sea (EC waters) and 3,180 t for Sub-areas VI, XII, XIV and Division Vb (EC Waters). Ireland takes its quota (318 t in 2003) exclusively from Sub-Area VI.
- There are no management objectives or a management plan for this stock.
- FSS recommends that management objectives be established and that a management plan be developed and implemented for fisheries catching anglerfish.



FSS – ECONOMIC COMMENTS

- The value of the 2002 Irish quota was about €1.1m.
- The value of the 2002 Irish landings was about €1.3m.
- This is a very valuable stock to demersal trawlers primarily from Killybegs and Greencastle.

ADDITIONAL INFORMATION

1. Previous assessment uncertainty has diminished in that recruitment is now estimated reasonably well. However, significant upward revisions of the fishing mortality in successive assessments indicate a tendency to underestimate F . There was a significant upward revision to the historical spawning biomass with the addition of the data for 2002.
2. Estimated Irish landings were about 390 t in 2002 and decrease of about 20% on the 2001 landings.
3. In the past the lack of TAC regulation in the adjacent Sub-area IV encouraged mis-reporting of landings into that area and undermined management for Sub-area VI. However, due to a long history of mis-reporting, the correct allocation of catches to Sub-areas IV and VI is not possible.
4. A recently expanded and modernised UK Scottish fleet primarily exploits this fishery. The fleet has managed to maintain landings by moving into deeper waters and by increasing efficiency using twin-rig trawls. This has made a realistic assessment for this stock very difficult.
5. The Irish fleet exploiting this fishery is mainly composed of otter trawl vessels from Greencastle and Killybegs.
6. Irish Sampling of this stock is supported through the EC

funded sampling programme that is required under Data Collection Regulations 1543/2000 and 1639/2001. In recent years the size of landed fish in Ireland has continued to decrease. This may lead to over exploitation of juveniles on nursery grounds.

7. The assessment uses a recruitment index calculated from data collected on a Scottish survey.
8. There are no working group discard estimates for this species. FSS have insufficient data on which to assess the level of anglerfish discarding by Irish vessels.
9. Mesh regulation offer little protection to this species since their shape means that even the small individuals are easily retained in the gear. However, the use of selective devices, such as rigid grids, to minimize catches of juvenile anglerfish have been studied in France with promising results. Industry-initiated programmes to improve current exploitation pattern (where the catch is dominated by small fish) should be used in fisheries catching juvenile anglerfish. Reducing catches of juvenile anglerfish would lead to increases in yield and increase their potential contribution to the future SSB. This would lead to a larger 'buffer stock' where there are a broad range of age groups in the population and SSB and catches are robust to occasional weak recruitments.
10. The assessment is mainly based on data concerning *L. piscatorius*. The Irish fishery catches more black-bellied monkfish *L. budegassa* than other fisheries on the northern shelf. Ratios of black-bellied to white-bellied anglerfish are not well estimated over time but black bellied anglerfish could constitute up to 30% of Irish landings. It may be beneficial to the Irish fisheries managers to take this into account when considering future management options for this stock.
11. The current low level of landings is a very worrying trend given that there is no perceived change in the exploitation pattern. In fact effective fishing effort may have increased. The sharp reduction in landings since 1996 and the scarcity of mature females in the catches may indicate that the stock is heavily over-exploited.
12. The expansion of the trawl fishery into deepwater coupled with a UK-Spanish deepwater tangle net fishery has probably lead to depletion of the spawning component. The fishery has expanded into areas which are believed to have been refugia for adult anglerfish, increasing the vulnerability of the stock to over-exploitation.
13. FSS participated in an EU-funded research project to increase biological knowledge of the anglerfish and megrim stock in Sub-area VI. Findings suggest that large mature females are uncommon in deeper water and indicate a very low SSB in this stock. Less than 1% of the monkfish examined in commercial and research catches were mature. These findings cannot be reconciled with the SSB estimates from this assessment. Therefore the SSB estimated in this length-based assessment might be unrealistic. Other findings of this project indicated that the no differences in stock structure could be detected from west of Ireland to the North Sea and FSS point out that the current assessment area may not be appropriate.
14. FSS point out that the ICES assessment only covers the period 1993-2002 during which the stock was not harvested sustainably. Fishing mortality in this assessment is calculated relative to the first year of the assessment period.

ICES ADVICE

3.7.7

Two species occur, *Lophius piscatorius* and *L. budegassa*, although catches are almost exclusively of the former.

State of stock/exploitation:

Based on the most recent estimate of the fishing mortality, ICES classifies the stock as being harvested outside safe biological limits. An assessment for the combined area indicates that the recent F 's have been well above F_{pa} . The spawning stock biomass has decreased, but biomass reference points have not been identified for this stock. The fish-

ery has expanded into deeper waters with an associated increase in catches, although these have declined since 1997. The fishery has expanded into areas believed to have been a refuge for adult anglerfish, increasing the vulnerability of the stock to over-exploitation. Immature fish are subjected to exploitation for a number of years prior to first maturity.

Management objectives:

No explicit management objectives are set for this stock. However, for any management objectives to meet precautionary criteria, their aim should be to reduce or maintain F below F_{pa} .

Precautionary Approach reference points (unchanged since 1998):

ICES considers that:	ICES proposes that:
There is currently no biological basis for defining B_{lim} or F_{lim} .	$F_{35\%SPR} = 0.30$ be chosen as F_{pa} . This fishing mortality corresponds to 35% of the unfished SSB/R. It is considered to be an approximation of F_{MSY} .

Single Stock Exploitation Boundaries:

Fishing mortality in 2004 should be reduced to less than F_{pa} . This implies landings of less than 8 800 t in 2004 for the combined Division IIIa, Subarea IV, and Divisions VIa and VIb.

The advice on the exploitation of this stock in 2004 is presented in the context of mixed fisheries and is found in Section 3.7.1.

Relevant factors to be considered in management:

ICES notes that long-term gains can be increased by reducing fishing mortality to F_{max} (0.19).

Historical catches for the combined area are believed to have been adequately estimated. However, due to a long history of mis-reporting, the correct allocation of catches to Subareas IV and VI is not possible. Estimates which take into account mis-reporting indicate that the percentage of the catch taken in (Division IIIa, Subarea IV) and (Divisions VIa & VIb) in the years 1993-2002 (the period used in the assessment) average 60% and 40%, respectively. These values may be used as a basis to allocate the 2003 TAC between these areas.

Anglerfish are subject to significant fishing mortality before attaining full maturity. Their body shape means that at a young age they are easily retained by the minimum mesh size currently in force. They are known to be discarded, although no routine discard sampling is undertaken. There is also a bycatch of small anglerfish associated with scallop dredging. The exploitation pattern should be improved to reduce the catch of small anglerfish. There is no minimal landing size for anglerfish, but in order to protect juveniles, the use of selective devices, such as rigid grids, which have been studied in France with promising results, should be further evaluated.

Catch forecast for 2004:

Basis: $F(2003) = F_{sq} = F(2002) = 0.72$;
Landings (2003) = 16.3 ; SSB(2004) = 10.7.

F(2004 onwards)	Basis	Landings (2004)	SSB (2005)
0	0	0	21.3
0.14	$0.2 * F_{sq}$	4.5	18.9
0.30	F_{pa}	8.8	16.5
0.36	$0.5 * F_{sq}$	10.3	15.7
0.43	$0.6 * F_{sq}$	12.0	14.8
0.57	$0.8 * F_{sq}$	15.0	13.1
0.72	$1.0 * F_{sq}$	17.8	11.6

Weights in '000 t.

Shaded scenarios considered inconsistent with a precautionary approach.

Comparison with previous assessment and advice:

Despite the extension of the assessed area and the use of different model parameters, the perception of the state of the stock is consistent with last year's assessment. The basis for the advice is the same as last year.

Elaboration and special comment:

The *status quo* catch forecast for 2003 that was made in 2002 was 17 100 t. The corresponding forecast of catch in 2003 made this year is 16 300 t. Both of these are well in excess of the TAC for 2003 (7000 t) that was forecast at the newly proposed F_{pa} value. This involves a large reduction in fishing mortality from 2002 to 2003. Anecdotal information from the fishery indicates that this TAC has been very restrictive, implying an increased incentive to mis-report or discard catches. This will degrade the quality of future assessments

of this stock, as information on the degree of mis-reporting and discarding is not available.

The reduction of TAC for 2003 by almost two-thirds of that in 2002 may imply an increased incentive to discarding unless fishing effort is reduced accordingly.

The distribution of anglerfish in the North Sea, Kattegat, and Skagerrak is closely associated with the distribution to the West of Scotland (Division VIa & VIb). It is likely that catches from these areas come from the same biological stock.

In order to facilitate the calculation of TACs the assessment is presented this year for the combined Northern Shelf, consisting of Division IIIa, Subarea IV and Subarea VI. In 2002 separate assessments were presented for the separate areas. Recent genetic studies have found no evidence of separate stocks and particle-tracking studies have indicated interchange of larvae between areas. Previous comparisons of joint and individual area assessments indicated similar results for the combined area assessments and individual area assessments.

Until the mid-1980s, anglerfish was taken mainly as a by-catch in bottom trawl groundfish fisheries. Restrictive TACs for other species in Division VIa led to increased fishing pressure on anglerfish in that area, where they are now caught in a targeted anglerfish fishery and as a bycatch in other demersal fisheries including roundfish fisheries in VIa, the haddock fishery on Rockall Bank, *Nephrops* fisheries, and fisheries in deeper waters. In the North Sea, anglerfish are caught as a bycatch in demersal fisheries and in *Nephrops* fisheries in the northern and eastern parts of the North Sea, the Fladen Ground and the Norwegian Deep.

The North Sea catch-at-length distribution is derived solely from Scottish market sampling. Information on catch composition is unavailable from other countries.

The key features of the species' life history in relation to its exploitation are the location of the main spawning areas in relation to the exploited areas, and whether or not there is any systematic migration of younger fish back into the deeper waters to spawn. At present, despite the large increase in catches, there is no apparent contraction in distribution; fish are still recruiting to relatively inshore areas such as the Moray Firth in the northern North Sea. The fact that spawning appears to occur largely in deep water off the edge of the continental shelf may offer the stock some degree of refuge. However, this assumes that the spawning component of the stock is resident in the deep water, and is thus not subject to exploitation. It is not known to what extent this is true, but it is clear that the current expansion of the fishery into deeper water is undesirable. Given the spatial development of the fishery, it cannot be ruled out that the serial depletion of fishing grounds may be occurring. In addition, some life-history characteristics of anglerfish suggest that it may be particularly vulnerable to high exploitation.

The North Sea Commission Fisheries Partnership has again initiated a survey that has been conducted among fishermen in order to evaluate their perceptions of the stock and catches in 2003 in relation to 2002. The results of the 2003 survey were made available to ICES in September 2003 (Figure 3.7.7.1). The overall trend for monkfish abundance is to have remained the same over the reference period, with an indication of an increase in the northern North Sea (area 1), where 45% of respondents have reported an increase. Returns from Skagerrak and Kattegat (areas 8 & 9) suggest a decrease in monkfish abundance. All areas reported there to be all sizes of monkfish in the catches, with the exception of the northwestern North Sea (area 3) where 40% of respondents reported that the catches comprised of small fish. These small fish were also reported in areas 3 & 4 (16% & 27%) in the 2002 survey. There were no large monkfish reported in the southern North Sea areas. Overall monkfish discards are less or the same as 2002, with only 4% of respondents noting an increase. ICES notes that the results of the fishermen survey could be consistent with the results of the assessment for this stock, although absolute estimates of abundance cannot be derived from the survey, which is comparing this year with last year's catch rates.

The assessment is based on analysis of catch-at-age data calibrated with data from three research vessel surveys.

Source of information:

Report of the Working Group on the Assessment of Northern Shelf Demersal Stocks, May 2003 (ICES CM 2004:01).

North Sea Stock Survey 2003. Preliminary results. 9 September, 2003. Europeche.

Catch data (Table 3.7.7.2):

Subarea IV – North Sea

Year	ICES Advice	Single-stock exploitation boundaries	Predicted catch corresp. To advice	Predicted catch corresponding to single-stock boundaries	Agreed TAC	Official landings	ACFM Landings
1989	Not assessed	-	-	-	-	10.1	9.3
1990	Not assessed	-	-	-	-	10.6	9.5
1991	Not assessed	-	-	-	-	11.8	10.6
1992	Not assessed	-	-	-	-	13.3	11.7
1993	Not assessed	-	-	-	-	15.5	13.1
1994	Not assessed	-	-	-	-	18.2	15.4
1995	Not assessed	-	-	-	-	20.9	15.8
1996	Not assessed	-	-	-	-	27.3	16.2
1997	Not assessed	-	-	-	-	25.8	18.2
1998	Not assessed	-	-	-	22.1	19.0	14.0
1999	Not assessed	-	-	-	22.1	14.9	11.7
2000	40% reduction in catches	-	<9.7	-	17.66	14.0	11.6
2001	2/3 of the catches in 1973-1990	-	5.7	-	14.13	14.7	10.2
2002	2/3 of the catches in 1973-1990	-	5.7	-	10.50	12.1	8.2
2003	Reduce F below F_{pa}	-	<6.7 ²⁾	-	7.0		
2004	¹⁾	Reduce F below F_{pa}	¹⁾	8.8			

Weights in '000 t. ¹⁾ Single stock boundary and the exploitation of this stock should be conducted in the context of mixed fisheries protecting stocks outside safe biological limits. ²⁾ Advice for Division IIIa, Subarea IV, and Subarea VIa combined.

Catch data (Table 3.7.7.3):

Subarea VI – West of Scotland and Rockall

Year	ICES Advice	Single-stock exploitation boundaries	Predicted catch corresp. To advice	Predicted catch corresponding to single-stock boundaries	Agreed TAC ¹	Official landings	ACFM landings ²
1987	Not assessed		-		7.8	5.2	5.6
1988	Not assessed		-		8.6	7.7	7.7
1989	Not assessed		-		8.6	6.0	7.3
1990	Not assessed		-		8.6	6.4	6.6
1991	No advice		-		8.6	6.0	6.3
1992	No advice		-		8.6	6.6	9.2
1993	No long-term gain in increased F		-		8.6	6.2	10.1
1994	No long-term gain in increased F		-		8.6	6.0	8.8
1995	A precautionary TAC not exceeding recent catch levels		-		8.6	7.2	12.3
1996	A precautionary TAC not exceeding recent catch levels		-		8.6	7.0	18.2
1997	Reduction in fishing effort		-		8.6	6.2	13.7
1998	Reduction in fishing effort		-		8.6	5.4	10.6
1999	Reduce fishing effort, effective implementation of the TAC		-		8.6	5.3	8.4
2000	40% reduction in catches		<7.4		8.0	4.4	7.5
2001	2/3 of the catches in 1973-1990		4.3		6.4	4.0	5.7
2002	2/3 of the catches in 1973-1990		4.3		4.8	2.3	4.2
2003	Reduce F below F_{pa}		<6.7 ³		3.18		
2004	⁴	Reduce F below F_{pa}	⁴				

¹Vb(EC), VI, XII, and XIV. ²Division VIa only. ³Advice for Division IIIa, Subarea IV, and Subarea VIa combined.

⁴Single-stock boundary and the exploitation of this stock should be conducted in the context of mixed fisheries protecting stocks outside safe biological limits. Weights in '000t.

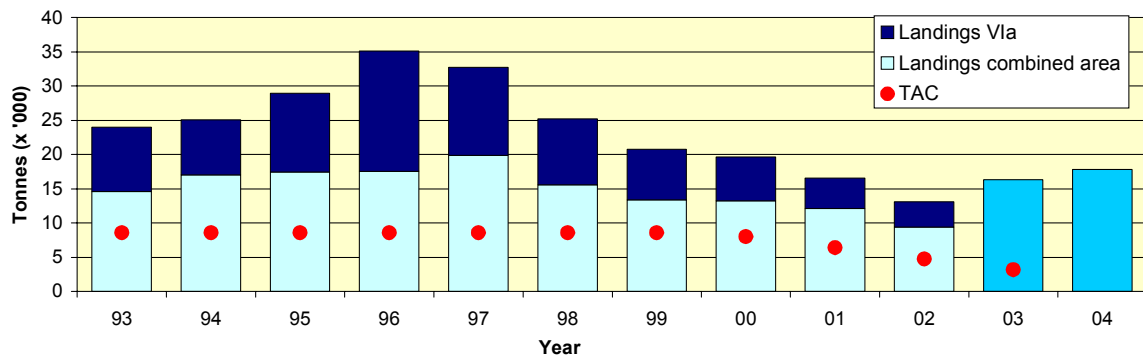
Catch data (Table 3.7.7.4):

Division IIIa, Subarea IV, and Subarea VI combined

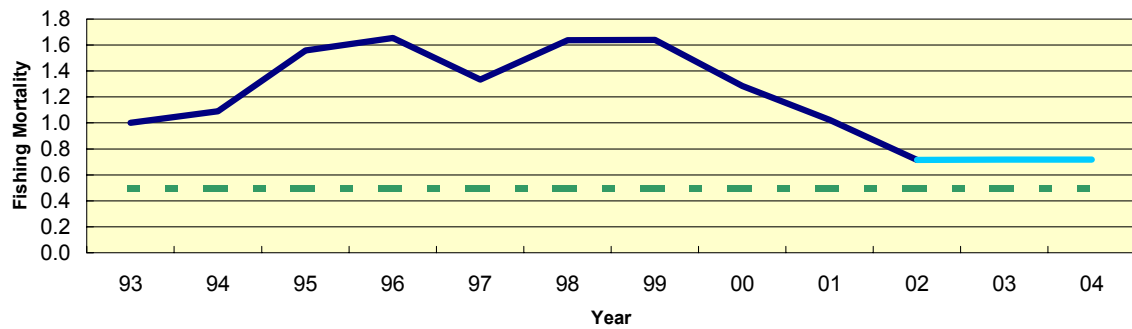
Year	ICES Advice	Single-stock exploitation boundaries	Predicted catch corresp. To advice	Predicted catch corresponding to single-stock boundaries	Agreed TAC ¹	Official landings	ACFM landings ²
2003	Reduce F below F_{pa}		<6.7		10.2		
2004	²	Reduce F below F_{pa}	²	<8.8			

¹Vb(EC), VI, XII, and XIV. ²Single stock boundary and the exploitation of this stock should be conducted in the context of mixed fisheries protecting stocks outside safe biological limits. Weight in '000 t.

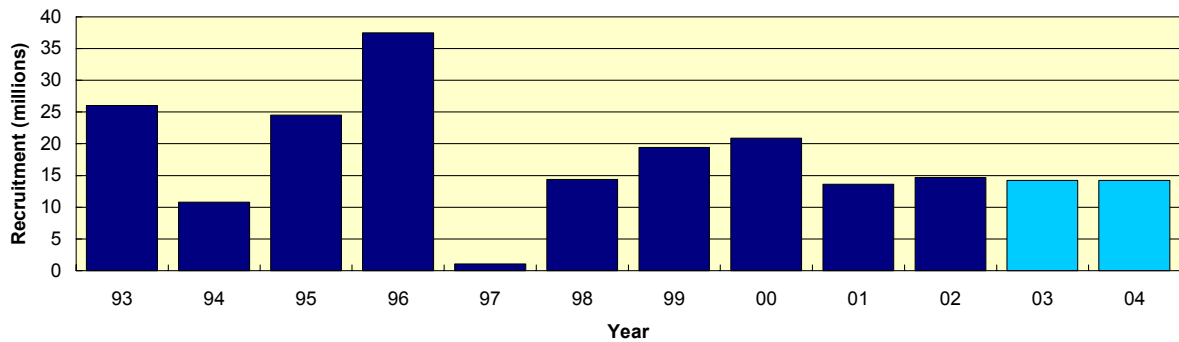
Anglerfish Vla and North Sea - Landings
Mean = 9.1



Anglerfish Vla and North Sea - Fishing Mortality
Mean = 1.29



Anglerfish Vla and North Sea - Recruitment (Age 0)
Mean = 18.3



Anglerfish Vla and North Sea - Spawning Stock Biomass
Mean = 7.7

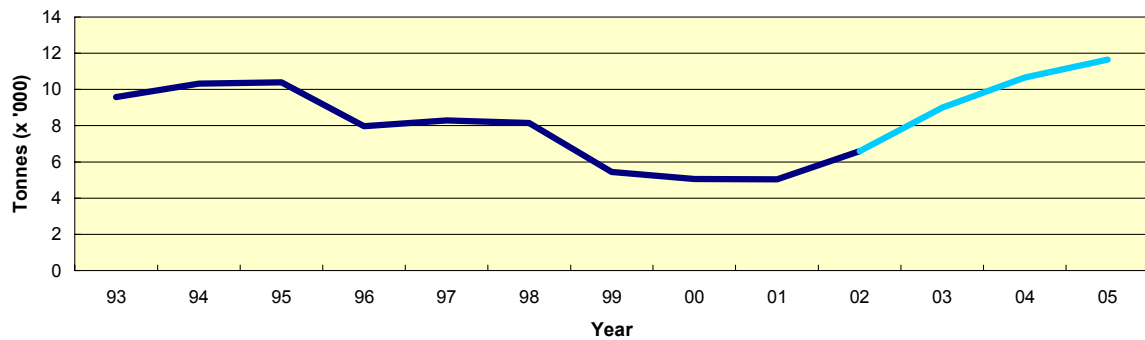


Table 3.7.7.1 Nominal catch (t) of Anglerfish in Division IIIa, 1990–2002, as officially reported to ICES.

	1990	1991	1992	1993	1994	1995	1996	1997	1998	1999	2000	2001	2002*
Belgium	22	15	48	34	21	35	-	-	-	-	-	-	-
Denmark	477	493	658	565	459	312	367	550	415	362	377	375	371
Germany	1	-	-	1	-	-	1	1	1	2	1	+	+
Norway	57	64	170	154	263	440	309	186	177	260	197*	200*	241
Sweden	13	23	62	89	68	36	25	39	33	36	27	46	55
Total	570	595	938	843	811	823	702	776	626	660	602	621	668

*Preliminary.

Table 3.7.7.4 Anglerfish in IIIa, IV and VI.

Year	Recruitment millions	SSB ‘000 tonnes	Catch ‘000 tonnes	Mean F
1993	26.02	9.57	23.97	1.000
1994	10.78	10.32	25.06	1.089
1995	24.49	10.39	28.91	1.557
1996	37.45	7.98	35.1	1.655
1997	1.08	8.3	32.73	1.333
1998	14.36	8.15	25.21	1.636
1999	19.43	5.44	20.77	1.638
2000	20.85	5.05	19.67	1.284
2001	13.63	5.04	16.57	1.023
2002	14.67	6.59	13.11	0.716

Table 3.7.7.2 Nominal catch (t) of ANGLERFISH in the North Sea, 1989–2002, as officially reported to ICES.**Northern North Sea (IVa)**

	1989	1990	1991	1992	1993	1994	1995	1996	1997	1998	1999	2000	2001	2002*
Belgium	1	8	2	9	3	3	2	8	4	1	5	12	-	8
Denmark	835	984	1,245	1265	946	1,157	732	1,239	1,155	1,024	1,128	1,087	1,289	1,298
Faroes	1	7	1	-	10	18	20	-	15	10	6	n/a		
France	-	-	124	151	69	28	18	7	7	3*	18 ¹ *	8	19*	7
Germany	187	70	71	68	100	84	613	292	601	873	454	182	95	95
Netherlands	70	18	23	44	78	38	13	25	12	-	15	12	3	8
Norway	309	421	587	635	1,224	1,318	657		672	954	1,219	1,182*	1,209*	875
							821							
Sweden	9	5	14	7	7	7	2	1	2	8	8	78	44	56
UK(E, W&NI)	99	91	129	143	160	169	176	439	2,174	668	781	218	183	...
UK (Scotland)	6,366	6,788	7,039	7,887	9,712	11,683	15,658	22,344	18,783	13,319	9,710	9,559	10,024	...
UK (total)														8,536
Total	7,877	8,392	9,235	10,209	12,309	14,505	17,891	25,176	23,425	16,860	13,344	12,338	12,866	10,883

* Preliminary. ¹Includes IVb,c.**Central North Sea (IVb)**

	1989	1990	1991	1992	1993	1994	1995	1996	1997	1998	1999	2000	2001	2002*
Belgium	209	216	357	538	558	713	579	287	336	371	270	449	579	436
Denmark	211	278	345	421	347	352 ¹	295	225	334	432	368	260	251	255
Faroes	-	-	-	-	2	-	-	-	-	-	-	n/a		
France	-	-	-	1	-	2	-	-	-	-*	... ² *	-	-*	+
Germany	2	1	4	2	13	15	10	9	18	19	9	14	9	17
Netherlands	574	267	285	356	467	510	335	159	237	223	141	141	123	62
Norway	2	27	17	4	3	11	15	29	6	13	17	9*	15*	11
Sweden	-	-	-	-	-	3	2	1	3	3	4	3	2	9
UK(E, W&NI)	628	754	669	998	1,285	1,277	919	662	664	603	364	423	475	...
UK (Scotland)	495	634	845	733	469	564	472	475	574	424	344	318	378	...
UK (total)														449
Total	2,121	2,177	2,522	3,053	3,144	3,447	2,627	1,847	2,172	2,088	1,517	1,617	1,832	1,239

* Preliminary. ¹Includes 2 tonnes reported as Subarea IV. ²Included in IVa.**Southern North Sea (IVc)**

	1989	1990	1991	1992	1993	1994	1995	1996	1997	1998	1999	2000	2001	2002*
Belgium	54	21	13	12	34	37	26	28	17	17	11	15	15	16
Denmark	-	-	2	-	-	-	-	-	-	+	+	+	+	+
France	-	-	-	-	-	-	-	-	-	10	... ¹ *	+	+	+
Germany	-	-	-	-	-	-	-	-	-	-	-	+	-	+
Netherlands	2	7	5	10	14	20	15	17	11	15	10	15	6	5
Norway							-	-	-	-	+	-*	+	-
UK(E&W&NI)	30	6	6	17	18	136	361	256	131	36	3	1	+	...
UK (Scotland)	-	-	-	-	-	17	-	3	1	+	+	+	+	...
														+
Total	86	34	26	39	66	210	402	304	160	78	24	31	21	21

* Preliminary. ¹Included in IVa.**Total North Sea**

	1989	1990	1991	1992	1993	1994	1995	1996	1997	1998	1999	2000	2001	2002*
Total	10,084	10,603	11,783	13,301	15,519	18,162	20,920	27,327	25,757	19,026	14,885	13,986	14,719	12,143
WG estimate	9,342	9,491	10,566	11,728	13,078	15,432	15,794	16,240	18,217	14,027	11,719	11,564	10,172	8,212
Unallocated	-742	-1,112	-1,217	-1,573	-2,441	-2,730	-5,126	-11,087	-7,540	-4,999	-3,166	-2,422	-4,547	-3,931

* Preliminary.

Table 3.7.7.3 Anglerfish in Subarea VI. Nominal landings (t) as officially reported to ICES.**Anglerfish in Division VIa (West of Scotland)**

	1989	1990	1991	1992	1993	1994	1995	1996	1997	1998	1999	2000	2001	2002
Belgium	8	-	3	2	9	6	5	+	5	2	+	+	+	+
Denmark	34	-	1	3	4	5	10	4	1	2	1	+	+	-
France	1,901	2,182	1,910	2,308	2,467	2,382	2,648	2,899	2,058	1,634*	1,814 ¹ *	1,132	951*	665
Germany	10		1	2	60	67	77	35	72	137	50	39	11	3
Ireland	556	398	250	403	428	303	720	717	625	749	617	515	475	
Netherlands	-	-	-	-	-	-	-	-	27	1	-	-	-	-
Norway	27	8	6	14	8	6	4	4	1	3	1	3*	2*	1
Spain	15	35	7	11	8	1	37	33	63	86	53	82	70	
UK	153	71	270	351	223	370	320	201	156	119	60	44	40	...
(E&W&NI)														
UK(Scotland)	3,024	2,921	2,613	2,385	2,346	2,133	2,533	2,515	2,322	1,773	1,688	1,496	1,119	...
UK (total)														1,132
Total	5,728	5,615	5,061	5,479	5,553	5,273	6,354	6,408	5,330	4,506	4,284	3,311	2,668	1,801
Unallocated		184	296	2,638	3,816	2,766	5,112	11,148	7,506	5,234	3,799	3,114	1,800	1,934
As used by													4,468	3,735
WG		5,799	5,357	8,117	9,369	8,039	11,466	17,556	12,836	9,654	7,413	6,425		

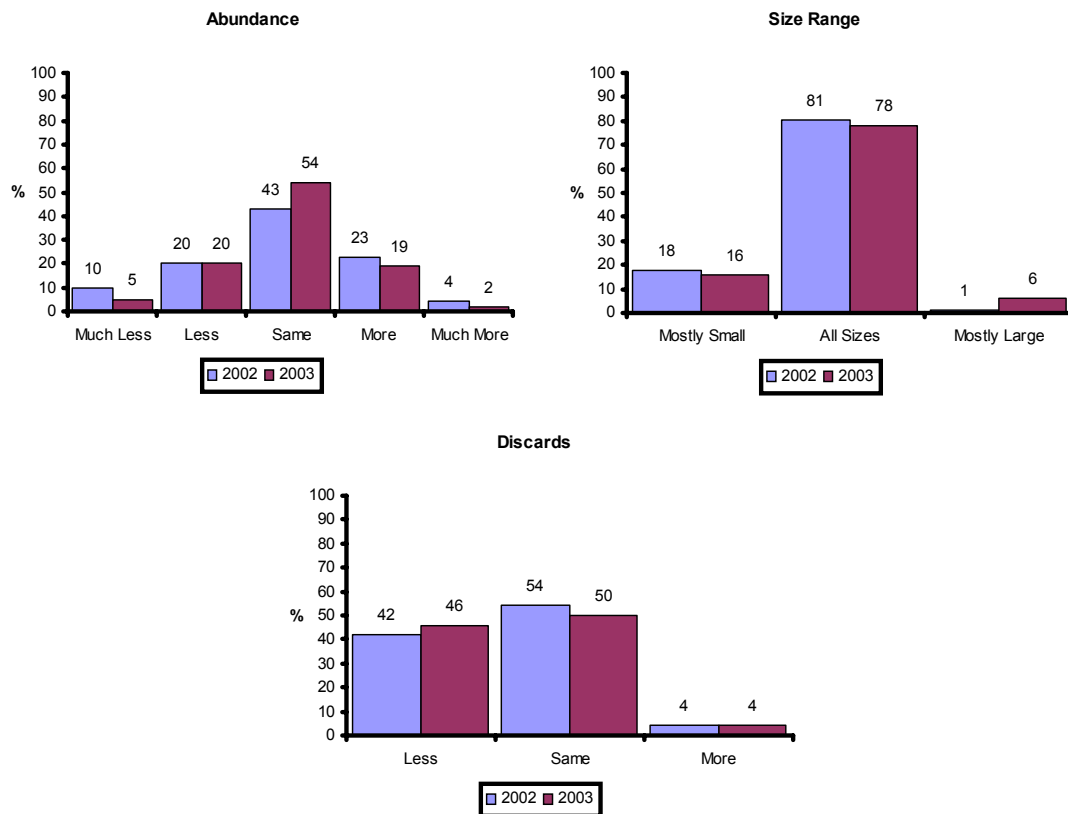
*Preliminary. ¹Includes VIb.**Anglerfish in Division VIb (Rockall)**

	1989	1990	1991	1992	1993	1994	1995	1996	1997	1998	1999	2000	2001	2002*
Faroe Islands	1	-	-	2	-	-	-	15	4	2	2			
France	-	-	-	-	29	-	-	-	1	1	... ¹ *	48	195*	44
Germany	-	-	-	-	103	73	83	78	177	132	144	119	67	35
Ireland	-	400	272	417	96	135	133	90	139	130	75	81	134	
Norway	13	16	18	10	17	24	14	11	4	6	5	11*	5*	3
Portugal	-	-	-	-	-	-	-	-	-	+	-	20	18	-
Russia	-	-	-	-	-	-	-	-	-	-	-	-	1	-
Spain	81	138	333	263	178	214	296	196	171	252	291	149	327	
U K	17	19	99	173	76	50	105	144	247	188	111	272	197	...
(E&W&NI)														
UK(Scotland)	201	249	201	224	182	281	199	68	156	189	344	374	367	...
UK (total)														414
Total	313	822	923	1,089	681	777	830	602	899	900	973	1,074	1,311	496

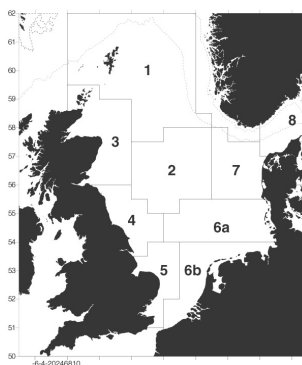
*Preliminary. ¹Included in VIa.**Total Anglerfish in Subarea VI (West of Scotland and Rockall)**

Year	1989	1990	1991	1992	1993	1994	1995	1996	1997	1998	1999	2000	2001	2002*
Total official	6,041	6,437	5,984	6,568	6,234	6,050	7,184	7,010	6,229	5,406	5,257	4,385	3,979	2,297
Total ICES	6,041	6,621	6,280	9,206	10,050	8,816	12,296	18,158	13,735	10,554	8,386	7,499	5,779	4,231

*Preliminary.



Percent frequency of responses for monkfish abundance, size range and discards by area, 2003

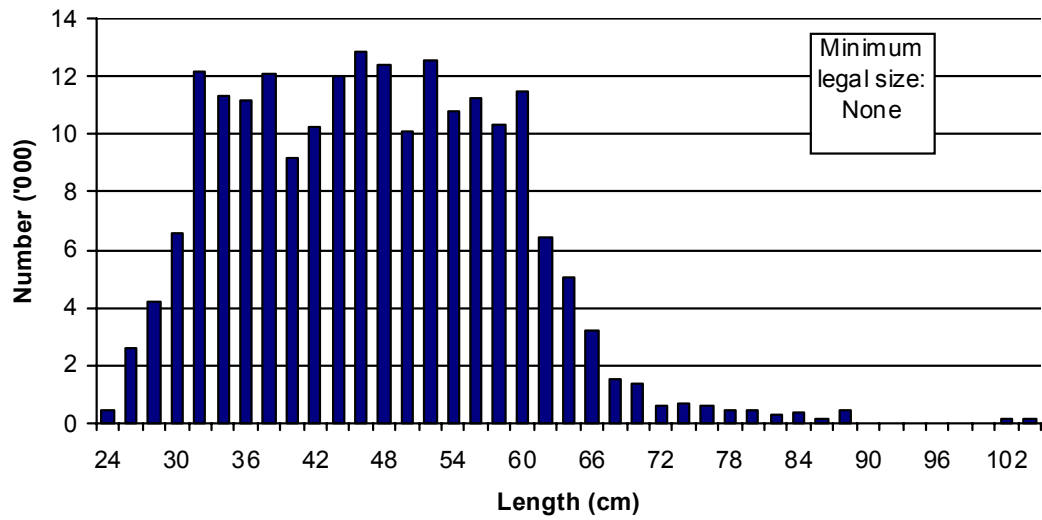


MONKFISH

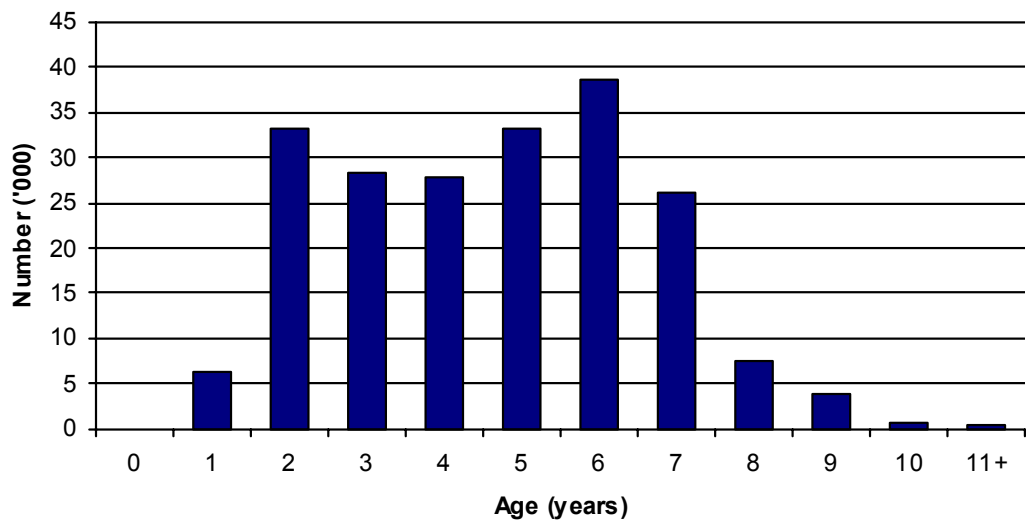
Area	Abundance					Size Range			Discards			n
	Much Less	Less	Same	More	Much More	Mostly Small	All Sizes	Mostly Large	Less	Same	More	
1	2	15	37	41	4	12	80	8	48	48	5	50
2	5	0	75	20	0	5	80	15	21	74	5	21
3	0	25	55	10	10	40	55	5	29	65	6	22
4	5	35	57	3	0	8	92	0	57	43	0	41
5	14	14	57	14	0	29	71	0	33	50	17	7
6a	0	18	59	24	0	24	76	0	33	67	0	17
6b	4	7	70	19	0	19	81	0	48	52	0	27
7	4	13	58	25	0	13	71	17	35	50	15	26
8	19	38	38	6	0	17	78	6	77	23	0	18
9	33	67	0	0	0	25	75	0	100	0	0	4
Overall	5	20	54	19	2	16	78	6	46	50	4	233

Figure 3.7.7.1 North Sea fishermen survey for monkfish abundance, size range and discards for the years 2002 and 2003. (Source: Europeche 2003).

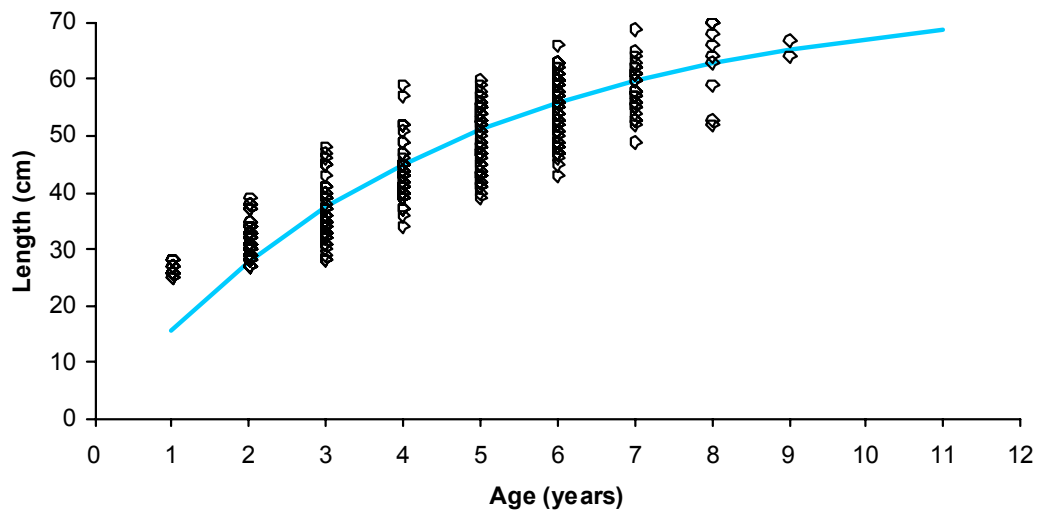
2002 Length Distribution: Irish Landings, Anglerfish in VIa



2002 Age Distribution: Irish Landings, Anglerfish in VIa



2002 Size at Age: Irish Sampling, Anglerfish in VIa



Northwest of Ireland and West of Scotland *Nephrops*

(WG -MA C = Division VIa)

For latest information, see: <http://www.ices.dk>



Fisheries Science Services

FSS – SINGLE STOCK CONSIDERATIONS

(See West of Scotland and Rockall for Mixed Fisheries Advice)

ICES considers that all stocks in this Management Area appear to be exploited at sustainable levels.

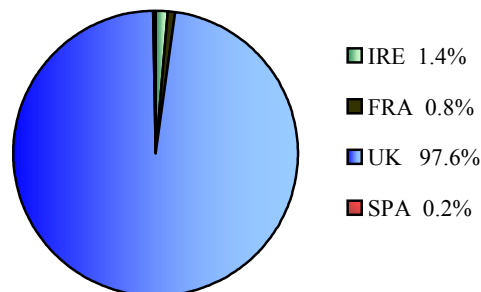
FSS recognise that other stocks that are outside safe biological limits are caught in *Nephrops* fisheries. FSS point out that an industry initiated programmes aimed at reducing catches of Hake, Cod and whiting should be considered in the management of West of Scotland *Nephrops* fisheries. Industry initiated programmes should be encouraged but must include a high rate of independent observer coverage or other totally transparent methods for ensuring that their catches of species outside safe biological limits are fully and credibly reported.

FSS considers there is no basis to revise the advice given previously for a) North Minch FU 11, b) South Minch (FU 12) and c) Clyde (FU 13). FSS continues to advise a Management Area TAC of 11 300 t for 2004 and 2005. However, the mixed fisheries advice given for *Nephrops* fisheries in the Celtic Sea and particularly in relation to stocks outside safe biological limits will determine the TAC for *Nephrops*.

In addition FSS considers that there may be some potential to expand *Nephrops* fisheries in new areas within MA C but mainly outside current FUs. These include fisheries at Stanton Bank, in Donegal Bay and in deep-water. Fisheries independent methods such as underwater television surveys could be used to evaluate the potential for increased *Nephrops* yields. However, the current Irish quota allocation in this area is low and may restrict the potential for Irish vessels to develop new *Nephrops* fisheries in Division VIa.

STATE OF THE STOCK

- There are no concerns about the status of *Nephrops* stocks in this area.
- Landings have fluctuated around 11,000 t since 1987.
- SSB, recruitment and fishing mortality have remained relatively stable in all FUs for both sexes.
- Reference points for stocks in this area have not been defined.



CURRENT MANAGEMENT

- The TAC area covers Sub-area VI and Division Vb this incorporates WG-MAs B C and D.
- WG-MA C contains three main fisheries in the North Minch (FU 11), South Minch (FU 12) and Firth of Clyde (FU 13) and analytical assessments are carried out for all three of these.
- Irish landings come from the component of this stock which is currently not assessed.
- The TAC in 2003 was 11,340 t with an Irish quota of 153 t.
- There are no explicit management objectives or a management plan for this stock. Management of *Nephrops* fisheries in this area needs to be considered in the context of mixed fisheries.
- FSS recommend that management objectives be established and that a management plan be developed and implemented for fisheries catching *Nephrops*.
- The following TCMs are in place for *Nephrops* in VIa after EC 850/98: *Minimum Landing Sizes (MLS)*; total length >70 mm, carapace length >20 mm, tail length >37 mm. *Mesh Size Restrictions*; Towed gears targeting *Nephrops* having at least 35% by weight of this species on board will require 70 mm diamond mesh plus an 80 mm square mesh panel as a minimum or having at least 30% by weight of *Nephrops* on board will require 80 mm diamond mesh.

FSS – ECONOMIC COMMENTS

- The value of the 2002 Irish quota was €0.48 m.
- The value of the 2002 Irish landings from Sub-area VI was €0.38 m.
- *Nephrops* are a small but valuable by-catch for trawl vessels operating at Stanton Bank and in Donegal Bay.

ADDITIONAL INFORMATION

1. ICES carried out analytical assessments for three stocks (FU 11, 12 & 13) in this Management Area in 2003. However the advice is based on average landings rather than forecasted landings from this analytical as-

assessment. This is because of concerns about whether the assessment method is appropriate for a stock where the age structure is modelled rather than measured annually. Multiple lines of evidence (CPUE trends, mean size, assessment) suggest that this stock remains in a healthy state therefore recent catch levels are considered sustainable by ICES.

2. The estimated international landings were 10,470 t in 2002.
3. Irish landings in 2002 were 119 t.
4. There is no information on misreporting in this stock.
5. The UK (Scotland) with 98% of the 2002 landings dominates this fishery. The fishery is mainly located in Scottish inshore waters and is fished by otter trawlers and creel vessels with 90.5% and 9.5% of the landings respectively.
6. Catch composition data suggest that the creel fisheries catch a higher proportion of berried females than the trawl fisheries and this could result in higher losses of SSB than in other FUs.
7. *Nephrops* are caught by Irish otter trawlers from Greencastle and Killybegs. Up until 1999 Irish landings of *Nephrops* from this area were negligible since then landings have substantially increased landings of *Nephrops* from Donegal Bay and the Stanton Bank.
8. FSS do not currently sample *Nephrops* in Division VIa.
9. BIM have initiated projects to develop the *Nephrops* fisheries in VIa during 2003. The restrictive Irish quota may impede this development.
10. There is also anecdotal evidence that *Nephrops* are occurring in commercial quantities in areas where they were not previously abundant possibly as a result of reduced predation by cod and other fish species.
11. The WGNPEH 2002 investigated landings of *Nephrops* from grounds outside current FUs and concluded that a revision of the FUs in this MA was not required.

ICES ADVICE

3.15.2.h

There are three Functional Units in this Management Area: a) North Minch (FU 11), b) South Minch (FU 12) and c) Clyde (FU 13).

State of stock/exploitation:

All stocks in this Management Area appear to be exploited at sustainable levels.

- a) North Minch: Annual LPUEs have fluctuated without trend over the longer term, but show an increase in the most recent years. VPA estimates of stock biomass, recruitment, and F are relatively stable, and there is no evidence of long-term trends. Relatively stable biomass levels are also evident from the results of the TV camera surveys. Age-based Y/R analysis indicates that the current F is just above F_{\max} for males, and below F_{\max} for females.
- b) South Minch: Annual LPUEs fluctuating without trend,

and more stable in recent years. Male and female stock biomass has fluctuated without trend over the whole time-series. Recruitment in recent years has generally been slightly below the long-term average, particularly in males. TV camera surveys suggest that abundance is fluctuating without trend. F_{bar} of both males and females is fluctuating without trend, and has been low in recent years. Age-based Y/R analysis indicates that the current F is just above F_{\max} for males, and below F_{\max} for females.

- c) Clyde: LPUEs were at a low level in the early 1990s, but have markedly increased since then and are currently at the highest recorded level. VPA suggests a stable stock biomass. Recruitment in the last seven years appears to have been just above the long-term average. TV camera surveys suggest a slight increase in abundance from the 2000 levels. F_{bar} for males showed a long-term trend of increase up to 1997, since when it has declined. F_{bar} for females has been fairly stable. Age-based Y/R analysis indicates that the current F is well above F_{\max} for males, and below F_{\max} for females.

Management objectives:

There are no management objectives set for this fishery.

Single Stock Exploitation Boundaries:

There is no basis to revise the advice given previously of a Management Area TAC of 11 300 t for 2004 and 2005.

Advice on the exploitation of this stock in 2004 is presented in the context of mixed fisheries and is found in section 3.7.1.

Relevant factors to be considered in management:

Catch composition data indicate that the creel fisheries in these FUs are taking higher proportions of berried females than the trawl fisheries. This could result in higher losses to the female spawning stock than in other FUs, where berried females are less accessible to exploitation.

Comparison with previous assessment and advice:

The results of the analytical assessments are in agreement with the 1997, 1999 and 2001 assessments.

Elaboration and special comments:

Only UK vessels are involved in these fisheries. In FUs 11 and 12, *Nephrops*-directed trawlers and creelers account for 75-85% and 15-20% of the landings respectively. In FU 13, over 95% of the landings are taken by *Nephrops*-directed trawlers. The use of 70-mm mesh size on multi-rig gear has been eliminated following the UK national ban in 2000. Effort has declined in each of the FUs in recent years, but this has been compensated by increases in LPUE in FU 11 and FU 13.

Discards are included in the assessments, and account for 10-15% of the catch weight.

LPUEs and mean size data as well as landings/area and effort/area indices are available for all FUs. Length-frequency data have been available since 1981.

Source of information:

Report of the Working Group on *Nephrops* Stocks, 19 – 27 March 2003 (ICES CM 2003/ACFM:18).

Catch data (Tables 3.15.2.h.1-2):

Year	ICES advice	Recommended TAC	Agreed TAC	ACFM landings ¹
1987				11.2
1988				12.7
1989				11.0
1990				10.0
1991				10.5
1992		~11.4	12.0	10.8
1993		~11.3	12.0	11.3
1994		11.3	12.6	11.1
1995		11.3	12.6	12.8
1996		11.3	12.6	11.2
1997		11.3	12.6	11.2
1998		11.3	12.6	11.2
1999		11.3	12.6	11.5
2000		11.3	12.6	11.0
2001		11.3	11.34	10.9
2002		11.3	11.34	10.5
2003		11.3	11.34	
2004		11.3		
2005		11.3		

(Weights in '000 t) ¹⁾ Does not include discards.

Table 3.15.2.h.1 *Nephrops* landings (tonnes) by Functional Unit plus Other rectangles in Management Area C (VIa).

Year	FU 11	FU 12	FU 13	Other	Total
1993	3192	4455	3342	344	11332
1994	3616	4415	2629	441	11101
1995	3656	4680	3989	460	12785
1996	2871	3995	4060	239	11165
1997	3046	4345	3618	243	11253
1998	2441	3730	4843	157	11171
1999	3257	4051	3746	438	11492
2000	3246	3952	3417	422	11037
2001	3259	3992	3190	420	10861
2002*	3416	3280	3373	397	10467
* provisional					

Table 3.15.2.h.2 *Nephrops* landings (tonnes) by country in Management Area C (VIa).

Year	Rep. of Ireland	Spain	UK	Total
1993	7	0	11325	11332
1994	3	0	11098	11101
1995	13	1	12770	12785
1996	8	1	11156	11165
1997	8	4	11240	11253
1998	23	11	11136	11171
1999	141	31	11320	11492
2000	113	53	10871	11037
2001	107	50	10704	10861
2002*	119	29	10318	10467
* provisional				

West of Scotland and Rockall Plaiice

(Sub-area VI)



Fisheries Science Services

FSS – SINGLE STOCK CONSIDERATIONS

(See West of Scotland and Rockall Overview for Mixed Fishery Advice)

The status if this stock is unknown.

FSS notes that the STECF and ICES advice for other West of Scotland and Rockall stocks is predicated primarily on the need to rebuild cod and haddock stocks. FSS endorses this approach as being consistent with the precautionary approach to fisheries management.

FSS point out that plaice are caught in mixed fisheries which may include catches of species outside safe biological limits in Sub-area VI. FSS point out that an industry initiated programmes aimed at reducing catches of Cod (VIa) and Haddock (VIb) should be considered in the management West of Scotland and Rockall fisheries. Industry initiated programmes should be encouraged but must include a high rate of independent observer coverage or other totally transparent methods for ensuring that their catches of species outside safe biological limits are fully and credibly reported.

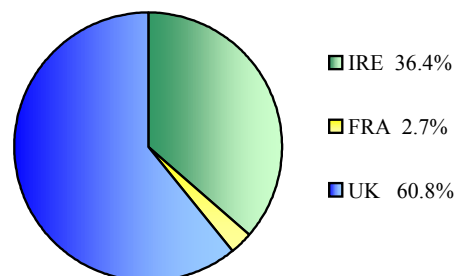
In the absence of ICES advice for this stock FSS would point out that there is a declining trend in landings for this stock and that the 'precautionary TAC' should be adjusted downwards in line with recent landings. Landings data available to FSS are incomplete in the most recent years. Complete 'official' landings during the period 1998-2000 are around 1,100 t. If a TAC was set in line with this figure it would translate to an Irish quota of around 400 t. However, the mixed fisheries advice given for mixed fisheries west of Scotland and at Rockall particularly in relation to stocks outside safe biological limits will determine the TAC for plaice.

STATE OF THE STOCK

- There is no ICES assessment for this stock.
- Preliminary international landings in 2002 were estimated to be 487 t.
- There are no reference points proposed for this stock.

CURRENT MANAGEMENT

- The TAC area covers Sub-areas, VI and XII and XIV and Division Vb.
- The TAC in 2003 was 1,534 t with an associated Irish quota of 559 t.



- There are no explicit management objectives or plans for this stock.
- FSS advises that management objectives be established and that a management plan be developed and implemented for the fishery catching plaice.

FSS – ECONOMIC COMMENTS

- The value of the 2002 Irish quota was about €1.7m.
- The value of the 2002 Irish landings was about €0.4m.
- This stock is economically important to small inshore trawlers operating out of Killybegs, Greencastle and the smaller ports in Donegal.

ADDITIONAL INFORMATION

1. In 2002 Irish vessels reported an estimated plaice landings of 146 t from VIa, a reduction of about 22% of the 2001 landings.
2. The Irish quota is not restrictive but this fishery is important to the smaller inshore boats operating in the south of Division VIa.
3. The TAC for this stock was reduced by 11% in 2003 and by 10% in 2002.
4. Plaice in VIa are caught mainly by demersal otter trawls. The main fisheries are at the Stanton, Stags and Donegal Bay fishing grounds.
5. Irish sampling for this stock is supported through the EC funded sampling programme which is required under Data Collection Regulation 1543/2000 and 1639/2001. The FSS sampling indicates that the Irish landings were mainly comprised of 3 and 4 year old fish.
6. FSS have conducted an annual groundfish survey in this area since 1993. This survey was discontinued in 2002 and will be replaced with a new groundfish survey on the *RV Celtic Explorer* in 2003. These data will be used in any future assessments of this stock.
7. Discarding practices are not well quantified but FSS sampling has indicated that discarding does occur in this fishery.
8. LPUE estimates for Irish demersal trawlers has been declining since 1996 possibly reflecting a decline in the stock abundance.

Plaice Division VIa landings by country as estimated by FSS. EU TAC and Irish quota also shown.
(Source of International data: ICES STATLANT 27A database)

Country	1980	1981	1982	1983	1984	1985	1986	1987	1988	1989	1990	1991
Belgium	.	.	.	.	.	.	.	3	1	1	.	-
Denmark	.	.	.	.	.	.	.	<0.5	<0.5	<0.5	7	<0.5
France	58	50	44	55	40	57	57	49	44	24	62	23
Germany	.	.	.	.	.	.	.	.	.	.	.	.
Germany,Fed.Rep.	.	.	.	.	<0.5	<0.5	<0.5	<0.5	<0.5	.	.	.
Ireland	392	464	425	565	649	660	403	516	649	579	670	560
Netherlands	.	.	.	.	.	.	204	.	.	.	.	.
Norway	.	.	.	.	.	.	.	.	.	.	.	.
Spain	.	.	.	1	.	.	.	.	.	.	.	.
U.S.S.R	.	.	.	.	.	.	.	.	.	.	.	.
UK (Eng. & Wales)	65	58	65	38	41	31	34	19	9	.	.	.
UK (Eng.Wal.NI)	.	.	.	.	.	.	.	.	.	27	11	37
UK (N.Ireland)	1	4	2	2	4	.	4	7	24	.	.	.
UK (Scotland)	1,049	1,065	947	967	1,070	1,065	1,046	1,149	1,000	1,185	1,097	1,433
Total	1565	1641	1483	1628	1804	1813	1748	1743	1727	1816	1847	2053
EU TAC³			1810	1810	1810	1810	1810	1810	1810	2000	2000	2000
Irish Quota			660	660	660	660	660	660	660	730	730	730

Country	1992	1993	1994	1995	1996	1997	1998	1999	2000	2001 ¹	2002	2003
Belgium	.	25	8	30	13	19	19	18	19	8		
Denmark	<0.5	-	<0.5	<0.5	<0.5	.	<0.5	.	.	<0.5		
France	19	16	4	6	1	2	1	.	.	1		
Germany	<0.5	.	.	.	.	.	.	.	.	.
Germany,Fed.Rep.	.	.	.	.	.	.	.	.	.	.
Ireland ²	357	339	360	340	562	549	440	337	230	187	146	
Netherlands	.	.	.	.	.	19	11	.	.	.		
Norway	<0.5	.	.	.	.	.	.	.	.	.
Spain	.	.	.	.	.	.	.	.	.	.
U.S.S.R	.	.	.	.	.	.	.	.	.	.
UK (Eng. & Wales)	.	.	.	.	.	.	.	.	.	.
UK (Eng.Wal.NI)	61	80	135	77	62	67	39	34	18	9		
UK (N.Ireland)	.	.	.	.	.	.	.	.	.	.
UK (Scotland)	1,292	1,095	1,181	1,344	1,266	1,052	973	657	387	498		
Total	1729	1555	1688	1797	1904	1708	1483	1046	654	703		
EU TAC³	2400	2400	2400	2400	2400	2400	2400	2400	2400	1920	1728	1534
Irish Quota	870	870	870	880	880	880	880	880	880	700	630	559

Plaice Division VIb landings by country as estimated by FSSEU TAC and Irish quota also shown.
(Source of International data: ICES STATLANT 27A database)

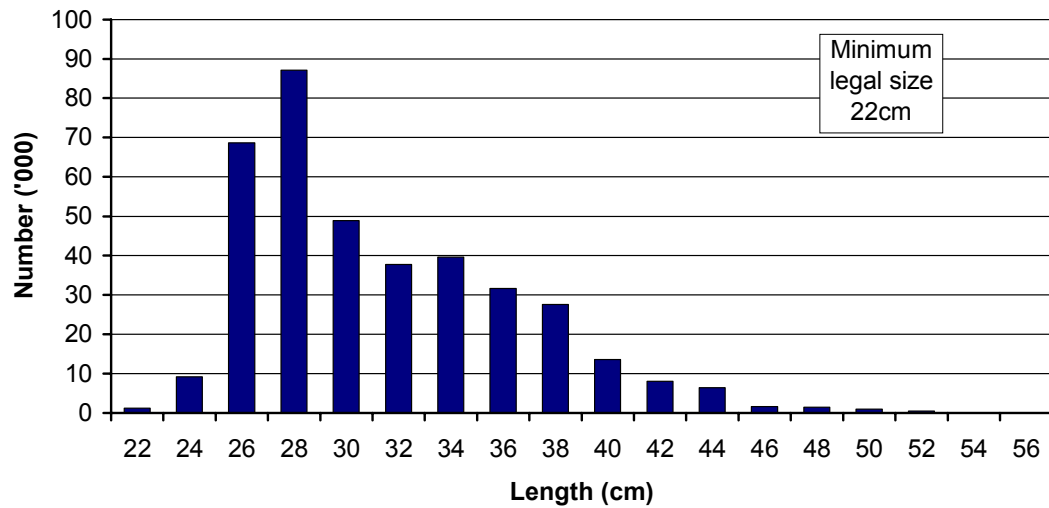
Country	1991	1992	1993	1994	1995	1996	1997	1998	1999	2000	2001 ¹
Ireland ²	.	.	5	1	2	4	<0.5	1	10	<0.5	<0.5
Russian Fed.	.	.	.	.	.	.	.	.	.	88	
UK (Eng.Wal.NI)	<0.5	3	2	5	2	9	15	15	<0.5	1	
UK (Scotland)	53	27	5	7	12	5	5	7	6	63	
Total	53	30	12	13	16	18	20	23	16	152	<0.5

¹ Official landings data were available from ICES for Sub-area VI. No official landings data were available from ICES for Division VIb.

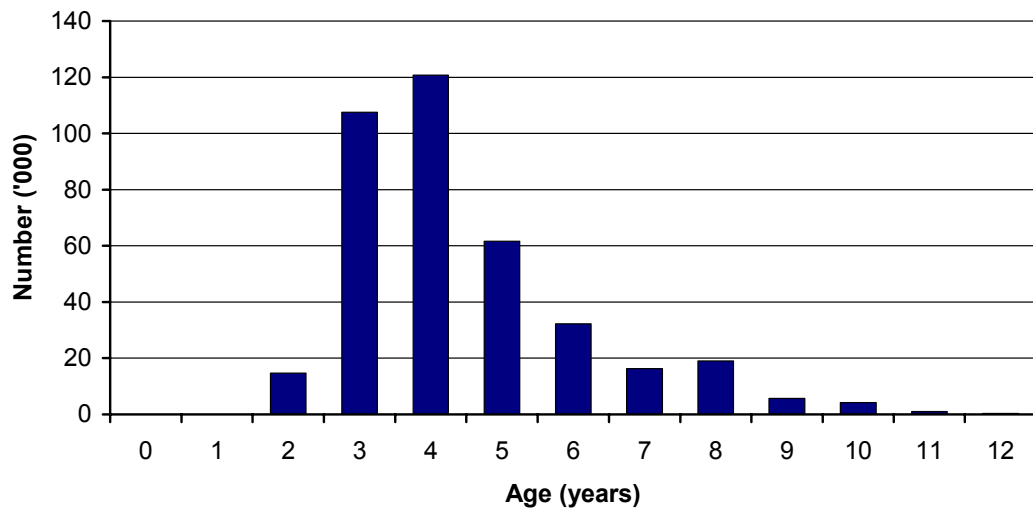
² Ireland landings since 1995 estimated from DCMNR Logbook databases

³ TAC area is Vb, VI, XII, XIV

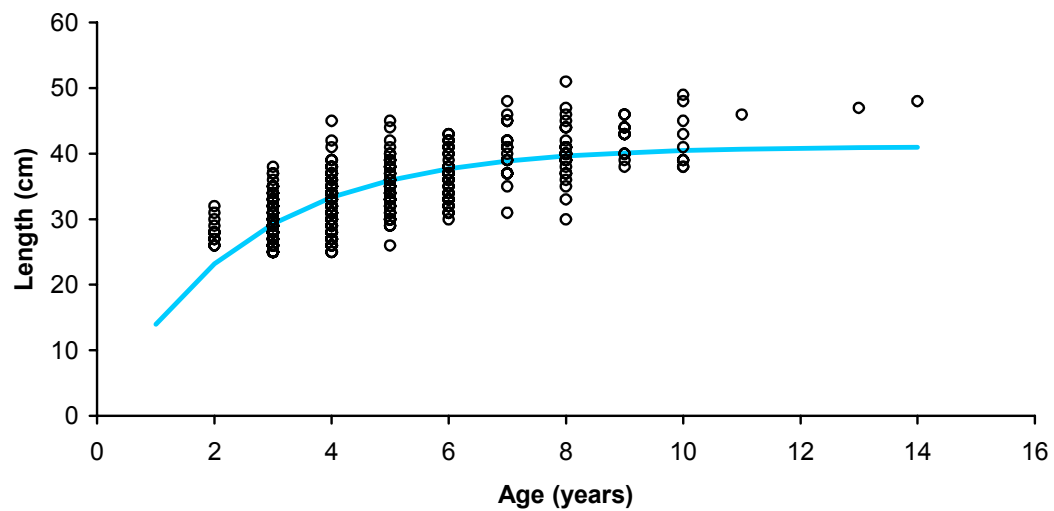
2002 Length Distribution: Irish Landings, Plaice in VIa



2002 Age Distribution: Irish Landings, Plaice in VIa



2002 Size at Age: Irish Sampling, Plaice in VIa



West of Scotland and Rockall Sole

(Sub-area VI)



Fisheries Science Services

FSS – SINGLE STOCK CONSIDERATIONS

(See West of Scotland and Rockall Overview for Mixed Fishery Advice)

The status if this stock is unknown.

FSS notes that the STECF and ICES advice for other West of Scotland and Rockall stocks is predicated primarily on the need to rebuild cod stocks. FSS endorses this approach as being consistent with the precautionary approach to fisheries management.

FSS point out that Irish vessels catch sole in mixed fisheries which may include catches of species outside safe biological limits in Sub-area VI. FSS point out that an industry initiated programmes aimed at reducing catches of Cod (VIa) and Haddock (VIb) should be considered in the management West of Scotland and Rockall fisheries. Industry initiated programmes should be encouraged but must include a high rate of independent observer coverage or other totally transparent methods for ensuring that their catches of species outside safe biological limits are fully and credibly reported.

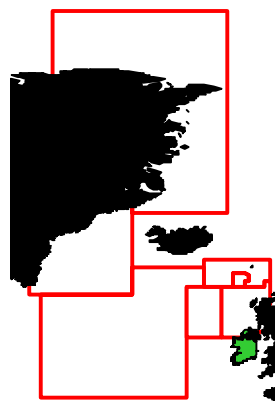
In the absence of ICES advice for this stock, FSS would point out that there is a declining trend in landings for this sole stock and that the 'precautionary TAC' should be adjusted downwards in line with recent landings. Landings data available to FSS are incomplete in the most recent years. Complete 'official' landings during the period 1999-2001 are around 54 t. If the TAC was set in line with this figure it would translate to an Irish quota of around 43 t. However, the mixed fisheries advice given for mixed fisheries west of Scotland and at Rockall particularly in relation to stocks outside safe biological limits will determine the TAC for sole.

STATE OF THE STOCK

- There is no ICES assessment for this stock.
- Estimated international 2001 landings were estimated to be 32 t in Division VIa. No international landings data for 2002 were available to FSS.
- There are no reference points proposed for this stock.

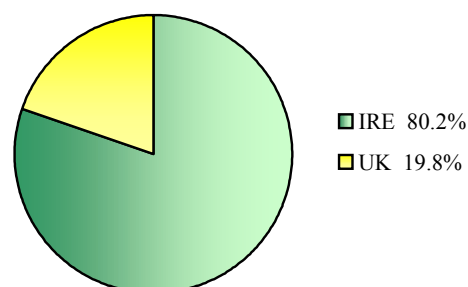
CURRENT MANAGEMENT

- The TAC area covers Sub-areas VI and XII and XIV and Division Vb.



Red Boxes-TAC/Management Areas

- The TAC in 2003 was 106 t with an associated Irish quota of 85 t.



- There are no explicit management objectives or plans for this stock.
- FSS advises that management objectives be established and that a management plan be developed and implemented for the fishery catching sole.

FSS – ECONOMIC COMMENTS

- The value of the 2002 Irish quota was about €1.0m
- The value of the 2002 Irish landings was about €0.3m.
- This stock is economically important to small inshore trawlers operating out of Killybegs, Greencastle and the smaller ports in Donegal.

ADDITIONAL INFORMATION

1. In 2002, the estimated Irish catch for sole in VIa was 24 t, similar to the 2001 landings.

2. The Irish quota is not restrictive but this fishery is important to the small inshore boats operating in the south of Division VIa.
3. The TAC for this stock was reduced by 15% in 2003.
4. Sole in VIa are caught mainly by demersal otter trawls. The main fisheries are at the Stanton, Stags and Donegal Bay fishing grounds.
5. Irish sampling for this stock is supported through the EC funded sampling programme which is required under Data Collection Regulation 1543/2000 and 1639/2001.
6. FSS have conducted an annual groundfish survey in this area since 1993. This survey was discontinued in 2002 and will be replaced with a new groundfish survey on the *RV Celtic Explorer* in 2003. These data will be used in any future assessments of this stock.
7. FSS data on discarding of sole in this area is limited but it is not considered to be a problem.
8. Irish otter trawl LPUE have been declining since 1998 possibly reflecting a decrease in the abundance of the stock.

Sole Division VIa landings as estimated by FSS. EU TAC and Irish quota also shown.

(Source of International data: ICES STATLANT 27A database)

Country	1980	1981	1982	1983	1984	1985	1986	1987	1988	1989	1990	1991
Belgium	.	.	.	.	.	.	.	.	.	.	.	.
Denmark	.	.	.	.	.	.	.	.	.	.	.	.
France	1	1	1	.	.	1	.	.	.	.	.	.
Germany	.	.	.	.	.	.	.	.	.	.	.	.
Ireland	23	35	57	54	48	39	33	42	71	89	80	53
Netherlands	.	.	.	.	.	.	1	.	.	.	.	.
UK (Eng.& Wales)	1	1	2	1	9	13	4	2	.	.	.	.
UK (Eng.Wal.NI)	.	.	.	.	.	.	.	.	.	2	1	4
UK (N.Ireland)	.	.	.	2	<0.5	.	<0.5	<0.5	1	.	.	.
UK (Scotland)	10	10	12	8	7	9	14	17	18	17	11	15
Total	35	47	72	65	64	62	52	61	90	108	92	72
EC TAC	50	70	70	70	70	70	90	110	130	130	50	70
Irish Quota	40	55	55	55	55	55	70	90	105	105	40	55

Country	1992	1993	1994	1995	1996	1997	1998	1999	2000	2001	2002 ¹	2003
Belgium	.	1	4	11	2	9	8	3	3	1		
Denmark	<0.5	.	.	.	.	.	.	.	.	.
France	.	1	.	1	.	.	.	.	.	<0.5		
Germany	.	.	.	.	.	.	.	.	.	.
Ireland ²	40	40	65	62	80	71	81	51	36	27	24	
Netherlands	.	.	.	.	.	7	-	.	.	.		
UK (Eng.& Wales)	.	.	.	.	.	.	.	.	.	.
UK (Eng.Wal.NI)	20	22	19	21	20	19	13	12	6	5	4	
UK (N.Ireland)	.	.	.	.	.	.	.	.	.	.
UK (Scotland)	15	13	10	8	8	7	9	4	3	4	2	
Total	75	77	98	103	110	113	111	70	48	37	32	
EC TAC	130	155	155	155	155	155	155	155	155	155	125	125
Irish Quota	105	125	125	125	125	125	125	125	125	125	100	100

Sole Division VIb

Country	1991	1992	1993	1994	1995	1996	1997	1998	1999	2000	2001	2002¹
France	.	.	.	.	.	.	.	.	.	.	.	.
Germany	.	.	.	.	.	.	.	1	.	.	.	.
Ireland ²							<0.5		1	<0.5	<0.5	
UK (Eng.& Wales)	.	.	.	.	.	.	.	.	.	.	.	.
UK (Eng.Wal.NI)	.	.	.	<0.5	<0.5	1	1	.	.	.	.	.
UK (Scotland)	<0.5	<0.5	.	<0.5	.	<0.5	.	1	1	2		
Total	<0.5	<0.5	0	<0.5	<0.5	1	1	2	2	2	<0.5	N/A

¹ Official landings data were available from ICES for Sub-area VI No official landings data were available from ICES for Division VIb

² Ireland landings from 1995 from DCMNR Logbook database
N/A= Not Available

West of Scotland and Rockall Pollack

(Sub-area VI)



Fisheries Science Services

FSS – SINGLE STOCK CONSIDERATIONS

(See West of Scotland and Rockall Overview for Mixed Fishery Advice)

The status of this stock is unknown.

FSS notes that the STECF and ICES advice for other West of Scotland and Rockall stock is predicated primarily on the need to rebuild cod stocks. FSS endorses this approach as being consistent with the precautionary approach to fisheries management.

FSS point out that Irish vessels catch pollack in mixed fisheries which may include catches of species outside safe biological limits in Sub-area VI. FSS point out that an industry initiated programmes aimed at reducing catches of Cod (VIa) and Haddock (VIb) should be considered in the management West of Scotland and Rockall fisheries. Industry initiated programmes should be encouraged but must include a high rate of independent observer coverage or other totally transparent methods for ensuring that their catches of species outside safe biological limits are fully and credibly reported.

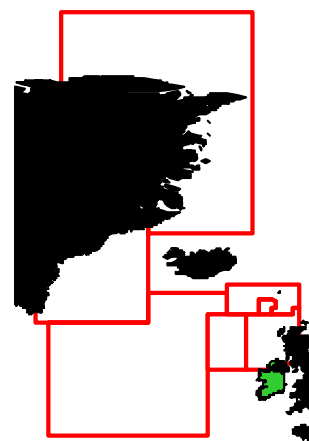
FSS point out that there is no scientific basis for current TAC which is far in excess of recent annual landings. FSS would point out that pollack are mainly distributed and fished in inshore areas and the current TAC area may contain several smaller stocks. In which case the current TAC management system may not be appropriate and localise stock depletion may still occur. FSS would advise that pollack stocks should be assessed and managed on a smaller geographical scale within this area. FSS suggest that catches in local areas be limited to recent averages and programmes be put in place to estimate sustainable exploitation levels for pollack stocks. However, the mixed fisheries advice given for mixed fisheries west of Scotland and at Rockall particularly in relation to stocks outside safe biological limits will determine the TAC for pollack.

STATE OF THE STOCK

- There is no ICES assessment for this stock.
- International landings in 2002 were estimated to be 138 t.
- There are no precautionary reference points proposed for this stock.

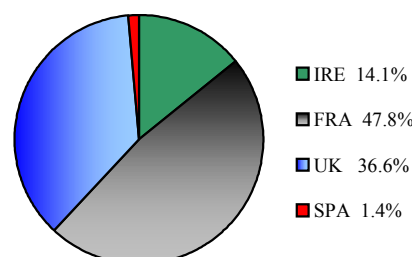
CURRENT MANAGEMENT

- The TAC covers Vb, VI, XII and XIV.



Red Boxes-TAC/Management Areas

- The 2003 TAC was 880 t with an associated Irish quota of 124 t.



- Currently the TAC is not restrictive, but the Irish quota could become restrictive if the TAC is reduced.
- There are no explicit management objectives or plans for this stock.
- FSS advises that management objectives be established and that a management plan be developed and implemented for fishery catching pollack.

FSS ECONOMIC COMMENTS

- The value of the 2002 Irish quota was €300,000.
- The value of the 2002 Irish landings from Division VI was €31,000.
- Pollack catches in the northwest are small but a very valuable component of the catch for some inshore vessels.

ADDITIONAL INFORMATION

1. Estimated Irish landings were 18 t in 2002.
2. The Irish quota is not restrictive, but this fishery is important to the smaller boats mainly operating in inshore waters.

3. There is little scientific information on biology and stock structure of pollack in this area.
4. FSS do not sample pollack in Sub-area VI.

Year	1991	1992	1993	1994	1995	1996	1997	1998	1999	2000	2001	2002	2003
TAC	1,100	1,100	1,100	1,100	1,100	1,100	1,100	1,100	1,100	1,100	1,100	880	880
International Landings	270	220	340	334	503	334	248	226	384*	190*	109*	138*	

* Preliminary data for France also comprises Sub-areas XII and XIV and Division Vb.

North Sea and West of Scotland Saithe

(Sub-areas IV & VI and Division IIIa)

For latest information, see: <http://www.ices.dk>



Fisheries Science Services

FSS – SINGLE STOCK CONSIDERATIONS

(See West of Scotland and Rockall Overview for Mixed Fishery Advice)

Based on the most recent estimates of SSB and fishing mortality, ICES classifies the stock as being within safe biological limits. FSS considers that this stock is a good example of a stock that has recovered from low levels when fished at levels below F_{pa} .

FSS notes that the STECF and ICES advice for other West of Scotland and Rockall stocks is predicated primarily on the need to rebuild cod and haddock stocks. FSS endorses this approach as being consistent with the precautionary approach to fisheries management.

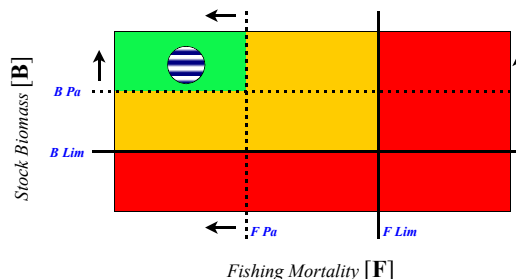
FSS point out that saithe are caught in mixed fisheries which may include catches of species outside safe biological limits in Sub-area VI. FSS point out that an industry initiated programmes aimed at reducing catches of Cod (VIa) and Haddock (VIb) should be considered in the management West of Scotland and Rockall fisheries. Industry initiated programmes should be encouraged but must include a high rate of independent observer coverage or other totally transparent methods for ensuring that their catches of species outside safe biological limits are fully and credibly reported.

FSS considers that fishing mortality in 2004 should be less than F_{pa} , corresponding to landings of less than 232,000 t. This corresponds to a TAC in Sub-areas VI, XII and XIV and Division Vb (EU waters) of 20,595 t. This translates to an Irish quota of 625 t. However, the mixed fisheries advice given for mixed fisheries west of Scotland and at Rockall particularly in relation to stocks outside safe biological limits will determine the TAC for saithe.

STATE OF THE STOCK

- There are no concerns for this stock which is considered to be within safe biological limits.
- Total estimated international landings in Sub-area VI and Sub-area IV and IIIa for 2002 were 5,200 t and 117,000 t, respectively. This represents a decrease of 30% and an increase of 30% in comparison with 2001 landings. This stock yielded landings of over 250 kt

State of the Stock in relation to the precautionary reference points (see page 18)

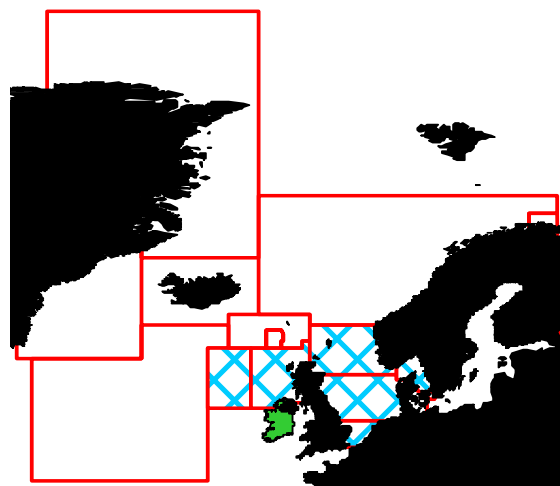


for most of the 1970s landings subsequently declined and have been close to 100 kt since the late 1980s.

- The current F is estimated to be 0.21 and is well below the proposed F_{pa} of 0.40. Fishing mortality has declined from 1986 to 2001, and is estimated to be below F_{pa} in 2002.
- Recruitment was mainly below average since the mid 1980s when the stock declined below B_{pa} the stock has increase again in recent years and the 1998 and 1999 year classes are estimated to be above average.
- The current SSB is 240,000 t and is above the proposed B_{pa} of 200,000 t. SSB was near or below B_{pa} between 1984 and 1996, but it has increased in the late 1990s and is estimated to be above B_{pa} since 1999.
- At current fishing mortality SSB is predicted to increase from 364,000 t in 2003 to 440,000 t in 2005 (well above B_{pa}).

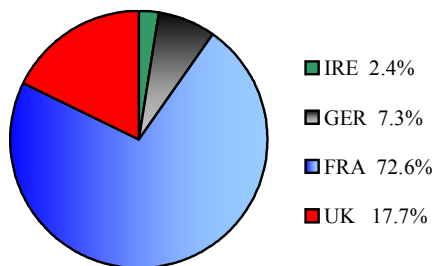
CURRENT MANAGEMENT

- The assessment area comprises two TAC areas; the first TAC area comprises Divisions IIa, IIIabcd, and Sub-area IV, the second TAC area covers Division Vb as well as Sub-areas VI, XII and XIV.



Red Boxes-TAC/Management Areas Blue Shading- Assessment Area

- The total TAC for Division VIb and Sub-areas VI, XII and XIV in 2003 was 17,100 t, with an allocated Irish quota of 415 t.



- There is a long term management plan for this stock based on the EU- Norway agreement that states that every effort be made to maintain SSB above 106,000 t (B_{lim}) and a TAC consistent with $F = 0.4$. Should SSB fall below B_{pa} this fishing mortality will be adapted in the light of the prevailing conditions.

FSS – ECONOMIC COMMENTS

- The value of the 2002 Irish quota was about €0.6m.
- The value of the 2002 Irish landings was about €0.1m
- Irish landings of saithe are low, but the occasional high catches taken can be profitable.
- This is a valuable species for French trawlers operating in the North Sea and west of Scotland. These vessels alternate between deepwater fishing and targeting saithe on the shelf edge.

ADDITIONAL INFORMATION

- The general tendency of this assessment to overestimate F and underestimate SSB is no longer apparent.
- Ireland landed an estimated 86 t in 2002.
- French deep-water fleets operating on the shelf edge and Scottish inshore fleets exploit the saithe fishery in Sub-area VI. Saithe in the North Sea are mainly taken in a directed trawl fishery in deep water near the northern shelf edge and the Norwegian Deep. The main fishery developed in the beginning of the 1970s. The fishery in area VI consists largely of a directed French deepwater fishery operating on the shelf edge and a Scottish fishery operating inshore. The directed fishery started in the early 1970s.
- Saithe is usually caught in mixed gadoid fisheries in Sub-area VI by trawlers operating out of Killybegs and Greencastle.
- Irish sampling for this stock is supported through the EC funded sampling programme which is required under Data Collection Regulation 1543/2000 and 1639/2001.
- FSS initiated a sampling programme for saithe on the

2002 groundfish survey.

- There is no long term gain in yield by increasing current fishing mortality. Medium-term analysis indicated that, at the *status quo* fishing mortality, there is a low probability of falling below B_{pa} in the medium term

ICES ADVICE

3.5.5

State of stock/exploitation:

Based on the most recent estimates of SSB and fishing mortality, ICES classifies the stock as being within safe biological limits. Fishing mortality has declined from 1986 to 2002, and is estimated to be below F_{pa} in 2002. SSB has remained near or below B_{pa} since 1984, but it has increased in the late 1990s and is estimated to have been above B_{pa} since 1999.

Management objectives:

In 1999 the EU and Norway have “agreed to implement a long-term management plan for the saithe stock, which is consistent with the precautionary approach and is intended to constrain harvesting within safe biological limits and designed to provide for sustainable fisheries and greater potential yield. The plan shall consist of the following elements:

- Every effort shall be made to maintain a minimum level of SSB greater than 106 000 t (B_{lim}).
- For 2000 and subsequent years the Parties agreed to restrict their fishing on the basis of a TAC consistent with a fishing mortality rate of 0.40 for appropriate age groups as defined by ICES.
- Should the SSB fall below a reference point of 200 000 t (B_{pa}), the fishing mortality referred to under paragraph 2 shall be adapted in the light of scientific estimates of the conditions then prevailing. Such adaptation shall ensure a safe and rapid recovery of SSB to a level in excess of 200 000 t.
- The Parties shall, as appropriate, review and revise these management measures and strategies on the basis of any new advice provided by ICES.”

ICES considers that the agreed Precautionary Approach reference points in the management plan are consistent with the precautionary approach, provided they are used as upper bounds on F and lower bounds on SSB, and not as targets.

Precautionary Approach reference points (unchanged since 1999):

ICES considers that:	ICES proposes that:
B_{lim} is 106 000 t.	B_{pa} be set at 200 000 t.
F_{lim} is 0.60.	F_{pa} be set at 0.40.

Technical basis:

$B_{lim}=B_{loss}=106\ 000$ t. (estimated in 1998)	$B_{pa} = 200\ 000$ t affords a high probability of maintaining SSB above B_{lim} , taking into account the uncertainty of assessments.
$F_{lim}=F_{loss}=0.6$, the fishing mortality estimated to lead to stock falling below B_{lim} in the long-term	F_{pa} =5th percentile of F_{loss} (0.45) implies that $B_{eq} < B_{pa}$. $F = 0.4$ implies that $B_{eq} > B_{pa}$ and $P(SSB_{MT} < B_{pa}) < 10\%$. This F is considered to provide approximately 95% probability of avoiding F_{lim} , taking into account the uncertainty of the assessment.

Single Stock Exploitation Boundaries:

Fishing mortality in 2004 should be less than F_{pa} , corresponding to landings of less than 232 000 t.

The advice on the exploitation of this stock in 2004 is presented in the context of mixed fisheries and is found in Section 3.5.1.

Relevant factors to be considered in management:

There is no long-term gain in yield by increasing current fishing mortality. Restricting landings to 162 000 t would maintain *status quo* fishing mortality and would increase stability of catches in the medium-term.

Before 1999, saithe in Subarea VI and saithe in Subarea IV and Division IIIa were assessed as two separate stocks. The ICES advice now applies to the combined areas IIIa, IV, and VI.

The assessment is considered to be uncertain because there are few survey data to confirm the stock trends as calibrated by commercial CPUE. The catch forecast is mainly driven by the assumption of average recruitment, with about one quarter of the predicted 2003 landings and 2004 SSB originating from this assumption. This means that the forecasts may not track fluctuations in the stock particularly well.

Catch forecast for 2004:

Basis: $F(2003) = F_{sq} = 0.26$; Landings(2003)=161; SSB(2004) =436.

F(2004 onwards)	Basis	Total Landings	Landings IIIa & IV ¹⁾ (2004)	Landings VI ¹⁾ (2004)	SSB(2005)
0.13	$0.5 * F_{sq}$	87	79	7.8	516
0.26	$1.0 * F_{sq}$	162	147	14.6	440
0.32	$1.25 * F_{sq}$	196	178	17.6	406
0.40	$1.54 * F_{sq} (=F_{pa})$	232	211	20.9	371
0.45	$1.75 * F_{sq}$	256	233	23.0	347

Weights in '000 t.

Shaded scenarios considered inconsistent with the precautionary approach applied in a single-species context.

¹⁾Landings split according to average in 1993-1998.

Medium- and long-term projections:

Results of previous medium-term analysis indicated that, under the *status quo* fishing mortality, there was a low probability of falling below B_{pa} in the medium term.

Comparison with previous assessment and advice:

This assessment gives slightly higher estimates of fishing mortalities for the years 2000 and 2001, and slightly lower estimates of SSB in 2000 and 2001, compared to the assessment presented last year. The general tendency of this assessment to overestimate F and underestimate SSB has not been apparent in the last two years.

Elaboration and special comment:

Saithe in the North Sea are mainly taken in a direct trawl fishery in deep water near the Northern Shelf edge and the Norwegian deeps. Norwegian, French, and German trawlers take the majority of the catches. In the first half of the year, the fishery is directed towards mature fish, while immature fish dominate in the catches the rest of the year. The main fishery was developed in the beginning of 1970s. In later years, the trawlers have also exploited deep-water fish.

The fishery in Subarea VI consists largely of a directed French, German, and Norwegian deep-water fishery oper-

ating on the shelf edge, and a Scottish fishery operating inshore.

The proportional contribution of saithe landings by area over different periods is as follows:

	Area IIIa & IV	Area VI
1982-1998	86%	14%
1988-1998	87%	13%
1993-1998	91%	9%

Analytical assessment is based on catch-at-age analysis using CPUE information from commercial fisheries and one survey series. Lack of recruitment indices for recent and incoming year classes makes catch predictions imprecise.

The North Sea Commission Fisheries Partnership has again initiated a survey that has been conducted among fishermen in order to evaluate their perceptions of the stock and catches in 2003 in relation to 2002. The results of the 2003 survey were made available to ICES in September 2003 (Figure 3.5.5.1). Overall the trend is towards a perceived increase in abundance of saithe across the North Sea, with 52% of respondents observing an increase over the reference period. In the south-eastern part ca. 80% of respon-

dents reported no perceived change in abundance. ICES notes that the results of the fishermen survey could be consistent with the results of the assessment for this stock, although absolute estimates of abundance cannot be derived from the survey, which is comparing this year with last year's catch rates.

Source of information:

Report of the Working Group on the Assessment of Demersal Stocks in the North Sea and Skagerrak, 9 – 18 September 2003 (ICES CM 2004/ACFM: 07).

North Sea Stock Survey 2003. Preliminary results. 9 September, 2003. Europeche.

Yield and spawning biomass per recruit

F-reference points:

	Fish Mort Ages 3-6	Yield/R	SSB/R
Average last 3 years	0.257	0.607	1.634
F_{max}	0.229	0.608	1.871
$F_{0.1}$	0.117	0.559	3.515
F_{med}	0.448	0.580	0.788

Catch data (Tables 3.5.5.1-2): Saithe in IV and IIIa

Year	ICES Advice	Single Stock Exploitation Boundaries	Predicted landings corresp. to advice	Predicted landings correp. To single stock exploitation Boundaries	Agreed TAC	Official landings	ACFM landings
1987	Reduce F		<198		173	154	149
1988	60% of F(86); TAC		156		165	113	107
1989	No increase in F; TAC		170		170	92	92
1990	No increase in F; TAC		120		120	85	88
1991	No increase in F; TAC		125		125	93	99
1992	No increase in F; TAC		102		110	92	92
1993	70% of F(91) ~ 93 000 t		93		93	99	105
1994	Reduce F by 30%		72		97	90	102
1995	No increase in F		107		107	97	113
1996	No increase in F		111		111	96	110
1997	No increase in F		113		115	86	103
1998	Reduce F by 20%		97		97	88	100
1999	Reduce F to F_{pa}		104		110	108	107
2000	Reduce F by 30 %		75		85	85	87
2001	Reduce F by 20 %		87		87	86	90
2002	$F < F_{pa}$		<135		135	112	117
2003	$F < F_{pa}$		<176		165		
2004	*	$F < F_{pa}$	*	<211			

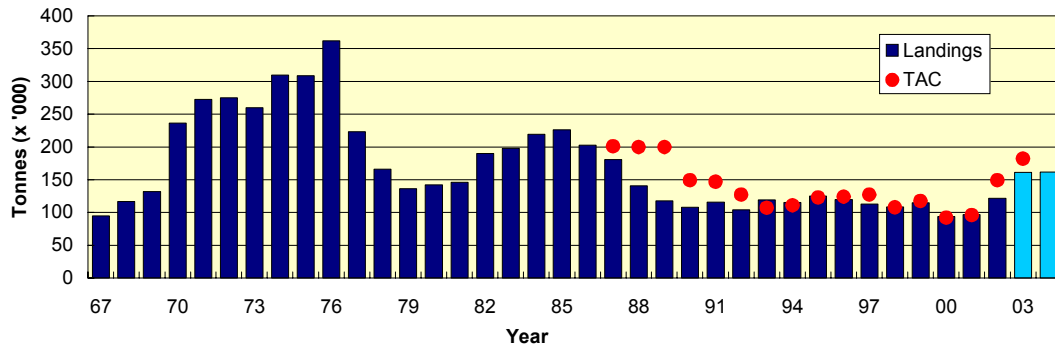
Weights in '000 t. * Single stock boundary and the exploitation of this stock should be conducted in the context of mixed fisheries protecting stocks outside safe biological limits.

Saithe in VI

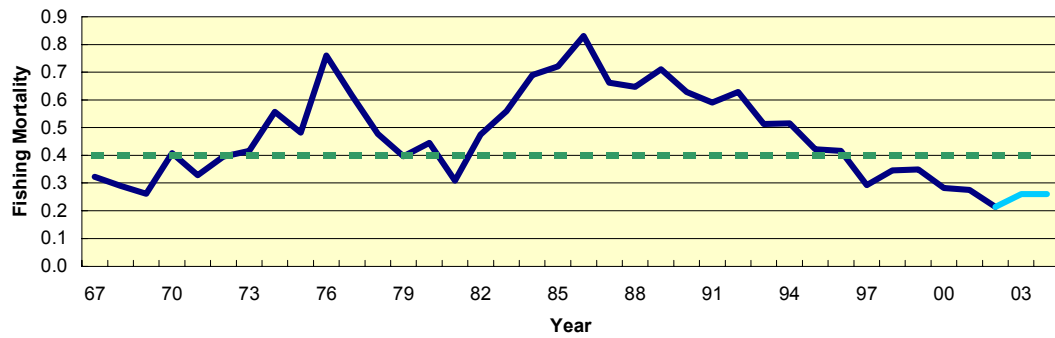
Year	ICES Advice	Single stock exploitation boundaries	Predicted landings corresp. to advice	Predicted catch corresp to single stock exploitation boundaries	Agreed TAC	Official landings	ACFM landings
1987	F reduced towards F_{\max}		19		27.8	32.5	31.4
1988	80% of $F(86)$; TAC		35		35	32.8	34.2
1989	$F < 0.3$; TAC		20		30	22.4	25.6
1990	80% of $F(88)$; TAC		24		29	18.0	19.9
1991	Stop SSB decline; TAC		21		22	17.9	17.0
1992	Avoid further reduction in SSB		<19		17	10.8	11.8
1993	$F = 0.21$		6.3		14	14.5	13.9
1994	Lowest possible F				14	13.0 ²	12.8
1995	Significant reduction in effort		-		16	10.6 ²	11.8
1996	No increase in F		10.2 ¹		13	9.4 ²	9.4
1997	Significant reduction in F				12	8.6 ²	9.4
1998	60% Reduction in F		4.8		10.9	7.4 ²	8.4
1999	60% reduction in F		4.8		7.5	6.8	7.3
2000	Reduce F by 30 %		6.0		7	6.4	5.9
2001	Reduce F by 20 %		9.0		9	8.7	8.4
2002	$F < F_{pa}$		<13		14	5.6	5.2
2003	$F < F_{pa}$		<17		17.1		
2004	$F < F_{pa}$	$F < F_{pa}$	<21	<21			

¹Status quo catch. ²Incomplete data. Weights in '000 t.

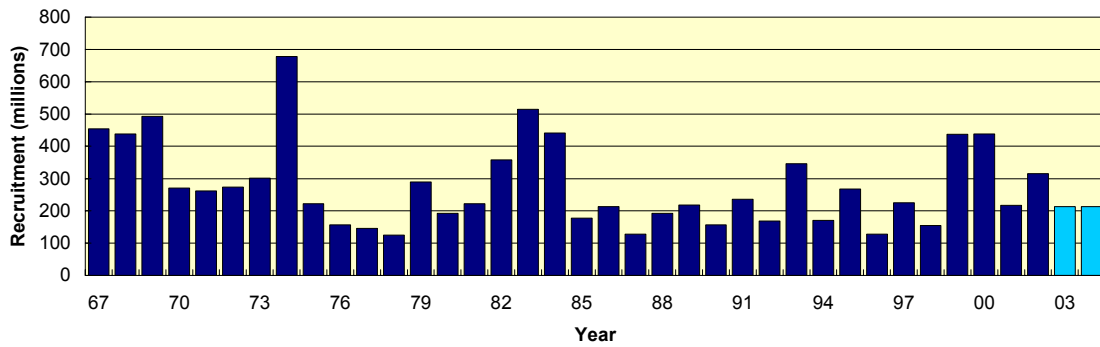
North Sea and West of Scotland Saithe - Landings
Mean = 169.8



North Sea and West of Scotland Saithe - Fishing Mortality
Mean = 0.48



North Sea and West of Scotland Saithe - Recruitment (Age 1)
Mean = 278.5



North Sea and West of Scotland Saithe - Spawning Stock Biomass
Mean = 232.1

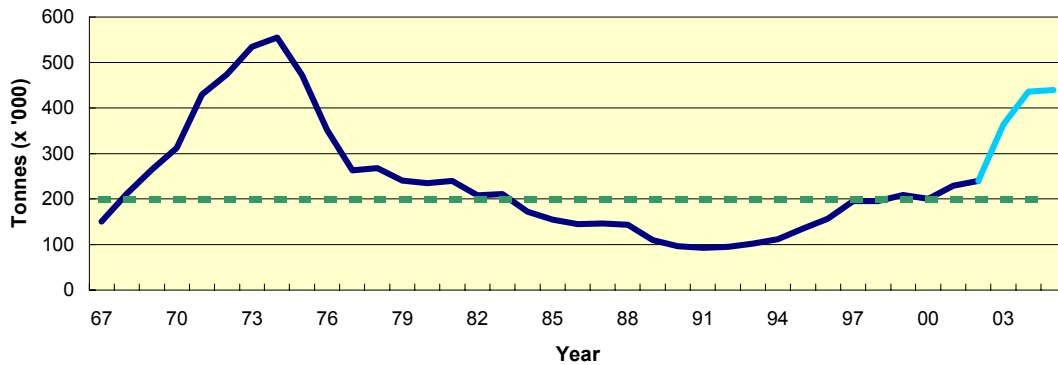


Table 3.5.5.1 Nominal catch (in tonnes) of Saithe in Subarea IV and Division IIIa and Subarea VI, 1992-2002, as officially reported to ICES.

Subarea IV and Division IIIa

Country	1992	1993	1994	1995	1996	1997	1998	1999	2000	2001	2002
Belgium	70	113	130	228	157	254	249	200	122	24	107
Denmark	4,669	4,232	4,305	4,388	4,705	4,513	3,967	4,494	3,529	3,575	5,668
Faroe Islands	2,480	2,875	1,780	3,808	617	158	1,298	1,101	-		
France	9,061	15,258	13,612	11,224	12,336	10,932	11,786 ¹	24,305 ^{1,2}	19,200	20,472	24,819
Germany	13,177	14,814	10,013	12,093	11,567	12,581	10,117	10,481	9,273	9,479	10,999
Netherlands	180	79	18	9	17	40	7	7	11	20	6
Norway	48,205	47,669	47,042	53,793	55,531	46,424	50,254	56,150	42,735 ¹	43,725 ¹	58,983 ¹
Poland	1,238	937	151	592	365	822	813	862	747	727	752
Sweden	3,302	4,955	5,366	1,891	1,771	1,647	1,857	1,929	1,468	1,627	1,863
UK (E. & W.)	2,893	2,429	2,354	2,522	2,864	2,556	2,293	2,874	1,227	1,186	2,521
UK (Scotland)	6,881	5,929	5,566	6,341	5,848	6,329	5,353	5,420	5,484	5,219	6,596
U.S.S.R.	-	-	-	-	-	-	-	-	67		
Total reported	92,156	99,290	90,337	96,889	95,778	86,256	87,994	107,823	83,863	86,368	112,314
Unallocated	187	5,840	12,098	16,525	14,458	17,006	12,983	-175	3,813	3,305	4,333
W.G. estimate	92,343	105,130	102,435	113,414	110,236	103,322	100,263	107,314	87,676	89,673	116,647
TAC	110,000	93,000	97,000	107,000	111,000	115,000	97,000	110,000	85,000	87,000	135,000

¹Preliminary values for France (1998-1999), Norway (2000-2002).

²Includes IIa (EC), IIIa-d (EC) and IV: France (1999).

Subarea VI

Country	1992	1993	1994	1995	1996	1997	1998	1999	2000	2001	2002
Belgium	2	2	-	-	-	-	-	-	-	-	-
Denmark	1	2	-	-	1	-	-	-	-	-	-
Faroe Islands	1	-	-	-	3	1	-	-			
France	6,534	10,216	8,423	6,145	4,781	4,662	3,635 ¹	3,467 ^{1,2}	3,310	5,157	3,054
Germany	685	222	524	321	1,012	492	506	250	305	466	467
Ireland	278	317	438	530	419	411	216	320	410	399	86
Norway	67	59	74	35	34	26	41	126	58 ¹	92 ¹	136 ¹
Spain	-	-	-	-	-	13	54	23	3	15	
Portugal	-	-	-	-	-	1	-	-	-		
UK (E. & W. & N.I.)	540	799	744	317	708	294	526	503	276	273	307
UK (Scotland)	2,708	2,903	2,828	3,279	2,435	2,659	2,402	2,084	2,463	2,246	1,567
United Kingdom											
Russia	-	-	-	-	-	-	-	3	25	1	1
Total reported	10,816	14,520	13,031	10,627	9,393	8,559	7,380	6,776	6,850	8,649	5,618
Unallocated	988	-577	-210	1,143	40	859	1,056	566	-960	-1,834	-495
W.G. estimate	11,804	13,943	12,821	11,770	9,433	9,418	8,436	7,342	5,890	6,818	5,186
TAC	17,000	14,000	14,000	16,000	13,000	12,000	10,900	7,500	7,000	9,000	14,000

¹Preliminary values: France (1998-1999), Norway (2000-2002).

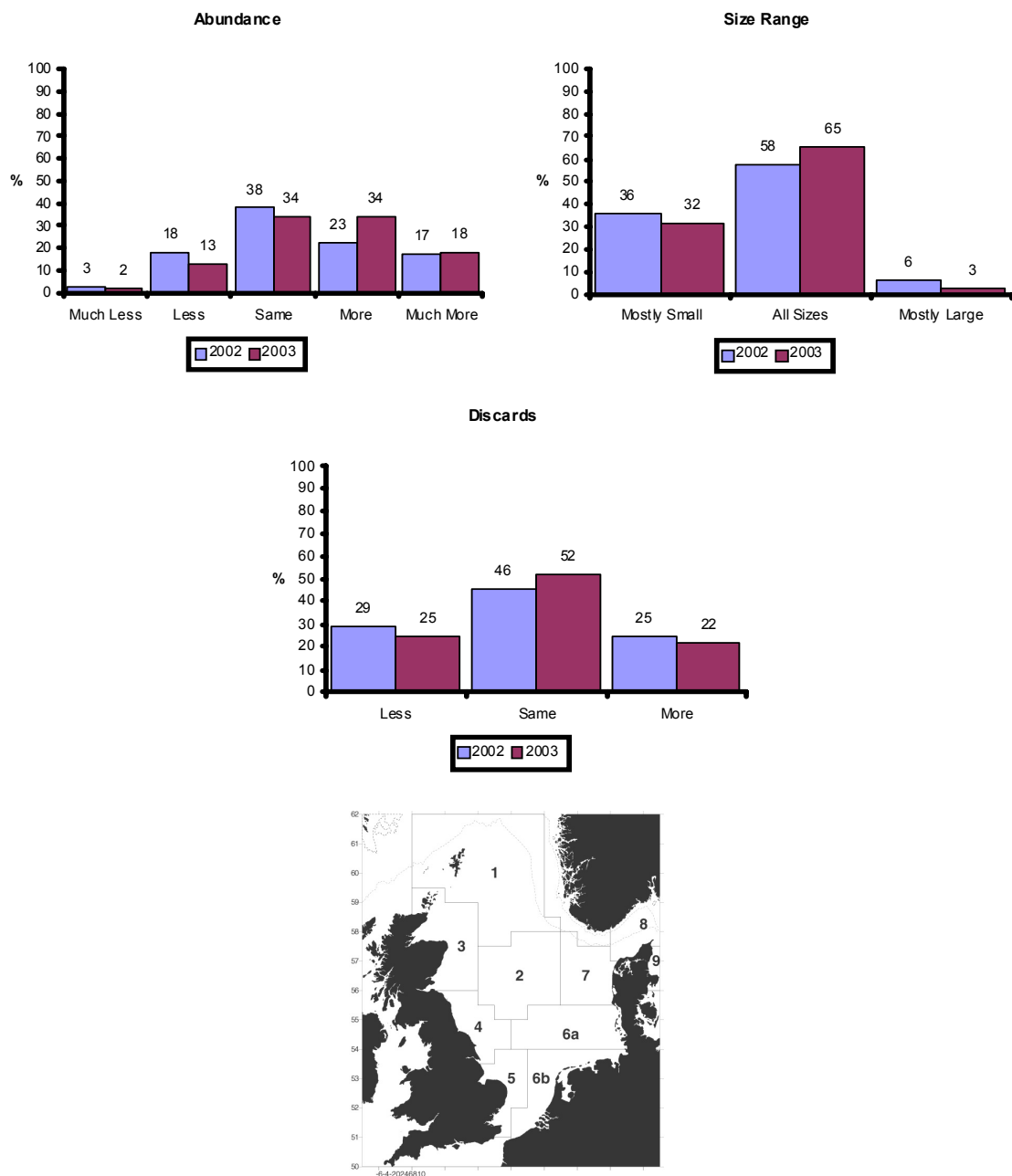
²Reported by TAC area, Vb (EC), VI, XII and XIV: France (1999).

Subareas IV and VI and Division IIIa

	1992	1993	1994	1995	1996	1997	1998	1999	2000	2001	2002
W.G. estimate	104,147	119,073	115,256	125,184	119,669	112,740	108,699	114,656	93,566	96,491	121,833

Table 3.5.5.2 Saithe in Subarea IV, Division IIIa (Skagerrak) and Subarea VI.

Year	Recruitment Age 1 thousands	SSB tonnes	Landings tonnes	Mean F Ages 3-6
1967	453729	150821	94514	0.3220
1968	438373	211683	116789	0.2907
1969	492279	263952	131882	0.2624
1970	270954	312029	236636	0.4079
1971	260843	429618	272481	0.3286
1972	273414	474090	275098	0.3950
1973	301468	534441	259602	0.4165
1974	678354	554846	309439	0.5565
1975	222306	471949	308926	0.4818
1976	157148	351395	361680	0.7607
1977	145475	262970	223395	0.6158
1978	124750	267776	166199	0.4774
1979	289717	240609	135967	0.3969
1980	192536	234427	142395	0.4451
1981	221856	239757	146092	0.3085
1982	357641	208255	189861	0.4747
1983	514731	210988	197774	0.5593
1984	440437	172482	219642	0.6889
1985	176947	154943	226129	0.7215
1986	212723	145244	202758	0.8309
1987	128199	146453	180776	0.6618
1988	192542	143202	140778	0.6471
1989	218411	110022	117609	0.7105
1990	156718	97026	107945	0.6285
1991	236028	92846	115576	0.5905
1992	167948	95155	104147	0.6278
1993	345952	102505	119073	0.5130
1994	170511	111696	115255	0.5156
1995	267696	134990	125183	0.4213
1996	127694	157006	119669	0.4165
1997	224568	195883	112740	0.2917
1998	154623	195735	108699	0.3455
1999	437244	208908	114655	0.3484
2000	437732	200768	93566	0.2820
2001*	212194	229909	96491	0.2754
2002*	212194	239878	121833	0.2146
2003		364000		
Average	273733	235629	169757	0.4786



SAITHE

Area	Abundance					Size Range			Discards			n
	Much Less	Less	Same	More	Much More	Mostly Small	All Sizes	Mostly Large	Less	Same	More	
1	6	18	22	42	12	38	60	2	31	45	24	52
2	0	15	38	31	15	25	67	8	8	58	33	13
3	0	8	58	33	0	38	62	0	0	92	8	14
4	0	14	32	36	18	28	72	0	42	58	0	25
5	0	0	0	100	0	50	50	0	0	100	0	2
6a	8	8	85	0	0	38	54	8	38	62	0	13
6b	0	22	78	0	0	17	78	4	48	48	4	23
7	0	12	28	32	28	59	67	4	17	50	33	25
8	0	0	0	45	55	41	59	0	9	36	55	22
9	0	0	17	67	17	17	83	0	17	50	33	6
Overall	2	13	34	34	18	32	65	3	25	52	22	195

Figure 3.5.5.1 North Sea fishermen survey for saithe abundance, size range and discards for the years 2002 and 2003. (Source: Europeche 2003).

Advice and Overview For Celtic Sea, West and Southwest of Ireland Mixed Demersal Fisheries



Fisheries Science Services

Advice on Mixed Demersal Stocks in the Celtic Sea, West and Southwest of Ireland (Divisions VIIb,c,f,g,h,j,k).

FSS ADVICE

FSS advise that mixed fisheries characteristics be taken into account when managing demersal and *Nephrops* fisheries in the Celtic Sea and West of Ireland Area. Stocks of Northern hake, Celtic Sea cod (VIIe-k), Celtic Sea plaice (VIIf&g) are outside safe biological limits and are the overriding concerns in the management advice for fisheries in Divisions VIIb-k. All the above species are caught in mixed fisheries.

ICES has advised that only demersal fisheries that can demonstrate that they harvest species outside safe biological limits within precautionary limits should be permitted. However because of insufficient data on the catch composition of all métiers involved in the mixed Celtic Sea fisheries it is not currently possible to provide mixed fisheries management scenarios as was done for stocks in the Irish Sea.

Therefore in the absence of a mixed fishery analysis for Divisions VIIb-k FSS advise that two general rules should be followed in the management of mixed fisheries west and southwest of Ireland and in the Celtic Sea.

- 1) Once the TAC is exhausted for a particular stock then all fisheries which catch that stock should be closed.
- 2) Fisheries should only be permitted when they demonstrate that they take zero catch of stocks where the TAC is exhausted.

Following consideration of the ICES and STECF advice FSS advises on the following 2004 catches for these critical stocks;

- Northern Hake –Landings in 2004 of less than 28,100 t
- Celtic Sea Cod (Divisions VIIe-k) –Landings in 2004 of less than 3,900 t
- Celtic Sea Plaice (Divisions f and g) – Landings in 2004 of less than 210 t

Catches of all other species should be limited to less than the exploitation limits given in the table below. FSS advise that industry initiated programmes aimed at reducing catches of species outside safe biological limits should be considered in the management of Celtic Sea, west and southwest of Ireland mixed demersal and *Nephrops* fisheries. Industry initiated programmes should be encouraged but must include a high rate of independent observer coverage or other totally transparent methods for ensuring that their catches of species outside safe biological limits are fully and credibly reported. FSS point out that this approach is in line with the spirit of the new ‘biologically sensitive area’ established around the south and west coast of Ireland (EC Reg. 1954/2003).

FSS note the poor performance of TACs, as implemented, in reducing fishing mortality. FSS stress that the required reductions in fishing mortality can only be achieved if reductions in effort are included in management, and effective deterrents to discarding are implemented.

FSS advise that a well defined ‘management plan’ is necessary to recover stocks caught in mixed fisheries in the Celtic Sea, west and southwest of Ireland and that stocks must be fished sustainably once they have recovered. FSS advise that such a plan should aim to manage properly defined métiers with clearly defined objectives that will ensure a high probability of recovery to agreed levels within a specified time frame.

Stock	State of the stock	FSS considerations regarding single-stock exploitation boundaries	FSS maximum advised catch from TAC area shown in bold. (Maximum advised catch from assessment area in brackets)
Anglerfish in Divisions VIIb-k and VIIa,b (<i>L. piscatorius</i> and <i>L. budegassa</i>)	Harvested outside safe biological limits	Fishing mortality should be reduced by 10% for both species in order to maintain fishing mortality below F_{pa} for both species.	22 346 t (26 700 t for both species combined (18 500 t <i>L. piscatorius</i> , and 8 200 t <i>L. budegassa</i>))
Cod in Divisions VIIe-k	Outside safe biological limits	Reduce in F in 2004 by 32% to F_{pa} . To rebuild SSB to levels above B_{pa} by 2007.	4 771 t (3,900)
Haddock in Divisions VIIb-k	Unknown, the stock is currently at a relatively high level	Fishing mortality should not increase. Mid year review of the TAC to be carried out in April 2004.	9 600 t (8 100 t)
Hake – Northern stock (Division IIIa, Subareas IV, VI and VII, and Divisions VIIa, b, d)	Outside safe biological limits	Reducing F by 36% would increase SSB in 2005 by 10%. This would imply landings of in 2004 which are consistent with the EU Recovery Plan aims of an annual TAC variation of < 15%.	15 736 t (28 100 t)
Megrim in Divisions VIIb,c,e-k and VIIa,b,d (<i>L. whiffiagonis</i> and <i>L. bosci</i>)	Harvested outside safe biological limits	Fishing mortality should be reduced to below F_{pa} , corresponding to landings of less than 20 200 t in 2004 (including a 5% contribution for <i>L. bosci</i>)	18 099 t (20 200 t)
<i>Nephrops</i> in Divisions VIIb,c,j,k (Management Area L)	Exploited at sustainable levels	Catches in 2004-2005 in FU 16 should be constrained to the recent low average of 2000-2002, i.e. 1 100 t. In other FUs of the Management Area L the catches should not be allowed to exceed the average of 1995-2002, i.e. 2 200 t.	17 450 t (3 300 t)
<i>Nephrops</i> in Divisions VIIf,g,h, excluding Rectangles 31 E1 and 32 E1-E2 + VIIa, south of 53°N (M. Area M)	Exploited at sustainable levels	In view of the relative stability of LPUE and stock biomass, landings from Management Area M should not exceed 4 600 t for both 2004 and 2005, based on average landings over the last 10 years.	17 450 t (4 600 t)
Plaice in the Celtic Sea (Divisions VIIf and g)	Outside safe biological limits	Fishing mortality should be restricted to 0.1 in order to bring SSB above B_{pa} in one year.	210 t
Plaice Southwest of Ireland (Division VIIh-k)	Unknown	Catches in 2004 be no more than the recent average (2000-2002).	320 t
Plaice West of Ireland (Division VIIb,c)	Uncertain	Catches in 2004 be no more than the recent average (2000-2002).	125 t
Sole in the Celtic Sea (Divisions VIIf and g)	Harvested outside safe biological limits	Fishing mortality in 2004 should be less than F_{pa} .	1,000 t
Sole Southwest of Ireland (Division VIIh-k)	Unknown	Catches in 2004 be no more than the recent average (2000-2002).	360 t
Sole West of Ireland (Division VIIb,c)	Uncertain	Catches in 2003 be no more than the recent average (2000-2002).	65 t
Whiting in Divisions VIIe-k	Inside safe biological limits	Fishing mortality should not increase.	14 468 t (14 000 t)
Cod VIIb,c	Unknown	Average catches (1999-2001)	4 771 t (171 t)
Whg VIIb c	Unknown	Average catches (1999-2001)	14 468 t (468 t)
West of Ireland and Celtic Sea Pollack	Unknown	Catches in local areas be limited to recent averages. Maintain current TAC.	17 000 t
West of Ireland and Celtic Sea Saithe	Unknown	Maintain current TAC.	8 710 t

FSS Review of Irish Demersal Fisheries in the Celtic Sea and west of Ireland during 2002

The main species targeted in Irish demersal fisheries in VIIb-k during 2002 were whiting, *Nephrops*, megrim, haddock, anglerfish, ling, pollock, saithe, cod, plaice and sole. The main gears used are fish directed otter trawls, *Nephrops* directed otter trawls, seine nets and gill nets. The Irish fleet that operates in this area is mainly inshore (length 15-20m) and offshore (length >20m) multi-purpose vessels which spend 5-10 days at sea. The fish directed otter trawl fleet can be further sub-divided into three métiers; targeting the traditional roundfish species (whiting, haddock and cod), targeting megrim, anglerfish and hake and targeting a mixture of flatfish and roundfish species in inshore areas. Effort for Irish otter trawlers increased by 8% in 2002.

The fish directed otter trawl and seine net fisheries targeting whiting, haddock and cod in 2002 mainly took place in VIIg on the Nymph Bank and Labadie Banks. The main ports are Dunmore East, Union Hall, Kinsale, Kilmore Quay and Helvick. The main by-catch species were hake, anglerfish, saithe and lemon sole.

The larger offshore vessels primarily target anglerfish and megrim on the continental shelf and slope in VIIj, VIIb & VIIc during 2002. In recent years several newly built vessels entered the Irish fleet under the Whitefish Renewal Scheme and several modern second-hand vessels have recently joined the fleet. There has also been an increase in the number of twin-rig trawlers in the area.

During 2002 smaller vessels in the inshore otter trawl fleet primarily target sole, turbot and plaice in the bays. There has been a rise in the number of Irish vessels switching to seine nets in recent years. These vessels are mainly targeting whiting and haddock and receive higher prices because of the good quality of the fish. In 2002 the seine net fishery occurred year round and operates mainly off the southwest and in the Celtic Sea.

In 2002 the beam trawl fleet reported landings mainly from the Celtic Sea effort declined by 19%. This fleet targets megrim and anglerfish with by-catches of witch, rays, ling, lemon sole and sole. The gill net fleet targets different species in different areas of VIIb-k and fisheries can be very selective on a species level. Saithe, pollack, spurdog and ling were the most important species in terms of volume in 2002. Cod, hake, turbot and anglerfish are also target in some areas an seasons. Effort has been declining since 1998 and effort in 2002 was 16% down on 2001.

The otter trawl fleet targeting *Nephrops* operates on the main *Nephrops* grounds in the Celtic Sea, the Smalls, the Aran grounds and on the Porcupine Bank. Their catches are dominated by *Nephrops* with much smaller landings of anglerfish, megrim, whiting and cod. Effort in this fleet was relatively stable on most grounds in VIIb-k in 2002 with the exception of Functional Unit 19 where effort increased substantially.

ICES 3.9 Stocks in the Celtic Sea, West and Southwest of Ireland

ICES description of International Fisheries

Most of the demersal fisheries in this area have a mixed catch. Although it is currently possible to associate specific target species with particular fleets, various quantities of cod, whiting, hake, anglerfish, megrim, sole, plaice, and *Nephrops* are taken together, depending on gear type. Some of the main commercial demersal fleets as used in stock assessments are listed in table 3.9.1.1

Since the 1930s, hake has been the main demersal species supporting trawl fleets on the Atlantic coasts of France and Spain. In 2002, Spain took 59% of the landings, France 29%, UK about 5%, Denmark 3%, and Ireland 2%. Hake are caught throughout the year, the peak landings being made in spring-summer months. The three main gear types used by vessels fishing for hake as a target species are lines (England and Wales, Spain), fixed-nets and trawls (all countries), mostly bottom trawls, a few pelagic ones (France), and recently also Very High Opening trawls (Spain).

In the Celtic Sea and Western Channel, fisheries for demersal species, mainly cod, whiting, sole and plaice, are conducted by Belgium, France, Ireland, and the UK. The principal gears used are otter trawls and beam trawls. The targeting of sole and plaice using beam trawls became prevalent during the mid-1970s, leading to an increase in the landings of these two species. More recently, cuttlefish have become an important component of beam trawl landings, particularly during the winter months. The gradual replacement of otter trawls by beam trawls has occurred in the Belgian and UK fleets. In the Bay of Biscay there has been a substantial replacement of inshore trawling by gillnet fisheries targeting sole.

A trawl fishery for anglerfish by Spanish and French vessels developed in the Celtic Sea, on the shelf edge around the 200-m contour to the south and west of Ireland and Bay of Biscay in the 1970s and expanded until 1990. This fishery used single and twin rig otter trawls in medium and deep water in Divisions VIIb,c,e-k. Bycatch species include hake, megrim and to a lesser extent *Nephrops*. Although effort in most fleets appears to have declined since the early 1990s the increasing use of twin trawls may have increased the overall efficiency. In addition, a gillnet fishery targeting anglerfish developed in the Celtic Sea on the shelf edge around the 200-m contour to the south and west of Ireland in the 1990s.

Megrim in the Celtic Sea, west of Ireland and in the Bay of Biscay are caught predominantly by Spanish and French vessels, which together have reported more than 60% of the total landings, and by Irish and UK demersal trawlers. Most UK landings of megrim are made by beam trawlers fishing in Divisions VIIe,f,g,h. Otter trawlers account for the

majority of Spanish landings from Subarea VII, prosecuting a mixed fishery for anglerfish, hake, and megrim on the shelf edge around the 200-m contour to the south and west of Ireland. Irish megrim landings are largely made by multi-purpose vessels fishing in Divisions VIIb,c,g for gadoids as well as plaice, sole, and anglerfish. Megrim landings have remained fairly stable over the period 1986–2002.

Nephrops are an important component of the fisheries in this area. These fisheries developed in the 1970s and 1980s. Fishing effort has decreased continuously since the early 1990s. However, gear efficiency has increased in recent years and this may have helped maintaining LPUE at relatively high levels. In the Bay of Biscay, since 1st January 2000, the mesh size used when fishing for *Nephrops* has increased and is now similar to the one used for other demersal fish (70 mm). Management of these fisheries needs to be sensitive to bycatches of stocks requiring protection such as Celtic Sea cod and Northern hake.

There are separate pelagic trawl fisheries targeting herring in the Celtic Sea and mackerel and horse mackerel in the whole area. In the past the herring fishery in this area was principally a “roe” fishery in recent years the number of vessels in this fishery has declined substantially and the fishery has change to targeting herring for human consumption. . There is also a small directed fishery for sprat in the Channel.

Management measures:

The assessment units used for many of the demersal stocks in this area are small and catches deriving from them are generally in the region of 10 000 t or less. However, the TACs set for the stocks often cover many assessment units. In addition, for some units, there are still insufficient data for adequate assessments. This means that TACs comprise a summation across units of analytical forecasts and average catches which may offer no effective management control of the exploitation rate. Since a number of stocks affected by this problem are close to or outside safe biological limits, there is a need to reconsider the areas for which TACs are set if management is to improve.

A notable feature of the demersal fisheries in this area is their mixed nature. The effectiveness of single-species TACs is likely to be diminished unless this is taken into account. Use of measures to reduce fishing mortality directly, such as effort reductions in fleets, is likely to avoid a number of the disadvantages of catch controls in regulating the exploitation rate.

The fisheries in the Celtic Sea are very similar to the fisheries in the Bay of Biscay and some of the same fleets operate in both areas. However, the technical measures in the two areas differ. Despite the revision by the European Commission Technical Conservation Regulation of existing technical measures in 1st January 2000, the minimum mesh

sizes in the Celtic Sea are still often different from those in the Bay of Biscay. These differences make enforcement more difficult.

The catch includes a large amount of juveniles of some late-maturing species (anglerfish, hake). While improving selectivity to prevent any catch of hake less than 55 cm (length of maturity for females) seems to be difficult, some selective devices such as rigid grids should be promoted to protect juveniles of the incoming strong year classes of white anglerfish.

State of the stocks:

The majority of the fish stocks which are assessed in this area are harvested outside safe biological limits. They are characterised by low spawning stock biomass and recent high fishing mortality rates. Of particular concern are Northern hake, Celtic Sea (VII f,g) and Western Channel (VII e) sole and plaice, Celtic Sea (VII e-k) cod, and Bay of Biscay (VIII a,b,d) sole. These stocks exhibit high F, low SSB, and low recruitments in most recent years. Celtic Sea sole SSB has increased recently due to an outstanding year class, but F remains high and the increase in SSB may be short-lived.

The Celtic Sea whiting stock has been fluctuating within safe biological limits, following periods of low and high recruitment.

The assessment of Celtic Sea haddock was considered indicative of trends in the stock (due to the short time-series). SSB is currently high, following the recruitment pattern, and is expected to increase further as a result of the outstanding 2001 year class.

Anglerfish and megrim are harvested outside safe biological limits. Recruitment for both species (*Lophius piscatorius* and *Lophius budegassa*) are well above average for some recent years.

The Northern hake stock is discussed fully in Section 3.12.2. It is important to note that this species is taken by most of the demersal fleets in this area. This hake stock is outside safe biological limits, and a rebuilding plan is needed in order to rebuild the SSB.

There are no major concerns about the *Nephrops* stock in the Celtic Sea (FU 20-22), SW of Ireland (FU 19) and Aran grounds (FU 17). There are concerns about the status of the *Nephrops* stock on the Porcupine Bank (FU 16) as landings and LPUE have declined significantly in recent years.

The *Nephrops* stock in the Bay of Biscay has declined since the early 1990s. A strong reduction in the fishing mortality and an improvement of the selection pattern is required. The recent increase in mesh size (from 55 mm to 70 mm), which occurred in 2000 is unlikely to have improved selectivity significantly.

The abundance of anchovy varies considerably according to fluctuations in recruitment, which is likely to be strongly dependent on environmental factors. In 2002, the stock is inside safe biological limits.

The mackerel caught in the area belong to the Southern and Western spawning components. The Western horse mackerel has declined rapidly since the mid-1980s and is estimated to continue to decline.

The state of individual stocks is presented in more detail the stock sections (see Sections 3.5.2-13, 3.15.2).

ICES ADVICE

3.9.1

Advice on demersal fish stocks West of Ireland (Divisions VIIb,c,j,k), in the Celtic Sea (Divisions VIIf-k), Western Channel (Division VIIe) and northern parts of the Bay of Biscay (Divisions VIIa,b-d, and e)

Demersal fisheries in the area are mixed fisheries, with many stocks exploited together in various combinations in different fisheries. In these cases management advice must consider both the state of individual stocks and their simultaneous exploitation in demersal fisheries. Stocks in the poorest condition, particularly those outside safe biological limits, necessarily become the overriding concern for the management of mixed fisheries where these stocks are exploited either as a targeted species or as a bycatch.

Many of the fleets in the area operate on a mixture of demersal species (Table 3.9.1.1). As trends in stocks of various species are generally not in synchrony, advice provided on the basis of the status of individual species may result in advised fishing mortalities for a group of co-harvested species that cannot be realized simultaneously within the context of mixed fisheries. Stocks in need of special conservation efforts, such as those affected by recovery plans, present particularly difficult challenges. The reduction of fishing mortality (and effort) required for stocks outside safe biological limits, makes it very unlikely that TACs which would be sustainable for healthier stocks in the mixed fisheries could be taken. The needs of the stock(s) under recovery plans could be met most directly by simply setting the TACs for all species in mixed fisheries to correspond to the fishing mortality intended for the species under recovery plans, which would result in large foregone yields in many healthier stocks. The foregone yield could be reduced somewhat if effort could be adjusted on a fleet-by-fleet basis to comply with the total fishing mortality in the proposed recovery plan, while allowing as much harvesting of other species as possible. However, such an approach requires reliable information on the catch-at-age for all species in all fisheries, and is still likely to leave substantial potential harvestable biomass of several species unavailable to any fishery.

Formulating advice in relation to mixed fisheries is a two-step procedure. First, ICES establishes limits for the exploitation of each species on basis of its status, consistent with the Precautionary Approach. The second step is to identify the major constraints within which mixed fisheries should operate and through this analysis identify the additional constraints that further limit the fishing possibilities.

The state and the limits to exploitation of the individual stocks are presented in the stock sections (Sections 3.9.2-3.9.14, 3.10.2-3.10.5, 3.12.2 and 3.15.2). ICES considers limits to the exploitation of single stocks as follows:

ICES Advice regarding the management of demersal fisheries West of Ireland (Divisions VIIb,c), in the Celtic Sea and Southwest of Ireland (Divisions VIIf,g,h,j,k), Western Channel (Division VIIe), and northern parts of the Bay of Biscay (Divisions VIIa,b,d,e).

The table above identifies the stocks outside safe biological limits, i.e. hake – Northern stock, cod in Divisions VIIe-k, Celtic Sea plaice (Divisions VIIf and g), sole in Division VIIe (Western Channel), and sole in Divisions VIIa,b (Bay of Biscay), which are the overriding concerns in the management and therefore determine the advice for management of all demersal fisheries simultaneously:

1. **For hake (Northern stock), cod VIIe-k, sole VIIe, sole VIIa,b and plaice VIIf,g either catches in 2004 as indicated in the table above, or recovery plans to define the limits within which the fisheries can take place and which ensure a large reduction in F in 2004;**
2. **Fishing should for each species be restricted within precautionary limits as indicated in the table of individual stock limits above.**

Furthermore, unless ways can be found to harvest species caught in a mixed fisheries within precautionary limits for all those species individually then fishing should not be permitted.

Relevant factors:

ICES notes that this advice presents a strong incentive to fisheries to avoid catching species outside safe biological limits. If industry-initiated programs aim at reducing catches of species outside safe biological limits to levels close to zero in mixed fisheries, then these programs could be considered in the management of these fisheries. Industry-initiated programs to pursue such incentives should be encouraged, but must include a high rate of independent observer coverage, or other fully transparent methods for ensuring that their catches of species outside safe biological limits are fully and credibly reported.

On a single-species basis reductions in fishing mortalities have been advised for several stocks which are outside safe biological levels. Fishing mortality is generally high and for

most stocks has reached the highest historical values in recent decades. The observed declines in SBB below precautionary levels are a clear indication of excessive effort. This, and the poor performance of TACs, as implemented, in reducing fishing mortality, leads ICES to reiterate that the required reductions in fishing mortality can only be achieved if reductions in effort are included in management, and effective deterrents to discarding are implemented. Extensive discarding occurs in most fisheries on roundfish, *Nephrops* and flatfish in this area. These discards are largely small and juvenile fish. They always result in foregone potential yield, and for depleted stocks they are a serious impediment to rebuilding.

All fisheries should be considered in the management; the major fisheries in the area are:

- a. Directed fisheries for hake (trawl, long lines and gillnets);
- b. Otter board trawl fishery in medium to deep water mainly taking anglerfish, megrim, and hake;
- c. Trawl fishery for *Nephrops* with bycatch of roundfish and flatfish;
- d. Trawl fishery for roundfish (cod, haddock, and whiting);

- e. Beam trawl fishery for flatfish taking sole, plaice, megrim, cod and anglerfish;
- f. Mixed demersal trawl fisheries (haddock, whiting, cod, sole, plaice, hake, megrim, anglerfish, squid and other species).
- g. Gillnet fisheries for sole.

The characteristics of these fisheries are as follows:

a. Directed fisheries for hake (trawl, long lines and gillnets)

Hake is caught in nearly all fisheries in Subareas VII and VIII. The catches (landings and discards) of hake and other species in these fisheries are currently not available and fleet definitions are in need of revision. Nevertheless the management of all these fisheries will need to include substantial reductions in hake catch such that the total catch of hake is less than 13 800 t over the distributional area of the stock.

Currently, the main part of the fishery (close to 80% of the total landings in 2002) was conducted in the five Fishery Units listed below:

Hake Fishery Unit	Description	Catch (2002)	% of 2002 catch
FU 4	Non- <i>Nephrops</i> trawling in medium to deep water in Subarea VII	6 273 t	16%
FU 1	Long-line in medium to deep water in Subarea VII	6 998 t	17%
FU 3	Gillnets in Subarea VII	6 276 t	16%
FU 13	Gillnets in shallow to medium water Subarea VIII	4 722 t	12%
FU 14	Trawling in medium to deep water in Subarea VIII	7 639 t	19%

The remaining catches are made by 12 other units. Hake are caught in association with the following commercially exploited species: megrim, anglerfish, *Nephrops*, sole, seabass, ling, blue ling, greater forkbeard, tusk, whiting, blue whiting, *Trachurus spp*, conger, pout, conger, cephalopods (octopus, *Loligidae*, *Ommastrephidae* and cuttlefish), and rays. The relative importance of these species in the hake fishery varies largely in relation to the different gears, sea areas and countries involved.

b. Otter board trawl fishery in medium to deep water mainly taking anglerfish, megrim, and hake

These fisheries target either anglerfish, megrim or hake depending on a variety of factors. Management of these fisheries need to include provisions to substantially reduce catches of hake such that the total catch of hake is less than

13 800 t over the distributional area of the stock.

c. Trawl fishery for *Nephrops* with bycatch of roundfish and flatfish

Catches of several stocks outside safe biological limits are made in *Nephrops* fisheries. In 2002 fisheries targeting *Nephrops* accounted for around 8% of the hake catch but also have significant discards. Cod are also caught by vessels fishing *Nephrops*. French *Nephrops* trawlers have accounted for between 10% and 20% of the total French cod landings from this stock in recent years. Similarly between 10-18% of Irish cod landings were made by vessels targeting *Nephrops* between 2000-2002. No information is available about the extent of cod discarding by *Nephrops* fleets. Management of *Nephrops* fisheries in this area must take into account the potential impact of these species on the cod and hake stock.

d. Trawl fishery for roundfish (cod, haddock, and whiting)

These fisheries target either cod, whiting or haddock depending on a variety of factors. Management of these fisheries needs to include provisions to substantially reduce catches of cod such that the total catch of cod is less than 700 t over the distributional area of the stock.

Cod in Divisions VIIe-k are taken in mixed trawl fisheries targeting cod, haddock and whiting. The majority of the landings are made by French gadoid trawlers. Analysis of landings on a daily basis for the French gadoid trawlers in 2002 showed that on a daily basis, catches of cod and whiting can be both mixed and separated in daily catches. This may indicate that whiting can be targeted with minimal bycatches of cod. Similarly otter trawlers targeting whiting and haddock account for the majority of the Irish landings of cod in Divisions VIIe-k. In practice a high level of independent observer coverage would be required to ensure that cod are not discarded or misreported in these fisheries.

e. Beam trawl fishery for flatfish taking sole, plaice, megrim, cod and anglerfish

The strongest links in beam trawl fisheries are between sole and plaice. These beam fisheries also catch other species such as cod. Therefore management needs to take into account all species caught in these fisheries.

Plaice in VIIfg are taken mainly as a bycatch in beam trawl fisheries directed at sole and anglerfish. Beam trawl fisheries for sole VIIe also take plaice and cod as a bycatch. Since plaice and sole are strongly linked in most fisheries for plaice in VIIe fishing mortality should be reduced substantially in line with the zero catch advice for sole in Division VIIe. The advice for an effective reduction in fishing mortality is consistent with the advice for plaice and cod in Division VIIe.

Cod are also caught by beam trawlers targeting sole and plaice throughout VIIe-k. Beam trawlers have accounted for 20-30% of the UK cod landings. The bycatches (landings and discards) of cod and other species in other beam fisheries are not currently available.

f. Mixed demersal trawl fisheries

The catch composition in the mixed demersal fisheries in this area varies largely in relation to the different gears, sea areas and countries involved. Management measures must ensure that catches of species outside safe biological limits are close to zero in these mixed fisheries.

Hake are caught in mixed demersal fisheries throughout this area. Plaice in VIIfg are taken as part of a mixed demersal fishery (rays, gadoids, flatfish and squid) by otter trawlers.

g. Gillnet fisheries for sole

More than two-thirds of the Division VIIIab sole is caught by gillnet. There are also catches in otter trawls and beam trawls. The management of other species caught in these fisheries need to take into account the management of sole. The stock of sole may have benefited from the effort measures taken for the rebuilding of the hake stock.

Catch options

The catch options that would apply if single stocks could be exploited independently of others are presented in the single-stock sections on individual stocks (Sections 3.9.2-14, 3.10.2-5, 3.12.2 and 3.15.2).

However, for the mixed demersal fisheries catch options must be based on the expected catch in specific combinations of effort in the various fisheries taking into consideration the advice given above. The distributions of effort across fisheries should be responsive to objectives set by managers, but must also result in catches that comply with the scientific advice presented above.

The information on the mix of species observed caught in demersal fisheries in this area is not complete. An evaluation of the effects of any combination of fleet effort on depleted stocks would require that the catch data on which such estimates were based included discard information for all relevant fleets. Such data have been collected for some fleets but are not available to ICES. ICES is therefore not in a position to present scenarios of the effects of various combinations of fleet effort. If data including discard were available it would be possible to present a forecast based on major groupings of fleet/fisheries.

Table 3.9.1.1 Commercial Fleets West of Ireland (Divisions VIIb,c,j,k) in the Celtic Sea (Divisions VIIf-k), Western Channel (Division VIIe), and northern parts of the Bay of Biscay (Divisions VIIla,b,d, and e) as used by Working Groups for tuning.

Fleet Name	Code	Gear Type	Fishing Area	Target assemblage	Used in the assessment of:
UK (E+W) Inshore fleet	UK-INSHORE	Beam trawlers	VIIe	Flatfish	
UK (E+W) Offshore fleet	UK-OFFSHORE	Beam trawlers	VIIe	Flatfish	
UK(E+W) <24 Beam trawlers	UK-WEC<24BT	Beam trawlers	VIIe	Flatfish	
UK(E+W) >24 Beam trawlers	UK-WEC>24BT	Beam trawlers	VIIe	Flatfish	
UK (E+W) VIIe Otter trawlers	UK-WECOT	Otter trawlers	VIIe	Demersal	Plaice VIIe Sole VIIe Cod VIIe-k
UK (E+W) VIIf Otter trawlers	UK-CSOT	Otter trawlers	VIIf	Demersal	Plaice VIIfg
UK (E+W) VIIe Beam trawlers	UK-WECBT	Beam trawlers	VIIe	Flatfish	Plaice VIIe Sole VIIe
UK (E+W) VIIf Beam trawl	UK-CSBT	Beam trawlers	VIIf	Flatfish	Sole VIIfg Plaice VIIfg
Belgium beam trawlers (different fishing power corrections)	BEL-BEAM	Beam trawlers	VIIfg	Flatfish	Sole VIIfg
Irish Otter Trawl	IR-OT	Otter trawlers	VIIb VIIj	Demersal	Sole VIIh-k
Irish VIIj Otter Trawl	IR-7J-OT	Otter trawlers	VIIj	Demersal	Cod VIIe-k
Irish Combined VIIb,j Otter Trawl	IR-7B&J-OT	Otter trawlers	VIIb,j	Demersal	Haddock VIIb-k
Irish Combined VIIg,j Otter Trawl	IR-7G&J-OT	Otter trawlers	VIIg,j	Demersal	Whiting VIIe-k Haddock VIIb-k
Irish VIIj Beam Trawl	IR-BT	Beam trawlers	VIIj	Demersal	
Irish Nephrops Trawlers	IR Neph	Otter trawlers	FU 17, 19, 20-22	Nephrops	Nephrops
French Lorient gadoids trawlers	FR-LORIENT	Otter trawlers	VIIIfgh VIIIfg	Gadoids	Cod VIIe-k Whiting VIIe-k
French <i>Nephrops</i> trawlers St Guénolé & Loctudy	FR-NEPHROPS	Otter trawlers	VIIIfgh VIIIfg	Nephrops	Nephrops Cod VIIe-k Whiting VIIe-k
French Les Sables offshore trawlers	FR-SABLES	Otter trawlers	VIIIab	Demersal	Sole VIIIab
French La Rochelle offshore trawlers	FR-ROCHEL	Otter trawlers	VIIIab	Demersal	Sole VIIIab

Table 3.9.1.1 (Cont'd)

Fleet Name	Code	Gear Type	Fishing Area	Target assemblage	Used in the assessment of:
UK (E+W) Beam trawlers	EW-FU06	Beam trawlers		Flatfish	N. L. pisc N. L. bude (Not used)
Irish Combined VIIb,g,j Otter Trawl	IR-7-OT	Otter	VIIb,g,j	Demersal	N. megrim
French <i>Nephrops</i> trawlers in VIII	FR-FU09	Otter	VIII	<i>Nephrops</i>	<i>Nephrops</i>
French Lesconil <i>Nephrops</i> trawlers in VIII	FR-LESCONIL	Otter	VIII	<i>Nephrops</i>	N. Hake
French Les Sables offshore trawlers in VIII	FR-SABLES	Otter	VIII	Demersal	N. Hake (20/24 h)
French benthic trawlers in VII	FR-FU04	Otter	VII	benthic	N. L. pisc (en h) N. L. bude (en h) N. Megrim (* kW)
French benthic trawlers in VIII	FR-FU14	Otter	VIII	benthic	N. L. pisc N. L. bude (Not used)
Spanish Vigo trawlers in VII	SP-VIGOTR7	Otter	VIIj-h	Megrim Hake Anglerfish	N. Hake N. L. pisc N. L. bude N. Megrim (days / 100 HP)
Spanish A Coruña trawlers in VII	SP-CORUTR7	Otter	VIIb-c,j-k	Hake Nephrops Megrim	N. Hake (days) N. L. pisc (days / 100 HP) N. L. bude ('') N. Megrim (N)
Spanish Pasajes "Bou" trawlers in VIII	SP-BOU_PA8	Otter	VIII	Hake	N. Hake (N)
Spanish Cantábrico trawlers in VII	SP-CANTAB7	Otter	VII	Mixed	N. Megrim (N)
Spanish Ondarroa VHVO pair trawlers in VIII	SP-PAIRT_ON8	Pair trawl	VIII	Hake	N. Hake
Spanish Pasajes VHVO pair trawlers in VIII	SP-PAIRT_PA8	Pair trawl	VIII	Hake	N. Hake
Spanish Pasajes VHVO pair trawlers in VII	SP-PAIRT_PA7	Pair trawl	VII	Hake	N. Hake (N)
Spanish Ondarroa "Baka" trawlers in VII	SP-BAKON7	Otter	VII	Mixed	N. Hake (N) N. L. pisc (N) N. L. bude (?)
Spanish Ondarroa "Baka" trawlers in VIII	SP-BAKON8	Otter	VIII	Mixed	N. Hake (N) N. L. pisc N. L. bude (?)

Northern Hake

(Division IIa, IIIa-d, Vb, VIIIabde and Sub-areas IV, VI, VII, XII & XIV)

For latest information, see: <http://www.ices.dk>



Fisheries Science Services

FSS – SINGLE STOCK CONSIDERATIONS

(See Celtic Sea, West and Southwest of Ireland Overview for Mixed Fisheries Advice)

Based on the most recent estimates of SSB and fishing mortality ICES classifies the stock as being outside safe biological limits.

FSS recognise that hake is caught in nearly all fisheries in Sub-areas VII and VIII. Therefore hake are therefore caught with other stocks that are outside safe biological limits. FSS point out that an industry initiated programmes aimed at reducing catches of Hake, Cod (VIIe-k) and Plaice (VIIfg) and Sole (VIIe & VIIa,b) should be considered in the management of Celtic Sea, West of Ireland and Biscay fisheries. Industry initiated programmes should be encouraged but must include a high rate of independent observer coverage or other totally transparent methods for ensuring that their catches of species outside safe biological limits are fully and credibly reported.

ICES has revised the reference points for this stock in 2003 and B_{pa} has been reduced from 165 kt to 140 kt, F_{pa} has been revised upwards from 0.2 to 0.25. These revisions have made it possible to rebuild the stock above these limits in the short-term.

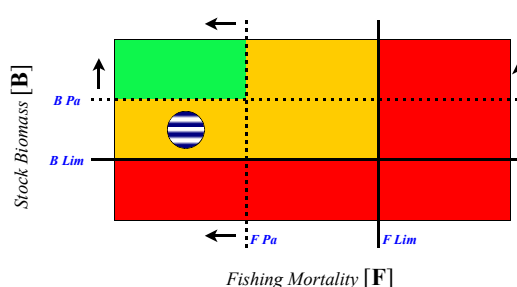
FSS considers that a 70% reduction in F which implies landings of 13,800 t in 2004 is severe and unlikely to be achieved. The recovery plan proposed by the EU Commission (Doc. COM2003-374 final) in July 2003 aims at an annual increase of the SSB of 10% with a limit on the annual TAC variation of 15%. A 10% increase in SSB in 2005 would imply landings of 28,100 t in 2004 and is consistent with the EU aims of an annual TAC variation of < 15%. This gives a Irish quota of

1,102 t. This approach is in line with STECF advice for the stock.

The TAC has been overshoot considerably in recent years. The poor performance of TACs, as implemented, in reducing fishing mortality, leads FSS to reiterate that the required reductions in fishing mortality can only be achieved if reductions in effort are included in management, and effective deterrents to discarding are implemented.

STATE OF THE STOCK

State of the Stock in relation to the precautionary reference points (see page 18)



Reference Points	Previous	Revised in 2003
B_{pa}	165,000	140,000
B_{lim}	120,000	100,000
F_{pa}	0.20	0.25
F_{lim}	0.28	0.35

- There are very serious concerns about this stock, and the stock is considered to be outside safe biological limits.
- Landings in 2002 were 40,000 t. There was a declining trend in landings between 1988-1998 landing in recent years have stabilized around 40,000 t.
- Fishing mortality in 2001 & 2002 is estimated to be

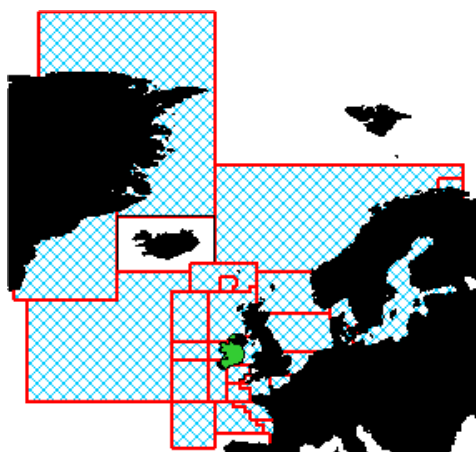
TAC Area	2003 TAC	2003 Irish Quota	FSS Advice for 2004 TAC	FSS Advice for 2004 Irish Quota
IIIbcd (EC waters)	904		843	
IIa (EC waters), North Sea (EC waters)	1,053		1,124	
Vb (EC waters), VI, VII, XII, XIV	16,823	1,114	15,736	1,102
VIIIa, b, d, e	11,220		10,397	
Total	30,000	1,114	28,100	1,102

just below $F_{pa} = 0.25$. F was close to F_{lim} during the mid 1980s to the mid 1990s when the stock declined. Fishing mortality shows a declining trend since 1995.

- Recruitments have been variable, though a downward trend is evident throughout the time series reaching a historic low in 2001. Recruitment in 2002 is estimated to be about average at 233 million.
- Spawning Stock Biomass in 2003 was 114,100 t, compared with $B_{pa} = 140,000$ t. SSB been relatively stable close to B_{lim} since the early 1990s.
- At status quo F , SSB is expected to decline further and remain close to B_{lim} in 2005.

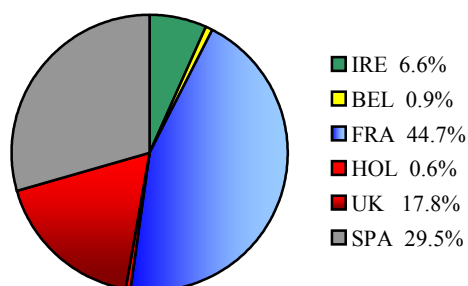
CURRENT MANAGEMENT

- The current assessment area covers four TAC areas: Divisions IIIa-d; IIa, IV; Vb,VI,VII; VIIIabde (see table above).
- The assessment area covers the stock's distribution in Sub-areas III, IV, V, VI, VII and VIIIabde.



Red Boxes-TAC/Management Areas Blue Shading-Assessment Area

- The TAC in 2003 for Vb, VI and VII was 16,823 t, with an Irish quota of 1,114 t.



- Current management measures for hake are discussed in the section on recovery plans.
- The recovery plan proposed by the EU Commission (Doc. COM2003-374 final) in July 2003 aims at an annual increase of the SSB of 10% with a limit on the annual TAC variation of 15%.
- Restrictive TACs in 2001 and 2002 have been overshoot considerably for this stock.

FSS – ECONOMIC COMMENTS

- The value of the 2002 Irish quota was about €2.9m.
- The value of the 2002 Irish landings was about €2.2m.
- This is an economically important high-value species that is taken in multi species fisheries with a variety of gears.

ADDITIONAL INFORMATION

1. The assessment methodology and results are very similar to last year. ICES has revised the reference points for this stock in 2003 and B_{pa} has been reduced from 165 kt to 140 kt, F_{pa} has been revised upwards from 0.2 to 0.25. These revisions have made it possible to rebuild the stock above these limits in the short term. However given the continued poor state of the stock and the magnitude of F reductions required managers may consider a longer term rebuilding plan seems appropriate for this stock.
2. Total landings of this stock in Vb, VI and VII were around 23,000 t in 2002. Landings in the entire assessment area were 40,000 t and catches were 40,300 t in 2002.
3. Landings by Irish fleet in 2002 were 642 t, a decrease of 32% from 2001.
4. Mis-reporting in this fishery is a problem but its extent is unknown.
5. In 2002, Spain took 59% of the landings, France 29%, UK about 5%, Denmark 3%, and Ireland 2%. and other countries (Norway, Belgium, Netherlands, Germany, and Sweden) contributing small amounts.
6. Hake are a very important component in the mixed species demersal trawl fisheries in most Irish ports. Ireland has important trawl, seine and gill-net fisheries for hake all along the western shelf and in the Celtic Sea and Stanton Bank area. The most important ports are Castletownbere, Dunmore East and Killybegs.
7. Sampling of this stock is supported by the EC-funded Sampling Programme, which is required under Regulations 1543/2000 and 1639/2001.
8. In 2002, Irish landings of hake ranged between 28 and 85 cm. The minimum size is 27 cm for this species. FSS started ageing hake for the first time in 2002. The results indicated that ages 2 and 7 were the most abundant in catches.
9. FSS have conducted a West Coast Groundfish Survey since 1993 and the results indicate that the Back of the Aran Islands Grounds and the Celtic Sea have important nursery areas for this stock.
10. In January 2003 the Irish Box Regulation was not re-enacted. However a new sensitive area was established based on the Hake recovery plan. The detail of measures to be enacted in this area are currently under discussion.
11. Discards used in the assessment are composed mainly of younger age classes (0-3 years). Discard in recent years accounted for 1-2% of the total catch and may be substantially underestimated.

12. Hake are targeted using demersal trawls, gill nets and long lines by the Spanish and French fleet. In 2002 these gear accounted for roughly equal landings of hake from Sub-area VII.

ICES ADVICE

3.12.2

State of stock/exploitation:

Based on the most recent estimates of SSB and fishing mortality ICES classifies the stock as being outside safe bio-

logical limits. Fishing mortality has been above F_{pa} between 1987 and 2000. SSB has generally declined till the early 1990s and has stabilised at a low level since then. SSB has been below B_{pa} since 1990, and very close to B_{lim} during 1992-1994 and in 2000. Recruitment estimates for 1997-2001 are the lowest recorded. Recruitment in 2002 is average.

Management objectives:

There are no explicit management objectives for this stock.

Precautionary Approach reference points (updated in 2003): Precautionary reference points were updated this year following a revision of the assessment model and input data in recent years. The old values were $B_{lim}=120\ 000\ t$, $B_{pa}=165\ 000\ t$, $F_{lim}=0.28$ and $F_{pa}=0.2$. The basis for setting reference points remained unchanged.

ICES considers that:	ICES proposes that:
B_{lim} is 100 000 t, the lowest observed biomass in the 2003 assessment.	B_{pa} be set at 140 000 t. Biomass above this affords a high probability of maintaining SSB above B_{lim} , taking into account the uncertainty in assessments.
F_{lim} is 0.35, the fishing mortality above which the stock dynamics are unknown.	F_{pa} be set at 0.25. This F is considered to have a high probability of avoiding F_{lim} and a high probability of maintaining SSB above B_{pa} in the next 10 years, taking into account the uncertainty in assessments.

Technical basis:

$B_{lim} = B_{loss}$.	$B_{pa} \sim B_{lim} \times 1.4$.
$F_{lim} = F_{loss}$.	$F_{pa} \sim F_{lim} * 0.72$.

Single-Stock Exploitation Boundaries:

Given the low stock size, and the recent poor recruitments, a recovery plan, which ensures a safe and rapid rebuilding of SSB to levels above B_{pa} should be implemented. The successful implementation of such a plan requires strong support from the fisheries, and effective monitoring of the fisheries and enforcement of the fishery regulations. This will also require effective control of effort in these mixed species fisheries at levels reduced substantially from recent levels. Rebuilding the stock in the short-term requires that less than 13 800 t be caught in 2004.

The advice on the exploitation of this stock in 2004 is presented in the context of mixed fisheries and is found in Section 3.9.1.

Recovery plan:

Rebuilding of the hake stock can be obtained by reducing the fishing mortality, or by a reduction in F combined with an improvement of the selection pattern. However, an improvement in the selection pattern alone is unlikely to be sufficient to reduce exploitation to the level needed to rebuild the hake stock. Direct effort reduction rather than just TAC controls, are required to promote reduction in fishing mortality. Closed areas and seasons may contribute to stock recovery, but only if accompanied by major reductions in effort.

The minimum legal mesh-size was increased from 55/65 mm to 70 mm in the Bay of Biscay since 1 January 2000. An emergency plan for Northern hake was implemented

on 1 September 2001. This plan combines a low TAC in recent years, and requires the use of a 100-mm mesh size for trawlers targeting hake in the Bay of Biscay and for trawlers operating in two non-*Nephrops* areas (one in the Bay of Biscay, one in the Celtic Sea). ICES has not been able to quantify the likely impact of these changes in mesh size, but, since hake is a late maturing fish, any improvement in the selection pattern that reduces the catch of younger fish (ages 0-2, ~ less than 30 cm) will have little short-term effect on SSB and only increase SSB in the medium-term. An improvement of the selection pattern would increase the probability that a reduction in fishing mortality will allow the rebuilding of SSB.

The recovery plan proposed by the EU Commission (Doc. COM2003-374 final) in July 2003 aims at an annual increase of the SSB of 10% with a limit on the annual TAC variation of 15%. ICES has not evaluated this plan. ICES notes that the reductions indicated in the proposed plan are very far from cuts in fishing mortality that could rebuild the stock in the short-term. The catch option table presented below suggests that a cut in fishing mortality of 70% in 2004 would rebuild the stock in the short-term.

Relevant factors to be considered in management:

Hake is caught in nearly all fisheries in Subareas VII and VIII.

Given the state of the stock, and the risk of impaired recruitment, any further delay in the definition/implementation of a recovery plan will be prejudicial to the stock and the fastest possible rebuilding to B_{pa} is strongly advised. An update of the STECF Harvest Control Rule scenario 8 was presented in last year's advice as being consistent with the Precautionary Approach based upon the previous BRPs, but this scenario is no longer appropriate.

Information from the fishery continues to indicate a decrease in the amount of small hake caught in recent years. This might be explained by an improvement in the selection pattern, changes in fishing strategy, small fish becoming inaccessible to sampling, or simply a consequence of weak year classes in recent years and the enforcement of a minimum landing size. LPUEs of trawlers operating in the same areas appear to show similar trends for the last years of the series, namely decreasing in Subarea VII and increasing in Divisions VIIIa,b,d.

The Spanish fleets operating in Subareas VI, VII, and VIII stopped fishing for one and a half months during the summer of 2002. Likewise in 2001, an important part of the Spanish (Basque) fleet fishing in Subarea VIII stopped its activity for one month in August.

Catch forecast for 2004:

Basis: $F(2003) = F_{sq} = \text{mean } F_{(00-02)} = 0.26$; Catch(2003) = 40.9; Landings(2003) = 40.4; SSB(2004) = 113.8.

F(2004) Onwards	Basis	Catch (2004)	Landings (2004)	SSB (2005)
0	0	0	0	155.6
0.05	0.2 F_{sq}	9.4	9.3	145.5
0.08	0.3 F_{sq}	14.0	13.8	140.0
0.11	+20%SSB ~0.4 F_{sq}	18.2	17.9	136.1
0.14	+15%SSB = 0.53 F_{sq}	23.1	22.8	130.8
0.16	0.6 F_{sq}	26.3	26.0	127.4
0.17	+10%SSB = 0.64 F_{sq}	28.5	28.1	125.1
0.21	0.8 F_{sq}	34.0	33.5	119.3
0.25	$F_{pa} \sim 0.96 F_{sq}$	39.1	39.1	116.5
0.26	1.0 F_{sq}	41.1	40.5	111.8

Weights in '000 t.

Shaded scenarios considered inconsistent with the precautionary approach applied in a single-species context alone. The options +10%SSB, +15%SSB and +20%SSB have been inserted to facilitate a discussion based on the proposed EC recovery plan.

Medium-term projections:

Medium-term projections suggest that fishing at F_{pa} leads to a 50% probability of the stock exceeding B_{pa} in 2008.

Comparison with previous assessment and advice:

Estimates of fishing mortality and SSB in the current and last year's assessments are similar. Recruitment estimates remain very similar with the exception of recent years: the 1999 year class has been revised upwards by 60% and the 2001 year class has been revised downwards by 45%. This might be caused by a discrepancy between survey and commercial catch information, which only includes partial discards numbers.

Unlike the advice given last year, a fishing mortality of 0.08 is now expected to rebuild SSB to B_{pa} by 2005. This change results primarily from the reduction by 25 000 t in the level of B_{pa} used in this year's advice.

Elaboration and special comment:

Since the 1930s, hake has been the main demersal species supporting trawl fleets on the Atlantic coasts of France and Spain. In 2002, Spain took 59% of the landings, France 29%, UK about 5%, Denmark 3%, and Ireland 2%. Hake are caught throughout the year, the peak landings being made in spring-summer months. The three main gear types used by vessels fishing for hake as a target species are lines (E & W, Spain), fixed-nets and trawls (all countries), mostly bottom trawls, a few pelagic ones (France), and recently also Very High Opening trawls (Spain).

Hake spawn from February through July along the shelf edge, the main areas extending from north of the Bay of Biscay to the south and west of Ireland. 0-groups descend to the seabed (at depths in excess of 200 m), moving to shallower water with a muddy seabed (75–120 m) by September. There are two major nursery areas: in the Bay of Biscay and off southern Ireland. Three-year-old hake

begin to move into the shallower regions of the Bay of Biscay and Celtic Sea, but as they approach maturity they disperse to offshore regions.

Hake movements are indicated by the seasonal distribution of catches. From the beginning of the year until March/April hake are present in the north of the Bay of Biscay. They appear on the shelf edge in the Celtic Sea in June and July. Between August and December the hake fishery is centred to the west and southwest of Ireland, with a decline in catch rates in shallower waters.

Length composition data by fishery unit are available annually for 1978–1989 and quarterly for 1990–2002. Prior to 1992, these were converted to age compositions by numerical methods. For 1992–2002, age readings were used.

As in 2002, it was decided to remove the age 0 from the international catch-at-age matrix for this year's assessment due to the enforcement of the minimum landing size and partial information on discards in recent years. Abundance indices for age 0 are available from surveys and are used in the assessment.

Source of information:

Report of the Working Group on the Assessment of Hake, Monk and Megrim, May 2003 (ICES CM 2004/ACFM:02).

Yield and spawning biomass per recruit**F-reference points:**

	Fish Mort Ages 2-6	Yield/R	SSB/R
Average last 3 years	0.265	0.250	0.689
F_{max}	0.162	0.265	1.135
$F_{0.1}$	0.096	0.247	1.703
F_{med}	0.286	0.245	0.630

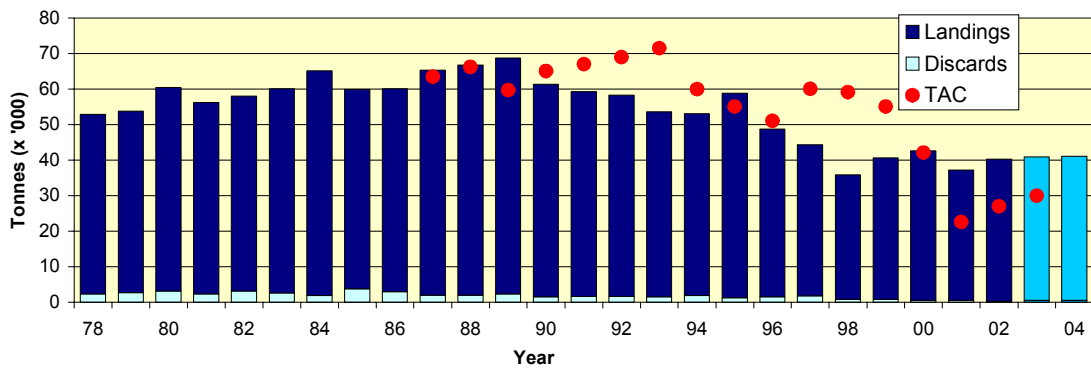
Catch data (Tables 3.12.2.1-2):

Year	ICES Advice	Single-Stock Exploitation Boundaries	Predicted catch corresp to advice	Predicted catch corresp to Single-Stock Exploitation Boundaries	Agreed TAC ¹	ACFM landings	Disc. slip.	ACFM catch
1987	Precautionary TAC; juvenile protection		-		63.5	63.4	2.0	65.3
1988	Precautionary TAC; juvenile protection		54		66.2	64.8	2.0	66.8
1989	Precautionary TAC; juvenile protection		54		59.7	66.5	2.3	68.8
1990	Precautionary TAC; juvenile protection		59		65.1	59.9	1.5	61.4
1991	Precautionary TAC; juvenile protection		59		67.0	57.6	1.7	59.3
1992	If required, precautionary TAC		61.5		69.0	56.6	1.7	58.3
1993	Enforce juvenile protection legislation		-		71.5	52.1	1.5	53.6
1994	F significantly reduced		<46		60.0	51.3	1.9	53.1
1995	30% reduction in F		31		55.1	57.6	1.2	58.9
1996	30% reduction in F		39		51.1	47.2	1.5	48.8
1997	20% reduction in F		54		60.1	42.6	1.8	44.4
1998	20% reduction in F		45 ²		59.1	35.0	0.8	35.8
1999	Reduce F below F_{pa}		<36 ²		55.1	39.8	0.8	40.6
2000	50% reduction in F		<20 ²		42.1	42.0	0.6	42.6
2001	Lowest possible catch, recovery plan		-		22.6	36.7	0.5	37.2
2002	Lowest possible catch / recovery plan		-		27.0	40.0	0.3	40.3
2003	Lowest possible catch / recovery plan		-		30.0			
2004	^{*)}	70% reduction in F or recovery plan	- ^{*)}	<13.8				

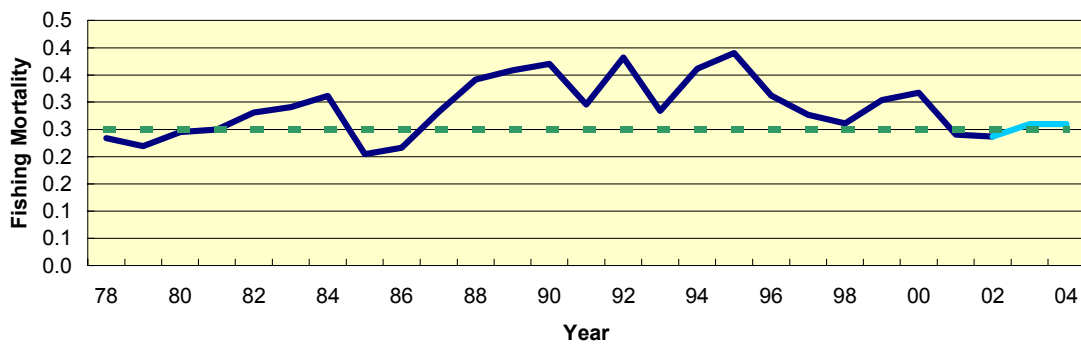
¹Sum of area TACs corresponding to Northern stock plus Division IIa (EC zone only). ²Landings. Weights in '000 t.

^{*)} Single-stock boundary and the exploitation of this stock should be conducted in the context of mixed fisheries protecting stocks outside safe biological limits.

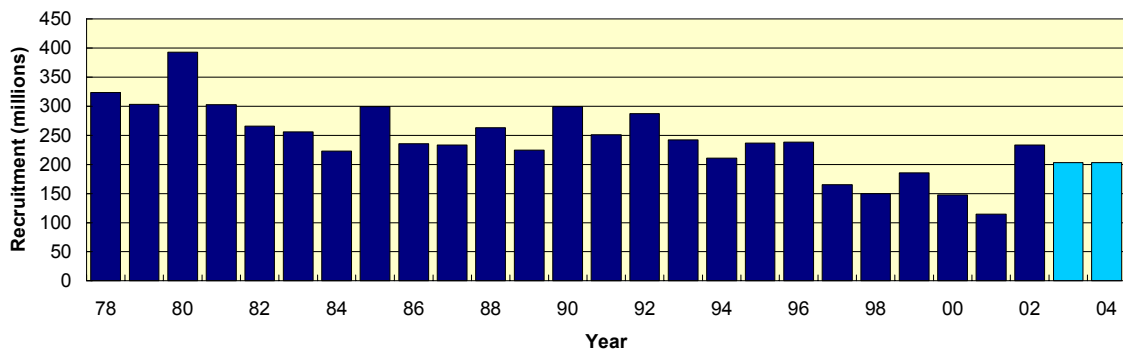
Hake - Northern stock - Landings & Discards
Mean = 52.6



Hake - Northern stock - Fishing Mortality
Mean = 0.29



Hake - Northern stock - Recruitment (Age 1)
Mean = 243.5



Hake - Northern stock - Spawning Stock Biomass
Mean = 148.1

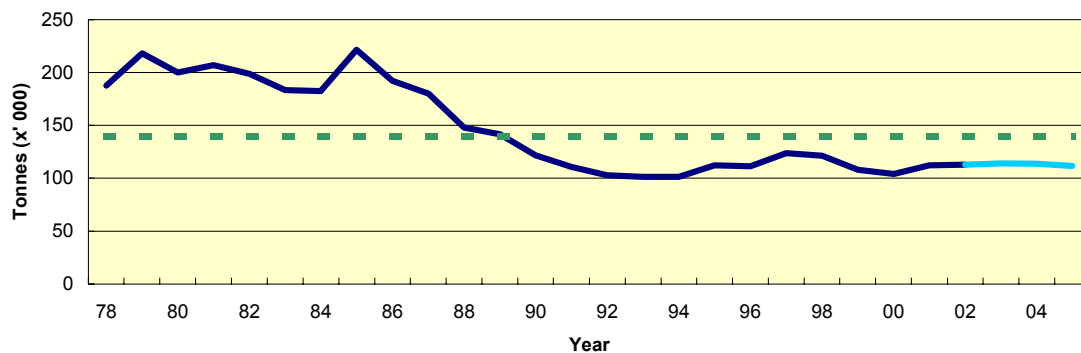


Table 3.12.2.1 Estimates of catches ('000 t) for the Northern Hake by area for 1961-2002.

Year	Landings (1)					Discards (2)	Catches (3)
	IVa+VI	VII	VIIIa,b	Unallocated	Total	VIIIa,b	Total
1961	-	-	-	95.6	95.6	-	95.6
1962	-	-	-	86.3	86.3	-	86.3
1963	-	-	-	86.2	86.2	-	86.2
1964	-	-	-	76.8	76.8	-	76.8
1965	-	-	-	64.7	64.7	-	64.7
1966	-	-	-	60.9	60.9	-	60.9
1967	-	-	-	62.1	62.1	-	62.1
1968	-	-	-	62.0	62.0	-	62.0
1969	-	-	-	54.9	54.9	-	54.9
1970	-	-	-	64.9	64.9	-	64.9
1971	8.5	19.4	23.4	0	51.3	-	51.3
1972	9.4	14.9	41.2	0	65.5	-	65.5
1973	9.5	31.2	37.6	0	78.3	-	78.3
1974	9.7	28.9	34.5	0	73.1	-	73.1
1975	11.0	29.2	32.5	0	72.7	-	72.7
1976	12.9	26.7	28.5	0	68.1	-	68.1
1977	8.5	21.0	24.7	0	54.2	-	54.2
1978	8.0	20.3	24.5	-2.2	50.6	2.4	52.9
1979	8.7	17.6	27.2	-2.4	51.1	2.7	53.8
1980	9.7	22.0	28.4	-2.8	57.3	3.2	60.5
1981	8.8	25.6	22.3	-2.8	53.9	2.3	56.3
1982	5.9	25.2	26.2	-2.3	55.0	3.1	58.1
1983	6.2	26.3	27.1	-2.1	57.5	2.6	60.1
1984	9.5	33.0	22.9	-2.1	63.3	1.9	65.1
1985	9.2	27.5	21.0	-1.6	56.1	3.8	59.9
1986	7.3	27.4	23.9	-1.5	57.1	3.0	60.1
1987	7.8	32.9	24.7	-2.0	63.4	2.0	65.3
1988	8.8	30.9	26.6	-1.5	64.8	2.0	66.8
1989	7.4	26.9	32.0	0.2	66.5	2.3	68.8
1990	6.7	23.0	34.4	-4.2	59.9	1.5	61.4
1991	8.3	21.5	31.6	-3.9	57.6	1.7	59.3
1992	8.6	22.5	23.5	2.1	56.6	1.7	58.3
1993	8.5	20.5	19.8	3.3	52.1	1.5	53.6
1994	5.4	21.1	24.7	0	51.3	1.9	53.1
1995	5.3	24.1	28.1	0	57.6	1.2	58.9
1996	4.4	24.7	18.0	0	47.2	1.5	48.8
1997	3.3	18.9	20.3	0	42.6	1.8	44.4
1998	3.2	18.7	13.1	0	35.0	0.8	35.8
1999	4.3	24.0	11.6	0	39.8	0.8	40.6
2000	4.0	26.0	12.0	0	42.0	0.6	42.6
2001	4.4	23.1	9.2	0	36.7	0.5	37.2
2002	2.9	21.1	15.9	0	40.0	0.3	40.3

(1) Spanish data for 1961-1972 not revised, data for Subarea VIII for 1973-1978 include data for Divisions VIIIa,b only. Data for 1979-1981 are revised based on French surveillance data. Includes Divisions IIIa, IVb,c from 1976.

There are some unallocated landings moreover for the period 1961-1970.

(2) Discards have been estimated from 1978 and only for Divisions VIII a,b.

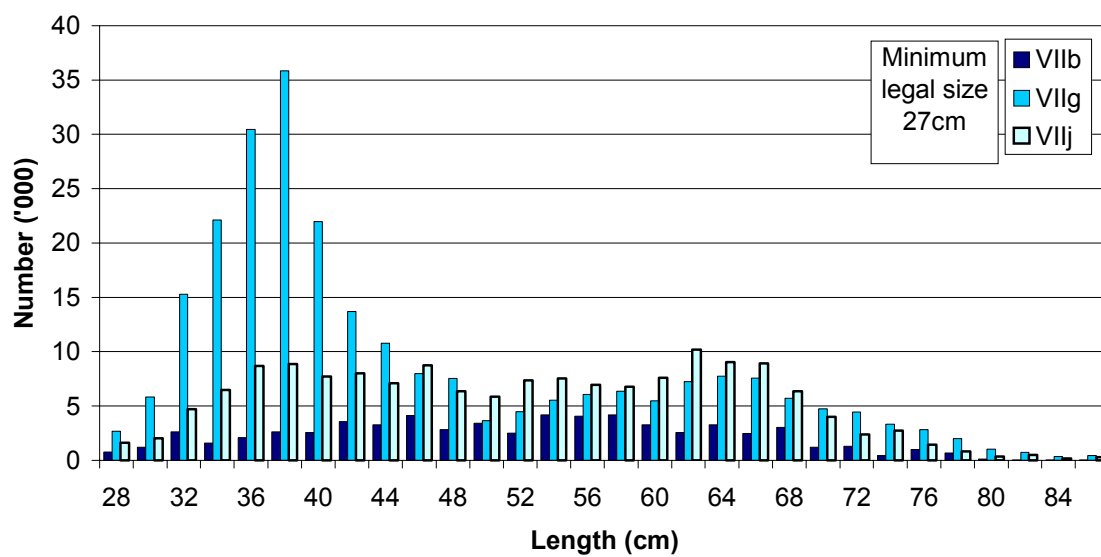
(3) From 1978 total catches used for the Working Group.

Table 3.12.2.2 Hake - Northern stock (IIIa, IV, VI, VII, VIIIa,b).

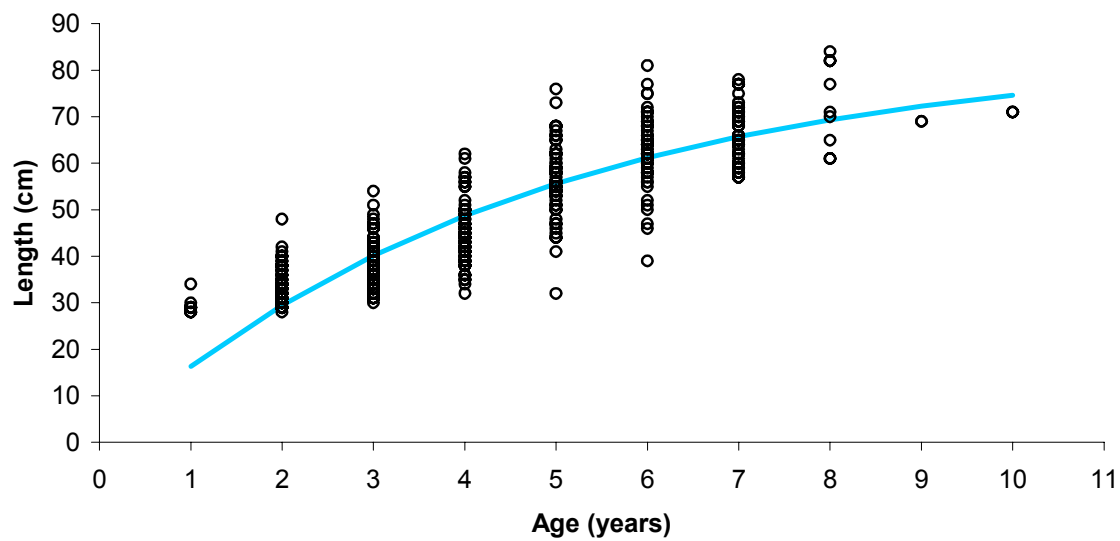
Year	Recruitment Age 0 thousands	SSB tonnes	Landings+discards tonnes	Mean F Ages 2-6
1978	324003	187798	52908	0.2338
1979	303497	218178	53799	0.2192
1980	392743	199908	60459	0.2448
1981	302853	207020	56264	0.2501
1982	265963	198807	58057	0.2810
1983	255603	183406	60128	0.2906
1984	222828	182264	65149	0.3116
1985	299515	221491	59939	0.2046
1986	235484	192023	60053	0.2166
1987	233620	179888	65320	0.2820
1988	263220	147954	66818	0.3412
1989	224785	141561	68781	0.3590
1990	299459	121691	61410	0.3703
1991	250981	110862	59286	0.2955
1992	287721	102829	58290	0.3818
1993	241865	101306	53637	0.2839
1994	211018	101207	53140	0.3615
1995	236847	112331	58862	0.3905
1996	238622	111319	48759	0.3122
1997	165042	123610	44357	0.2769
1998	149922	121249	35877	0.2608
1999	185686	107914	40648	0.3038
2000	147922	103983	42624	0.3172
2001	114650	112119	37192	0.2405
2002	233567	112826	40312	0.2368
2003	203000*	114155		
Average	243497	148142	54483	0.2906

*Geometric Mean over 1990-2001.

2002 Length Distribution: Irish Landings, Northern Hake



2002 Size at Age: Irish Sampling, Northern Hake



Celtic Sea and Western Channel Cod

(Divisions VIIe-k)

For latest information, see: <http://www.ices.dk>



Fisheries Science Services

FSS – SINGLE STOCK CONSIDERATIONS

(See Celtic Sea, West and Southwest of Ireland Overview for Mixed Fisheries Advice)

Given the recent estimate of biomass, recent poor recruitments and continued high fishing mortality, ICES has classified this stock as outside safe biological limits.

FSS considers a 90% reduction in fishing mortality in 2004 relative to F_{sq} is required to restore SSB above B_{pa} in 2005. If such a reduction is not possible, a recovery plan which includes a sustained reduction of fishing mortality should be implemented to rebuild the stock above B_{pa} in the medium term.

STECF have advised that this could be achieved by 2007 with a 32% reduction in F in 2004 to F_{pa} . FSS notes that this is based on a projection which assumes that recruitment is above that seen in recent years and leaves SSB in 2005 close to B_{lim} .

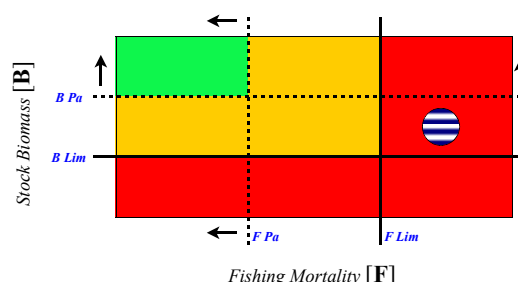
FSS considers that an industry initiated programme aimed at reducing cod and whiting catches to 'close to zero' should be considered in the management of Celtic Sea fisheries. Industry initiated programmes should be encouraged but must include a high rate of independent observer coverage or other totally transparent methods for ensuring that their catches of species outside safe biological limits are fully and credibly reported.

FSS consider that a well defined 'management plan' is necessary to recover the cod stock and to fish it sustainably once it has recovered. FSS considers that such a plan requires clearly defined objectives that will ensure a high probability of recovery to agreed levels. FSS considers that the proper definition and evaluation of all métiers involved in the fishery is crucial to this management plan.

TAC Area	TAC 2003	Proposed TAC 2004	Basis
VIIe-k		3,900	Assessment
VIIId		0	
VIIb-c		171	Average Catches, 1999-2001 (As reported to the WGSSDS 2003)
Total TAC(VIIb-k, VIII, IX, X)	6,700	4771	
Irish quota	753	536	

STATE OF THE STOCK

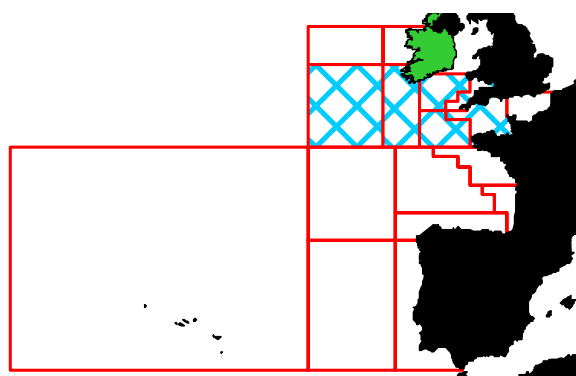
State of the Stock in relation to the precautionary reference points (see page 18)



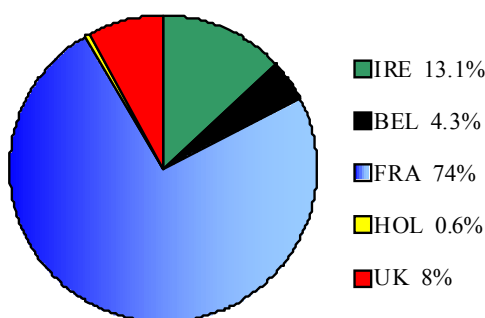
- There are very serious concerns about the state of this stock.
- The landings in 2002 were estimated to be 9,100 t, an increase of 14% compared to landings in 2001. In general, landings have declined in recent years from a maximum of 12,800 t in 1996.
- Fishing mortality (estimated to be 0.96) is too high in this stock and has been above the $F_{pa} = 0.68$ since 1989 and above $F_{lim} = 0.90$ since 1998.
- Recruitment has been highly variable with the 1998 year classes below average and the 1999 and 2000 year class above average (5.3 million fish). The 2001 and 2002 year classes are well below the mean at respectively 2.0 and 1.7 million fish.
- SSB has decreased since 1996 and at 9,187 t is currently below $B_{pa} = 10,000$ t.
- Short-term predictions suggest that, at current fishing mortality, SSB will decrease to 8,668 t in 2003 and decrease again in 2004 to 5,884 t close to B_{lim} .

CURRENT MANAGEMENT

- The TAC area covers Divisions VIIb-k, and Sub Areas VIII, IX and X.
- The assessment area covers Divisions VIIe-k.



Red Boxes-TAC/Management Areas Blue Shading- Assessment Area



- The 2003 TAC was 6,700 t with an associated Irish quota of 753 t.
- There are no explicit management objectives or plan for this stock.
- FSS recommend that management objectives be established and that a management plan be developed and implemented for fisheries catching cod.

FSS – ECONOMIC COMMENTS

- The value of the 2002 Irish quota was about €2.2m.
- The value of the 2002 Irish landings was about €1.6m
- Cod remains an economically important species in Irish mixed demersal fisheries.

ADDITIONAL INFORMATION

1. The results of this assessment are consistent with those of last year.
2. Irish landings in 2002 were 694 t in Sub-Area VIIe-k. This is a decrease of 36% from the 2001 landings.
3. There is no information on possible mis-reporting for this stock but it may be suspected when TACs became more restrictive in recent years.
4. France took about 80% of the total landings in VIIe-k in 2002. Ireland, the UK and Belgium landed about 8%, 7% and 6% of the 2002 landings respectively.
5. Most of the French landings are from the Lorient-based gadoid fleet.
6. Demersal trawlers from Dunmore East and Castletownbere and other ports in south-west Ireland have traditionally targeted Celtic Sea cod during the spring. There is a well established gill net fishery in the south east ports

and in recent years a targeted gill net fishery involving boats from Dingle has also become important.

7. Irish Sampling for this stock is supported through the EC funded sampling programme which is required under Data Collection Regulation 1543/2000 and 1639/2001. FSS sampling indicates that very young fish dominated the Irish landings in 2002 with 80% of the landings being between 1 and 2 years old.
8. In 2003 Irish commercial catch and effort data from log-books were used for the third time to tune the assessment.
9. FSS commenced a groundfish survey in 1997 on RV *Celtic Voyager* in the Celtic Sea. Catch rates to date have been very low for both juvenile and adult cod confirming the poor state of the stock. This survey was used for the first time in 2003 to tune the assessment. The survey provided an age 0 (juvenile abundance) recruitment index for the first time.
10. Discards in Irish fisheries in recent years have been estimated at less than 1% of landings from Divisions VIIg and VIIj. Discarding is estimated to have increased for French fleets in the second part of 2002 in order to try to avoid a fishery closure for cod.
11. FSS tagging work in the Irish Sea suggests that only a small component of cod landings from the Celtic Sea are from fish which spawn in the Irish Sea. No cod that had been tagged in the Celtic Sea were recaptured in the Irish Sea.

ICES ADVICE

3.9.2

State of stock/exploitation:

Based on the most recent estimate of the biomass ICES classifies the stock as being outside safe biological limits. SSB has decreased since 1996 and is currently below B_{pa} . Recruitment is highly variable. The 1999 and 2000 year classes are above average, whilst the 2001 and 2002 year classes are estimated to be very weak. Fishing mortality has generally increased, and has been mostly above F_{pa} since the mid-1980s, and has been close to or above F_{lim} since 1989.

Management objectives:

There are no explicit management objectives for this stock.

Precautionary Approach Reference Points (established in 1999):

ICES considers that:	ICES proposes that:
B_{lim} is 5 400 t, the lowest observed spawning stock biomass.	B_{pa} be set at 10 000 t. Biomass above this value affords a high probability of maintaining SSB above B_{lim} , taking into account the variability in the stock dynamics and the uncertainty in assessments.
F_{lim} is 0.90, the fishing mortality estimated to lead to potential collapse.	F_{pa} be set at 0.68. This F is considered to have a high probability of avoiding F_{lim} and maintaining SSB above B_{pa} in the medium-term, taking into account the uncertainty assessments.

Technical basis:

$B_{lim} = B_{loss}$	B_{pa} = historical development of the stock
F_{lim} = based on historical response of the stock	F_{pa} = 5th percentile of F_{loss}

Single Stock Exploitation Boundaries:

A 90% reduction in fishing mortality in 2004 relative to F_{sq} is required to restore SSB above B_{pa} in 2005. If such a reduction is not possible, a recovery plan which includes a sustained reduction of fishing mortality should be implemented to rebuild the stock above B_{pa} in the medium-term. Direct effort reductions, rather than TAC controls, are required to promote such a reduction in fishing mortality.

Advice on the exploitation of this stock in 2004 is presented in the context of mixed fisheries and is found in Section 3.9.1.

Relevant factors to be considered in management:

The yield-per-recruit model suggests that a reduction in fishing mortality to F_{max} (=0.29) will increase the long-term yield.

Some scenarios that may be relevant in establishing a recovery plan are presented in Table 3.9.2.3 and Figure 3.9.2.1. They assume F to be reduced to F_{pa} in 2004. A further and sustained reduction in F of 10-20% would promote an increase in SSB above B_{pa} in 3-4 years (assuming GM recruitment).

The assessment area was expanded in 1997 to cover Divisions VIIe-k and the ICES advice applies to these areas. However, the cod TAC is set for Subareas VII (excluding Division VIIa) and VIII. Within this larger area there is no control over where the catches will be taken. In order to be able to regulate the fishing mortality on the cod stock in Division VIIe-k, a TAC (or effort control measure) must be set specifically for this area.

Cod in VIId is a part of the North Sea cod complex. Considering the poor state of the North Sea cod stock, the cod TAC for Subareas VII (excl. VIIa) and VIII must be kept at the present low levels.

Medium- and long-term projections:

Assuming the current selection pattern, fishing at F_{max} would require a 70% reduction in fishing mortality.

Comparison with previous assessment and advice:

The estimates of recruitment and SSB are very similar to those obtained last year, while the estimate of fishing mortality in 2001 is now lower. Landings in 2002 were similar to those assumed for last year's forecast. Last year's advice was for a reduction of 60% in F , with associated landings of around 3.8 kt; the current forecast assumes landings of 6.8 kt. This discrepancy is in accordance with estimated landings being well above the advice.

Catch forecast for 2004:

Basis: $F(2003) = F(00-02) = 0.93$;
Landings(2003) = 6.8 ; SSB(2004) = 5.9.

F(2004)	Basis	Landings (2004)	SSB (2005)
0.00	0.0 F_{sq}	0.0	10.8
0.09	0.1 F_{sq}	0.7	10.0
0.29	F_{max}	2.0	8.7
0.37	0.4 F_{sq}	2.4	7.8
0.56	0.6 F_{sq}	3.4	6.7
0.65	0.7 F_{sq}	3.8	6.2
0.68	F_{pa}	3.9	6.0
0.75	0.8 F_{sq}	4.2	5.7
0.93	F_{sq}	4.9	4.9

Weights in '000 t.

Shaded scenarios considered inconsistent with the precautionary approach.

About 28% of the calculated SSB(2005) (year class 2003 at age 2) is based on long-term geometric mean recruitment.

Elaboration and special comment:

Cod in Divisions VIIe-k are taken in mixed trawl fisheries. Landings of cod by French *Nephrops* trawlers have fluctuated between 10% and 20% of the total French cod landings from this stock in recent years.

Most cod spawning in the Celtic Sea occurs off northern Cornwall in mid- to late March. There is also some spawning off southeast Ireland and a little in the Western Channel. Tagging studies have given no evidence of cod movement out of Division VIIe, where there appears to be a simple inshore-offshore migration between deep-water wrecks and reefs in the summer and inshore spawning areas in the winter. Recent tagging work in the Irish Sea suggest that only a small component of cod landings from the Celtic Sea are fish which spawn in the Irish Sea. Furthermore, no cod tagged in the Celtic Sea were recaptured in the Irish Sea.

The analytical assessment was based on landings data and CPUE data for four commercial fleets and three surveys.

Source of information:

Report of the Working Group on the Assessment of Southern Shelf Demersal Stocks, July 2003 (ICES CM 2004/ACFM:03).

Yield and spawning biomass per recruit

F-reference points:

	Fish Mort Ages 2-5	Yield/R	SSB/R
Average last 3 years	0.934	1.602	1.614
F_{max}	0.291	2.120	7.492
$F_{0.1}$	0.171	1.981	11.872
F_{med}	0.723	1.769	2.390

Catch data (Tables 3.9.2.1-3):

Year	ICES Advice	Single stock exploitation boundaries	Predicted catch corresp. to advice	Predicted catch corresponding to single stock boundaries	Agreed TAC ¹	ACFM Landings
1987	Reduce F		< 6.4 ²			-
1988	No increase in F; TAC		7.0 ²			17.7
1989	No increase in F; TAC		8.6 ²			20.3
1990	No increase in F; TAC		9.2 ²			12.9
1991	TAC; SSB = mean		4.5 ²			9.3
1992	Appropriate to reduce F		-			9.6
1993	20% reduction in F		6.5 ²		19.0	10.2
1994	20% reduction in F		5.6 ²		17.0	10.3
1995	20% reduction in F		4.7 ³		17.0	11.7
1996	20% reduction in F		4.7 ³		20.0	12.8
1997	20% reduction in F		7.4 ⁴		20.0	11.8
1998	10% reduction in F		8.8 ⁴		20.0	10.7
1999	Reduce F below F_{pa}		9.2 ⁴		19.0	9.9
2000	Reduce F below F_{pa}		< 7.6 ⁵		16.0	7.0
2001	40% reduction in F		< 4.3 ⁵		10.5	8.5
2002	45% reduction in F		< 5.3 ⁵		8.7	9.1
2003	60% reduction in F		< 3.8 ⁵		6.7	
2004	⁶	90% reduction in F or recovery plan	⁶			

¹TAC covers Subareas VII (except Division VIIa) and VIII. ²For the VIIf+g stock component. ³For the VIIf-h stock component. ⁴For the VIIe-h stock component. ⁵For the VIIe-k stock component. ⁶Single stock boundary and the exploitation of this stock should be conducted in the context of mixed fisheries protecting stocks outside safe biological limits. Weights in '000 t.

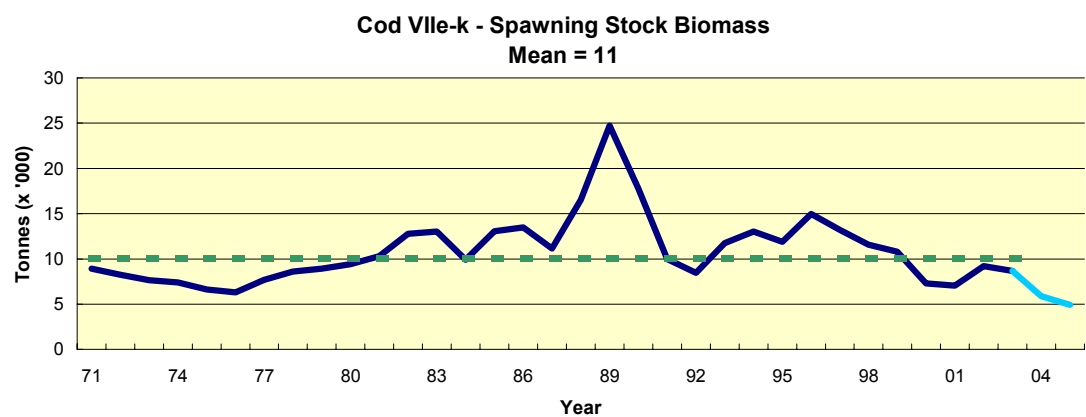
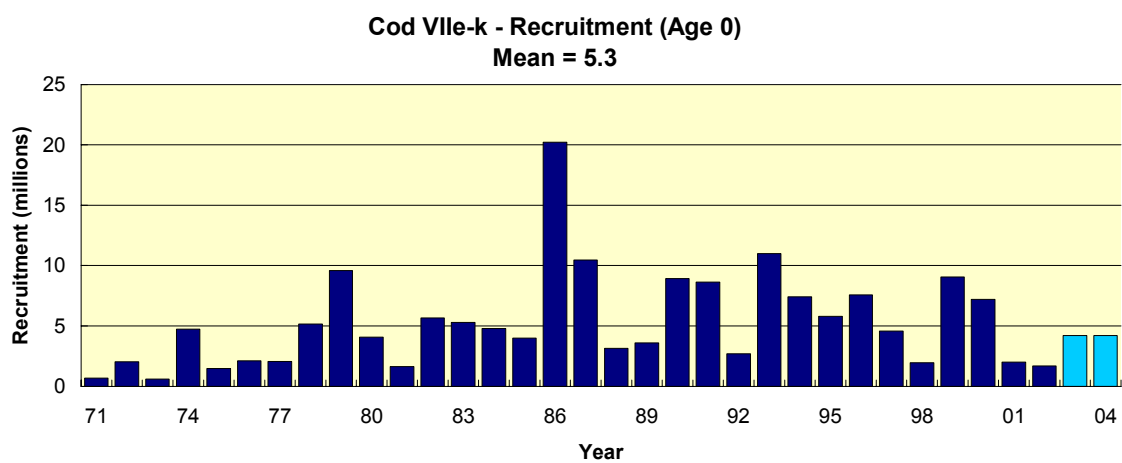
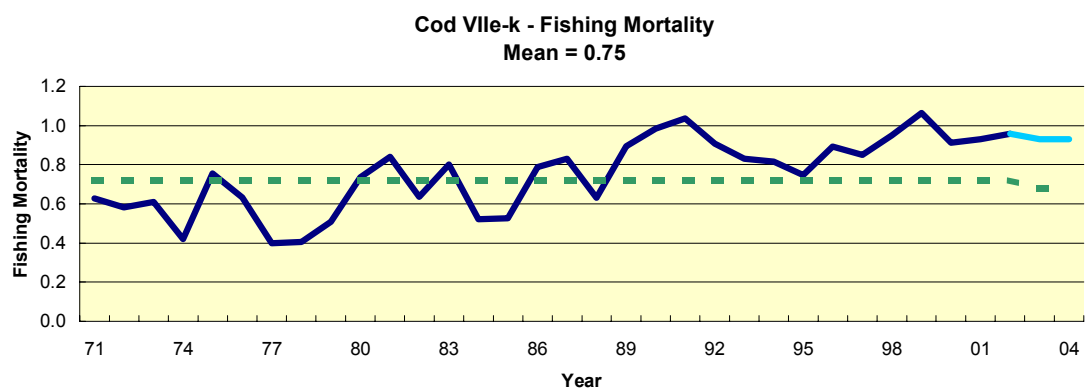
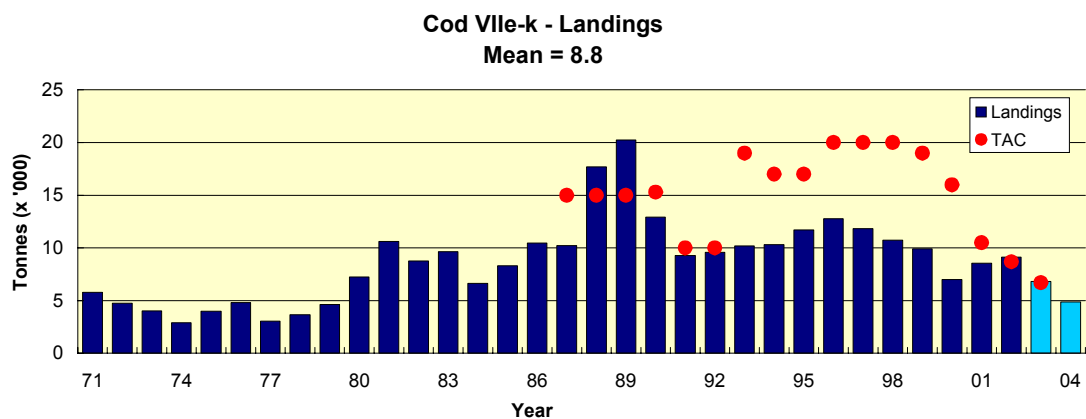


Table 3.9.2.1 Nominal landings of Cod in Divisions VII e-k used by the Working Group

Year	Belgium	France	Ireland	UK	Others	Total
1971						5782
1972						4737
1973						4015
1974						2898
1975						3993
1976						4818
1977						3058
1978						3647
1979						4650
1980						7243
1981						10596
1982						8766
1983						9641
1984						6631
1985						8317
1986						10475
1987						10228
1988	554	14371	1480	1292	2	17699
1989	910	16259	1860	1223	15	20267
1990	621	9542	1241	1346	158	12908
1991	303	6206	1659	1094	20	9282
1992	195	6950	1212	1207	13	9577
1993	391	8100	766	945	6	10207
1994	398	7372	1616	906	8	10300
1995	399	8317	1946	1035	8	11705
1996	552	9055	1982	1166	0	12754
1997	693	8445	1513	1166	0	11818
1998	528	7383	1718	1089	0	10718
1999	326	6820	1883	897	0	9926
2000	208	4747	1302	745	0	7002
2001*	347	6270	1091	838	0	8546
2002*	555	7252	694	618	0	9119

* provisional

Scaled landings 1971-1987 (SSDS WG 1999)

Table 3.9.2.2 Cod in Divisions VIIe-k.

Year	Recruitment Age 0 thousands	SSB tonnes	Landings tonnes	Mean F Ages 2-5
1971	691	8928	5782	0.6284
1972	2033	8225	4737	0.5822
1973	610	7668	4015	0.6096
1974	4749	7411	2898	0.4195
1975	1467	6628	3993	0.7551
1976	2092	6301	4818	0.6321
1977	2061	7686	3059	0.3997
1978	5164	8617	3647	0.4056
1979	9568	8934	4650	0.5080
1980	4075	9432	7243	0.7365
1981	1651	10275	10597	0.8410
1982	5680	12776	8766	0.6355
1983	5285	13032	9641	0.8014
1984	4782	9918	6631	0.5210
1985	4013	13051	8317	0.5264
1986	20213	13484	10475	0.7882
1987	10467	11150	10228	0.8305
1988	3138	16519	17699	0.6304
1989	3589	24710	20267	0.8934
1990	8935	17744	12908	0.9844
1991	8631	9969	9282	1.0373
1992	2712	8482	9577	0.9072
1993	11002	11743	10207	0.8304
1994	7401	13023	10300	0.8158
1995	5798	11885	11705	0.7465
1996	7568	14970	12754	0.8931
1997	4562	13195	11818	0.8501
1998	1949	11573	10717	0.9503
1999	9055	10775	9926	1.0657
2000	7215	7276	7002	0.9132
2001	2020	7060	8546	0.9304
2002	1688	9187	9119	0.9577
2003	4203*	8668		
Average	5275	10918	8791	0.7508

*GM

Table 3.9.2.3 Cod in Vlle-k : Short term forecast scenarios

Deterministic projection using a constant R = 4.2 millions over the simulated period

SSB

Year	status quo	A	B	C	D	E
2003	8669	8669	8669	8669	8669	8669
2004	5884	5884	5884	5884	5884	5884
2005	4933	6039	6039	6039	6039	6039
2006	5784	7959	8704	9218	8993	8424
2007	6318	9334	11696	13464	12153	10883
2008	6598	10169	14929	18566	14520	13290
2009	6711	10589	18377	22770	16016	15169
2010	6756	10797	22154	25930	16917	16394

Yield

Year	status quo	A	B	C	D	E
2003	6826	6826	6826	6826	6826	6826
2004	4877	3924	3924	3924	3924	3924
2005	5423	5019	4446	4053	4224	4660
2006	6156	6200	5216	4430	5189	5528
2007	6476	6854	5611	4577	6387	6053
2008	6630	7230	5821	5824	7218	6761
2009	6692	7419	5892	6804	7737	7438
2010	6718	7518	6655	7547	8061	7876

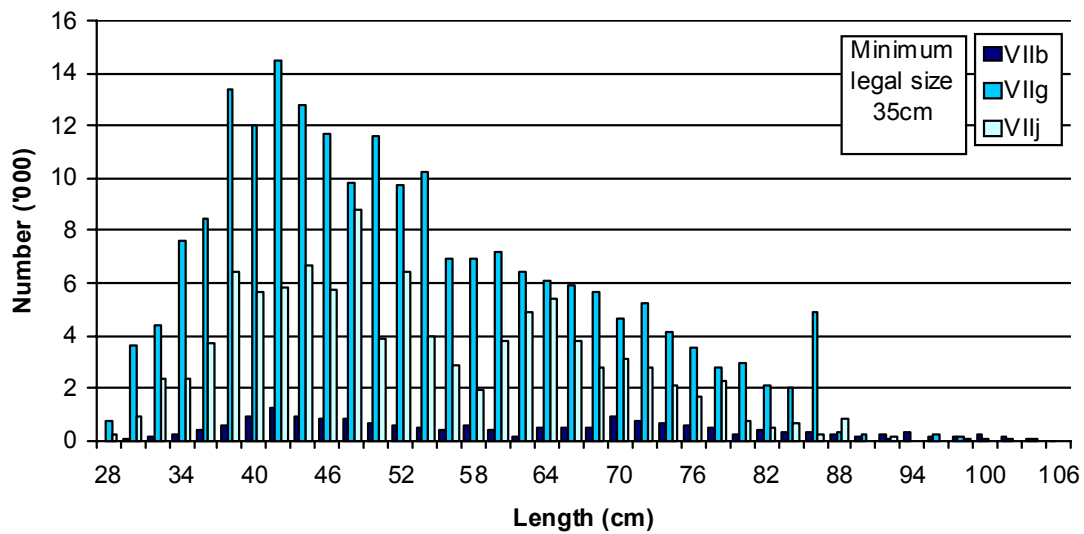
F(3-7)

Year	status quo	A	B	C	D	E
2003	0.93	0.93	0.93	0.93	0.93	0.93
2004	0.93	0.68	0.68	0.68	0.68	0.68
2005	0.93	0.68	0.58	0.54	0.54	0.61
2006	0.93	0.68	0.49	0.44	0.47	0.55
2007	0.93	0.68	0.42	0.35	0.47	0.50
2008	0.93	0.68	0.35	0.29	0.47	0.47
2009	0.93	0.68	0.30	0.29	0.47	0.47
2010	0.93	0.68	0.29	0.29	0.47	0.47

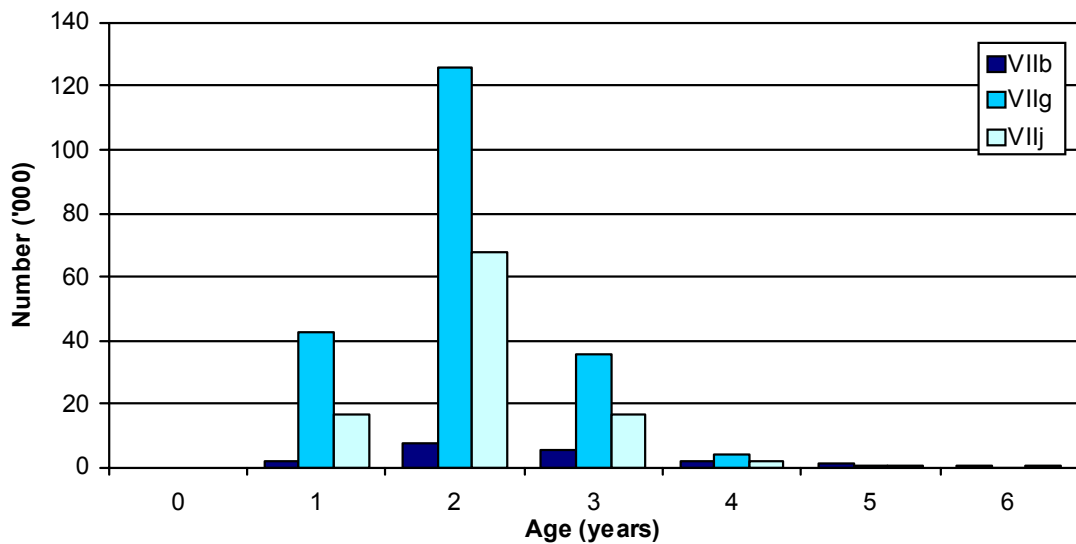
Key	Run	F pattern	F Reduction	F strategy	Basis
	A	Fsq		0.68	Fpa
	B	Fsq	15%	0.29	Fmax
	C	Fsq	20%	0.29	Fmax
	D	Fsq	20%	0.47	0.5*Fsq
	E	Fsq	10%	0.47	0.5*Fsq

For all runs, F is assumed to be reduce to Fpa in 2004

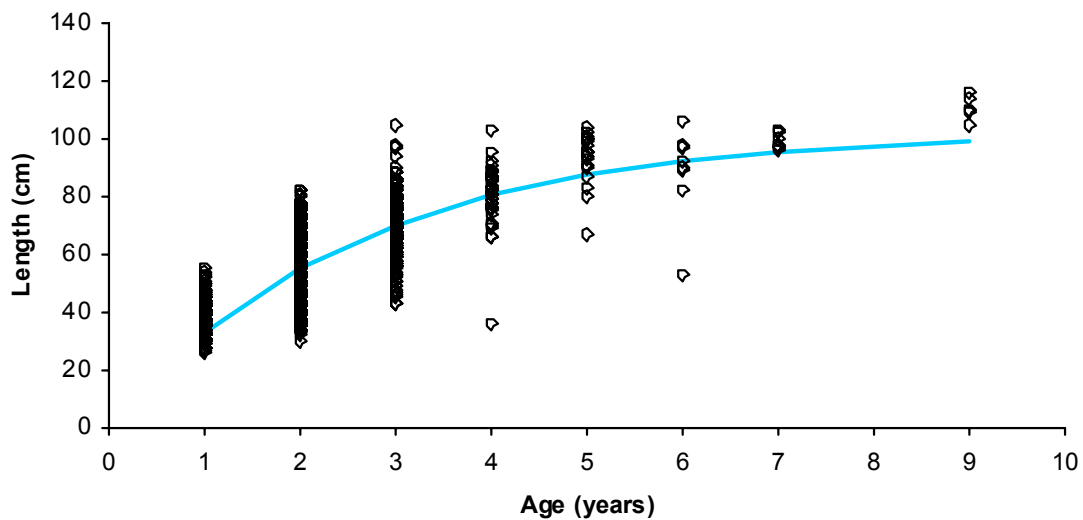
2002 Length Distribution: Irish Landings, Cod in VIIb VIIg VIIj



2002 Age Distribution: Irish Landings, Cod in VIIb VIIg VIIj



2002 Size at Age: Irish Sampling, Cod in VIIb VIIg VIIj



West of Ireland Cod

(Divisions VIIb,c)



Fisheries Science Services

FSS – SINGLE STOCK CONSIDERATIONS

(See Celtic Sea, West and Southwest of Ireland Overview for Mixed Fisheries Advice)

FSS considers that catches in 2004 be no more than the recent average (1999-2001) of around 171 t as included in advice for Cod VIIe-k.

Cod in Divisions VIIb,c are included in the management area VIIb-k. There was no ICES advice for this stock.

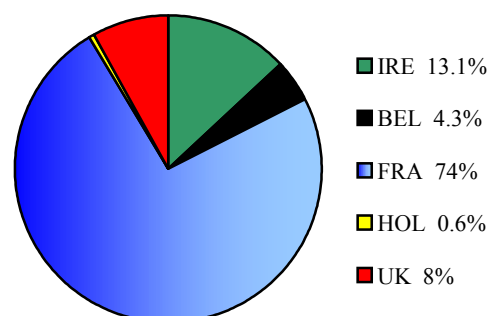
STATE OF THE STOCK

- No assessment of cod in Divisions VIIb,c is carried out at present.
- There are no reference points for cod in VIIb,c.
- Landings have declined since 1996.

ADDITIONAL INFORMATION

1. The TAC area covers Divisions VIIb-k, Sub Areas VIII, IX X and CECAF 34.1.1 (Madeira). The TAC in 2003 was set at 6,700 t
2. Irish landings in 2002 were 59 t, (estimate) a 55% decrease of last years landings of 107 t.
3. The level of misreporting in this area is unknown.

4. Ireland is the major participant in this fishery. The UK and France land the remainder. Cod are caught in mixed species otter trawl fisheries in VIIb,c by vessels operating from Killybegs, Rossaveal and Dingle.
5. Cod are an economically valuable by-catch in fisheries targeting anglerfish, megrim and *Nephrops* in this area.
6. Irish Sampling for this stock is supported through the EC funded sampling programme which is required under Data Collection Regulation 1543/2000 and 1639/2001. FSS sampling indicates that the length distribution of Cod VIIb is dominated by 38-46 cm fish, mostly 2 and 3 year olds.
7. FSS have conducted a groundfish survey in this area since 1992, however, cod catches are generally very low.
8. FSS data on discarding of cod in this area is limited but discards are considered to be negligible.
9. There is no official ICES advice for this stock.
10. The linkages between Cod VIIb,c and adjacent areas is unclear. Until the dynamics of these cod stocks become clear the Working Group resolved to continue the collation of data on VIIb,c cod.

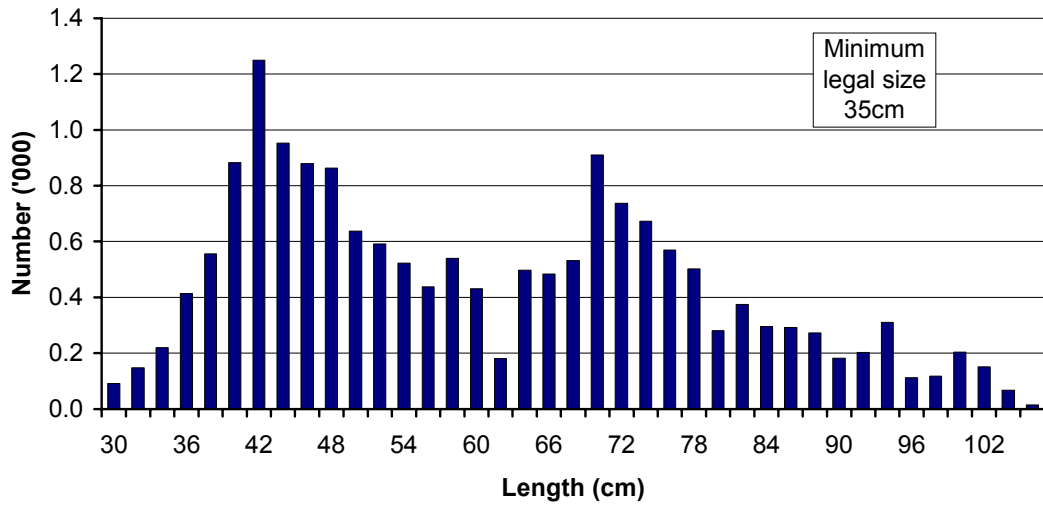


Nominal Landings (t) (as reported to WGSSDS) of Cod in Division VIIb,c for 1995-2002

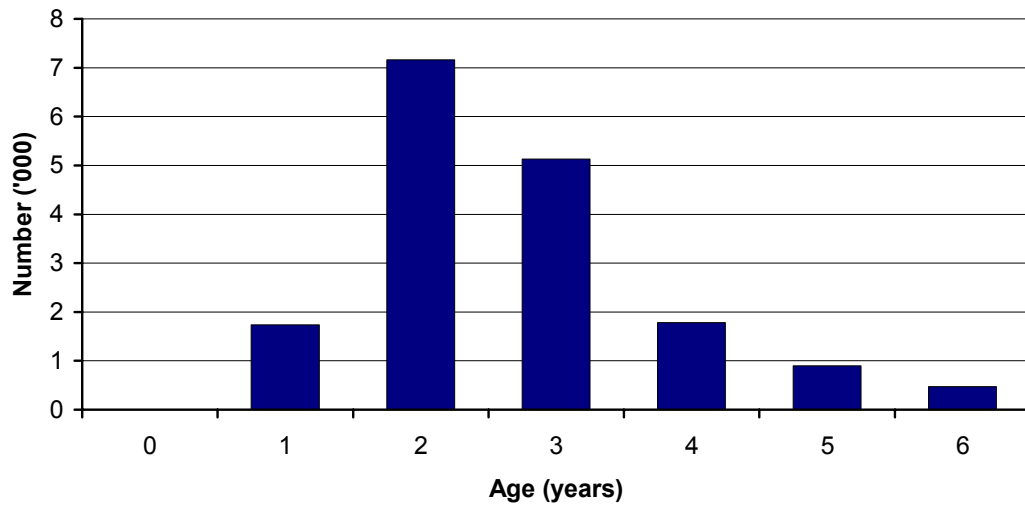
Country	1995	1996	1997	1998	1999	2000	2001	2002
France	91	115	71	44*	... ¹ *	44	39*	33*
Germany	-	-	3	-	-	-	-	-
Ireland	282	353	177	234	154	141	107	
Netherlands	-	-	-	-	-	-	+	
Norway	3	1	6		11	+	1	6*
Spain	6	3		6	2	3	1	
UK(E/W/NI)	25	35	37	25	4	4	2	1
UK(Scotland)	66	12	7	9	1	-		1
Total	473	519	301	318	172	192	150	

*Preliminary. ¹See VIIg-k.

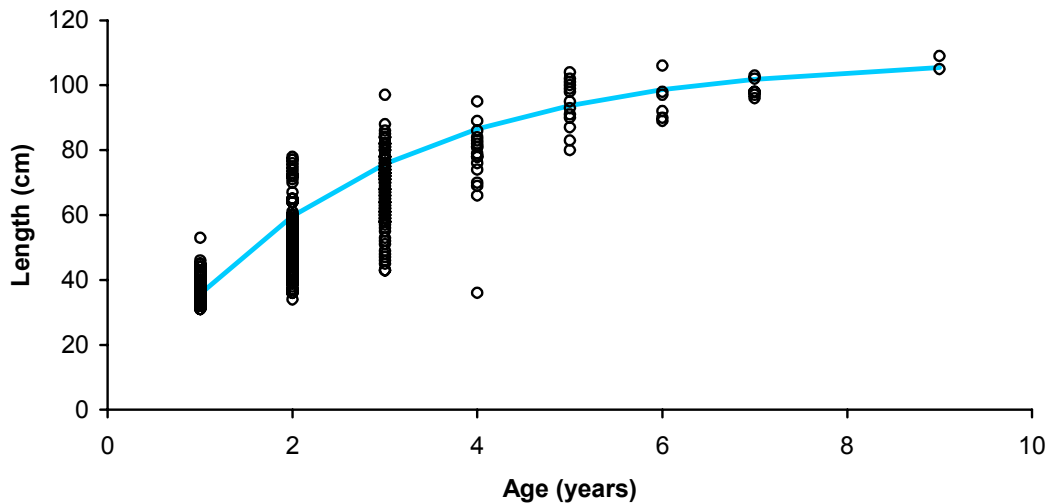
2002 Length Distribution: Irish Landings, Cod in VIIb



2002 Age Distribution: Irish Landings, Cod in VIIb



2002 Size at Age: Irish Sampling, Cod in VIIb



West of Ireland and Celtic Sea Haddock

(Divisions VIIb-k)

For latest information, see: <http://www.ices.dk>



Fisheries Science Services

FSS – SINGLE STOCK CONSIDERATIONS

(See Celtic Sea, West and Southwest of Ireland Overview for Mixed Fisheries Advice)

The state of the stock is unknown in relation to safe biological limits.

FSS note that the stock is at a relatively high level in response to recent high recruitments. The 2001 year class is the highest in the short time series. Catches in 2004 are therefore expected to increase and result in discarding of fish in countries with restrictive quotas.

FSS considers that the TAC for this area should be set at 8,100 t. This is based on the average catches (1996-1998) that were observed when the last large recruitment of haddock occurred. This gives a total TAC of 9,600 t of which no more than 1,500 t can be taken from Division VIIa. This translates to an Irish quota of 2,133 t for VII and 650 t for Division VIIa.

FSS are aware of the possibility of strong incoming recruitments particularly in relation to the 2001 year class. FSS consider that if the strength of the 2001 year class is confirmed in 2004, then a mid year review of the TAC should be carried out in April 2004. This review would include new survey results which could confirm the strength of the 2001 year class.

FSS consider the STECF advice for a TAC of 18,000 t is based on an assessment that is imprecise in relation to recruitment and fishing mortality.

However the mixed fisheries advice given for demersal fisheries in the Celtic Sea and particularly in relation to stocks outside safe biological limits will determine the TAC for haddock.

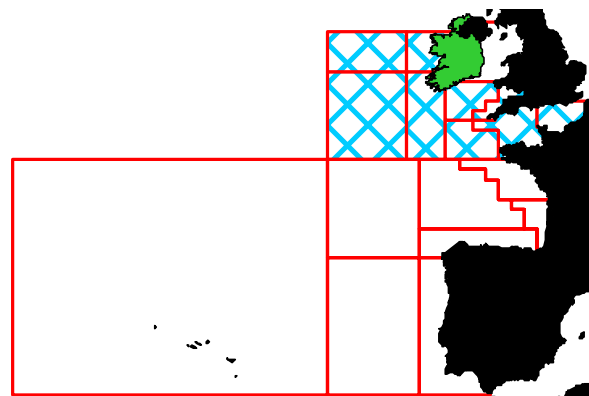
TAC Area	TAC 2003	Irish quota 2003	Proposed TAC 2004	Proposed Irish quota 2004
VII,VIII,IX,X	8,185	1,819	9,600	2,133
Of which no more than X can be taken in VIIa	585	253	1,500	650

STATE OF THE STOCK

- The state of the stock is unknown in relation to safe biological limits. However, the current assessment is considered to be indicative of recent trends, and indicates that the stock is currently at a relatively high level in response to some high recruitment in recent years.
- Landings between 1984-1995 have varied from 2,600 t to 4,900 t. There was a sharp increase in 1996 to 6,600 t and in 1997 to over 10,000 t. This was due to strong recruitment in the 1995 year class. Total international landings in 2002 were estimated at 6,810 t, a decrease of 21% from 2001.
- Fishing mortality has increased from a low in 1995 but has remained high since.
- Recruitment has fluctuated greatly and there are present indications of a strong 2001-year class (63.8 million).
- SSB increases in response to year-class strength and was estimated in 2002 at 18.4 million.

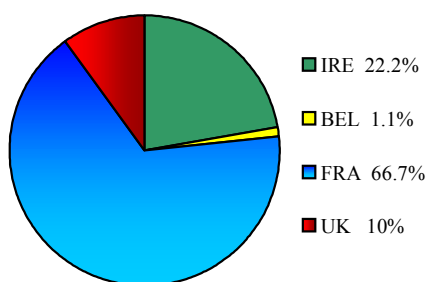
CURRENT MANAGEMENT

- The TAC area traditionally covers Sub-areas VII, VIII, IX, X and CECAF 34.1.1 with special condition for Division VIIa.



Red Boxes-TAC/Management Areas Blue Shading- Assessment Area

- In 2003, the TAC for Divisions VII, VIII, IX, X and CECAF 34.1.1 was 8,185 t with an associated Irish quota of 1,820 t (of which no more than 253 t could be fished in VIIa).
- There are no explicit management objectives or a management plan for this stock.
- FSS recommend that management objectives be established and that a management plan be developed and implemented for fisheries catching haddock.



FSS – ECONOMIC COMMENTS

- The value of the 2002 Irish quota (Sub-area VII,VIII, IX,X) was about €2.7m.
- The value of the 2002 Irish landings was about €2.7 m.
- Because of the haddock outbursts of the late 1990s this fishery has increased in economic importance in the mixed demersal fisheries of the west and south coast. It is an important by-catch for otter trawlers and seiners operating out of Dunmore East, Union Hall, Castle-townbere, Dingle and Rossaveal.

ADDITIONAL INFORMATION

1. The current assessment on this stock is based on a short time series of catch at age and tuning fleet data. Inherent imprecision in recruitment estimates, fishing mortality estimates and expected mean weights in the catch make it difficult to predict the future status of the stock with acceptable confidence.
2. Irish landings in 2002 were estimated to be 2,100 t.
3. Haddock are caught in a mixed demersal fishery targeting haddock, cod and whiting. Management advice needs to be considered in that context.
4. Misreporting is not thought to be a problem in this fishery since the TAC has always been in excess of landings. However, recent reductions in the TAC have brought the TAC to a level closer to recent landings.
5. France takes about 50-60% of the landings, Ireland usually accounts for 25-40% with the remainder taken by Belgium, Norway, the Netherlands, Spain and the UK.
6. Irish sampling for this stock is supported through the EC funded sampling programme which is required under Data Collection Regulation 1543/2000 and 1639/2001. FSS sampling indicates fish in VIIj, g and b are dominated by 2-3 year olds.
7. In 2003, Irish commercial catch and effort data from logbooks were used for the third time to tune the assessment.
8. The FSS West Coast Groundfish Survey (WCGS) has been conducted in Divisions VIIb & c and VIIj & k since 1993. In 2003, the data from this survey were used for the third time to tune the assessment.
9. Data from the Irish Sea Celtic Sea groundfish survey (ISCSGS) is included for the first time in this assessment.
10. Discard data were not included in the assessment. However the length compositions from Irish otter trawlers in VIIb and VIIj suggest that discarding of undersized fish may be substantial.

ICES ADVICE

3.10.2.a

State of stock/exploitation:

The state of the stock is unknown in relation to safe biological limits. However, the current assessment is considered to be indicative of recent trends, and indicates that the stock is currently at a relatively high level in response to high recruitment in recent years. F has been relatively stable since 1996. Recruitment seems to be highly variable, and the 2001 year class is estimated to be the highest in the short series. This would be expected to reflect in increased catch.

Management objectives:

none.

Precautionary Approach reference points:

not defined.

Single Stock Exploitation Boundaries:

ICES advises that fishing mortality should not increase.

Advice on the exploitation of this stock in 2004 is presented in the context of mixed fisheries and is found in Section 3.9.1.

Relevant factors to be considered in management:

This stock is presently managed by a TAC set for the whole of Subareas VII, VIII, IX and X. The TAC currently includes an additional allocation for Division VIIa. There are indications of a strong year class (2001) in the fishery; a TAC based on an average of recent landings would therefore lead to increased discarding of marketable fish. No catch forecast can be presented as the assessment is only indicative of stock trends.

The extent of interaction with cod with respect to fisheries in the Celtic Sea is unknown.

Elaboration and special comment:

Assessing the state of this stock is difficult due to the short time-series of assessment data, but the available data is considered indicative of stock development. Catches of haddock are recorded along the entire western seaboard of the British Isles, with concentrations off the west coast of Scotland, off the NW coast of Ireland, in the Celtic Sea, and in the western Irish Sea. The extent of mixing between these areas is not presently known. However, recent patterns of recruitment and growth differ between areas.

Some information on discards indicates that they may be substantial.

Source of information:

Report of the Working Group on the Assessment of Southern Shelf Demersal Stocks, July 2003 (ICES CM 2004/ACFM:03).

Yield and spawning biomass per recruit

F-reference points:

	Fish Mort Ages 2-4	Yield/R	SSB/R
Average last 3 years	0.625	0.563	1.156
F_{max}	0.589	0.563	1.231
$F_{0.1}$	0.335	0.525	2.093
F_{med}	1.303	0.513	0.536

Catch data (Tables 3.10.2.1-2):

Year	ICES Advice	Single stock exploitation boundaries	Predicted catch corresp. to advice	Predicted catch corresponding to single stock boundaries	Agreed TAC ¹	Official Landings ²	ACF M landings
1987	Not dealt with					3.0	2.6
1988	Not dealt with					4.0	3.6
1989	Not dealt with					4.2	3.2
1990	Not dealt with					2.9	2.0
1991	Not dealt with					2.6	2.3
1992	Not dealt with					2.9	2.7
1993	Not dealt with					3.4	3.3
1994	Not dealt with					4.1	4.1
1995	Not dealt with				6	4.5	4.5
1996	Not dealt with				7 ³	6.7	6.8
1997	Not dealt with				14	10.3	10.8
1998	Not dealt with				20	7.4	7.7
1999	Not dealt with				22 ⁴	5.2	5.0
2000	No expansion of catches				16.6 ⁴	6.7	7.6
2001	No expansion of catches				12 ⁴	9.7	8.6
2002	No expansion of catches		8.0		9.3 ⁴	4.8	6.8
2003	No expansion of catches		7.2		8.185 ⁴		
2004	⁵	No increase in F	⁵	-			

¹Applies to Subareas VII, VIII, IX and X. ²Possible underestimates due to misreporting. ³Increased in-year to 14 000 t. ⁴Includes separate Division VIIa allocation. ⁵Single stock boundary and the exploitation of this stock should be conducted in the context of mixed fisheries protecting stocks outside safe biological limits. Weights in 000' tonnes.

Table 3.10.2.2 Haddock in Divisions VIIb-k

Year	Recruitment (Age 1) thousands	SSB tonnes	Landings tonnes	Mean F Ages 2-4
1993	10431	11505	3348	0.4737
1994	8109	13075	4131	0.3640
1995	25106	12625	4470	0.3144
1996	36633	18577	6756	0.6233
1997	12098	20053	10827	0.7425
1998	6223	16263	7668	0.6967
1999	8493	11742	5027	0.7537
2000	29868	11383	7626	0.5657
2001	21249	19073	8615	0.6737
2002	63886	18406	6810	0.6366
2003	14700*	40612		
Average	21527	17574	6528	0.5844

*GM(1993-2001)

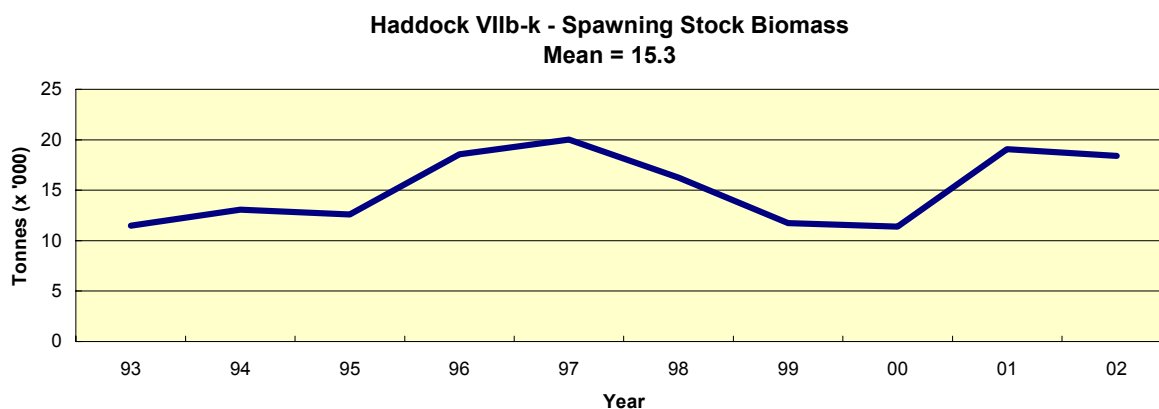
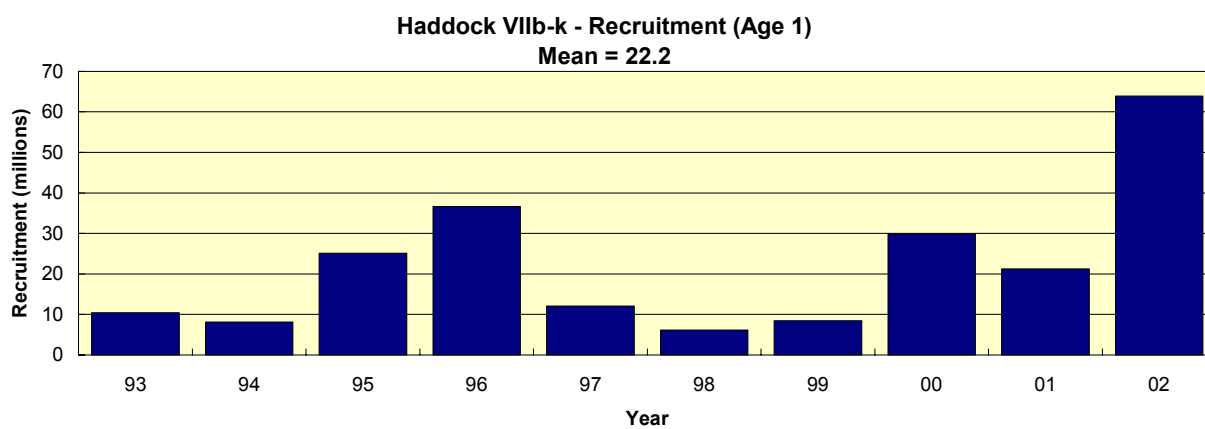
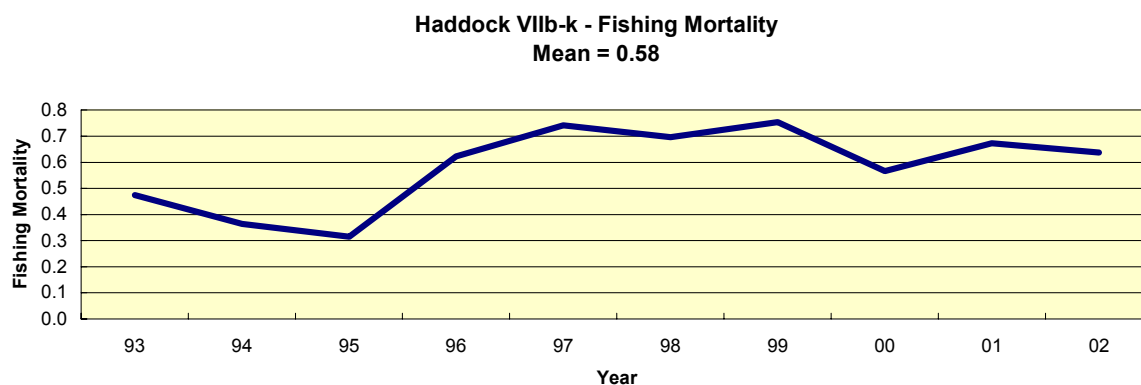
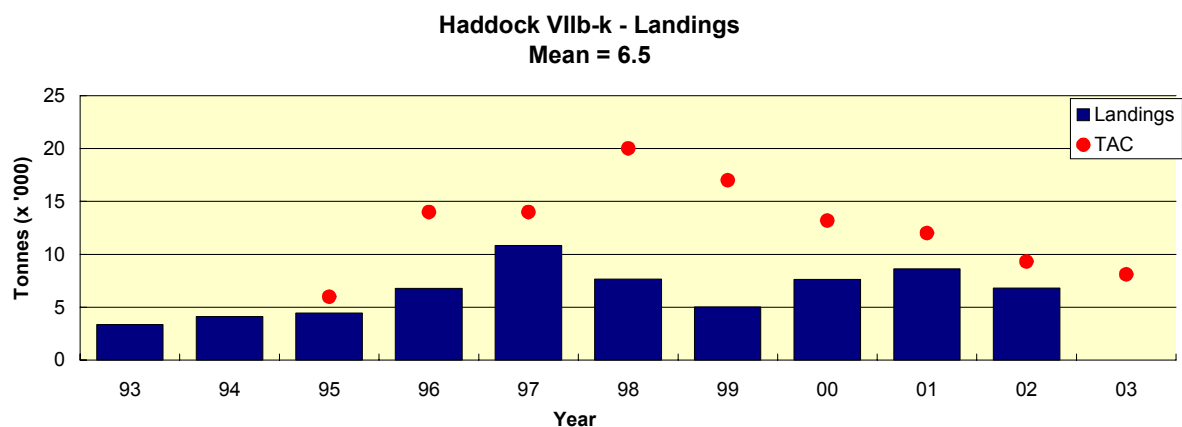
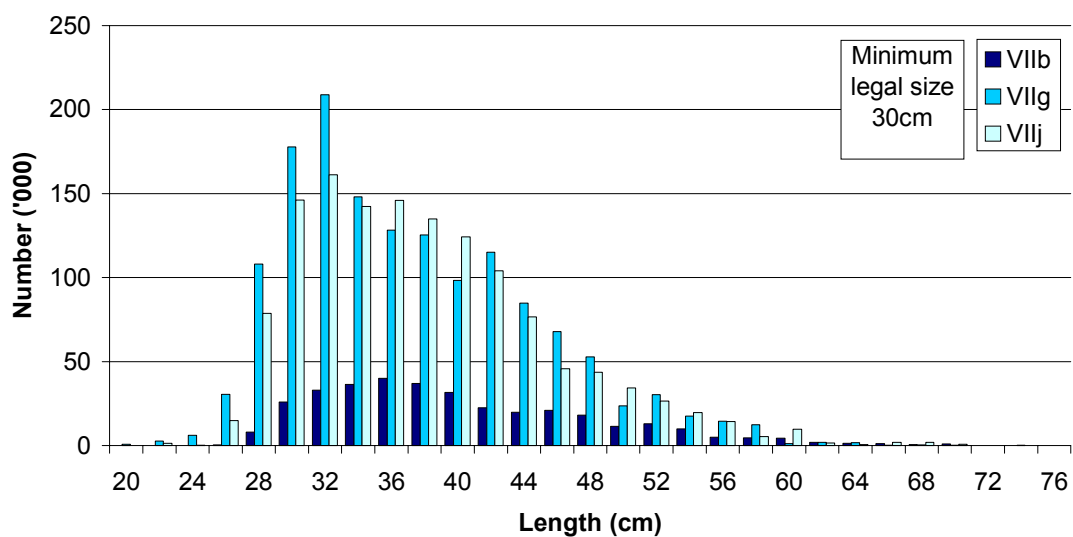


Table 4.5. 1 3.10.2.1 Haddock in VIIb- k (Celtic Sea & West of Ireland)
Nominal landings (t) of Haddock in Divisions VIIb, c, e- k, 1984- 2002, as officially reported to ICES,
and total landings as used by the Working Group.

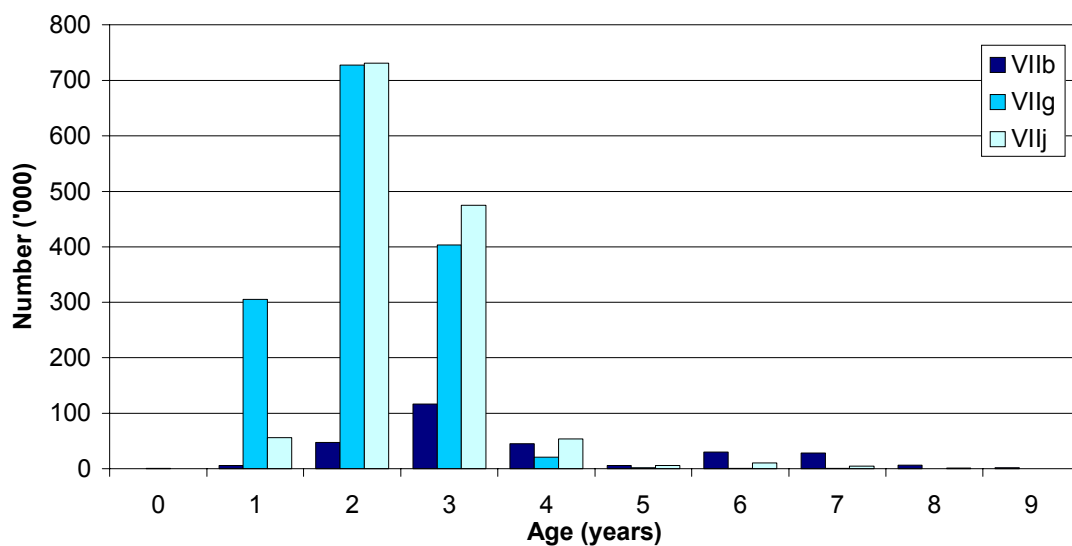
Country	1984	1985	1986	1987	1988	1989	1990	1991	1992	1993	1994	1995	1996	1997	1998	1999	2000	2001	2002
Belgium	-	4	6	12	64	117	22	18	21	51	123	189	133	246	142	51	90	165	132
France	3,328	2,438	2,279	2,380	3,275	3412	2110	1,247	1,461	1,839	2,788	2,964	4,527	6,581	3674*	2725*	3088	4821*	4288*
Ireland	646	794	317	314	275	323	461	1,020	1,073	1,262	908	966	1,468	2,789	2,788	2,034	3066	3608	N/A
Netherlands															3	-	-	-	
Norway	17	4	86	-	-	27	31	38	26	-	17	64	38	31	49	71	13*	19*	21
Spain	532	561	-	-	-	-	-	-	-	-	-	19	48	54	260	88	110	646	
UK (Channel Islands)	-	-	-	-	-	-	-	-	-	-	1	-	-	-	-	-	-	-	
UK (England & Wales)	340	168	188	194	405	278	123	137	220	189	193	228	432	554	410	273	287	409	313
UK (Scotland)	63	7	57	79	4	17	195	113	86	67	47	38	7	15	35	5	2	13	2
United Kingdom																			
Total	4926	3976	2933	2979	4023	4174	2942	2573	2887	3408	4077	4468	6653	10270	7361	5247	6656	9681	4756
Unallocated										-60	54	2	103	557	307	-220	970	-1,066	2,054
Total as used by the Working Group										3,348	4,131	4,470	6,756	10,827	7,668	5,027	7,626	8615	6810

Preliminary*

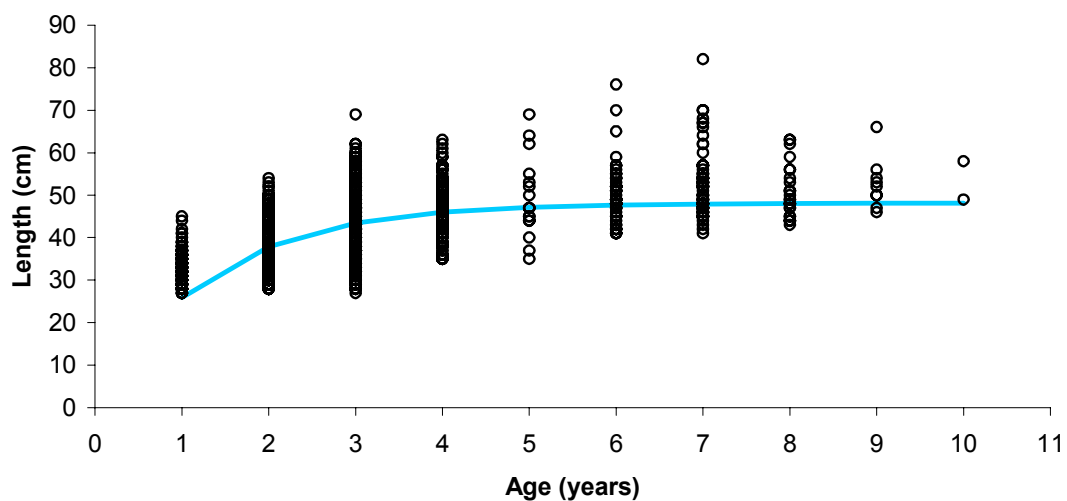
2002 Length Distribution: Irish Landings, Haddock in VIIb VIIg VIIj



2002 Age Distribution: Irish Landings, Haddock in VIIb VIIg VIIj



2002 Size at Age: Irish Sampling, Haddock in VIIb VIIg VIIj



Celtic Sea and Western Channel Whiting

(Division VIIe-k)

For latest information, see: <http://www.ices.dk>



Fisheries Science Services

FSS – SINGLE STOCK CONSIDERATIONS

(See Celtic Sea, West and Southwest of Ireland Overview for Mixed Fisheries Advice)

ICES consider this stock as being inside safe biological limits based on the most recent estimates of fishing mortality and SSB.

FSS consider that fishing mortality should not increase, corresponding to landings of at most 14,000 t in 2004.

However the mixed fisheries associations for the Celtic Sea and in particular for those stocks outside safe biological limits will ultimately determine the 2004 TAC for whiting.

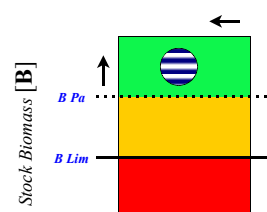
FSS consider that a well defined 'management plan' is necessary for the Celtic Sea stocks. FSS considers that such a plan requires clearly defined objectives that will ensure a high probability of recovery to agreed levels within a specified time frame. FSS considers that the proper definition and evaluation of all métiers involved in the mixed fishery is crucial to this management plan.

TAC Area	TAC 2003	Proposed TAC 2004	Basis
VIIe-k		14,000	Assessment
VIIId		0	Assessment Sub-area IV and Division VIIId
VIIb,c, VIII, IX, & X		468	Average Catches, 1999-2001 (As reported to the WGSSDS 2003)
Total TAC	31,700	14,468	
Irish quota	8,814	4,022	

STATE OF THE STOCK

- There are no concerns about the state of this stock and the stock is within safe biological limits.
- The landings in 2002 were 13,100 t (estimated), an 11% decrease on the 2001 estimate. Landings had previously been maintained around 20,000 t from 1994 to 1999 but declined to around 15,000 t since 2000.
- Fishing mortality has decreased between 1991-1997

State of the Stock in relation to the precautionary reference points (see page 18)



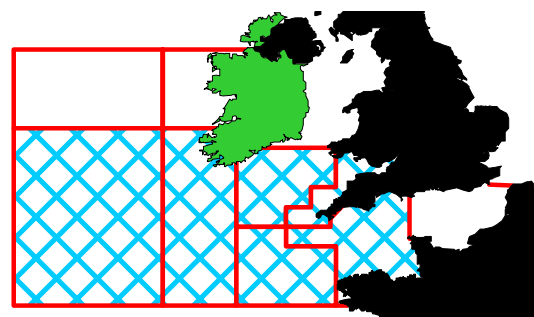
F_{pa} & F_{lim} not defined

but has been at a higher level since. F is estimated to be 0.68. F_{pa} has not been defined for this stock.

- This year's assessment indicates that during the period 1995-1997 year classes are all below average, that the 1999 recruitment was the highest in the time series, but that the subsequent year classes were all below average. The 2002 year class is estimated to be below average (64.4 million).
- SSB is estimated to have decreased from 80,000 t in 1995 to 32,400 t in 2000 and to have increased to about 45,000 t in 2001 and 2002. SSB remains above B_{pa} . The recent increase in SSB results from the contribution of the 1999 year-class.
- Assuming *status quo* F and using the GM recruitment SSB is predicted to decline from current levels (39,000 t in 2003) to about 30,700 t in 2004 and 32,400 t in 2005. This remains well above B_{pa} .

CURRENT MANAGEMENT

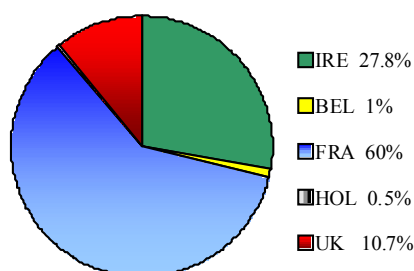
- The TAC area covers Divisions VIIb-k, and the assessment area covers Divisions VIIe-k.



Red Boxes-TAC/Management Areas Blue Shading- Assessment Area

- The 2003 TAC was 31,700 t with an associated Irish quota of 8,814 t. This is the same as the 2002 TAC.
- There are no explicit management objectives or plan for this stock.
- FSS recommend that management objectives be established and that a management plan be developed and implemented for fisheries catching whiting.

Special Note: FSS strongly advise that Division VIII should be included as part of the North Sea management area.



FSS – ECONOMIC COMMENTS

- The value of the 2002 Irish quota was about €7.2m.
- The value of the 2002 Irish landings was about €3.9m.
- Whiting has a low value but the volume landed means that it is the most economically valuable component of the mixed demersal fisheries in the Celtic Sea.

ADDITIONAL INFORMATION

1. The strength of the 1999 year class has been revised downwards in recent assessments and is estimated to be similar to previous high recruitments.
2. Irish landings in 2002 were estimated to be about 4,850 t.
3. The levels of mis-reporting is not known for the Celtic Sea but it is unlikely that there is mis-reporting of whiting in the area because the TAC has been in excess of recent landings.
4. Demersal trawlers from Dunmore East and Castle-townbere and other ports in south-west Ireland have traditionally targeted Celtic Sea whiting in a mixed trawl fishery. Poor catches elsewhere have attracted vessels from Greencastle, Co. Donegal to this fishery in recent years.
5. Irish sampling for this stock is supported through the

EC funded sampling programme which is required under Data Collection Regulation 1543/2000 and 1639/2001. FSS sampling indicates that very young fish dominated the Irish landings in 2002 with 78% of the landings being between 2 and 3 years old.

6. In 1997 FSS commenced a groundfish survey in the Celtic Sea on *RV Celtic Voyager*. This survey was discontinued in 2002 and will be replaced with a new groundfish survey on the *RV Celtic Explorer* in 2003.
7. Irish commercial catch and effort data from logbooks were used again in 2003 to tune the assessment.
8. In the years where discard sampling levels of the Irish otter trawl fleet were highest discard rates of up to 49 % by number were estimated from the Irish otter trawl fleet. Available data indicate that discarding rates are high in this fishery. This may indicate that estimates of F and catch numbers are too low, particularly at younger ages and this may cause an overestimate of landings in prediction forecasts.

ICES ADVICE

3.9.3

State of stock/exploitation:

Based on the most recent estimate of SSB and fishing mortality ICES classifies the stock as being inside safe biological limits. SSB reached high levels in 1995 and 1996, and has decreased until 1999 but remaining well above B_{pa} . SSB increased in 2001 as the outstanding 1999 year class matured. The 2000 and 2001 year classes are estimated to have been very weak. Fishing mortality was very high during the 1980s, decreased in the early 1990s and is currently estimated to be around 0.7.

Management objectives:

There are no explicit management objectives are set for this stock.

Precautionary Approach reference points (established in 1998):

ICES considers that:	ICES proposes that:
B_{lim} is 15 000 t, the lowest observed spawning stock biomass.	B_{pa} be set at 21 000 t. Biomass above this affords a high probability of maintaining SSB above B_{lim} , taking into account the uncertainty of the assessment.
F_{lim} is not defined.	F_{pa} not proposed.

Technical basis:

$B_{lim} = B_{loss}$	$B_{pa} = B_{lim} * 1.4$
F_{lim} not proposed.	F_{pa} not proposed.

Single Stock Exploitation Boundaries:

Fishing mortality should not increase, corresponding to landings of at most 14 000 t in 2004.

Advice on the exploitation of this stock in 2004 is presented in the context of mixed fisheries and is found in Section 3.9.1.

Relevant factors to be considered in management:

There is no long-term gain in increasing fishing mortality.

The assessment area was expanded in 1997 to cover Divisions VIIe-k. The TAC for whiting is set for all of Subarea VII (excluding Division VIIa). In order to protect whiting in Divisions VIIe-k, the TAC should be allocated to Divisions, with catches in the other parts of Subarea VII being accounted against such TACs. The state of whiting in Division VIId should be considered, if setting an overall TAC for Subarea VII.

Catch forecast for 2004:

Basis: $F(2003) = F(00-02 \text{ unscaled}) = F_{sq} = 0.68$; Landings(2003) = 20.5; SSB(2004) = 30.7.

F (2004)	Basis	Landings (2004)	SSB (2005)
0.27	$0.4 \times F_{sq}$	6.8	39.4
0.41	$0.6 \times F_{sq}$	9.6	36.7
0.54	$0.8 \times F_{sq}$	11.9	34.4
0.68	F_{sq}	14.0	32.4
0.81	$1.2 \times F_{sq}$	15.8	30.6
0.95	$1.4 \times F_{sq}$	17.4	29.1
1.08	$1.6 \times F_{sq}$	18.8	27.7

Weights in '000 t.

Geometric mean recruitment assumptions account for 42% of the forecast SSB (2005).

Comparison with previous assessment and advice:

The outstanding 1999 year class is now estimated by three surveys and verified by two commercial fleets and found to be 25% lower than previously estimated. This may relate to the year class being discarded. There was an upward revision of fishing mortality and a downward revision of SSB in the current assessment.

Elaboration and special comment:

Celtic Sea whiting are taken in a mixed species fisheries (cod, whiting, hake, *Nephrops*). The French *Nephrops* trawlers have for several years adopted a larger mesh, following by-catch restrictions and market demand for larger *Nephrops*.

The main spawning areas of whiting in the Western Channel and Celtic Sea are off Start Point (VIIe), off Trevoise Head (VIIf), and southeast of Ireland (VIIg). Returns of adult whiting tagged in the Western Channel indicated more movement into the Celtic Sea than between the Western and Eastern Channel. Whiting released in the Bristol Channel moved south and west towards the two spawning grounds off Trevoise Head and southeast of Ireland. There was no evidence of emigration out of the Celtic Sea area. The results of returns of whiting tagged and released in the County Down spawning area show that a greater proportion of Irish Sea whiting move south into the Celtic Sea than north towards the west of Scotland.

Analytical assessment is based on landings, commercial CPUE, and surveys data. Some information on discards indicates that they may be substantial.

Source of information:

Report of the Working Group on the Assessment of Southern Shelf Demersal Stocks, July 2003 (ICES CM 2004/ACFM:03).

Yield and spawning biomass per recruit F-reference points:

	Fish Mort Ages 2-5	Yield/R	SSB/R
Average last 3 years	0.677	0.204	0.485
$F_{0.1}$	0.221	0.177	0.899
F_{med}	1.681	0.199	0.306

Catch data (Tables 3.9.3.1-2):

Year	ICES Advice	Single stock exploitation boundaries	Predicted catch corresp. to advice	Predicted catch corresponding to single stock boundaries	Agreed TAC ¹	ACFM Landings
1987	<i>Status quo</i> F; TAC		7.1 ²			12.7
1988	Precautionary TAC		7.0 ²			13.6
1989	Precautionary TAC		7.9 ²			16.5
1990	No increase in F; TAC		8.4 ²			14.1
1991	Precautionary TAC		8.0 ²			13.5
1992	If required, precautionary TAC		8.0 ²			12.4
1993	Within safe biological limits		6.6 ²		22.0	16.3
1994	Within safe biological limits		< 9.4 ²		22.0	20.0
1995	20% reduction in F		8.2 ³		25.0	22.7
1996	20% reduction in F		8.6 ³		26.0	18.3
1997	At least 20% reduction in F		< 7.3 ⁴		27.0	20.5
1998	At least 20% reduction in F		< 8.2 ⁴		27.0	19.2
1999	No increase in F		12.4 ⁴		25.0	19.9
2000	17% reduction in F		< 13.1 ⁴		22.2	14.9
2001	No increase in F		13.5 ⁴		21.0	14.5
2002	No increase in F		27.7 ⁴		31.7	13.1
2003	No increase in F		20.2 ⁴		31.7	
2004	⁵	No increase in F	⁵	14.0		

¹ TAC covers Subarea VII (except Division VIIa). ²For the VIIf+g stock component, ³For the VIIf-h stock component, ⁴For the VII e-k stock component. ⁵Single stock boundary and the exploitation of this stock should be conducted in the context of mixed fisheries protecting stocks outside safe biological limits. Weights in '000 t.

Table 3.9.3.2 Whiting in Divisions VIIe-k.

Year	Recruitment Age 0 thousands	SSB tonnes	Landings tonnes	Mean F Ages 2-5
1982	62158	19006	11225	1.0568
1983	50210	15159	11781	1.3753
1984	54046	16205	9985	1.1760
1985	71618	17601	10838	1.0166
1986	133137	17810	9952	1.0483
1987	105911	21452	12652	1.2732
1988	33105	30694	15128	1.0854
1989	55039	36175	16541	0.9358
1990	108582	26633	14106	0.9379
1991	163807	20114	13508	1.1634
1992	147395	27151	12364	0.7885
1993	202576	44951	16320	0.7711
1994	109819	61461	20034	0.5953
1995	64047	80127	22678	0.5207
1996	59366	77697	18260	0.3814
1997	58636	64985	20532	0.3833
1998	72280	51152	19245	0.4707
1999	165639	42132	19915	0.7784
2000	48264	32364	14919	0.7168
2001	32453	46573	14469	0.7894
2002	64437	44268	13083	0.5250
2003	82052*	38957		
Average	88390	37849	15121	0.8471

*GM

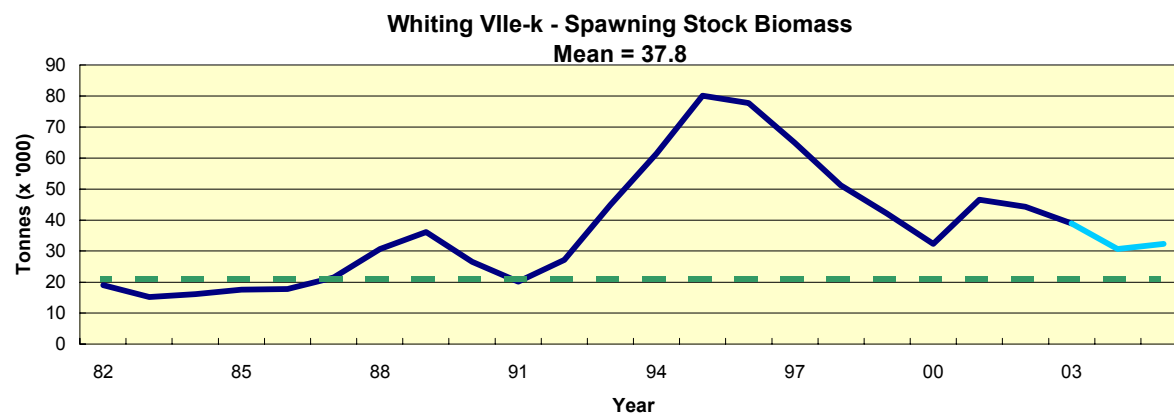
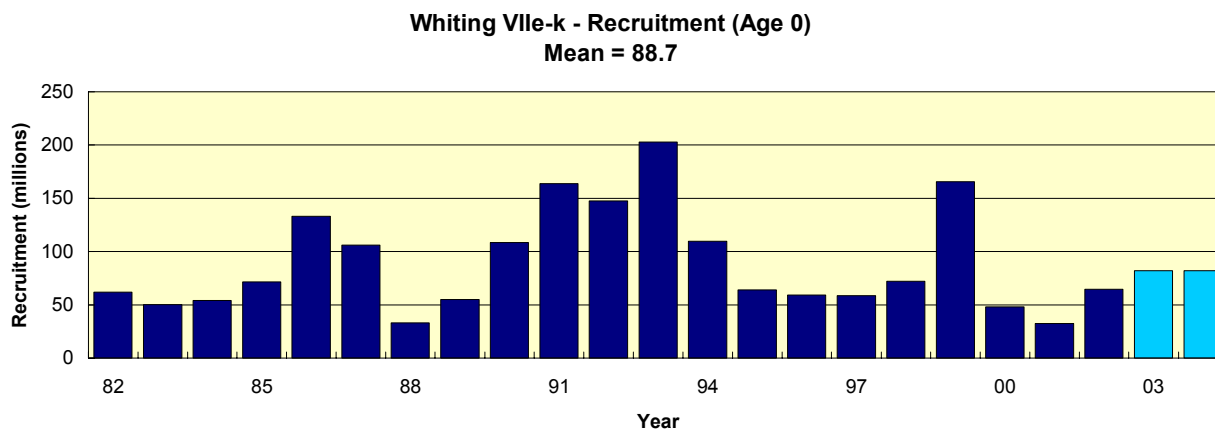
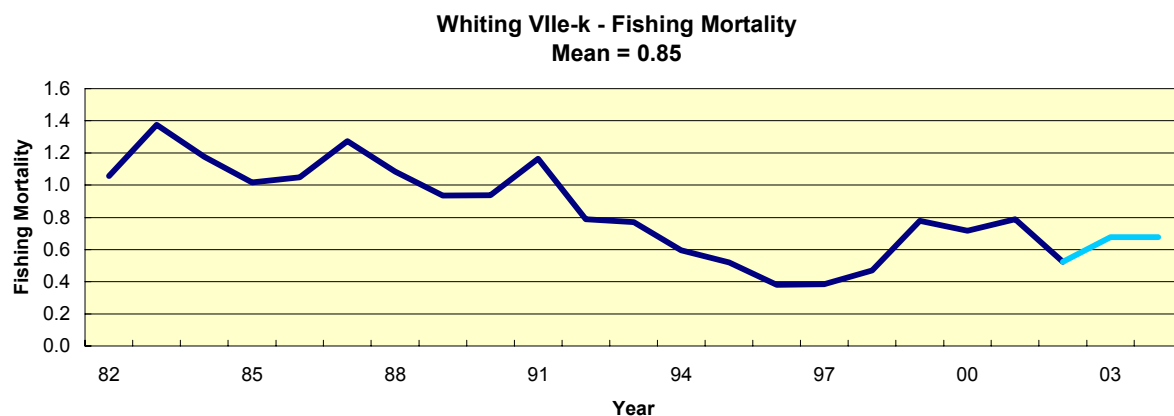
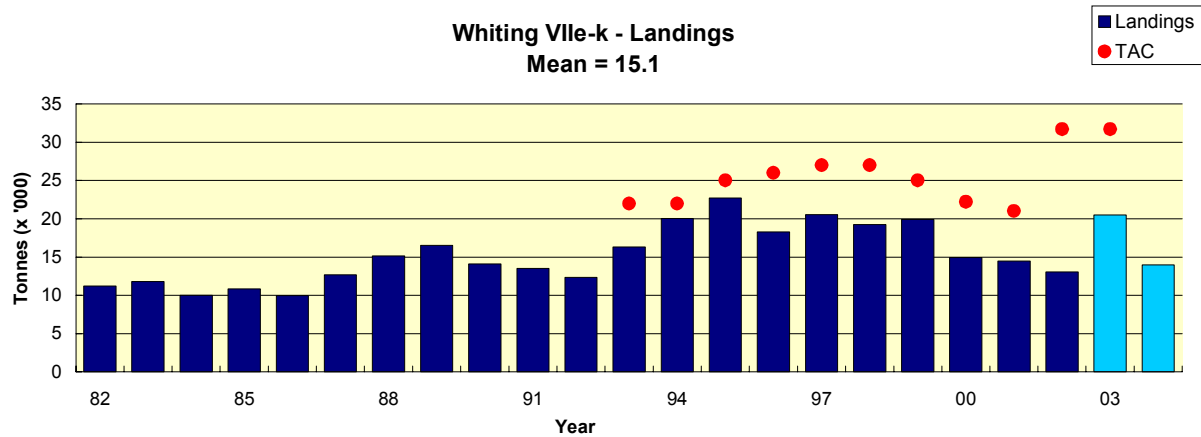


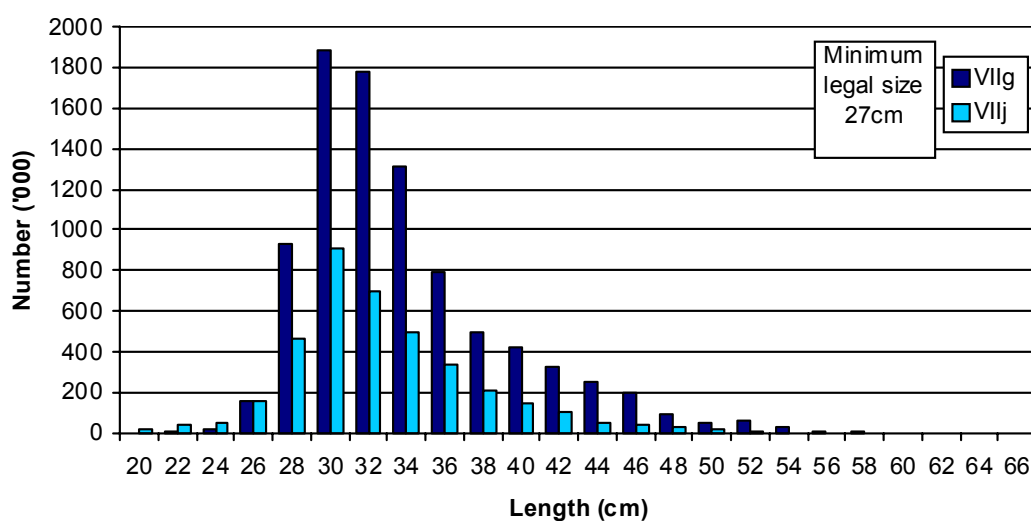
Table 3.9.3.1 WHITING in Divisions VIIe- k.
Nominal Landings (t) as reported to ICES, and total landings as used by the Working Group.

	1983	1984	1985	1986	1987	1988	1989	1990	1991	1992	1993	1994	1995	1996	1997	1998	1999	2000	2001	2002
Belgium	135	161	167	107	111	159	296	308	292	107	145	228	205	268	449	479	448	194	171	149
Denmark																				
France	8,982	7,171	7,820	7,647	10,054	11,410	12,171	10,464	9,956	9,165	10,771	12,634	13,400	9,936	11,370	11,711 ^a	16,418 ^b	9,077 ^a	7,190 ^a	7,248 ^a
Germany																				
Ireland	1,487	1,301	2,241	1,309	1,452	388	2,817	1,478	1,258	1,691	3,631	5,618	6,077	6,115	6,893	5,228	5,807	4,785	5,008	
Netherlands		368		124											8	1			5	4
Spain													4	31	24	53	21	11	9	
UK (EAW/NI)	1,177	954	610	765	1,035	1,588	1,252	1,782	1,969	1,379	1,756	1,548	1,804	1,728	1,742	1,709	1,346	1,252	946	844
UK (Scotland)						1	5	74	33	8	17	6	23	34	42	68	3	2	11	12
United Kingdom																				
Total	11,781	9,985	10,838	9,952	12,652	13,566	16,541	14,106	13,508	12,364	16,320	20,034	21,513	18,120	20,520	19,247	24,043	15,331	13,340	8,257
Unallocated	0	0	0	0	0	1,562	0	0	0	0	0	0	1,165	140	12	-2	-4,128	-412	1,129	4,826
Working Group	11,781	9,985	10,838	9,952	12,652	15,128	16,541	14,106	13,508	12,364	16,320	20,034	22,678	18,260	20,532	19,245	19,915	14,919	14,469	13,083

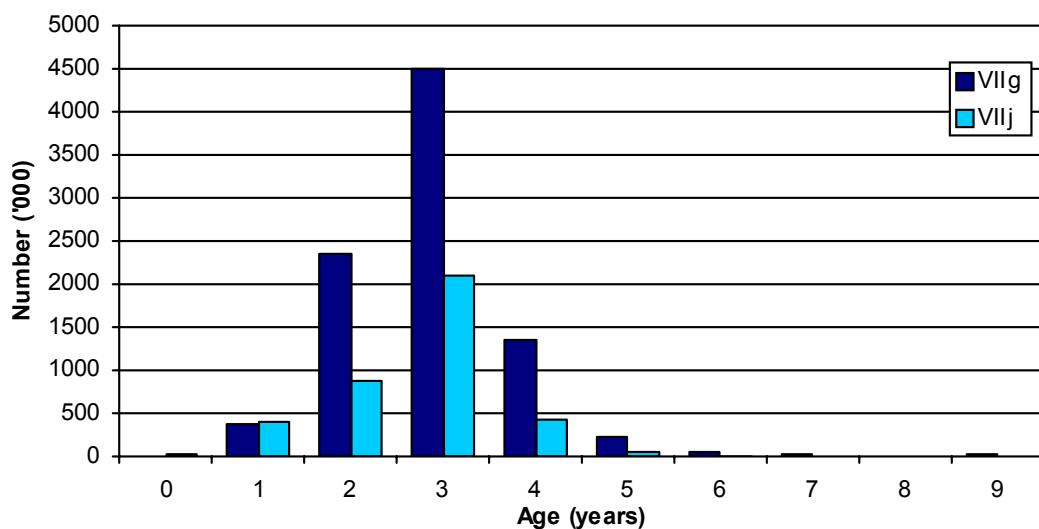
a.: Preliminary

b.: Preliminary, Reported as VIIb- k

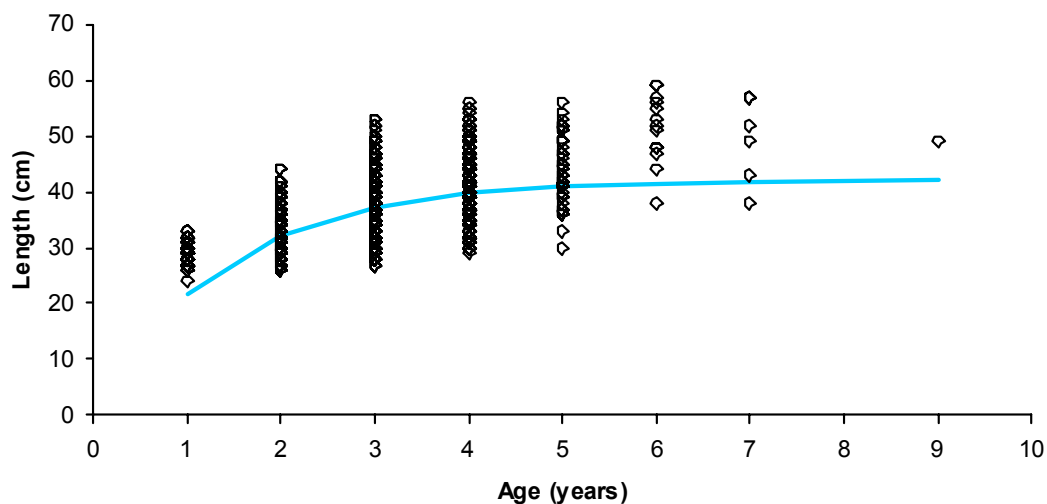
2002 Length Distribution: Irish Landings, Whiting in VIIg VIIj



2002 Age Distribution: Irish Landings, Whiting in VIIg VIIj



2002 Size at Age: Irish Sampling, Whiting in VIIg VIIj



West of Ireland Whiting

(Divisions VIIb,c)



Fisheries Science Services

FSS – SINGLE STOCK CONSIDERATIONS

(See Celtic Sea, West and Southwest of Ireland Overview for Mixed Fisheries Advice)

FSS considers that catches in 2004 be no more than the recent average (1999-2001) of around 468 t as included in advice for Whiting VIIe-k.

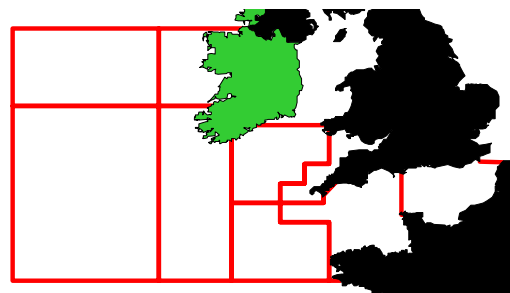
Whiting in Divisions VIIb,c are included in the management area VIIb-k. There was no ICES advice for this stock.

STATE OF THE STOCK

- No assessment is carried out at present for this stock.
- There are no reference points for this stock.
- Total international estimated landings in 2002 were 368 t.

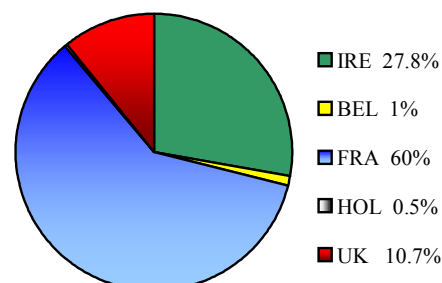
ADDITIONAL INFORMATION

1. The TAC area covers Divisions VIIb-k. The TAC in 2003 was set at 31,700 t
2. Irish landings in 2002 were estimated to be 368 t. This is an increase of 16% on the 2001 landings.
3. Ireland is the major participant in this fishery.
4. Irish sampling for this stock is supported through the EC funded sampling programme which is required under Data Collection Regulation 1543/2000 and 1639/2001. FSS sampling shows that the stock is dominated by 2-4 year olds or 30-34 cm fish.



Red Boxes-TAC/Management Areas

5. FSS have conducted an annual groundfish survey in this area since 1993. These data will be used in any future assessments of this stock which incorporate Division VIIb,c.
6. Discarding practices are not well quantified but FSS sampling has indicated that discarding does occur in this fishery.
7. The linkages between Whiting VIIb,c and adjacent areas is unclear. Until the dynamics of these cod stocks become clear the Working Group resolved to continue the collation of data on VIIb,c whiting.

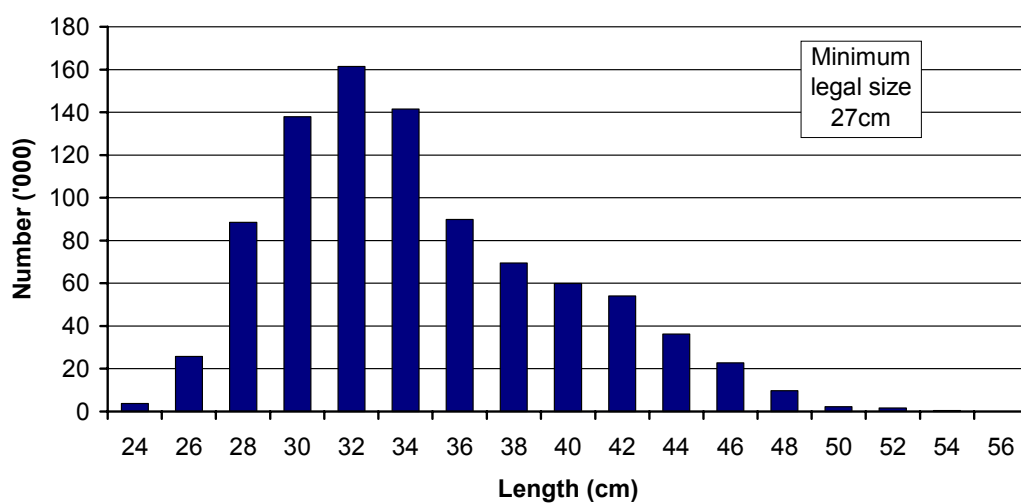


Nominal Landings (t) of Whiting in Divisions VIIb,c for 1995-2002

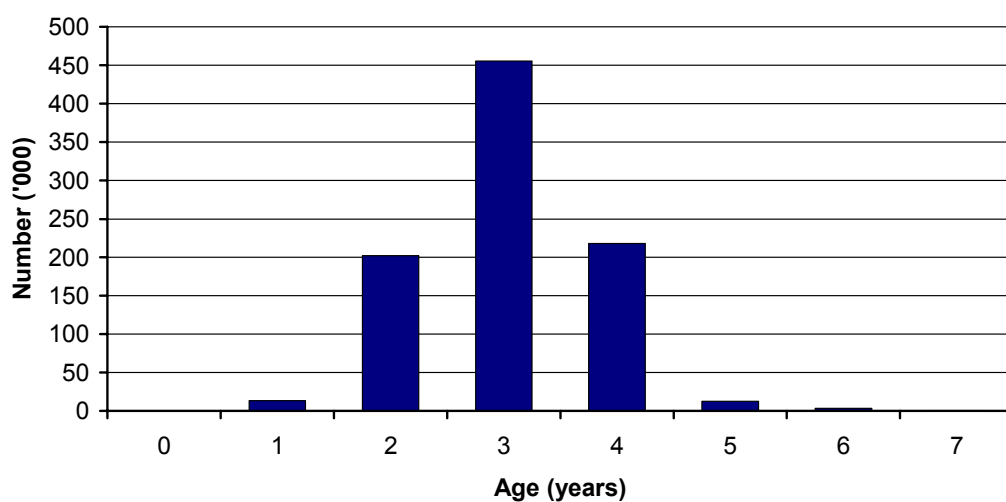
Country	1995	1996	1997	1998	1999	2000	2001	2002
France	57	76	65	37*	... ¹ *	107	123	129*
Ireland	1,894	1,233	403	323	206	563	357	
Netherlands	-	-	-	-	-	-	2	-
Spain	+	+	-	27	1	4	-	
UK(E/W/Nl)	24	96	75	49	10	6	5	4
UK(Scotland)	71	17	4	27	-	19	1	+
Total	2,046	1,422	547	463	217	699	488	

*Preliminary. ¹See VIIg-k.

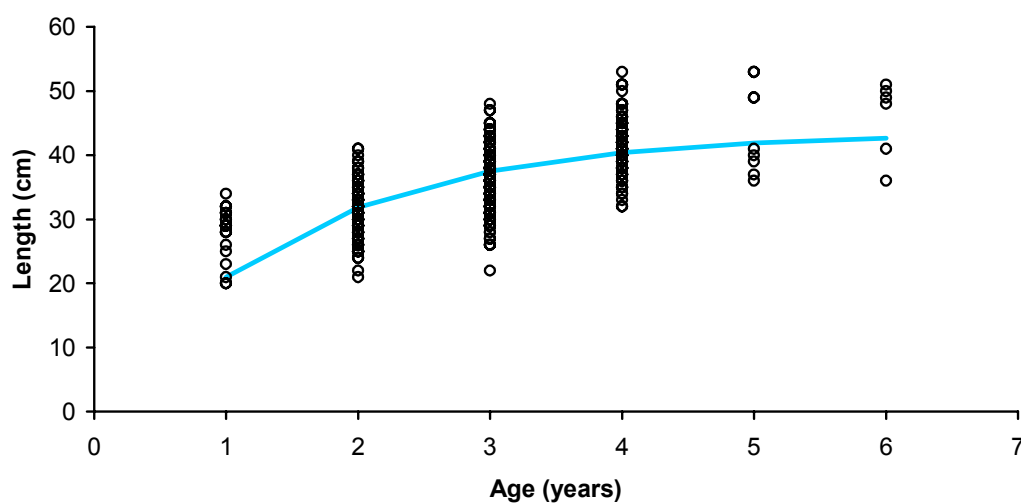
2002 Length Distribution: Irish Landings, Whiting in VIIb



2002 Age Distribution: Irish Landings, Whiting in VIIb



2002 Size at Age: Irish Sampling, Whiting in VIIb



Celtic Sea and Bay of Biscay Anglerfish

(Sub-area VIIb-k and Divisions VIIa,b)

For latest information, see: <http://www.ices.dk>



Fisheries Science Services

FSS – SINGLE STOCK CONSIDERATIONS

(See Celtic Sea, West and Southwest of Ireland Overview for Mixed Fisheries Advice)

Based on the most recent estimates of SSB and fishing mortality ICES classifies the stock of *L. piscatorius* as being harvested outside safe biological limits, and the stock of *L. budegassa* as being inside safe biological limits.

FSS recognise that anglerfish are an important component of mixed fisheries taking hake, megrim, sole, cod, plaice, and Nephrops. Anglerfish are therefore caught with other stocks that are outside safe biological limits. FSS point out that an industry initiated programmes aimed at reducing catches of Hake, Cod (VIIe-k) and Plaice (VIIfg) and Sole (VIIe & VIIa,b) should be considered in the management of Celtic Sea, West of Ireland and Biscay fisheries. Industry initiated programmes should be encouraged but must include a high rate of independent observer coverage or other totally transparent methods for ensuring that their catches of species outside safe biological limits are fully and credibly reported.

A major feature of these stocks are the abundance of juveniles due to recent strong recruitments. Industry-initiated programmes should therefore include measure to reduce catches of juvenile anglerfish as the current exploitation pattern (where the catch is dominated by small fish) represents growth over-fishing. Reducing catches of juvenile anglerfish would lead to increases in yield and increase their potential contribution to the future SSB. This would lead to a larger 'buffer stock' where there are a broad range of age groups in the population and SSB and catches are robust to occasional weak recruitments.

If managers want to maximise short-term catches of these species then F should be reduced by 10% for both species in order to maintain fishing mortality below F_{pa} for both species. This corresponds to landings of less than 18,500 t in 2004 for *L. piscatorius*, and landings of less than 8,200 t in 2004 for *L. budegassa*. However, if managers want to adopt a longer term plan for the stock then FSS point out that there would be significant gains in yield and spawners per recruit

by reducing F to F_{max} . FSS considers that a longer-term management strategy where B_{MSY} and F_{MSY} are targets is more appropriate for a long-lived species like anglerfish.

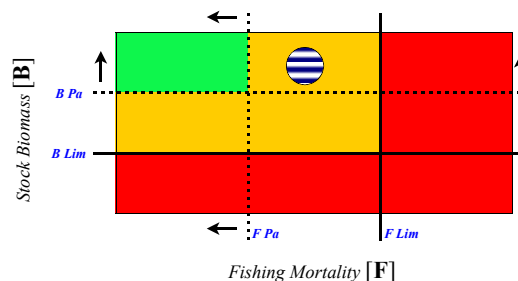
FSS would again point out that the assessment area does not include Division VIIa. Therefore an additional TAC allocation of 555 t (based on average landings 1999-2001) for VIIa should be added to the recommended TAC for VIIb-k to attain a TAC for the entire Sub-area VII.

TAC Area	2003 TAC	2003 Irish quota	2004 Proposed TAC*	2004 Irish quota
VII	15,810	1,198	22,346	1,693
VIIIabde	3562		4,909	
Total	19,372		27,255	

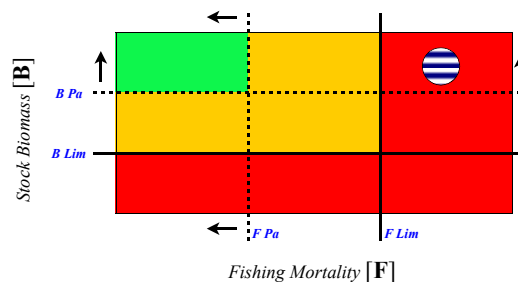
*Including average 1999-2001 VIIa landings of 555 tonnes

STATE OF THE STOCK

L. budegassa - State of the Stock in relation to the precautionary reference points (see page 18)



L. piscatorius - State of the Stock in relation to the precautionary reference points (see page 18)

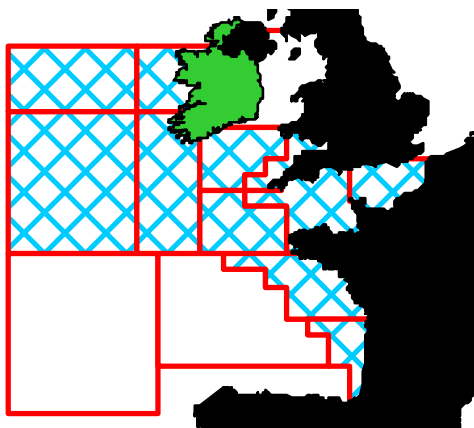


- There are no concerns about the *L. budegassa* stock, there are some concerns about *L. piscatorius* which is harvested outside safe biological limits.

- Landings of *L. piscatorius* were 20,200 t (estimates) in 2002. Landings of *L. budegassa* were 6,500 t (estimates) in Sub-area. Landings of both species have fluctuated in a cyclical way but have been low in recent years. Combined landings peaked in 1981 close to 40,000 t (estimates).
- Fishing mortality for *L. piscatorius* has been above $F_{pa} = 0.24$ in recent years and is close to F_{lim} in 2002. Fishing mortality for *L. budegassa* has been below but is now around $F_{pa} = 0.23$.
- Recruitment of both species has increased in recent years. The 2000 year-class was strong in *L. piscatorius* the 1998, 1999 and 2000 year classes are strong in *L. budegassa*.
- Spawning Stock Biomass of *L. piscatorius* showed a declining trend between 1997 and 2002 but it has stabilized at around 35,000 t (above $B_{pa} = 31,000$ t) in recent years. The SSB of *L. budegassa* has remained stable above B_{pa} (22,000 t) in recent years.
- SSB of *L. piscatorius* is expected to increase in the short term at status quo fishing mortality. SSB of *L. budegassa* is also expected to increase assuming status quo fishing mortality.

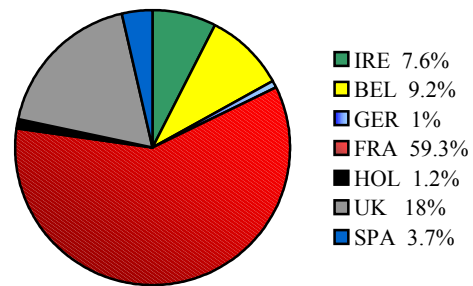
CURRENT MANAGEMENT

- There are two separate TACs for this stock Sub-area VII and a TAC for Divisions VIIIabde. These TAC areas do not correspond to the assessment area (Divisions VIIb-k and VIIIa,b). An additional allocation needs to be made for VIIa.
- Two species (*L. piscatorius* and *L. budegassa*) are caught in the management and assessment area. These species are not routinely separated by the industry therefore a combined TAC is set for both species.



Red Box-TAC/Management Area Blue Shading- Assessment Area

- The 2003 TAC for Sub-area VII was 15,810 t with an associated Irish quota of 1,198 t.
- There are no explicit management objectives or plans for this stock.
- There is no minimum legal landing size for anglerfish.
- FSS advises that management objectives be established and that a management plan be developed and implemented for fisheries taking anglerfish.



FSS – ECONOMIC COMMENTS

- The value of the 2002 Irish quota was about €3.9m.
- The value of the 2002 Irish landings was about €7.9m.
- This is an economically important high-value species taken with hake and megrim. Some of the new larger Irish whitefish vessels are heavily reliant on these species.

ADDITIONAL INFORMATION

1. The F and SSB estimates for *L. budegassa* were similar to last year's assessments. The perception of the of *L. piscatorius* has been revised upwards by the current assessment which uses the same model settings as last year with only one years additional data. Recruitment estimates in several recent years have been revised upwards this may because some commercial fleets which now appear to be catching large numbers of juvenile anglerfish get a stronger weighting in the assessment calibration. SSB estimates in recent years are now above B_{pa} whereas last year they were below B_{pa} .
2. Total estimated landings of both species in Divisions VII b-k were 23,000 t in 2002. Landings of *L. piscatorius* in 2002 were 17,855 t, a 20% increase from 2001 and those of *L. budegassa* were 5,152 t in 2002, a 15% increase.
3. Estimated landings from the Irish fleet were 2,410 t in 2002, a 4% increase from 2001.
4. The quota for this stock is restrictive for the Irish and most other fleets. Therefore misreporting continues to be a serious problem in this stock. FSS continues to be concerned that inaccurate landings data may cause the assessment to be over optimistic.
5. The European fleet on the western seaboard of Ireland has heavily targeted anglerfish for over 15 years. France and Spain take 70% of the landings. The remainder is taken by the UK and Ireland (around 10% each) and Belgium (less than 5%). The trawl fleets (which account for around 80% of the landings) heavily targeted anglerfish on the shelf and down the slope. These fleets have improved their efficiency by increasing spread of their trawls, switching to twin-rigs and pioneering new grounds not previously fished. A fishery, mainly by UK and French flag vessels using tangle-nets, exploit anglerfish in deepwater and on rough ground. Anglerfish are also targeted by UK, Belgian and Irish beam trawlers.
6. Irish landings for this stock are mainly taken in otter

trawls and, increasingly by twin-rigs because of the recent Whitefish Renewal Scheme. Anglerfish are the main target species along the western shelf for demersal vessels from Killybegs, Rossaveal, Dingle, Castletownbere, Union Hall, Dunmore East and many other smaller ports.

7. Sampling of these stocks is supported by the EC-funded Sampling Programme which is required by Directives 1543/2000 and 1639/2001.
8. *L. piscatorius* sampled by FSS in Sub-area VII ranged in length between 20 cm and 89 cm, but were dominated by fish in the range 28 to 55 cm. FSS started ageing anglerfish for the first time in 2002. Ages between 1 and 14 are represented in the catch.
9. FSS have conducted a west coast groundfish survey since 1993 and the results indicate that the continental shelf west and south of Ireland is an important nursery area for this stock.
10. FSS recommends that technical measures such as fixed grids be introduced into this fishery to reduce catches of juvenile anglerfish and improve the exploitation pattern for these species. The use of selective devices, such as rigid grids, which have been studied in France with promising results, will be further evaluated.
11. There is no systematic sampling of discards for anglerfish, but programmes were conducted in 1992 and 1997 on the French fleets, in 1994 on the Spanish fleets and from 1996 to 1998 in Ireland. The Irish results indicate very low level of discarding.
12. There is no minimum legal landing size for anglerfish and, since it is likely that the discards are limited and include only very small fish, they are not included in the assessment.

ICES ADVICE

3.9.12.a

State of stocks/exploitation:

Based on the most recent estimates of SSB and fishing mortality ICES classifies the stock of *L. piscatorius* as being harvested outside safe biological limits, and the stock of *L. budegassa* as being inside safe biological limits. SSB of both stocks decreased from 1986 until 1993, then increased up to 1995-1996 and are presently decreasing. For both stocks, fishing mortality in most years has been above F_{pa} , and even above F_{lim} for *L. piscatorius*. In 2002 fishing mortality is estimated to be at F_{pa} for *L. budegassa*, while for *L. piscatorius* F_{2001} is above F_{pa} . Recent recruitments of *L. piscatorius* (1997 -2000 year classes) are above average and there are indications of a strong year class (2001). Recent recruitment of *L. budegassa* (1997 - 2000 year classes) is well above average.

Management objectives:

There are no explicit management objectives for this stock. However, for any management objectives to meet precautionary criteria, their aim should be to reduce or maintain F below F_{pa} , and to increase or maintain spawning stock biomass above B_{pa} .

Precautionary Approach reference points: *L. piscatorius*: (changed in 2000)

ICES considers that:	ICES proposes that:
B_{lim} is not defined.	B_{pa} be set at 31 000 t.
F_{lim} is 0.33.	F_{pa} be set at 0.24.

Technical basis:

B_{lim} : Not defined.	$B_{pa} = B_{loss}$. There is no evidence of reduced recruitment at the lowest biomass observed and B_{pa} can therefore be set equal to the lowest observed
F_{lim} : F_{loss} , the fishing mortality estimated to lead to potential stock collapse.	F_{pa} : $F_{lim} \times 0.72$. This F is considered to have a high probability of avoiding F_{lim} , taking into account the uncertainty in assessments.

***L. budegassa*: (B_{pa} changed in 2002 due to the correction of the maturity ogive values):**

ICES considers that:	ICES proposes that:
B_{lim} is not defined.	B_{pa} be set at 22 000 t.
F_{lim} is not defined.	$F_{pa} = 0.23$.

Technical basis:

B_{lim} = Not defined.	$B_{pa} = B_{loss}$. There is no evidence of reduced recruitment at the lowest biomass observed and B_{pa} can therefore be set equal to the lowest observed SSB.
F_{lim} = Not defined.	F_{pa} be set at $F_{med} = 0.23$. This F is consistent with the proposed B_{pa} .

Single-Stock Exploitation Boundaries:

F should be reduced by 10% for both species in order to maintain fishing mortality below F_{pa} for both species. This corresponds to landings of less than 18 500 t in 2004 for *L. piscatorius*, and landings of less than 8200 t in 2004 for *L. budegassa*.

The advice on the exploitation of this stock in 2004 is presented in the context of mixed fisheries and is found in Section 3.9.1.

Relevant factors to be considered in management:

The majority of the anglerfish catch consists of young fish, which have not yet reached maturity and the current exploitation pattern represents growth over-fishing. A prime objective in the short-term is to avoid excessive discards in the fishery. This might be achieved using technical measures such as sorting grids (see response to special request Section 3.9.12b).

The fishery is expected to become heavily dependant on the strong year classes entering the fishery. The increase in small individuals in the catches may impair their potential contribution to the future landings. Also, SSB of the recent strong year classes could be impaired by such growth overfishing. There is no minimal landing size for anglerfish but in order to project juveniles of these year classes, the use of selective devices, such as rigid grids, should be promoted.

L. piscatorius and *L. budegassa* are both caught on the same grounds and by the same fleets, and are usually not separated by species in landings; therefore, management measures for both species must be considered together and in conjunction with other species caught in these fisheries (sole, cod, rays, megrim, *Nephrops* and hake). The management area for this stock also includes Division VIIa, where catches in recent years have been between 500 and 1300 t.

Catch forecast for 2004:

Basis: *L. piscatorius*: $F_{2003} = F(00-02) = 0.27$; Landings(2003) = 18 400; SSB(2004) = 38 500.

Basis: *L. budegassa*: $F_{2003} = F(00-02) = 0.23$; Landings(2003) = 7 600 ; SSB(2004) = 29 200.

<i>L. piscatorius</i>				<i>L. budegassa</i>			
F(2004)	Basis	Landings(2004)	SSB(2005)	F(2004)	Basis	Landings(2004)	SSB(2005)
0.090	$F_{max} = 0.34F_{sq}$	8.3	52.9	0.152	$F_{max} = 0.66F_{sq}$	6.2	36.6
0.16	$0.6F_{sq}$	12.9	49.0	0.14	$0.6F_{sq}$	5.6	37.1
0.19	$0.7F_{sq}$	14.9	47.4	0.16	$0.7F_{sq}$	6.5	36.3
0.21	$0.8F_{sq}$	16.7	45.8	0.18	$0.8F_{sq}$	7.3	35.6
0.24	$F_{pa} = 0.9F_{sq}$	18.5	44.2	0.21	$0.9F_{sq}$	8.2	34.9
0.27	F_{sq}	20.3	42.7	0.23	$F_{pa} = F_{sq}$	9.0	34.2
0.29	$1.1F_{sq}$	22.0	41.3	0.25	$1.1F_{sq}$	9.8	33.6
0.32	$1.2F_{sq}$	23.7	39.9	0.28	$1.2F_{sq}$	10.6	32.9

Weights in '000 t.

Shaded scenarios considered inconsistent with the precautionary approach.

Medium- and long-term projections:

Due to the well above-average year classes in recent years recruiting to the fishery, medium-term projections suggest there is more than 95% probability of both stocks remaining above B_{pa} in the medium-term at the current level of fishing mortality.

Comparison with previous assessment and advice:

For *L. budegassa* the present estimates of F and SSB are very similar to those obtained from last year's assessment. For *L. piscatorius*, recent SSB estimates have been revised upwards and fishing mortality has been revised downwards. Changes in strategy and fishing grounds of the fishery have caused changes in the selection pattern of some fleets towards smaller fish. Recent recruitments for both stocks have been strongly revised. These revisions affect the estimate of SSB in the short and the medium-term

Elaboration and special comment:

Anglerfish landings from the west of the British Isles and south to the northern Bay of Biscay comprise two species - *L. piscatorius* and *L. budegassa*. *L. piscatorius* has a wide distribution in waters from the south-western Barents Sea to the Atlantic coast of Spain, whereas *L. budegassa* has a more southerly distribution, ranging from the British Isles in the north to Senegal in the south. Large specimens of both species are found in deep waters. Juvenile anglerfish have been caught both in deep water and along the shoreline, and discrete nursery areas have not been identified.

Anglerfish are an important component of mixed fisheries taking hake, megrim, sole, cod, plaice, and *Nephrops*. A trawl fishery by Spanish and French vessels developed in the Celtic Sea and Bay of Biscay in the 1970s, and overall

annual landings may have reached 35–40 000 t by the early 1980s. Even though fishing effort increased until 1990, landings decreased between 1986 and 1993, but returned to the original level 10 years ago, when France and Spain together reported more than 75% of the total landings of both species combined. The remainder is taken by the UK and Ireland (around 10% each) and Belgium (less than 5%). Otter-trawls (the main gear used by French, Spanish and Irish vessels) currently take about 80% of the total landings of *L. piscatorius*, while around 60% of UK landings are by beam trawlers and gillnetters. Over 95% of total international landings of *L. budegassa* are taken by otter trawlers. There has been an expansion of the French gillnet fishery in the late 1980s in the Celtic Sea and in the north of the Bay of Biscay, mainly by vessels based in Spain and fishing in medium to deep waters. Otter-trawling in medium and deep water in ICES Subarea VII appears to have declined, even though the increasing use of twin trawls by French vessels may have increased significantly the overall efficiency of the French fleet. Fishing activity by UK gillnetters and beam trawlers has remained relatively stable over the period 1986–1995. Belgium landings of anglerfish are exclusively by beam trawlers.

The analytical age-based assessment is based on landings, survey and commercial CPUE data. The catch-at-age matrix covers ages up to 13+ for *L. piscatorius* and to 14+ for *L. budegassa*. Short-term predictions of landings and SSB are not sensitive to recent assumed recruitment.

Source of information:

Report of the Working Group on the Assessment of Southern Shelf Stocks of Hake, Monk and Megrim, May 2003 (ICES CM 2004/ACFM:02).

Anglerfish (*L. piscatorius*)

Yield and spawning biomass per recruit

F-reference points:

	Fish Mort Ages 3-8	Yield/R	SSB/R
Average last 3 years	0.267	0.916	2.040
F_{max}	0.090	1.209	7.946
$F_{0.1}$	0.056	1.137	11.792
F_{med}	0.277	0.901	1.922

Anglerfish (*L. budegassa*)

Yield and spawning biomass per recruit

F-reference points:

	Fish Mort Ages 6-10	Yield/R	SSB/R
Average last 3 years	0.231	0.488	1.828
F_{max}	0.152	0.511	3.001
$F_{0.1}$	0.095	0.482	4.608
F_{med}	0.233	0.487	1.804

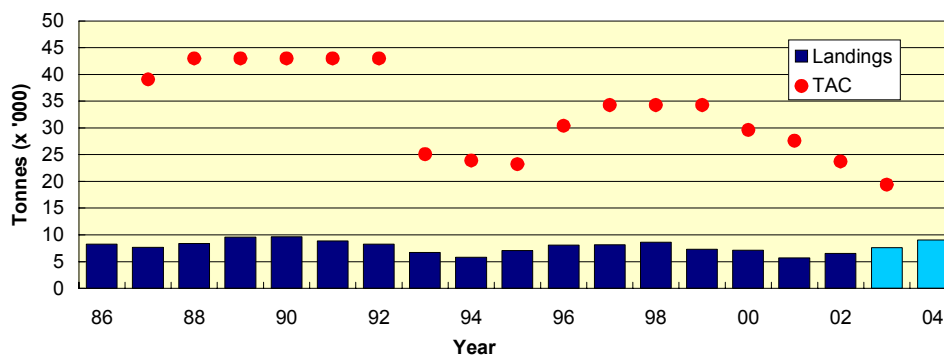
Catch data (Tables 3.9.12.1-5):

Year	ICES Advice	Single-Stock Exploitation Boundaries	Predicted catch corresp. to Single-Stock Exploitation Boundaries	Predicted catch corresp. to advice	Agreed TAC ¹	ACFM Landings	Landings of <i>L. piscat.</i>	Landings of <i>L. budeg.</i>
1987	Not assessed		-		39.08	29.5	21.9	7.6
1988	Not assessed		-		42.99	28.5	20.1	8.4
1989	Not assessed		-		42.99	30.0	20.5	9.5
1990	Not assessed		-		42.99	29.4	19.8	9.6
1991	No advice		-		42.99	25.1	16.2	8.8
1992	No advice		-		42.99	21.1	12.8	8.3
1993	Concern about <i>L. pisc.</i> SSB decrease		-		25.1	20.1	13.5	6.7
1994	SSB decreasing, still inside safe biological limits		-		23.9	21.9	16.1	5.8
1995	No increase in F		20.0		23.2	26.8	19.7	7.1
1996	No increase in F		30.3		30.4	30.2	22.1	8.1
1997	No increase in F		34.3		34.3	29.8	21.7	8.1
1998	No increase in F		33.0		34.3	28.2	19.6	8.6
1999	No increase in F		32.9		34.3	24.5 ³	17.2 ³	7.3 ³
2000	At least 20% decrease in F		< 22.3		29.6	22.0 ³	14.9 ³	7.1 ³
2001	Reduce F below F_{pa}		< 27.6		27.6	22.2	16.6	5.6
2002	Reduce F below F_{pa}		< 19.9		23.7	26.7	20.2	6.5
2003	At least 30% decrease in F		< 16.4		19.4 ⁺⁺			
2004	^{*)}	At least 10% decrease in F	^{*)}	<26.7				

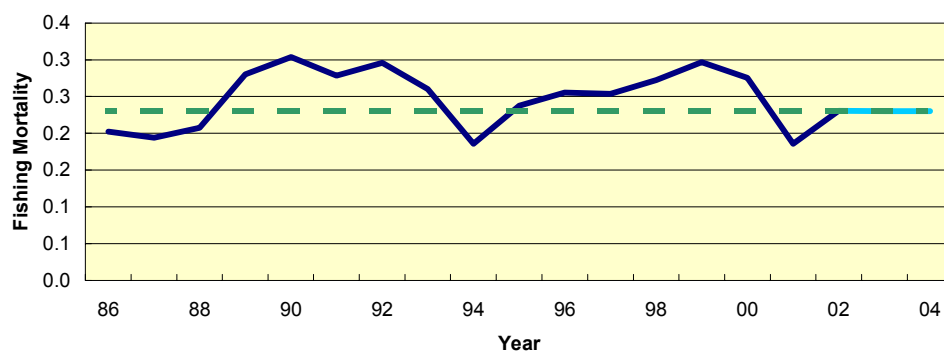
¹Includes Division VIIa and Divisions VIIIId,e; applies to both species. ³Revised. Weights in '000 t. ⁺⁺ TAC uplift in the process.

^{*)} Single-stock boundary and the exploitation of this stock should be conducted in the context of mixed fisheries protecting stocks outside safe biological limits. Weight in '000 t.

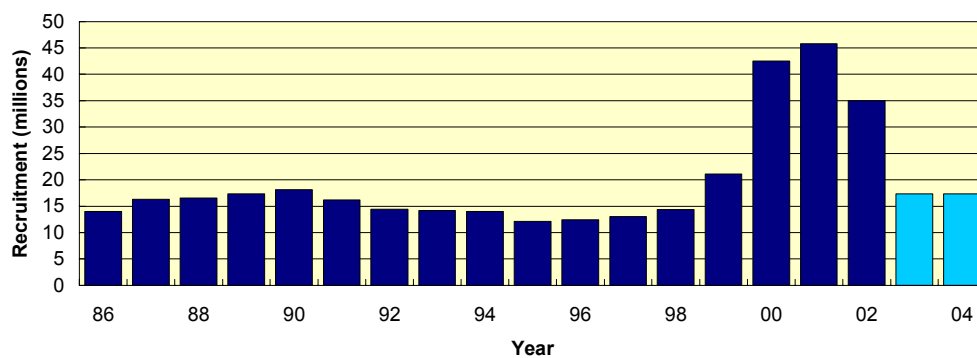
Anglerfish (*L.budegassa*) VIIb-k & Villab - Landings
Mean = 7.7



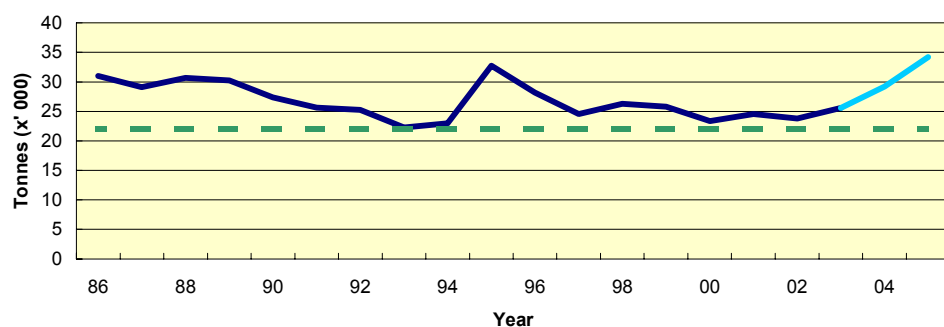
Anglerfish (*L.budegassa*) VIIb-k & Villab - Fishing Mortality
Mean = 0.25



Anglerfish (*L.budegassa*) VIIb-k & Villab - Recruitment (Age 1)
Mean = 19.9

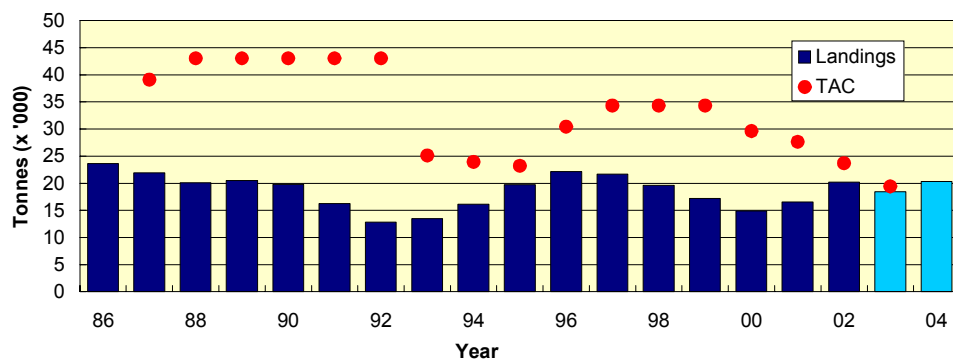


Anglerfish (*L.budegassa*) VIIb-k & Villab - Spawning Stock Biomass
Mean = 26.7



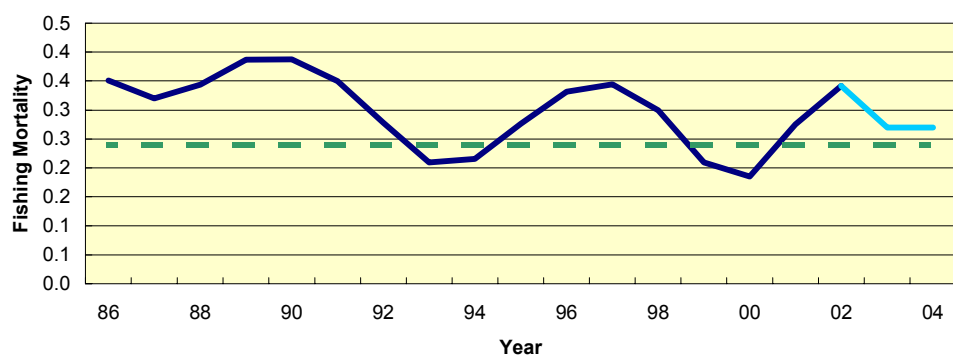
Anglerfish (*L.piscarorius*) VIIb-k & VIIIab - Landings

Mean = 18.6



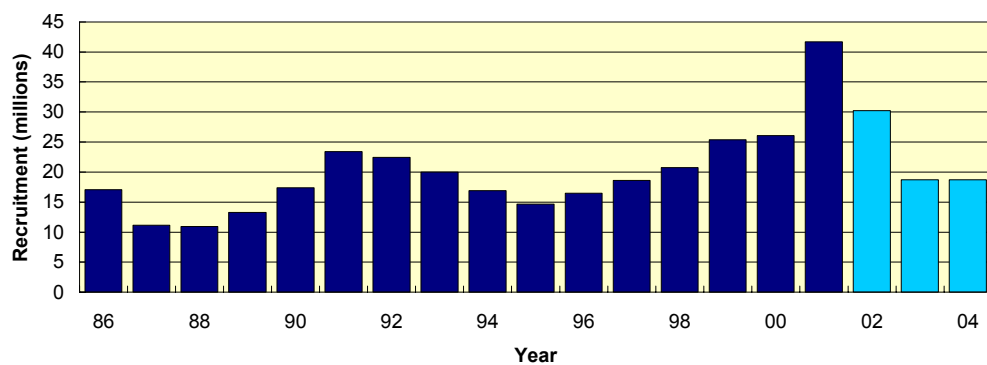
Anglerfish (*L.piscarorius*) VIIb-k & VIIIab - Fishing Mortality

Mean = 0.3



Anglerfish (*L.piscarorius*) VIIb-k & VIIIab - Recruitment (Age 1)

Mean = 20.4



Anglerfish (*L.piscarorius*) VIIb-k & VIIIab - Spawning Stock Biomass

Mean = 39.1

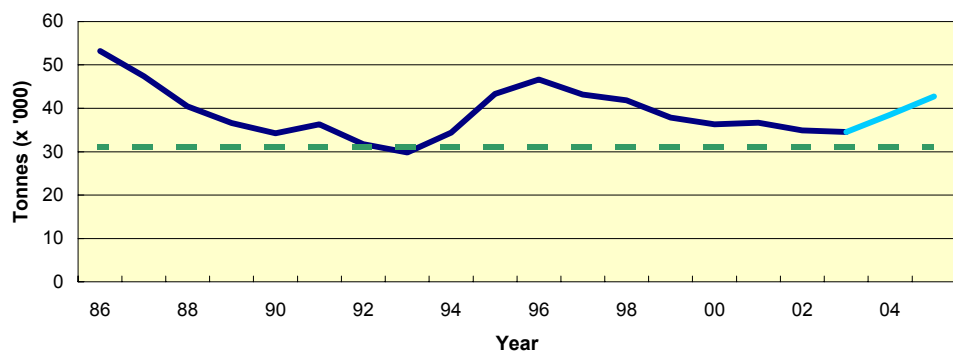


Table 3.9.12.1 Landings (t) of both species of Anglerfish in Divisions VIIb-k and VIIa,b,d. Working Group estimates.

Year	VIIb-k	VIIa,b,d	Total
1977 ¹			19895
1978 ¹			23445
1979 ¹			29738
1980 ¹			38880
1981 ¹			39450
1982 ¹			35285
1983 ¹			38280
1984 ¹	28847	7909	36756
1985 ¹	28491	7161	35652
1986	25987	5897	31883
1987	22295	7233	29528
1988	22494	5983	28477
1989	24731	5276	30007
1990	23434	5950	29384
1991	20385	4684	25069
1992	17554	3530	21084
1993	16633	3507	20140
1994	18093	3841	21934
1995	21922	4862	26784
1996	24132	6102	30233
1997	23928	5846	29774
1998	23295	4876	28171
1999	21288	3224	24512
2000	19250	2711	21961
2001 ¹	19366	2838	22204
2002*	23006	3674	26680

*Preliminary.

¹ Revised.

Table 3.9.12.2 Landings (t) of *L. piscatorius* in Divisions VIIb-k and VIIIa,b,d.
Working Group estimates.

Year	VIIb-k	VIIIa,b,d	Total
1984 ¹	23056	5416	28472
1985 ¹	23193	4568	27761
1986	19544	4122	23666
1987	17180	4729	21909
1988	16147	3948	20095
1989	17584	2889	20474
1990	16374	3379	19753
1991	14071	2158	16229
1992	11456	1362	12818
1993	11894	1587	13481
1994	14075	2045	16120
1995	16618	3113	19730
1996	18153	3988	22141
1997	17743	3917	21660
1998	16786	2787	19572
1999	15690	1506	17186
2000	13765	1133	14898
2001 ¹	14903	1616	16519
2002*	17855	2313	20168

*Preliminary.

¹ Revised

Table 3.9.12.3 Landings (t) of *L. budegassa* in Divisions VIIb-k and VIIIa,b,d.
Working group estimates.

Year	VIIb-k	VIIIa,b,d	Total
1984 ¹	5791	2493	8284
1985 ¹	5298	2593	7891
1986	6443	1775	8217
1987	5115	2504	7619
1988	6347	2035	8382
1989	7146	2387	9533
1990	7061	2571	9632
1991	6314	2526	8840
1992	6098	2168	8266
1993	4739	1919	6659
1994	4018	1796	5814
1995	5304	1749	7053
1996	5978	2114	8092
1997	6185	1929	8114
1998	6510	2089	8599
1999	5607	1718	7325
2000	5485	1578	7064
2001 ¹	4463	1222	5685
2002*	5151	1361	6513

*Preliminary.

¹ Revised.

Table 3.9.12.4 Anglerfish (*L. piscatorius*) in Divisions VIIb-k and VIIa,b.

Year	Recruitment Age 1 thousands	SSB tonnes	Landings tonnes	Mean F Ages 3-8
1986	17050	53243	23666	0.3510
1987	11153	47359	21909	0.3201
1988	10907	40462	20095	0.3440
1989	13269	36595	20474	0.3870
1990	17406	34258	19753	0.3874
1991	23413	36357	16229	0.3497
1992	22476	31710	12818	0.2781
1993	20021	29785	13481	0.2093
1994	16919	34414	16120	0.2155
1995	14692	43367	19730	0.2768
1996	16454	46612	22141	0.3317
1997	18645	43204	21660	0.3441
1998	20734	41841	19572	0.2998
1999	25399	37849	17185	0.2098
2000	26039	36306	14898	0.1851
2001	41649	36676	16519	0.2752
2002	30200*	34907	20168	0.3418
2003	30200*	34525		
Average	19764	39114	18613	0.3004

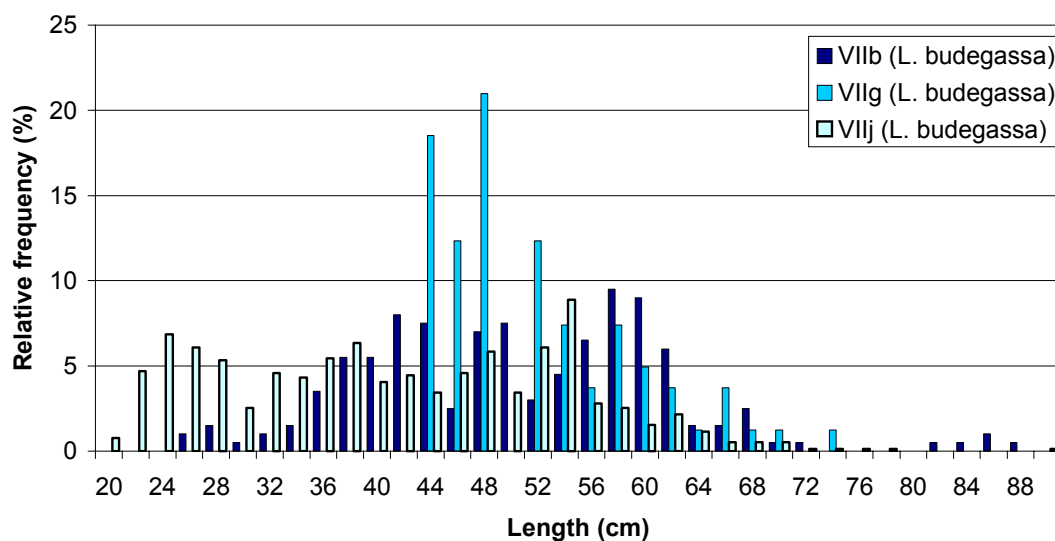
*Geometric Mean over 1999-2001.

Table 3.9.12.5 Anglerfish (*L. budegassa*) in Divisions VIIb-k and VIIa,b.

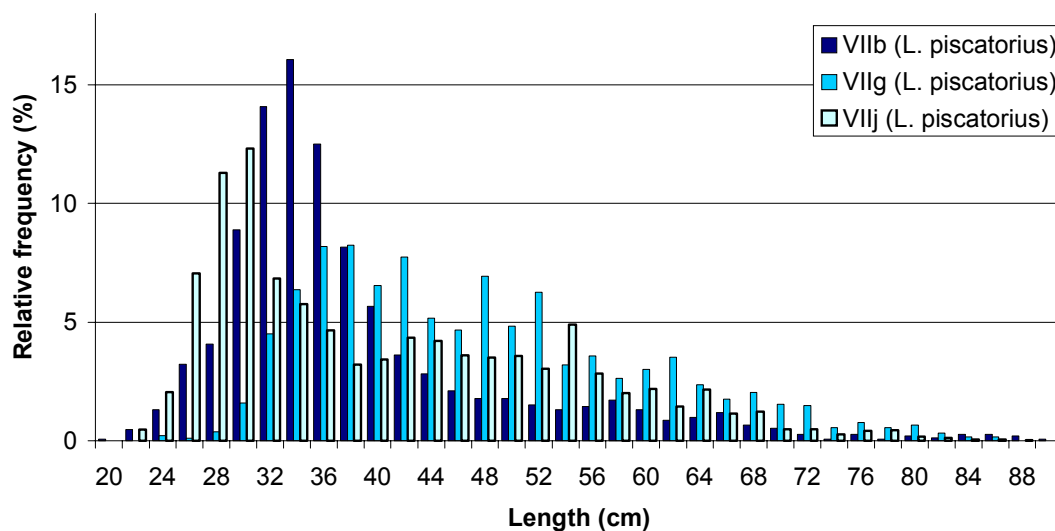
Year	Recruitment Age 2 thousands	SSB tonnes	Landings tonnes	Mean F Ages 6-10
1986	14048	31027	8217	0.2021
1987	16288	29075	7619	0.1938
1988	16508	30692	8382	0.2075
1989	17311	30241	9533	0.2802
1990	18140	27348	9632	0.3035
1991	16214	25659	8840	0.2782
1992	14465	25221	8266	0.2958
1993	14225	22244	6659	0.2603
1994	14024	22997	5814	0.1856
1995	12143	32732	7053	0.2374
1996	12386	28158	8092	0.2554
1997	13013	24526	8114	0.2537
1998	14365	26262	8599	0.2723
1999	21130	25767	7325	0.2967
2000	42535	23386	7064	0.2755
2001	45810	24540	5685	0.1859
2002	35000	23786	6513	0.2309
2003	34500*	25555		
Average	23261	22671	7803	0.2533

*Geometric Mean over 1999-2001.

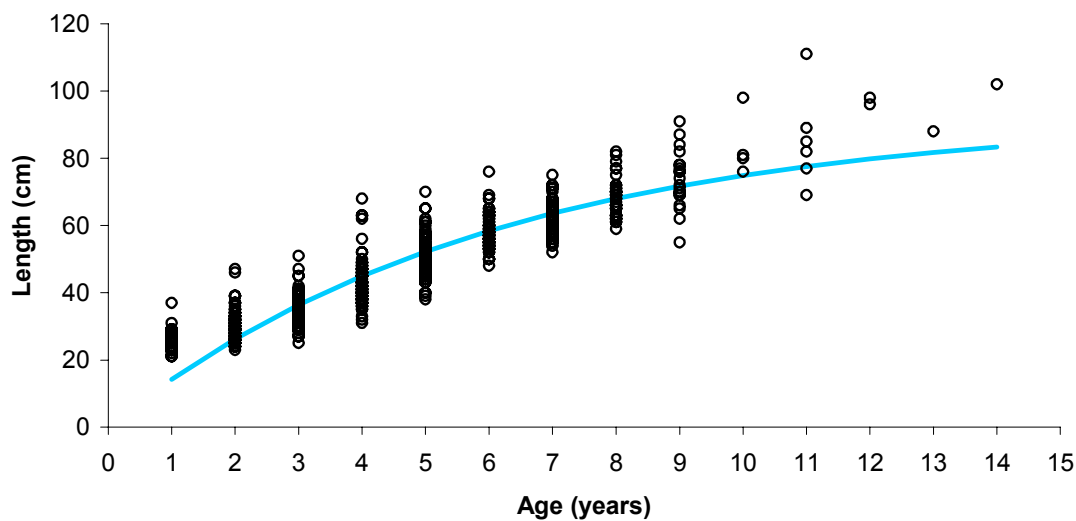
2002 Length Distribution: Irish Sampling, *L. budegassa*



2002 Length Distribution: Irish Sampling, *L. piscatorius*



2002 Size at Age: Irish Sampling, *L. piscatorius*



Celtic Sea and Bay of Biscay Megrim

(Sub-area VII and Divisions VIIIa,b,d,e)

For latest information, see: <http://www.ices.dk>



Fisheries Science Services

FSS – SINGLE STOCK CONSIDERATIONS

(See Celtic Sea, West and Southwest of Ireland Overview for Mixed Fisheries Advice)

Based on the most recent estimates of SSB and fishing mortality ICES classifies the stock of *Lepidorhombus whiffiagonis* as being harvested outside safe biological limits.

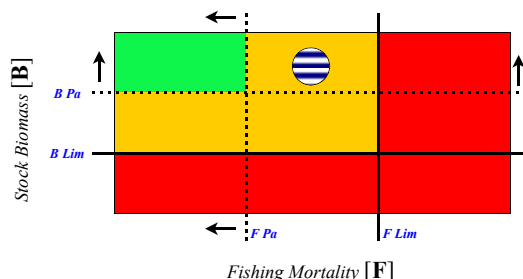
FSS recognise that megrim are an important component of mixed fisheries taking hake, anglerfish, sole, cod, plaice, and *Nephrops*. Megrim are therefore caught with other stocks that are outside safe biological limits. FSS point out that an industry initiated programmes aimed at reducing catches of Hake, Cod (VIIe-k) and Plaice (VIIfg) and Sole (VIIe & VIIIa,b) should be considered in the management of Celtic Sea, West of Ireland and Biscay fisheries. Industry initiated programmes should be encouraged but must include a high rate of independent observer coverage or other totally transparent methods for ensuring that their catches of species outside safe biological limits are fully and credibly reported.

FSS considers that fishing mortality should be reduced to below F_{pa} , corresponding to landings of less than 19,200 t in 2004. Including a 5% contribution of *L. boscii* in the landings, the equivalent TAC for the two species combined would be 20,200 t. This would translate to an Irish quota of 2,996 t. However, the mixed fisheries advice given for demersal fisheries in the Celtic Sea and particularly in relation to stocks outside safe biological limits will determine the TAC for megrim.

TAC area	2003 TAC	2003 Irish Quota	Proposed 2004 TAC	Proposed 2004 Irish Quota
VII	14,336	2,373	18,099	2,996
VIIIa,b,d,e	1,664		2,101	
Total	16,000		20,200	

STATE OF THE STOCK

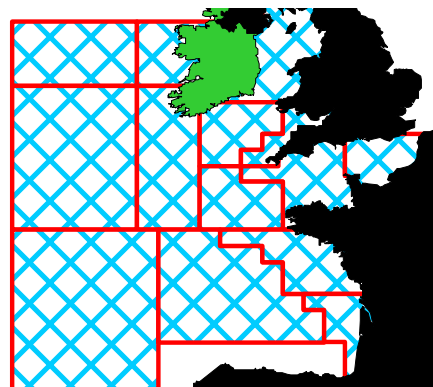
State of the Stock in relation to the precautionary reference points (see page 18)



- There are concerns about the stock of *Lepidorhombus whiffiagonis* that is harvested outside safe biological limits.
- The catches in 2002 were 17,400 t (estimates), which is 2% higher than in 2002. Catches have been relatively stable, fluctuating around 17,000 t since 1990.
- The fishing mortality in 2002 was 0.39, compared with the proposed $F_{pa} = 0.3$. Fishing mortality has around F_{pa} since the mid 1990s.
- The 1997 and the 1999 year classes are estimated to be strong.
- The Spawning Stock Biomass in 2003 was 82,400 t, compared with the proposed $B_{pa} = 55,000$ t. The SSB has been increasing in recent years.
- In the short term SSB is predicted to decline in 2004 and 2005 at current fishing mortality.

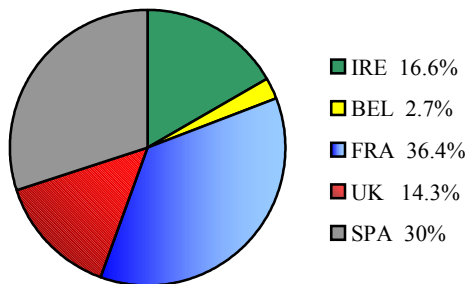
CURRENT MANAGEMENT

- There are two TAC areas covering the assessment area for this stock; Sub Area VII and Divisions VIIIa, b,d,e.
- The assessment area for this stock; Sub-area VII and Divisions VIIIa,b,d,e.



Red Boxes-TAC/Management Areas Blue Shading- Assessment Area

- The 2003 TAC was 14,336 t with an Irish quota of 2,373 t. The TAC for VIIa,b,d,e was 1,664 t in 2003.



- There are no explicit management objectives or plan for this stock.
- FSS advises that management objectives be established and that a management plan be developed and implemented for fisheries taking megrim.

FSS – ECONOMIC COMMENTS

- The value of the 2002 Irish quota was about €6.6m.
- The value of the 2002 Irish landings was about €7.2m.
- Megrim is an extremely important species for the Irish industry, caught in mixed fisheries with hake and anglerfish, but also with *Nephrops*, cod and whiting.

ADDITIONAL INFORMATION

- Historical trends in F and SSB are similar to those in the previous assessment. There is a downward revision in F and upward revision in SSB in the very recent years (by less than 10% for SSB and less than 24% for F). The present advice is similar to last year's advice. The 2002 catches and landings were around 10% lower than predicted last year. The assessment includes discards.
- Irish landings of megrim in this area were 2,413 t (estimate) in 2003.
- Spain and France dominate the fishery with about 70% of the landings between them. Ireland accounts for around 15 % of the total international landings
- Megrim are a very valuable by-catch for Irish demersal trawlers from Killybegs, Castletownbere, Waterford and Rossaveal. In recent years megrim have also become important to the Irish beam trawl and twin-rig fleets.

- Irish sampling for this stock is supported through the EC-funded Sampling Programme, which is required under Data Collection Directives 1543/2000 and 1639/2001.
- FSS sampling has shown that ages between 3 and 5 are the dominant year classes in VIIb,g,j.
- This assessment is tuned using Irish commercial catch and effort data from logbooks.
- FSS also carried out an egg and larval survey in March 2000 and 2001. The preliminary results from this survey indicate that the continental shelf edge southwest of Ireland is an important spawning area for megrim.
- The fishery consists of two species. Irish sampling indicates that catch rates of *L. boschii* are negligible in landings. Irish fishermen don't separate the two species. Due to their smaller average size *L. boschii* are more common in discards particularly in deeper waters.
- Discards accounted for around 10% of the total catches by weight in recent years. Prior to 1998 discard rates were higher at around 15 % it is thought that recent mesh size increased and a more appropriate MLS might explain the observed decrease in discard rate. However the selection pattern remains poor, the fishery takes a disproportionate amount of small fish. Further technical measures such as increases in mesh size to reduce the catches of small fish should be investigated for this stock.

ICES ADVICE 3.9.11

State of stock/exploitation:

Based on the most recent estimates of SSB and fishing mortality ICES classifies the stock of *Lepidorhombus whiffiagonis* as being harvested outside safe biological limits. SSB was high from 1984 to 1988, then declined until 1990 but has remained above B_{pa} . The fishing mortality has declined from the 1991 peak until 1997 and has increased since then to above F_{pa} . Recruitment at age 1 has been relatively stable with peaks for the 1997 and the 1999 year classes.

Management objectives:

There are no explicit management objectives for this stock.

Precautionary Approach reference points (established in 1998):

ICES considers that:	ICES proposes that:
B_{lim} is not defined.	B_{pa} be set at 55 000 t.
F_{lim} is 0.44.	F_{pa} be set at 0.30.

Technical basis:

B_{lim} = Not defined.	$B_{pa} = B_{loss}$. There is no evidence of reduced recruitment at the lowest biomass observed and B_{pa} was therefore set equal to the lowest observed SSB.
$F_{lim} = F_{loss}$, the fishing mortality above which stock dynamics are unknown.	$F_{pa} = F_{med}$; implies a less than 5% probability that ($SSB_{MT} < B_{pa}$). This F is consistent with the proposed B_{pa} and it approximates F_{MSY} .

Single-Stock Exploitation Boundaries:

Fishing mortality should be reduced to below F_{pa} , corresponding to landings of less than 19 200 t in 2004. Including a 5% contribution of *L. boschii* in the landings, the equivalent TAC for the two species combined would be 20 200 t.

The advice on the exploitation of this stock in 2004 is presented in the context of mixed fisheries and is found in Section 3.9.1.

Relevant factors to be considered in management:

ICES notes that long-term gains can be obtained by reducing fishing mortality to F_{max} (0.193).

For most fleets, megrim is taken in mixed fisheries for hake, anglerfish, *Nephrops*, cod, and whiting.

Catch forecast for 2004:

Basis: $F(2003) = F(00-02) = 0.34$; Landings(2003) = 20.3 t; Catch(2003) = 22.6 t; SSB(2004) = 79.9.

F(2004)	Basis	Catch(2004)	Landings (2004)	SSB(2005)
0.17	$0.5 F_{sq}$	12.6	11.6	87.7
0.20	$0.6 F_{sq}$	14.8	13.6	85.0
0.24	$0.7 F_{sq}$	17.0	15.6	82.4
0.27	$0.8 F_{sq}$	19.0	17.4	80.0
0.30	F_{pa}	21.0	19.2	77.6
0.34	$1 F_{sq}$	22.9	20.9	75.4
0.37	$1.1 F_{sq}$	24.7	22.6	73.2
0.41	$1.2 F_{sq}$	26.4	24.2	71.2

Weights in '000 t.

Shaded scenarios considered inconsistent with the precautionary approach applied in a single-species context alone.

Medium- and long-term projections:

This year's assessment is not a full assessment and no new medium-term projections were performed.

Comparison with previous assessment and advice:

Historical trends in F and SSB are similar to those in the previous assessment, with a downward revision in F and upward revision in SSB in the very recent year (by less than 10% for SSB and less than 24% for F). The present advice is similar to last year's advice.

Elaboration and special comment:

Discards are estimated to be less than 10% by weight of the total catches in recent years and comprise fish over a large range of sizes.

Megrim are widely distributed over the whole of Subareas VII and VIII and are most abundant in the deeper waters of the continental shelf. Spawning takes place between January and April along the edge of the continental shelf to the southwest and west of the British Isles, and research

vessel trawling surveys indicate that 0-group megrim do not move far from the spawning grounds on the shelf edge during their first year.

An age-based analytical assessment using catch-per-unit effort from three commercial fleets and two surveys was performed. Discard estimates were used but were considered incomplete as only Spain provided data. In order to be able to assess correctly the recruiting year classes in stocks where discards make up an important part of catches, discard sampling programmes should be regularly planned. As discard practices change between years and countries, annual discard estimates are essential.

Source of information:

Report of the Working Group on the Assessment of Southern Shelf Stocks of Hake, Monk and Megrim, May 2003 (ICES CM 2004/ACFM:02).

Yield and spawning biomass per recruit

F-reference points:

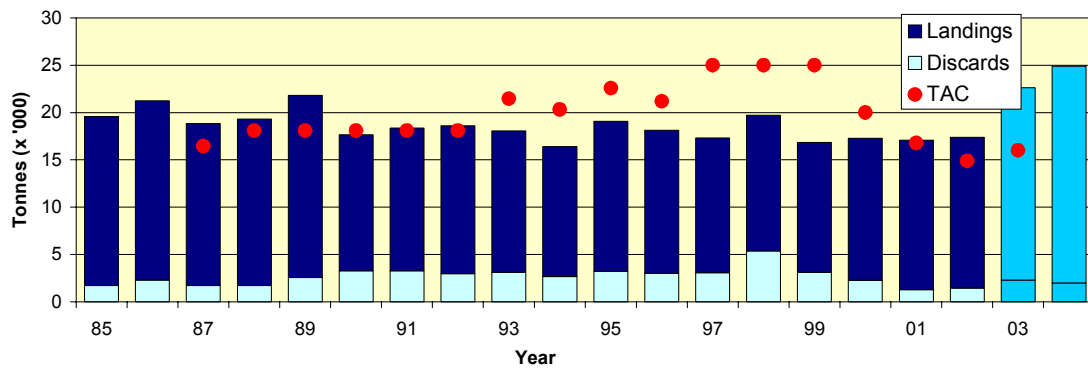
	Fish Mort Ages 3-6	Yield/R	SSB/R
Average last 3 years	0.338	0.060	0.238
F_{max}	0.193	0.065	0.386
$F_{0.1}$	0.120	0.061	0.555
F_{med}	0.304	0.062	0.261

Catch data (Tables 3.9.11.1-2):

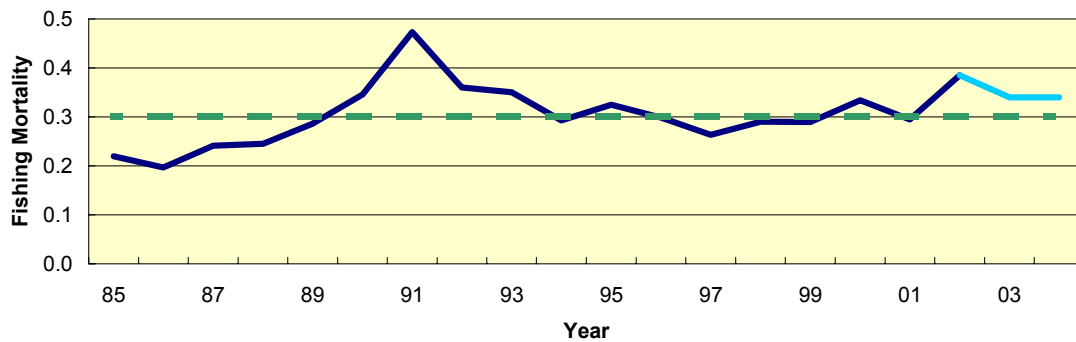
Year	ICES Advice	Single-stock exploitation boundaries	Predicted catch corresp. to advice	Predicted catch corresponding to single-stock boundaries	Agreed TAC ¹	ACFM Landings	Disc. slip.	ACFM Catch
1987	Not assessed		-		16.46	17.1	1.7	18.8
1988	Not assessed		-		18.1	17.6	1.7	19.3
1989	Not assessed		-		18.1	19.2	2.6	21.8
1990	Not assessed		-		18.1	14.4	3.3	17.7
1991	No advice		-		18.1	15.1	3.3	18.4
1992	No advice		-		18.1	15.6	3.0	18.6
1993	Within safe biological imits		-		21.46	14.9	3.1	18.0
1994	Within safe biological limits		-		20.33	13.7	2.7	16.4
1995	No particular concern		-		22.59	15.9	3.2	19.1
1996	No long-term gain in increased F		16.6		21.20	15.1	3.0	18.1
1997	No advice		14.3		25.0	14.3	3.1	17.3
1998	No increase in F		15.2		25.0	14.3	5.4	19.7
1999	Reduce F below F_{pa}		14.6 ¹		25.0	13.7	3.1	16.9
2000	Reduce F below F_{pa}		<14.2 ¹		20.0	15.0	2.3	17.3
2001	Reduce F below F_{pa}		<14.1 ¹		16.8	15.8	1.3	17.1
2002	Reduce F below F_{pa}		<13.0 ¹		14.9	15.9	1.5	17.4
2003	Reduce F below F_{pa}		<16.1 ¹		16.0			
2004	²	Reduce F below F_{pa}	²	<20.2 ¹				

¹Includes *L. boscii*. ² Single-stock boundary and the exploitation of this stock should be conducted in the context of mixed fisheries protecting stocks outside safe biological limits. Weights in '000 t.

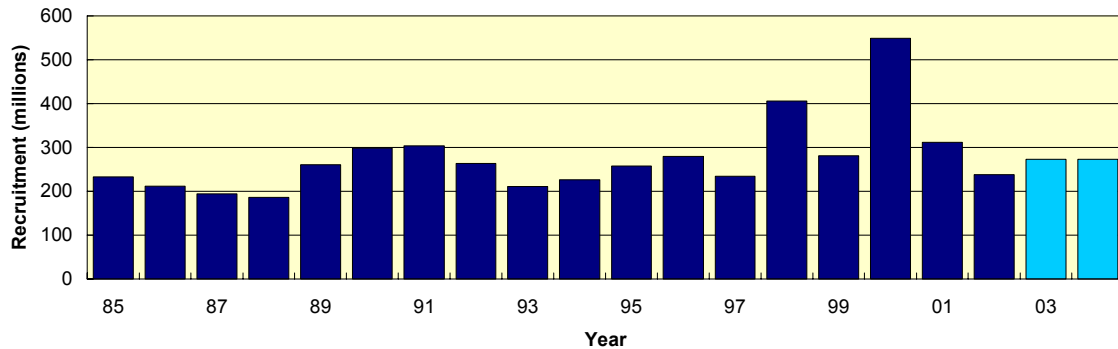
Megrim Subarea VII & Divisions VIIIa,b,d - Landings & Discards
Mean = 15.8



Megrim Subarea VII & Divisions VIIIa,b,d - Fishing Mortality
Mean = 0.3



Megrim Subarea VII & Divisions VIIIa,b,d - Recruitment (Age 1)
Mean = 274.4



Megrim Subarea VII & Divisions VIIIa,b,d - Spawning Stock Biomass
Mean = 66.9

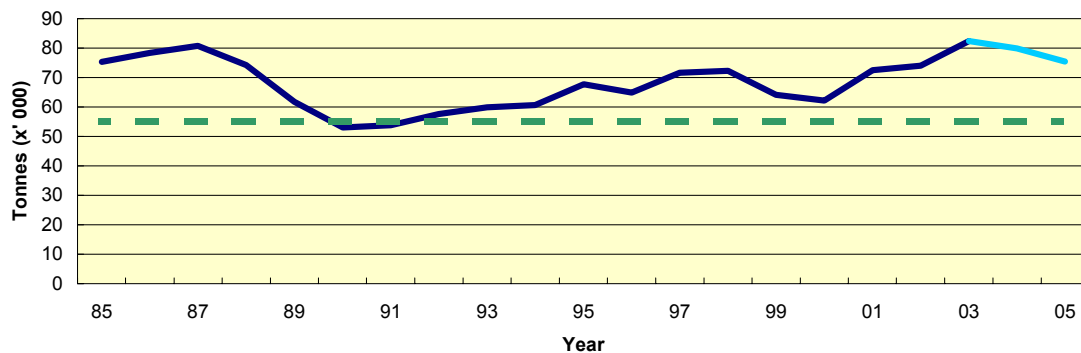


Table 3.9.11.1 Megrim (*L. whiffiagonis*) in Divisions VIIb,c,e-k and VIIIa,b,d. Nominal landings and catches (t) provided by the Working Group.

	1985	1986	1987	1988	1989	1990	1991	1992	1993	1994
Total landings	17865	18927	17114	17577	19233	14371	15094	15600	14929	13685
Total discards	1732	2321	1705	1725	2582	3284	3282	2988	3108	2700
Total catches	19597	21248	18819	19302	21815	17655	18376	18588	18037	16385
Agreed TAC ¹			16460	18100	18100	18100	18100	18100	21460	20330

	1995	1996	1997	1998	1999	2000	2001	2002
Total landings	15862	15109	14254	14345	13714	15031	15806	15937
Total discards	3206	3026	3066	5371	3135	2265	1275	1466
Total catches	19068	18135	17320	19716	16850	17297	17081	17402
Agreed TAC ¹	22590	21200	25000	25000	25000	20000	16800	14900

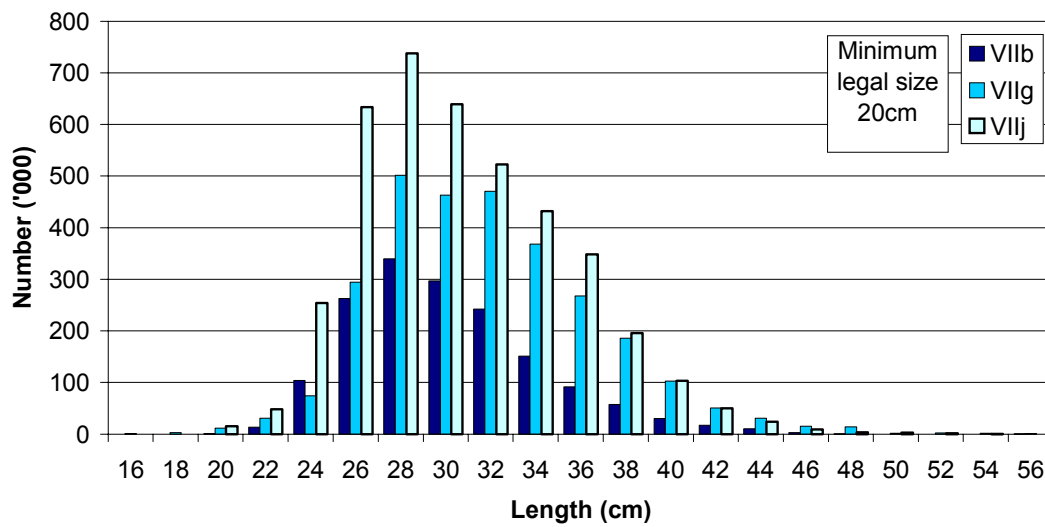
¹ For both Megrim species and VIIa included.

Table 3.9.11.2 Megrim (*L. whiffiagonis*) in Subarea VII & Divisions VIIIa,b,d.

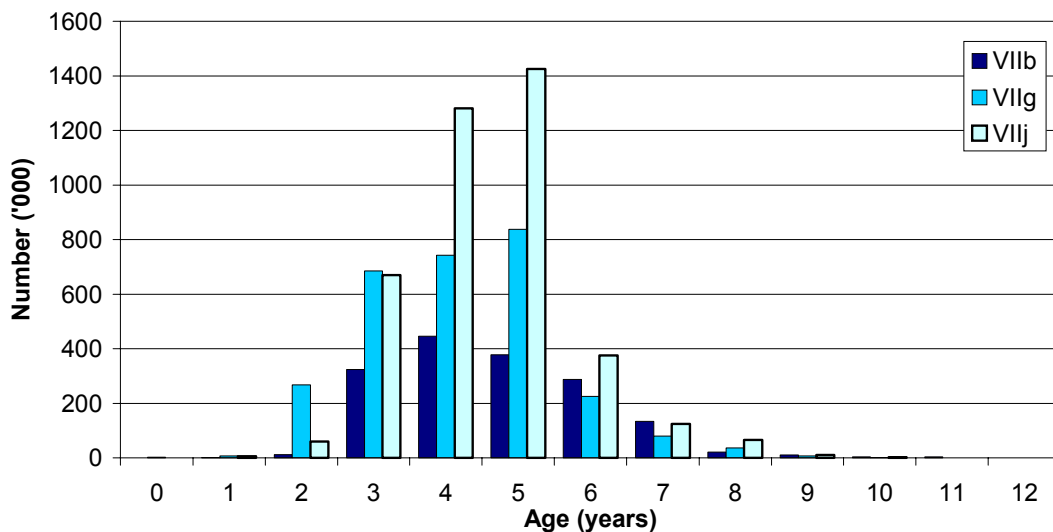
Year	Recruitment Age 1 thousands	SSB tonnes	Landings+discards tonnes	Mean F Ages 3-6
1984	236917	78836	18828	0.2002
1985	232322	75219	19597	0.2194
1986	211820	78327	21248	0.1969
1987	194049	80705	18819	0.2412
1988	185665	74230	19302	0.2446
1989	260134	61725	21815	0.2860
1990	298339	53027	17655	0.3456
1991	302979	53795	18376	0.4734
1992	263306	57629	18588	0.3597
1993	210626	59894	18037	0.3502
1994	225925	60683	16385	0.2928
1995	257522	67647	19068	0.3247
1996	279311	64877	18135	0.2986
1997	234265	71614	17320	0.2631
1998	404996	72278	19717	0.2898
1999	281168	64084	16850	0.2896
2000	548435	62170	17297	0.3339
2001	311456	72495	17081	0.2945
2002	237587	73925	17402	0.3852
2003	272958*	82354		
Average	272464	67535	18501	0.2994

*Geometric Mean over 1987-2001.

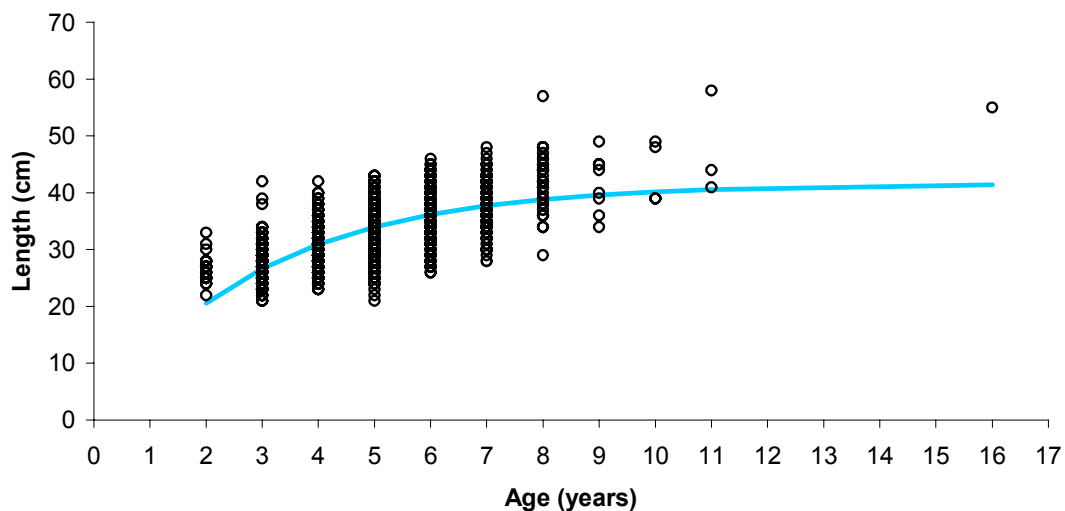
2002 Length Distribution: Irish Landings, Megrim in VIIb VIIg VIIj



2002 Age Distribution: Irish Landings, Megrim in VIIb VIIg VIIj



2002 Size at Age: Irish Sampling, Megrim in VIIb VIIg VIIj



Celtic Sea Plaice

(Division VIIg)

For latest information, see: <http://www.ices.dk>



Fisheries Science Services

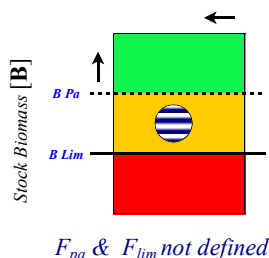
FSS – SINGLE STOCK CONSIDERATIONS

(See Celtic Sea, West and Southwest of Ireland Overview for Mixed Fisheries Advice)

FSS considers that fishing mortality should be restricted to below 0.10 in 2004 corresponding to landings of less than 210 t. This would bring SSB above B_{pa} in 2005. If this is not possible then FSS considers that a recovery plan which includes a sustained reduction of fishing mortality be implemented to rebuild the stock above B_{pa} in the medium-term. This corresponds to an Irish quota of 15 t in 2004.

STATE OF THE STOCK

State of the Stock in relation to the precautionary reference points (see page 18)

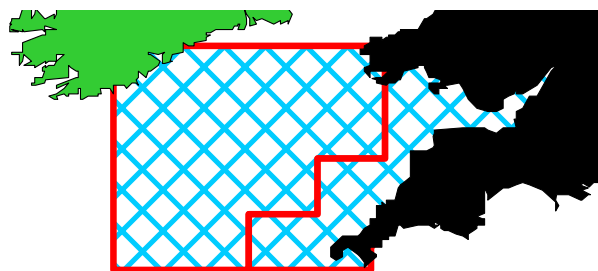


- There are serious concerns about the state of this stock and it is considered to be outside safe biological limits.
- The estimated landings in 2002 were 630 t.
- Fishing mortality has decreased since 1999. In 2002 ($F_{3-6} = 0.52$) was estimated to have been 13% below the average of the time series.
- With the exception of 1995, all recruitments since 1989 have been below average. Recruitment in 2002 is the lowest in the time series.
- SSB rose to a high level throughout the 1980s, following a series of above-average recruitment, but has declined since 1988. SSB is estimated to have been below B_{pa} since 1998. SSB estimated to be 1,300 t in 2002.
- The SSB of this stock is estimated to be between B_{lim} (1,100 t) and B_{pa} (1,800 t). Assuming F in 2004 is

equal to F status quo, the probability that SSB will remain below B_{pa} in 2005 is greater than 95%.

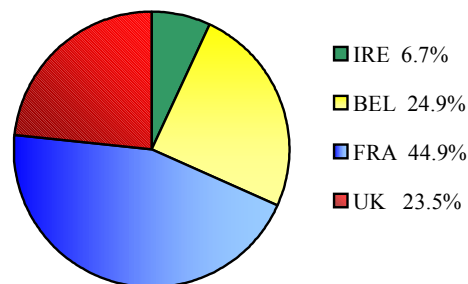
CURRENT MANAGEMENT

- The TAC area covers Divisions VIIg as does the assessment area.



Red Boxes-TAC/Management Areas Blue Shading– Assessment Area

- The 2003 TAC was 660 t with an associated Irish quota of 46 t.



- There are no explicit management objectives or plans for this stock. FSS advises that management objectives be established and that a management plan be developed and implemented for fisheries catching plaice.

FSS – ECONOMIC COMMENTS

- The value of the 2002 Irish quota was about €0.6m.
- The value of the 2002 Irish landings was about €0.2m.

ADDITIONAL INFORMATION

1. Results of this assessment are close to the previous one. The 2001 year class which is based recent survey information been estimated to be only half of the strength of an average year class. Discard estimates are not included in this assessment. This may represent a major deficiency as discard rates are believed to be high for this stock.

2. Irish estimated landings in 2002 were 72 t. This is an increase of 57% on the 2001 landings.
3. Mis-reporting has been considered a problem for this stock in earlier years. Under-reporting and mis-reporting of catches by ICES Division may have taken place in the most recent years, but no information is available on the scale of the problem. The status quo forecast indicates landings in excess of the TAC for 2003.
4. In the 1970s, the Divisions VIIIf,g plaice fishery was mainly carried out by Belgian beam trawlers and Belgian and UK otter trawlers. Effort in the UK and Belgian beam-trawl fleets increased in the late 1980s, but has since declined. Recently, many of these otter trawlers have been replaced by beam trawlers, which target sole.
5. Irish Sampling for this stock is supported through the EC funded sampling programme which is required under Data Collection Regulation 1543/2000 and 1639/2001. FSS sampling indicates that approximately 60% of Irish landings in 2002 were 3 to 4 year old fish.
6. In 1997 FSS commenced a groundfish survey in the Celtic Sea on RV *Celtic Voyager*. This survey was discontinued in 2002 and will be replaced with a new groundfish survey on the RV *Celtic Explorer* in 2003.

7. FSS has carried out plaice tagging surveys since 2001. To date a total of 2000 plaice have been tagged.
8. Discarding practices are not well quantified but FSS sampling has indicated that discarding does occur in this fishery.
9. There were no early closures of the fishery for plaice in 2002, however, the fishery was closed to Belgian vessels fishing for sole from June. A similar closure of the fishery to Belgian vessels fishing for sole was imposed in 2001 from October 31st.

ICES ADVICE

3.9.4

State of stock/exploitation:

Based on the most recent estimate of the biomass ICES classifies the stock as being outside safe biological limits. SSB decreased from 1988 to 2000 and has been below B_{pa} since 1998. Fishing mortality has fluctuated around the average. Most recent year classes have been below average, and the 2001 year class is estimated to be the weakest in the series.

Management objectives:

There are no explicit management objectives for this stock.

Precautionary Approach reference points (established in 1998, modified in 2001):

ICES considers that:	ICES proposes that:
B_{lim} is 1 100 t, the lowest observed spawning stock biomass B_{loss} .	B_{pa} be set at 1 800 t. Biomass above this affords a high probability of maintaining SSB above B_{lim} , taking into account the uncertainty assessments.
F_{lim} not defined.	F_{pa} not defined.

Technical basis:

$B_{lim}=B_{loss}$	$B_{pa}=B_{lim} * 1.64$
F_{lim} =Not defined	F_{pa} not defined

Single Stock Exploitation Boundaries:

Fishing mortality should be restricted to below 0.10 in 2004 corresponding to landings of less than 210 t. This would bring SSB above B_{pa} in 2005. If this is not possible then ICES recommends that a recovery plan which includes a sustained reduction of fishing mortality be implemented to rebuild the stock above B_{pa} in the medium-term. Direct effort reductions, rather than TAC controls, are required to promote such a reduction in fishing mortality.

Advice on the exploitation of this stock in 2004 is presented in the context of mixed fisheries and is found in Section 3.9.1.

Relevant factors to be considered in management:

At *status quo* F, SSB is likely to remain below B_{pa} .

Plaice is taken mainly in a directed beam-trawl fishery for sole, and to a lesser extent in otter trawl fisheries, and as a consequence cannot be managed separately. To increase SSB of plaice towards B_{pa} in the short-term a stronger (than 25%) reduction in sole fishing effort is required.

Catch forecast for 2004:

Basis: $F_{sq} = F(00-02) = 0.52$; Landings (2003) = 0.76; SSB(2004) = 1.34.

F(2004)	Basis	Landings (2004)	SSB(2005)
0	0	0	1.99
0.10	$0.23 * F_{sq}$	0.21	1.80
0.21	$0.4 * F_{sq}$	0.33	1.69
0.31	$0.6 * F_{sq}$	0.47	1.56
0.39	$0.75 * F_{sq}$	0.56	1.47
0.42	$0.8 * F_{sq}$	0.59	1.44
0.52	F_{sq}	0.71	1.34
0.62	$1.2 * F_{sq}$	0.82	1.25
0.73	$1.4 * F_{sq}$	0.91	1.16

Assumed average recruitment contributed 40% of the forecasted SSB for 2005. Weights in '000 t.
Shaded scenarios considered inconsistent with the precautionary approach.

Medium- and long-term projections:

Assuming the current selection pattern, F_{max} is estimated to be $0.54 F_{sq}$. A medium-term analysis was not carried out for this Update assessment.

Comparison with previous assessment and advice:

Results of this assessment are close to the previous one. The 2001 year class has based recent survey information been estimated to be only half of the strength of an average year class..

Elaboration and special comment:

The fisheries that catch plaice in the Celtic Sea mainly involve vessels from France, Belgium, England and Wales, and to a lesser extent Ireland.

In the 1970s, the Divisions VIII,g plaice fishery was mainly carried out by Belgian beam trawlers and Belgian and UK otter trawlers. Effort in the UK and Belgian beam-trawl fleets increased in the late 1980s, but has since declined. Recently, many otter trawlers have been replaced by beam trawlers, which target sole. Landings gradually increased until 1989, then declined rapidly in 1991. The main fishery occurs in the spawning area off the north Cornish coast, at depths greater than 40 m, about 20 to 25 miles offshore. Although plaice are taken throughout the year, the larger landings occur during March after the peak of spawning, and again in September.

There is some evidence from tagging that plaice from the south and west coasts of Wales move southwards to join the adult population off the north Cornish coast during spawning.

The analytical age-based assessment was performed using landings, survey, and commercial CPUE data.

Source of information:

Report of the Working Group on the Assessment of Southern Shelf Demersal Stocks, July 2003 (ICES CM 2004/ACFM:03).

Yield and spawning biomass per Recruit**F-reference points:**

	Fish Mort Ages 3-6	Yield/R	SSB/R
Average last 3 years	0.519	0.251	0.470
F_{max}	0.282	0.257	0.840
$F_{0.1}$	0.115	0.230	1.745
F_{med}	0.500	0.251	0.487

Catch data (Tables 3.9.4.1-2):

Year	ICES Advice	Single stock exploitation boundaries	Predicted catch corresp. to advice	Predicted catch corresponding to single stock boundaries	Agreed TAC	Official landings	ACFM Landings
1987	TAC not to be restrictive on other species		-		1.8	2.19	1.90
1988	TAC not to be restrictive on other species		-		2.5	2.58	2.12
1989	TAC not to be restrictive on other species		-		2.5	2.22	2.15
1990	F likely to be F(88)		~1.9		1.9	1.83	2.08
1991	F likely to be F(89)		~1.7		1.9	1.36	1.50
1992	No long-term gains in increasing F		-		1.5	1.30	1.19
1993	No long-term gains in increasing F		-		1.4	0.98	1.11
1994	No long-term gains in increasing F		-		1.4	0.96	1.07
1995	No increase in F		1.29		1.4	0.98	1.03
1996	20% reduction in F		0.93		1.1	1.26	0.95
1997	20% reduction in F		1.10		1.1	1.15	1.22
1998	20% reduction in F		1.00		1.1	0.66	1.07
1999	35% reduction in F		0.67		0.9	0.72	0.97
2000	30% reduction in F		0.70		0.80	0.68	0.74
2001	40% reduction in F		0.60		0.76	1.12	0.72
2002	At least 35% reduction in F		0.68		0.68	0.63	0.63
2003	At least 40% reduction in F		<0.66		0.66		
2004	¹	F < 0.10 or recovery plan	¹	<0.21			

¹ Single stock boundary and the exploitation of this stock should be conducted in the context of mixed fisheries protecting stocks outside safe biological limits.
Weights in '000 t.

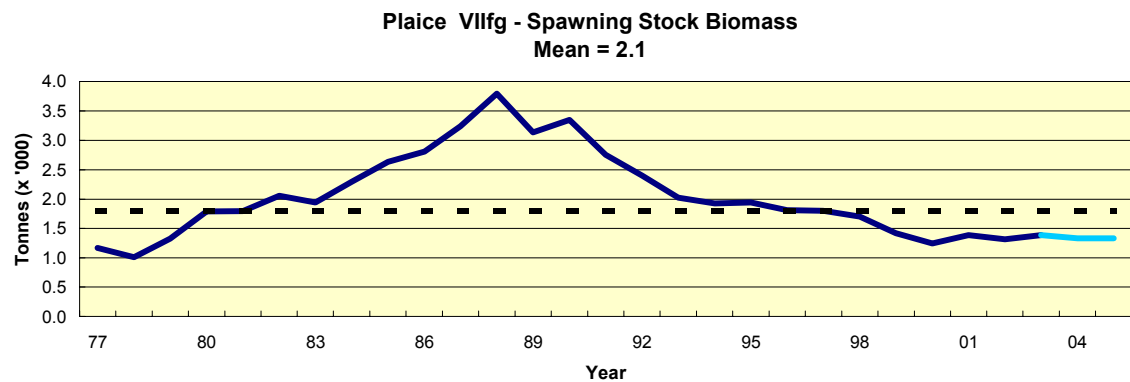
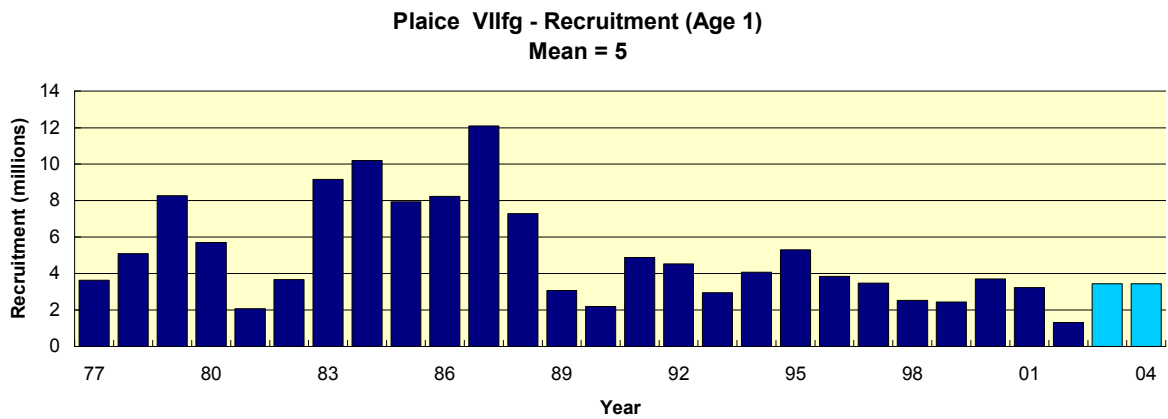
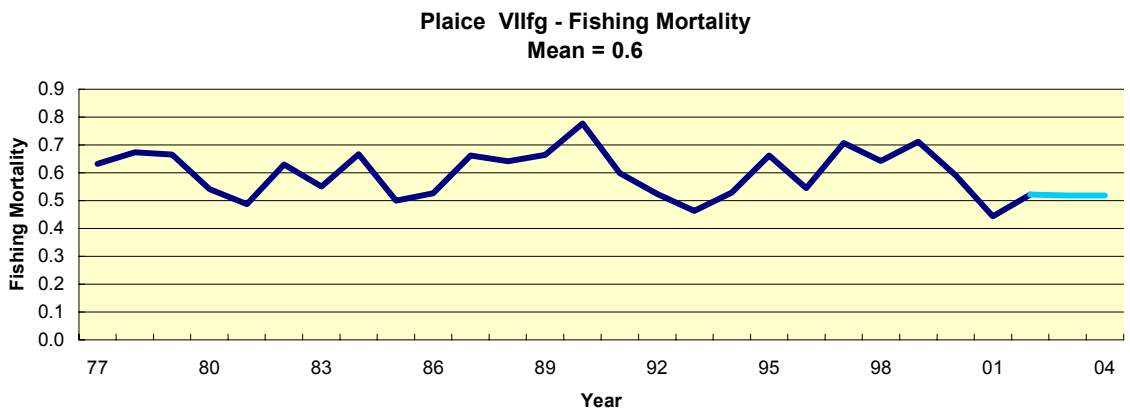
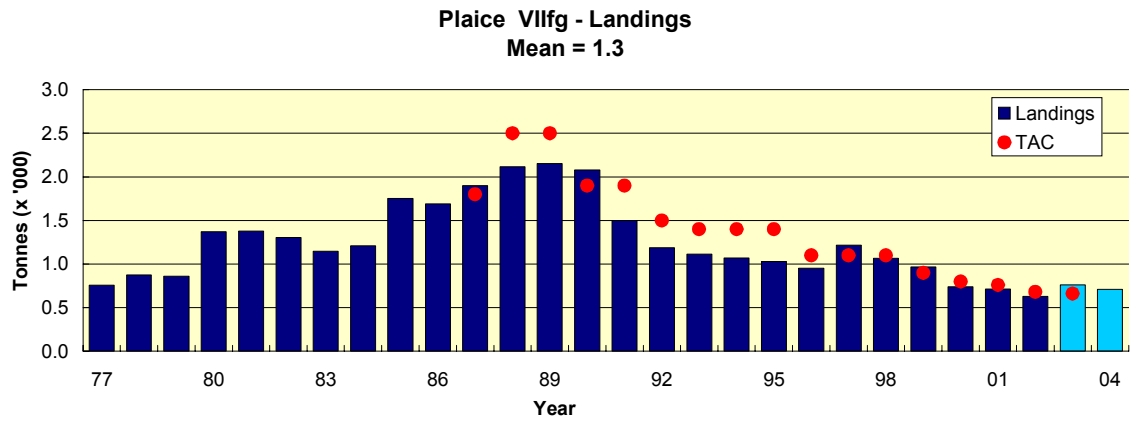
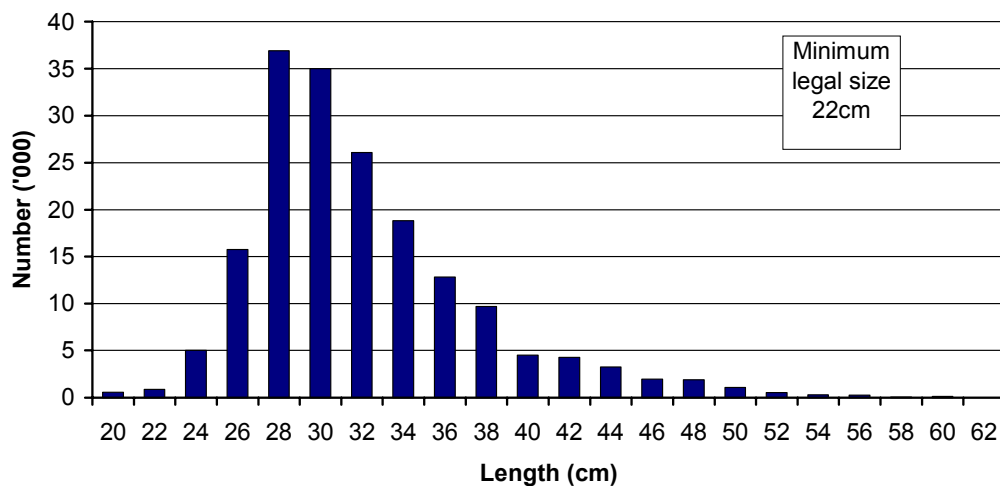


Table 3.9.4.2 Celtic Sea plaice (Divisions VII f and g).

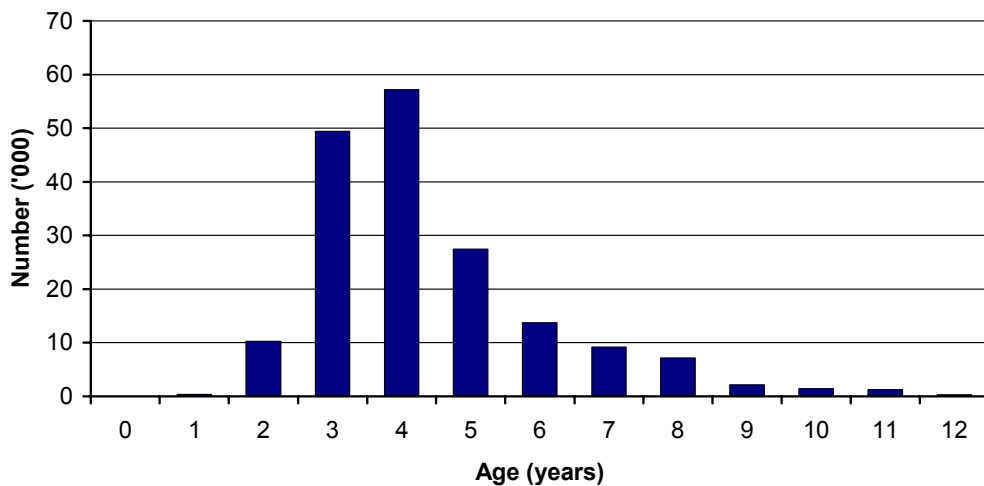
Year	Recruitment Age 1 thousands	SSB tonnes	Landings tonnes	Mean F Ages 3-6
1977	3633	1170	757	0.632
1978	5091	1010	875	0.673
1979	8264	1323	863	0.666
1980	5708	1789	1373	0.541
1981	2080	1793	1377	0.488
1982	3678	2055	1303	0.630
1983	9161	1942	1146	0.551
1984	10211	2298	1210	0.666
1985	7947	2635	1752	0.500
1986	8229	2809	1691	0.527
1987	12088	3237	1901	0.661
1988	7289	3792	2116	0.641
1989	3059	3133	2151	0.664
1990	2197	3347	2082	0.777
1991	4883	2749	1501	0.599
1992	4532	2398	1188	0.524
1993	2940	2024	1114	0.463
1994	4070	1927	1070	0.529
1995	5299	1936	1028	0.661
1996	3842	1808	952	0.545
1997	3477	1801	1217	0.707
1998	2529	1698	1067	0.642
1999	2445	1417	968	0.711
2000	3706	1246	739	0.591
2001	3229	1384	715	0.444
2002	1331	1311	630	0.522
2003	3436	1393	630	0.522
Average	4976	2053	1238	0.595

*GM(1989-2001) **Survey estimate

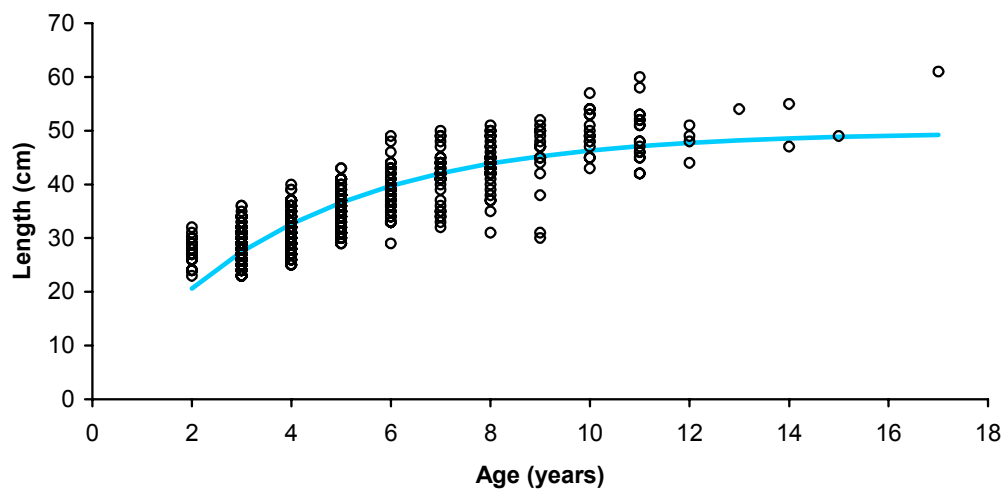
2002 Length Distribution: Irish Landings, Plaice in VIIg



2002 Age Distribution: Irish Landings, Plaice in VIIg



2002 Size at Age: Irish Sampling, Plaice in VIIg



Southwest of Ireland Plaice

(Divisions VIIh-k)

For latest information, see: <http://www.ices.dk>



Fisheries Science Services

FSS – SINGLE STOCK CONSIDERATIONS

(See Celtic Sea, West and Southwest of Ireland Overview for Mixed Fisheries Advice)

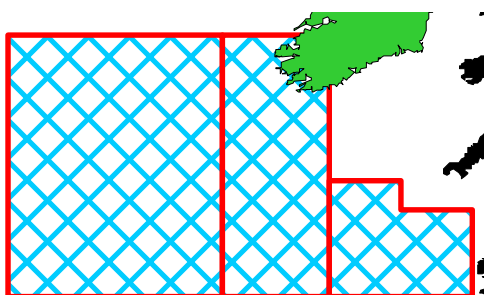
FSS consider that catches in 2004 should be no more than the recent average (1999-2001) of around 320 t, in order to avoid an expansion of the fishery until there is more information to facilitate an adequate assessment. This translates to an Irish quota of 140 t.

STATE OF THE STOCK

- The state of this stock is unknown
- The estimated total international landings of plaice in Divisions VIIh-k in 2002 were 325 t.

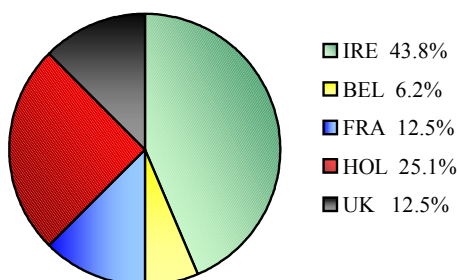
CURRENT MANAGEMENT

- The TAC area covers Divisions VIIh-k as does the assessment area.



Red Boxes-TAC/Management Areas Blue Shading- Assessment Area

- The 2003 TAC was 582 t with an associated Irish quota of 255 t.



- There are no explicit management objectives or plan for this stock. Ireland has an opportunity as the main participant in this fishery to propose a management strategy for this stock.

FSS – ECONOMIC COMMENTS

- The value of the 2002 Irish quota was €1.1m.
- The value of the 2002 Irish landings was €0.4m.
- Plaice is an important species particularly to smaller inshore trawlers in the southwest of Ireland.

ADDITIONAL INFORMATION

1. Irish estimated landings in 2002 were 156 t. This is almost identical to the 2001 (154 t) landings.
2. Mis-reporting may be a problem in this fishery.
3. Ireland, with 48% of the 2002 landings, dominates the fishery. Belgium, the UK and France take most of the remaining catch.
4. Plaice are mainly caught in mixed species otter trawl fisheries in inshore parts of VIIj by vessels from Dingle, Castletownbere, Union Hall, Baltimore and Schull. Otter trawls accounted for 95% of the landings in 2002.
5. Irish Sampling for this stock is supported through the EC funded sampling programme which is required under Data Collection Regulation 1543/2000 and 1639/2001. FSS sampling suggests that the stock is dominated by 3-4 year olds.
6. FSS have conducted an annual groundfish survey in this area since 1993.
7. The level of discards is not well quantified but FSS sampling has indicated that discarding does occur in this fishery.

ICES ADVICE

3.9.13

State of stock/exploitation:

The state of the stock in relation to biological reference points is not known. Landings have been declining and landings in 2001 – 2002 are the lowest in the time-series.

Management objectives:

No explicit management objectives have been established for this stock.

Precautionary Approach Reference points:

No precautionary reference points have been proposed for this stock.

Single Stock Exploitation Boundaries:

Catches in 2004 should be no more than the recent average (2000-2002) of around 320 t, in order to avoid an expansion of the fishery until there is more information to facilitate an adequate assessment.

Advice on the exploitation of this stock in 2004 is presented in the context of mixed fisheries and is found in Section 3.9.1.

Relevant factors to be considered in management:

Recent landings have been about 30% of the TAC. Plaice are taken as part of a mixed demersal fishery by otter trawlers. Management options proposed for plaice should also take into consideration other demersal fish species taken in the fishery.

No assessment was performed.

Comparison with previous assessment and advice:

A tentative assessment was carried out last year; this year the data were updated and screened, but no assessment was performed. ICES advised that catches in 2003 should be no more than the recent average (1998-2000).

Elaboration and special comment:

Due to the short time-series and the lack of independence between the catch-at-age data and available tuning data, it was not possible to carry out an acceptable assessment.

Plaice are predominantly caught within mixed species otter trawl fisheries in Division VIIj. These vessels target mainly hake, anglerfish, and megrim. Beam trawlers and seiners generally take a lesser catch of plaice. Ireland is the major participant in this fishery with around 60% of the international landings between 1993-2001.

Source of information:

Report of the Working Group on the Assessment of Southern Shelf Demersal Stocks, July 2003 (ICES CM 2004/ACFM:03).

Catch data (Table 3.9.13.1):

Year	ICES Advice	Single stock exploitation boundaries	Predicted catch corresp. to advice	Predicted catch corresponding to single stock boundaries	Agreed TAC	ACFM landings
1993	-		-		-	652
1994	-		-		-	578
1995	-		-		-	541
1996	-		-		-	431
1997	-		-		-	639
1998	-		-		-	439
1999	-		-		-	538
2000	-		-		-	367
2001	-		-		1215	276
2002	-		-		1080	325
2003	Reduce TAC to recent average (1998-2000)		450		582	
2004	¹	Reduce TAC to recent average (2000-2002)	¹	320		

¹ Single stock boundary and the exploitation of this stock should be conducted in the context of mixed fisheries protecting stocks outside safe biological limits
Weight in t.

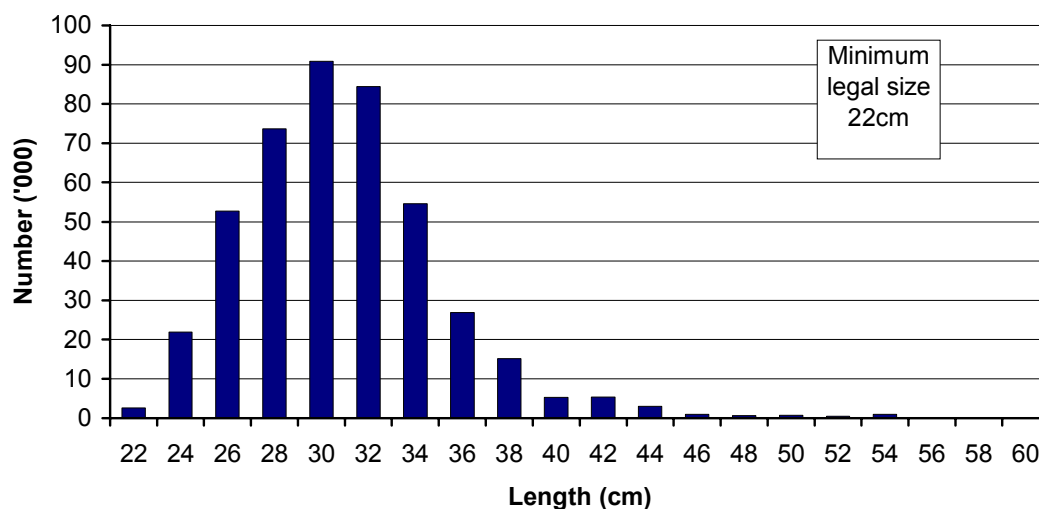
Table 4.7.1 **Plaice in Divisions VII h-k (Southwest Ireland).**
Nominal landings (t), 1993-2002, as officially reported to ICES.

Country	1996	1997	1998	1999	2000	2001	2002
Belgium	304	442	335	284	157	194	205
France	244	287	243 ^a	731 ^a	266	239 ^a	178 ^a
Ireland	388	422	420	414	276	205	n/a
Netherlands	52		13	1	2		
Spain					5	3	
UK (England & Wales)	191	199	133	111	105	99	84
UK (Scotland)	1				1		
Total	1180	1350	1144	1541	812	740	467
Unallocated	-749	-711	-705	-1003	-445	-464	-142
Figures used by working group	431	639	439	538	367	276	325

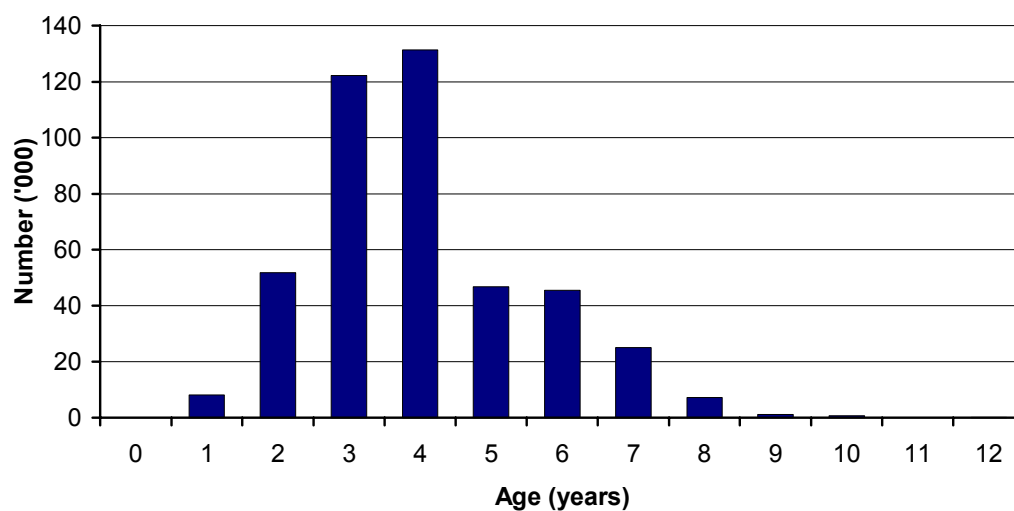
n/a: Not available

^a: Preliminary

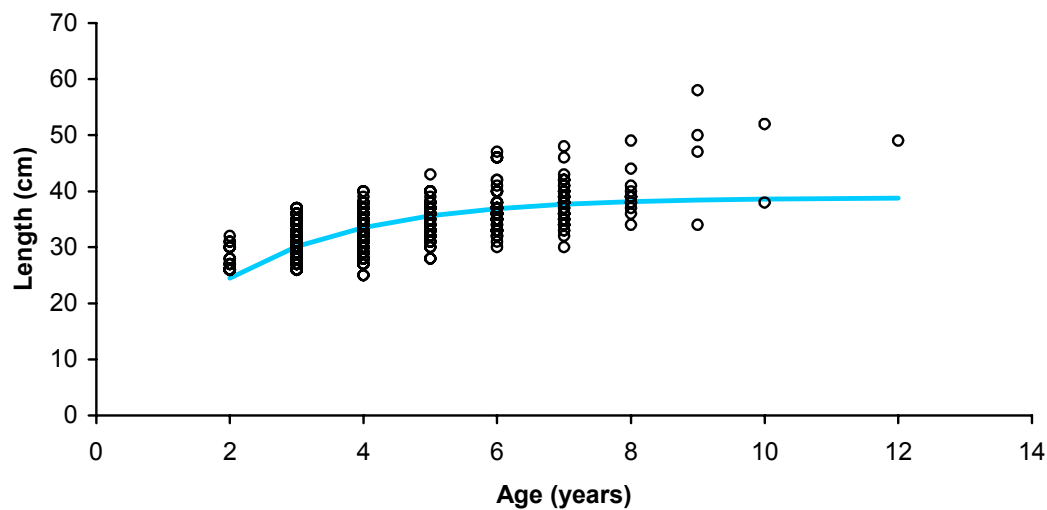
2002 Length Distribution: Irish Landings, Plaice in VIIj



2002 Age Distribution: Irish Landings, Plaice in VIIj



2002 Size at Age: Irish Sampling, Plaice in VIIj



West of Ireland Plaice

(Divisions VIIb,c)

For latest information, see: <http://www.ices.dk>



Fisheries Science Services

FSS – SINGLE STOCK CONSIDERATIONS

(See Celtic Sea, West and Southwest of Ireland Overview for Mixed Fisheries Advice)

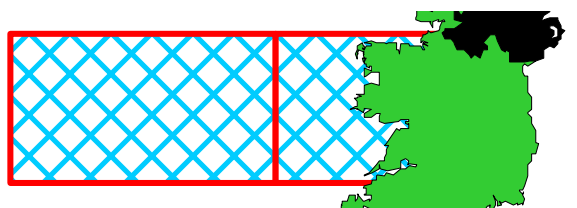
FSS considers that catches in 2004 should be no more than the recent average (1999-2001) of around 125 t, in order to avoid an expansion of the fishery until there is more information to facilitate an adequate assessment. This translates to a TAC of 125 t and an Irish quota of 100 t in 2004.

STATE OF THE STOCK

- The state of the stock is unknown.
- No assessment was carried out.
- The estimated international landings for 2002 were 69 t.

CURRENT MANAGEMENT

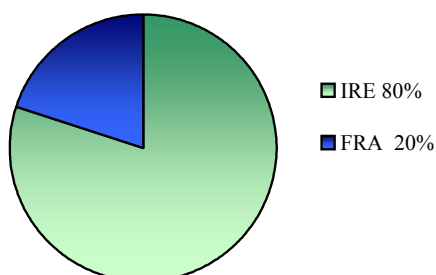
- The TAC area covers VIIb,c as does the assessment area.



Red Boxes-TAC/Management Areas

Blue Shading- Assessment Area

- The 2003 TAC was 160 t with an associated Irish quota of 128 t.
- There are no explicit management objectives or plan for this stock. Ireland has an opportunity as the main participant in fisheries in this area to develop and implement a management strategy for these fisheries.



FSS – ECONOMIC COMMENTS

- The value of the 2002 Irish landings was € 0.1m.

ADDITIONAL INFORMATION

1. ICES advice for this stock is based on the average of recent catches (2000 – 2002), however 2002 catches are incomplete and therefore FSS recommends that the range 1999 – 2001 be used, which is consistent with the advice given last year.
2. A tentative assessment was carried out on this stock. No short term or medium predictions were carried out due to the short time series of data available. Irish estimated landings in 2002 were 51 t. This is a 10% decrease from landings in 2001.
3. Misreporting is not considered to be a problem in this fishery.
4. On average, Ireland had 95% of total international landings between 1993-2001. This has fallen to approximately 75% in 2002.
5. The majority of the landings, are taken by otter trawls (92%) and Scottish seines (5%).
6. Irish Sampling for this stock is supported through the EC funded sampling programme, which is required under Data Collection Regulation 1543/2000 and 1639/2001. FSS sampling indicates that the stock is dominated by 3-5 year olds.
7. FSS have conducted an annual groundfish survey in this area since 1993.
8. The level of discards is not well quantified but FSS sampling has indicated that discarding does occur in this fishery.

ICES ADVICE 3.10.4

State of stock/exploitation:

The state of the stock in relation to biological reference points is not known. Landings have declined since 1996 to a historic low in 2002.

Management objectives:

No explicit management objectives have been established for this stock.

Precautionary Approach Reference Points:

No precautionary reference points have been proposed for this stock.

Single stock exploitation boundaries:

Catches in 2004 should be no more than the recent average (2000-2002) of around 90 t, in order to avoid an expansion of the fishery until there is more information to facilitate an adequate assessment.

Advice on the exploitation of this stock in 2004 is presented in the context of mixed fisheries and is found in Section 3.9.1.

Relevant factors to be considered in management:

Plaice are taken as part of a mixed demersal fishery by otter trawlers. Management options proposed for plaice should also take into consideration other demersal fish species and *Nephrops* taken in the VIIb,c fishery. No assessment was performed.

Comparison with previous assessment and advice:

A tentative assessment was attempted in 2002, but results

were considered unreliable. ICES advised that catches should be no more than the recent average.

Elaboration and special comment:

No assessment was performed this year. The concerns about the short time-series and lack of independence between catch-at-age and tuning data remain.

Ireland is the major participant in this fishery with around 90% of the international landings between 1993-2001. Plaice are normally caught in mixed species otter trawl fisheries in Division VIIb. These vessels mainly target other demersal fish species and *Nephrops*.

Source of information:

Report of the Working Group on the Assessment of Southern Shelf Demersal Stocks, July 2003 (ICES CM 2004/ACFM:03).

Catch data (Table 3.10.4.1):

Year	ICES Advice	Single stock exploitation boundaries	Predicted catch corresp. to advice	Predicted catch corresponding to single stock boundaries	Agreed TAC	ACFM landings
1993	-		-		-	197
1994	-		-		-	215
1995	-		-		-	315
1996	-		-		-	240
1997	-		-		-	213
1998	-		-		-	183
1999	-		-		-	172
2000	-		-		-	116
2001	-		-		240	87
2002	No advice		-		180	69
2003	Reduce TAC to recent landings		160		160	
2004	¹	Reduce TAC to recent av. landings (1998-2002)	¹	90		

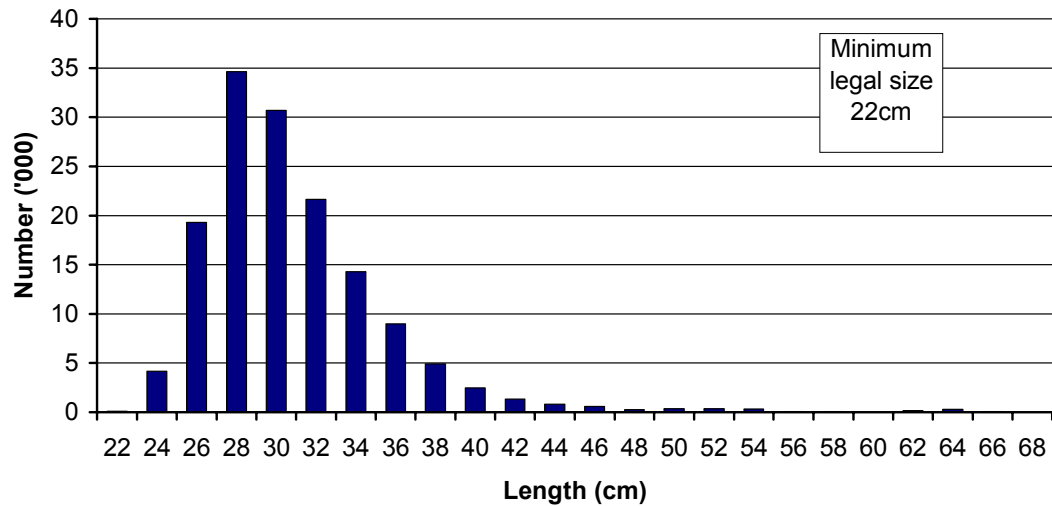
¹ Single stock boundary and the exploitation of this stock should be conducted in the context of mixed fisheries protecting stocks outside safe biological limits Weight in t.

Table 3.10.4.1 Nominal Landings (t) of Plaice in Divisions VIIb,c 1993-2002, as officially reported to ICES

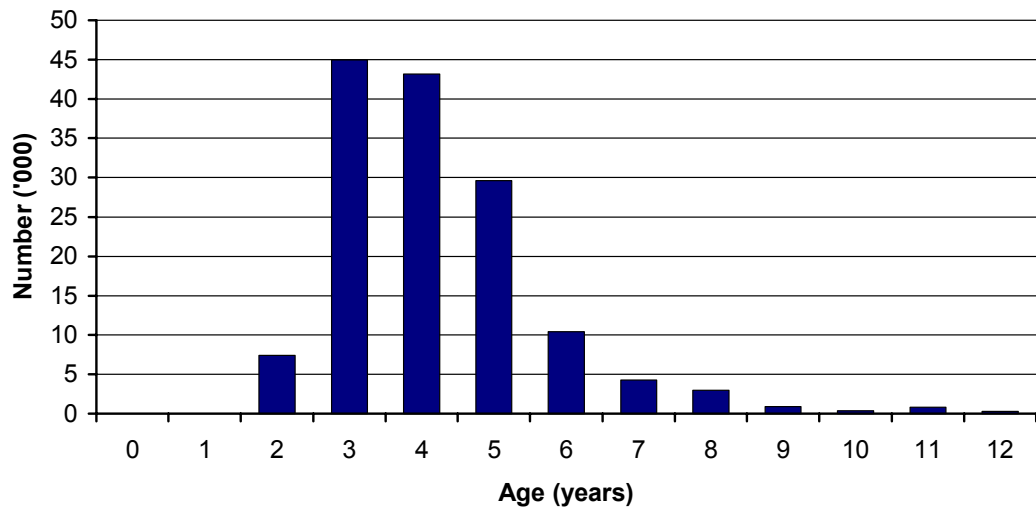
Country	1996	1997	1998	1999	2000	2001*	2002
France	1	3	-*	8*	31	8*	18*
Ireland	248	206	160	157	99	70	n/a
Spain	-	-	-	-	+	+	n/a
UK(Eng & Wales)	2	+	1	+	+	+	2
UK(Scotland)	+	+	+	2	+	-	-
Total	251	209	161	167	130	78	20
Unallocated	11	-4	-22	-5	14	-9	-49
Total figures as used by the WG	240	213	183	172	116	87	69

*Preliminary

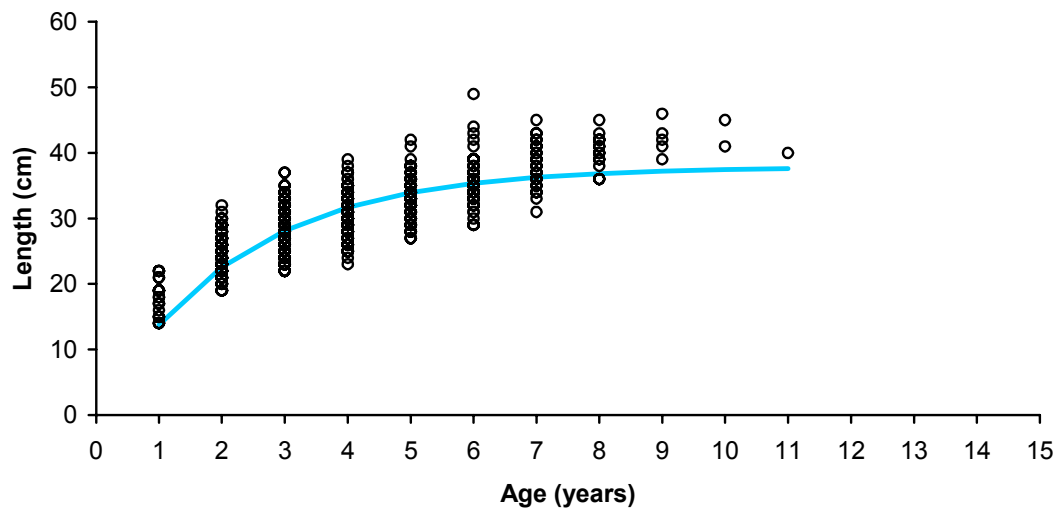
2002 Length Distribution: Irish Landings, Plaice in VIIb



2002 Age Distribution: Irish Landings, Plaice in VIIb



2002 Size at Age: Irish Sampling, Plaice in VIIb



Celtic Sea Sole

(Divisions VIIfg)

For latest information, see: <http://www.ices.dk>



Fisheries Science Services

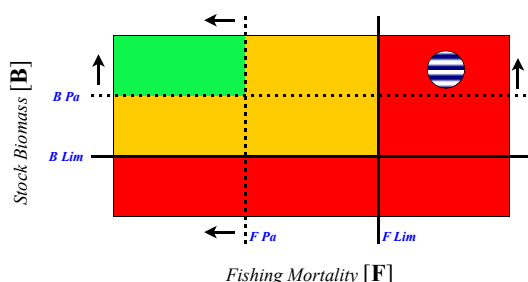
FSS – SINGLE STOCK CONSIDERATIONS

(See Celtic Sea, West and Southwest of Ireland Overview for Mixed Fisheries Advice)

FSS considers that fishing mortality should be reduced to below F_{pa} , in order to maintain SSB above B_{pa} in the short-term. This reduction of current F by 25% from *status quo* F corresponds to landings of less than 1000 t in 2004. This corresponds to a reduction of 25% from *status quo* F and translates to an Irish quota of 31 t in 2004.

STATE OF THE STOCK

State of the Stock in relation to the precautionary reference points (see page 18)

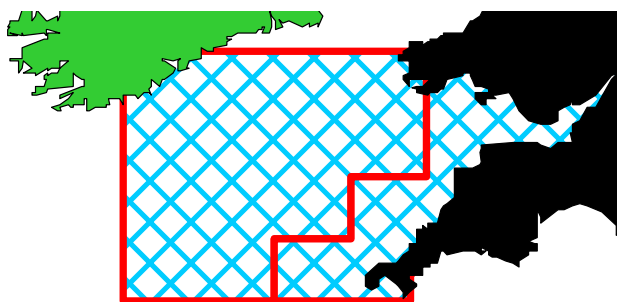


- There are concerns about the state of this stock which is harvested outside safe biological limits.
- The 2002 landings were 1,345 t (estimated), which is 15% higher than in 2001. Landings peaked in 1971 and have been increasing since 1998.
- Fishing mortality, estimated to be 0.59 in 2002, is too high for this stock and has been above the $F_{pa} = 0.37$ since 1983.
- Recruitment has fluctuated during the time series and the 1998 year-class is the biggest on record. This year class has maintained the stock above B_{pa} at high levels of fishing mortality. Recruitment in 2002 was estimated to be 5.7 million.
- SSB is estimated to have declined continuously from the highest value of 5900 t in 1971 to the lowest in the time series in 1998. In 2002, the exceptional year class 1998 contributes strongly to SSB and therefore SSB has increased sharply. SSB for 2002 is estimated to be 3,660 t, above $B_{pa} = 2,200$ t.

- SSB will decrease at current fishing mortality, with a low probability of falling below B_{pa} (2,200 t) in the medium term.

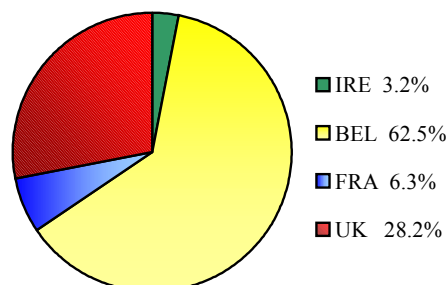
CURRENT MANAGEMENT

- The TAC area covers Divisions VIIfg as does the assessment area



Red Boxes-TAC/Management Areas Blue Shading-Assessment Area

- The 2003 TAC was 1,240 t with an associated Irish quota of 39 t.



- There are no explicit management objectives or plans for this stock. FSS advises that management objectives be established and that a management plan be developed and implemented for fisheries catching sole.

FSS – ECONOMIC COMMENTS

- The value of the 2002 Irish quota was about €0.4m.
- The value of the 2002 Irish landings was about €0.6m.
- The high market value of sole makes it an economically important component of the mixed demersal otter trawl fisheries in the Celtic Sea.

ADDITIONAL INFORMATION

1. Comparison of this years assessment with last years shows a substantial downward revision of F in recent years and an upward revision of SSB. The high re-

cruitment year class 1998 was again revised upward substantially for the second consecutive year.

2. Irish estimated landings in 2002 were 48 t. This is a 37% increase on 2001 landings (35 t).
3. The levels of misreporting in this stock are unknown, however, TACs have been restrictive and overshoot by some countries in recent years.
4. Irish Sampling for this stock is supported through the EC funded sampling programme which is required under Data Collection Regulation 1543/2000 and 1639/2001.
5. FSS commenced a groundfish survey in 1997 on *RV Celtic Voyager* in the Celtic Sea. This survey was discontinued in 2002 and will be replaced with a new groundfish survey on the *RV Celtic Explorer* in 2003.
6. The results of tagging experiments suggest that there is only limited movement of sole between VIIIf and elsewhere. There is an important spawning ground in VIIIf for sole.
7. In previous years, discard data were available from the Irish otter trawl fleet, indicating that discarding of sole is negligible. For the other fleets, no discard data were available to the WG. It is expected that discard data will be gathered in the future by Belgium and the UK.
8. Current fishing mortality is not sustainable in this stock. The only reason SSB is above B_{pa} is because of the single strong recruiting year class. Therefore fishing mortality will have to be reduced to F_{pa} to maintain this stock above B_{pa} in the medium term.
9. In the second quarter of 2003, area VIIIf,g was closed for all Belgian fisheries. This has not been taken into account for the predictions, as this measure is not be-

lieved to restrict the 2003 landings to the TAC. Firstly because the area will be open again in the third and fourth quarter, and in the past it has been proven that the uptake of the quota can be high during those quarters (especially in the fourth quarter). Secondly the TAC was overshoot with approx. 30% in 2002 although there was a closure for the Belgian fisheries for sole since the beginning of June in that year.

ICES ADVICE

3.9.5

State of stock/exploitation:

Based on the most recent estimates of fishing mortality and SSB, ICES classifies the stock as being harvested outside safe biological limits. Fishing mortality has increased since the late 1970s, exceeding F_{lim} since the early 1980s, and in 2002 was above F_{lim} . SSB has declined steadily since the early 1970s. SSB fell below B_{pa} in 1989, remained around that level until 1995, then fell again to a series low in 1998. SSB remained low until 2001, when the outstanding 1998 year class began to contribute and SSB increased above B_{pa} . SSB is forecast to remain around the 2002 level in 2003-2004. Recruitment has fluctuated with some peaks: the 1970, 1989 and 1999 year classes were strong, and the 1998 year class the strongest in the series.

Management objectives:

There are no explicit management objectives for this stock.

Precautionary Approach reference points (established in 1998):

ICES considers that:	ICES proposes that:
B_{lim} is not defined.	B_{pa} be set at 2 200 t. There is no evidence of reduced recruitment at the lowest biomass observed and B_{pa} can therefore be set equal to the lowest observed SSB.
F_{lim} is 0.52, the fishing mortality estimated to lead to potential stock collapse.	F_{pa} be set at 0.37. This F is considered to have a high probability of avoiding F_{lim} and maintaining SSB above B_{pa} in 10 years, taking into account the uncertainty of assessments.

Technical basis:

B_{lim} : Not defined	$B_{pa} : B_{loss}$
$F_{lim} : F_{loss}$	$F_{pa} : F_{lim} \times 0.72$; implies a less than 5% probability that ($SSB_{MT} < B_{pa}$)

Single Stock Exploitation Boundaries:

Fishing mortality should be reduced to below F_{pa} , in order to maintain SSB above B_{pa} in the short-term. This reduction of current F by 25% from *status quo* F corresponds to landings of less than 1000 t in 2004.

Advice on the exploitation of this stock in 2004 is presented in the context of mixed fisheries and is found in Section 3.9.1.

Relevant factors to be considered in management:

The assessment indicates a large 1998 year class, and SSB is expected to be maintained in the short-term. However, outstanding year classes have only been produced at long intervals and the stock increase is therefore likely to be temporary.

Sole is taken mainly in a directed beam trawl fishery with

plaice as a by-catch, and to a lesser extent in otter trawl fisheries. Management should take account of the mix of Celtic Sea sole and plaice.

Plaice and sole are exploited in the same fishery and the status of plaice is such that a reduction in fishing mortality of 80% is indicated. Therefore, the status of the plaice stock determines the management of the sole.

Catch forecast for 2004:

Basis: $F(2003) = F_{sq} = F(00-02) = 0.49$; Landings(2003) = 1.37; SSB(2004) = 3.36.

F(2004)	Basis	Landings (2004)	SSB (2005)
0.30	$0.6 * F_{sq}$	0.83	3.70
0.35	$0.7 * F_{sq}$	0.95	3.55
0.37	$F_{pa} = 0.75 * F_{sq}$	1.00	3.47
0.39	$0.8 * F_{sq}$	1.06	3.40
0.44	$0.9 * F_{sq}$	1.17	3.27
0.49	F_{sq}	1.27	3.13
0.54	$1.1 * F_{sq}$	1.37	3.01

Weights in '000 t.

Shaded scenarios considered inconsistent with the precautionary approach.

Medium- and long-term projections:

Assuming the current selection pattern, F_{max} is $0.50 * F_{sq}$.

Comparison with previous assessment and advice:

Results are very close to those of the previous assessment, although the estimate of F in 2001 has been revised downwards. The size of the 1998 year class was confirmed.

Elaboration and special comment:

The fisheries for sole in the Celtic Sea and Bristol Channel involve vessels from Belgium, taking two thirds, the UK one quarter, and France and Ireland taking minimal amounts of the total landings. The sole fishery is concentrated on the north Cornish coast off Trevose Head and around Lands End.

Sole are taken mainly in a beam trawl fishery that started in the early 1960s and, to a lesser extent, in the longer established otter trawl fisheries. In the 1970s, the fishery was mainly carried out by Belgian beam trawlers and Belgian and UK otter trawlers. The use of beam trawls (to target sole and plaice) increased during the mid-1970s, and the Belgian otter trawlers have now been almost entirely replaced by beam trawlers. Effort in the Belgium beam-trawl fleet increased in the late 1980s as vessels normally operating in the North Sea were attracted to the west by improved fishing opportunities. Beam trawling by UK vessels increased substantially from 1986, reaching a peak in 1990 and decreasing thereafter. In the Celtic Sea, the beam and otter trawl fleets also take plaice, rays, brill, turbot, and anglerfish.

The main spawning areas for sole in the Celtic Sea are in waters 40–75 m deep, off Trevose Head, and spawning usually takes place between February and April. Juvenile sole are found in relatively high abundance in depths up to 40 m, and adult sole (fish aged 3 plus) are generally found in deeper water. Spawning and nursery grounds are well defined.

The results of recent tagging experiments suggest that there is only limited movement of sole between the Bristol Channel and adjacent areas.

The age-based analytical assessment was performed using catch-per-unit effort data from two commercial fleets and one survey.

Source of information:

Report of the Working Group on the Assessment of Southern Shelf Demersal Stocks, July 2003 (ICES CM 2004/ACFM:03).

Yield and spawning biomass per recruit**F-reference points:**

	Fish Mort Ages 4-8	Yield/R	SSB/R
Average last 3 years	0.492	0.206	0.520
F_{max}	0.244	0.217	1.062
$F_{0.1}$	0.102	0.193	2.099
F_{med}	0.399	0.211	0.652

Catch data (Tables 3.9.5.1-2):

Year	ICES advice	Single stock exploitation boundaries	Predicted catch corresp. to advice	Predicted catch corresponding to single stock boundaries	Agreed TAC	ACFM Landings
1987	<i>Status quo</i> F; TAC		1.6		1.6	1.22
1988	F = F(pre-86); TAC		0.9		1.1	1.15
1989	F at F(81–85); TAC		1.0		1.0	0.99
1990	No increase in F		1.2		1.2	1.19
1991	No increase in F		1.1		1.2	1.11
1992	No long-term gains in increasing F		1.1		1.2	0.98
1993	No long-term gains in increasing F		-		1.1	0.93
1994	No long-term gains in increasing F		-		1.1	1.01
1995	No increase in F		1.0		1.1	1.16
1996	20% reduction in F		0.8		1.0	1.00
1997	20% reduction in F		0.8		0.9	0.93
1998	20% reduction in F		0.7		0.85	0.88
1999	Reduce F below F_{pa}		0.81		0.96	1.01
2000	Reduce F below F_{pa}		<1.16		1.16	1.09
2001	Reduce F below F_{pa}		< 0.81		1.02	1.17
2002	Reduce F below F_{pa}		< 1.00		1.07	1.35
2003	Reduce F below F_{pa}		< 1.24		1.24	
2004	¹	Reduce F below F_{pa}	¹	< 1.00		

¹ Single stock boundary and the exploitation of this stock should be conducted in the context of mixed fisheries protecting stocks outside safe biological limits. Weights in '000 t.

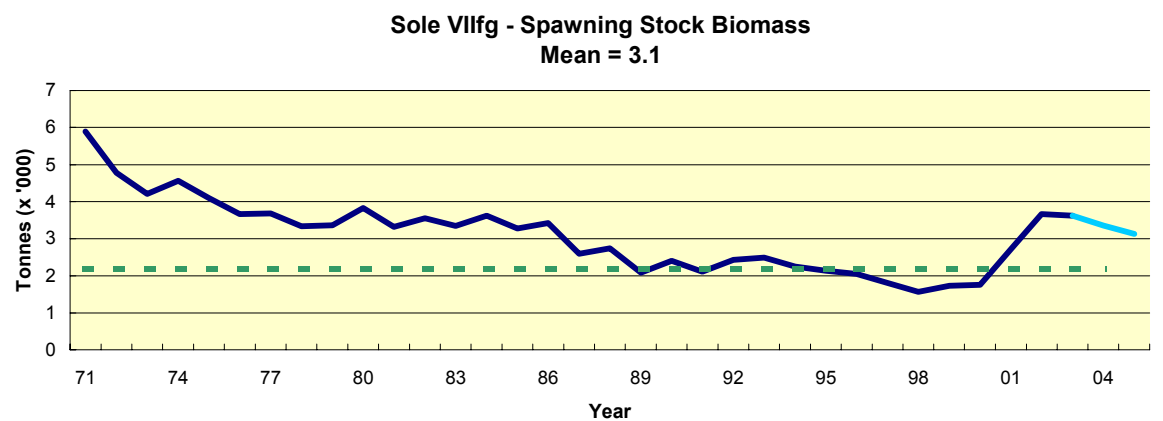
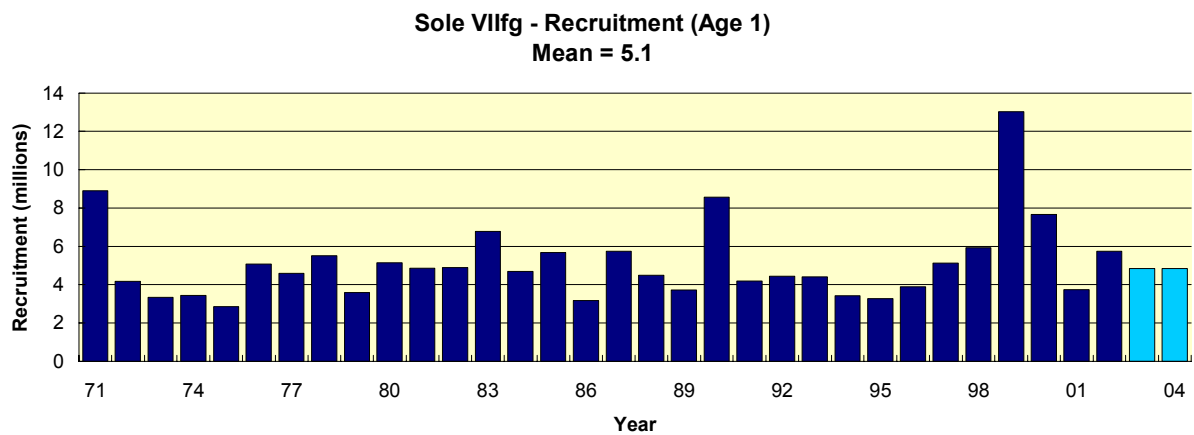
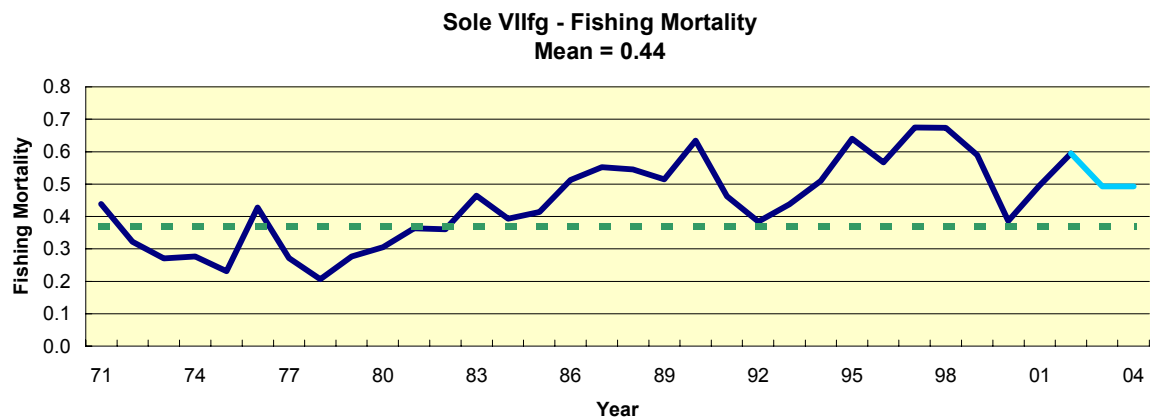
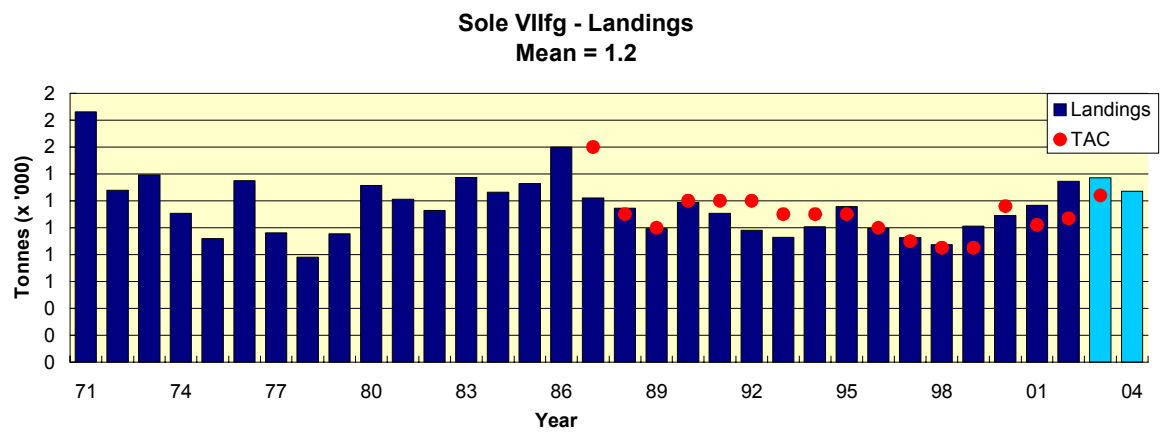


Table 3.9.5.1 Celtic Sea SOLE. Divisions VIIIf and VIIg. Official Nominal landings (t), 1986–2002 and data used by the Working Group.

Country	1986	1987	1988	1989	1990	1991	1992	1993	1994	1995	1996	1997	1998	1999	2000	2001	2002 ¹
Belgium	1039*	701*	705*	684*	716*	982*	543*	575*	619*	763*	695*	660*	675*	604	694	720	703
Denmark	2	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
France	146	117	110	87	130	80	141	108	90	88	102	99	98	61	74	77	66 ¹
Ireland	188*	9	72	18	40	32	45	51	37	20	19	28	42	51	29	35	n/a
UK(E. & W,NL)	611*	437	317	203	353	402	325	285	264	294	265	251	198	231	243	288	318
UK(Scotland)	-	-	-	-	0	0	6	11	8	-	0	0	-	0	-	-	+
Netherlands	3	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Total	1,989	1,264	1,204	992	1,239	1,496	1060	1030	1,018	1,165	1081	1038	1013	886	1,040	1,120	1,087
Unallocated	-389	-42	-58	-	50	-389	-79	-102	-9	-8	-86	-111	-138	65	51	48	258
Total used in assessment	1,600	1,222	1,146	992	1,189	1,107	981	928	1,009	1,157	995	927	875	1,012	1,091	1,168	1,345

¹Preliminary
* including VIIg-k

Table 3.9.5.2 Sole in Divisions VII f and g (Celtic Sea).

Year	Recruitment Age 1 thousands	SSB tonnes	Landings tonnes	Mean F Ages 4-8
1971	8910	5887	1861	0.4381
1972	4183	4780	1278	0.3217
1973	3345	4208	1391	0.2707
1974	3440	4563	1105	0.2767
1975	2853	4096	919	0.2314
1976	5086	3661	1350	0.4276
1977	4601	3686	961	0.2715
1978	5516	3335	780	0.2063
1979	3589	3360	954	0.2768
1980	5150	3826	1314	0.3051
1981	4848	3314	1212	0.3632
1982	4888	3550	1128	0.3612
1983	6781	3340	1373	0.4642
1984	4686	3624	1266	0.3929
1985	5682	3274	1328	0.4135
1986	3162	3424	1600	0.5129
1987	5738	2597	1222	0.5527
1988	4479	2736	1146	0.5452
1989	3728	2090	992	0.5141
1990	8569	2402	1189	0.6344
1991	4196	2114	1107	0.4623
1992	4446	2427	981	0.3845
1993	4414	2488	928	0.4376
1994	3412	2253	1009	0.5094
1995	3265	2140	1157	0.6404
1996	3887	2052	995	0.5665
1997	5130	1807	927	0.6745
1998	5918	1560	875	0.6732
1999	13016	1730	1012	0.5901
2000	7676	1754	1091	0.3868
2001	3740	2709	1168	0.4959
2002	5737	3662	1345	0.5944
2003	4840*	3624		
Average	5119	3093	1155	0.4436

*GM

Southwest of Ireland Sole

(Divisions VIIh-k)

For latest information, see: <http://www.ices.dk>



Fisheries Science Services

FSS – SINGLE STOCK CONSIDERATIONS

(See Celtic Sea, West and Southwest of Ireland Overview for Mixed Fisheries Advice)

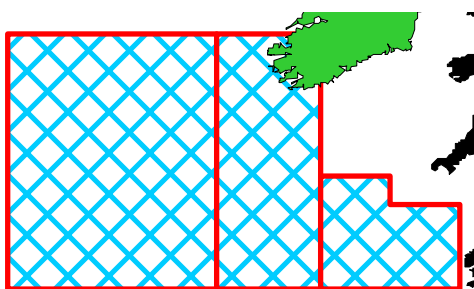
FSS considers that catches in 2004 should be no more than the recent average (1999-2001) of around 330 t, in order to avoid an expansion of the fishery until there is more information to facilitate an adequate assessment. This translates to an Irish quota of 149 t.

STATE OF THE STOCK

- The state of the stock is unknown.
- Due to the short time series of data and tuning fleets, the assessment is treated as preliminary.
- It is not appropriate to produce trends in biomass, fishing mortality and recruitment due to the short time series of data available.
- The estimated total international landings of sole in divisions VII h-k in 2002 was 421 t.

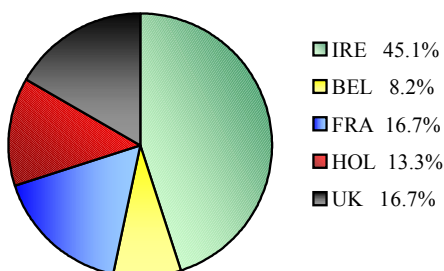
CURRENT MANAGEMENT

- The TAC area covers Divisions VIIh-k as does the assessment area.



Red Boxes-TAC/Management Area Blue Shading- Assessment Area

- The 2003 TAC was 390 t with an associated Irish quota of 176 t.



- There are no explicit management objectives or plan for this stock. Ireland has an opportunity as the main participant in fisheries in this area to develop and propose a management strategy for these fisheries.

FSS – ECONOMIC COMMENTS

- The value of the 2002 Irish quota was € 3.4 m.
- The value of the 2002 Irish landings was € 1.5 m.
- The high market value of sole makes it a very important fishery particularly to smaller inshore trawlers in the southwest of Ireland.

ADDITIONAL INFORMATION

1. A tentative assessment was carried out on this stock. No short term or medium predictions were carried out.
2. Irish estimated landings in 2002 were 129 t. A slight increase on the 110 t landed in 2001.
3. Mis-reporting is not considered as a problem in this stock.
4. In 2002, France, UK and Ireland each landed roughly a third of total international landings.
5. The majority of the Irish landings for this fishery are taken by otter trawls (87%) and beam trawls (11%). This is a very important target fishery for the inshore Irish otter trawl fleet, particularly in Dingle, Castletownbere, Baltimore and Union Hall.
6. Irish sampling for this stock is supported through the EC funded sampling programme which is required under Data Collection Regulation 1543/2000 and 1639/2001. FSS sampling indicates that the Irish landings in 2002, were dominated by 3 - 4 year olds or 24-29cm fish. Older age groups are well represented in the landings.
7. FSS have conducted an annual groundfish survey in this area since 1993 and this survey data was used in the assessment.
8. Irish commercial catch and effort data from logbooks were used to tune the assessment.
9. FSS data on discarding of sole in this area is limited but discarding is not considered to be a problem.

ICES ADVICE
3.9.174

State of stock/exploitation:

The state of the stock is not known in relation to biological reference points. Landings in 1999-2001 are the lowest in the short time-series.

Management objectives:

No explicit management objectives have been established for this stock.

Precautionary Approach Reference Points:

No precautionary reference points have been proposed for this stock.

Single Stock Exploitation Boundaries:

ICES recommends that catches in 2004 be no more than the recent average (2000-2002) of around 360 t, in order to avoid an expansion of the fishery until there is more information to facilitate an adequate assessment.

Advice on the exploitation of this stock in 2004 is presented in the context of mixed fisheries and is found in Section 3.9.1.

Relevant factors to be considered in management:

Recent landings have been about 50 - 65% of the TAC. Sole are taken as part of a mixed demersal fishery by otter trawlers. Management options proposed for sole should also take into consideration other demersal fish species taken in the fishery.

Catch forecast for 2003:

not available.

Medium- and long-term projections:

not available.

Comparison with previous assessment and advice:

The assessment is tentative and data-development. ICES advised catches no more than the recent average for this stock in 2002.

Elaboration and special comment:

ICES carried out a tentative assessment on the status of this stock. This assessment used catch-at-age data from 1993-2002 and commercial and survey tuning data from Ireland. The time-series of the data and tuning fleets were short, and the results given by the assessment were considered not sufficiently reliable to make conclusions about the current stock status.

Sole are predominantly caught within mixed species otter trawl fisheries in Division VIIj. These vessels target mainly hake, anglerfish, and megrim. Beam trawlers and seiners generally take a lesser catch of sole. Ireland is the major participant in this fishery with around 50% of the international landings between 1993-2001.

Source of information:

Report of the Working Group on the Assessment of Southern Shelf Demersal Stocks, July 2003 (ICES CM 2004/ACFM:03).

Catch data (Table 3.9.14.1):

Year	ICES Advice	Single stock exploitation boundaries	Predicted catch corresp. to advice	Predicted catch corresponding to single stock boundaries	Agreed TAC	ACFM landings
1993	No advice		-		-	495
1994	No advice		-		-	398
1995	No advice		-		-	403
1996	No advice		-		-	443
1997	No advice		-		-	564
1998	No advice		-		-	423
1999	No advice		-		-	327
2000	No advice		-		-	327
2001	No advice		-		650	325
2002	No advice		-		650	421
2003	Reduce TAC to recent landings		330		390	
2004	¹	Reduce TAC to recent average (2000-2002)	¹	360		

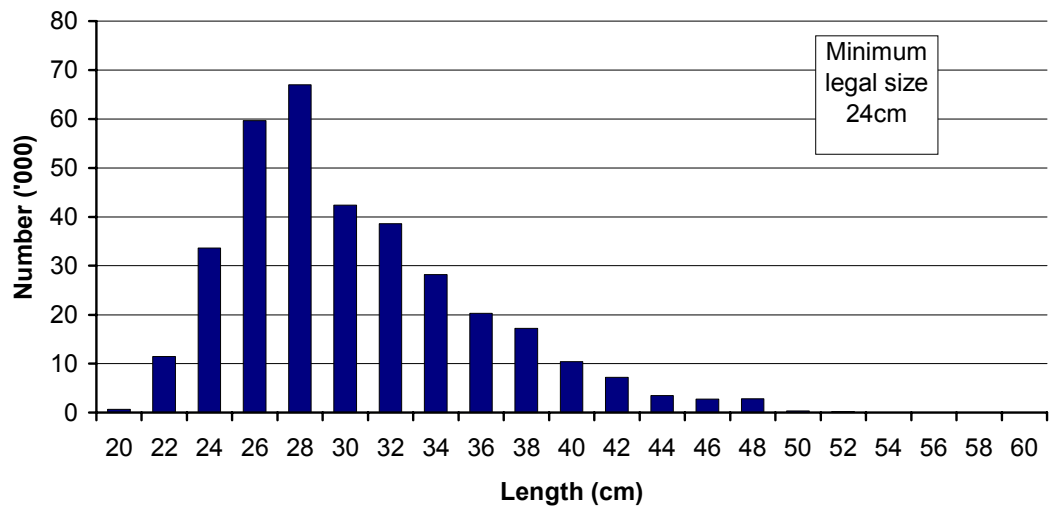
¹ Single stock boundary and the exploitation of this stock should be conducted in the context of mixed fisheries protecting stocks outside safe biological limits
Weight in t.

Table 3.9.14.1 Sole in Divisions VII h-k (Southwest Ireland).
Nominal landings (t), 1996-2002, as officially reported to ICES.

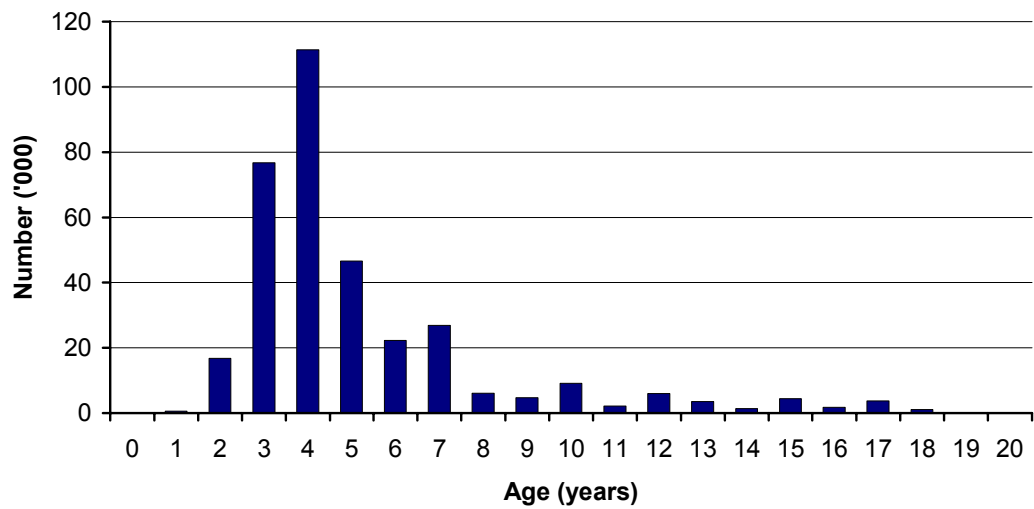
Country	1996	1997	1998	1999	2000	2001	2002
Belgium	375	368	346	101	8	13	154
France	50	58	74*	77*	78	97*	107*
Ireland	183	203	221	207	111	125	n/a
Netherlands	70		7	1	10		
UK (England & Wales)	148	113	111	97	95	111	124
Total	826	742	759	483	302	346	385
Unallocated	-383	-178	-336	-156	25	-21	36
Total figures used by Working Group	443	564	423	327	327	325	421

*Preliminary

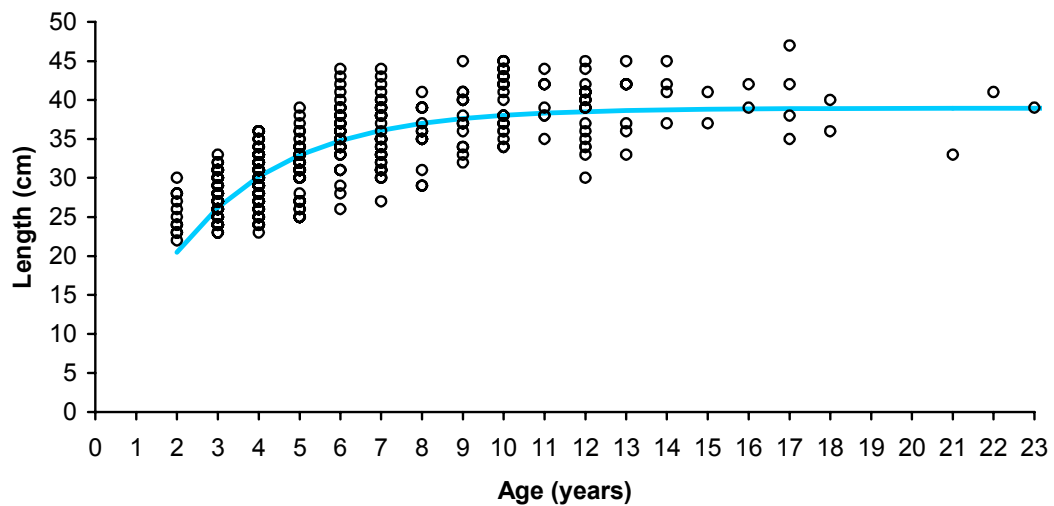
2002 Length Distribution: Irish Landings, Sole in VIIj



2002 Age Distribution: Irish Landings, Sole in VIIj



2002 Size at Age: Irish Sampling, Sole in VIIj



West of Ireland Sole

(Divisions VIIb,c)

For latest information, see: <http://www.ices.dk>



Fisheries Science Services

FSS – SINGLE STOCK CONSIDERATIONS

(See Celtic Sea, West and Southwest of Ireland Overview for Mixed Fisheries Advice)

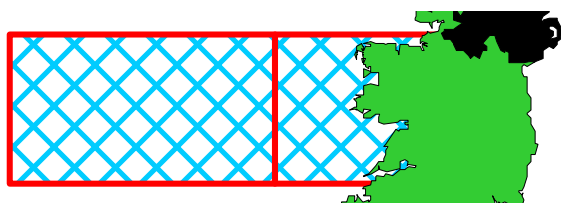
FSS considers that catches in 2004 should be no more than the recent average (1999-2001) of around 67 t. This translates to an Irish quota of 55 t in 2004.

STATE OF THE STOCK

- The state of the stock is unknown.
- The estimated total landings for 2002 were 61 t.

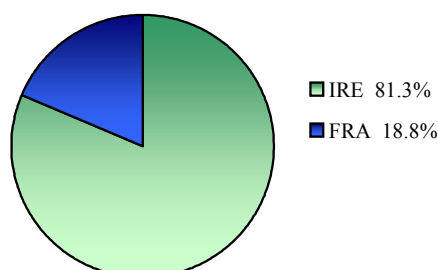
CURRENT MANAGEMENT

- The TAC area covers Divisions VIIb,c as does the assessment area.



Red Boxes-TAC/Management Areas Blue Shading-Assessment Area

- The 2003 TAC was 80 t with an associated Irish quota of 65 t.



- There are no explicit management objectives or plan for this stock. Ireland has an opportunity as the main participant in fisheries in this area to develop a management strategy for these fisheries.

FSS – ECONOMIC COMMENTS

- The value of the 2002 Irish landings was € 0.6 m.

ADDITIONAL INFORMATION

- Irish estimated landings in 2002 were 51 t.
- Misreporting is not perceived to be a problem in this fishery.
- On average, Ireland had 95% of total international landings between 1993-2001. This figure is 84% in 2002.
- Sole are caught in mixed species otter trawl fisheries (accounting for 92% of the landings in 2002) mainly in inshore areas of VIIb.
- Irish Sampling for this stock is supported through the EC funded sampling programme, which is required under Data Collection Regulation 1543/2000 and 1639/2001. FSS sampling indicates that the Irish landings were mainly comprised of 3 to 5 year old fish (70% of the landings). Older age groups are also well represented in the landings.
- FSS data on discarding of sole in this area is limited but discarding is not considered to be a problem.
- FSS has conducted an annual groundfish survey in this area since 1993.

ICES ADVICE 3.10.5

State of stock/exploitation:

The state of the stock in relation to biological reference points is not known. Landings have been relatively stable in recent years.

Management objectives:

No explicit management objectives have been established for this stock.

Precautionary Approach Reference Points:

No precautionary reference points have been proposed for this stock.

Single Stock Exploitation Boundaries:

Catches in 2004 should be no more than the recent average (2000-2002) of around 65 t, in order to avoid an expansion of the fishery until there is more information to facilitate an adequate assessment.

Advice on the exploitation of this stock in 2004 is presented in the context of mixed fisheries and is found in Section 3.9.1.

Relevant factors to be considered in management:

Sole are taken as part of a mixed demersal fishery by otter trawlers. Management options proposed for sole should also take into consideration other demersal fish species and *Nephrops* taken in the VIIb, c fishery.

No assessment was performed.

Comparison with previous assessment and advice:

A tentative assessment was performed on this stock in 2002, but this year the data were updated and quality checked only. Last year ICES advised that catches should be no more than recent average.

Elaboration and special comment:

No assessment was performed on this stock, due to the short time-series and lack of independence between the catch-at-age data and available tuning data.

Ireland is the major participant in this fishery with 96% of the international landings between 1993-2001. Sole are normally caught in a mixed species otter trawl fisheries in Division VIIb. These vessels mainly target other demersal fish species and *Nephrops*.

Source of information:

Report of the Working Group on the Assessment of Southern Shelf Demersal Stocks, July 2003 (ICES CM 2004/ACFM:03).

Catch data (Table 3.10.5.1):

Year	ICES Advice	Single stock exploitation boundaries	Predicted catch corresp. to advice	Predicted catch corresponding to single stock boundaries	Agreed TAC	ACFM landings
1993	-		-		-	60
1994	-		-		-	70
1995	-		-		-	59
1996	-		-		-	57
1997	-		-		-	55
1998	-		-		-	66
1999	-		-		-	72
2000	-		-		-	68
2001	-		-		80	60
2002	No advice		-		80	61
2003	Reduce TAC to recent landings		65		80	
2004	¹	Reduce TAC to recent landings (1998-2002)	¹	65		

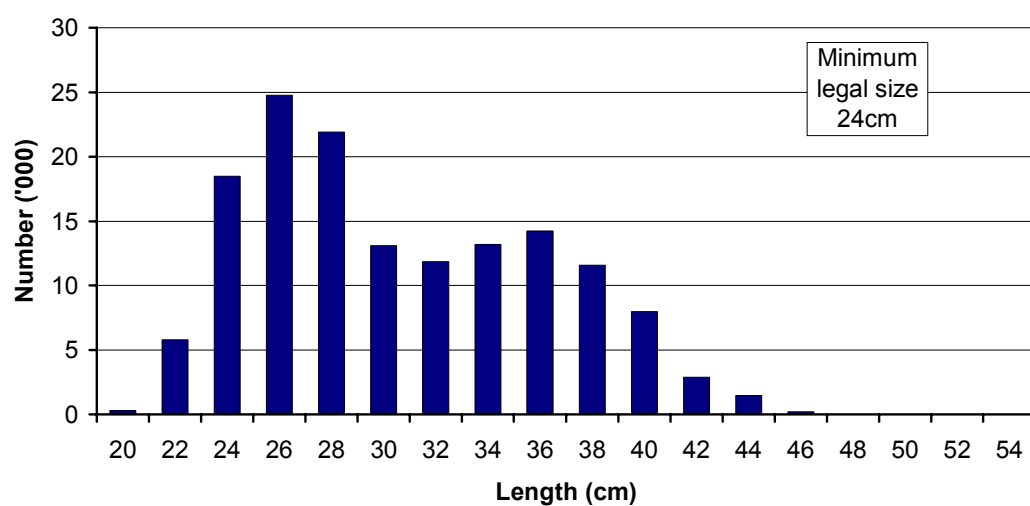
¹ Single stock boundary and the exploitation of this stock should be conducted in the context of mixed fisheries protecting stocks outside safe biological limits
Weight in t.

Table 3.10.5.1 Nominal Landings (t) of Sole in Divisions VIIb,c 1993-2002, as officially reported to ICES.

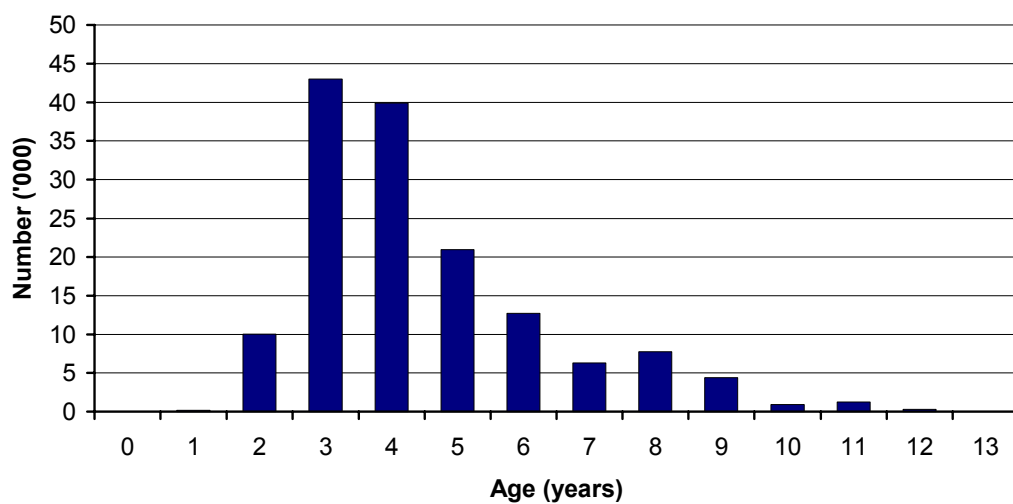
Country	1993	1994	1995	1996	1997	1998	1999	2000	2001	2002
France	1	1	2	2	3		2*	12	8	10*
Ireland	59	60	59	52	51	49	68	65	53	n/a
UK(E/W/Ni)	+	+	+	+	1	+		+		
Unallocated										
Total	60	61	61	54	55	49	70	75	45	
Unallocated		9	-2	3		17	2	-7	15	
Total figures used by the working group	60	70	59	57	55	66	72	68	60	61

*Preliminary

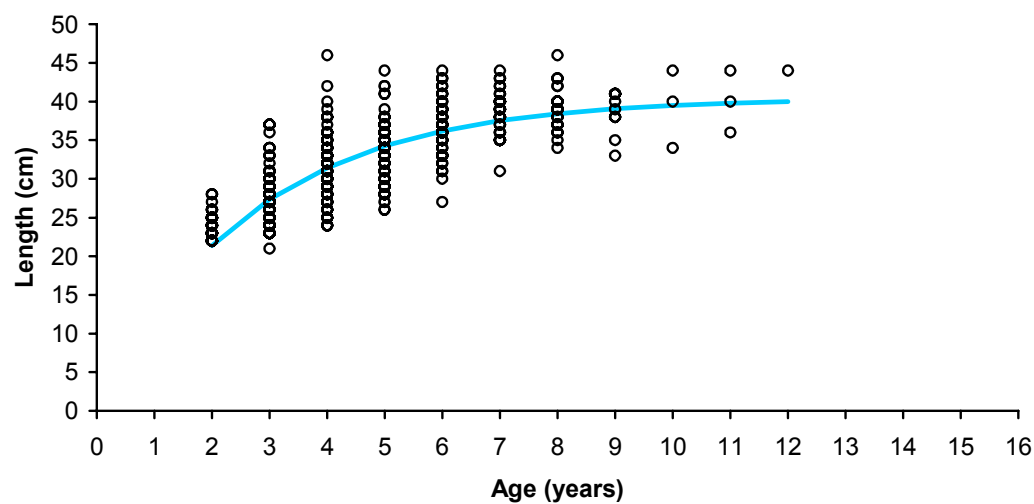
2002 Length Distribution: Irish Landings, Sole in VIIb



2002 Age Distribution: Irish Landings, Sole in VIIb



2002 Size at Age: Irish Sampling, Sole in VIIb



West of Ireland and inshore south of Ireland *Nephrops*

(WG - MA L = Divisions VIIb,c,j,k, VIIg (Rectangles 31E1, 32E1, 32 E2)
and VIIa (Rectangles 33E2 and 33E3))

For latest information, see: <http://www.ices.dk>



Fisheries Science Services

FSS – SINGLE STOCK CONSIDERATIONS

(See Celtic Sea, West and Southwest of Ireland Overview for Mixed Fisheries Advice)

ICES considers the stock in FU 16 to be overexploited. Stocks in FU 17, FU 18, and FU 19 in this Management Area are considered to be exploited at sustainable levels.

FSS recognise that other stocks that are outside safe biological limits are caught in *Nephrops* fisheries. FSS point out that an industry initiated programmes aimed at reducing catches of Hake, Cod (VIIe-k) and Plaice (VIIfg) and Sole (VIIe & VIIa,b) should be considered in the management of Celtic Sea, West of Ireland and Biscay *Nephrops* fisheries. Industry initiated programmes should be encouraged but must include a high rate of independent observer coverage or other totally transparent methods for ensuring that their catches of species outside safe biological limits are fully and credibly reported.

FSS advise that the catches in 2004-2005 in FU 16 should be constrained to the recent low average of 2000-2002, i.e. 1,100 t. In other FUs of the Management Area L the catches should not be allowed to exceed the average of 1995-2002, i.e. 2,200 t. The combined catches should thus not exceed 3,300 t. This translates to a 2003 TAC of 17,450 t and associated Irish quota of 6,436 t for Sub-area VII (see Table). However, the mixed fisheries advice given for mixed

Nephrops fisheries in the Celtic Sea and particularly in relation to stocks outside safe biological limits will determine the TAC for *Nephrops*.

FSS point out that the current management system where a TAC is applied to Sub-area VII may lead to unbalanced exploitation of *Nephrops* stocks and may also hinder management of *Nephrops* fisheries in a mixed fisheries context. FSS considers that individual *Nephrops* stocks should be managed and effort be controlled on a more appropriate geographical scale i.e. the Functional Unit level. In this Management Area catches and effort should be strictly limited to afford maximum possible protection to the vulnerable FU 16 stock.

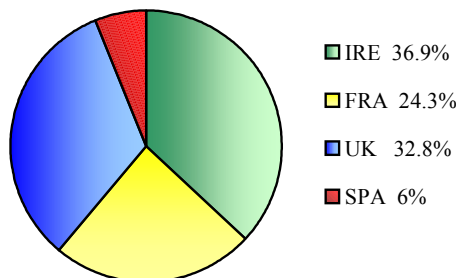
STATE OF THE STOCK

- The status of *Nephrops* stocks in this area are unknown.
- The recent decline in *Nephrops* landings and LPUE from FU 16 to the lowest in the time series in 2002 is a cause of concern. Preliminary analytical assessments indicated declining trends in recruitment and SSB and high fishing mortalities in recent years.
- The *Nephrops* stock in FU 17 is thought to be exploited at sustainable levels with recent landings around 1,000 t and stable LPUE trends. A preliminary analytical assessment for males indicates stable SSB and recruitment at relatively high recent fishing mortality.
- The status of the *Nephrops* stock in FU 19 is highly uncertain though landings and LPUE have increased substantially in 2002.
- Reference points for stocks in this area have not been defined.

Management Area	Functional Units	Landings advice	Basis
WG-MA J	14, 15	9,550	Average landings 1995-1999
WG-MA L	16, 17, 18, 19	3,300	Landings for FU 16 constrained to recent low (2000-2002 = 1,100 t) Average Landing 1995-2002 for other FUs = 2,200 t
WG-MA M	20-22	4,600	Average landings 1993-2002
Sub-Area VII	14 to 22	17,450	
Irish Quota 2004		6,436	37% of VII TAC

CURRENT MANAGEMENT

- The TAC area comprises all of ICES Sub-area VII, whereas the WG-MA L is Division VIIb,c,j,k and inshore rectangles south of Ireland (31E1, 32E1, 32E2, 33E2, 33E3).
- The WG-MA L contains two main fisheries on the Porcupine Bank (FU 16) and in outer Galway Bay, off the Aran Islands (FU 17). The WG-MA L also includes very small inshore fisheries to the north (FU 18) and numerous small-scattered inshore fisheries off the south-west and south coasts (FU 19).
- The 2003 agreed TAC for all of Sub-area VII was 17,790 t, of which Ireland's share was 6,561 t.



- There are no explicit management objectives or a management plan for this stock. FSS recommend that management objectives be established and that a management plan be developed and implemented for fisheries catching *Nephrops*.
- Management of *Nephrops* fisheries in this area needs to be considered in the context of mixed fisheries.
- The following TCMs are in place for *Nephrops* in VII (excluding VIIa) after EC 850/98: *Minimum Landing Sizes (MLS)*; total length >85 mm, carapace length >25 mm, tail length >46 mm. *Mesh Size Restrictions*; Towed gears targeting *Nephrops* having at least 35% by weight of this species on board will require 70 mm diamond mesh plus an 80 mm square mesh panel as a minimum or having at least 30% by weight of *Nephrops* on board will require 80 mm diamond mesh.

FSS – ECONOMIC COMMENTS

- The value of the 2002 Irish quota in Sub-area VII was €25.5 m.
- The value of the 2002 Irish landings from MA L was €10.5m and from VII was €26.6m.
- *Nephrops* are a very important fishery in this area particularly to vessels operating out of Rossaveal, Dingle, Union Hall and other south and east coast ports.

ADDITIONAL INFORMATION

1. ICES attempt analytical assessments for these stocks on a biannual basis a new assessment was carried out in 2003. These preliminary assessments are hampered by poor quality sampling data or by a short time series of sampling data and are considered highly uncertain. The advice is based on average landings rather than forecasted landings from these analytical assessments.

Multiple lines of evidence (CPUE trends, mean size, assessment) all suggest that the FU 16 stock has declined substantially and is now at very low levels. The FU17 stock remains in a healthy state and recent catch levels are probably sustainable. The status of the FU 19 stock is unknown the many discrete populations present sampling problems and in fact may represent multiple stockettes that should be sampled and assessed independently.

2. The provisional 2002 international landings were 3,982 t, with 1,282 t in FU16, 1,154 t in FU17, 14 t in FU18, 1,288 t in FU19 and 243 t in non-FU rectangles.
3. The provisional Irish landings in 2002 were 2,955 t and increase on the 2001 landings of 2,090 t and equal to the highest in the time series in 1998 (2,955 t).
4. There is no information on misreporting in this stock.
5. Landings are dominated by Ireland with between 60-75% of the landings in recent years. France, Spain and the UK caught 13%, 9% and 4% of the 2002 landings respectively.
6. The Irish fishery consists of otter trawl vessel and increasingly in recent years twin-rig vessels. Vessels from Rossaveal, Dingle, Union Hall, Dunmore East and Kinsale mainly exploit the fishery.
7. Irish sampling of this stock is supported through the EC funded sampling programme that is required under Data Collection Regulations 1543/2000 and 1639/2001. Historical biological data for these stocks are limited.
8. *Nephrops* directed underwater television surveys were successfully carried out in FU 17 during 2002 and 2003. This and future surveys will provide the first fisheries independent index of stock size and will be used to calibrate future stock assessments. Fishery independent information on stock size and *Nephrops* distribution from underwater television surveys should be developed for other FUs in MA L.
9. Substantial discarding of small *Nephrops* occurs in some fisheries in this MA. Recent discard estimates for FU 17 indicate that discards can be up to 25% by number and 17% by weight.
10. There are significant whitefish by-catches taken in the *Nephrops* fishery in VII.
11. Ireland dominates the landings in these fisheries some of which are within the 12-mile zone. There is an opportunity for Ireland to develop long-term management plans for these stocks.
12. FU 16 has been expanded this year to include adjacent statistical rectangles with significant catches of *Nephrops*.

ICES ADVICE

3.15.2k

There are four Functional Units in this Management Area: a) Porcupine Bank (FU 16), b) Aran Grounds (FU 17), c) Ireland NW coast (FU 18), and d) Ireland SW and SE coast (FU 19).

State of stock/exploitation:

The stock in FU 16 is considered to be overexploited. Stocks in FU 17, FU 18, and FU 19 in this Management Area are considered to be exploited at sustainable levels.

- a) Porcupine Bank FU 16: Both landings and LPUEs for all fleets show downward trends and there are indications of decreasing effort in some fisheries. Landings in 2000 were the lowest in the time-series. LPUEs for all fleets reached historic lows in 2000. Some declines in effort are apparent, but this does not appear to have resulted in favourable changes in LPUE.
- b) Aran Grounds FU 17: This stock is considered to be exploited at sustainable levels. Landings in recent years have been around 1000 t. The LPUEs are relatively stable, although the time-series is very short. Length-based Y/R analyses indicate that the current F is above F_{\max} in both males and females.
- c+d) Ireland coastal stocks FU 18, FU 19 and other statistical rectangles: There are only landings, LPUE, and effort data for these stocks. Landings from FU 19 have increased substantially in 2002. Although the time-series of LPUE data is short, recent LPUEs are the highest in the time-series and more than double the 1999 LPUE.

Management objectives:

There are no management objectives set for this fishery.

Single Stock Exploitation Boundaries:

Catches in 2004-2005 in FU 16 should be constrained to the recent low average of 2000-2002, i.e. 1 100 t. In other FUs of the Management Area L the catches should not be allowed to exceed the average of 1995-2002, i.e. 2 200 t. The combined catches should thus not exceed 3 300 t.

Advice on the exploitation of this stock in 2004 is presented in the context of mixed fisheries and is found in section 3.9.1.

Relevant factors to be considered in management:

This Management Area is within a much larger TAC area (Subarea VII), and the single TAC set for the whole Subarea will not result in balanced exploitation. In an attempt to resolve this problem, ICES suggests a separate *Nephrops* TAC for Division VIIa, as is done for several finfish stocks (such as cod, whiting, plaice, and sole). This is particularly important in the current context where the stock in FU 16 appears to be overexploited and other stocks within the TAC area are fully exploited and relatively stable.

Hake are taken in this fishery. It should be noted that there is a requirement to rebuild the northern hake stock.

Comparison with previous assessment and advice:

The proposed Management Area TAC represents a net decrease of 1 140 t on the advice given in 2001. There has been a change in the perception of the state of exploitation in FU 16. Following confirmation of the low landings in 2000, this stock is now considered to be overexploited. Additional statistical rectangles have been added to the definition of stock area for FU 16 after it was shown in 2002 that there have been significant landings within Division VIIb,c,j,k taken outside the defined stock areas.

Elaboration and special comments:

Landings from the Porcupine Bank (FU 16) are mainly by France, Ireland, Spain, and the UK. Landings have declined significantly since the start of the time-series. Landings from the other FUs in this MA are dominated by Ireland. Landings from FU 17 have generally increased since the start of the time-series but have fluctuated in recent years around 1 000 t. Landings from FU 19 have fluctuated considerably with very low landings in 1994 and very high landings in 2002. These fluctuations appear to be related to the *Nephrops*-directed effort that varies, depending on the availability of other species. Landings from other statistical rectangles have been around 400 t. At the 2002 WG meeting the landings outside existing FUs were investigated. FU 16 was expanded to include adjacent rectangles with considerable catches and no new FUs were defined.

CPUE and LPUE data are available for most FUs, but the extent of the data series is often limited. There are concerns about changes in efficiency and variations in the targeting of *Nephrops* by fleets in this MA. The quality of historical sampling data is poor with only landings LFDs available for most stocks with patchy and incomplete seasonal coverage. The required sampling under the EU data collection regulation is expected to improve the quality of data for assessment of these stocks.

Nephrops in this area are caught both by vessels primarily targeting *Nephrops* with fish by-catch and by vessels targeting fish with smaller *Nephrops* by-catch. These fisheries and métiers are not currently well defined. However, management of *Nephrops* fisheries should be considered in a mixed fishery context particularly in relation to the hake rebuilding plan.

For FU 16 it was not possible to carry out age-based assessments for this stock owing to concerns about the quality of the available length-frequency, landings, and effort data. A fishery-independent TV survey in FU 17 was undertaken for the first time in 2002.

In FU 18 data are insufficient to allow for length- or age-based assessments.

Source of information:

Report of the Working Group on *Nephrops* Stocks, 19 – 27 March 2003 (ICES CM 2003/ACFM:18).

Catch data (Tables 3.15.2.k.1-2):

Year	ICES advice	Recommended TAC	Agreed TAC ¹	ACFM landings ²
1987				4.5
1988				3.9
1989				4.0
1990				3.1
1991				3.4
1992		3.8	20.0	3.7
1993		~4.0	20.0	3.6
1994		~4.0	20.0	4.3
1995		~4.0	20.0	4.9
1996		4.0	23.0	4.3
1997		4.0	23.0	4.4
1998		4.0	23.0	5.0
1999		4.0	23.0	4.2
2000		4.0	21.0	2.7
2001		4.0	18.9	3.3
2002		4.44	17.79	4.0
2003		4.44	17.79	
2004	<i>Restrict landings to 2000-2002 levels</i>	3.3		
2005	<i>Restrict landings to 2000-2002 levels</i>	3.3		

(Weights in '000 t) ¹⁾ Subarea VII; ²⁾ Does not include discards.

Table 3.15.2.k.1 *Nephrops* landings (tonnes) by Functional Unit plus other rectangles in Management Area L (VIIb,c,j,k).

Year	FU 16	FU 17	FU 18	FU 19	Other	Total
1993	1857	372	10	905	455	3599
1994	2512	729	126	390	570	4327
1995	2936	866	26	695	397	4920
1996	2230	525	46	888	623	4312
1997	2409	841	15	756	340	4361
1998	2155	1410	78	827	514	4985
1999	2132	1140	16	572	322	4182
2000	872	880	9	686	243	2691
2001	1163	913	2	809	369	3256
2002*	1282	1154	14	1288	243	3982
* provisional						

Table 3.15.2.k.2 *Nephrops* landings (tonnes) by country in Management Area L (VIIb,c,j,k).

Year	France	Rep. of Ireland	Spain	UK	Total
1993	1039	1310	1075	175	3599
1994	1322	1716	1069	220	4327
1995	1500	2376	767	277	4920
1996	1216	1905	875	316	4312
1997	1123	2273	554	411	4361
1998	980	2955	571	479	4985
1999	1010	2400	536	236	4182
2000	489	1720	320	162	2691
2001	498	2090	487	182	3256
2002*	505	2955	363	159	3982
* provisional					

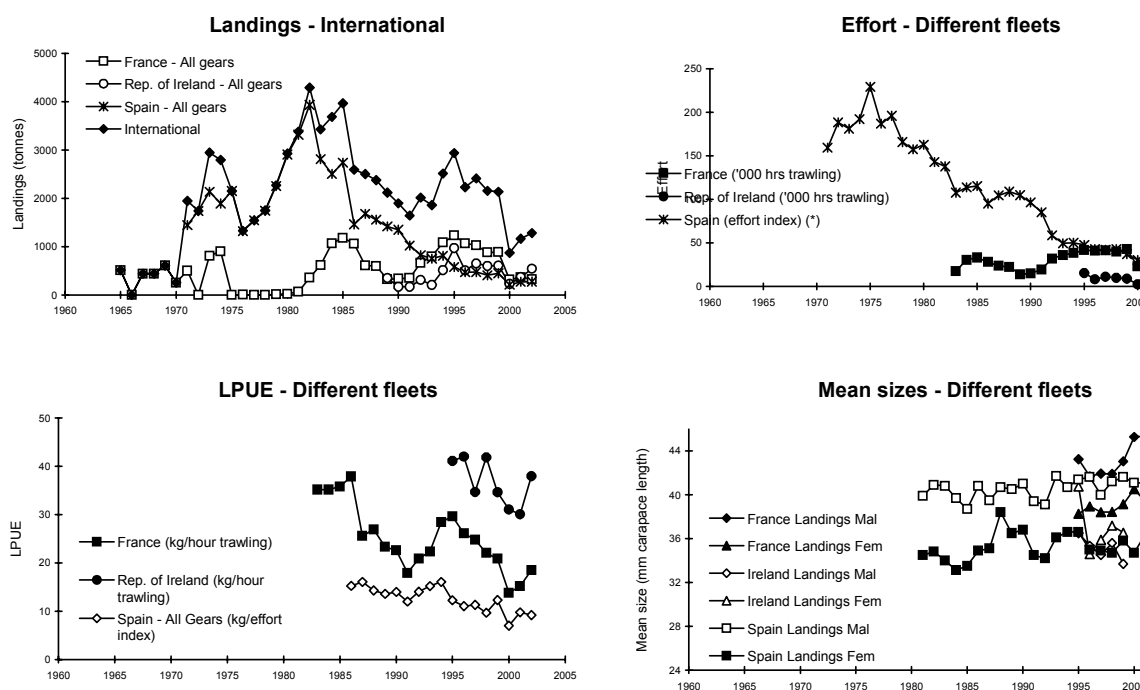


Figure 3.15.2.k.1 Porcupine Bank (FU 16): Long-term trends in landings, effort, LPUEs, and mean sizes of *Nephrops*.

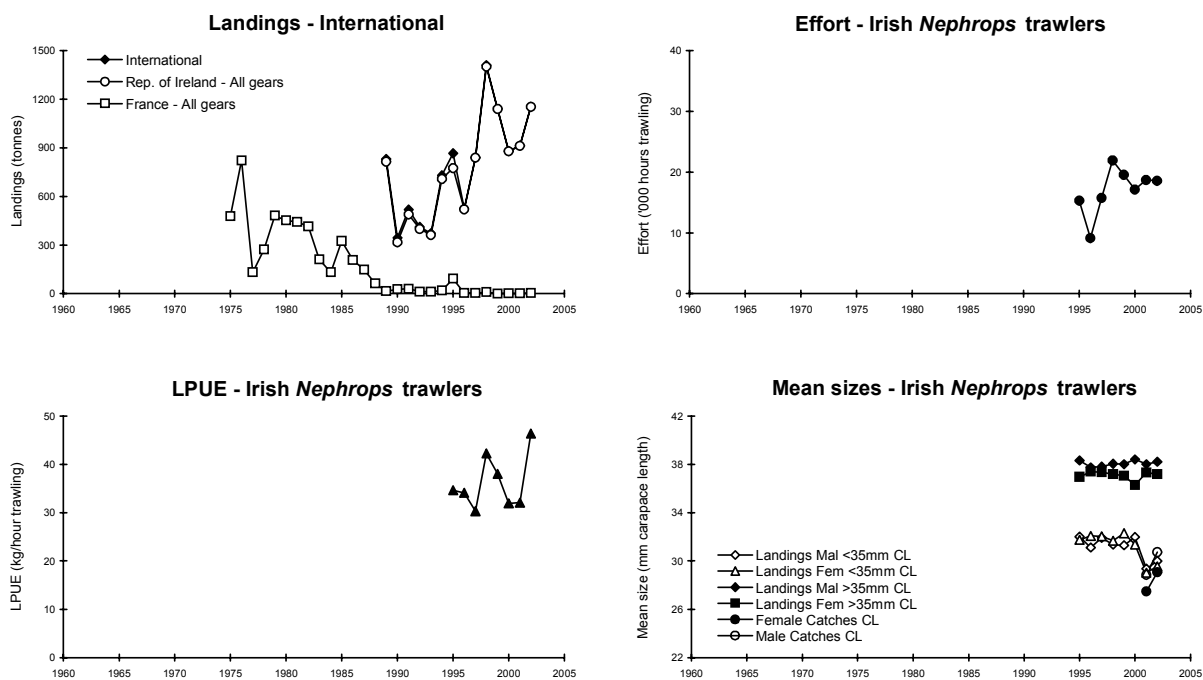


Figure 3.15.2.k.2 Aran Grounds (FU 17): Long-term trends in landings, effort, LPUEs, and mean sizes of *Nephrops*.

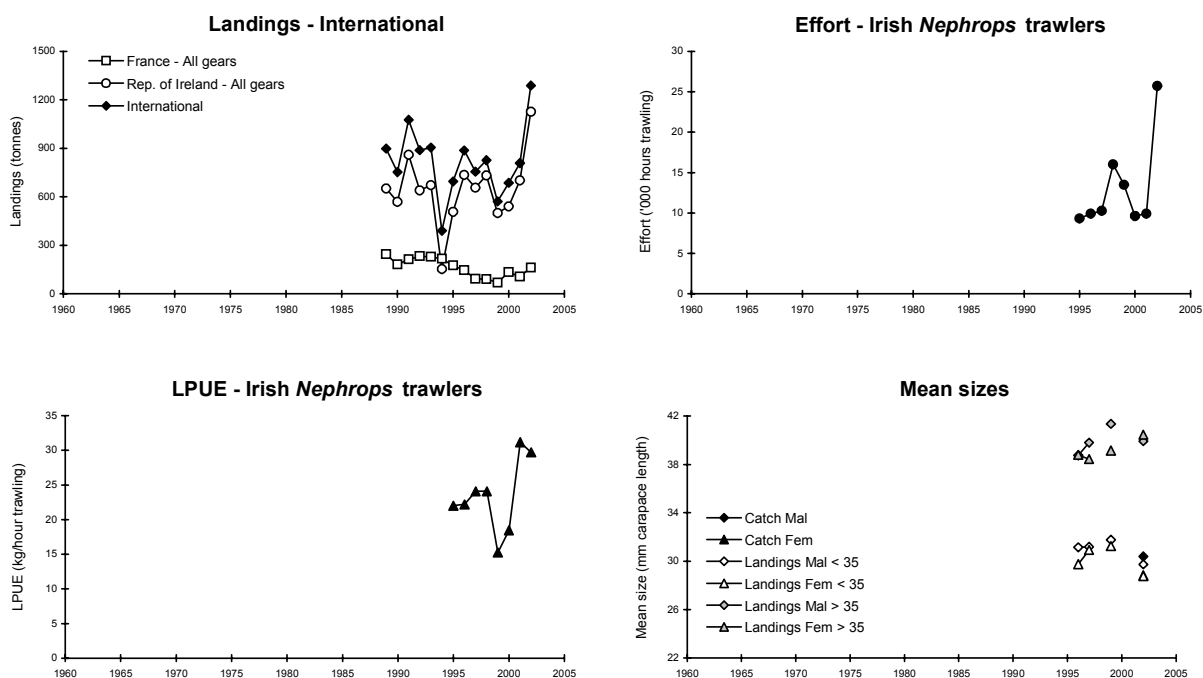


Figure 3.15.2.k.3 Ireland SW and SE coast (FU 19): Long-term trends in landings, effort, LPUEs, and mean sizes of *Nephrops*.

Southern Irish Sea and Celtic Sea *Nephrops*

(WG-MA M = Division VIIa South of 53°N and Divisions VIIg,h
excluding inshore rectangles south of Ireland (31E1, 32E1, 32E2, 33E2, 33E3))

For latest information, see: <http://www.ices.dk>



Fisheries Science Services

FSS – SINGLE STOCK CONSIDERATIONS

(See Celtic Sea, West and Southwest of Ireland Overview for Mixed Fisheries Advice)

ICES considers that the stock in this Management Area appears to be exploited at sustainable levels.

FSS recognise that other stocks that are outside safe biological limits are caught in *Nephrops* fisheries. FSS point out that an industry initiated programmes aimed at reducing catches of Hake, Cod (VIIe-k) and Plaice (VIIg) and Sole (VIIe & VIIa,b) should be considered in the management of Celtic Sea, West of Ireland and Biscay *Nephrops* fisheries. Industry initiated programmes should be encouraged but must include a high rate of independent observer coverage or other totally transparent methods for ensuring that their catches of species outside safe biological limits are fully and credibly reported.

In view of the relative stability of LPUE and stock biomass, FSS recommends that landings from Management Area M should not exceed 4,600 t for both 2004 and 2005, based on average landings over the last 10 years. This translates to a 2003 TAC of 17,450 t and associated Irish quota of 6,436 t for Sub-area VII (see Table). However, the mixed fisheries advice given for *Nephrops* fisheries in the Celtic Sea and particularly in relation to stocks outside safe biological limits will determine the TAC for *Nephrops*.

FSS point out that the current management system where a TAC is applied to Sub-area VII may lead to

unbalanced exploitation of *Nephrops* stocks and may also hinder management of *Nephrops* fisheries in a mixed fisheries context. FSS considers that individual *Nephrops* stocks should be managed and effort be controlled on a more appropriate geographical scale i.e. the Functional Unit level.

STATE OF THE STOCK

- There are no concerns about the status of *Nephrops* in this area.
- Landings have fluctuated around 4,500 t since 1960. Landings in the last three years have been around 4,600 t having increased from 3,500 t in 1999.
- Fishing mortality for FU 20-22 has fluctuated at a constant level for the time series but is estimated to have increased in the most recent years.
- Recruitment in 2001 and 2002 is estimated to be above average.
- Spawning stock biomass has remained relatively stable.
- Reference points for stocks in this area have not been defined.

CURRENT MANAGEMENT

- The 'precautionary' TAC covers Sub-area VII, whereas this Management Area M is Division VIIa South of 53°N and Division VIIg,f,h and excluding inshore rectangles south of Ireland (31E1, 32E1, 32E2, 33E2, 33E3).
- The Management Area M contains several discrete fisheries south and east of the Smalls and east of the Labadie bank (FU 20-22). The MA also includes numerous smaller-scattered fisheries where the substrate is suitable. Within MA M an analytical assessment is carried out on FUs 20-22 combined.
- The 2003 agreed TAC for all of Sub-area VII was 17,790 t, of which Ireland's share was 6,561 t.

Management Area	Functional Units	Landings advice	Basis
WG-MA J	14, 15	9,550	Average landings 1995-1999
WG-MA L	16, 17, 18, 19	3,300	Landings for FU 16 constrained to recent low (2000-2002 = 1,100 t) Average Landing 1995-2002 for other FUs = 2,200 t
WG-MA M	20-22	4,600	Average landings 1993-2002
Sub-Area VII	14 to 22	17,450	
Irish Quota 2004		6,436	37% of VII TAC

- There are no explicit management objectives or a management plan for this stock. FSS recommend that management objectives be established and that a management plan be developed and implemented for the fishery catching *Nephrops*.
- Management of this stock needs to be considered in a mixed fishery context.
- The following TCMs are in place for *Nephrops* in VII (excluding VIIa) after EC 850/98: *Minimum Landing Sizes (MLS)*; total length >85 mm, carapace length >25 mm, tail length >46 mm. *Mesh Size Restrictions*; Towed gears targeting *Nephrops* having at least 35% by weight of this species on board will require 70 mm diamond mesh plus an 80 mm square mesh panel as a minimum or having at least 30% by weight of *Nephrops* on board will require 80 mm diamond mesh.

FSS – ECONOMIC COMMENTS

- The value of the 2002 Irish quota in Sub-area VII was €25.5 m.
- The value of the 2002 Irish landings from Management Area M was €5.5 m and from VII was €26.6 m.
- *Nephrops* are a very important fishery in this area particularly to vessels operating out of Dunmore East, Howth and Clogherhead.

ADDITIONAL INFORMATION

1. ICES do analytical assessments for these stocks on a biannual basis and a new assessment was carried out in 2003. However the advice is based on average landings rather than forecasted landings from this analytical assessment. This is because of concerns about whether the assessment method is appropriate for a stock where the age structure is modelled rather and measured annually. The assessment is based on landed male *Nephrops* catch only which adds to the uncertainty around the results of this analytical assessment. However, multiple lines of evidence (CPUE trends, mean size, assessment) all suggest that this stock remains in a healthy state therefore recent catch levels are considered sustainable by ICES.
2. The provisional international landings were 4,750 t (estimate) in 2002.
3. The importance of these *Nephrops* grounds to the Irish fleet has increased in recent years. Irish estimated landings in 2002 were 1,590 t a decrease from the 2001 landings of 2,120 t. Most of the Irish landings from this fishery were from the grounds south of the Smalls.
4. There is no information on misreporting in this stock.
5. Landings by French vessels have accounted for between 55-75% of the total landings from MA M in recent years whereas landings by Irish vessels have accounted for between 25-45% of the total.
6. The Irish fishery consists of otter trawl vessels and increasingly in recent years twin-rig vessels. Vessels

from Dunmore East, Howth and Clogherhead mainly exploit the fishery.

7. Irish Sampling of this stock is supported through the EC funded sampling programme that is required under Data Collection Regulations 1543/2000 and 1639/2001.
9. There are no surveys directed at *Nephrops* in this area. Fishery independent information on stock size and *Nephrops* distribution from underwater television surveys should be developed for MA M.
10. Ireland started collecting *Nephrops* discard information for this stock for the first time in 2002. *Nephrops* discard rates in 2002 were 9% by number and 3% by weight. The minimum commercial landing size for the French fleet is higher than for the Irish fleet and discard rates in the French fishery may be higher. More frequent sampling of the *Nephrops* discards in this fishery by France would improve the quality of the length-frequency data.
11. There are significant whitefish by-catches (mainly cod and anglerfish) taken in the *Nephrops* fishery in MA M.
12. This FU was expanded by WGNeph 2002 to include landings from ICES rectangle 30E4. This has contributed to the increase in advised catches for this area.

ICES ADVICE

3.15.2.1

There are three Functional Units in this Management Area: FUs 20, 21, and 22, together called the Celtic Sea.

State of stock/exploitation:

The stock in this Management Area appears to be exploited at sustainable levels.

Celtic Sea (FUs 20, 21, and 22 combined): Age-based assessment (on males only) shows relative stability in stock biomass. F_{bar} has been fairly stable until 2001, but has increased in 2002. However, the assessment has a tendency to over-estimate F in the most recent years. Age-based Y/R analysis indicates that the current F for the males is above F_{max} .

Management objectives:

There are no management objectives set for this fishery.

Single Stock Exploitation Boundaries:

In view of the relative stability of LPUE and stock biomass, landings from Management Area M should not exceed 4 600 t for both 2004 and 2005, based on average landings over the last 10 years.

Advice on the exploitation of this stock in 2004 is presented in the context of mixed fisheries and is found in section 3.9.1.

Relevant factors to be considered in management:

Because there has been no discard sampling since 1997, it is not possible to judge whether the size composition of discards has changed. The lack of a regular discard sampling programme means also that estimates of recruitment should be considered cautiously.

There is a 25% increase in the advice, but not a 25% increase in the landings that have been at the higher level for some time. The assessment indicates that this higher level of landings has been sustainable.

Comparison with previous assessment and advice:

Results of this year's assessment show similar trends in biomass and F_{bar} compared to the 2001 assessment. There has been a build-up of data and other information on this stock.

Elaboration and special comments:

Landings from this stock are reported by France, the Republic of Ireland and the UK. Up to 1993, the French landings represented at least 80% of the international *Nephrops*

landings from the Celtic Sea, and this proportion has declined somewhat since then. There has been a considerable increase in Irish landings, from around 700 t in the early 1990s to around 1 500 t at present. Total international landings have increased somewhat over recent years, reaching levels of around 4 600 t in 2000-2002.

Discard data are available for some years only (1985, 1991, and 1997). It is expected that the new Irish catch sampling programme implemented in 2002 will improve the quality of the series for future assessment. More frequent discard samplings of the French fleet would greatly improve the quality of the length-frequency data, the more so since (a) the minimum landing sizes applied by the two fleets are different (25 mm CL in Ireland vs. 35 mm CL in France), and (b) discarding by the French fleet is substantial (owing to the large commercial minimum landing size).

Source of information:

Report of the Working Group on *Nephrops* Stocks, 19 – 27 March 2003 (ICES CM 2003/ACFM:18).

Catch data (Tables 3.15.2.1.1-2):

Year	ICES advice	Recommended TAC	Agreed TAC ¹	ACFM landings ²
1987				3.1
1988				2.9
1989				4.0
1990				4.3
1991				3.3
1992		~3.8	20.0	4.3
1993		3.8	20.0	4.6
1994		3.8	20.0	5.2
1995		3.8	20.0	5.5
1996		3.8	23.0	4.9
1997		3.8	23.0	4.3
1998		3.8	23.0	4.0
1999		3.8	23.0	3.7
2000		3.8	21.0	4.6
2001		3.8	18.9	4.7
2002		3.8	17.79	4.7
2003		3.8	17.79	
2004	<i>Adjust TAC in line with landings of the most recent 10 years</i>	4.6		
2005	<i>Adjust TAC in line with landings of the most recent 10 years</i>	4.6		

(Weight in '000 t) ¹⁾ Subarea VII. ²⁾ Does not include discards.

Table 3.15.2.1.1 *Nephrops* landings (tonnes) by Functional Unit plus Other rectangles in Management Area M (VII f,g,h, excluding rectangles 31 E1 and 32 E1-E2 + VIIa, South of 53°N).

Year	FUs 20-22	Other	Total
1993	4374	273	4648
1994	4869	285	5153
1995	5223	327	5550
1996	4611	252	4863
1997	4027	254	4280
1998	3835	144	3979
1999	3532	146	3678
2000	4579	56	4635
2001	4644	37	4681
2002*	4603	144	4748
* provisional			

Table 3.15.2.1.2 *Nephrops* landings (tonnes) by country in Management Area M (VII f,g,h, excluding rectangles 31 E1 and 32 E1-E2 + VIIa, South of 53°N).

Year	Belgium	France	Ireland	UK	Spain	Total
1993	0	3815	770	63	0	4648
1994	2	3658	1426	68	0	5153
1995	2	3803	1620	125	0	5550
1996	2	3363	1412	86	0	4863
1997	4	2589	1592	95	0	4280
1998	1	2241	1673	64	0	3979
1999	0	2745	892	41	0	3678
2000	1	2782	1805	47	0	4635
2001	1	2532	2128	21	0	4681
2002*	0	3134	1590	15	8	4748
* provisional na = not available						

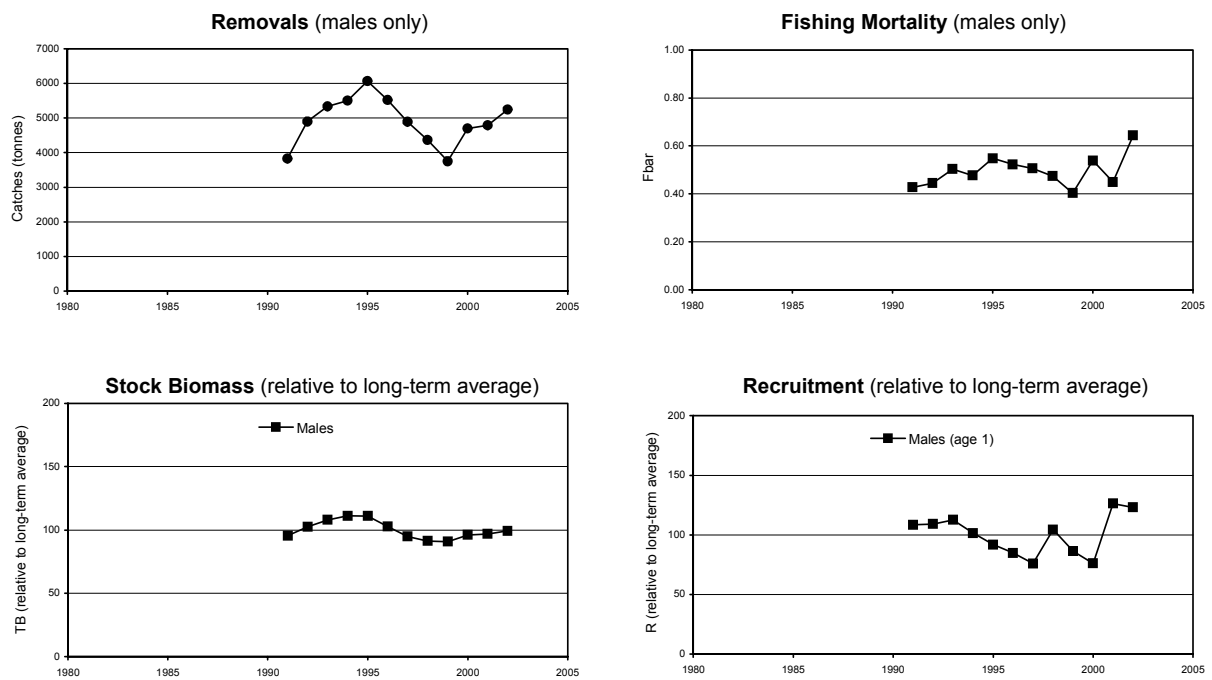


Figure 3.15.2.1.1 Celtic Sea (FUs 20-22): Output VPA: Trends in Catches, F_{bar} , Stock Biomass, and Recruitment.

West of Ireland and Celtic Sea Pollack

(Sub-area VII)



Fisheries Science Services

FSS – SINGLE STOCK CONSIDERATIONS

(See Celtic Sea, West and Southwest of Ireland Overview for Mixed Fisheries Advice)

The status of this stock is unknown.

FSS point out that Irish vessels catch pollack in mixed fisheries which may include catches of species outside safe biological limits in Sub-area VII. FSS point out that an industry initiated programmes aimed at reducing catches of Hake, Cod (VIIe-k) and Plaice (VIIfg) and Sole (VIIe & VIIa,b) should be considered in the management of Celtic Sea, West of Ireland and Biscay fisheries. Industry initiated programmes should be encouraged but must include a high rate of independent observer coverage or other totally transparent methods for ensuring that their catches of species outside safe biological limits are fully and credibly reported.

FSS point out that there is no scientific basis for current TAC which is far in excess of recent annual landings. FSS would point out that pollack are mainly distributed and fished in inshore areas and the current TAC area may contain several smaller stocks. In which case the current TAC management system may not be appropriate and localise stock depletion may still occur. FSS would advise that pollack stocks should be assessed and managed on a smaller geographical scale within this area. FSS suggest that catches in local areas be limited to recent averages and programmes be put in place to estimate sustainable exploitation levels for pollack stocks.

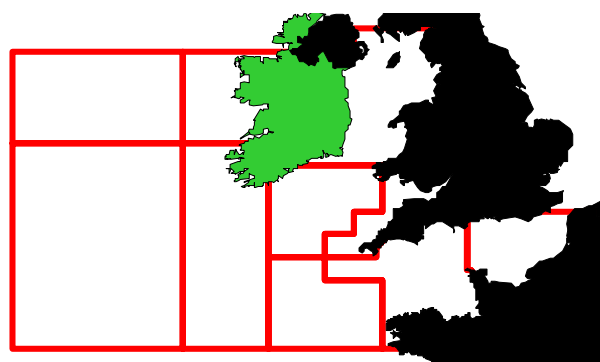
Irish landings and LPUEs have been relatively stable in recent years perhaps indicating that the stocks around the Irish coast are sustainably exploited. Reducing the International TAC would make the Irish quota restrictive. In the absence of ICES advice for this stock, FSS advise the current TAC be maintained in 2004. This translates TAC in 2004 of 17,000 t and an Irish quota of 1,298 t. However, the mixed fisheries advice given for fisheries in the Celtic Sea and particularly in relation to stocks outside safe biological limits will determine the TAC for pollack.

STATE OF THE STOCK

- There is no ICES assessment for this stock in Sub-area VII.
- Preliminary international landings in 2002 were estimated to be 5,886 t.
- The status of the stock is unknown.
- There are no precautionary reference points proposed for this stock.

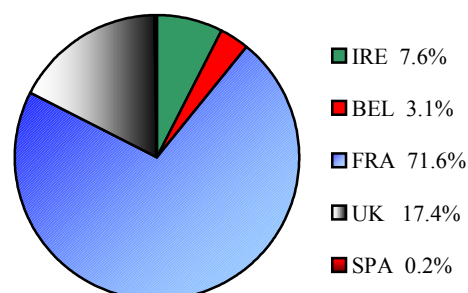
CURRENT MANAGEMENT

- The TAC area covers Sub-area VII.



Red Boxes-TAC/Management Areas

- The 2003 TAC was 17,000 t with an associated Irish quota of 1,298 t.



- There are no explicit management objectives or plans for this stock.
- FSS advises that management objectives be established and that a management plan be developed and implemented for the fishery catching pollack.

FSS ECONOMIC COMMENTS

- The value of the 2002 Irish quota was €2.2 million.
- The value of the 2002 Irish landings from Sub-area VII was €2.1 million.

- Pollack are a very valuable component of the catch for some inshore vessels.

ADDITIONAL INFORMATION

1. Estimated Irish landings were 1,225 t in 2002.
2. The Irish quota is not restrictive but this fishery is particularly important to smaller Irish vessels operating off the southwest and west coasts.

3. Pollack is taken in many localised inshore fisheries.
4. There is little scientific information on the biology and stock structure of pollack in VII.

Year	1991	1992	1993	1994	1995	1996	1997	1998	1999	2000	2001	2002	2003
TAC	14,000	14,000	14,000	14,000	14,000	14,000	17,000	17,000	17,000	17,000	17,000	17,000	17,000
<i>Irish Quota</i>	1,070	1,070	1,070	1,070	1,070	1,150	1,300	1,300	1,300	1,300	1,300	1,298	1,298
International Landings	5,850	5,310	5,320	6,031	5,683	6,493	6,073	5,709	3,294	3,786	4,588	5,886*	

*Data are preliminary for 2002.

West of Ireland and Celtic Sea Saithe

(Sub-area VII)



Fisheries Science Services

FSS – SINGLE STOCK CONSIDERATIONS

(See Celtic Sea, West and Southwest of Ireland Overview for Mixed Fisheries Advice)

The status of this stock is unknown.

FSS recognise saithe are caught in mixed fisheries with other stocks that are outside safe biological limits. FSS point out that an industry initiated programmes aimed at reducing catches of Hake, Cod (VIIc-k) and Plaice (VIIfg) and Sole (VIIe & VIIa,b) should be considered in the management of Celtic Sea, West of Ireland and Biscay mixed fisheries. Industry initiated programmes should be encouraged but must include a high rate of independent observer coverage or other totally transparent methods for ensuring that their catches of species outside safe biological limits are fully and credibly reported.

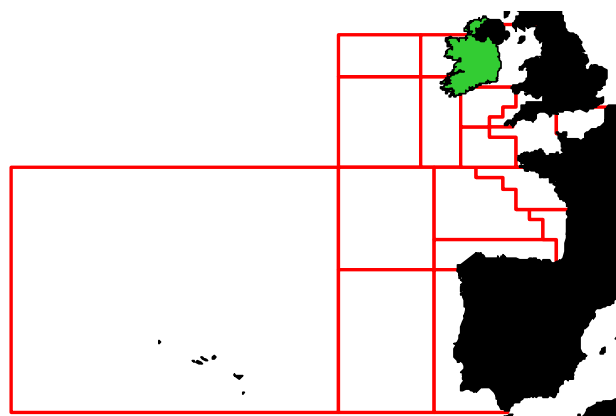
FSS point out that there is no scientific basis for the proposed TAC and that the current TAC which is far in excess of recent annual landings. Irish landings and LPUEs have been relatively stable in recent years perhaps indicating that the stock is sustainably exploited. Reducing the International TAC would make the Irish quota restrictive. Therefore, in the absence of ICES advice for this stock, FSS considers that the catches in 2004 should not exceed 8,710 t (= 2003 TAC). This translates into an Irish quota of 2,450 t. FSS advises that a programme be initiated to evaluate stock status, so that management objectives and a management plan can be formulated for this stock. However, the mixed fisheries advice given for fisheries in the Celtic Sea and particularly in relation to stocks outside safe biological limits will determine the TAC for saithe.

STATE OF THE STOCK

- There is no ICES assessment for this stock.
- International landings increased to around 10,000 t in the late 1980s and early 1990s. Between 1992 and 1996 landings were around 6,000 t to 7,000 t. However, landings have declined somewhat since 1997 and catch data are incomplete for some countries.
- There are no precautionary reference points proposed for this stock.

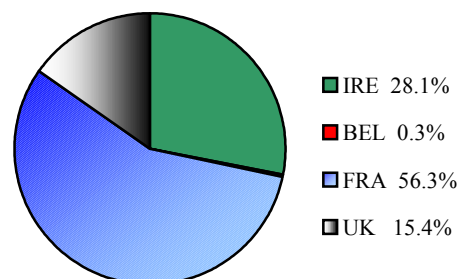
CURRENT MANAGEMENT

- The TAC covers VII, VIII, IX, and X.



Red Boxes-TAC/Management Areas

- The 2003 TAC was 8,710 t with an associated Irish quota of 2,450 t.



- Currently the TAC is not restrictive.
- There are no explicit management objectives or plans for this stock.
- FSS advises that management objectives be established and that a management plan be developed and implemented for fishery catching saithe.

FSS ECONOMIC COMMENTS

- The value of the 2002 Irish quota was €3.2 million.
- The value of the 2002 Irish landings from Division VII was €1.6 million.
- Saithe catches are a valuable component of the catch for Irish vessels operating out of Dingle, Dunmore East, Greencastle and Killybegs.

ADDITIONAL INFORMATION

1. Estimated Irish landings were 1,245 t in 2002.
2. The Irish fishery takes place mainly in VIIg and VIIj by vessels using gillnets and otter trawls. There are

- also some catches made with other gears including seine nets.
3. Saithe are a pelagic shoaling species and the stock structure and biology of this species is poorly understood.
 4. Irish sampling for this stock is supported through the EC funded sampling programme which is required

- under Data Collection Regulation 1543/2000 and 1639/2001.
5. FSS commenced a sampling programme for saithe on the 2002 groundfish survey.

Saithe Division VII official nominal landings by country
(Source: ICES STATLANT 27A database)

Country	1980	1981	1982	1983	1984	1985	1986	1987	1988	1989	1990
Belgium	15	8	11	3	9	18	20	16	23	13	6
Denmark	6	.	.	.	.	.	.	.	1	.	.
France	2,317	3,056	2,406	3,415	2,503	6,101	8,256	6,210	6,185	8,278	6,625
Germany,Fed.Rep	6	.	.	2	.	.	.	.	124	30	.
Ireland	1,120	1,093	1,264	942	1,129	1,088	677	1,624	1,400	2,165	1,068
Netherlands	3	66	2	3	.	.	.	.	.	.	.
Norway	.	.	.	2	<0.5	3	38	2	1	12	15
Portugal	.	.	.	.	.	.	.	.	.	.	.
Spain	.	128	98	46	99	50	.	.	.	.	.
U.S.S.R	.	.	.	.	.	.	.	.	.	.	.
UK (Ch. Islands)	.	.	.	.	.	.	.	.	.	.	.
UK (Eng.& Wales)	100	120	238	166	954	412	249	372	762	.	.
UK (Eng.Wal.NI)	.	.	.	.	.	.	.	.	.	1,157	1,021
UK (Guernsey)	.	.	5	5	6	13	2	3	4	3	3
UK (Isle of Man)	19	36	34	16	27	9	6	3	4	2	3
UK (N.Ireland)	301	577	872	668	411	665	635	571	491	.	.
UK (Scotland)	56	92	119	138	140	477	488	1,064	143	131	1,040
Total	3,943	5,176	5,049	5,406	5,278	8,836	10,371	9,865	9,138	11,791	9,781

Country	1991	1992	1993	1994	1995	1996	1997	1998	1999	2000	2001	2002 ¹
Belgium	4	2	3	6	5	3	6	7	7	4	6	14
Denmark	.	<0.5	.	1	.	.	.	.	.	.	.	.
France	7,286	1,911	1,778	3,234	2,119	2,101	1,615	1,537	.	.	661	621
Germany,Fed.Rep	.	.	.	.	.	.	.	.	.	.	.	.
Ireland ²	1,495	1,721	2,010	1,915	2,382	2,062	1,384	1,431	1,352	.	1,471	1,245
Netherlands	1	.	.	.	.	3	2	.	.	.	.	.
Norway	29	38	<0.5	7	14	13	7	.	5	1	67	3
Portugal	.	.	.	.	.	.	.	.	.	.	.	12
Spain	.	.	.	.	13	27	23	69	34	35	.	54
U.S.S.R	.	.	.	.	.	.	.	.	.	.	.	.
UK (Ch. Islands)	.	.	.	.	.	2	.	.	.	.	.	.
UK (Eng.& Wales)	.	.	.	.	.	.	.	.	.	.	.	.
UK (Eng.Wal.NI)	1,040	1,217	984	1,059	991	1,340	954	594	413	291	305	287
UK (Guernsey)	<0.5	1	.	.	8	.	4	<0.5	2	.	.	.
UK (Isle of Man)	10	8	5	4	11	11	9	7	2	1	<0.5	4
UK (N.Ireland)	.	.	.	.	.	.	.	.	.	.	.	.
UK (Scotland)	1,094	705	1,114	979	862	878	557	382	299	162	33	6
Total	10,959	5,603	5,894	7,205	6,405	6,440	4,561	4,027	2,114	494	2,543	2,246

¹ Official landings data were available from ICES for Sub-area VII

² Ireland landings from 1995 from DCMNR Logbook databases

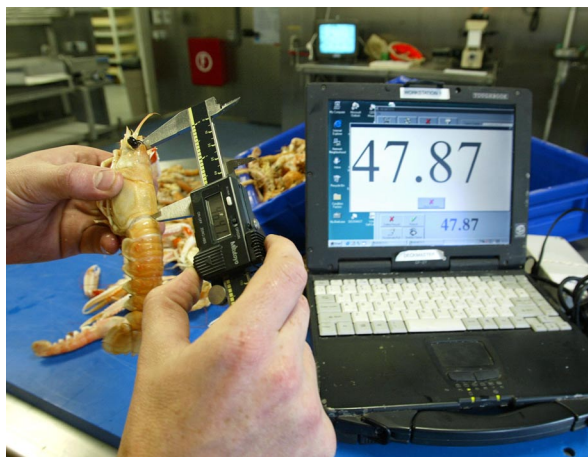
Nephrops Fisheries Review

NEPHROPS NORVEGICUS (DUBLIN BAY PRAWNS)

Introduction

Nephrops are abundant on grounds with fine cohesive mud that is stable enough to support their unlined burrows. The main *Nephrops* or prawn fishing grounds around Ireland are shown in the Figure 1. *Nephrops* have an annual reproductive cycle. After a short planktonic phase (2-3 weeks) the juvenile *Nephrops* settle on the bottom and do not appear to undertake extensive migrations. *Nephrops* spend most of their life within their burrows, which can be up to 20-30 cm below the surface. Therefore *Nephrops* are only vulnerable to trawl capture when they emerge. *Nephrops* emergence patterns vary in different grounds and are related to tidal movements as well as time of day and season. Fishermen often observe large fluctuations in trawl catches of *Nephrops* reflecting these variable emergence patterns.

Several important prawn fisheries occur around Ireland. For assessment purposes the ICES Working Group on *Nephrops* Stocks (WGNPEH) divide *Nephrops* from different geographical areas into Functional Units (FUs) and Management Areas (MAs) see Appendix 1. A more detail analysis of on the stock status and fisheries in the various MAs is given in the stock sections.



The Irish prawn fishery

Nephrops are primarily caught using otter trawls, however a small percentage of the landings are made by vessels using pots. Most vessels targeting *Nephrops* use twin-rig trawls with heavy ground ropes. In 2002 more than 220 Irish vessels over 12 m declared *Nephrops* landings. Of these 117 landed more than 10 t. These vessels range in size from 10-35 m, with most in the 16-25 m size category. The vessels tend to be multipurpose only targeting *Nephrops* when environmental conditions are suitable and

targeting demersal fin-fish at other times. The pot vessels operate in the inshore bays of Cork and Kerry and will typically catch larger *Nephrops* than in trawls. In 2003 a number of BIM supported experimental fisheries also took place with the aim of maintaining some of the *Nephrops* catch alive and landing live *Nephrops* to the market. Some fisheries are very seasonal e.g. the Porcupine Bank fishery where as others are year round with seasonal peaks in landings e.g. Western Irish Sea fishery.

Irish landings of *Nephrops* in 2002 were 7,000 t. This represents a slight decrease on the official 2000 landings (7,074 t). Approximately 29% of the 2002 landings were landed as tails. The *Nephrops* fishery is extremely valuable to the Irish fleet. The estimate of first sale value in 2002 was €27.1 million, making *Nephrops* the second most valuable species after mackerel.

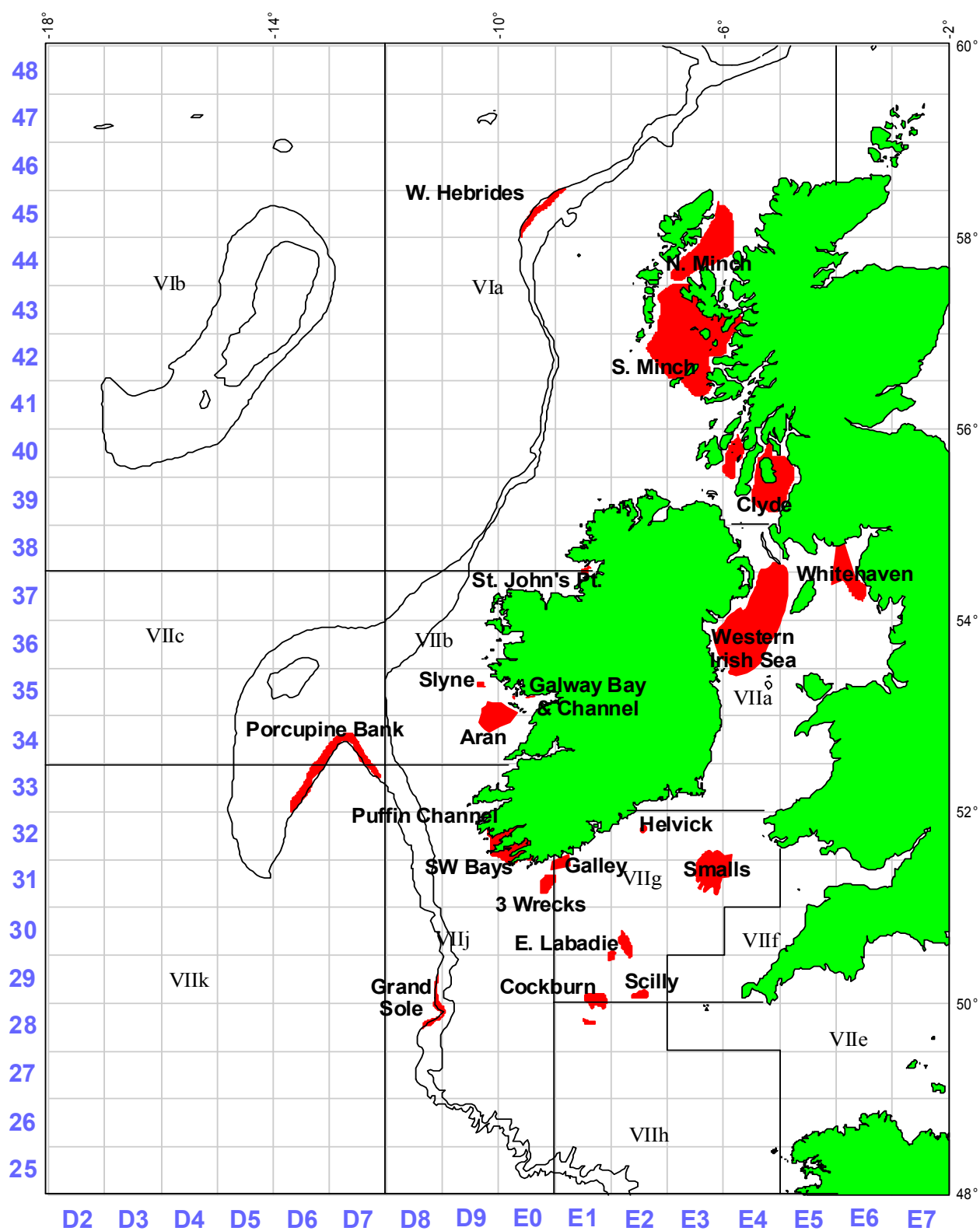
Highest catches by the Irish fleet in 2002 were from the Western Irish Sea (FU 15) where 2,283 t (live weight) of *Nephrops* were caught. Landings by the Irish fleet from the smaller eastern Irish Sea stock were 203 t in 2002. Most of the *Nephrops* caught in the Irish Sea are landed into east coast ports including Howth, Clogherhead and Skerries with 2002 *Nephrops* landings of 1,922 t, 545 t and 422 t respectively. *Nephrops* landings were worth approximately €8.5 m in Howth, €2.9 m in Clogherhead and €1.8 m in Skerries. Vessels from these ports also fish in the Celtic Sea.

The Celtic Sea fishery (FUs 20-22) is currently the second most important prawn fishery with provisional Irish landings of 1,489 t in 2002. There are several distinct grounds such as the Smalls, East Labadie, West Labadie, Cockburn bank and other grounds. Most of the *Nephrops* caught are either landed in Dunmore East (2002 landings of 819 t worth €2.4 m) or in other south and east coast ports.

Important prawn resources are also found closer inshore in the Celtic Sea on the Galley head grounds, Kinsale and in the inshore bays of the south west coast. Irish landings of *Nephrops* from these grounds were 1,126 t in 2002. The most important ports include Union Hall with landings of 522 t worth €1.7 m and Kinsale with landings of 257 t worth €0.8 m.

On the west coast the grounds at the back of the Aran Islands (FU 17) are very important (2002 landings were 1,152 t), particularly to the Rossaveal fleet. Total *Nephrops* landings into Rossaveal were 1,323 t (live weight) in 2002 with a value of €4.7 m. Further offshore the Porcupine Bank grounds (FU16) yields valuable catches of very large *Nephrops* during the summer months. However, Irish landings in 2002 (543 t) were low compared to recent years.

Figure 1. The main *Nephrops* or prawn fishing grounds around Ireland



Industrial fisheries West of Scotland (Division VIa)

No ACFM information has been included for these stocks

For latest information, see: <http://www.ices.dk>



Fisheries Science Services

Sandeel Division VIa

FSS – ADVICE

ICES does not provide advice for this stock. FSS recommend that the current management regime (see Additional Information) should be maintained corresponding to catches of less than 12,000 t. Furthermore

the impact of the fishery on both the stock and the wider ecosystem must be considered in a management plan for this fishery.

ADDITIONAL INFORMATION

The current management regime for the sandeel fishery uses a multi-annual TAC of 12,000 t per year with the fishery closed from 31 July. Access is limited to vessels with a track record. These arrangements took effect in 1998 for a period of three years and were renewed in 2001.

The state of the stock is unknown. When last assessed in 1996 this stock was inside safe biological limits. Landings and effort in this fishery have declined in recent years and are estimated to be only 300 t in 2001 (the lowest in the time series).

Trends in Sandeel Landings and Effort for the Scottish Industrial Fleet in VIa

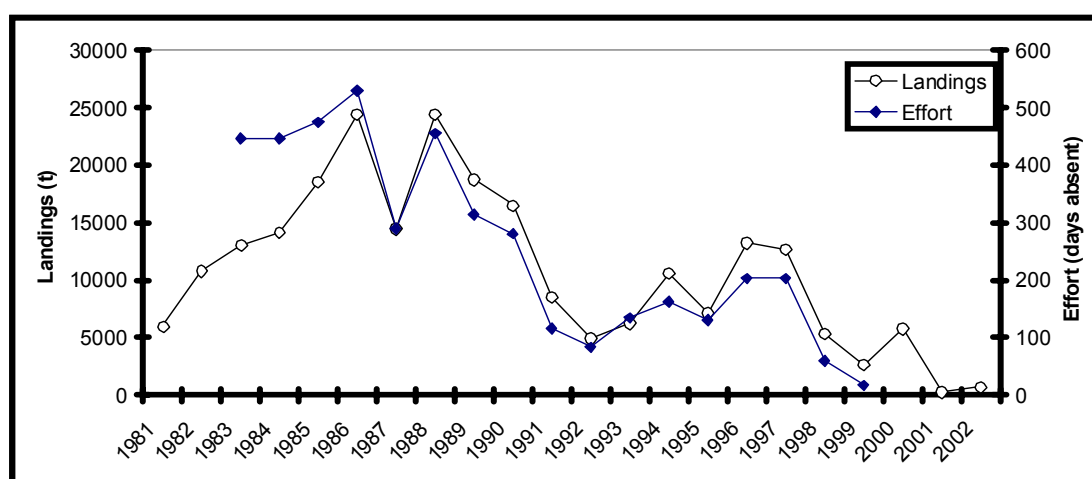


Table 3.7.10.1 Sandeel, Division VIa Landings (tonnes), 1981-2002, as officially reported to ICES.

Country	1981	1982	1983	1984	1985	1986	1987	1988	1989	1990	1991
Denmark	-	-	-	-	-	-	-	-	-	-	-
UK, Scotland	5972	10786	13051	14166	18586	24469	14479	24465	18785	16515	8532
United Kingdom											
Total	5972	10786	13051	14166	18586	24469	14479	24465	18785	16515	8532
Country	1992	1993	1994	1995	1996	1997	1998	1999	2000	2001	2002*
Denmark	-	80	-	-	-	-	-	-	-	-	-
UK, Scotland	4935	6156	10627	7111	13257	12679	5320	2627	-	-	-
United Kingdom								5771		295	706
Total	4935	6236	10627	7111	13257	12679	5320	2627	5771	295	706

*Preliminary data for 2002

Norway pout

Division VIa

FSS – ADVICE

FSS recommend that given the advice for cod and depleted nature of whiting in this area that no industrial fishery for Norway pout should be permitted in Division VIa unless it can be demonstrated that this fishery does not have a significant impact on the cod or whiting stocks. FSS point out that even an extremely small by-catch (in terms of percentage of catch) of either cod or whiting could be a significant cause of fishing mortality on these stocks.

ADDITIONAL INFORMATION

There are no specific management objectives for the fisheries exploiting this stock. The EC fishery is not managed by TAC. Although Norway does not currently fish in VIa it is allowed to fish in VIa North of 56°30'N as part of the conditions of its IIa, Skagerrak and Kattegat, North Sea (EC waters) quota allocation. The fishery is a small mesh trawl fishery operated by Danish vessels. Catches are highly variable. The fishery is known to take place on the Stanton Bank which is an important nursery areas for whitefish species in VIa. The only data available are official landings statistics. Recent information suggest that there was an industrial fishery in 2003 on the Stanton Bank, however levels of catches are not yet available. There is no other information available on which to base scientific advice. By-catches in this fishery should be quantified and made available to ICES.

Norway pout in Division VIa (West of Scotland)

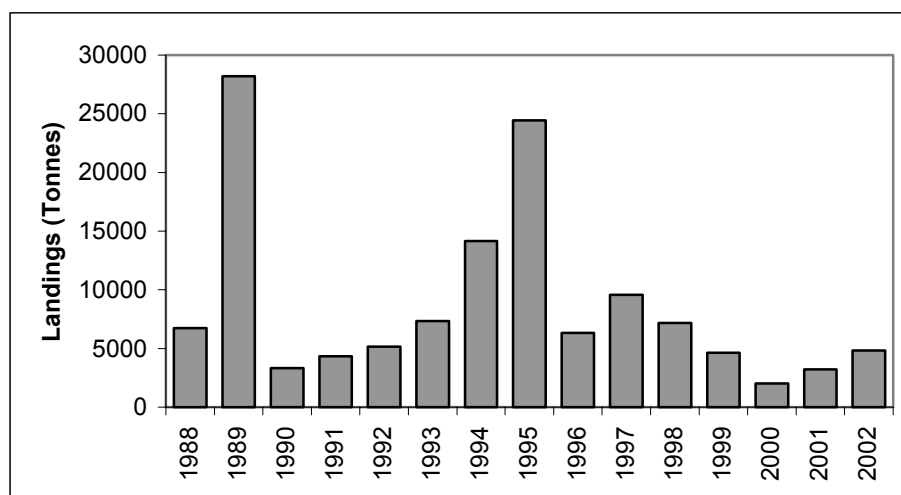


Table 3.7.9.1 Norway pout in Division VIa. Officially reported landings (tonnes)

Country	1988	1989	1990	1991	1992	1993	1994	1995	1996	1997	1998	1999	2000	2001	2002
Denmark	5849	28180	3316	4348	5147	7338	14147	24431	6175	9549	7186	4624	2005	3214	4815
Faroes	376	11	-	-	-	-	-	-	-	-	-	-	-	-	-
Germany	-	-	-	-	-	-	-	1	-	-	-	-	-	-	-
Netherlands	-	-	-	-	10	-	-	7	7	-	-	1	-	-	-
Norway	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Poland	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
UK (E+W)	-	-	-	-	1	-	1	-	-	-	-	-	-	-	-
UK (Scotland)	517	5	-	-	-	-	+	-	140	13	-	-	-	-	-
Total	6742	28196	3316	4348	5158	7338	14148	24439	6322	9562	7186	4625	2005	3214	4815

Arctic Stocks (Cod, Haddock and Saithe)

No ACFM information has been included for these stocks

For latest information, see: <http://www.ices.dk>



Fisheries Science Services

There are a number of Arctic stocks in which Ireland has an interest. This is because the EU has quota on these stocks and Ireland has a share of this quota.

Ireland has taken part in these fisheries in recent years and the main catches have been taken by a small number of trawlers that started fishing in the 1990s. In 2000 and 2001 new vessels, including long liners, joined the Irish fleet as a result of the white fish fleet renewal programme and these have also exploited the Arctic fisheries. The fisheries are important to Norway and Russia but a number of other countries including Iceland, Faroe Is. United Kingdom, Spain, Poland and Greenland also take catches.

The main stocks that are exploited by the Irish fleet are Cod, Haddock, and Saithe. Summaries of the state of each stock and of the ICES advice for each stock are presented below. The full analyses of these stock carried out by ICES are presented in the ICES Report of the Northern Pelagic and Blue Whiting Working Group and in the Report on the Arctic Fisheries Working Group.

Cod in Sub areas I and II

North-East Arctic Cod

FSS – ADVICE

FSS endorses the ICES and STECF advice which states that in order to harvest the stock within safe biological limits ICES recommends a considerable reduction in fishing mortality to below $F_{pa}(0.40)$. This corresponds to catches in 2004 of less than 398,000 t. This would imply an Irish quota of about 247 t. It should be noted that the Pa points for this stock have been revised on the basis of environmental and biological considerations.

STATE OF THE STOCK

- The stock is harvested outside safe biological limits. SSB is above B_{pa}
- The landing have fluctuated since 1987, between 762,000 t and 212,000 t. Catches in 2002 were 445,000 t.
- Fishing mortality in 2002 was 0.70 which, is lower

than in recent years, but this level is still is not sustainable.

- Recruitment was high in the mid 1990s but surveys indicate a poor 2001 and an average 2002 recruitment.
- The SSB in 2002 was estimated to be 505,000 t and has increased from 222,000 t in 2000. It is now above B_{pa} , which is 460,000 t

CURRENT MANAGEMENT

- The TAC area corresponds with the assessment area.
- The TAC agreed for this stock for 2003 is 395,000 t,
- From 2004 the TAC will be managed according to a harvest control rule agreed by the joint Norwegian-Russian Fisheries commission.
- The overall TAC in 2002 was 395,000 t. The EU quota was 16,355 t. and the Irish allocation was 245 t. There is also an EU quota of 13,667 t in Area I and IIb (Svalbard zone) of which 100 t is not allocated to any individual quota.
- The management objective is to maintain the SSB above B_{pa} 460,000 t with a fishing mortality of less than F_{pa} (0.40).

ADDITIONAL INFORMATION

1. The upward revision of SSB from the 2003 assessment is mainly due to an increase in abundance of most age groups in the most recent survey.
2. The total catch taken from this fishery in 2002 was estimated to be about 445,000 t. The Irish catch was 221 t in the Norwegian zone and there were no reported Irish catches in the Svalbard zone.
3. The main catches are taken by Norway, and Russia.
4. Although misreporting was not considered to be a problem in this fishery there is now increasing evidence to suggest that under-reporting of catches during the 1990s and in recent years may be significant.
5. The main gears used are trawls in off shore waters and gillnets, longlines, handlines and Danish seines in inshore waters.
6. The fishery is an important source of revenue for a small number of Irish vessels.
7. The management regime in operation for this fishery includes inspections at sea and continuous surveys during the main fishing seasons.
8. The state of the cod stock appears to be linked to the capelin stock, which has increased in recent years and is expected to be at an intermediate level in 2002. Capelin is an important source of food for cod and therefore a strong capelin stock is beneficial to the cod stock.

North-East Arctic Haddock

FSS – ADVICE

FSS endorses the ICES and STECF advice for this fishery which recommends that, the fishing mortality should be reduced to below $F_{pa} = 0.35$ corresponding to catches of less than 120,000 t in 2004.

STATE OF THE STOCK

- The stock is being harvested outside safe biological limits.
- Landings have fluctuated very much over the years, as in most haddock stocks, but have decreased from 173,000 t in 1996 to 84,000 t in 2002.
- The F in 2002 was estimated to be 0.48. Fishing mortality had gradually increased in the 1990s as catches increased but has declined in the last three years. The proposed F_{pa} is 0.35.
- The 1999, 2000 and 2001 year classes are expected to be above average. Strong year classes are a feature of this stock.
- The SSB in 2003 was estimated to 120,000 t which is above the B_{pa} of 80,000 t. The SSB is expected to increase further in the short term.

CURRENT MANAGEMENT

- The TAC for this stock applies to Sub-areas I and II, excluding Norwegian coastal haddock. The assessment area covers Sub areas I and Divs. IIa and IIb.
- The EU share of this TAC is combined with that for the North Sea. The agreed TAC for Sub-areas I and II for 2003 was 54,000 t. Ireland is permitted a by catch of haddock in the cod fishery.

ADDITIONAL INFORMATION

1. The assessment is considered to be more accurate than those of recent years.
2. The total catch taken from this fishery in 2002 t was about 84,000 t. The Irish catch was 38 t. The Irish catch is taken predominantly in the first quarter with longlines.
3. The main catches are taken by Norway and Russia. Small catches were taken by a number of other countries.
4. The main catches are taken as by-catch in the fisheries for cod. Restrictions of haddock catches therefore depend on the management of North-East Arctic Cod.
5. Misreporting does not appear to be a problem.
6. The fishery, like that for the Arctic cod, is closely monitored and regulated.
7. The harvest control rule proposed by the joint Norwegian – Russian Fisheries Commission was evaluated by ICES and found not to be consistent with the precautionary approach.

North-East Arctic Saithe

FSS – ADVICE

FSS endorses the ICES and STECF advice that fishing mortality for this stock should be below F_{pa} . This corresponds to catches in 2004 less than 186,000 t.

STATE OF THE STOCK

- The stock is within safe biological limits.
- Landings have been between 135,000 t and 170,000 t for the past 10 years. Landings in 2002 were 154,000 t.
- Fishing mortality declined from 1990 and has stabilized in the past few years at around 0.2. This is below F_{pa} (0.26).
- Several above average year classes recruited to the stock in the late 1980s but four of the past 5 recruiting year classes have been below average.
- SSB in 2003 was estimated to be about 440,000 t. SSB increased in the 90's and has stabilised since 1998. This was mainly because of good recruitment. B_{pa} is 150,000 t
- Fishing at $F_{sq}(0.2)$ is considered to yield stable catches and have a low risk of SSB falling below B_{pa} by 2007.

CURRENT MANAGEMENT

- The 2003 TAC set by Norwegian authorities for Sub-areas I and II is 164,000 t. The EU has also a quota for 2003 of 3,900 t.
- In addition to TAC regulations there are minimum mesh sizes, minimum landing size and closed area regulations in operation.
- The minimum landing size increased in 1999.
- Ireland is permitted to take a by-catch of saithe in the cod fishery.

ADDITIONAL INFORMATION

1. The assessment tends to overestimate F and underestimate SSB. The 2003 assessment revised the 2002 SSB upwards by 13%.
2. The total catch taken from this fishery in 2002 was 154,100 t.
3. The main catches were taken by Norway. Small catches were taken by a number of other countries.
4. The fishery is prosecuted by trawls, purse seine and gillnets in that order
5. The main catches are taken as by-catch in the cod fishery.

Deepwater Fisheries Review

Deepwater fishing only began in Irish waters in the 1980's when large French trawlers began to target blue ling. Later these vessels began to target other deepwater species such as orange roughy, black scabbard, roundnose grenadier and sharks. The fishery expanded rapidly and there were no management measures in place. Spanish longliners also began to target deepwater species, mainly sharks and forkbeards, as quotas for species such as hake became restrictive. By the mid 1990s Scotland, Norway and Ireland were showing interest in deepwater fishing with trips being made to the continental slopes, Rockall and even the Mid-Atlantic Ridge. A separate, pelagic, deepwater fishery for argentinines began in the late 1980s, with Irish vessels taking most of the catch. Dutch vessels now dominate this fishery.



The term deepwater fishery refers to those taking place in waters of greater than 400 m depth. This does not distinguish what are commonly known as deep sea fish from more traditionally targeted shelf species. For example, demersal species such as monk and megrim are often caught in depth below 400 m and could be included. Conversely, ling is found on the continental shelf and in in-shore waters, but the main international fisheries are in deep waters. For the purposes of ICES fisheries science and international fisheries management, the term refers to species dealt with in the ICES WGDEEP, in addition to redfish and Greenland halibut that are assessed separately. By that rationale, blue whiting, a species normally fished in depths of around 400 m is not considered in this section.

BIOLOGY AND ASSESSMENT

Most species that live in true deep waters have life history strategies that make them vulnerable to exploitation. Many of the species are slow growing, mature late and at a large size, and have low reproductive output. This is not true of all species caught in deepwater fisheries, for example ling has a life history strategy not very different to cod or haddock. However many of the deepwater species dis-

play little possibility to recover from stock depletion in the short term. On the other hand, the fact that stocks of many deepwater species are composed of many age groups means that they are less susceptible to fluctuations in fecundity.

Management measures were not implemented during the early expansionary phase of the fishery in the 1990's. At that time, the process of collecting data was slow, preventing assessments being carried out. In 1994, ICES established a *Study Group on the Biology and Assessment of Deep Sea Fisheries Resources (SGDEEP)*, which began the collation of data on the biology and fisheries of these species. This process was aided by a large EU-funded project, *EC FAIR*, that the Marine Institute participated in. This project ran from 1995 to 1998 and the final report has remained the key reference for deepwater fisheries in Europe from the Arctic to the Mediterranean. SGDEEP produced assessments of deepwater fish species in 1998 and 2000. By this time it was clear that most stocks were depleted, with strong declines in CPUE in many cases. The group was reconstituted as a working group in 2002, but the absence of updated fisheries dependent data from the main fishing nation, France, prevented new assessments of the most important species. However, by this time, there was substantial evidence that abundance of most of the main species had declined sharply since the beginning of the fisheries in the early 1990s.

FISHERIES

In 2002, Irish vessels landed around 16,000 t of deepwater fish, valued at over €20 million. The Irish fleet consists of a small number of efficient trawlers. In addition several longliners joined the fleet, though at present only one remains. This fleet was developed as part of the BIM white-fish renewal scheme, from 1999 onwards. From the behaviour of the Irish fleet, it is possible to define the following distinct Irish deepwater fisheries:

- Trawling over “peaks” for orange roughy, with by catch of cardinal fish.
- Trawling on “flat grounds” on the continental slopes for mixed species, roundnose grenadier, black scabbard, siki sharks, blue ling and orange roughy.
- Longlining on continental slopes for siki sharks, mora and forkbeard. There has also been some targeting of ling and tusk by this method.

In addition to these fisheries, there are a number of other distinct deepwater fisheries that Irish vessels have been involved in from time to time. These fisheries are not subject to management at present, and include the following:

- Demersal trawling for Greenland halibut, with by

catch of redfish, west of Shetland Isles.

- Longlining for Greenland halibut, sharks and tusk on Hatton Bank (2001 only).
- Trawling for orange roughy in international waters of the Mid Atlantic Ridge and Hatton Bank.

MANAGEMENT

There was no effective management of deepwater fishing in EU waters. Despite an extensive consultation process within the EU and later also in NEAFC, no measures were put in place throughout the 1990's. One piece of legislation, the so-called "western waters" regulations did impose limits on the effort that could be expended on catching four deepwater species. In 2002, after an extensive round of negotiations in the Council of the EU, a regime was established for management of deepwater species in European Community waters and for vessels flying the flag of Member States.

Council Regulation 2347/2002 establishes an effort control system for deepwater fisheries. A licence restricts access to certain deepwater species. The capacity of this deepwater fleet is restricted to the combined horsepower and gross tonnage in any one of three reference years, 1998, 1999 and 2000. In addition, there are provisions for designated ports and use of VMS. The regulation also requires that Member States vessels have observers on-board, to ensure that data are collected to allow for stock assessment of these species, and an additional list of by-catch and discard species. Most deepwater species are covered by this regulation, but ling is excluded, because it is caught extensively in shallow water fisheries too.

Council Regulation 2340/2002 sets TAC's and quotas for Member States' vessels for a selected number of deepwater species in certain areas. These species and areas are:

• Black scabbard	I, II, III, IV, V, VI, VII, IX, X, XII
• Argentine	III, IV, V, VI, VII
• Tusk	I, II, III, IV, V, VI, VII, XIV
• Roundnose grenadier	I, II, III, IV, Va, Vb, VI, VII
• Orange roughy	VI, VII
• Blue ling	II, III, IV, V, VI, VII
• Ling	I, II, III, IV, V, VI, VII, VIII, IX, X, XII, XIV
• Red seabream	VI, VII, VIII, IX, X

The quotas allocated to Ireland, under this regulation, are restrictive for all species.

In 2002 and 2003, a series of consultations were held to deal with possible management measures for these species in the NEAFC regulatory area, i.e. the area beyond EEZ waters. The issues were discussed at the Extraordinary Meeting of NEAFC in May 2003. The following is a summary of the draft recommendations:

1. Limitation of the effort put into the fishing for deep-sea species in the NEAFC Regulatory Area for 2004.
2. Effort shall not exceed the highest level put into deep-sea fisheries in previous years.
3. Effort should be calculated as aggregate power, aggregate tonnage, fishing days at sea or number of participating vessels.
4. All vessels fishing for deep-sea species shall be specifically authorised for the purpose in accordance with the NEAFC Scheme of Control and Enforcement.
5. Requirement to collect biological and fisheries data, including effort data, in support of scientific stock assessment.
6. Each Contracting Party should apply compatible measures regulating deep-sea fishing within their EEZs.

7. Contracting Parties recognise the need to work towards resolving controversial issues concerning the European Union's Proposals and any other relevant submissions.

In 2003 NEAFC attempted to collate all catch and effort statistics for contracting parties (EU, Norway, Russia, Greenland, Faroe Islands, Iceland, Poland and Poland), both within and outside coastal state jurisdictions. This task was not completed successfully, and in particular effort data are still very incomplete.

HABITAT PROTECTION

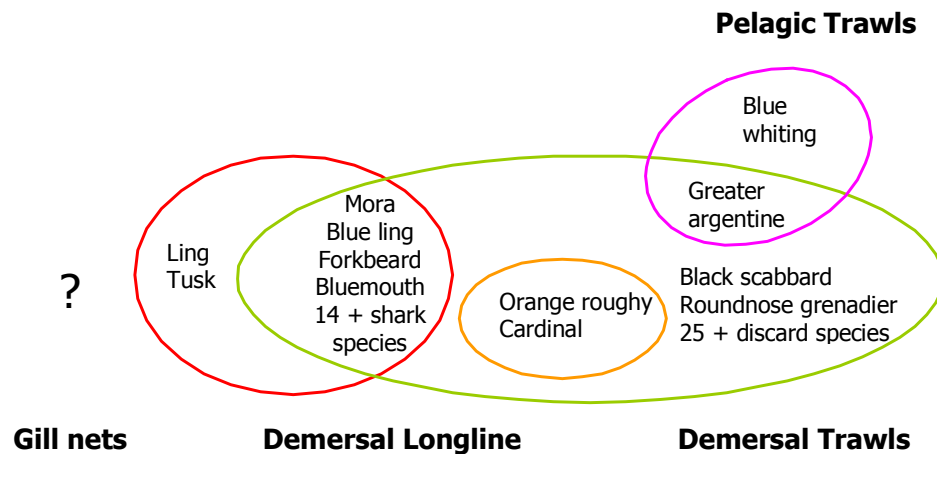
There are extensive areas of cold water corals on the European continental slopes, around the Rockall Bank, the Faroe Islands, Iceland, along the Mid-Atlantic Ridge and at west Greenland. These have received attention from conservation organisations, and this interest led to the creation of an ICES Study Group on Cold Water Corals (SGCOR). ICES was asked to identify "areas where cold-water corals may be affected by fishing" by the European Commission in 2000. This request was processed by ACE, the Advisory Committee on the Ecosystem. This committee produced advice in 2003, based on the reports of the SGCOR. The in-

corporation of ecosystem considerations into fisheries management advice is a new and developing area.

RESEARCH WORK

In the late 1980s the FRC (now Marine Institute) began collecting biological data from the pelagic deepwater fishery for Argentine. This work was carried out in conjunction with BIM, who were organising this exploratory fishery. Later this work was continued as part of an EU-funded *Stride* project. This EU project allowed Ireland to continue to conduct research into roundnose grenadier, forkbeard and bluemouth rockfish. Further research was conducted in the mid-1990s on sharks, black scabbard and Baird's smoothhead as part of the *EC-FAIR* project, and in depth research into deepwater sharks has been continued under another EU-funded project *DELASS*. The Marine Institute conducted a series of deepwater fishery independent trawl and longline surveys from 1993 to 2000. This

work provided data that were used in assessing these species in ICES. Exploratory fishing trips were organised at this time by BIM, and the MI participated by collecting biological data. With the advent of the Whitefish Renewal Scheme, BIM began to deploy observers on the new deepwater vessels, collecting biological and technical information. Under the new regulations, observers will be required to collect data to allow for assessment of deepwater fisheries. A new NDP project is underway to provide data for the assessment of orange roughy, using traditional and acoustic methods. This work is being conducted by UCC and will involve deepwater trawl surveys in 2004 and 2005. Collection of biological data in observer and port-sampling trips has been harmonised under the EU Data Collection Regulation. This will avoid unnecessary duplication of effort in the collection of routine data for stock assessment purposes within the EC.



Most deepwater fisheries are mixed fisheries. This schematic diagram shows the interactions between the main gear types in the area west of Ireland and the main species taken. Some species are caught by more than one gear. Data on bycatch in pelagic trawl fishery for *Argentina silus* are lacking. No data are available for gill net fisheries

Deepwater Stocks in the Northwestern Area

For latest information, see: <http://www.ices.dk>



Fisheries Science Services

Greenland Halibut

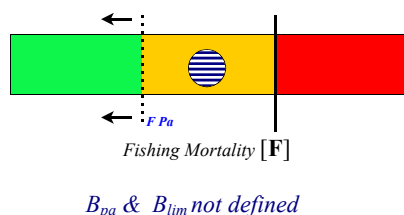
Sub-areas V and XIV

FSS – ADVICE

FSS agrees with the ICES that the fishing mortality be reduced to F_{pa} . This corresponds to catches in 2004 of less than 20,000 t.

STATE OF THE STOCK

State of the Stock in relation to the precautionary reference points (see page 18)



- There are concerns about this stock, which is harvested outside safe biological limits. Recent F 's are estimated to be above the proposed F_{pa} and close to F_{MSY} . Even though the recent historical development of SSB and fishing mortality are not well estimated, it is likely that fishing mortality has decreased and biomass increased in recent years.
- Survey biomass indices and CPUE's in Division Va have increased to some extent from a low in 1996, but again declined in 2002. CPUE from XIVb and Vb are stable in that period.
- Estimated international catch in these areas decreased from 61,000 t in 1989 to 29,000 t in 2002.
- Advice this year was based on a production model. F_{pa} is set as F/F_{MSY} and equal to 0.67.

ADDITIONAL INFORMATION

- Irish vessels have targeted this species in the Faeroe-Shetland Channel in recent years. This area is outside the area assessed, but it is very likely to be part of the same stock, that is wide-ranging in the northern North

Atlantic. Hence, FSS suggests that the advice for V and XIV gives an indication of the state of the stock in Division IVa and VIa also.

- In 2002 preliminary Irish landings were 84 t. These landings mainly came from Irish trawlers fishing in Division VIa.
- Assessment and management areas should be extended to cover the distribution of this stock outside Arctic waters.

Table 3.2.5.6 Greenland halibut in Sub-areas V, XII and XIV

Year	Landings (t)
1968	21,872
1969	24,237
1970	33,823
1971	28,973
1972	26,473
1973	20,463
1974	36,280
1975	23,494
1976	6,045
1977	16,578
1978	14,349
1979	23,616
1980	31,252
1981	19,239
1982	32,441
1983	30,891
1984	34,024
1985	32,075
1986	32,984
1987	46,622
1988	51,118
1989	61,396
1990	39,326
1991	37,950
1992	35,423
1993	40,817
1994	36,958
1995	36,300
1996	35,825
1997	30,267
1998	20,360
1999	20,371
2000	26,839
2001	28,021
2002	29,260
Average	30,456

Redfish Species (*Sebastes* spp.)

There are two main commercial species of redfish *Sebastes mentella* and *Sebastes marinus*. However the stock structure of these species is very complicated, and scientists disagree on stock ID. A third species, *Sebastes viviparus* is now being fished in Icelandic waters. ICES considers that there are at least three stocks of *Sebastes mentella*:

- Oceanic *Sebastes mentella* occurs in the open ocean in pelagic waters to about 1000 m over very deep waters in the Irminger Sea (Denmark Strait). Exploited by pelagic trawlers.
- Pelagic Deep-sea *Sebastes mentella* occurs in pelagic waters in the Irminger Sea (Denmark Strait), deeper than the oceanic stock, but with some overlap also. Exploited by pelagic trawlers.
- Deep-sea *Sebastes mentella*, a demersal stock found on the continental shelves and slopes of Iceland, Faroes and Greenland. Mainly exploited by demersal trawlers.

ICES and NAFO Scientific Council agree that there is no evidence that the stocks of *Sebastes mentella* in the NAFO area are different to those in the adjacent Irminger Sea.

The other main species, *Sebastes marinus* has two distinct stocks:

- Continental shelf *Sebastes marinus*, occurring in demersal waters less than 500 m depth. This stock overlaps with the Deep-sea *Sebastes mentella* and is likewise mainly taken in demersal trawls.
- Giant *Sebastes marinus*, a pelagic deep-sea stock found over peaks on the Reykjanes Ridge and now very depleted.

The main fisheries for these are in V, XII and XIV. The fisheries for redfish in VI, where Irish effort mainly occurs, are a negligible part of overall North Atlantic fisheries, but take three species, and at least one stock component of each redfish species.

taken by pair-trawls and *S. mentella* by otter trawlers. The Faroe Islands take about 90% of the catch, German and French fleets take most of the remainder. Most recent landings data are not available.

- VI: UK, French and Irish demersal trawlers take demersal stocks as a by-catch, being a negligible proportion of the total catches in the whole area.
- XII: Mainly pelagic *S. mentella* stocks are exploited by at least 13 fleets, from Russia, Germany, Iceland, Faroe Islands and Norway. Since 2000 there has been an extension of effort into the NAFO zone. Available landings data fluctuated between 20,000 t and 29,000 t in the late 1990s.
- XIV: Both species and all stocks are exploited. German freezer trawlers take most of the demersal catches, and a pelagic fishery began in 1982 in the deeper waters of the area and since 1990 the main fleets have been from Russia, Iceland, Norway and Germany. There is now more effort in international waters in this area. Landings data declined from 127,000 t in 1996 to 64,309 t in 1999. Landings by the main countries, Germany and Russia, have declined by about 40% in this period, probably due to declining CPUE and profitability.

TAC's: For V, XII and XIV is 119,000 t in 2002, with an EU share of 16,452 t. Ireland has a quota of 4 t, most of the TAC being allocated to Germany (11,100 t).

In east Greenlandic waters (V and XIV) there is an EU allocation of 25,500 t, mainly distributed to Germany (21,168 t). In west Greenlandic waters (NAFO 0 and 1) there is an EU allocation of 5,500 t, mainly distributed to Germany (5,395 t). In Va the EU has an allocation of 3,000 t, distributed mainly to Germany (1,690 t) and UK (1,160 t).

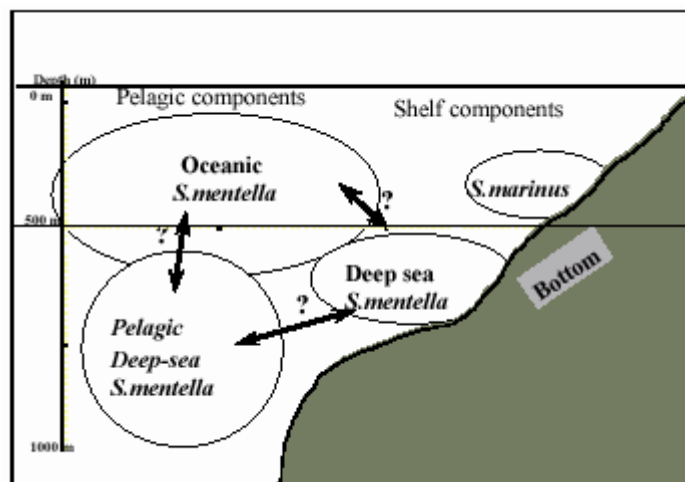
In Vb the EU has an allocation of 6,300 t, distributed mainly to Germany (5,796 t).

Redfish fisheries

In 2002, Irish vessels landed 36 t of redfish, from Sub-areas II, IV and VI. Landings reported as redfish from Sub-area VII are most likely either the deepwater species, bluemouth rockfish or the pelagic species, boarfish. MI advises that separate landings data be kept for these species and for the *Sebastes* species.

Va: Demersal and pelagic trawls, demersal *S. marinus* and *S. mentella* predominate in catches, but in recent years pelagic fisheries for *S. mentella* have become more important. Iceland is the main country exploiting redfish in this area. Nominal landings have declined from 109,000 t in 1998 to 67,000 t in 2002.

Vb: Demersal stocks are most important, *S. marinus*



Sebastes marinus on the continental shelf

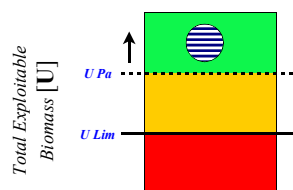
Sub-areas V, VI, XII and XIV

FSS – ADVICE

FSS agrees with ICES that because the stock will only temporarily be above U_{pa} effort should be reduced by 25%, corresponding to catches not exceeding a total of 37,400 t in ICES Divisions Va and Vb. In order to rebuild the stock further in the near future, fishing effort in ICES Divisions Va and Vb should be kept low to ensure that the fishery will not expand on the incoming 1990-year class. FSS points out that this species is caught along with deep-sea *S. mentella* and with Greenland halibut. These species should be managed together as a mixed fishery assemblage. FSS agree with ICES that there should be no directed fishery for *Sebastes marinus* in Sub-area XIV as the fishable component of this stock is depleted.

STATE OF THE STOCK

State of the Stock in relation to the precautionary reference points (see page 18)



- This stock is considered to be within safe biological limits.
- The stock in Division Va has fluctuated between U_{pa} and U_{lim} since 1990 and is currently slightly above U_{pa} .
- In Sub-area XIV the German groundfish survey has shown an almost continuous decrease in biomass indices by more than 90% from 1986-2001, but there are signs of recovery in 2002. The fishable stock in east Greenland has been depleted in the last decade.
- In Division Vb catches have declined since 1985 to a low level. The strong 1990-year class has started to recruit to the fishery and should sustain the stock in the short to medium term. The surveys do not indicate further strong year classes.
- U_{lim} = 20% of highest observed survey index. U_{pa} = 60% of highest observed survey index. U is an index of total exploitable biomass.

ADDITIONAL INFORMATION

- International landings decreased from 130,000 t in 1982 to 42,000 t in 1994 and decreased to 37,000 t in

2001, increasing to 50,000 t in 2002. Most of these now come from Va and Vb, since the XIV fishery has become severely depleted.

- The survey index for 2003 is higher than in 2002, due to a strong 1990-year class. The advice is as last year.
- The species is taken with deep-sea *Sebastes mentella* and both species are managed together. However the species is also taken with Greenland halibut, though ICES still gives separate advice for the latter stock.
- Most Irish landings from this stock come from IV. Landings in these areas are a negligible component of total landings.

Pelagic fishery for *Sebastes mentella*

Sub-areas V, VI, XII and XIV and the NAFO area

FSS – ADVICE

MI agrees with the ICES advice that catches should not exceed recent levels, in all areas including the NAFO area. The average catch in the period 1997-2001 has been approximately 120,000 t. MI agrees with the ICES advice that management action should prevent any single stock component from being exploited disproportionately.

MI advises that measures be taken to protect juvenile redfish at east Greenland, and measures be taken to reduce by-catch of juvenile redfish in the shrimp fishery in that area.

STATE OF THE STOCK

- The state of the stock is unknown in Va, XII, XIV and the NAFO area.
- Available CPUE series show the pelagic redfish abundance has remained stable since 1995, for all areas and the depth ranges of both stock components.
- Acoustic biomass estimates in 2001 suggest a population of 2 million tonnes, but this estimate is highly uncertain. Therefore it is not clear whether this estimate is above or below the 5% exploitation rate considered sustainable.
- The acoustic surveys do not provide a consistent index of stock development, because of possible changes in depth distribution and the changing geographical coverage of the survey.
- This is a relatively new fishery, and needs careful monitoring to track stock development.

ADDITIONAL INFORMATION

- The pelagic fishery is conducted only on adults. The fishery began in the Irminger Sea in 1982 and catches increased to 1988, but then decreased to 1991 as Rus-

sian effort declined. New fleets entering the fishery between 1991 and 1996. The fishery now extends into the NAFO area.

- The latest acoustic estimate of biomass was 715,000 t, but only covers the area down to the deep scattering layer (350 m). The oceanic *Sebastes mentella* stock appears to be moving deeper and more south-westwards.
- Trawl data were used to estimate the biomass down to 500 m as about 1.1 million tonnes, but this estimate is not directly comparable with the acoustic estimate.
- Freezer trawlers mainly prosecute the fisheries for this species. Opportunities for wet fish trawlers are limited by the distance of the main grounds, in east and west Greenland, from markets.
- Nursery grounds for *Sebastes mentella* in Sub-area XIV probably supply recruits to both pelagic stocks and to the demersal stock at Iceland and the Faroes. Therefore this nursery ground should be afforded maximum protection.
- Redfish is often a by-catch in valuable fisheries for Greenland halibut.

Deep-sea *Sebastes mentella* on the continental shelf

Sub-areas V, VI, XII and XIV

FSS – ADVICE

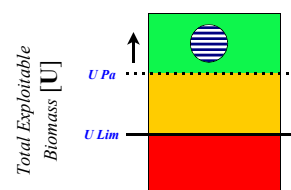
FSS agrees with the ICES advice that effort should be kept low and no higher than the recent average.

Accordingly, the catch for the total stock should be less than 26,000 t. The TAC or effort restriction allocated to the demersal redfish fishery in Division Va should be given separately for the separate redfish stocks. As the fishable stock of *Sebastes mentella* in Sub-area XIV is depleted, MI agrees with ICES that there should be no directed fishery for *Sebastes mentella* in that area.

MI advises that measures be taken to protect juvenile redfish at east Greenland, and measures taken to reduce by-catch of juvenile redfish in the shrimp fishery in that area.

STATE OF THE STOCK

State of the Stock in relation to the precautionary reference points (see page 18)



- The stock is considered to be inside precautionary limits, though the status varies among regions. In Sub-area XIV the SSB of this stock remains severely depleted.
- All CPUE series show substantial reductions from the late 1980's. Since the mid 1990's the index from Iceland has remained relatively stable, slightly above U_{pa} .
- $U_{pa} = U_{max}/2$ and $U_{lim} = U_{max}/5$, where U is defined as the CPUE series in Va from Icelandic demersal trawl fishery.
- There is evidence of a strong 1989-year class, that has begun to recruit to the fishery.

ADDITIONAL INFORMATION

- The total catches have declined by over 70% since 1994, partly due to declining stock status, but also due to catch restrictions.
- There is no management plan for this stock, but such a plan should aim to keep U above U_{pa} .
- Freezer trawlers mainly prosecute the fisheries for this species. Opportunities for wet fish trawlers are limited by the distance of the main grounds, in east and west Greenland, from markets.
- Redfish is often a by-catch in valuable fisheries for Greenland halibut.
- Nursery grounds for *Sebastes mentella* in Sub-area XIV probably supply recruits to both pelagic stocks and to the demersal stock at Iceland and the Faroes. Therefore this nursery ground should be afforded maximum protection.
- The grounds in west Greenland where this stock occurs are very rough and are difficult to trawl.
- FSS notes that U , defined as a CPUE series, may not be reliable if the effect of increasing efficiency of the reference fleets is not considered.

Table 3.2.6.a.1 REDFISH. Nominal catches (tonnes) by countries, in Division Va 1996-2002, as officially reported to ICES.

Country	1996	1997	1998	1999	2000	2001	2002*
Faroe Islands	309	242	280	255			
Germany	233	-	284	428	513	844	467
Iceland	67,757	73,976	108,380	81,430	95,118	48,970	66,449
Norway	134	-	-	18	36*	26*	16
UK (E/W/Ni)	-	-	-	542	734	1,037	...
UK (Scotland)	-	-	-	149	70	114	...
United Kingdom							704
Total	68,433	74,218	108,944	82,822			

*Preliminary.

Table 3.2.6.a.2 REDFISH. Nominal catches (tonnes) by countries, in Division Vb 1996-2002, as officially reported to ICES.

Country	1996	1997	1998	1999	2000	2001	2002*
Faroe Islands	7,286	7,199	6,484	6,191			
France	62	98	110*		250	178*	207
Germany	189	36	-	207	79	88	2
Iceland	-	-	-	-	-	54	-
Ireland	-	-	-	-	-	1	
Norway	33	25	39	37	42*	24*	30
Russia	-	-	-	-	12	-	-
UK (E/W/Ni)	40	+	4	15	111	92	...
UK (Scotland)	43	36	27	46	142	116	...
United Kingdom							409
Total	7,653	7,394	6,664				

*Preliminary.

Table 3.2.6.a.3 REDFISH. Nominal catches (tonnes) by countries, in Division VI 1996-2002, as officially reported to ICES.

Country	1996	1997	1998	1999	2000	2001	2002*
Estonia	-	-	-	-	-	+	
Faroe Islands	-	12	-	44			
France	489	395	297*		269	210*	96
Germany	9	1	1	+	+	1	-
Ireland	-	10	10	34	54	47	
Norway	7	6	3	8	11*	5*	9
Portugal	-	-	1	-	-	-	-
Russia	-	-	-	243	461	88	19
Spain	-	-	-	38	16	4	
UK (E/W/Ni)	54	19	12	4	20	44	...
UK (Scotland)	603	518	364	762	405	485	...
United Kingdom							383
Total	1,162	961	688				

*Preliminary.

Table 3.2.6.a.4 REDFISH. Nominal catches (tonnes) by countries, in Subarea XII 1996-2002, as officially reported to ICES.

Country	1996	1997	1998	1999	2000	2001	2002*
Estonia	7,092	3,720	3,968	2,108	4,000	-	-
Faroe Islands	3,127	3,822	1,793	528			
France	-	-	3*	-*	+	1	+
Germany	4,391	8,866	9,746	8,204	1,128	3,833	3,032
Greenland	3,537	...	1,180*	1,188*	124*	740*	
Iceland	3,613	3,856	1,311	5,072	3,121	11,679	-
Latvia	1,084	-	-	-	-	-	1,144
Norway	1,013	31	602	2,040	2,158*	878*	1,094
Poland	-	662	-	-	-	-	1
Portugal	-	-	-	-	-	387	-1
Russia	606	-	89	7,698	9,243	4,509	6,038 ²
Spain	410	1,155	2,231	1,723	576	1,332	
UK (E/W/Ni)	33	-	+	187	-	-	...
UK (Scotland)	13	-	-	1	+	-	...
United Kingdom							4
Total	24,919	22,112	20,923	28,749			

* Preliminary. ¹ Included in XIV. ² See footnote 3 in XIV.

Table 3.2.6.a.5 REDFISH. Nominal catches (tonnes) by countries, in Subarea XIV 1996-2002, as officially reported to ICES.

Country	1996	1997	1998	1999	2000	2001	2002*
Estonia	-	-	-	-	3,811	599	-
Faroe Islands	298	123	47	2			
Germany	16,996	11,610	9,709	8,935	7,840	6,758	9,576
Greenland	2,699	193	296*	3,152*	3,545*	2,587*	
Iceland	49,381	33,820	6,441	23,770 ¹	17,999	31,786	44,430
Norway	6,453	3,187	525	3,253	3,803*	4,258*	4,215
Poland	-	114	-	-	-	-	-
Portugal	2,379	3,674	4,133	4,302	4,154	2,116	3,090 ²
Russia	45,142	36,930	25,748	16,652	14,851	23,851	25,542 ³
Spain	3,897	7,552	4,660	4,175	2,657	4,982	
UK (E/W/Ni)	247	28	43	68	45	179	...
UK (Scotland)	6	-	-	-	-	-	...
United Kingdom							33
Total	127,498	97,231	51,602	64,309			

* Preliminary. ¹ Note Excluding 58 t reported as area unknown. ² Reported as V/XII/XIV 3,060 t and 30 t as V/XIV/GRN. ³ The catch of Atlantic redfishes total of 31,580 tonnes by ICES Subareas XII and XIV, includes catches in NAFO 1F of 4,820 tons.

Deepwater Stocks South of 63°N

For latest information, see: <http://www.ices.dk>



Fisheries Science Services

Background

ICES has produced voluminous management advice for deepwater species, since 2000. These texts were in response to requests for advice from NEAFC and the European Commission. FSS has provided an interpretation of this advice in the Stockbooks for 2000, 2001 and 2002.

In 2000, ICES produced a document discussing possible management options for deepwater fisheries. Advice for individual species was produced, based on assessments carried out by ICES SGDEEP. For the individual species, ICES provided advice for reductions in effort for ling, tusk, black scabbard and roundnose grenadier. For other species, the ICES advice was that fisheries should only be permitted when they “expand very slowly, and are accompanied by programmes to collect data for evaluation of stock status.” The latter statement led to confusion, as it seemed to suggest that fisheries for vulnerable species could be allowed to expand provided that scientific data were being collected. This advice was poor, and could not be implemented.

In 2001, ICES ranked the deepwater species according to their vulnerability to exploitation, based on life-history characteristics. In addition two categories of species were defined, those that were “fully or over-exploited” and those that were taken in “developing, new fisheries”. However some of the species included in the latter category, were in fact taken in fisheries that had been in operation for at least 10 years. Such species as leafscale gulper shark, Portuguese dogfish, argentine and greater forkbeard, all ranked as vulnerable, cannot be considered as being taken in new or developing fisheries in all areas. In 2001, ICES revised the precautionary reference points, based on fishing mortality, spawning stock biomass and total exploitable biomass. ICES also information was given on improvements that should be made in data collection. In 2001, STECF convened a sub-group to deal with management options for deepwater species. This group defined management areas, and stated that effort control offered a better means of regulating these fisheries than catch control.

In 2002, ICES advice was to reduce effort on ling, tusk, roundnose grenadier and black scabbard that were classified as over-exploited in 2001. For orange roughy and blue ling, in areas where they were considered to be over

exploited, the ICES advice was that there be no directed fishing. For the remaining species, taken in “developing, new fisheries” ICES advice was similar to that provided in 2000, that “fishing should not be allowed to expand faster than the acquisition of information necessary to provide a basis for sustainable exploitation.” In the absence of updated assessments, the ICES advice was in general, a reiteration of previous advice.

FSS ADVICE

There is no new assessments of deepwater species in 2003, because the Working Group on the Biology and Assessment of Deep-sea Fisheries Resources met by correspondence. In 2004, WGDEEP will meet to update assessments of these species. However in 2003, there were three specific requests from NEAFC on deepwater fisheries. The first referred to management advice, the second to ICES areas for data collection, assessment and management, and the third on information on vulnerable deep-sea fish aggregations and habitats.

1. Where ICES has advised effort reductions in respect of deep-sea species, ICES is asked to clarify what reference basis should be used in interpreting the advised percentage reductions, i.e. which years or level of effort represents the 100% starting point.

ICES identified the 1998 situation as when most stocks were severely depleted. ICES suggests the use of the effort data for this year as a reference level for such stocks. ICES notes that its advice was for an effort reduction from that reference level.

FSS agrees with this ICES advice, but notes that NEAFC attempted to collate all effort data for deepwater species in EEZ and international waters in 2003. This exercise was not entirely successful. FSS points out that it will not be possible to implement the ICES advice until all international effort data are collated. Therefore FSS advises that all countries should collate all effort data.

2. With the aim of improving the system of provision of catch data for deep-sea species, ICES is requested to comment on possible sub-dividing of relevant areas. In doing this, ICES should take account of the distribution of blue whiting and pelagic *Sebastes mentella*.

All these locations have been mentioned in previous reports from ICES. For these areas it should be possible to provide exact documented information on locations of past fishing/catches combined with updated information on fishing activities. Contracting parties should be encouraged to make such information available to ICES.”

For orange roughy, the response was “As a consequence of the rapid depletion of the orange roughy stock in Sub-area VI, the ICES advice recommends no directed fishery in this sub-area.

The Hebridean Terrace Seamount is an area where aggregations of orange roughy were exploited during the early 1990s. This large seamount is presumed to have been inhabited by the main component of the spawning stock in Sub-area VI.

All the scientific literature available, and the experience of the collapse of the fishery in Sub-area VI, suggest that rapid depletion of orange roughy stocks is very likely to occur in other areas as well. Although the state of the stock in Sub-area VII is unclear because the adult stock biomass is unknown, the level of sustainable catches is believed to be low, and substantially lower than the recent catches.

The information on the location and state of the orange roughy aggregations in other sub-areas where exploitation within EEZs occurs (e.g. Va,b, X) is unknown, and the provision of data by statistical rectangles is necessary to provide more specific advice on spatial management options. In the Azorean EEZ the fishery has only been exploratory, and a general trawl ban has been introduced. Considering the ICES advice from 2002, exploitation with other gears should not be allowed to expand quickly, either.

Outside EEZs, there are fisheries for orange roughy on the Hatton Bank and Mid-Atlantic Ridge. The abundances and states of the populations in these areas are unknown. It is likely that the current landings result from catches of a few trawlers targeting small discrete aggregations. The precise fishing locations are unknown and data for both stock assessment and management are lacking. It is recommended that data on the area distribution of the catch at statistical rectangle scale are collected and data from VMS be made available for assessment and management.

It is recognised that the provision of detailed data on fishing location and catches, e.g. from VMS, will require that the question of confidentiality will have to be addressed. ICES is prepared to protect confidential information sources, in its assessments and preparation of advice for management of these stocks.”

FSS advises that for blue ling, closed areas alone are not sufficient to reduce fishing pressure. How-

ever these areas should be subject to closures to afford some protection to spawning fish.

For orange roughy, FSS points out that all available information on spawning aggregations of orange roughy be collected as quickly as possible.

FSS points out that ICES advice produced in 2003 and over the previous three years can be taken together as advice for deepwater fisheries. FSS considers that deepwater species should be dealt with in the context of mixed-fisheries advice, as is now the case for demersal fisheries.

Ling

FSS – ADVICE

ICES advice in 2002 was that ling is fully or over exploited in all areas, and that overall fishing effort on ling be reduced by 30%.

In 2003, ICES clarified this advice, in reply to a request by NEAFC, stating reduction in effort should refer to 1998 levels. STECF endorses this interpretation of the ICES advice.

FSS agrees with the STECF interpretation of the ICES advice, and points out that it has been difficult to collate the data required to begin the process of reducing effort. Since ling is caught in demersal fisheries on the continental shelf and in mixed deepwater fisheries, it should be managed in a mixed fisheries context.

STATE OF THE STOCK

- The state of the stock is highly uncertain due to the lack of updated information. In previous years it was considered to be outside safe biological limits in all parts of its range. There is no evidence to suggest that the situation has changed.
- International landings in VI and VII were 28,000 t in 1988, declining to 12,500 t in 1992, increasing to 21,000 t in 1995, but decreased to 10,250 t in 2002, the lowest in the series. In VIII and IX landings decreased from around 1,300 t in 1990 to about 300 t in 2002, the lowest in the series

CURRENT MANAGEMENT

- In 2003 the EU TAC for Community waters and those not under the jurisdiction of third countries of VI, VII, VIII, IX, X, XII and XIV is 14,966 t, and Ireland has a quota of 1,102 t. This quota is restrictive for Irish demersal vessels and does not permit targeting of ling in deep waters by Irish longliners.
- Norway has a quota of ling in EU waters (IIa, IVb,

Vb, VI and VII) of 9,500 t. Norwegian vessels are allowed a by-catch of up to 25% of other species, not exceeding 3,000 t. This allocation to Norway can be interchanged with tusk up to maximum value of a further 2,000 t of either species. These allocations are for longliners only.

- The Faroe Islands has a quota of 800 t for ling, blue ling and tusk, combined, in EU waters of VIaN and VIb. Faroese vessels are permitted a by-catch of up to 20% of other species, not exceeding 75 t. These allocations are for longliners only.
- The minimum size for ling is 63 cm.

ADDITIONAL INFORMATION

- The updated CPUE series for the Icelandic longline fishery in Va showed no trend in the period 1994-2001. The series from the groundfish survey, for the years 1985 to 2001, shows however a rather clear declining trend, and indices for 2000 and 2001 are the lowest in the series. The commercial effort statistics may not fully account for changes in efficiency. Considered together, these series may be interpreted as showing a declining abundance of ling being compensated for by enhanced efficiency in the commercial fishery.
- Available data suggest that also the ling stock in Va is declining, but no statement can be made of the state of the stock in relation to reference points at this stage.
- Total landings in VI and VII 2002 were 10,250 t, and preliminary Irish landings were 1,406 t.
- Norwegian long-liners (directed fishery) take the main catches in Sub-area VI and VII, west of Scotland, Donegal and Mayo. There are small catches in Division VIIa and Ireland takes most of the catch. In Divisions VIIb,c,g,j and k UK (English and Welsh) trawlers take most of the ling as a by-catch.
- There are insufficient data on age, growth and reproduction for ling. Sampling of this stock is supported by the EC-funded Sampling Programme, which is required under Regulations 1543/2000 and 1639/2001.
- Since ling is taken in mixed demersal fisheries on the shelf, FSS considers it more appropriate to assess this species in the demersal assessment working groups, and to remove it from WGDEEP.

Tusk

FSS – ADVICE

ICES advice in 2002 was that tusk is fully or over exploited in all areas, and that overall fishing effort on tusk be reduced by 30%.

In 2003, ICES clarified this advice, in reply to a request by NEAFC, stating reduction in effort should refer to 1998 levels. STECF endorses this interpretation of the ICES advice.

FSS agrees with the STECF interpretation of the ICES advice, for all areas apart from Hatton Bank, and points out that it has been difficult to collate the data required to begin the process of reducing effort. Since tusk is caught in the same mixed deepwater fisheries as ling, it should be managed in a mixed fisheries context.

At Hatton Bank (VIb2 and XIIb), the 2001 ICES advice was that tusk is taken in developing, new fisheries. FSS advises that fisheries taking tusk at Hatton Bank should not be allowed to expand until reliable assessments show that increased harvests are sustainable.

STATE OF THE STOCK

- The state of the stock is uncertain due to the lack of relevant CPUE data for the major fisheries in the most recent years. In previous years the stock was considered to be fully or over-exploited in all areas, except the Hatton Bank, in VIb and XII. It is unlikely that the exploitation rate has decreased in recent years. The stock probably remains outside safe biological limits.
- In VI and VII landings fluctuated between 2,000 t and 4,000 t in the last 10 years. In 2002, landings were 1,771 t. Landings in Vb have declined from 6,200 t in 1991 to 1,957 t in 2002.
- In Division Va, the Icelandic groundfish survey index from the suggests a pronounced declining abundance.

CURRENT MANAGEMENT

- In 2003, the EU TAC for Community waters and those not under the jurisdiction of third countries of V, VI and VII is 710 t, with an Irish quota of 40 t.
- Norway has a quota of tusk in EU waters (IIa, IVb, Vb, VI and VII) of 5,000 t. Norwegian vessels are allowed a by-catch of up to 25% of other species, not exceeding 3,000 t. This allocation to Norway can be interchanged with ling up to maximum value of a further 2,000 t of either species. These allocations are for longliners only.
- The Faroe Islands has a quota of 800 t for tusk, ling and blue ling combined, in EU waters of VIaN and VIb. Faroese vessels are permitted a by-catch of up to 20% of other species, not exceeding 75 t. These allocations are for longliners only.

ADDITIONAL INFORMATION

- The CPUE for the Icelandic longliners in Division Va in 2001 was the lowest on record, and seems to have declined since 1997. The abundance index derived from the groundfish survey in Va has shown an almost uninterrupted declining trend since 1985, and in 2000 and 2001 it was about 35% of the level observed at the beginning of the series. Both CPUE series thus suggest significantly declining abundance.
- There is some evidence of increased abundance of small fish in recent years in Va.

- In 2002, landings were 7,137 t in the V, VI and VII. Preliminary Irish landings in these areas were 47 t in 2002, mainly from Sub-area VI, with small by-catches from vessels targeting Arctic stocks in the Norwegian zone.
- The most important fisheries are in II, Va and Vb. Tusk is taken as a by-catch of ling by Norwegian longliners in VI. There are new Russian and Norwegian fisheries for the species on Hatton Bank.
- Since ling is taken in mixed demersal fisheries on the shelf, FSS considers it more appropriate to assess this species in the demersal assessment working groups, and to remove it from WGDEEP.

Blue Ling

FSS – ADVICE

FSS agrees with ICES that there should be no directed fisheries for blue ling in any area. FSS reiterates the ICES recommendation that technical measures such as closed areas be implemented to protect spawning aggregations. In addition FSS points out that a recovery plan is required for blue ling. Furthermore in order to be consistent with the Precautionary Approach, management measures for mixed fisheries taking blue ling should be determined by measures to assist the recovery of this species.

STATE OF THE STOCK

- There are serious concerns about the state of stocks of blue ling, that are outside safe biological limits in all areas.
- Landings in VI and VII were 6,096 t in 2002, having risen from 4,300 t in 1994. Landings declined from 9,200 t in 1988. In Va and Vb, landings have declined in recent years.
- The exploitable biomass at the end of 2002 is considered to be below 20% of the maximum observed biomass, and is therefore below U_{lim} .

CURRENT MANAGEMENT

- The TAC in 2003 the EU TAC for Community waters and those not under the jurisdiction of third countries of II, IV and V is 138 t, with an Irish quota of 10 t. The EU TAC for Community waters and those not under the jurisdiction of third countries of VI and VII is 3,678 t, with an Irish quota of 10 t.
- The Faroe Islands has a quota of 800 t for blue ling, tusk and ling combined, in EU waters of VIaN and VIb. Faroese vessels are permitted a by-catch of up to 20% of other species, not exceeding 75 t. These allocations are for longliners only. The Faroe Islands has a quota of 940 t of blue ling, roundnose grenadier and black scabbard combined in VIaN and VIb. This allocation is for trawlers only.

- The minimum landing size for blue ling is 70 cm.

ADDITIONAL INFORMATION

- CPUE values for 2001 from French trawlers in VI and VII were the lowest in the series. The survey index from the Icelandic groundfish survey has decreased by 50% since 1986.
- Landings in VI and VII were 6,096 t in 2002, with preliminary Irish landings of 340 t.
- The stock structure of blue ling is poorly understood. The species has several discrete spawning areas in V, XIV and possibly VI. Area VII is considered to be the southern extremity of the species. The areas where blue ling are known to spawn should be protected by technical measures as part of an overall plan to assist the recovery of this species.
- Another very similar species, Spanish ling inhabits waters from VII southwards. This species does not form spawning aggregations, and is not a target species for any fishery.
- The main fisheries are the French trawl fisheries in Vb2, VI and VII. In Vb and VII these target spawning fish in the spring. Elsewhere there is an Icelandic fishery in Va and a Faeroes fishery in Vb1.

Orange Roughy

FSS – ADVICE

FSS agrees with ICES advice that orange roughy stocks cannot sustain high rates of exploitation. Newly-discovered aggregations are often overexploited before enough information is available to provide timely advice on management. FSS further agrees with ICES that exploitation of orange roughy should be strictly limited and the stocks/populations closely monitored. Reiterating ICES' recommendation, FSS point out that the data obtained from such monitoring should be incorporated into appropriate management measures. These recommendations should also apply to areas where there is currently no exploitation on orange roughy.

FSS agrees with ICES advice that there should be no directed fishery in Sub-area VI. In other areas, ICES classifies orange roughy as being taken in new, developing fisheries. FSS advises that fisheries taking orange roughy in Sub-area VII, X and XII should not be allowed to expand until reliable assessments show that increased harvests are sustainable. Consequently, FSS advise that the TAC in 2004 be set at 1,349 t in 2004, with an Irish quota of 300 t.

STATE OF THE STOCK

- There are serious concerns about the state of the stock of orange roughy in VI which is severely depleted and outside safe biological limits. In VII there appears to be sequential depletion of previously unexploited aggrega-

tions. Elsewhere the situation is uncertain.

- Landings in VI decreased from 3,500 t in 1993 to 116 t in 1995 and have remained below 200 t for the rest of the 1990's, with landings in 2001 being 280 t. In VII landings rose to 3,000 t in 1992, declined to 800 t in 1995, and increased again to 3,400 t in 2001 (preliminary figures).
- Landings in VII have increased in recent years and CPUE has remained stable. However, this probably reflects sequential depletion of aggregations.

CURRENT MANAGEMENT

- In 2003, the EU TAC for Community waters and those not under the jurisdiction of third countries of VI is 88 t, the Irish quota is 10 t.
- In 2003, the EU TAC for Community waters and those not under the jurisdiction of third countries of VII is 1,349 t, with an Irish quota of 300 t.
- There are no quota restrictions on non-EU countries.

ADDITIONAL INFORMATION

- Conventional assessments of orange roughy are unlikely to be possible due to the biology of the species, the particular nature of the fishery and the difficulty in collecting data over a sufficient time period to permit a meaningful assessment of the stock.
- Abundance indices from French trawlers for VI reached the lowest value in the series in 2001. There has been no sign of recovery of this stock since the end of targeted fishing in the 1990s. The CPUE index in VII from French trawlers has been relatively stable since 1997, but this probably reflects sequential depletion of different aggregations.
- CPUE is likely to remain stable for this species despite reductions in abundance. This is because of the tendency of the species to re-aggregate after fishing, the targeting of these aggregations by the fishery and the movement of the fishery from aggregation to aggregation.
- Landings in VI and VII were 5,765 t, the highest in the series. Most of these landings are from VII. Preliminary Irish landings in 2002 were 5,244 t, mainly from Sub-area VII. Given that the TAC in 2003 is much lower than landings in 2002, it is to be expected that misreporting is a feature of the fishery for orange roughy.
- There are four main fisheries in the north Atlantic. The main fishery up to 2000 was conducted by French trawlers in VI and VII. In 2001, an Irish fishery rapidly developed in Sub-area VII, taking the most of the landings. The Faeroese fishery has almost ceased and mainly operated in Division Vb and international waters (Hatton Bank and Mid-Atlantic Ridge). There is a small Icelandic coastal fleet conducted in Division Va. There have been landings of around 500 t, by New Zealand in the most recent years in international waters areas.
- Orange roughy are particularly vulnerable to over ex-

ploitation being very long lived (estimated to reach 180 years) and to form dense aggregations that are targeted by fisheries.

- Sampling of this species is supported by the EC-funded Sampling Programme, which is required under Regulations 1543/2000 and 1639/2001. In 2002, Irish landings were dominated by orange roughy in the length range 51 cm to 61 cm.
- A Marine Institute funded MRM Strategic Project on the biology and assessment of orange roughy is currently being conducted by UCC, involving acoustic techniques.

Roundnose grenadier

FSS – ADVICE

ICES advice in 2001 was that roundnose grenadier is fully or over exploited in all areas, and that overall fishing effort be reduced by 50%.

In 2003, ICES clarified this advice, in reply to a request by NEAFC, stating reduction in effort should refer to 1998 levels. STECF endorses this interpretation of the ICES advice.

FSS agrees with the STECF interpretation of the ICES advice, for Sub-areas V, VI and VII, and points out that it has been difficult to collate the data required to begin the process of reducing effort. Since roundnose grenadier is caught in mixed deepwater fisheries, it should be managed in a mixed fisheries context. FSS points out that this advice should also apply to IIIa. In other areas, the 2001 ICES advice, that roundnose grenadier is taken in developing, new fisheries. Therefore, FSS advises that fisheries taking roundnose grenadier in these areas should not be allowed to expand until reliable assessments show that increased harvests are sustainable.

STATE OF THE STOCK

- There are concerns about the state of stocks of roundnose grenadier. In previous years the stocks in Vb, VI and VII were considered to be fully or over exploited.
- Landings in VI rose to 8,000 t in 1993, declined to 5,000 t in 1998 and rose to 8,800 t in 2001. In VII landings rose to 1,900 t in 1994, declined to 889 t in 2000 but increased to 1,330 t in 2001.
- The state of the stock in Vb, VI and VII seems unclear because of a recent increase in CPUE from French trawlers. There is no evidence that this upward trend in recent French CPUE is related to increased abundance of this species.

CURRENT MANAGEMENT

- In 2003, the EU TAC for Community waters and

those not under the jurisdiction of third countries of V, VI and VII is 5,106 t, with an Irish quota of 346 t.

- The Faroe Islands has a quota of 940 t of blue ling, roundnose grenadier and black scabbard combined in VIaN and VIb. This allocation is for trawlers only.

ADDITIONAL INFORMATION

- ACFM considers a 50% reduction in effort to be appropriate to allow rebuilding to commence.
- Trends in the size composition of the landings towards smaller fish suggest that the stock is severely impacted by the fishery and current level of catches are likely to be unsustainable.
- Landings in V, VI and VII rose to over 12,000 t in 1991, declined to about 8,000 t (1996-1998) and increased to over 16,000 t in 2001. Preliminary international landings in 2002 were 9,764 t, with Irish landings of 617 t.
- In Vb, VI and VII the main fishery is by French trawlers, targeting it in the mixed species deepwater fishery. Spain has developed a large scale fishery on the Hatton Bank in VIb and XII.
- The level of fishing of this species in international waters in VIb and XII has never been fully known.
- Due to its biological parameters, the species can only sustain a low fishing mortality and recovery of depleted stock(s) is expected to be slow. Therefore, the lack of assessment should not delay the implementation of a management regime for roundnose grenadier.

Black scabbard

FSS – ADVICE

ICES advice in 2001 was that black scabbard was fully or over exploited in Sub-areas V, VI, VII and VIII, and that overall fishing effort be reduced by 50%.

In 2003, ICES clarified this advice, in reply to a request by NEAFC, stating reduction in effort should refer to 1998 levels. STECF endorses this interpretation of the ICES advice.

FSS agrees with the STECF interpretation of the ICES advice, for sub-areas V, VI, VII and VIII, and points out that it has been difficult to collate the data required to begin the process of reducing effort. Since black scabbard is caught in mixed deepwater fisheries, it should be managed in a mixed fisheries context.

FSS points out that there is no evidence that a separate stock exists in IX, therefore the 50% reduction should also apply to this Sub-area too.

FSS agrees with the STECF interpretation of the ICES advice for Sub-areas V, VI, VII, XII and VIII, and points out that it has been difficult to collate the data required to begin the process of reducing effort. Since

black scabbard is caught in demersal fisheries on the continental shelf and in mixed deepwater fisheries, it should be managed in a mixed fisheries context. FSS points out that there is no evidence that a separate stock exists in IX, therefore the 50% reduction should also apply to IX.

In Sub-areas X and XII, the 2001 ICES advice, that black scabbard is taken in developing, new fisheries. Therefore, FSS advises that fisheries taking black scabbard in these areas should not be allowed to expand until reliable assessments show that increased harvests are sustainable.

STATE OF THE STOCK

- There are concerns about the state of this stock. In previous years it was considered fully or over-exploited in all areas except X.
- Landings in VI and VII rose to 5,947 t in 2002, the highest in the series. Landings in VIII and IX peaked at 4,500 t in 1993, and were 2,724 t in 2002.
- The state of the stock in V, VI, VII and XII is very unclear. French CPUE shows a consistent decline to a historically low level in 1999, a slight increase in 2000, and then a very considerable increase in 2001. There is no evidence that this upward trend in recent French CPUE is related to increased abundance of this species. In IX, CPUE from longliners suggests that abundance has remained relatively stable during the past decade.

CURRENT MANAGEMENT

- In 2003, the EU TAC for Community waters and those not under the jurisdiction of third countries of V, VI, VII and XII was 3,110 t with an Irish quota of 93 t.
- The Faroe Islands has a quota of 940 t of blue ling, roundnose grenadier and black scabbard combined in VIaN and VIb. This allocation is for trawlers only.

ADDITIONAL INFORMATION

- There is no evidence supporting the upward trend in French trawler CPUE. It is not considered to be evidence that the stock is increasing in size.
- Landings in V, VI, VII and XII rose to nearly 5,000 t in 1993, declined to 2,000 t in 1998 and then increased to over 6,000 t in 2002. The Irish preliminary landings in 2002 were 1,049 t.
- There are two separate fisheries; west of Ireland and the UK black scabbard is taken in the mixed trawl fishery with roundnose grenadier, orange roughy, blue ling and sharks. In the south it is taken in targeted artisanal long fisheries off Portugal.
- There is considerable debate about the biology of this species, it is considered to be short lived and fast growing by some scientists, but there is evidence from FSS studies that it is a typical deepwater spe-

cies, long lived and slower growing.

- It does not seem likely that the dynamics of the species could explain the sharp increase in CPUE in the northern area in 2001.
- FSS advises that this species is not reported as cutlass fish in landings statistics.

Greater Forkbeard

FSS – ADVICE

FSS agrees with the ICES advice that greater forkbeard stocks can probably only sustain very low rates of exploitation. FSS advises that expansion of fisheries should not be allowed until reliable assessments indicate that increased harvests are sustainable.

FSS points out that since greater forkbeard is caught in some demersal fisheries on the continental shelf and in mixed deepwater fisheries, it should be managed in a mixed fisheries context.

STATE OF THE STOCKS

- The state of forkbeard stocks is unknown. In previous years it was classified as a new or developing fishery by ICES. However, this species has been fished since the 1980s.
- Landings in VI and VII rose gradually throughout the 1990s, peaking at 4,600 t in 2000 and were 3,170 t in 2002.

ADDITIONAL INFORMATION

- Landings in VI and VII were 3,170 t in 2002, with Irish preliminary landings of 481 t.
- The species is taken as a by-catch in trawl and longline fisheries mainly in VI, VII and VIII.
- Mora, another deepwater species, is often reported as greater forkbeard.

Portuguese dogfish and Leafscale gulper shark (siki sharks)

FSS ADVICE

FSS agrees with ICES advice that deepwater sharks can sustain only very low exploitation rates. They are taken in mixed fisheries, and should be managed in that context. Due to declining trends in CPUE, overall exploitation should be reduced.

FSS endorses that ICES advice that species-specific landings data be collected for all deepwater sharks to allow better understanding and quantification of the status of exploited shark species.

FSS agrees with the ICES consideration that it is not possible to identify the exact reduction in effort required, but that it is more likely to be large (50%) rather than small (10%).

STECF notes that the ICES advice for deepwater species in 2003 is unclear, in that it recommends effort reductions but does not specify reference levels. The interpretation of STECF is that, based on the ICES answer to a request from NEAFC, for clarification of such reference levels, the advised reduction in effort should refer to 1998 levels.

FSS agrees with the STECF interpretation of the ICES advice and points out that it has been difficult to collate the data required to begin the process of reducing effort. Since deepwater sharks are caught in demersal fisheries on the continental shelf and in mixed deepwater fisheries, they should be managed in a mixed fisheries context. FSS recommends that efforts to report and collect landings statistics for each species continue.

STATE OF THE STOCKS

- The status of these stocks is unknown, but there is evidence of strong declines in survey CPUE from 1993 to 2002.
- It is very difficult to get an accurate picture of deepwater shark landings, because many countries do not collect separate statistics. However French landings for these species increased to about 2,500 t in 2001, the highest in the series.
- There has been an increase in the commercial CPUE index from French trawlers in VI. But this is not supported by Norwegian and Irish survey CPUE that shows a declining trend to 2002. There is no evidence that the upward trend in French CPUE is due to increased abundance.

ADDITIONAL INFORMATION

- A preliminary assessment was carried out in 2002, but the input data were very poor. Updated CPUE data were presented to WGEF in 2003, that do not support the upward trend in French CPUE.
- The current advice is based on commercial CPUE data and fishery independent surveys. However, these data may indicate trends but do not provide absolute estimates of abundance.
- The increase in French trawler CPUE for VI in 2000 and 2001 was not supported by combined Irish and Norwegian longline CPUE data.
- Landings of both species in the ICES area have increased from 615 t in 1990 to 7,000 t in 2001. However, estimated landings of “various sharks”, (including an unknown component of deepwater sharks, but excluding as far as possible non-deepwater species) increased from 40 t in 1990 to 4,800 t in 1998, but declined to 2,000 t in 2001. Preliminary Irish landings of both deepwater shark spe-

cies in 2001 were 339 t.

- The main fishery is in VI and VII as part of the mixed species trawl fishery. France is the main participant. In VII and VIII Spanish and Spanish-owned flag gill-netters and longliners target these species in some years. There are directed artisanal longline fisheries off Portugal.
- No landings data are available for Spanish and Spanish-owned vessels, except for the Spanish trawl fishery on the Hatton Bank.
- FSS are involved in an EC-funded project (DELASS, 99-055) to develop stock assessments for these species. Much progress has been made on methodologies, but there are still insufficient data with which to conduct assessments.

Greater argentine

FSS ADVICE

FSS agrees with the ICES advice that greater argentine stocks can probably only sustain very low rates of exploitation, and that fisheries on such species, also as by-catch, should be permitted only when they are accompanied by programs to collect data. FSS point out that the ICES advice for roundnose grenadier also seems relevant for greater argentine, that expansion of fisheries should not be allowed until reliable assessments indicate that increased harvests are sustainable.

STATE OF THE STOCK

- The state of stocks of greater argentine is unknown, and no assessment has ever been attempted.
- Landings in VI and VII were highest in 1989 at 25,500 t, but declined to less than 2,000 t in 1993, but increased to over 22,000 t in 2001, but declined to around 15,000 t in 2002. Landings in Vb fluctuated between 8,000 t and 12,000 t since the mid 1990s, but decreased to around 400 t in 2002.
- There have been no assessments of greater argentine, but the decline in fish of ages more than 20 years suggests that the stock has been impacted by fishing.

CURRENT MANAGEMENT

- In 2003, the EU TAC for Community waters and those not under the jurisdiction of third countries of III and IV is 1,556 t, with an Irish quota of 10 t.
- In 2003, the EU for Community waters and those not

under the jurisdiction of third countries of V, VI and VII was 6,247 t with an Irish quota of 441 t.

- Norway has an allocation of 500 t of this species in EU waters of V, VIaN and VII west of 12° W, and in XIV, this allocation being interchangeable with blue whiting.
- The Faroe Islands are allowed unavoidable by-catches of this species in their fishery for blue whiting in EU waters of V, VIaN and VII west of 12° W only, and in XIV.

ADDITIONAL INFORMATION

- The lack of data have prevented any assessments of argentine being carried out.
- Landings in VI and VII were highest in 1989 at 25,500 t, but declined to less than 2,000 t in 1993, but increased to over 22,000 t in 2001, but declined to around 15,000 t in 2002. Irish preliminary landings in 2002 were 7,593 t.
- Misreporting is a problem in fisheries for this species. There is a tendency to misreport other pelagic species as greater argentine.
- The main participants in this fishery in VI and VII are Dutch freezer trawlers. Irish refrigerated seawater vessels targeted the species heavily in the late 1980's and in recent years there has been some targeting of the species by Irish vessels.

Other species

Limited data, mainly landings, exist for other deepwater species caught by Irish deepwater fisheries.

- Preliminary Irish landings of cardinal were 55 t in 2002, mainly as a by-catch of orange roughy fishing in VII.
- Wreckfish were taken by Irish vessels in 2001 and 2002, some of these catches came from outside the ICES area.

Estimated landings (tonnes) of deep-water species by ICES Sub-areas and Divisions, 1988-2002. Data for 2001 and 2002 are preliminary.

I+II	Species	1988	1989	1990	1991	1992	1993	1994	1995	1996	1997	1998	1999	2000	2001	2002
ALFONSINOS (Beryx spp.)																
	ARGENTINES (Argentina silus)	11351	8390	9120	7741	8234	7913	6807	6775	6604	4463	8261	7163	6293	14363	7474
	BLUE LING (Molva dyptergia)	3537	2058	1412	1479	1039	1020	422	364	267	292	279	292	252	200	148
BLACK SCABBARD FISH (Aphanopus carbo)																
	BLUEMOUTH (Helicolenus dactylopterus)															
	GREATER FORKBEARD (Phycis blennoides)															
	LING (Molva molva)	6126	7368	7628	7793	6521	7093	6322	5954	6346	5409	9200	7651	5964	4950	7108
MORIDAE																
	ORANGE ROUGHY (Hoplostethus atlanticus)															
	RABBITFISHES (Chimaerids)															
	ROUGHHEAD GRENNADIER (Macrourus berglax)		589	829	424	136			17		55		48	94	1	2
	ROUNDNOSE GRENNADIER (Coryphaenoides)	22	49	72	52	15	15	7	2	106	100	46		2	12	
	rupestris)															
	RED (=BLACKSPOT) SEABREAM (Pagellus bogaraveo)															
	SHARKS, VARIOUS	37	15												1	
SILVER SCABBARD FISH (Lepidopus caudatus)																
	SMOOTHHEADS (Alepocephalidae)															
	TUSK (Brosme brosme)	14403	19350	18628	18306	15974	17585	12566	11617	12795	9426	15353	17183	14008	12050	12182
WRECK FISH (Polyprion americanus)																
III+IV																
Species																
ALFONSINOS (Beryx spp.)																
	ARGENTINES (Argentina silus)	2718	3786	2321	2554	5319	3269	1508	1082	3300	2598	3982	4319	2471	1914	1328
	BLUE LING (Molva dyptergia)	385	482	522	648	592	438	442	503	202	291	292	271	144	276	378
	BLACK SCABBARD FISH (Aphanopus carbo)	2		57				16	2	4	2	9	6	5	12	18
	BLUEMOUTH (Helicolenus dactylopterus)												5			
	GREATER FORKBEARD (Phycis blennoides)	15	12	115	181	145	34	12	3	18	7	12	31	11	26	561
	LING (Molva molva)	11933	12486	11025	10943	12154	14249	12288	14112	14531	12325	14472	10472	9858	8375	9096
MORIDAE																
	ORANGE ROUGHY (Hoplostethus atlanticus)															
	RABBITFISHES (Chimaerids)															
	ROUGHHEAD GRENNADIER (Macrourus berglax)				7					36			4	11		24
	ROUNDNOSE GRENNADIER (Coryphaenoides)	618	1055	1439	2053	2754	1441	771	85	2284	177	1854	3187	2406	3121	4250
	rupestris)															
	RED (=BLACKSPOT) SEABREAM (Pagellus bogaraveo)															
	SHARKS, VARIOUS				3	133	78	86	20	14	32	359	201	36	62	
	SILVER SCABBARD FISH (Lepidopus caudatus)				27											
	SMOOTHHEADS (Alepocephalidae)															
	TUSK (Brosme brosme)	4490	6515	4319	4623	5029	5234	3433	3405	3576	2341	3474	2498	3411	3196	2990
WRECK FISH (Polyprion americanus)																

Va	Species	1988	1989	1990	1991	1992	1993	1994	1995	1996	1997	1998	1999	2000	2001	2002
	ALFONSINOS (Beryx spp.)															
	ARGENTINES (Argentina silus)	206	8	112	247	657	1255	613	492	808	3367	13387	5518	4593	3046	4960
	BLUE LING (Molva dyptergia)	2171	2533	3021	1824	2906	2233	1632	1635	1323	1344	1154	1583	1680	906	1324
	BLACK SCABBARDFISH (Aphanopus carbo)							1			1		9	18	8	13
	BLUEMOUTH (Helicolenus dactylopterus)															
	GREATER FORKBEARD (Phycis blennoides)	5861	5612	5598	5805	5116	4854	4604	4192	4060	3933	4302	4647	3743	3317	2887
	MORIDAE															
	ORANGE ROUGHY (Hoplostethus atlanticus)				65	382	717	158	64	40	79	28	14	68	19	10
	RABBITFISHES (Chimaerids)				499	106	3	60	106	21	15		2	4		
	ROUGHHEAD GRENADIER (Macrourus berglax)								15	4			4		5	
	ROUNDNOSE GRENADIER (Coryphaenoides2 rupestris)	4	7		48	210	276	210	398	140	198	120	129	67	57	60
	RED (=BLACKSPOT) SEABREAM (Pagellus bogaraveo)															
	SHARKS, VARIOUS	31	54		58	70	39	42	45	65	70	87	45	45	57	
	SILVER SCABBARDFISH (Lepidopus caudatus)															
	SMOOTHHEADS (Alepocephalidae)					10	3	1	1							
	TUSK (Brosme brosme)	6855	7061	7291	8732	8009	6075	5824	6225	6102	5394	5171	7264	6391	4747	3409
	WRECKFISH (Polyprion americanus)															

Vb	Species	1988	1989	1990	1991	1992	1993	1994	1995	1996	1997	1998	1999	2000	2001	2002
	ALFONSINOS (Beryx spp.)			5		4			1							
	ARGENTINES (Argentina silus)	287	227	2888	60	1443	1063	960	12286	9498	8433	17570	8214	8343	10460	406
	BLUE LING (Molva dyptergia)	9526	5264	4799	2962	4702	2836	1644	2440	1602	2798	2584	2932	2514	2318	1086
	BLACK SCABBARDFISH (Aphanopus carbo)		166	419	152	33	287	160	424	186	68	180	172	313	581	358
	BLUEMOUTH (Helicolenus dactylopterus)												58	16		
	DEEP WATER CARDINAL FISH (Epigonus telescopus)										8	2	6			
	GREATER FORKBEARD (Phycis blennoides)	2	1	38	53	49	27	4	9	7	7	8	34	32	98	148
	LING (Molva molva)	4488	4652	3857	4512	3614	2856	3622	4070	4896	5657	5359	5238	3719	4505	2249
	MORIDAE				5								1			
	ORANGE ROUGHY (Hoplostethus atlanticus)			22	48	13	37	170	420	79	18	3	5	155	5	
	RABBITFISHES (Chimaerids)								1				3	54	82	47
	ROUGHHEAD GRENADIER (Macrourus berglax)										9	58	1	4		
	ROUNDNOSE GRENADIER (Coryphaenoides1 rupestris)	258	1549		2311	3817	1681	668	1223	1078	1112	1667	1996	1787	1719	814
	RED (=BLACKSPOT) SEABREAM (Pagellus bogaraveo)															
	SHARKS, VARIOUS		140		78	164	478	192	262	380	308	433	470	409	543	
	SILVER SCABBARDFISH (Lepidopus caudatus)															

SMOOTHHEADS (Alepocephalidae)
TUSK (Brosme brosme)
WRECKFISH (Polyprion americanus)

VI+VII	Species	1988	1989	1990	1991	1992	1993	1994	1995	1996	1997	1998	1999	2000	2001	2002
	ALFONSINOS (Beryx spp.)			8		3	1	5	3	178	25	81	87	102	128	115
	ARGENTINES (Argentina silus)	10438	25559	7294	5197	5906	1577	5707	7546	5863	7301	5555	8856	13863	22273	15926
	BLUE LING (Molva dyptergia)	9285	9434	6396	7319	6697	5471	4309	4892	6928	7361	8004	9471	8522	11070	6096
	BLACK SCABBARDFISH (Aphanopus carbo)		154	1060	2759	3436	3529	3101	3278	3689	2995	1967	2166	3712	4620	5947
	BLUEMOUTH (Helicolenus dactylopterus)												403	342	137	36
	DEEP WATER CARDINAL FISH (Epigonus telescopus)										279	241	349	3		
	GREATER FORKBEARD (Phycis blennoides)	1898	1815	1921	1574	1640	1462	1571	2138	3590	2335	3040	3430	4919	4339	3170
	LING (Molva molva)	28092	20545	15766	14684	12671	13763	17439	20856	20838	16668	19863	15087	14593	11319	10250
	MORIDAE				1	25							20	104	95	49
	ORANGE ROUGHY (Hoplostethus atlanticus)	8	17	4908	4523	2097	1901	947	995	1039	1071	1337	236	355	641	550
	RABBIFISHES (Chimaerids)						2						34	9	28	6
	ROUGHHEAD GRENADIER (Macrourus berglax)					18	5	2								
	ROUNDNOSE GRENADIER (Coryphaenoides32 rupestris)	2440		5730	7793	8338	10121	7860	7767	7095	7070	6364	6538	9790	14907	8950
	RED (=BLACKSPOT) SEABREAM (Pagellus252 bogarveo)	189	134	123	123	40	22	10	11	29	56	17	25	20	50	24
	SHARKS, VARIOUS	85	40	43	254	639	1392	1864	2099	2176	3240	3023	1791	8		
	SILVER SCABBARDFISH (Lepidopus caudatus)					2						18	15			
	SMOOTHHEADS (Alepocephalidae)										7			978	4689	1
	TUSK (Brosme brosme)	3002	4086	3216	2719	2817	2378	3233	3085	2417	1832	2240	1654	4498	2673	1771
	WRECKFISH (Polyprion americanus)	7		2	10	15				83		12	14	14	17	

VIII+IX	Species	1988	1989	1990	1991	1992	1993	1994	1995	1996	1997	1998	1999	2000	2001	2002
	ALFONSINOS (Beryx spp.)			1		1		2	82	88	135	269	198	161	222	123
	ARGENTINES (Argentina silus)															191
	BLUE LING (Molva dyptergia)										14	33	3	2	4	37
	BLACK SCABBARDFISH (Aphanopus carbo)	2602	3473	3274	3979	4389	4513	3429	4272	3815	3556	3152	2752	2403	2766	2724
	BLUEMOUTH (Helicolenus dactylopterus)												31	36	34	16
	DEEP WATER CARDINAL FISH (Epigonus telescopus)										3	5	3	3		
	GREATER FORKBEARD (Phycis blennoides)	81	145	234	130	179	395	320	384	456	361	665	377	383	451	328
	LING (Molva molva)	1028	1221	1372	1139	802	510	85	845	1041	1034	1799	451	331	516	309
	MORIDAE								83	52	88			20	18	8

XII	Species	1988	1989	1990	1991	1992	1993	1994	1995	1996	1997	1998	1999	2000	2001	2002
	ALFONSINOS (Beryx spp.)								2							
	ARGENTINES (Argentina silus)						6			1			2			
	BLUE LING (Molva dyptergia)	263	70	5	1147	971	3335	752	573	788	417	438	1353	505	839	66
	BLACK SCABBARDFISH (Aphanopus carbo)					512	1144	824	301	444	200	154	112	244	118	1
	BLUEMOUTH (Helicolenus dactylopterus)															
	GREATER FORKBEARD (Phycis blennoides)					1	1	3	4	2	2	1		6	8	6
	LING (Molva molva)			3	10			5	50	2	9	2	2	7	59	32
	MORIDAE													1		
	ORANGE ROUGHY (Hoplostethus atlanticus)					8	32	93	676	818	808	629	431	92	16	6
	RABBITFISHES (Chimaerids)										32	42	115	48	63	
	ROUGHHEAD GRENADIER (Macrourus berglax)											39	5	7	9	
	ROUNDNOSE GRENADIER (Coryphaenoides berglax)	10600	9500	2800	7510	1997	2741	1161	644	1728	8676	11978	9660	8522	7803	752
	rupestris)															
	RED (=BLACKSPOT) SEABREAM (Pagellus bogaraveo)					75										
	SHARKS, VARIOUS				1	2	6	8	139	147	32	56	50	1069	1208	
	SILVER SCABBARDFISH (Lepidopus caudatus)	102	20			19										
	SMOOTHHEADS (Alepocephalidae)									230	3692	4643	6549	4146	3132	
	TUSK (Brosme brosme)	1	1		1	1	12	1	18	158	30	1	1	5	51	27
	WRECKFISH (Polyprion americanus)															

XIV	Species	1988	1989	1990	1991	1992	1993	1994	1995	1996	1997	1998	1999	2000	2001	2002
	ALFONSINOS (Beryx spp.)															
	ARGENTINES (Argentina silus)			6										217	66	
	BLUE LING (Molva dyptergia)	242	71	79	155	110	3725	384	141	14	4	55	8	532	97	1
	BLACK SCABBARDFISH (Aphanopus carbo)											2		90		
	BLUEMOUTH (Helicolenus dactylopterus)															
	GREATER FORKBEARD (Phycis blennoides)															23
	LING (Molva molva)	3	1	9	1	17	9	6	17	0	61	6	1	26	35	20
	MORIDAE															
	ORANGE ROUGHY (Hoplostethus atlanticus)															
	RABBITFISHES (Chimaerids)															
	ROUGHHEAD GRENADIER (Macrourus berglax)					52	5	2			6	14		26	4	
	ROUNDNOSE GRENADIER (Coryphaenoides berglax)	52	45	47	29	31	26	15	27	25	59	126	124	46	92	41
	rupestris)															
	RED (=BLACKSPOT) SEABREAM (Pagellus bogaraveo)															
	SQUALID SHARKS	2253	2151	3871	5610	7836	7985	7474	6801	7065	6158	6318	5636	7150	9175	
	SHARKS, VARIOUS including some squalids	3630	1860	2026	4453	10429	9044	5757	5383	5974	7579	9602	7655	6764	7874	
	SILVER SCABBARDFISH (Lepidopus caudatus)															
	SMOOTHHEADS (Alepocephalidae)															
	TUSK (Brosme brosme)	2	23	32	135	202	80	25	87	281	118	15	9	4158	4121	
	WRECKFISH (Polyprion americanus)													11	69	58

DEEPWATER CORALS

The deepwater areas west of Ireland have long been known to have extensive areas of cold-water corals. These reefs were originally documented by the various national deepwater research expeditions that were conducted in the early 20th century. However deepwater corals received little further attention from the scientific community until the late 1990's. The renewed research was aided by EU-funded research projects. At this time, concerns were first raised about the impact that marine industries such as fishing, mineral exploration, aggregate extraction and dumping may have on these vulnerable and long-lived species.

Ecosystem based advice is a new and developing area for ICES, the Advisory Committee on the Ecosystem (ACE) was set up to provide such advice and to incorporate environmental and fisheries assessments into the advisory process (see section on Ecosystem considerations in fisheries management). There is need for greater collaboration between environmental and fisheries scientists, and more joint research between these groups. Much work remains to be done, to achieve integrated advice, spanning fisheries, ecosystem and environmental considerations.

ACE has produced advice on the distribution of cold-water corals in the North Atlantic and the impact of fisheries. This advice is directly relevant to the management deepwater fisheries.

FSS work is to conduct scientific research in support of ACFM and the provision of advice on fisheries management. However FSS presents a summary of the ACE advice and puts forward an explanation of the process by which this advice was formulated.

Formulation of advice on cold-water corals

In July 2000, the European commission requested ICES to identify “*areas where cold-water corals may be affected by fishing*”. This request was dealt with by ACE at its 2003 meeting (*report still in preparation*). ACE produced advice based on the 2003 report of the ICES Study Group on Mapping the Occurrence of Cold-Water Corals (SGCOR).

The SGCOR report presented information on the occurrence of cold-water corals in the North Atlantic. In Irish EEZ waters, the information presented to SGCOR consisted of literature sources, documenting corals associated with carbonate mounds on the upper continental slopes of the Rockall Trough and Porcupine Seabight. These mounds are found in depths of between 500 and 1,200 m and vary from small structures to over 300 m in height. A French led ecological survey was carried out in 2001 off the west coast of Ireland, the CARACOLE survey. Its aim was to investigate and map carbonate mounds and cold-water corals. Five coral/ mound complexes were studied:

- Thérèse Mound: - Eastern slopes of Porcupine Seabight

- Propellor Mound: - North slopes of Porcupine Seabight
- Perseverance Mounds: - North slopes of Porcupine Seabight
- R1 Mound: - Northwest slope of Porcupine Bank
- R2 Mound: - Southeast slope of Rockall Bank.

Evidence of lost gillnets and tanglenets was found in some areas, especially on Thérèse Mound. Trawl marks were detected between mounds, using side-scan sonar.

Reference was made in the SGCOR report to the Irish orange roughy fishery that targets aggregations over peaks. The fishing technique employed had a major impact on coral habitats in Australia and New Zealand, with several documented sources.

ICES ACE Advice

- 1) In order to assess the impact, and potential impact, of fishing on the destruction of corals other than *Lophelia pertusa* and other colony-forming Scleractinia corals, ICES Member Countries should provide further information on the distribution of, and threats to, large slow-growing octocorals, especially *Paragorgia arborea* and *Primnoa resedaeformis*, as well as other large forms of cold-water corals such as gorgonians.
- 2) In order to best tailor advice addressing actual fishing pressure, ICES Member Countries and relevant Commissions should provide access to detailed, suitably personalized data on the location of fishing effort, both current and anticipated, in areas known or likely to contain *Lophelia* and other cold-water corals.
- 3) In order to add to knowledge on the distribution of *Lophelia* and trawling impact, ICES Member Countries and relevant Commissions should ensure that by-catch recording schemes and fisheries observer reports include records of *Lophelia* and other cold-water corals.
- 4) In order to protect *Lophelia* reefs at the Darwin Mounds, ICES recommends that the area be closed to bottom trawling within a box with the following corner coordinates: 59° 54' N, 7° 39' W; 59° 54' N, 6° 47' W; 59° 37' N, 6° 47' W; and 59° 37' N, 7° 39' W.
- 5) In order to protect carbonate mounds and *Lophelia* reefs in Irish offshore waters, it is recommended that four areas be closed to bottom trawling: the R1 and R2 regions near the Rockall Trough, the Perseverance and Propeller Mounds Complex, and the Thérèse Mound Complex.

FSS ADVICE

FSS advice is in relation to the points 1 to 5 of the ICES ACE advice.

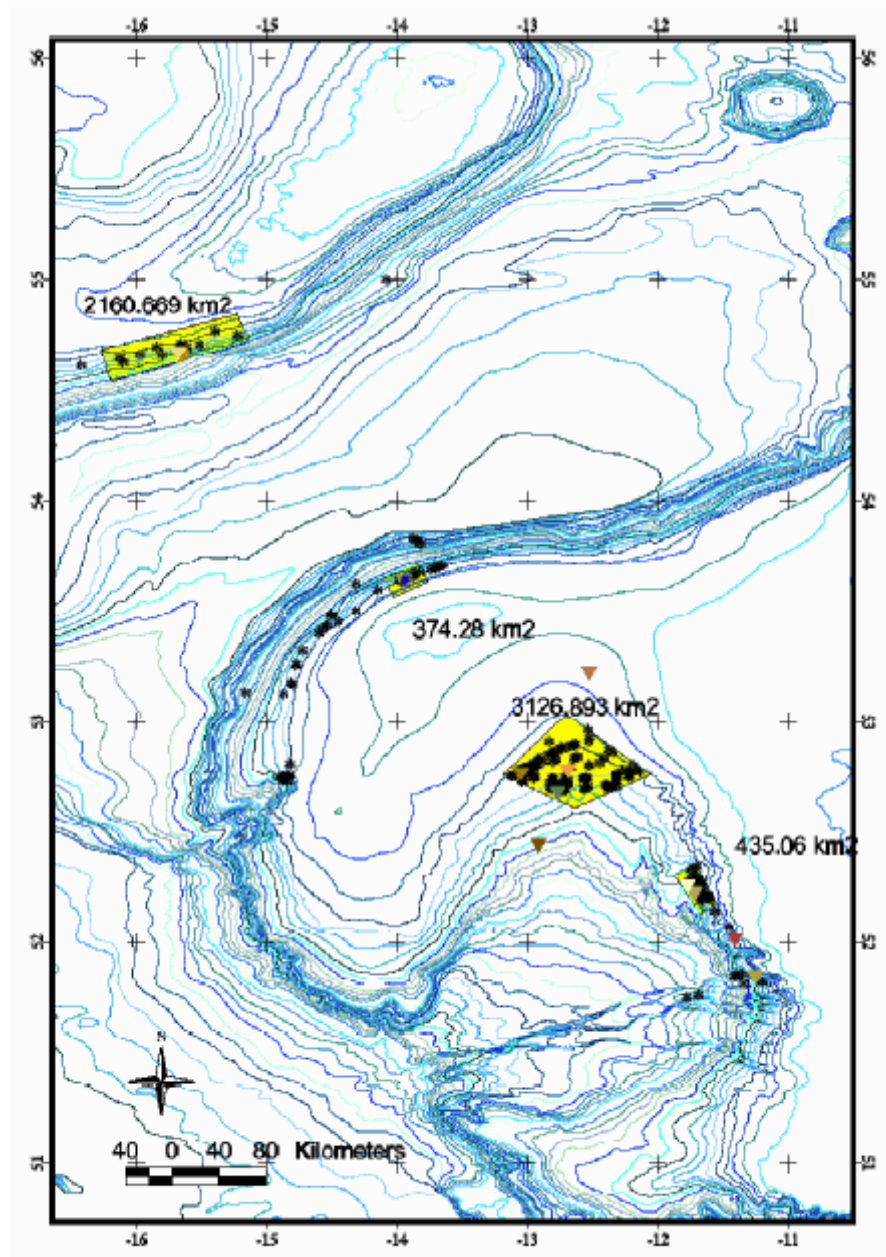
- 1) FSS agrees with this advice, but strongly recommends that all Member States provide updated, accurate data on these and other forms of cold-water corals in their EEZ's and in international waters.
- 2) FSS recognises the sensitivity of such data, in relation to orange roughy fisheries.
- 3) FSS advises that more knowledge is required on the distribution of *Lophelia* and on the impact of all fishing techniques on this and other cold-

water corals. FSS is concerned that there are insufficient data to evaluate the impacts of all fishing techniques on deepwater corals.

- 4&5) FSS advises that accurate scientific data are required to designate closed areas in areas where there are extensive *Lophelia* reefs. FSS further advises that the impact of fishing, by all gears, on coral habitats must be investigated, including trawling, tanglenetting, gillnetting, pots and longlines.

FSS strongly recommend that it will be essential to have extensive consultation between fishermen, fisheries scientists, environmental scientists and managers, in order to achieve an effective means of protecting *Lophelia* reefs.

Figure 4.3.1. Four sites to the west of Ireland identified as suitable for the protection of cold-water coral reefs and carbonate mounds by the Irish Coral Task Force.



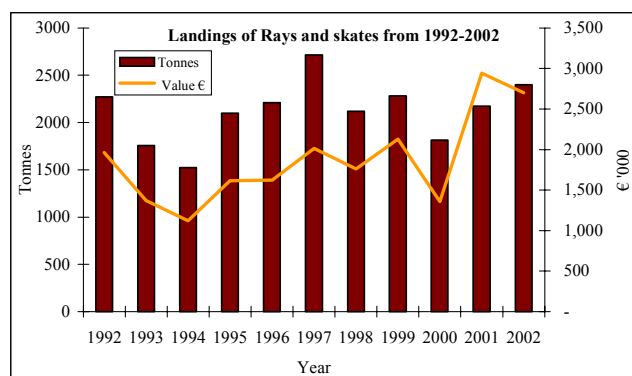
Non – Quota Species Review

Under the terms of the new Memorandum of Understanding between the European Commission and ICES, management advice is being sought on many non-quota species, such as lemon sole, brill, skate, ray and spurdog.



RAYs AND SKATEs

Though these species are not subject to quotas in Irish waters, they are a valuable component of Irish landings. There are several fisheries for rays and skates, often they are taken as by-catch in mixed trawl fisheries. However the most important fishery is in the southern Irish Sea, they are targeted on the “Peaks” ground using rockhopper otter trawls and beam trawls. The main ports where they are landed are Howth, Arklow and Kilmore Quay. In 2002, ray and skate landings were about 2,400 t, valued at €2.7 million, placing these species among the most valuable to the catching sector. Rays are landed into the west and northwest ports and sold to the Dublin market or to continental Europe, mainly Belgium. The blonde ray *Raja brachyura*, the thornback ray *Raja clavata*, the spotted ray *Raja montagui*, the cuckoo ray *Raja naevus* are the four main species exploited in the Irish Sea. In addition, the small-eye ray *Raja microcellata* is also a component of the landings in the Celtic Sea. In addition to these species, *Raja batis* the common skate is caught on the west and north coast fisheries and the undulate ray *Raja undulata* is taken in fisheries in the southwest.

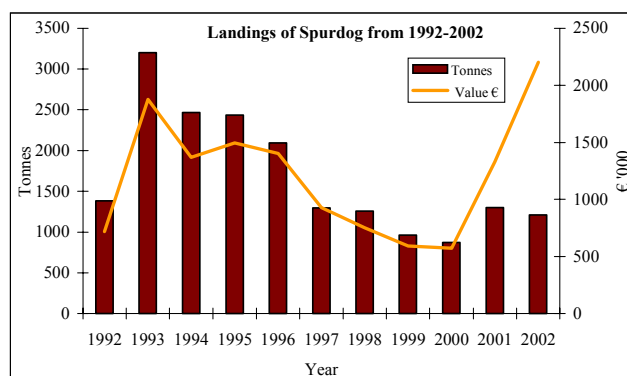


SPURDOG

Once a nuisance species in fisheries for salmon and herring, spurdog became a highly valuable species by the mid 1980s. Though the landings of spurdogs has declined in recent years, the value of these landings has increased. This species is a by-catch in demersal trawl fisheries and there is some targeted fishing with gill nets. In 2002 Irish landings were 1,213 t worth € 2.2 million. Spurdog is a by-catch in demersal otter trawl fisheries but prices for the species vary considerably. The gill-net fishery for this species, targeting females, developed and expanded rapidly from 1977 onwards. Between 1977 and 1985 landings increased from 116 t to almost 8,000 t annually. The fishery began in Co. Donegal but effort shifted southward as catches declined. The fishery became moribund in the early 1990's as the stocks became depleted. There is some targeting of this species in recent years but landings are very low in comparison to 1980's levels.

SPOTTED DOGFISH

Though spotted dogfish are marketed in several European countries including France and Belgium, they are not of



commercial importance in Ireland; although they are landed at various ports around the coast, and sold for bait in pot fisheries. Landings of spotted dogfish in Donegal and the west coast are primarily to supply crab and lobster fisheries while in the Irish Sea some of the landings supply the whelk fishery. In 2002 Irish boats landed 505 t of both species of spotted dogfish.

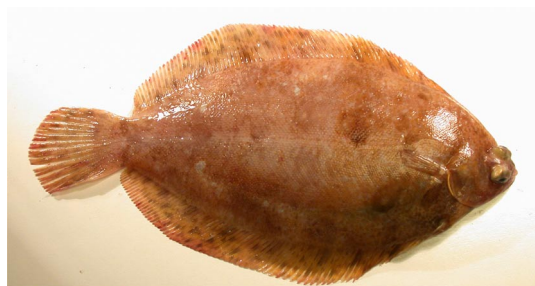
LARGE SHARKs

Several species of large sharks are regularly found in Irish waters. They are occasional by-catches in commercial fisheries. Some are valuable, such as porbeagle. The blue shark comprises a large by-catch and is often discarded in many tuna fisheries. However an important feature of the new Irish mid-water trawling fishery for tuna, is that shark by-catch is very low. This is to be expected as these fast-swimmers usually avoid towed gears. In recent years, separate landings statistics are collected for these species. Only 1 tonne of blue shark was reported in Irish landings

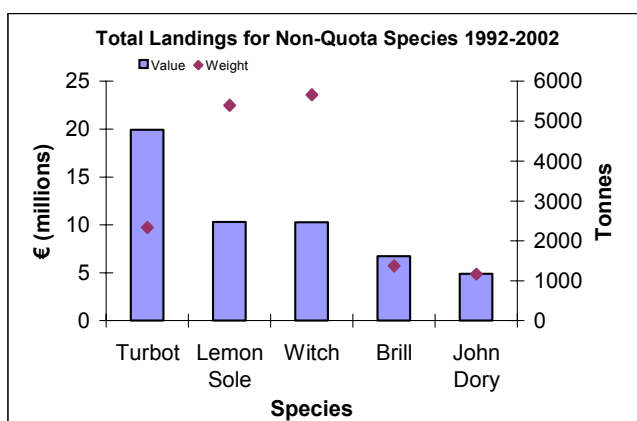
in 2002. This is a low value species that is not always retained because its flesh deteriorates rapidly. It is a by-catch or discard in several fisheries. Porbeagle is a high value species. It is a by-catch in demersal fisheries with landings of 3 t in 2002. Tope is another by-catch shark species with reported landings of about 2 t in 2001. There are also unidentified landings of sharks amounting to 357 t. It is important that efforts continue, to collect separate statistics for these species. Large sharks these are not important commercial species, they have huge importance as sport fish species and shark angling is a very important marine tourism resource in Irish coastal areas.

The Central Fisheries Board is Ireland's statutory agency to conserve, develop, protect and promote inland fisheries and sea angling resources. The Central Fisheries Board's Marine Sportfish Tagging Programme was initiated in 1970 in conjunction with selected skippers of angling charter vessels. The Central Fisheries Board programme is the second largest shark tagging programme in the world. Since its inception it has provided a large data set on the movements, migrations and biology sharks and rays, particularly the blue shark, thornback ray, undulate ray, tope, porbeagle and angel shark. The results of these studies have been reported by CFB scientists in several recent scientific publications. The project is now in its 33rd year. Under the DELASS project, the data for the thornback ray *Raja clavata* and blue shark *Prionace glauca*, were analysed to investigate stock structure and basic biology of the two species. Future work on blue shark research will be conducted as part of the Memorandum of Understanding between the Marine Institute and the US National Marine Fisheries Service. The CFB, FSS and NMFS will work together to improve our knowledge of blue shark movements, stock structure and biology.

In response to the call for plans of action on elasmobranch fisheries management, STECF convened a sub-group to evaluate stock status of elasmobranchs taken in European fisheries. The group evaluated available information on stock status and provided a discussion of management measures that could be applied to elasmobranch stocks. More work will be required to evaluate elasmobranch stock status and the newly constituted ICES Working Group on Elasmobranch Fishes will deal with this subject. This work should ideally become part of the research into mixed fisheries, as most elasmobranchs are taken as part of mixed fisheries.

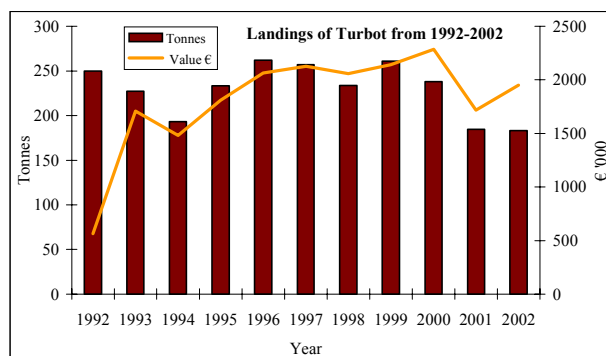


The five most important demersal non-quota fin-fish species to the Irish fishing industry are turbot, lemon sole, witch, brill and john dory. In 2002, these species had a combined value of €6.0 million. These species are usually by-caught by otter trawls and beam trawls targeting demersal fisheries and are generally landed in small quantities. Due to the increasing pressure on quota species, it is important to increase the research of non-quota or non-TAC species. Sampling of these stocks is carried out by the Fisheries Assessment Technicians on their routine discard trips. Sampling is also incorporated into the FSS annual groundfish surveys.



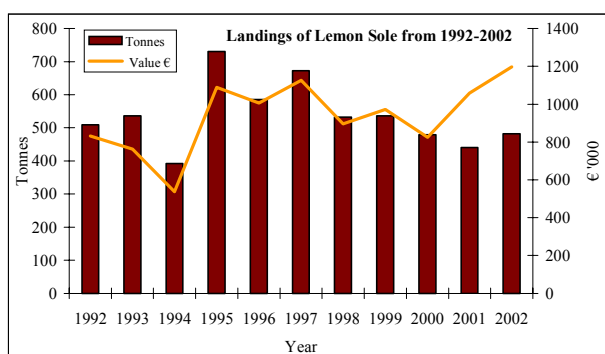
TURBOT (*PSETTA MAXIMA*)

Turbot was worth almost €2.0 m to the Irish fishing industry in 2002, a 13% increase on 2001 value. Turbot have previously been fished using tangle nets. Beam trawls, otter trawls and seiners are also used. There is a small artisanal longline fishery for turbot in France. The quantity of turbot caught by otter trawls at any time is small, usually one or two per tow. Highest catches are in the summer months when spawning occurs. Turbot commands high market prices and is always in high demand making it a very important non-quota species. Presently turbot are being farmed in Kilkieran Bay, Co. Galway by Turbard Iarthar Chonamara (TIC) Teo. Although some work has been carried out, little is known about the biology of wild turbot stocks in Irish waters.



LEMON SOLE (*MICROSTOMUS KITT*)

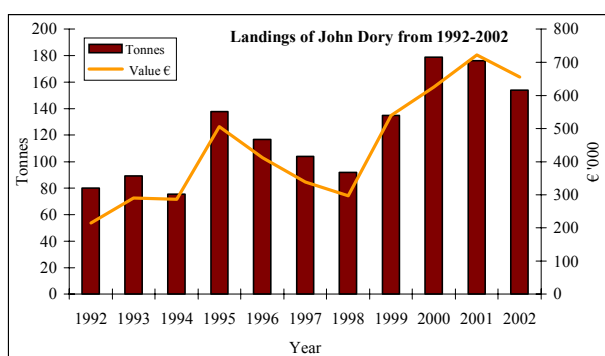
Lemon sole is caught commercially and as by-catch species in otter trawls. It lives on the seabed in a range of habitats ranging from mud and sand to gravel and even rocky grounds. Although normally living in deeper waters smaller specimens can be caught close inshore. The majority of fish caught are too small to be landed commercially. In 2002 lemon sole landings were valued at € 1.2m. Over the last ten years the price per tonne of lemon sole has varied from €1,300 to €2,400. Fisheries Science Services continue to sample this species in ICES Divisions VIa and VIIg, identified as the two most important areas for lemon sole landings in previous years.



JOHN DORY (*ZEUS FABER*)

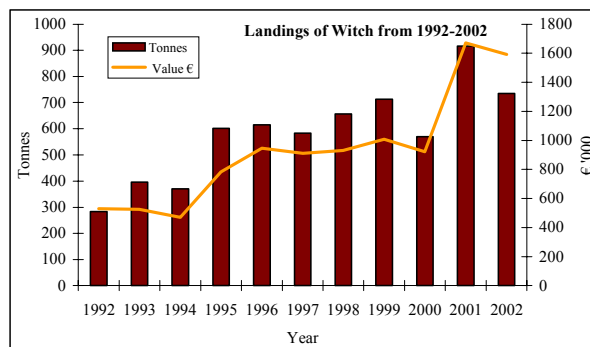
This species is usually caught in small numbers. This may be due to its solitary nature. John Dory rarely forms shoals larger than five individuals. It is an inshore fish which may be found out to 200m, primarily on sandy ground. In 2002, 154 t of john dory were landed with a commercial value of €0.65m.

The value of john dory has varied from €3,200-€4,200 per tonne over the last ten years.



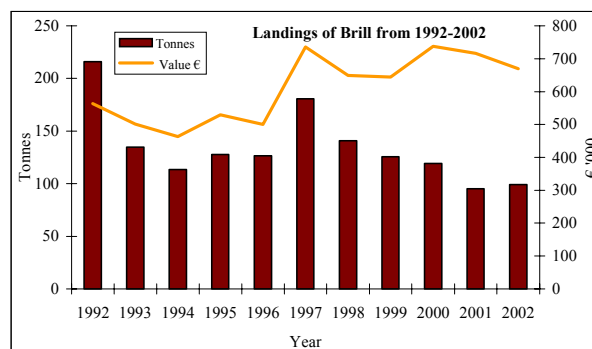
WITCH (*GLYPTOCEPHALUS CYNOGLOSSUS*)

Witch is found in deep waters. It is most abundant on fine muddy sand or mud in depths of 50m down to 1400m. It is less common closer inshore in shallow waters. This species is targeted by demersal otter trawls. In the Celtic Sea boats may get up to one box of witch per tow. There is a targeted Spanish fishery for witch at Rockall and the Hatton Bank. In 2002, 736 t (a 180 t decrease from 2001) of witch was landed with a value of €1.6m. From 1993-2002 the price per tonne of witch has varied from €1,300-€2,300.



BRILL (*SCOPHTALMUS RHOMBUS*)

In 2002, Irish vessels caught 99 t of brill with a value of €0.7m. This flat fish is caught principally as by-catch in demersal otter trawls. It is also important for small inshore vessels. In addition, brill can be caught in tangle nets targeting species such as monkfish, rays and turbot. It is a shallow-water fish found close inshore and usually on sandy bottoms. Adult brill are bottom-living fish. The young are found near the shore and in intertidal pools on sandy shores. There has been a gradual increase in the price per tonne of brill in the last ten years, varying from €2,600 in 1992 to €7,500 in 2001. In 2002 however there was slight decrease to €6,700.



Inshore Fisheries Review

Apart from the 12 nm zone, there is no formal designation of inshore fisheries in Ireland. The types of vessel which frequent this coastal band were, according to BIM, vessels of < 15 m. It would be useful to have a further breakdown of the inshore fleet, segregating the full and part time fishermen who exploit quota and non-quota species within 6 nm of the coast in vessels of <12 m. In fact, the composition of the fleets frequenting waters inside both the 6 and 12 nm zones is very complex. Some other European Community nations are allowed access up to 6 miles of parts of the coast. Large Irish pelagic vessels fish sprat even closer while vessels of <15 m are capable of fishing outside 12 nm.



Near-shore waters are exploited with a greater range of gears than waters further from the coast although, paradoxically, these shallow depths are important nursery areas and the inshore fleet, many of whose boats are not registered, harvest managed (quota) species. There is no restriction on trawling close to shore and gears of this kind take a mixture of finfish and crustacean species.

This year the inshore review covers unit stocks which are targeted using rod and line (1), Pot (trap) (10), by dredge or various kinds (6) and by gathering (including digging and raking) (4). In one case tangle netting makes a contribution to landings. The unit stocks belong to the following taxa: Fish (1), Decapod crustaceans (8), Gastropods (3), Intertidal bivalves (4), surface bivalves (3) and Echinoderms (1). Based on official statistics prepared by DCMNR, the minimum first sale value of these fisheries combined, allowing that some, like the Northern brown crab fishery and the Southern Irish Sea fishery for scallop have extended their activities beyond the 12 nm zone, is €26.4 m. This figure does not include whitefish or pelagic fin fish harvested close to shore which number among them some of the most valuable quota-controlled species. Not included either are *Nephrops* which may be captured close inshore but which is dealt with elsewhere in the stock book. Nor are the surface bivalves like the oysters which are mariculture (hence managed) fisheries.

The lack of a geographical segregation of vessels of different size and the existence of a polyvalent sector in which boats can switch from one gear type to another, is a major obstacle to the development of a rational exploitation pattern in inshore fisheries. The initiative of 2001 which sought to develop the sector, if it were effective in any way, had the consequence of increasing capitalisation in an already over-subscribed fleet. Inshore fisheries are effectively open access fisheries and there is little or no incentive in these to exploit rationally. For a decade there has been talk of some kind of access control – as by limited entry for example – to inshore fisheries but a framework for that has still to be devised and the large unregistered component of boats working close to shore is testimony to the unregulated nature of these fisheries.

Ideally, waters within the coastal band should be segregated into zones which are fished by a limited number of vessels of a particular size class using only certain defined gears.

Those who work in the inshore sector, be they scientists or fishers, recognize the desirability of a regulated system. Controls are effective, provided they are impartially imposed. However much controls are disliked, there are few justifications to living without them. It is the nature of fishing that those who pursue their livelihoods in this way are independently minded and although individuals may have a strong sense of the value of conservation few if any, fishers will view one of their fellows flouting the law while they themselves remain compliant indefinitely. The result if a free-for-all and the recent history of Irish fisheries illustrates it well.

Of the 20 stock units which make up the inshore section of this report, no advice is proffered on the management of green crab fisheries; further information is considered desirable in formulating a management plan for scallop on the north coast, queen scallop on north and east coasts and the management of palourde. This is not to say that sufficient information is available on any of the other stock units, it is rather to state that in these cases, further information is a pre-requisite to a management strategy.



The inshore sector needs new regulations in addition to those at present on the books. The Shrimp Order 2003 which came into effect on 13 June of this year is a case in

point. In future it will provide for a close season for the months of May – July inclusive while what is required is a closure which commences in January or February instead.

The regulation which bans the taking of crawfish in “cray nets” but permits the continued use of those nets is pointless. This method of capture is widely regarded as being responsible for the depletion of this valuable crustacean and it is highly unlikely, given the high first sale prices of crawfish, that any which are captured in a tangle net would be returned alive to the water.

In the case of periwinkle a size limit is required to prevent the heavy exploitation of undersized individuals which are of little if any value to the trade. The introduction of a close season (or seasons) for this species has also been recommended.

The speed with which razor clam beds were fished down is symptomatic of the lack of any management regime for inshore resources; the fishery commenced in the late 1990s and was rapidly populated by a variety of boats using custom built hydraulic dredges. Within three years the Gormanstown bed of *Ensis siliqua*, regarded by fish processors as one of the largest in Europe, was abandoned, although boats have returned to it in the last year, the advance of technology in the meantime allowing them to more efficiently rework the substratum there. The bed lay fallow for two years but there has been no sign of stock regeneration in the meantime. Although techniques have improved, hydraulic dredging causes a large incidental mortality of harvestable razor clams. There is a strong case for harvesting them by diving but only if that were to be carried out under strict supervision and in compliance with a management plan.

In the case of the Purple Sea Urchin, the legal status of the fishery remains to be clarified. Purple sea urchin is not on the schedule of species which may be exploited under the aegis of wildlife legislation yet landings of it continued to be registered in 2002. Wildlife conservation regulations have been making a progressive impact in limiting certain fisheries activities and there is a requirement to ascertain and manage the allocation of species such as interstitial bivalves among fisheries interests and bird life in SACs, for example.

Appropriate information is the basis for fisheries management which may proceed in various ways. One of the most straightforward is the imposition of Technical Conservation Measures such as size limits. Size limits are very useful in, for example, pot fisheries where undersized catch may be released alive after capture. Fisheries for several important inshore species can, in theory at least, be regulated in this way and some, like spider crab and whelk have both national and EU size limits. They are not enforced and the retention of sub-sized animals is for some stock units a considerable problem. A related issue is the landing of large volumes of crab claws which had the effect of obscuring the size of the animals from which they were removed, thus masking the capture of at least some undersized brown crab. Some of the abuses of size limits

are highly visible and would be easily prevented because market outlets are few and landings are traded in large volume. Just as providing a definition of vessel segregation according to its size and where it should locate is insufficient to achieve that aspiration, the formulation of a TCM will not achieve anything unless it is enforced. One of the greatest concerns expressed for inshore stocks is the recurring non-compliance with both EU and national TCMs in 2002.

Overshadowing these concerns is the lack of any fleet policy and consequent free-for-all. Fishing capacity is currently disproportionate to the resource which supports it. In one of the stock units large vessels have extended exploratory fishing beyond the inshore stocks because they have been exhausted. In another, larger vessels which by any definition would have been regarded as offshore, have re-focused their efforts on inshore stocks as a result of the whitefish and shellfish resources which supported them becoming too depleted to do so any longer. Re-targeting effort on a large scale may have serious consequences when it results in stock collapse. There is reason to be concerned about the whelk fishery in the south west Irish Sea; it should be remembered that this export trade to the Far East was painstakingly built up by a number of processors and that continuity of supply is a necessary part of holding onto it. A stock collapse would lead to a loss in trade which might well result in the irrevocable loss of market share.



A fleet policy which results in a reduction in effort must be the priority for the inshore in the future. The unsatisfactory licensing and registration situation presents major difficulties at the moment. In the present context it is easy to understand why such TCMs as exist are not implemented; prosecuting a licensed fisher for non-compliance is harsh when his neighbour's boat might not be fishing legally. How far we are from a legally compliant and policed fleet it is difficult to know but the long promised limited entry fisheries which would operate within defined gear quantities are as far away as ever, and the amount of gear in use is increasing all the time.

Inshore Fisheries Management eds, David Symes and Jeremy Phillipson, Kluwer Academic Publishers, Netherlands (2001)

Table 1 A summary of inshore unit stocks examined in the stock book, with their first sale value (modified from DCMNR data).

STOCK	Stock type	Type of fishing activity	First sale value (€)
Bass on all coasts	Anglers' fish	Rod and Line	Unquantifiable
Shrimp on south and west coasts	Decapod crustacean	Pot	1,115,588
Velvet crab on all coasts	Decapod crustacean	Pot	711,694
Northern brown crab	Decapod crustacean	Pot	5,064,336
South east brown crab	Decapod crustacean	Pot	
Spider crab on mainly west and south coasts	Decapod crustacean	Pot	123,682
Green crab on all coasts	Decapod crustacean	Pot	1,028,199
Lobster on all coasts	Decapod crustacean	Pot	7,690,466
Crawfish on mainly western coasts	Decapod crustacean	Pot/net	876,724
Whelk in the south west Irish Sea	Decapod crustacean	Pot	5,029,304
Northern whelk	Gastropod	Pot	
Periwinkle on all coasts	Gastropod	Gathering	1,347,061
Purple sea urchin on west coasts	Echinoderm	Gathering	762
Palourde on west coasts	Interstitial bivalve	Gathering	0
Common cockle in the Irish Sea	Interstitial bivalve	Dredge/Rake	219,545
Razor clam, mainly east coast	Interstitial bivalve	Dredge	553,062
Surf clams on south and west coasts	Interstitial bivalve	Dredge	905,005
South east scallop fisheries	Surface bivalves	Dredge	1,683,574
Scallop off the North coast	Surface bivalves	Dredge	
Queen scallop on North and east coasts	Surface bivalves	Dredge	89,513
Total €			26,438,515

Bass on all Coasts

(Sub-areas VI and VII)

Dicentrarchus labrax



Fisheries Science Services

FSS – ADVICE

FSS recommend that bass should continue to be managed as an angler's rather than a commercial species. Such bye-laws and other regulations as are currently in place should remain and they should be enforced. FSS also advises that efforts should be made to obtain wider protection for the species which is seen to be vulnerable in Irish waters

STATE OF THE STOCK

- Irish bass landings are dominated by occasional large recruitments. Fish of 1989 and 1990 are still plentiful but the 1995 year class, which is robust among UK fish, is not strongly represented in Irish waters. The stock is seen to be greatly depleted since the 1960s and 1970s.
- Enforcement of the conservation regulations is taking place but significant illegal fishing is believed to be taking place. One ruse is to catch bass by gill nets in Irish waters and land them into Wales. The extent of this practice is unknown. There are no statistics on the clandestine trade in this species other than the records of prosecutions and seized illegally-caught bass from which the Marine Institute and Central Fisheries Board staff occasionally obtain scales and length measurements.
- Bass are on sale in virtually all supermarkets and fish shops in the Republic of Ireland: all that have been examined so far are imported farmed fish.

CURRENT MANAGEMENT

Bass in Irish waters are protected by a number of measures whose effect has been to extinguish the commercial fishery for the species. The Bass (Conservation of Stocks) Order, 1990, regulates the activities of Irish fishermen within ICES sub-areas VI and VII: fishing for bass is prohibited, the taking of bass using nets is prohibited, and Irish fishing boats must not have bass on board or engage in transshipment of bass. This order also sets the legal size of capture of bass at 40 cm.

Two further measures are renewed annually. The Bass (Restrictions on Sale) Order prohibits the sale or offer for sale of bass (other than bass which have been imported

into the State) for a 12 month period. The Bass Fishing Conservation bye-law imposes a bag limit of two bass in any one period of 24 hours and it provides a ban on angling for bass during the spawning season (15 May – 15 June). They are renewed usually on or about 1st July.

These regulations have the effect of confining the exploitation of bass to anglers. Bass is the only marine fish species which is managed in this way in Ireland.

These regulations are enforced by the Regional Fisheries boards in association with the Central Fisheries board and prosecutions are made.

ADDITIONAL INFORMATION

1. Ireland's bass are genetically part of a European panmixia. The origin of our broodstock is not established beyond doubt and it is possible that some, at least, are distributed as eggs and larvae to our coastal waters from spawning concentrations of the adults from the south coast of England/north west France. Once here, bass establish strong affinities with summer feeding areas to which they return in successive years. Currently accepted divisions of Atlantic bass stocks are shown in Fig 1. The distribution of bass has a southern emphasis. However, global warming has encouraged its northward extension and the removal of top predators like cod has provided a niche in which bass have been able to establish.
2. Although bass occur on all parts of the Irish coast, they are more abundant in the south. The origin of >900 sets of scales and life data sent in for analysis demonstrates this.
3. Analysis reveals that bass caught by anglers have a mean total length of 51.0 cm (+/- 10.1; N=670) and those taken in nets a mean total length of 48.1 cm (+/- 4.2; N= 123). Age at full recruitment to the angling fishery in Ireland is 6-8 years (Fig 2).
4. Bass have irregular strong recruitments. The only clear signal for a good year class since juvenile surveys were undertaken by the Marine Institute (in association with the Central and Regional Fisheries Boards) between 1996 and 2003 inclusive was 2002 (Fig 3). Strong year classes tend to occur throughout the species's range although there have been some differences between them in Ireland and the UK, a detail which supports the view that bass in Irish waters should be regarded as a separate stock for management purposes.
5. Bass is reserved for anglers in Ireland and in support of this policy commercial fishing for the species by Irish fishermen is not permitted. The only available indicators of bass abundance are the records which

anglers maintain. One such log, from the Cork Angling Club, has been in existence since 1963. It demonstrates the decline in the species in recent years.

6. Age composition of bass landings is dominated by occasionally strong year classes. The 1989 year class was regarded in the UK as of similar strength to the 1959 one which dominated the catches of the later 1960s and 1970s; while the 1989 year class was well represented in Ireland, it was relatively short lived. A strong 1995 year class in Britain is not much in evidence in Ireland.
7. The southern distribution of bass reflects its preference for warmer waters. 0 group bass are sampled in

the last week in August; their mean lengths in August 2003 resulted from the very warm conditions of this summer. Occasionally it has been feasible to recognize particular year classes of bass because their history included a very warm year which influenced scale development resulting in a wide band of summer growth.

Sources of information

Report of the study group on bass ICES CM 2003. Lowestoft, England, 18 – 22 August 2003

Fig 1 The sea areas in which sex unit stocks of bass are identified (from SGBASS, 2003): A, North Sea, B, Biscay, C, west-south-west-coast, D, Ireland, E, Eastern Channel and F, Western channel, south. Arrows indicate main range of movement of adult bass in each unit.

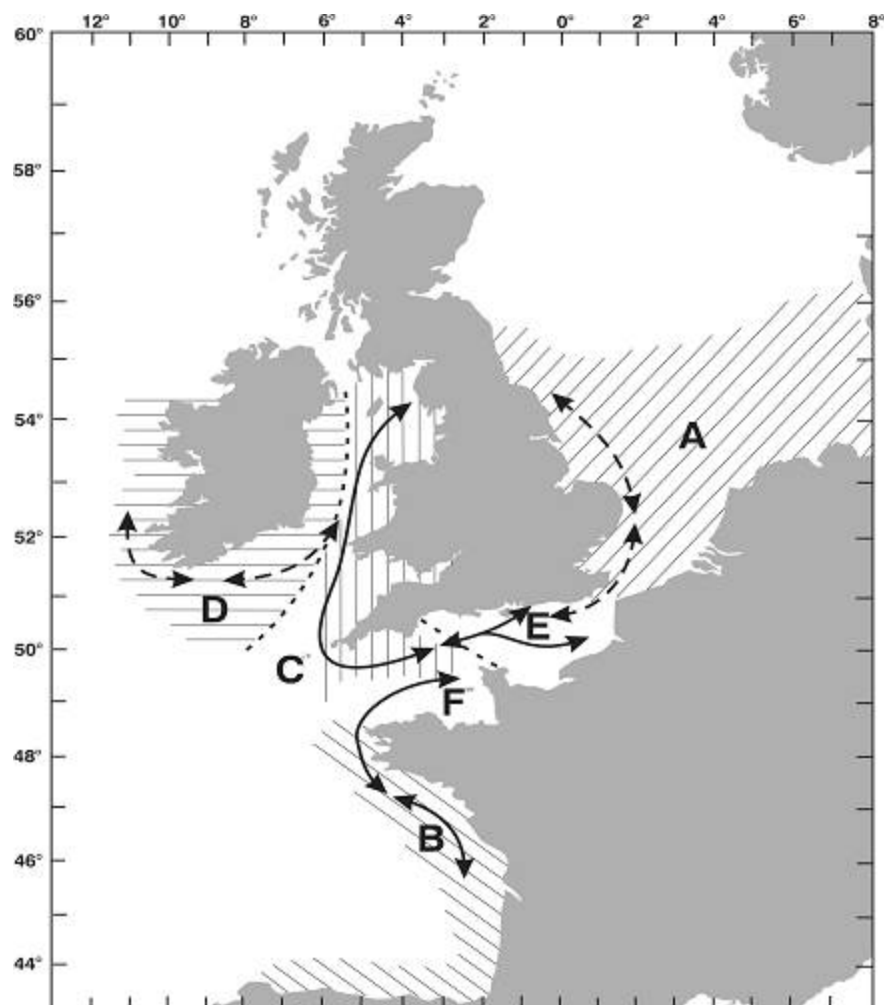


Fig 2 Age frequency distribution of angler-caught bass in Ireland (1996-2003).

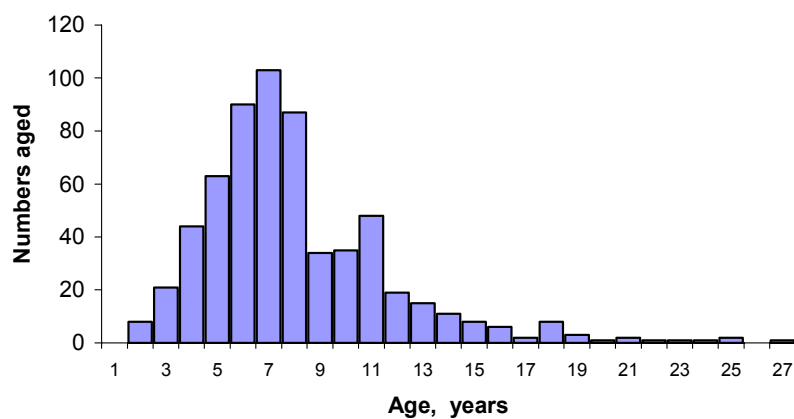
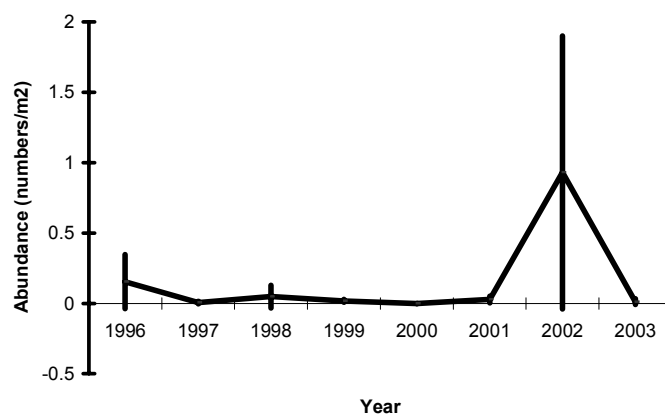


Fig 3 Abundance of 0 group bass (+/- 1 s.d.) in the last week of August, 1996 – 2003.



Shrimp on South and West Coasts

(Divisions VIa, VIIa (south coast), b,g and j)

Palaemon mainly *serratus*



Fisheries Science Services

FSS– ADVICE

To be effective and to afford protection to the spring spawning cohort, the close time should extend from approximately the end of January to the end of August. The fishery should be monitored. Shrimp are intensively fished within the geographic range of this fishery and fishing effort (number of pots) should be capped.

STATE OF THE STOCK

Shrimp probably occur as a number of local stocklets rather than as a single stock unit. The animals are small, hence they are eaten by a wide range of predators. This and their short lives (about 2 years), makes stock size prediction problematical. The state of this fishery is unknown.

CURRENT MANAGEMENT

The Shrimp (Fisheries Management and Conservation) Order, 2002 [S.I. No 180 of 2002] which introduced a close season for the period 7 May to 17 August 2002, was renewed on 13 June 2003 [Shrimp (Fisheries Management and Conservation) Order, 2003; S.I. No 232 of 2003], the close time to run from that date until 1 August 2003 and, in subsequent years from 1 May until 1 August.

ADDITIONAL INFORMATION

1. This fishery commenced in the mid-1970s in south west Ireland whence it has extended north to Connemara and east to Co Waterford; most recently, though to a more limited extent, into Co Donegal. It is carried on using plastic Chinese-hat-ended creels. As is general in the inshore sector, fishing effort has risen with time. The fishing season has also extended and in some parts of Ireland fishing now takes place all the year round.
2. The fishery landed 152 t worth €1.1 m in 2002.
3. From the beginning of the 1990s shrimp fishing reached a new intensity and landings have been consistently higher since; the greatest landings to date were made in 1999 since when they have declined (Fig 1).
4. Because the population dynamics of *Palaemon* are poorly understood and fishing pressures are increas-

ing, there is concern for the survival of this fishery. In such circumstances a precautionary approach is strongly advised, stabilising the fishery and then monitoring it with a view to modifying fishing effort as problems become apparent.

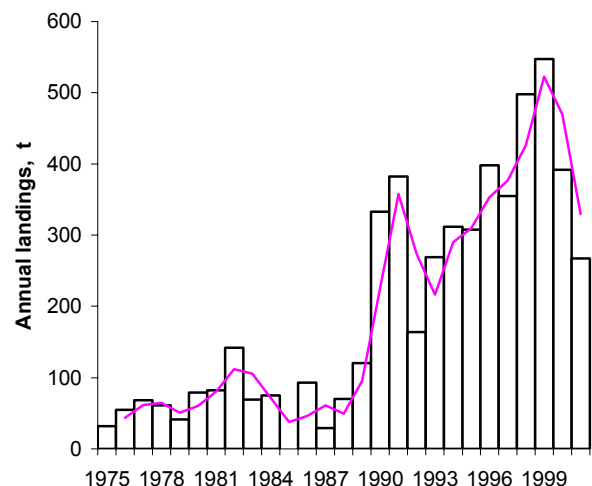


Fig 1 Landings of shrimp to Ireland 1975 – 2002 (Source: DCMNR).

Velvet Crab on all Coasts

(Sub-areas VI and VII)

Necora puber



Fisheries Science Services

FSS – ADVICE

General observations concerning the desirability of capping effort in this mixed crustacean species pot fishery are appropriate.

STATE OF THE STOCK(S)

Unknown.

CURRENT MANAGEMENT

None

ADDITIONAL INFORMATION

1. Landings of velvet crab were worth €0.7 m in 2002. They have remained stable at approximately 300 t over the past seven years.
2. Landings of this species are a component – most often a by-catch rather than a target species - of the pot fishery for larger crustaceans. The species occurs very close inshore.
3. Landings are probably a reflection of fishing effort generally in the earlier part of the fishing year. When, in the later summer and autumn, fishing effort moves offshore that relationship is lost (Fig 2).
4. Processors report the loss of larger size grades from the landings.

Fig 1 Landings of velvet crab (t), 1990-2002:
Source, DCMNR

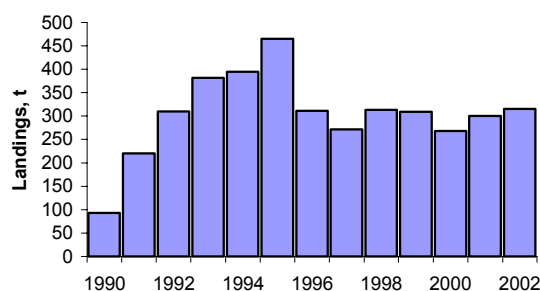
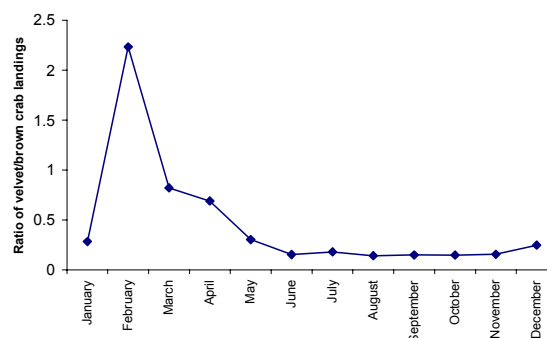


Fig 2 Ratio of weights of velvet to brown crab in the south east fishery, data averaged monthly from 1987 to 1998 (Source: industry).



Northern Brown Crab

(Sub-area VI, Division VIIb)

Cancer pagurus



Fisheries Science Services

FSS – ADVICE

FSS advises that the number of vessels participating in this fishery should be capped and there should be no further expansion of fishing effort.

STATE OF THE STOCK

The state of this stock is unknown but the available indicators (slowly declining LPUE) give cause for concern. The offshore fleet is mobile, moving gear to the highest densities of crab hence the prevailing high LPUE data for this fleet may not represent the abundance of the animals; the area in which fishing takes place is known to have expanded considerably since the offshore sector came into existence in the 1990s. Inshore LPUE data are collected at a time when the animals migrate into shallow water where they are concentrated so that these data might not be a good indicator of true abundance either.

CURRENT MANAGEMENT

Landings of brown crab in this fishery are subject to the EU size limit of 130 mm across the maximum width of the carapace (Annex XII of regulations 850/98); at the most northern limit of the fishery the appropriate size limit might be 140 mm. The prohibition of landing claws which exceed 5% of the carcass weight landed also applies.

ADDITIONAL INFORMATION

1. Total landings of brown crab in 2002 were 10,000 t, with a first sale value of €13.2 m. The landings were distributed as shown in Fig 1. Less than 1% came from the Irish Sea, the South east fishery, which is dealt with separately, produced 8%, the South coast 6% and the South-west almost 15%. Other than the South-east fishery which appears to be a discrete fishery, the stock situation elsewhere is unknown. The Northern fishery accounted for 70% of all landings in 2002.
2. The extent of the Northern crab stock has been investigated by tagging experiments. In 2001 the range of crab tagged at Malin Head extended northwards to latitude 56°, westwards to the continental slope and south to Galway. The prevailing direction of crab movement is westwards against the current, which moves east-

wards in Co Donegal; the larvae are presumably washed back against the adults' trajectory.

3. This, the largest of Ireland's brown crab stocks, is shared with Scotland and may extend further north of 56° latitude. It has offshore and inshore sectors which are likely to exploit the same stock; the close similarity of CPUE in both is clear although (Fig 2) the inshore sector is less well documented than the offshore.
4. The offshore sector, as reported last year, consisted of four *vivier* vessels to which two further 22 m vessels were added since 2001. An additional three vessels of 15-18 m are on order to be added to the fleet before the end of 2003. Approximately 7-8 offshore vessels operate in this fishery at present. The inshore fleet consists of approximately 60 half decker vessels and has been in existence since the 1960s.
5. Because crabs cannot be aged, this fishery has been monitored using LPUE data and the offshore sector is well documented. However, LPUE data must be interpreted with caution in a crab fishery whose inshore sector is likely to be occupied by an aggregation or concentration of animals during the summer months. Data for the offshore sector may provide a good indication of stock abundance, provided they are collected in the same way and in the same place each year. Instead, it was demonstrated using GPS that between 1991 and 1996 effort in the northern fishery intensified and the area over which fishing took place expanded.
6. LPUE in the offshore sector of the Northern fishery, declined from almost 3 kg per pot lift in 1991 to approximately 2 kg per pot lift in 1994; thereafter it stabilized until 2000 when it declined from 1.8 to 1.37 and then increased to 1.6 kg per pot hauled in 2002.
7. In the course of a mark-recapture experiment carried out in 2001, an estimated 25% of the crab stock was removed by fishing in a five week period, indicating a heavy exploitation rate.

Sources of information:

Report of the study group on the biology and life history of crabs, Tromsø, Norway, 2003

Development of computerised systems for visualisation and mapping of shellfisheries data: a case study using the Donegal crab fishery (1998) by Oliver Tully, Ronan Cosgrove, Fergal Nolan, Richard McCormick, Eugene Hannigah, Gerard Breslin, Charles O'Donnell, Aodh O'Donnell, Gareth Gallagher. MRM project reference number A14. Marine Institute.

Population assessment of the Malin Head exible crab (*Cancer pagurus* L) stock (2002) by M Robinson, A O'Leary, and O Doyle BIM

Fig 1 Distribution of brown crab landings along the Irish coastline in 2002 (Source: DCMNR).

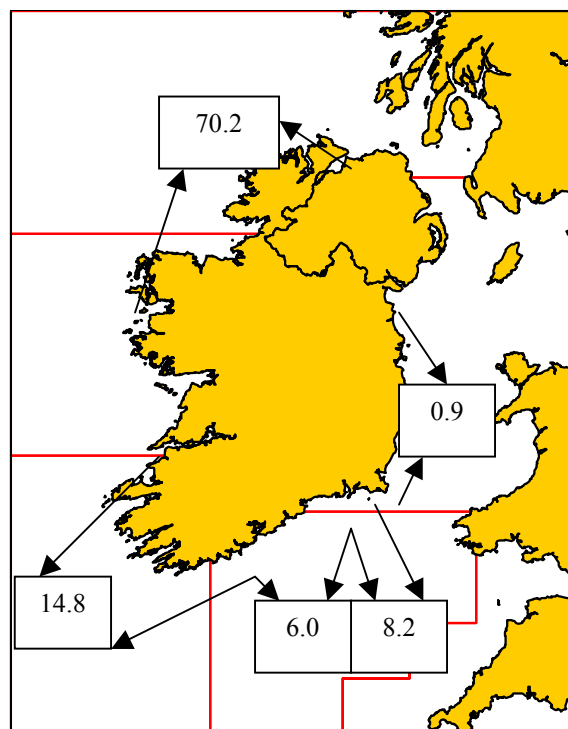
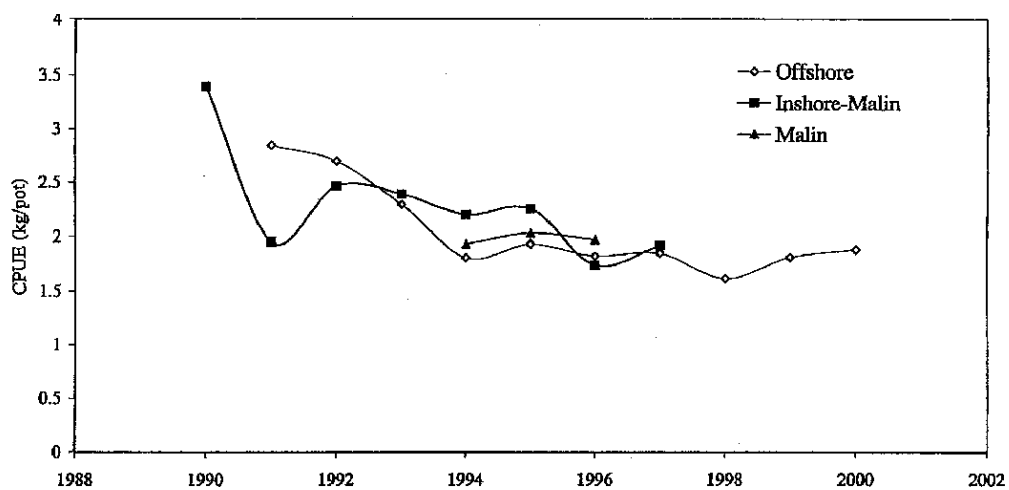


Fig 2 CPUE in various elements (in- and offshore) of the Northern fishery, 1990 – 2000 - demonstrating their similarity.



South East Brown Crab

(Divisions VIIa,g)

Cancer pagurus



Fisheries Science Services

FSS – ADVICE

FSS advises that the TCMs which are currently law, should be enforced. The compilation of official statistics for the fishery have, in the past, been shown to be inaccurate by a factor of 2-3 and the method by which this is achieved needs to be overhauled and standardised.

This stock is in need of management. It is exploited along with a number of other crustacean species. A logbook system should be introduced and its use regulated, data abstracted and accurate catch trends ascertained on a regular basis. A cap on gear is believed to be essential and that question has been under review for several years by virtue of its relevance to the management of the associated lobster fishery.

STATE OF THE STOCK

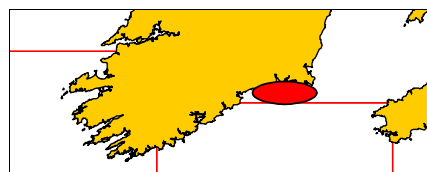
Assessment of crab stocks is complicated by the fact that they cannot be aged. One approach is to monitor LPUE with a view to stabilising it. Such indicators as are available, suggest that LPUE in this fishery has declined but the data could be explained as more fishermen sharing the resource. It is very likely that brown crab in this area hyper-aggregate in inshore waters during summer and autumn months and the exploitation of heavily concentrated numbers of animals can give a misleading account of their abundance. CPUE data collected by the Roscoff off-shore fleet in Division VIIg, which is likely to be occupied by a large proportion of this crab stock, are not reassuring.

CURRENT MANAGEMENT

Two EU TCMs apply to this stock (see Annex XII of regulation 850/98): One fixes the minimum length of the maximum carapace width at 130 mm, the second prohibits the landing of crab claws which exceed 5% of the weight of whole crab. The carapace dimension cannot be deduced from claw size hence, the restriction on claw landings serves to elucidate compliance with the size limit. In the event neither regulation is enforced so that whereas there is little evidence for the size limit not being complied with there is circumstantial evidence that it is not.

ADDITIONAL INFORMATION

1. This fishery extends from longitude -6.3° to -7.0° . It is conducted within 8 nm of the coast and it has an offshore component. Few animals tagged in 2002 and 2003 were retaken as far west as Helvic Head so they may have returned to deeper water at that longitude.



2. The fishery is conducted throughout the year (Fig 1) effort increasing to a maximum in the late autumn. Female crab are in their best condition and they are therefore at their most valuable at that time.
3. This fishery is highly productive, yielding >900 t to an inshore fishery with an estimated maximum extent of <500 km² and a coastline of approximately 55 km in 2002.
4. In spring the landings consist largely of males which are fairly sedentary and they are joined by progressively greater numbers of females as the year advances. The females move back to deeper waters in winter.
5. The females may migrate into coastal waters in order to moult and mate. Speed of movement declines to a minimum during the summer months but in the autumn it increases, the females moving westwards along the coast.
6. This fishery has a negligible discard of legally sized crabs because of the demand for crab to be used as bait for whelk in the adjoining pot fishery in the Irish Sea. The overall LPUE for the fishery is estimated at 0.85 kg per pot lift and, in this statistic, it yields approximately half what Northern brown crab fishery produces.
5. Current levels of LPUE are, in part at least, a consequence of increasing fishing effort. In the period 1972 – 1980 inshore fishing effort directed on larger crustaceans in this fishery by pots and traps doubled; the following decade it further increased by 128%. Thirty years after 1968 the number of pots per km of fishery had increased by 241 %. In 1998 the number of pots and traps fished by km of coastline stood at 191; the latest census, prepared for 2002 provided an estimate of in excess of 292 pots per km (Source John Hickey, BIM). In a period of 14 years, fishing effort was therefore more than 347% greater than in 1988, the number of pots having risen from approximately

50 per km of coastline in the early 1970s. Increasing pot numbers is a conservative estimate of fishing power, unquantifiable technological innovation also having contributed much in the interim.

7. Estimated effort expressed in terms of boat and pot numbers, in this fishery in 2002, are shown in Table 1; at the height of the fishery, in October 2002, there were >14,000 pots in this fishery and up to 69 vessels working them.
8. The offshore super-crabber fleet from Roscoff maintains records of landings in Division VII g. While the LPUE levels have remained stable in the vicinity, it is notable that the amount of effort expended by the fleet in VIIg has greatly declined in recent years, a phenomenon which could be explained either by other Divisions having become more productive, attracting effort away from VII g, or to a decline in fishing in VII g.

Sources of information

This stock summary is based on a paper in preparation: Bionomics of brown crab *Cancer pagurus* in south east Ireland. By Edward Fahy, John Hickey, Nicoletta Perella, Antonio Hervas, Jim Carroll and David Stokes.

Edward Fahy, Jim Carroll and David Stokes (2002) The inshore pot fishery for brown crab (*Cancer pagurus*) landing into south east Ireland: estimate of yield and assessment of status. Irish Fisheries Investigations, 11: 26 pp

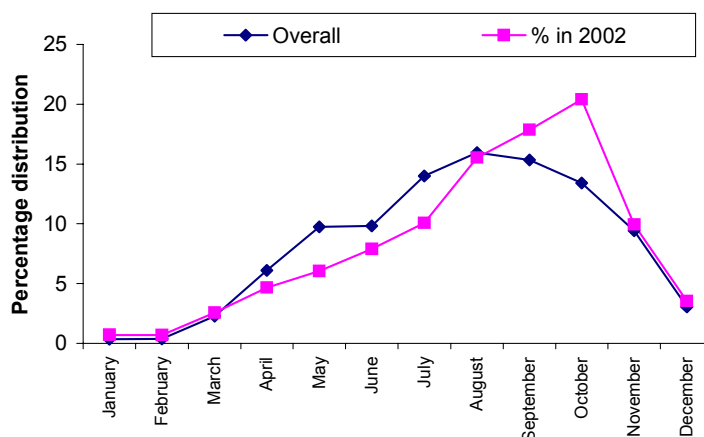
Report of the study group on the biology and life history of crabs. ICES CM 2003.

Additional information was kindly supplied by Oliver Tully of BIM, Martin Robinson of Trinity College and Daniel Latrouite of IFREMER.

Table 1 Estimated numbers of pots fishing and the number of boats operating in any day in 2002

Month	Number pots fishing on any day	Number boats operating
January	485	14
February	588	10
March	1,723	24
April	3,640	19
May	6,388	32
June	5,185	22
July	6,816	44
August	12,918	55
September	13,394	42
October	14,235	69
November	5,727	69
December	2,369	24

Fig 1. Monthly percentage distribution of brown crab landings in 2002 shown with the similar data averaged for several years in the mid 1990s to demonstrate the general pattern.



Spider Crab on Mainly West and South Coasts

(Sub-area VII)

Maja brachydactyla



Marine Institute
Foras na Mara

Fisheries Science Services

FSS– ADVICE

FSS advises that the size limits for this species be enforced. There should also be a ban on the use of tangle nets to which method of capture the species is susceptible. In fisheries like Magharees, the only one which has targeted spider crab in Ireland over a period of more than 20 years, there should be a cap on gear in use. Because much spider crab is unsuitable to supply a quality market, there has been a tendency to use immatures and small adults as whelk bait and this is not desirable.

STATE OF THE STOCK(S)

- There is no indication of any local stocklet of spider crab being in danger from over fishing.
- The market demands a high quality product which is available in limited quantities but adult crab are generally plentiful and egg bearing females numerous although a large proportion of both are not commercially worth landing.
- Provided exploitation of smaller animals for bait or as a by-catch in tangle nets does not inflict damage on the reproductive segment of a population, no immediate danger is foreseen.

CURRENT MANAGEMENT

- Annex XII of EU regulation 850/98 imposes a size limit of 120 mm carapace length on this species. The Spider crab (Conservation of stocks) order, 2001 [S.I. No. 321 of 1001] imposed a national size limit of 125 mm carapace length on female spider crab and 130 mm carapace length on males. Although there are good biological reasons for the national regulation, it was introduced at the behest of the industry in Magharees to ensure a product of reasonable quality for export. Outside Magharees enforcement of the regulations is, at best, poor.
- Local efforts have been made in Magharees to cap pot numbers in order to stabilise fishing effort. They have not been successful and without government support they are unlikely to succeed.

ADDITIONAL INFORMATION

1. Although they occur on all Irish coasts, spider crab are at the northern limit of their range in Ireland and Scotland. The main fishery for them in the eastern Atlantic, is in the vicinity of Galicia (currently closed due to the continuing oil spill from the tanker *Prestige*), and the Channel Islands.
2. The problem with spider crab is their low value (compared with, say, lobster) and the absence of a home market for them. Most of those landed in Ireland are consumed in France and Spain. At the same time it has proved problematical to collect sufficient animals of high quality to economically justify their transport to the Continent.
3. The heaviest local concentration of spider crab in Ireland is in Tralee and Brandon Bays which constitute the Magharees fishery. Since the 1980s spider crabs have been targeted for there for export. There are currently 10,000 pots fished in Magharees.
4. Landings from the Magharees were, in the first years of the fishery, until 1989, relatively high (Fig 1); they then declined and, with the exception of a later temporary rise in yield (from 1996 to 1999), they have remained stable for approximately 12 years.
5. The pattern of yield which has developed is explained by the fact that virgin populations consist of several year classes of spider crab in their terminal moult. Unlike other crabs, spider crabs do not further grow or develop once they have reached that stage. However, a spider crab in its terminal moult may survive for up to 10 years hence, unexploited populations contain a higher proportion of animals in this developmental stage. Once exploitation begins, spider crabs in their terminal moult are depleted until, in a heavily fished stock, a single year class supplies all the adults for exploitation.
6. Adult male spider crab, which are recognizable from the allometry of the cheliped, have a large range in size; this extends from 100 to 170 mm carapace length. The reason for this variation is not known although it is suspected that in certain favourable conditions, an extra instar may be introduced to the life cycle. This is deduced from the higher incidence of larger spider crabs in the stocks in France in certain years.
7. Since the Magharees fishery for spider crabs commenced in the 1980s, the behaviour of the fishermen there has changed and a progressively higher proportion of the catch is made in the spring months. Males invade the fishing grounds before females, they behave territorially in fishing pots and traps and thus,

they are highly vulnerable to capture by this method of fishing. By the early autumn, males are less abundant in the landings and females are relatively more important.

8. In 2002, 166 t of spider crabs were landed to the Magharees fishery and an additional 63 t were recorded from other parts of the coast.
9. The additional tonnage came from local initiatives to develop spider crab fisheries and there may have been a greater effort to record landings of this species as a result because, in earlier years, the species has been regularly taken in the south eastern large crustacean fishery but these landings were not always noted.
10. Experimental fisheries for spider crab in Derrinver, Blacksod and Cleggan in 2001 logged CPUE indices of 0.72 – 0.78 kg per pot, indicating the basis for a viable fishery. The length frequency distributions for crabs captured there characterise a virgin stock (Fig 2) and contrast with the later years in Magharees (Fig 3).

11. The results suggest there may be potential for a small spider crab fishery along much of the west coast; in its early years it will yield males of good quality. Whether these will be sufficient to sustain an export market remains to be seen.

Sources of information:

Edward Fahy (2001) The Magharees spider crab *Maja squinado* fishery in 200. Irish Fisheries Investigations No 9 21 pp 2 appendices.

Eoghan Kelly, Declan Nee, Vera O'Donovan and Oliver Tully (2003) Survey data for spider crab (*Maja squinado*) survey west and north west coast of Ireland 2002. BIM Dublin 20pp

Report of the Study group on the biology and life history of crabs ICES CM 2003

Fig 1. An index of LPUE (tonnes landed/numbers of pots in the fishery) in the Magharees fishery, 1981 – 2002

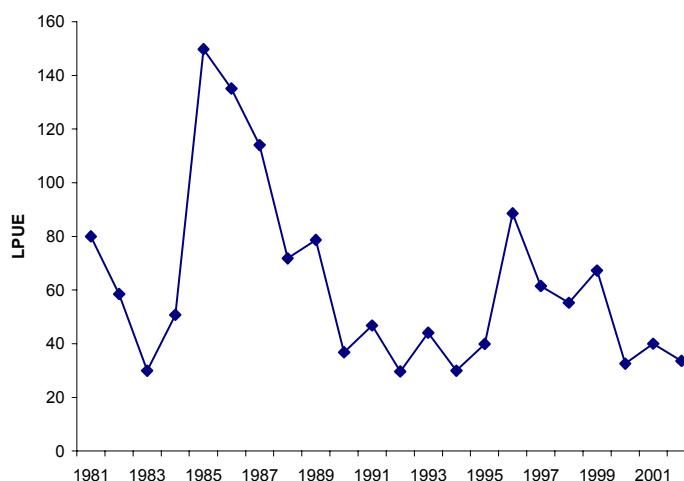


Fig 2. Length frequency distributions of spider crabs in two unexploited populations surveyed by BIM between 2001 and 2002 (Upper) Derrinver and (Lower) Blacksod Bay.

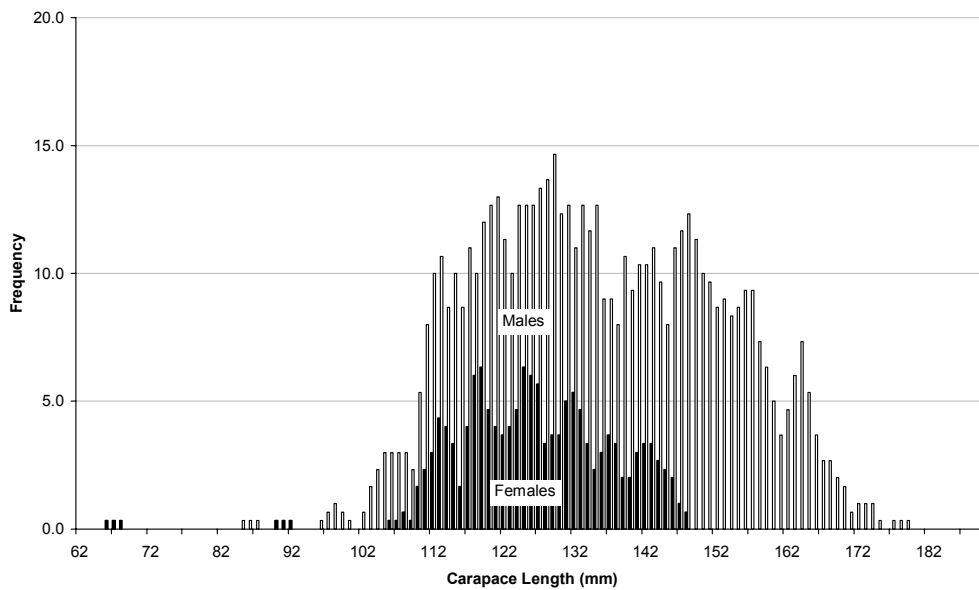
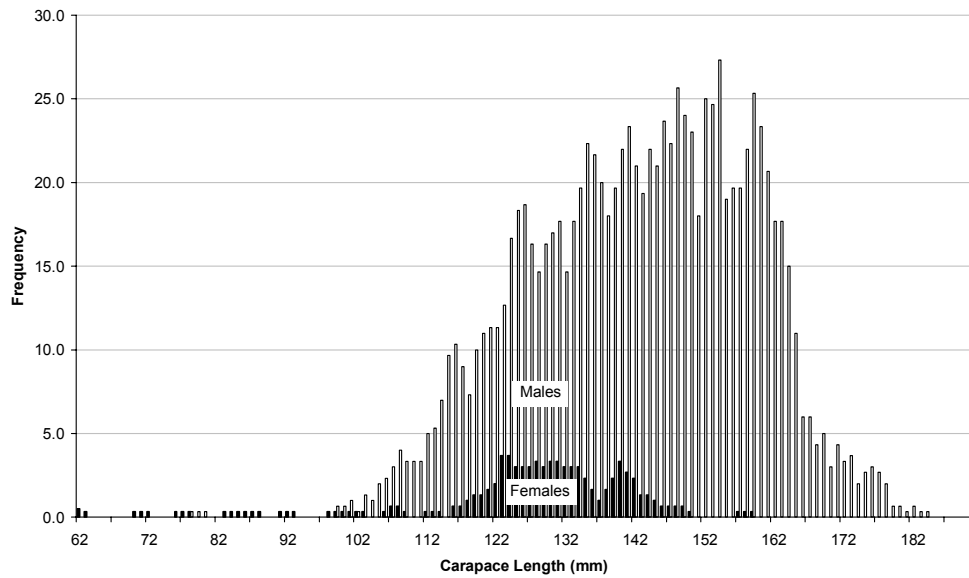
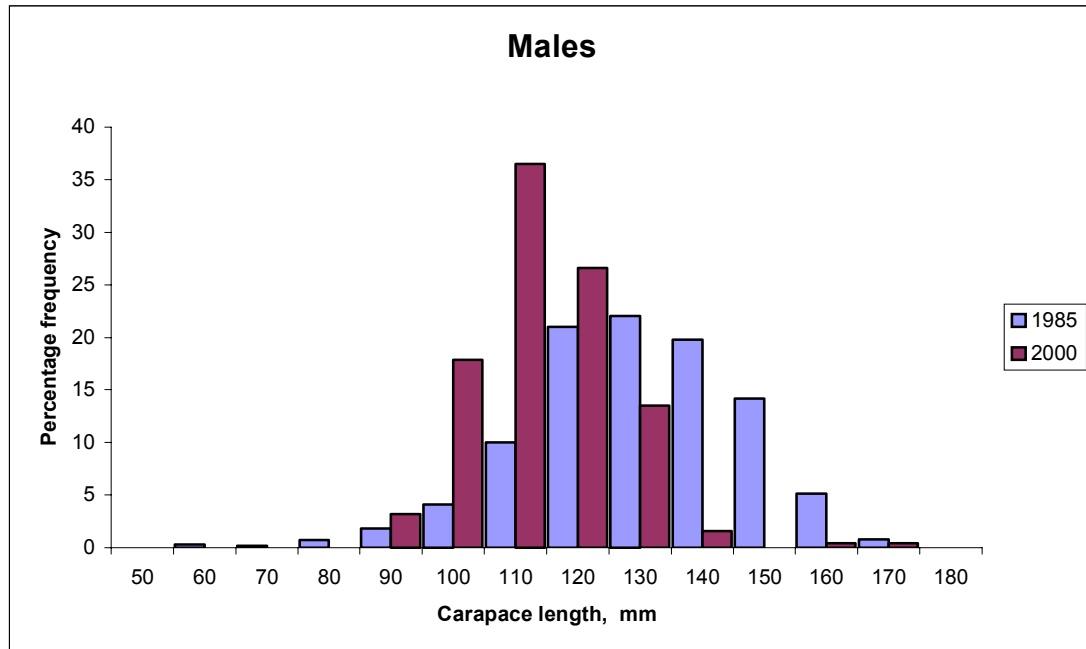


Fig 3. Comparable length frequencies of male spider crab in the landings to Magharees in 1985 and 2002 to illustrate the depletion in the larger size categories



Green Crab on all Coasts

(Sub-areas VI and VII)

Carcinus maenas



Fisheries Science Services

FSS – ADVICE

FSS advises that further data should be sought on the biology and ecology of this species.

STATE OF THE STOCK

Unknown. There is likely to be a number of stocklets rather than a single stock.

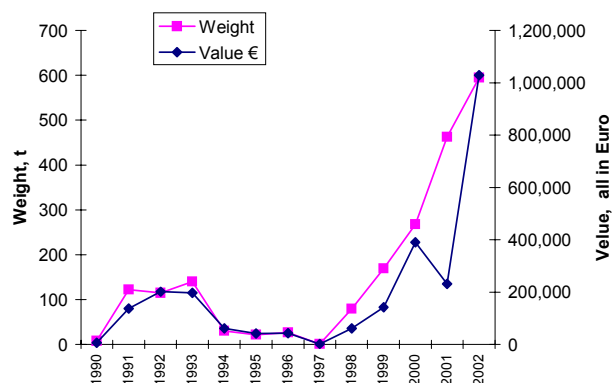
CURRENT MANAGEMENT

None to enhance its status. The removal of green crab from shellfish beds is rewarded by bounty.

ADDITIONAL INFORMATION

1. Landings of green crab in 2002, almost reached 600 t and were valued at more than €1.0 m
2. Green crab is a successful scavenger and predator, which has extended its range in other continents where it has a pest status in mariculture.
3. The fishery for green crab has been expanding since 1998: Green crab can be used as bait in whelk fisheries. It also provides ingredients for food processing. Anglers use newly moulted green crab as bait, particularly for sea bass which is an important predator of the species.
4. The main market for green crab is currently in France where its capacity in 2002 was estimated at 1,000 t.
5. The removal of green crab from shell fish layings contributes to better survival of juvenile bivalves. BIM offers a bounty for the destruction of green crab.

Fig 1. Weight and value (converted to € without adjustment for inflation) of green crab landings, 1990 – 2002. Source: DCMNR.



Lobster on all Coasts

(Sub-areas VI and VII)

Homarus gammarus



Marine Institute
Foras na Mara

Fisheries Science Services

FSS– ADVICE

TCMs are effective only where fishing effort is stabilised. There is a need for restrictions on entry to this fishery and a cap on the amount of gear in use. FSS advises that such a fishery regime be introduced. The current range of conservation measures (minimum size and V-notching) should be continued and enforcement of the regulations should be intensified. Consideration should be given to the introduction of a maximum size limit at 120 – 125 mm carapace length, to protect previously V-notched females whose tail fins have repaired.

STATE OF THE STOCK

Egg per recruit is low, calculated at 7% of virgin egg production. Catch rates have been stable or increasing over the past decade despite strong increases in fishing effort, this suggesting that recruitment has been strong. Stocks may be vulnerable to a further reduction in egg production and recruitment in a less favourable recruitment environment.

CURRENT MANAGEMENT

In Europe and North America a management strategy for lobster is to increase natural egg production by the use of TCMs and by limiting fishing effort. The minimum landing size is currently 87 mm carapace length and it is illegal to land lobsters which have V-notched or damaged tail fins.

ADDITIONAL INFORMATION

1. Lobster landings to Ireland totalled 539 t valued at €7.7 m in 2002 (Source: DCMNR).
2. Lobster management is funded by government through BIM and administered locally by co-operatives. The purpose of size limits and V-notching programmes is to enhance natural egg production.
3. Since the practice was introduced in 1990, 100,000 female lobsters have been V-notched and released. A voluntary logbook scheme to record target and incidental catch rates of legal, undersized and V-notched lobsters was introduced in 1995 by BIM in Co Wexford and this was extended to all coasts in 2002.

4. Catch rates of V-notched lobsters represented 20 – 30 % of the population of legal sized female lobsters in 2002. V-notched lobsters were larger in size and of greater fecundity than the average female lobster.
5. Size at maturity (at which 50% of the animals are expected to spawn) is 95 mm carapace length which is 8 mm above the minimum landing size at present.
6. Catch rates in 2002 varied by region and were strongest in the southwest (25 lobsters per 100 pots hauled) and weakest in the south east (5-10 lobsters per 100 pots hauled).
7. Although catch rates have been strong over the past 10 years, they are 3 times lower than in the 1960s.
8. V-notches persist for up to three moults after which they grow out; during this time the lobster may increase in size by up to 30 mm carapace length.

Crawfish on Mainly Western Coasts

(Sub-areas VI and VII)

Palinurus elephas



Fisheries Science Services

FSS – ADVICE

FSS advises that crawfish stocks are overfished and in need of urgent remedial measures. An outright ban on the use of “cray nets” would be more effective than catch restrictions. Further opportunities to reduce fishing pressures on this species should be sought in an effort to rebuild the population.

STATE OF THE STOCK

The only information currently available is landings data which suggest that crawfish are in decline.

CURRENT MANAGEMENT

E.U. technical conservation measures (Annex XII of regulation 850/98) specify a size limit of 100 mm carapace length. The Crawfish (Conservation of Stocks) order, 2001 [S.I. No 322 of 2001] imposes this size limit also. The Crawfish (Fisheries Management and Conservation) Order, 2002 [S.I. no 179 of 2002] bans the taking of crawfish by net in two areas off the Galway and Kerry coasts.

ADDITIONAL INFORMATION

1. In 2002, 36 t of crawfish landings were priced first sale at €877,000 (Source: DCMNR) making this the most valuable of the larger crustacean species.
2. Crawfish have however been in decline at least since 1990 (Fig 1) although landings stabilised over the past four years. A similar pattern is displayed by the ratio of crawfish to lobster purchases by weight in recent years (Fig 2).
3. Crawfish are known to be vulnerable to a number of fishing methods, including towed gears (trawls and scallop dredges) the latter of which may kill the animals without recovering them. Tangle nets (“cray nets”) which were introduced to target this species and which are now used to capture fin fish, are credited with playing a large role in the decline of crawfish.

Fig 1 Annual landings of crawfish to Ireland, 1990 – 2002 (Source: DCMNR).

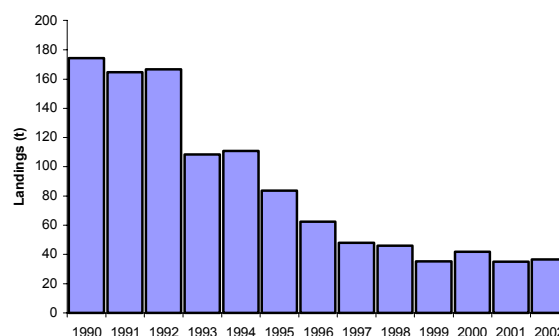
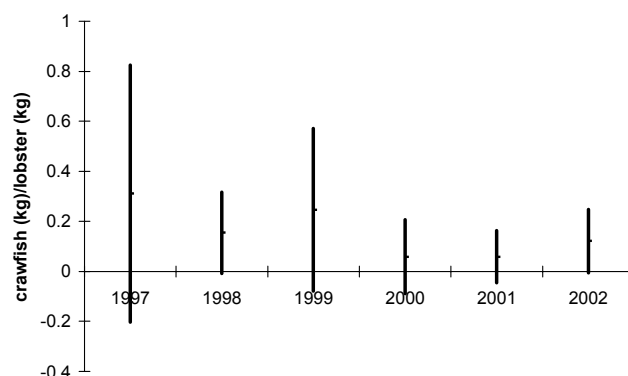


Fig 2 Ratio of crawfish to lobster purchases by a major crustacean buyer, 1997 – 2002 from various locations on the west coast. Mean annual values +/- I s.d.



Whelk in the South West Irish Sea

(Division VIIa)

Buccinum undatum



Fisheries Science Services

FSS – ADVICE

FSS advises that there is reason to be concerned about the lack of management within this fishery. The landing of undersized whelk has been normal practice for as long as processing lines have been mechanised but the latest assessment confirms that it has significantly worsened at the same time as landings have peaked. National conservation regulations for this species should be enforced and they include the provision that undersized whelk are segregated and immediately returned to the water. This is an inshore fishery and entry to it should be confined to smaller vessels, this emphasising the need for a limited entry and participation. In view of the marketing problems affecting whelk, it is most desirable that the fishery maintains a sustainable output because disruption of supply is likely to result in customer loss.

STATE OF THE STOCK

The state of the stock is unknown. The fishery is divided for assessment purposes into four sectors which perform differently. There is evidence of pulses of recruitment in the centre two sectors (Arklow and Courtown) during the past three years. Recruit overfishing has taken place since the fishery expanded in the 1990s and stock depletion has taken place in the southern sector (Wexford). Assessment work undertaken in 2002-2003 indicates the largest percentage of undersized whelk landed to date took place in that year; the annual mortality coefficient was also higher than in any other year.

CURRENT MANAGEMENT

The Whelk (Conservation of Stocks) Order, 2001 (S.I. 294 of 2001) makes it an offence to have on board, tranship or offer for sale whelk that are less than 25 mm in width across the broadest part of the shell, this corresponding to an approximate length of 50 mm; the order further directs that sub-sized animals should be carefully handled and returned immediately to the water. Annex XII of EU regulation 850/98 imposes a size limit of 45 mm length, which has approximately the same effect. Neither regulation is enforced.

ADDITIONAL INFORMATION

1. Landings of whelk from the Irish Sea in 2002 totalled more than 7,000 t with a first sale value of €4.7 m, the heaviest in the history of this fishery which expanded in the 1990s (Fig 1).
2. The fishery is a relatively inexpensive one to become involved in and boats have entered and left it in response to the state of the market and, particularly at the southern periphery of the fishery, the local depletion of stocks. At its peak in 1996 the fishery involved some 80 vessels which number halved in the interim. In the last three years boats have again re-joined and some additional larger vessels have redirected their effort onto whelk as a result of the exhaustion of whitefish and other shellfish resources.
3. The trade in whelk has been disrupted on a number of occasions for commercial reasons which are likely to have discouraged participation in the fishery. An unstable commercial environment has in the past contributed positively to the conservation of stocks.
4. Whelk are exported, largely to the Far East and sustaining this trade is problematical. Continuity of supply is essential to the survival of this market.
5. For assessment purposes the Irish Sea fishery is divided into four sectors; landings from Dublin and Wexford, at the northern and southern end respectively, are characterised by larger whelk and few juveniles (Table 1). The centre Arklow and Courtown sectors, in contrast, yield large volumes of small whelk. These centre sectors may be the spawning grounds for some whelk which on-grow in the Dublin and Wexford sectors.
6. The four sectors have performed differently in the course of the expansion of this fishery: the Dublin and Courtown ones have had a stable annual output; the yield from Wexford has declined, despite the fact that virtually no juvenile whelk are landed there, while landings from the Arklow sector have greatly increased. Landings into Arklow were greater in 2002 than in any year in the history of this fishery (Fig 1).
7. Partly coinciding with the record landings of 2002, the overall percentage of undersized whelk landed was higher than in any year to date (Table 1), largely as a result of the heavy landings of undersized whelk in the Arklow sector.
8. Coefficients of annual mortality (Z) were also higher in three sectors of the fishery and overall in 2002 than in any previous year (Table 2).

Fig 1. Landings from the South west Irish Sea whelk fishery and from its four sectors, 1989 – 2002 (Source: DCMNR).

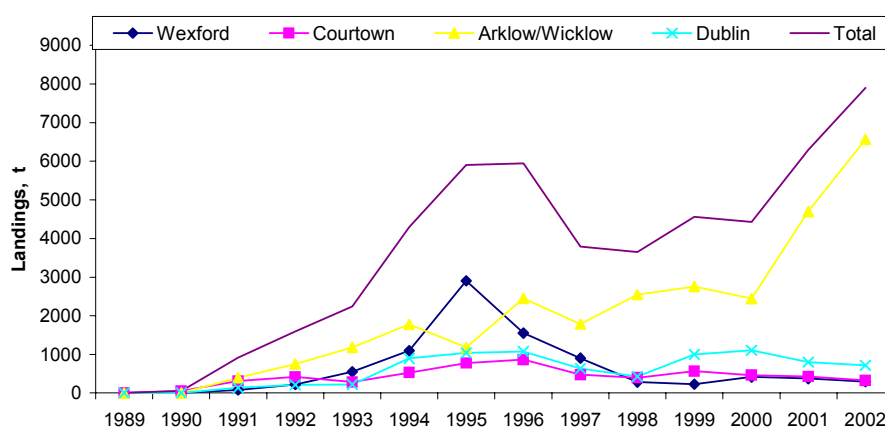


Table 1 Percentage undersized whelk (<50mm long), by number, landed in each fishery sector annually

Year	Dublin	Arklow	Courtown	Wexford	Overall average
1994	27.5	32.6	51.1	7.9	31.4
1995					
1996	4.6	27.5	47.6	12.0	24.3
1997	61.8	26.8	19.4	4.5	32.7
1998					
1999	12.3	33.8	48.9	1.6	33.1
2000	9.7	40.0	48.9	8.8	37.1
2001	22.7	33.7	16.1	6.7	28.9
2002	20.1	22.6	11.8	0.6	20.3
2003	23.1	43.1	21.1	7.6	40.2
Averages	22.7	32.5	33.1	6.2	31.0

Italicised figures are based on assessments from September to August of the following year, undertaken for the stock book.

Table 2 Coefficients of mortality (Z) calculated from the catch curves for each year in which an assessment was undertaken.

Year	Dublin	Arklow	Sectors Courtown	Wexford	Averages
1994	0.40	0.56	0.66	0.48	0.53
1995					
1996	0.26	0.48	0.64	0.40	0.45
1997	0.81	0.90	0.94	0.51	0.79
1998					
1999	0.24	0.68	0.88	0.62	0.61
2000	0.41	0.68	0.86	0.21	0.54
2001	0.57	0.79	0.86	0.50	0.68
2002	0.77	0.90	0.91	0.52	0.77
2003	0.90	0.88	1.00	0.77	0.89
Averages	0.54	0.73	0.84	0.50	0.66

Italicised figures were obtained in an assessment for the period September - August, undertaken for the stock book.

Northern Whelk

(Division VIa)

Buccinum undatum



Marine Institute
Foras na Mara

Fisheries Science Services

FSS – ADVICE

FSS advise that the size limits imposed on whelk fisheries by national and European measures, should be strictly enforced. Buyers should ensure that the product conforms to these requirements. Fishermen should be discouraged from exploiting nursery areas which may be identified from catches containing a high proportion of individuals of sub-legal size.

STATE OF THE STOCK

The status of this stock is unknown but, in view of its close similarity with whelk in the Wexford sector of the Irish Sea fishery and with patches of whelk in the vicinity of Kilmore Quay (the latter being a fishery for large crustacean species), the Northern fishery is assumed to be a vulnerable one, susceptible to rapid depletion and requiring a long period of recovery after being fished down.

CURRENT MANAGEMENT

Size limit imposed by national and European regulations. Extent of compliance with these is unknown.

ADDITIONAL INFORMATION

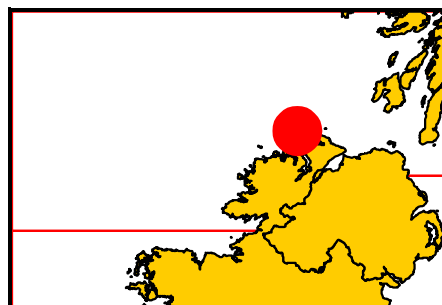
1. Only occasional landings from this fishery, which takes place in the vicinities of Greencastle, Burtonport, Glengad and Culdaff, have been recorded since whelk became a significant export in the mid 1990s. In 2001 less than 1 t was landed (Source: DCMNR). Over the past 12 months 711 t were purchased by a single buyer (Source: industry).
2. Limited sampling of these landings took place in 2003. These reveal:
 - a. Northern whelk are predominantly thick shelled, as opposed to the thin shelled animals which are harvested in the Irish Sea. Thick shelled whelk typically occur in crustacean fisheries and the largest Irish brown crab stock(s) occur in Division VIa. These whelk are likely to be the survivors which were able to withstand predation from crab by virtue of their heavy armament rather than being a different genetic strain.
 - b. The exploited animals have few juveniles and un-

dersized among them (approximately 6% by number) and this characterises whelk in the Wexford sector of the Irish Sea fishery. Few undersized might indicate either close adherence to the law (smaller whelk being sieved out and discarded) or it could signify a relatively slow rate of recruitment.

- c. The growth rate of whelk in the Northern fishery is similar to that of Irish Sea whelk and the representation of older age groups in the landings is reminiscent of the Dublin and Wexford sectors of the Irish Sea fisheries before these stocks became depleted.
- d. Exploited characteristics of the Northern Stock include a full recruitment at 5 years and a mortality coefficient (Z) value of 0.48 which is also similar to ages at full recruitment prevailing in the Irish Sea and values of Z in the Dublin and Wexford sectors of the Irish Sea fishery. Higher values of Z in the Arklow/Wicklow and Courtown sectors are a consequence of high recruitments there because these sectors contain extensive nursery grounds for whelk.

Sources of information:

A second assessment of the whelk *Buccinum undatum* fishery in the southwest Irish Sea with particular reference to its history of management by size limit. By Edward Fahy, Eric Masterson, David Swords and Niamh Forrest (2000) Irish Fisheries Investigations No 6, 67 pp.



ⁱ There are two regulations with a similar outcome: The National Whelk (Conservation of Stocks) order, S.I. no 278 of 1994, imposes a minimum size dimension of 25 mm, to be measured across the maximum width of the shell; this measurement corresponding to approximately 50 mm length [from the apex to the shell to the end of the siphonal canal]. The E.U. size limit of 45 mm length is contained in Annex XII of regulation 850/98.

Fig 1. Length frequency distribution of whelk from the Northern stock sampled in 2003

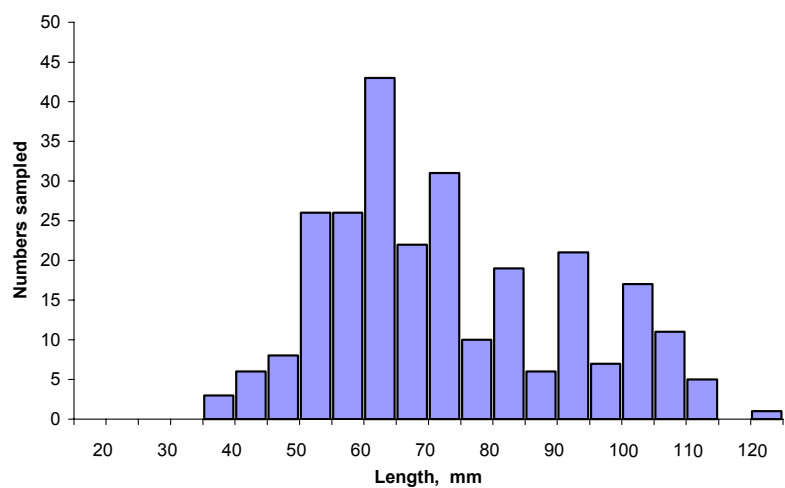
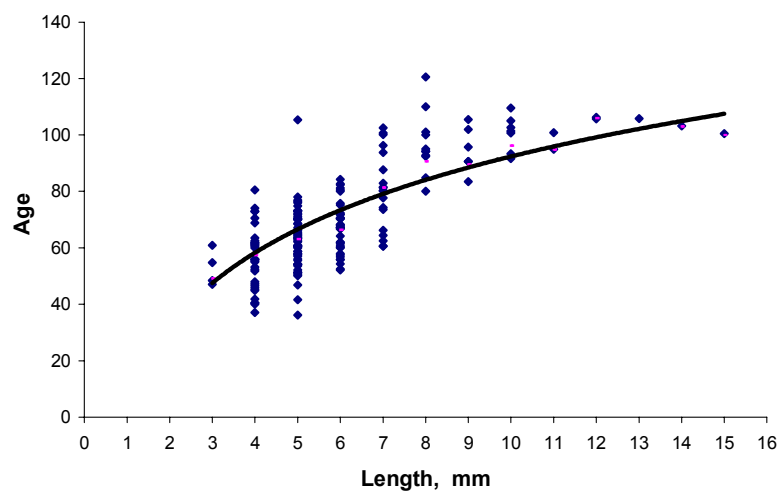


Fig 2. Growth curve for whelk in VI a



Periwinkle on all Coasts

(Sub-areas VI and VII)

Littorina littorea



Fisheries Science Services

FSS – ADVICE

A size limit should be established and enforced in a way which ensures undersized animals are released before sale. Consideration should be given to establishing a close season in the months of June and July or from May to August when high temperatures cause mortalities. Consideration might also be given to a close season between January and April when spawning is taking place.

STATE OF THE STOCK

Periwinkles should be regarded as stocklets rather than belonging to a single stock unit. There is no assessment of any of these hence, the state of the stock is unknown. A frequent complaint about the quality of landings in recent years suggests that too many juveniles are gathered. Although landings have been declining slightly, they are still high and would appear to be sustainable.

CURRENT MANAGEMENT

This is an open access fishery. The only regulation which applies to it is the EU directive on shellfish hygiene (91/492).

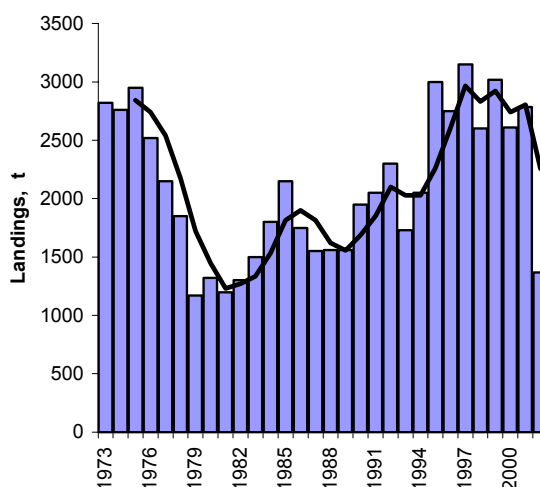
ADDITIONAL INFORMATION

1. The periwinkle fishery had landings of 1,368 t in 2002 with an estimated first sale of €1.35 m.
2. Periwinkles are gathered on virtually all Irish coasts to supply an export trade to the United Kingdom, Belgium, the Netherlands, France and Spain. A recent survey attributed the source of periwinkle exports to the following areas in Ireland:

Area 1: Donegal, Leitrim, part Sligo	3 %
Area 2: part Sligo, Mayo, Galway, Clare	68 %
Area 3: Limerick, Kerry, Cork	19 %
Area 4: Waterford, Wexford	3 %
Area 5: Louth, Dublin	7 %

3. Annual landings of periwinkle fell from 2,400 tonnes in the 1970s to 1,600 in the following decade. They increased again in the 1990s but have tended slightly downward since mid-decade. Wholesalers report a decline in the quality of landings, indicating too many small animals are being gathered.

Fig 1 Annual landings (t) of periwinkle, 1973 – 2002. Source, DCMNR



Purple Sea Urchin on West Coast

(Divisions VIa, VIIb,j)

Paracentrotus lividus



Fisheries Science Services

FSS – ADVICE

Harvesting of this species should only be by special permit, referring to a specific and detailed location, issued after considering the status of the stocklet and specifying the amount to be harvested.

STATE OF THE STOCK

- Landings of *Paracentrotus lividus* declined from 375 tonnes in 1976 to 0.3 t in 2002 (Fig 1) and these figures are believed to represent its changed status.
- The species is widely regarded as depleted and possibly locally extinct; some tidal pools which held this species in the recent past do not support it now. The extent and status of sub-tidal populations is not known.

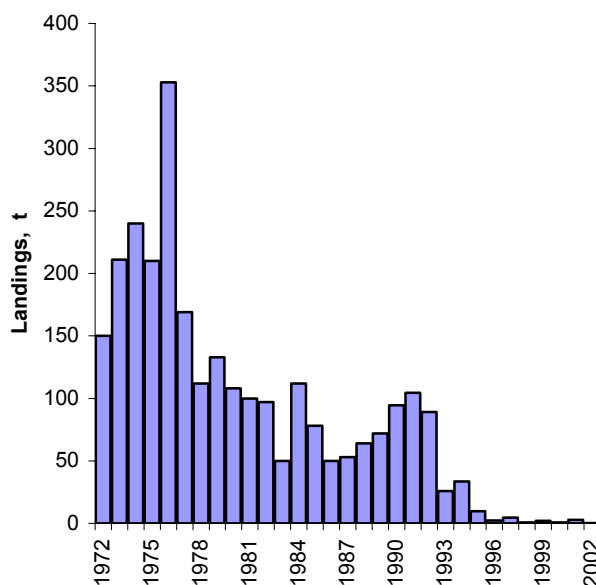
CURRENT MANAGEMENT

The provisions of SI no 372 of 2001 should extend protection from exploitation of this species. The prohibition on diving for shellfish is also relevant but some depleted populations occurred in rock pools rather than deeper water so that diving apparatus was not required to reach them.

ADDITIONAL INFORMATION

- In 2002 total landings of *Paracentrotus lividus* 1. In 2002 total landings of *Paracentrotus lividus* amounted to 0.3 t valued at €762.
- This species is universally regarded as vulnerable to over-exploitation and slow to regenerate its numbers from depleted stocks. Attempts are being made elsewhere to rear it artificially for human consumption.
- In Ireland *Paracentrotus* is omitted from S.I. No 372 of 2001 – Wildlife (Fish and Aquatic Invertebrate Animals) (Exclusion) Regulations, 2001 which has the effect of declaring certain species to be outside the provision of the Wildlife (Amendment) Act, 2000. Excluded species are those which are being or are capable of being commercially exploited. Thus, *Paracentrotus lividus*, is no longer regarded as a commercial species.

Fig 1 Landings (t) of *Paracentrotus lividus*, purple sea urchin, 1972-2002. Source: DCMNR



Palourde on West Coast

(Divisions VIIb, j)

Tapes decussates



Fisheries Science Services

FSS– ADVICE

FSS advises that further data should be sought on the biology and ecology of this species.

STATE OF THE STOCK

Unknown.

CURRENT MANAGEMENT

There is a minimum size limit of 40 mm length (annex XII of EU regulation 850/98).

ADDITIONAL INFORMATION

1. Landings of palourde fluctuate considerably from one year to the next (Fig 1); the species is a valuable one. Between 1990 and 2001, first sale prices (converted to € but unadjusted for inflation) have ranged between €3.9 and €5.6 per kg.
2. In 1992 288 t were landed, with a first sale value of almost €2.0 m (£1.5 m), unadjusted for inflation.
3. Palourde are interstitial bivalves which are dug out of the sand at low spring tides.
4. No landings were registered in 2002, the only time that has happened in the time series which runs from 1990.
5. Growth data were obtained from commercial samples in 2003 (Fig 2). The $L_{(inf)}$ is not far above the minimum size limit of 40 mm in length.

Fig 1 Annual landings (t) for the period 1900 – 2002.
Source:DCMNR

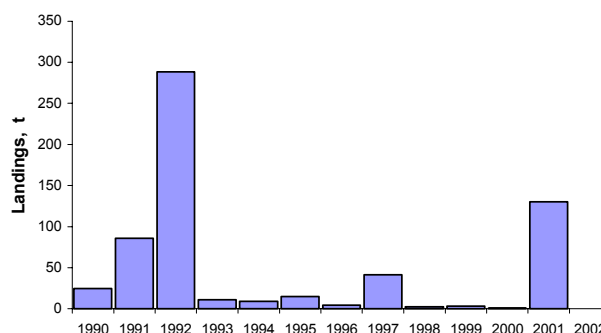


Fig 2 Calculated growth curve and raw length at age data for Palourde from a commercial sample. The size limit is superimposed.

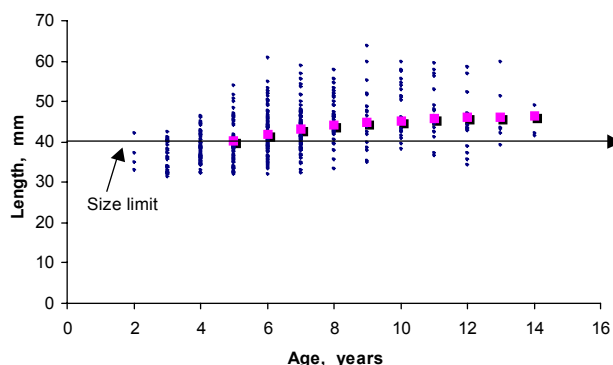
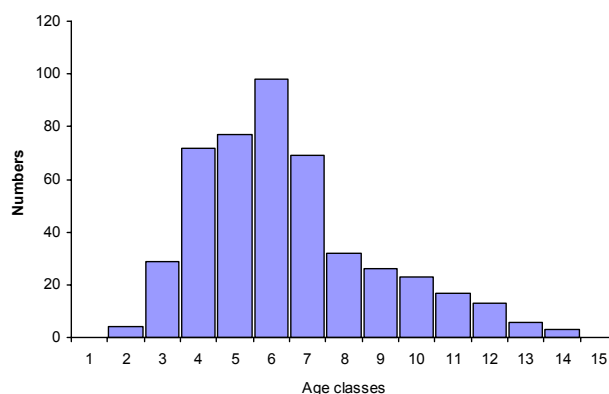


Fig 3 Age class frequency distribution of Palourde in commercial samples.



Common Cockle in the Irish Sea

(Division VIIa)

Cerastoderma edule



Fisheries Science Services

FSS – ADVICE

Fishing effort is expanding rapidly and needs to be controlled. Some cockle areas are within candidate SAC's of ornithological interest and a balance must be sought between fishing and maintaining its scientific values. The assessment and management of cockle fisheries is feasible and a variety of measures ranging from closed areas, close seasons, size limits and various quota arrangements are in theory available to secure rational exploitation and to safeguard scientific interest. A management plan should be developed.

STATE OF THE STOCK

The state of this resource is not known.

CURRENT MANAGEMENT

The only regulation which applies is the EU Directive (79/223) that the water quality in areas from which harvesting takes place should be of a certain standard.

ADDITIONAL INFORMATION

1. Cockles have been landed into Ireland in small quantities during the last decade (Fig 1). In 2002 111 t were landed with a value of €0.22 m.
2. Cockles can be harvested using hand operated rakes, mechanically by tractor and harrow at low tide and by a variety of hydraulic and air lift dredges.
3. The cockle fishery at Annagassen, Co Louth, expanded rapidly in 2002 and 2003; in 2003, landings until the end of September totalled 228 t, double the landings for the entire previous year.
4. Inspections during 2003 confirmed that the quality of landings is good. The fishery expanded rapidly in the summer-autumn months (Fig 2) however and the number of boats participating in it are increasing. At time of writing this five suction dredgers are involved. There is a small hand rake component in the fishing effort.

Fig 1 Annual landings (t) of cockles to Ireland, 1990 – 2002; figures for 2003 are incomplete (Source, DCMNR).

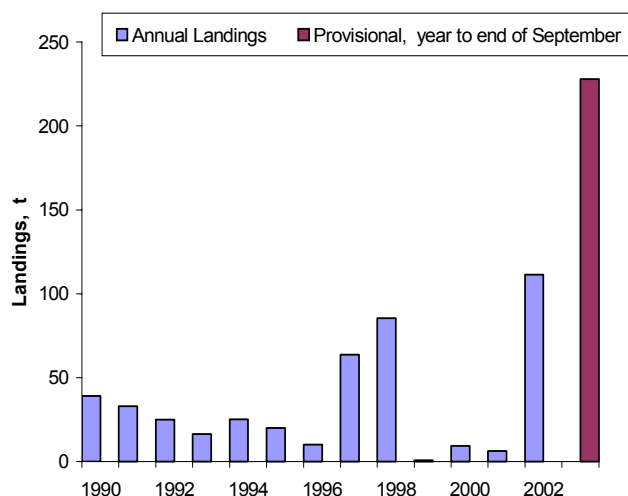
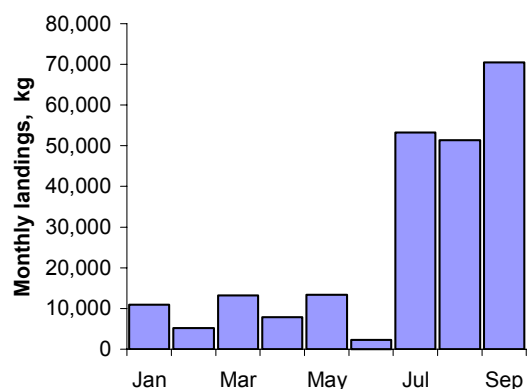


Fig 2 Monthly landings of cockles from Dundalk Bay, 2003. (Source: DCMNR).



Razor Clams on Mainly East Coast

(Division VIIa)

Ensis spp



Fisheries Science Services

FSS– ADVICE

In view of the facts that razor clams are slow growing and late maturing and that successful spatfalls may be erratic, special and urgent consideration should be given to devising a management policy for them. Controls in this fishery should include closed areas and fallowing periods. To monitor progress in this and other bivalve fisheries, a combined logbook/gatherer's document should be introduced and its use should be enforced.

Methods of harvesting have improved but they need to be reviewed and possibly controlled to limit incidental damage of associated fauna. Diving for razor clams is currently prohibited by law but there are strong reasons for revising that prohibition, under stringent controls.

Divers would be more selective in what they take back to the surface and they would cause less disturbance to the substratum. Divers would also take a more marketable and less stressed animal from soft substrata where dredging can cause considerable damage to the shellfish, lessening the prospect of depuration, and resulting in its rejection by buyers.

The market for razor clams is small and there is a case for restricting landings at time when demand is low in order to raise prices and to prevent dumping of unwanted product.

STATE OF THE STOCK

- Fig 1 is presented as representative of the abundance of razor clams. Currently, there are virtually no landings to the west coast. The larger east coast beds of *E. siliqua* were fished down to point where harvesting became uneconomic. Improving technology has enabled some of them to be revisited. In the early days of this fishery (1997–1999) it was feasible to trace all landings from the Gormanstown bed which was the only one open to exploitation; since then, other areas have been opened to harvesting some of them in quality B waters from which the razors are cooked before export. Exploitation currently extends from Portmarnock, north of Dublin, to Annagassen,

Dundalk, Co Louth. Consideration is being given to harvesting in Dublin Bay. Exploited beds may take 20 years to recover their pre-harvested biomass and the resource can be described as depleted.

CURRENT MANAGEMENT

Razor clams are subject to size limit by EU regulation (Annex XII of 950/98). Harvesting of razor clams is permitted only in waters whose quality is specified in Council Directive on the quality required in shellfish waters 79/923 EEC.

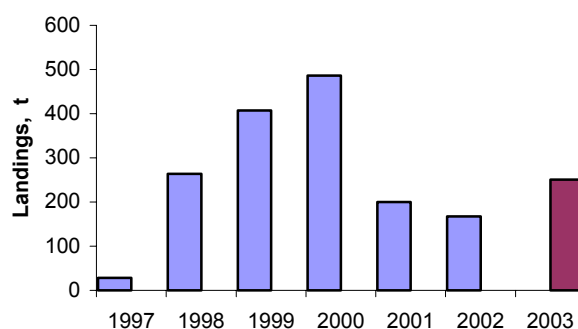
ADDITIONAL INFORMATION

- Two species of razor clam, *Ensis siliqua* and *E. arcuatus*, have contributed to the landings, *E. arcuatus* coming from the Atlantic coast. The fishery for them commenced in the late 1990s rose to a peak in 2000 and declined, although landing statistics for part of 2003 exceed those of the year before. The value of landings in 2002 was €0.55 m.
- The two species have distinctive habitat preferences, *E. arcuatus* frequenting coarse (maërl) sand, *E. siliqua* living in finer sediments.
- Locally, *Ensis* spp. are frequently the most abundant bivalves. Harvesting them has been carried out by dredging and, although techniques have improved since the first blade or harrow dredges were used in the late 1990s, the technique still causes considerable incidental damage and disturbance to razor clams and associated fauna. Rejection and discard rates as a result of breakage and bruising have declined from the estimated 60% which used to accompany the early dredgers but the consequences of fishing by these methods are not completely quantified.
- The harvestable proportion of a razor clam bed can be as high as 90% of the clam biomass.
- Both species of razor clams are long lived, longevity extending to 16–18 years. Growth becomes asymptotic after 10 years. The spawning period appears to be extensive although investigations have revealed there is only one spat fall per year in the case of *E. arcuatus*. Spat falls appear to take place frequently although investigations on the razor clam bed at Gormanstown, on the east coast, currently in progress, record only one spat fall in five years while similar observations on *E. arcuatus* in Co Galway, reveal a spat fall in 2000, a better one a year later and a poor spat fall a year after that.
- The rapid clearance of razor clam beds by dredging has had a number of consequences for the market which is largely confined to Spain. Large quantities

of the animals have occasionally over-supplied the limited outlets and the price for razor clams has fallen as a result. Within Spain itself there are two market sectors. Canneries prefer *Ensis siliqua* but lose interest in or about March when the animal commences

spawning and loses condition. The fresh (live) market prefers smaller razor clams and *E. arcuatus* would be more suited to it.

Fig 1 Annual landings (t) of razor clams from 1997 to 2002; provisional landings to September 2003 are also given.



Surf Clams on South and West Coasts

(Sub-areas VII)

Spisula mainly *solida*



Fisheries Science Services

FSS – ADVICE

The minimum size limit should be enforced. There is little incentive for not doing so because smaller animals obtain very low prices however, such is the state of dredge fisheries at present that even sub-sized animals sometimes find a market.

These species are ideally managed locally by fishermen who forbear from exploiting them until an optimal size has been reached. Surf clams are easily aged so that occasional surveys should serve to predict when harvesting is appropriate. A simple box dredge is the ideal way to exploit these animals although repeated dredging of a bed will cause mortalities among non-target age and size groups. It is important that fishermen's groups should insist that appropriate bar spacing on their dredges is introduced and that dredges are not overloaded so that this sorting mechanism does not operate.

The limited circumstances in which surf clams proliferate are vulnerable to environmental change, particularly to dredge spoil clogging the interstices of the coarse sand and this should be noted where EIS are being compiled.

STATE OF THE STOCK

Spisula fisheries exist as isolated stocklets. With the exception of one, all of those examined to date had previously been exploited and the growth curves of the animals displayed characteristics of fished, some of them heavily fished, populations. This resource is a relatively limited one which is absorbing some of the over-capacity which developed in fisheries for razor clams.

CURRENT MANAGEMENT

The only management measure is an EU regulation (Annex XII of 850/98) specifying a minimum size limit of 25 mm in length. Some attempts have been made to manage these fisheries locally by fishermen staying away from beds which are recovering from heavy exploitation or which have had a large recruitment below harvesting size.

ADDITIONAL INFORMATION

1. Fisheries for surf clams developed as an offshoot of the razor clam fishery in the late 1990s.
2. Beds of these interstitial clams so far discovered are small in extent, c 1-2 km². They usually occur in special circumstances of strong current and in a medium or large grain size composed of shell or *Lithothamnium* sand (known as *Spisula* sand) which can be vulnerable to siltation.
3. To date *Spisula solida* is the only species encountered.
4. The clams have a life expectancy of up to 10 years; they reach legal size at about age 3 – 4 (Fig 1). Most rapid growth is made in the early years and relatively little weight is added in later ones. Surf clams require fewer years in which to reach asymptotic size than, say, razor clams, so that planning a phased harvesting regime is more realistic for *Spisula*.
5. It is feasible to age the animal relatively easily using external shell sculpture making verification of predictions about year class strength straightforward.
6. A disadvantage in this species (and possibly other interstitial species also) is irregular spatfalls which undermine continuity of supply (Fig 2). The reasons for these are unknown but the small size of the beds in which the species usually occurs might be a factor.
7. Erratically good recruit years complicate the construction of yield per recruit curves for the species.
8. Fisheries for surf clams should ideally be managed on a co-operative basis.
9. Clam dredges should be equipped with a bar spacing of a minimum 11 mm to accommodate the size limit (Fig 3).

Source of information:

Edward Fahy, Jim Carroll, Margaret O'Toole and John Hickey (2003) A preliminary account of fisheries for the surf clam *Spisula solida* (L) (Mactracea) in Ireland. Fisheries Bulletin No 21; 27 pp.

Fig 1 A growth curve for *Spisula solida* in Waterford Harbour.

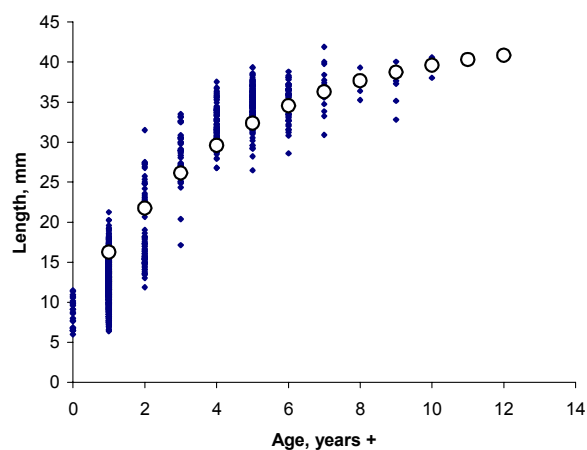


Fig 2. Age frequency in an unexploited clam patch in the Saltee Islands in 2003. The sample was taken by commercial dredge, hence the absence of youngest age groups.

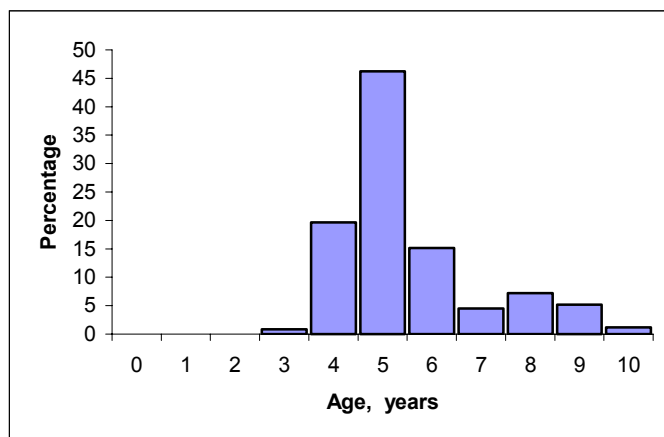
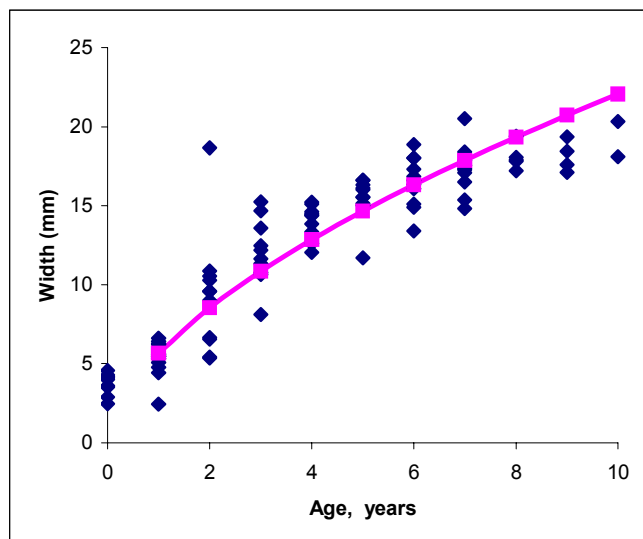


Fig 3. The relationship between minimum width and age of *Spisula solida* which establishes the age at which minimum size is achieved as approximately 3 years.



South East Scallop Fisheries

(Divisions VIIa,g)

Pecten maximus



Fisheries Science Services

FSS – ADVICE

FSS advises that a precautionary approach which would protect spawning stock in this fishery should be implemented. Although knowledge of this stock is currently limited, it is assumed that increased recruitment would result from a larger biomass (although this relationship does not always operate).

The management priority in this fishery is reducing fishing effort (through reducing the number of dredges per vessel, reducing the number of boats and/or reducing the number of days at sea. Reducing the catch in the short term as through the operation of regional, individual or fleet sector quotas is another approach.

Higher growth rates of scallop in smaller inshore grounds suggests that these might be suitable places into which translocation of juveniles for on-growing might be attempted. Different minimum landing sizes for different stock(lets) and area closures might be conducive to higher yield per recruit.

STATE OF THE STOCK

The amount of gear per vessel has been increasing. The fishing power and effort are currently in excess of what the resource can sustain. Fishing mortality and fishing effort are regarded as currently too high and unsustainable.

CURRENT MANAGEMENT

Scallop landings are limited to animals of greater than 100 mm maximum width by EU regulation (Annex XII of 850/98). Participation in the fishery in 2002 was by 22 vessels of total 2,612 GRT.

ADDITIONAL INFORMATION

1. This fishery lands the majority of scallops caught by the Irish fleet. Total landings from all scallop fisheries in 2002 were 1,139 t with a first sale value of €3.4 m. (Source: DCMNR) (see also Table 1).
2. Fishing activity of the south east scallop increased between 1995 and 2002. Pre 1997 only 103 dredges

were operated; these increased to 198 between 1997 and 2000 and in 2002 the number was 528 although not all of the increased effort went into VIIa, g.

3. In 1970 only two small inshore grounds were fished but by 2002 fishing activity was distributed throughout the southern Irish Sea, western English Channel and north west of Brittany [VIIe, f, h] (Fig 1).
4. Catch data examined from two sources, E.U. log-books and private diaries, provided conflicting results. The diaries indicated significant reductions in scallop per effort post-1999 (Fig 2). As a result of inshore depletion, scallops have been sought offshore and further south.
5. The following findings emerged from research conducted in 2001 on the grounds closest to Ireland (B&H, Tuskar, Ship and Barrels – Fig 1)
 - a. Highest densities of commercial and under-sized scallop in an area directly south of the Waterford estuary, to a distance of 30 nm offshore.
 - b. Growth rates were highest on the inshore grounds and in the eastern part of the fishery.
 - c. Age-based cohort analysis indicated an average F on commercial class sizes of 0.81, an exploitation rate of 55% (Fig 3).
 - d. Landings were dominated by scallops of 4-6 y.o. and some 3 y.o. were also recruited.
 - e. Stock size (ages 3-10) was estimated at 52.7 m.
 - f. Recruitment appears to take place regularly in this fishery.
 - g. The stock(lets) in different parts of this fishery have different characteristics suggesting that individual sub-area management strategies might be effective.

Source of information:

Fishing activity and stock assessment of scallops off the south east coast of Ireland 1995-2002 (2002) By Oliver Tully, Antonio Hervas and John Hickey. BIM, Dublin

Table 1. Landings to scallop (t) by Irish vessels, 1995 - 2002. Source, DCMNR

Port	1995	1996	1997	1998	1999	2000	2001	2002	Totals
Achill				0.5					0.5
Arklow	1.5			1.5	13.0	12.0			28.0
Baltimore	0.0				0.1				0.1
Bantry	2.2							2.7	4.9
Carna							4.8		4.8
Castlegregory							0.2		0.2
Castletownbere							2.9	0.9	3.8
Crosshaven				0.7					0.7
Cleggan			0.6						0.6
Cobh	0.5	1.1	1.6	1.4	0.7	1.2	1.3	1.5	9.3
Duncannon	0.5			0.0	59.7	116.7	74.1		251.0
Dingle				13.8	69.0		64.3	12.4	159.5
Downings							37.7	53.2	90.9
Dunmore East	147.6	88.6	168.9	32.9	292.0	198.3	72.4	44.3	1045.0
Dunmanus								2.5	2.5
Fenit									0.0
Galway					0.3				0.3
Garnish/Travara							1.4		1.4
Glengariff								0.8	0.8
Greencastle					0.6	4.7	22.8	36	64.1
Helvick					0.0	0.0			0.0
Howth	8.2		0.2	53.0	137.2	77.8	62.0	74.5	412.9
Kenmare							0.3	1.4	1.7
Killybegs						0.6			0.6
Kilmore Quay	0.1	248.9	336.6	451.6	745.5	870.2	368.7	608.2	3629.8
Rosslare	2.1	0.0	2.4	4.3	5.7	82.1	356.1	99.7	552.4
Rossaveal		0.1	6.2	12.3	38.1	0.0	34.9		91.6
Sneem							3.2	6	9.2
Tully/Renvyle							0.4		0.4
UK		0.0	0.1	10.7	37.6	13.1	262.1	119	442.6
Valentia							13.8		13.8
Waterford	11.0	3.5	12.4	8.6	90.9	31.0	20.3	76	253.7
Westport							5.5		5.5
Wicklow				2.5			1.2		3.7
Totals	173.7	342.2	529.0	593.8	1490.4	1407.7	1410.4	1139.1	7086.3

Fig 1 Evolution of scallop fisheries in the south east: top left, scallop fisheries in the 1970s, top right, 1980s, bottom left, 1990s, bottom right, 2002.

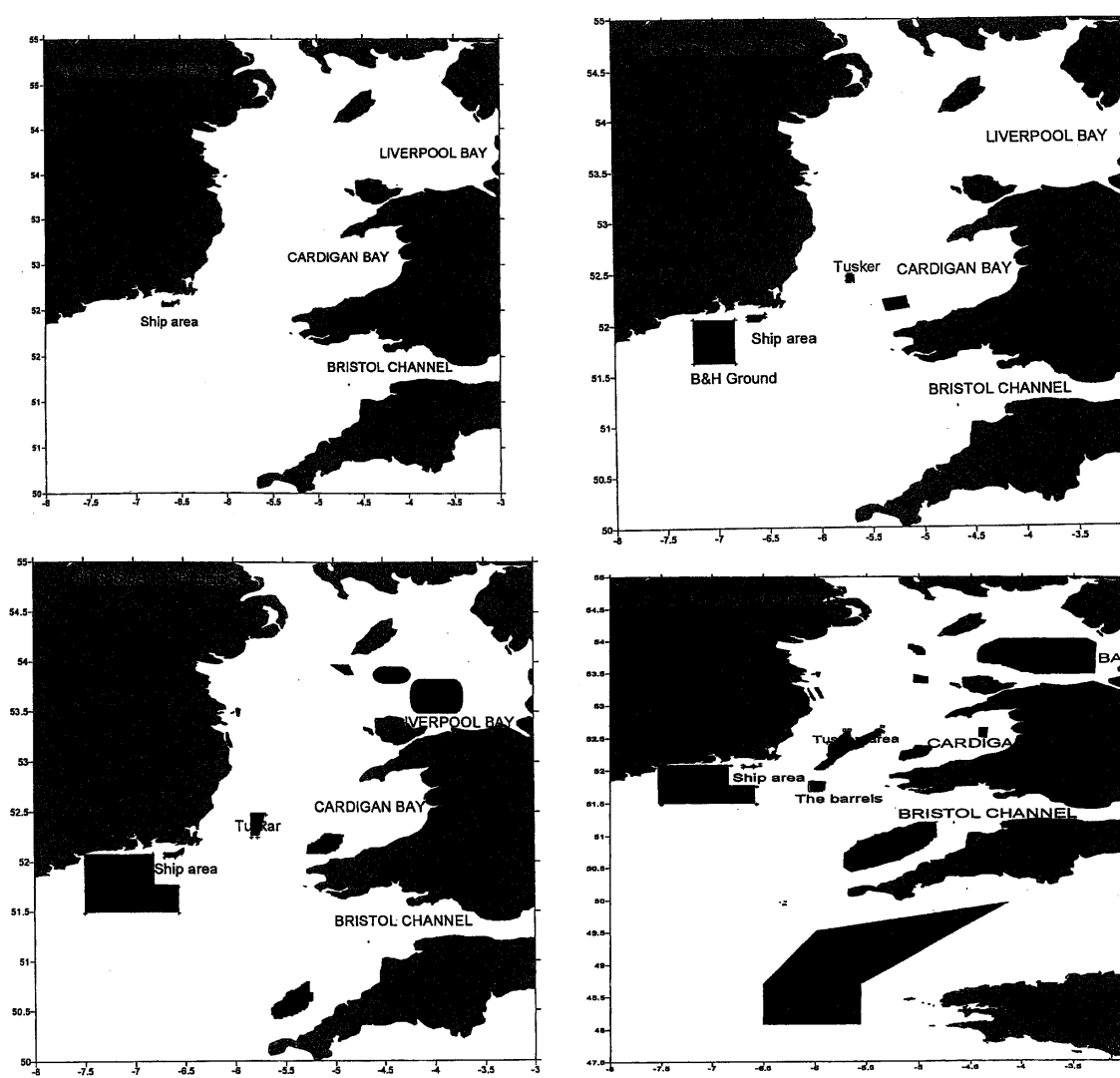


Fig 2 Trend of Lthe S.E. scallop PUE in fishery, 1993 – 2003, as revealed by private diaries in selected index vessels.

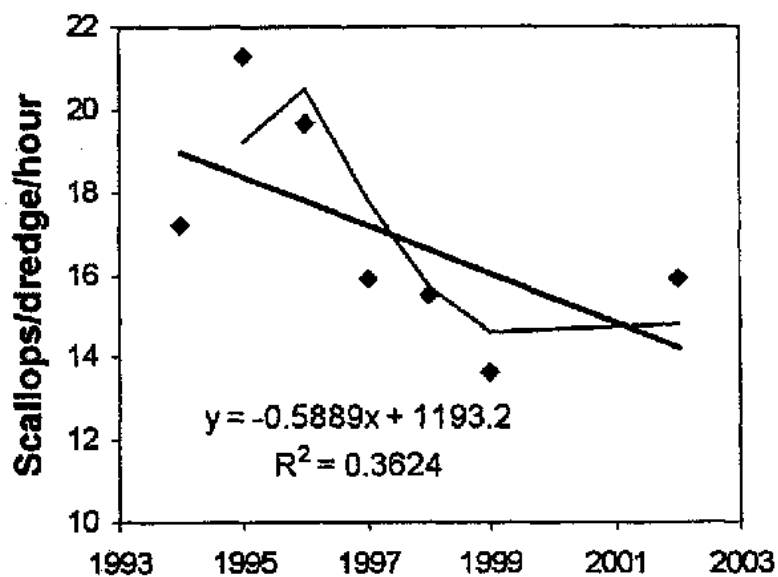
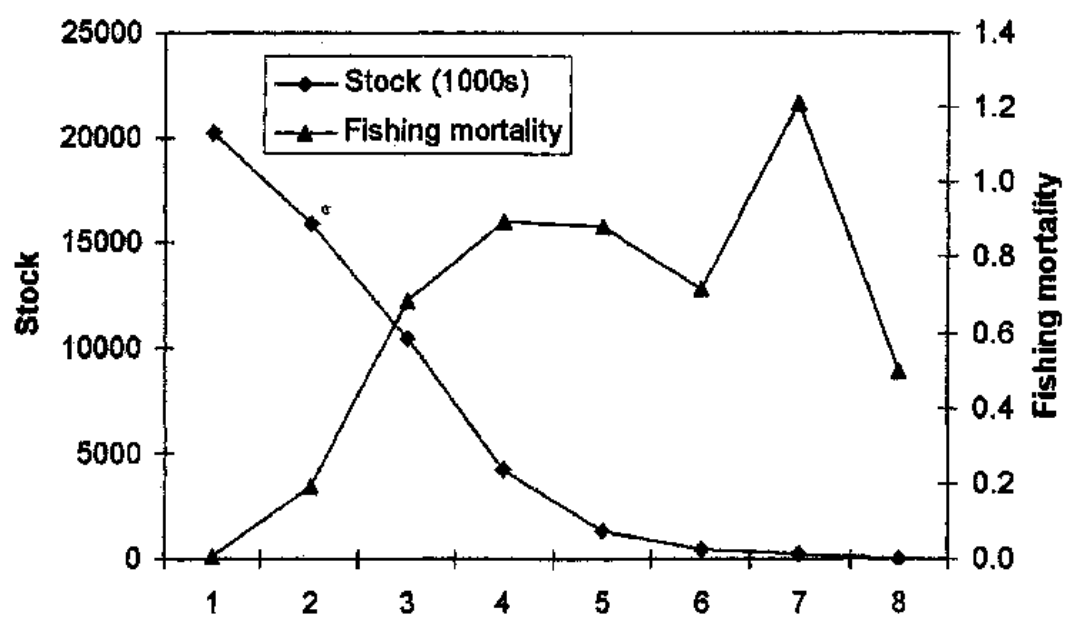


Fig 3 Stock size at age and fishing mortality (F) at age in the south east scallop fishery.



Scallop off the North Coast

(Division VIa)

Pecten maximus



Marine Institute
Foras na Mara

Fisheries Science Services

FSS – ADVICE

FSS advises that further data should be sought on the biology and ecology of this species.

STATE OF THE STOCK

Unknown.

CURRENT MANAGEMENT

EU regulations impose a minimum size limit of 100 mm length on landings of scallop (Annex XII of EU regulation 850/98).

ADDITIONAL INFORMATION

1. Survey data from BIM in 2002 indicate commercially exploitable stocks North east of Malin Head in 40 –85 m of water, centred off the north and extending eastwards on the Antrim coast
2. The Malin Head stock is possibly a component of a larger metapopulation whose sources of recruitment are not known.
3. The fishery has been irregularly exploited in recent years; landings of 23 t were made into Greencastle in 2001 (see Table 1 in South-east scallop).
4. In 2002 more than 60% of scallops caught were 4 – 5 years old.

Queen Scallop on North and East Coasts

(Divisions VIa, and VIIa)

Aequipecten opercularis



Marine Institute
Foras na Mara

Fisheries Science Services

FSS – ADVICE

FSS recommends the collection of further data on the biology and distribution of this species.

STATE OF THE STOCK

Unknown

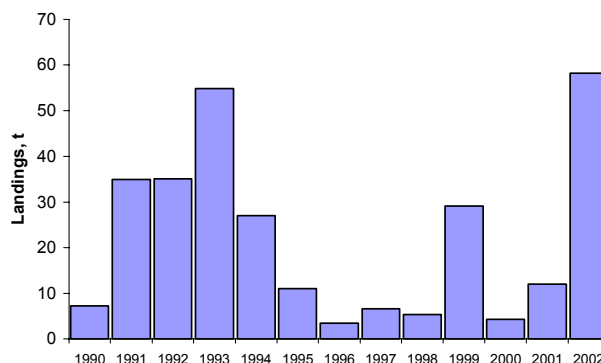
CURRENT MANAGEMENT

The maximum length of the shell of queen scallop must be a minimum of 40 mm to conform with EU regulation (Annex XII of 850/98). The only other regulation which applies is the EU regulation 223/91 concerning the quality of water from which bivalve shellfish are harvested.

ADDITIONAL INFORMATION

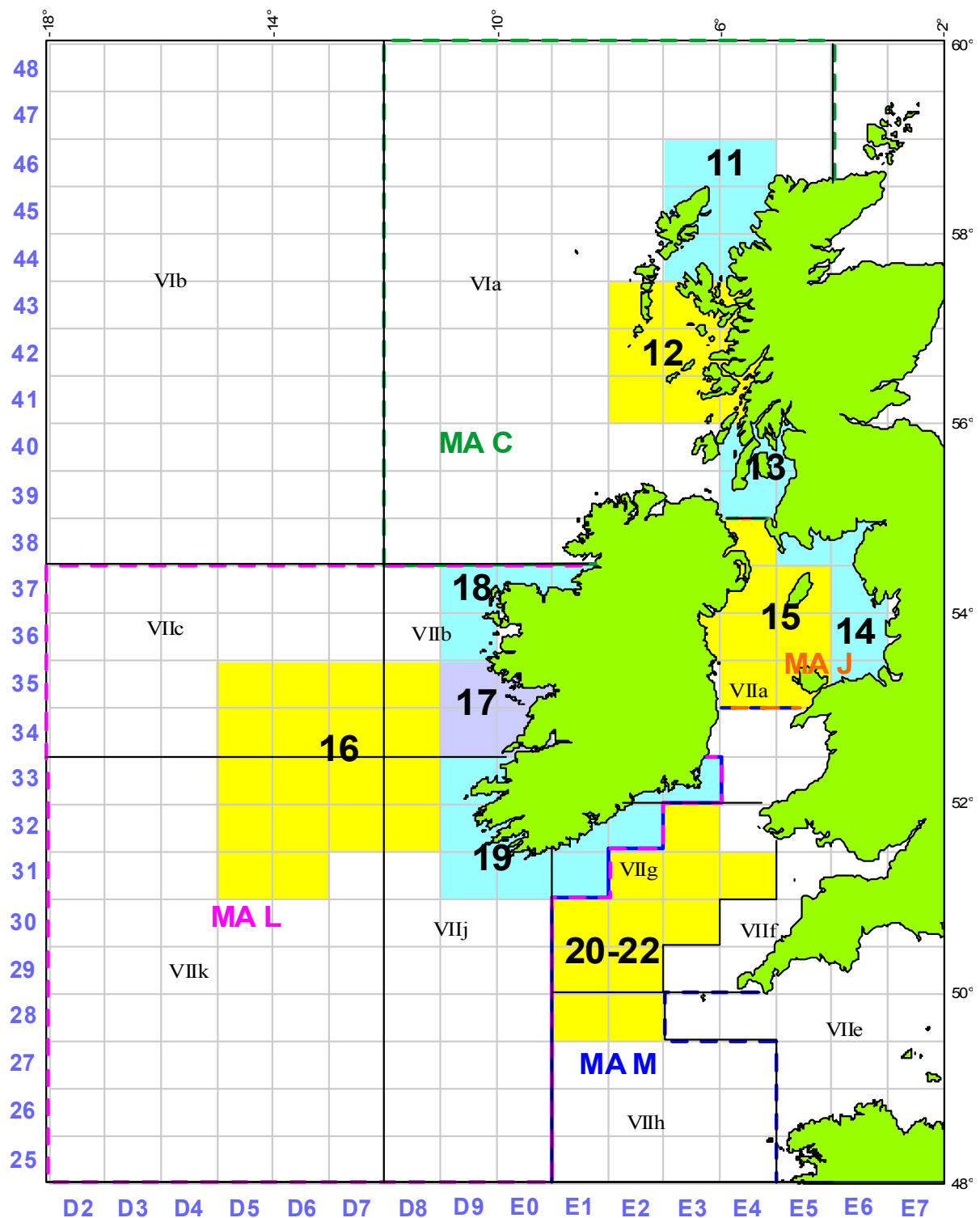
1. In 2002 58 t of queen scallop valued at €89,500 were landed to Ireland; this was the highest landing in twelve years (Fig 1). In 1996 only 3.4 t were recorded and in 2000 4.3 t were registered.
2. The majority of queen scallops landed in 2002 were harvested from a new directed fishery off Malin Head and from the southern Irish Sea.
3. Surveys conducted by BIM in 2001 recorded queen scallop in discrete patches separated by few or no scallops over a wide area in the Irish Sea.
4. Average size of queen scallop sampled was 60 mm shell height. This corresponds approximately to 63 mm shell length.
5. Recruitment was complete at age 3 y.o. and animals of this age made up 45% of the catch in 2001.

Fig 1 Landings of queen scallop to Ireland, 1990 – 2002.
Source: DCMNR



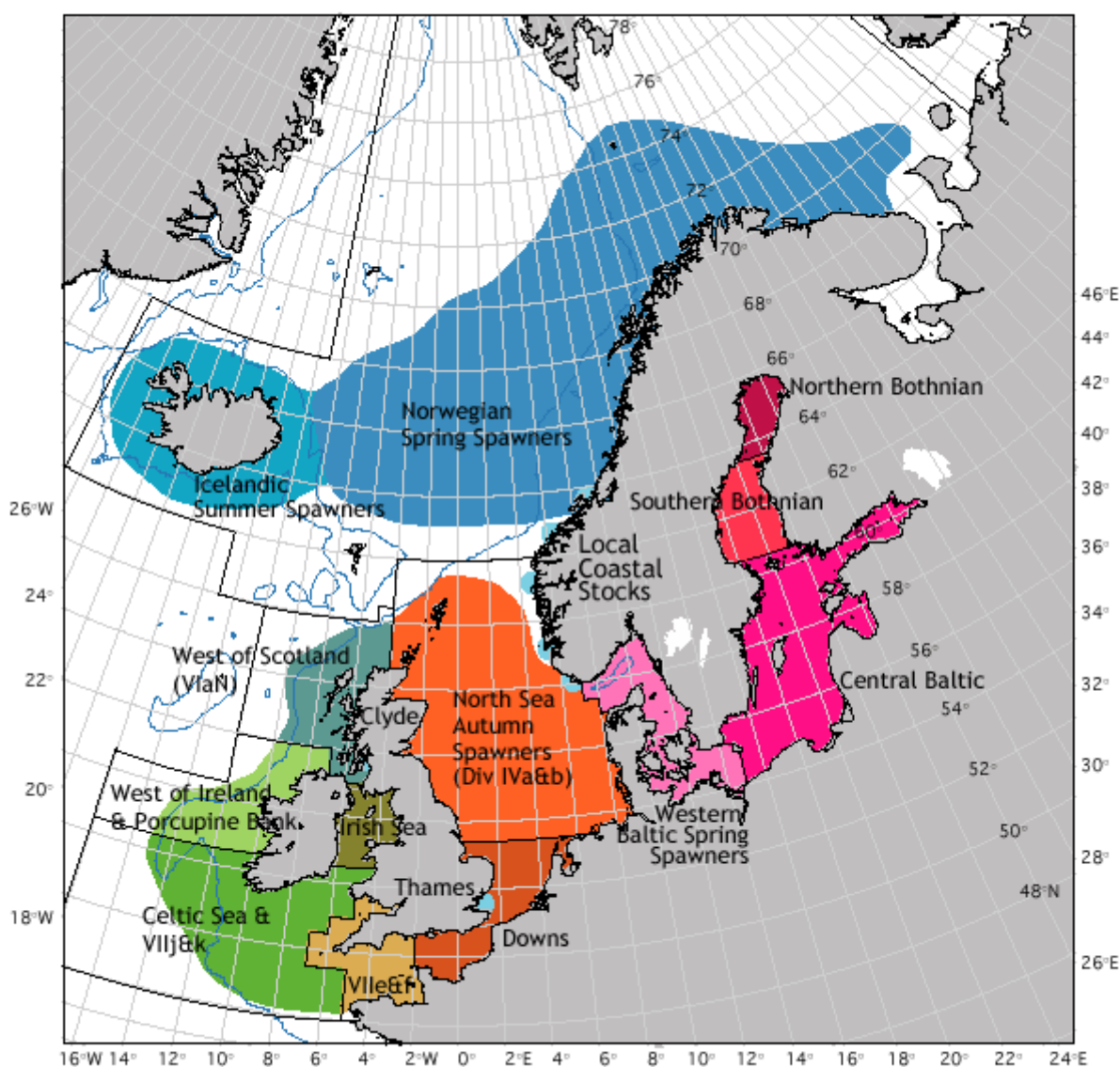
Appendix I

Nephrops Functional Units (FUs) and Management Areas (MAs) around Ireland



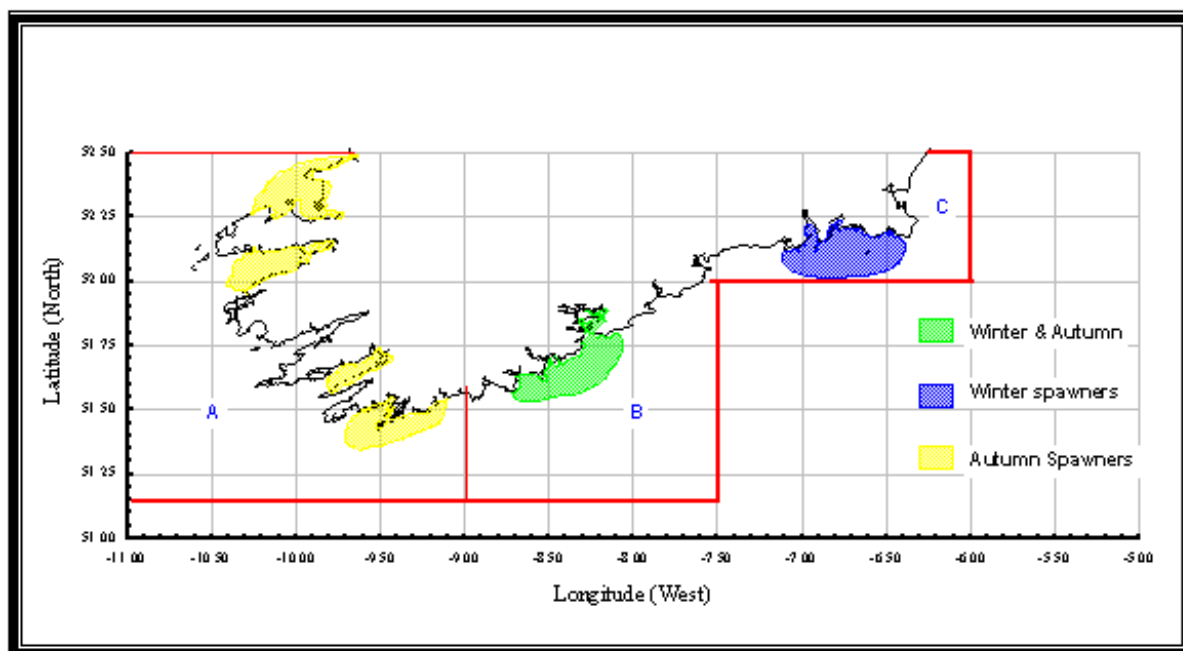
Appendix II

North East Atlantic Herring Assessment and Management Units



Appendix III

Herring Spawning boxes off the South coast.



Appendix IV

EU Member States shares of the 2003 TAC's

HERRING	Total tonnes	IRE	BEL	DEN	GER	FRA	HOL	UK	SPA	POR	SWE	FIN	Not alloc.
I,II (Atlanto-Scandic) ⁽¹⁾⁽²⁾	35,500	3,204	13	12,378	2,168	534	4,430	7,914	41	41	4,587	192	
Vb, VIa ⁽³⁾ , VIIb	29,340	4,432			3,280	621	3,280	17,728					
VIa ⁽⁴⁾ , VIIbc	14,000	12,727					1,273						
VIIa ⁽⁵⁾	4,800	1,250						3,550					
VIIghjk ⁽⁶⁾	13,000	11,235			144	802	802	16					

⁽¹⁾ The quota may be fished in Norwegian waters after Member States have been notified by the Commission that an Agreement with Norway on the issue has been finalised.

⁽²⁾ The quota, which is set to cover the fishery in the first part of the year, is preliminary and will be reviewed not later than April 2003.

⁽³⁾ Reference is to the herring stock in ICES Division VIa, north of 56 00'N and in that part of VIa which is situated east of 07 00'W and north of 55 00'N, excluding the Clyde.

⁽⁴⁾ Reference is to the herring stock in ICES Division VIa, south of 56 00'N and west of 07 00'W

⁽⁵⁾ ICES division VIIa is reduced by the area added to the Celtic Sea bounded: to the north by latitude 52 30' N to the south by latitude 52 00'N to the west by the coast of Ireland to the east by coast of UK.

⁽⁶⁾ ICES division VIIg,h,j,k is increased by the area added to the Celtic Sea bounded: to the north by latitude 52 30' N to the south by latitude 52 00'N to the west by the coast of Ireland to the east by coast of UK.

MACKEREL	Total tonnes	IRE	BEL	DEN	GER	FRA	HOL	UK	SPA	POR	SWE	FIN	Not alloc.
Vb, VI, VII, VIIIabde, XII, XIV	310,808	66,300 ⁽¹⁾			19,890	13,261	29,006	182,331	20				

⁽¹⁾ of which, 19,890 t may be found from 1 January to 15 February & 1 October to 31 December 2003 in EC waters of ICES Division IVa.

HORSE MACK.	Total tonnes	IRE	BEL	DEN	GER	FRA	HOL	UK	SPA	POR	SWE	FIN	Not alloc.
IIa, IV	41,667	1,641	65	28,273	2,132	45	4,587	4,174			750		
Vb, VI, VII, VIIIabde, XII, XIV	130,000	30,693		11,796	9,428	6,230	44,981	12,751	12,875	1,246			

BL. WHITING	Total tonnes	IRE	BEL	DEN	GER	FRA	HOL	UK	SPA	POR	SWE	FIN	Not alloc.
Vb, VI, VII, XII, XIV	107,281	17,165		2,218	8,582	11,944	26,963	25,032	14,304	1,073			

ALBACORE TUNA	Total tonnes	IRE	BEL	DEN	GER	FRA	HOL	UK	SPA	POR	SWE	FIN	Not alloc.
Atlantic, north of 5°N ⁽¹⁾	38,638	3,320 ⁽²⁾				6,259		400	25,928	2,730			

⁽¹⁾ It is prohibited to use any gill net, bottom set gill net, trammel net and entangling net.

⁽²⁾ Maximum of 50 Irish vessels flying the flag to fish Northern Albacore

COD	Total tonnes	IRE	BEL	DEN	GER	FRA	HOL	UK	SPA	POR	SWE	FIN	Not alloc.
I,II	16,353	245			1,976	1,814		7,665	2,204	2,204			245
Vb, VI, XII, XIV	1,808	407 ⁽¹⁾	3		27	287		1,084					
VIIa	1,950	1,284	26			71	7	562					
VIIb-k, VIII, IX, X	6,700	875	289			4,958	41	537					

⁽¹⁾ of which, no more than 354t may be fished in Vb, VIa.

HADDOCK	Total tonnes	IRE	BEL	DEN	GER	FRA	HOL	UK	SPA	POR	SWE	FIN	Not alloc.
Vb, VI, XII, XIV	8,675	1,321 ⁽¹⁾	17		21	860		6,455					
VII, VIII, IX, X ⁽²⁾	8,185	1,819 ⁽³⁾	91			5,456		819					
ad hoc VIIa	585	253	9			42		281					

⁽¹⁾ of which, no more than 1,214t may be fished in Vb, VIa.

⁽²⁾ Landings of haddock caught in Division VIIa will be prohibited when the totality of such landings exceeds 585 tonnes.

⁽³⁾ of which, no more than 253t may be fished in VIIa.

WHITING	Total tonnes	IRE	BEL	DEN	GER	FRA	HOL	UK	SPA	POR	SWE	FIN	Not alloc.
Vb, VI, XII, XIV	2,000	582			6	122		1,290					
VIIa	500	288	1			17		193					
VIIb-k	31,700	8,814	309			19,020	155	3,402					

As agreed by Council Regulations (EC) No 2341/2002 of 16 December 2002. Changes may be made during 2003

Appendix IV

EU Member States shares of the 2003 TAC's

POLLACK	Total tonnes	IRE	BEL	DEN	GER	FRA	HOL	UK	SPA	POR	SWE	FIN	Not alloc.
Vb,VI,XII,XIV	880	124				421		322	12				
VII	17,000	1,298	529			12,177		2,964	32				

SAITHE	Total tonnes	IRE	BEL	DEN	GER	FRA	HOL	UK	SPA	POR	SWE	FIN	Not alloc.
Vb,VI,XII,XIV	17,119	415			1,251	12,424		3,029					
VII,VIII,IX,X	8,710	2,450	22			4,901		1,337					

HAKE	Total tonnes	IRE	BEL	DEN	GER	FRA	HOL	UK	SPA	POR	SWE	FIN	Not alloc.
Vb,VI,VII,XII,XIV	16,823 ⁽¹⁾	1,114 ⁽²⁾	152			7,512	98	2,988	4,959				

⁽¹⁾ Within an overall TAC of 30 000 tonnes for the northern stock of hake

⁽²⁾ Within VIIa, b, d, e no more than 100 tonnes can be taken

ANGLERFISH	Total tonnes	IRE	BEL	DEN	GER	FRA	HOL	UK	SPA	POR	SWE	FIN	Not alloc.
Vb,VI,XII,XIV	3,180	318	114		130	1,407	110	978	122				
VII	15,810	1,198	1,461		163	9,375	189	2,843	581				

MEGRIMS	Total tonnes	IRE	BEL	DEN	GER	FRA	HOL	UK	SPA	POR	SWE	FIN	Not alloc.
Vb,VI,XII,XIV	4,360	565				1,932		1,367	495				
VII	14,336	2,373	387			5,220		2,055	4,301				

PLAICE	Total tonnes	IRE	BEL	DEN	GER	FRA	HOL	UK	SPA	POR	SWE	FIN	Not alloc.
Vb,VI,XII,XIV	1,534	559				42		932					
VIIa	1,675	1,173	43			19	13	428					
VIIbc	160	128				32							
VIIIfg	660	46	164			296		155					
VIIhjk	582	255	36			73	146	73					

SOLE	Total tonnes	IRE	BEL	DEN	GER	FRA	HOL	UK	SPA	POR	SWE	FIN	Not alloc.
Vb,VI,XII,XIV	106	85						21					
VIIa	1,010	123	499			6	158	224					
VIIbc	80	65				15							
VIIIfg	1,240	39	775			78		349					
VIIhjk	390	176	32			65	52	65					

NEPHROPS	Total tonnes	IRE	BEL	DEN	GER	FRA	HOL	UK	SPA	POR	SWE	FIN	Not alloc.
Vb,VI	11,340	153				92		11,070	23				
VII	17,790	6,561				4,326		5,836	1,067				

As agreed by Council Regulations (EC) No 2341/2002 of 16 December 2002. Changes may be made during 2003

Appendix IV

EU Member States shares of the 2003 TAC's

BLACK SCABBARDFISH	Total tonnes	IRE	BEL	DEN	GER	FRA	HOL	UK	SPA	POR	SWE	FIN	Others
V, VI, VII, XII ⁽¹⁾	3,110	93			37	2,600		185	185				10 ⁽²⁾

GREATER SILVER SMELT	Total tonnes	IRE	BEL	DEN	GER	FRA	HOL	UK	SPA	POR	SWE	FIN	Others
III, IV ⁽¹⁾	1,566	10		1,388	14	10	65	25			54		

GREATER SILVER SMELT	Total tonnes	IRE	BEL	DEN	GER	FRA	HOL	UK	SPA	POR	SWE	FIN	Others
V, VI, VII ⁽¹⁾	6,247	441			476	10	4,971	349					

TUSK	Total tonnes	IRE	BEL	DEN	GER	FRA	HOL	UK	SPA	POR	SWE	FIN	Others
V, VI, VII ⁽¹⁾	710	40			10	415		200	35				10 ⁽²⁾

ROUNDNOSE GRENADIER	Total tonnes	IRE	BEL	DEN	GER	FRA	HOL	UK	SPA	POR	SWE	FIN	Others
V, VI, VII ⁽¹⁾	5,106	346			10	4,396		258	86				10 ⁽²⁾

ORANGE ROUGHY	Total tonnes	IRE	BEL	DEN	GER	FRA	HOL	UK	SPA	POR	SWE	FIN	Others
VI ⁽¹⁾	88	10				58		10	10				

ORANGE ROUGHY	Total tonnes	IRE	BEL	DEN	GER	FRA	HOL	UK	SPA	POR	SWE	FIN	Others
VII ⁽¹⁾	1,349	300				1,019		10	10				10 ⁽²⁾

BLUE LING	Total tonnes	IRE	BEL	DEN	GER	FRA	HOL	UK	SPA	POR	SWE	FIN	Others
II, IV, V ⁽¹⁾	138	10		10	10	61		37					10 ⁽²⁾

BLUE LING	Total tonnes	IRE	BEL	DEN	GER	FRA	HOL	UK	SPA	POR	SWE	FIN	Others
VI, VII ⁽¹⁾	3,678	10			39	2,788		709	122				10 ⁽²⁾

LING	Total tonnes	IRE	BEL	DEN	GER	FRA	HOL	UK	SPA	POR	SWE	FIN	Others
VI, VII, VIII, IX, X, XII, XIV ⁽¹⁾	14,966	1,102	56	10	204	4,397		5,063	4,124	10			

RED SEABREAM	Total tonnes	IRE	BEL	DEN	GER	FRA	HOL	UK	SPA	POR	SWE	FIN	Others
VI, VII, VIII ⁽¹⁾	350	10				14		35	281				10 ⁽²⁾

REDFISH	Total tonnes	IRE	BEL	DEN	GER	FRA	HOL	UK	SPA	POR	SWE	FIN	Not alloc.
V, XII, XIV ^{(2) (3)}	16,452	4 ⁽²⁾			11,100	1,037	5	27	1,949	2,330			

⁽¹⁾ Community waters and waters not under the sovereignty or jurisdiction of third countries

⁽²⁾ May be taken in NAFO Divisions IF and 3K but shall be counted against the quota for V, XII, XIV within a total quota of 25 000 tonnes.

⁽³⁾ Community waters and areas beyond fisheries jurisdiction of other coastal States.

DEFINITION OF FISHERIES TECHNICAL TERMS AND ACRONYMS



Fisheries Science Services

Abundance Index Information obtained from samples or observations and used as a measure of the weight or number of fish which make up a stock.

ACFM Advisory Council on Fisheries Management – This ICES group is responsible for compiling and analysing all available fish stock information to compile advice on stock levels and strategies for management.

Acoustic surveys Acoustic surveys use sound waves emitted from a "transducer" to estimate the density of plankton and fish shoals. The survey vessel tows the transducer under water, which is linked to an echo sounder in the vessel which records the shoals of fish as "marks" on a screen or paper trace. The density of these marks is used to calculate total biomass of a stock.

Age The number of years of life completed, here indicated by an Arabic numeral, followed by a plus sign if there is any possibility of ambiguity (age 5, age 5+) (see <http://www.efan.no>)

Annual (or seasonal) Total Mortality Rate The number of fish which die during a year (or season), divided by the initial number. Also called actual mortality rate, coefficient of mortality.

Benthic Anything living on, or in, the bottom of the sea.

BIM An Bord Iascaigh Mhara, The Irish Sea Fisheries Board, charged with responsibility for development of the fishing and aquaculture industries in Ireland. (see <http://www.bim.ie>)

Biomass Measure of the quantity, usually by weight in metric tons (2,205 pounds = 1 metric ton), of a stock at a given time.

Biological reference points Various reference points can be defined for fished stocks. These can be used as a management target or a management trigger (i.e. point where more stringent management action is required) Examples include fishing mortality reference points $F_{0.1}$, F_{max} , F_{med} , F_{pa} and biomass reference points B_{pa} and B_{lim} .

B_{lim} The B_{lim} is the limit of the spawning stock biomass, below which recruitment is impaired or the dynamics of the stock are unknown.

B_{pa} B_{pa} is the Spawning Stock Biomass (SSB) level above which the stock should be maintained to ensure that recruitment is not impaired. In stocks where there has been no evidence of reduced recruitment below a certain SSB size, B_{pa} has been calculated by multiplying B_{loss} (the lowest observed SSB) by uncertainty factor ($e^{-1.645}$) to take into account assessment uncertainty.

By-catch Refers to discarded catch (see Discards) plus incidental catch not purposely targeted by the fishermen.

Catchability The fraction of a fish stock which is caught by a defined unit of the fishing effort. When the unit is small enough that it catches only a small part of the stock (0.01 or less) it can be used as an instantaneous rate in computing population change. Also called catchability coefficient, force of fishing mortality.

Catch Curve A simple assessment method where the slope of a line fitted through the log of numbers of fish taken at successive ages or sizes is used to estimate total mortality (Z).

CECAF Fisheries Committee for the Eastern Central Atlantic – a committee of FAO (see below) and web page http://www.fao.org/fi/body/rfb/cecaf/cecaf_home.htm

CFP Common Fisheries Policy – The instrument of fisheries management within the European community (see http://europa.eu.int/comm/fisheries/policy_en.htm)

CFB / Central Fisheries Board is responsible for National inland fisheries development plans, administration of funding programmes, fresh water and sea angling promotion and management of fish rearing operations. (see <http://www.cfb.ie/index.htm>)

CPUE / Catch Per Unit of Effort The catch of fish, in numbers or in weight, taken by a defined unit of fishing effort. Also called catch per effort, fishing success, or availability.

Critical Size The average size of the fish in a year-class at the time when the instantaneous rate of natural mortality equals the instantaneous rate of growth in weight for the year-class as a whole. Also called optimum size.

DCR / Data Collection Regulation EU Council Regulations 1543/2000 and 1639/2001 established a community framework for the collection and management of the data needed to conduct the common fisheries policy. Each member state must collect data on the biology of the fish stocks, on the fleets and their activities and on economic and social issues. (see http://europa.eu.int/comm/fisheries/policy_en.htm)

DELASS Developing Elasmobranch Stock Assessments – An EU-funded project aimed at species identification, stock identification and discrimination, as well as data preparation and exchange on elasmobranch species such as sharks and rays.

Demersal Fish, such as cod, whiting, haddock, sole, plaice, skates and rays, that normally swim in mid-water at or close to the sea floor.

Discard Discards are defined as that part of the catch returned to the sea as a result of economic, legal or other considerations.

Discard rate The percentage (or proportion) of the total catch which is discarded.

Effective fishing effort Fishing effort or intensity standardised in some way e.g. hours fished in an area.

Elasmobranchs Fish, such as skates, rays, sharks and dogfish, whose skeletons are cartilaginous rather than bony (as in the teleost species such as cod, whiting, plaice and herring).

Emergency Measures Measures adopted by the EU prior to the introduction of cod and hake as part of the recovery plan. See the section on "Some Key Issues in Fisheries Management" for details of these measures.

Equilibrium Catch The catch (in numbers) taken from a fish stock when it is in equilibrium with fishing of a given intensity, and (apart from the effects of environmental variation) its abundance is not changing from one year to the next.

Equilibrium Yield The yield in weight taken from a fish stock when it is in equilibrium with fishing of a given intensity, and (apart from effects of environmental variation) its biomass is not changing from one year to the next. Also called sustainable yield, equivalent sustainable yield.

Exploitation pattern The distribution of fishing mortality over the age composition of the fish population determined by the type of fishing gear, area and seasonal distribution of

fishing, and the growth and migration of the fish. The pattern can be changed by modifications to fishing gear, for example, increasing mesh or hook size, or by changing the ratio of harvest by gears exploiting the fish (e.g., gill net, trawl, hook and line, etc.).

Exploitation rate The proportion of a population at the beginning of a given time period that is caught during that time period (usually expressed on a yearly basis). For example, if 720,000 fish were caught during the year from a population of 1 million fish alive at the beginning of the year, the annual exploitation rate would be 0.72.

FAO Fisheries and Agriculture Organization – Based in Rome, this organization is part of the United Nations (see <http://www.fao.org/fi/default.asp>).

FAT Fisheries Assessment Technician – regionally-based sea-going staff employed by FSS.

Fishing Effort The total fishing gear in use for a specified period of time. When two or more kinds of gear are used, they must be adjusted to some standard type

Fishing Mortality Deaths in a fish stock caused by fishing.

F_{lim} is the limit fishing mortality. F_{lim} should be avoided with high probability because it is associated with unknown stock dynamics or stock collapse.

F_{max} The rate of fishing mortality for a given exploitation pattern rate of growth and natural mortality, that results in the maximum level of yield-per-recruit.

$F_{0.1}$ The fishing mortality rate at which the increase in yield-per-recruit in weight for an increase in a unit-of-effort is only 10 percent of the yield-per-recruit produced by the first unit of effort on the unexploited stock (i.e., the slope of the yield-per-recruit curve for the $F_{0.1}$ is only one-tenth the slope of the curve at its origin).

F_{pa} is a precautionary reference point designed to ensure that there is a high probability that F_{lim} will be avoided and that spawning stock biomass will remain above the threshold (B_{pa}) below which the probability of good to average recruitment is decreased.

Gadoids An important family of food fish, including cod, haddock, rocklings, hake, whiting, blue whiting and ling. Usually characterised by the presence of a barbel on the chin.

Gill nets Static nets suspended in the water column to trap fish by the gills.

Groundfish Species of demersal fish dwelling on, or close to the sea floor, as targeted in the annual FSS groundfish surveys around the Irish coast.

Growth overfishing Occurs when fishing mortality exceeds F_{max}

ICES International Council for the Exploration of the Seas – Ireland shares the Total Allowable Catches TACs for many stocks we exploit with our European Union partners. Because of this international dimension many stocks need to be assessed in an international fora such as ICES. (see: <http://www.ices.dk/>)

ICCAT International Commission for the Conservation of Atlantic Tuna – (see: <http://www.iccat.es/>)

Incidental Catch The retained catch of non-targeted species.

IFREMER France's national marine research agency – (see: <http://www.ifremer.fr/anglais/>)

Inshore fisheries There are various definitions of inshore fisheries including those fisheries that are conducted within 12 miles of the shore, including demersal, pelagic, shellfish and sea angling fisheries.

Length Frequency An arrangement of recorded lengths which indicates the number of times each length or length interval occurs. For example, 10 measurements of lengths are taken in the following order 10, 12, 12, 14, 12, 15, 15, 12, and 10. A typical length frequency would be

Length	Occurrence
10	2
11	0
12	4
13	0
14	1
15	2
16	0
17	0
18	0

or

Interval	Occurrence
10-12	6
13-15	3
16-18	0

Long-term potential catch The largest annual harvest in weight that could be removed from a fish stock year after year, under existing environmental conditions. This can be estimated in various ways, from maximum values from production models to average observed catches over a suitable period of years.

Maintainable Yield "The largest catch that can be maintained from the population, at whatever level of stock size, over an indefinite period. It will be identical to the sustainable yield for populations below the level giving the MSY, and equal to the MSY for populations at or above this level".

Management Plan A plan agreed to promote the sustainable use of marine resources, usually characterised by clearly defined objectives, and agreed management actions and constraints that will ensure a high probability of maintenance or recovery of resources to agreed sustainable levels.

Maximum Sustainable Yield The largest average catch or yield that can continuously be taken from a stock under existing environmental conditions. (For species with fluctuating recruitment, the maximum might be obtained by taking fewer fish in some years than in others.) Also called maximum equilibrium catch, maximum sustained yield, sustainable catch.

Marine Institute The Marine Institute is Ireland's national agency with the following general functions: "to undertake, to co-ordinate, to promote and to assist in marine research and development and to provide such services related to marine research and development, that in the opinion of the Institute will promote economic development and create employment and protect the environment." Marine Institute Act, 1991 – (see: <http://www.marine.ie/>)

FSS / Fisheries Science Services – One of seven service areas of the Marine Institute, FSS's mission is to assess, research and advise on the marine fisheries resource in Irish waters – (see: <http://www.marine.ie/>)

Mortality rates Mortality rates are critical for determining the abundance of fish populations and the effects of harvesting strategies on yield and spawning potential from a stock. Fish abundance is a balance between the factors that act to increase the stock births and factors that decrease population numbers (deaths). When births exceed deaths, the stock increases, and vice-versa. The stock is brought into stability when the number of recruits entering the fishery balances the number of deaths. Fishery managers can control deaths caused by fishing by manipulating the fishing effort on fish of sizes vulnerable to the gear. Fishing mortality can be changed through indirect methods, such as regulating mesh size to make fish of certain ages less vulnerable to the gear. Direct control measures, such as catch quotas or effort limits, determine the rate of fishing mortality on the vulnerable

sizes. The total number of births is determined by the abundance of breeders in the population the spawning stock which can also be manipulated by managers.

Mortality occurs at all life stages of the population. Depending on the species, mortalities suffered from the egg to larval stages are usually very high, less so from the larval to juvenile stage. In young fish, death can occur from several causes - starvation, predation, or disease. If fish survive their first year, these natural causes of death usually decline dramatically, and in many cases, fishing becomes the dominant source of mortality. Pollution may also add to the death rate of the population. Generally, young fish are more vulnerable to pollution mortalities than are older fish.

Knowing the sources and levels of mortalities affecting fish populations is a critical ingredient of forecasting both landings and spawning stock sizes, and in evaluating the changes in populations that may be induced by regulations such as minimum mesh sizes, minimum fish lengths, quotas, effort limits, and area closures. The rate at which the stock is harvested is usually estimated by calculating the abundance of a cohort or year class over successive years to determine how rapidly it is declining. The total mortality of the population is the sum of deaths due to both natural and fishing-related causes.

The fishing mortality rate (F) on each age group of a stock is determined by two factors

- (1) the proportion of that age group that is big enough to be captured by the gear (usually termed the partial recruitment of each age), and
- (2) the overall amount of fishing effort on the stock. At intermediate stock abundance levels the relationship between effort and F is direct. A doubling of effort translates into a doubling of the fishing mortality rate. At very low or very high stock sizes (when the stock is either hard to locate or unavoidable), the relation between effort and F may change.

MPA / Marine Protection Area A conservation area in the sea usually designated for the protection and maintenance of biological diversity and natural and cultural resources.

Natural Mortality Deaths in a fish stock caused by predation, illness, pollution, senility, etc., but not fishing.

NEAFC / North Eastern Atlantic Fisheries Commission – A commission that manages fisheries off Scandinavia and north-eastern Europe - (see <http://www.neafc.org/>)

Nominal catch The sum of the catches that are landed (expressed as live weight or equivalents). Nominal catches do not include unreported discards.

NOAA / National Oceanic and Atmospheric Administration FSS co-operate with NOAA, our US counterparts, on a number of strategic projects. (see <http://www.noaa.gov>)

Optimum Yield (OY) The yield from a fishery which provides the greatest overall benefit to the nation with particular reference to food production and recreational opportunities; it is based on MSY as modified by economic, social or ecological factors.

Pelagic Fish that spend most of their life swimming in the water column, as opposed to resting on the bottom, are known as pelagic species.

Quota A portion of a total allowable catch (TAC) allocated to an operating unit, such as a Vessel class or size, or a country.

Rate Of Exploitation The fraction, by number, of the fish in a population at a given time, which is caught and killed by man during the year immediately following. The term may also be applied to separate parts of the stock distinguished by size, sex, etc. Also called fishing coefficient.

Rebuilding Plan (See Recovery Plan)

Recovery Plan The terms Recovery Plan and Rebuilding Plan

are used interchangeably to describe a series of measures undertaken where a stock shows signs of high fishing mortality, low recruitment, declining landings and very low spawning stock biomass to the extent that the stock cannot replace itself (a condition known as “Recruitment Failure”). Recovery Plans aim to protect spawning aggregations and/or juveniles through Technical Conservation Measures (TCM’s). These measures take the form of closed areas, increased mesh sizes and gear modifications (such as separator panels). A substantial reduction in annual TAC’s is normally the starting point for a recovery plan, followed by the appropriate TCM. Effort reductions will be the third element in future recovery plans. Ireland is the center of three recovery plans – for Irish Sea Cod, West of Scotland Cod and Northern Hake. See the section on “Some Key Issues in Fisheries Management” for further details.

Recruitment The amount of fish added to the exploitable stock each year due to growth and/or migration into the fishing area. For example, the number of fish that grow to become vulnerable to the fishing gear in one year would be the recruitment to the fishable population that year. This term is also used in referring to the number of fish from a year class reaching a certain age. For example, all fish reaching their second year would be age 2 recruits.

Recruitment overfishing The rate of fishing above which the recruitment to the exploitable stock becomes significantly reduced. This is characterised by a greatly reduced spawning stock, a decreasing proportion of older fish in the catch, and generally very low recruitment year after year.

Relative Abundance An estimate of actual or absolute abundance; usually stated as some kind of index; for example, the average catch per tow on a survey.

Sample A proportion or a segment of a fish stock which is removed for study, and is assumed to be representative of the whole. The greater the effort, in terms of both numbers and magnitude of the samples, the greater the confidence that the information obtained is a true reflection of the status of a stock (level of abundance in terms of numbers or weight, age composition, etc.)

Shellfish Fisheries Those fisheries where the target species are either crustaceans (e.g. *Nephrops*, lobsters, crabs and crayfish) or molluscs (Cephalopods, scallops, oysters etc.).

STECF The Scientific Technical and Economic Committee on Fisheries was established by the European Commission and comprises fisheries scientists and economists from the member states. The role of STECF is to advise the European Commission on scientific, technical and economic issues related to the management of fisheries resources that are exploited worldwide by members of the European Union.

Stock A "stock" is a population of a species living in a defined geographical area with similar biological parameters (e.g. growth, size at maturity, fecundity etc.) and a shared mortality rate. A thorough understanding of the fisheries biology of any species is needed to define these biological parameters.

SSB / Spawning stock biomass The total weight of all sexually mature fish in the population. The size of SSB for a stock depends on abundance of year classes, the exploitation pattern, the rate of growth, fishing and natural mortality rates, the onset of sexual maturity and environmental conditions.

Spawning stock biomass-per-recruit (SSB/R) The expected lifetime contribution to the spawning stock biomass for a recruit of a specific age (e.g., per age 2 individual). For a given exploitation pattern, rate of growth, and natural mortality, an expected equilibrium value of SSB/R can be calculated for each level of F. A useful reference point is the level of SSB/R that would be realised if there were no fishing. This is a maximum value for SSB/R, and can be com-

pared to levels of SSB/R generated under different rates of fishing. For example, the maximum SSB/R for Georges Bank haddock is approximately 9 kg for a recruit at age 1.

Sustainable yield The number or weight of fish in a stock that can be taken by fishing without reducing the stock biomass from year to year, assuming that environmental conditions remain the same.

TAC / Total allowable catch is the total regulated catch from a stock in a given time period, usually a year.

Tangle nets Static nets lain on the bottom of the sea, aimed at trapping fish and shellfish by entanglement in their meshes.

Teleost Fish species – such as cod, mackerel, plaice and sole – have skeletons made of bone, as opposed to elasmobranchs – such as sharks and rays – whose skeleton is composed of cartilage.

TCM / Technical Conservation Measures These measures take the form of closed areas, increased mesh sizes and gear modifications (such as separator panels) and are aimed at protecting specific stocks, or age-classes within that stock, from overfishing (See also Recovery Plans).

U An index of exploitable biomass. Notation used for deepwater stocks by ACFM in May 1998.

U_{lim} For deepwater stocks has been calculated as $0.2 * U_{max}$ (may be a smoothed abundance index).

U_{pa} For deepwater stocks has been calculated as $0.5 * U_{max}$. For redfish $U_{pa}=0.5$ or $0.6 * U_{max}$.

Virtual population analysis (or cohort analysis) An analysis of the catches from a given year class over its life in the fishery. If 10 fish from the 1968 year class were caught each year for 10 successive years from 1970 to 1979 (age 2 to age 11), then 100 fish would have been caught from the 1968 year class during its life in the fishery. Since 10 fish were caught during 1979, then 10 fish must have been alive at the beginning of that year. At the beginning of 1978, there must have been at least 20 fish alive because 10 were caught in 1978 and 10 more were caught in 1979. By working backward year by year, one can be virtually certain that at least 100 fish were alive at the beginning of 1970. A virtual population analysis goes a step further and calculates the number of fish that must have been alive if some fish also died from causes other than fishing. For example, if in addition to the 10 fish caught per year in the fishery, the instantaneous natural mortality rate was also known then a virtual population analysis calculates the number that must have been alive each year to produce a catch of 10 fish each year plus those that died from natural causes. If one knows the fishing mortality rate during the last year for which catch data are available (in this case, 1979), then the exact abundance of the year class can be determined in each and every year. Even when an approximate fishing mortality rate is used in the last year (1979), a precise estimate of the abundance can usually be determined for the stock in years prior to the most recent one or two (e.g., 1970-1977 in the example) (1976 or 1975). Accuracy depends on the rate of population decline and the correctness of the starting value of the fishing mortality rate (in the most recent year). This technique is used extensively in fishery assessments since the conditions for its use are so common; many fisheries are heavily exploited, the annual catches for a year class can generally be easily determined, and the natural mortality rate is known within a fairly small range and is low compared with the fishing mortality rate.

Whitefish Term used to describe demersal species such as cod, plaice, ray etc., as opposed to pelagic or salmonid species.

Year class (or cohort) Fish in a stock born in the same year. For example, the 1987 year class of cod includes all cod born in 1987, which would be age 1 in 1988. Occasionally, a stock produces a very small or very large year class which

can be pivotal in determining stock abundance in later years.

Yield-per-recruit The expected lifetime yield-per-fish of a specific age (e.g., per age 2 individual). For a given exploitation pattern, rate of growth, and natural mortality, an expected equilibrium value of Y/R can be calculated for each level of F.

"If ever there was a fish made to endure, it is the Atlantic cod... But it has among its predators man, an openmouthed species greedier than cod."

Mark Kurlansky, "Cod" (1997).