

## 2.4.11 Capelin in the Iceland–East Greenland–Jan Mayen area (Subareas V and XIV and Division IIa west of 5°W)

### State of the stock

Spawning biomass in relation to precautionary limits	Fishing mortality in relation to precautionary limits	Fishing mortality in relation to high long-term yield	Fishing mortality in relation to agreed target	Comment
Undefined	Undefined	Undefined	Appropriate	

In the absence of defined reference points, the state of the stock is unknown. The SSB is highly variable because it is dependent on only two age groups. It is estimated that 406 000 t were left for spawning in spring 2008 which is just above the management target. The acoustic survey in November 2007 estimated the 2006 year class to be the lowest in the time-series and not sufficient to start a fishery in 2008/09.

### Management objectives

The fishery is managed according to a two-step management plan which requires a minimum spawning-stock biomass of 400 000 t by the end of the fishing season. The first step in this plan is to set a preliminary TAC based on the results of an acoustic survey carried out to evaluate the immature (age 1 and most of age 2) part of the capelin stock about a year before it enters the fishable stock. The initial quota is set at 2/3 of the preliminary TAC, calculated on the condition that 400 000 t of the SSB should be left for spawning. The second step is based on the results of another survey conducted during the fishing season for the same year classes. This result is used to revise the TAC, still based on the condition that 400 000 t of the SSB should be left for spawning.

ICES has not evaluated the management plan with respect to its conformity to the precautionary approach.

### Single-stock exploitation boundaries

#### *Exploitation boundaries in relation to existing management plans*

The 2006 year class is estimated to be very low and not sufficient to start a fishery in 2008/09. There should be no fishery until new information on stock size becomes available and it shows a predicted spawning-stock biomass sufficiently larger than 400 000 t in March 2009 to ensure that there is a high probability that the actual SSB will be at least 400 000 t if any fishery is allowed.

### Management considerations

Capelin is an important forage fish and declines in stock may be expected to have implications for the productivity of their predators.

### Factors affecting the fisheries and the stock

#### *Regulations and their effects*

Discards are allowed when catches are beyond the carrying capacity of the vessel. Methods of transferring catches from the purse-seine of one vessel to another vessel were invented long ago, and since skippers of purse-seine vessels prefer to operate in groups, discards are practically zero. In the pelagic trawl fishery, such large catches of capelin rarely occur.

A regulation calling for immediate, temporary area closures when high abundance of juveniles are measured in the catch (more than 20% of the catch composed of fish less than 13 cm) is enforced, using on-board observers.

#### *Changes in fishing technology and fishing patterns*

In recent years, the fishery has changed from being mostly an industrial fishery to being mostly for human consumption. This is largely because of the low abundance and low TACs.

### *Impacts of the environment on the fish stock*

The decline in stock abundance in the early 1990s can most likely be ascribed to natural causes.

Distribution of the stock may have changed in response to environmental factors. Icelandic waters are characterized by highly variable hydrographical conditions, with temperatures and salinities depending on the strength of Atlantic inflow through the Denmark Strait and the variable flow of polar water from the north.

In the years 2002–2005 and 2007, great difficulties were encountered in locating and assessing the juvenile part of the stock (ages 1 and 2; and ages 2 and 3 after 31 December). In this period, the quarterly monitoring of environmental conditions of Icelandic waters shows a rise in sea temperatures north and east of Iceland, which probably also reaches farther north and northwest. The temperature increase is so great that it may have led to displacements of the juvenile part of the capelin stock. In 2006 the 2005 year class was observed in its traditional locations on the continental shelf.

### **Scientific basis**

#### *Data and methods*

The basis for stock assessment and short-term forecasts are acoustic surveys and catch-at-age information.

#### *Uncertainties in assessment and forecast*

In the period 1 November 2007 until 27 February 2008, 6 acoustic surveys were conducted to confirm the initial TAC. The practice of increasing search time when the acoustic measurements of capelin are low may result in a biased assessment of stock size.

#### *Comparison with previous assessment and advice*

Last year the advice was for an initial TAC of 206 000 t. This year no initial TAC is advised.

### **Source of information**

ICES. 2008. Report of the North-Western Working Group, 21–29 April 2008. ICES CM 2008/ACOM:03.

Year	ICES Advice	Predicted catch <sup>1</sup> corresp. to advice	Agreed <sup>2</sup> TAC	ICES landings <sup>3</sup>
1986	TAC	1,100	1,290	1,333
1987	TAC <sup>1</sup>	500	1,115	1,116
1988	TAC <sup>1</sup>	900	1,065	1,036
1989	TAC <sup>1</sup>	900	*	808
1990	TAC <sup>1</sup>	600	250	314
1991	No fishery pending survey results <sup>1</sup>	0	740	677
1992	Precautionary TAC <sup>1</sup>	500	900	788
1993	TAC <sup>1</sup>	900	1,250	1,179
1994	Apply the harvest control rule	950	850	842
1995	Apply the harvest control rule	800	1,390	930
1996	Apply the harvest control rule	1,100	1,600	1,571
1997	Apply the harvest control rule	850	1,265	1,245
1998	Apply the harvest control rule	950	1,200	1,100
1999	Apply the harvest control rule	866	1,000	934
2000	Apply the harvest control rule	650	1,090	1,071
2001	Apply the harvest control rule	700	1,300	1,250
2002	Apply the harvest control rule	690	1,000	988
2003	Apply the harvest control rule	835	900	741
2004	Apply the harvest control rule	*335	985	784
2005	Apply the harvest control rule	**No fishery	235	238
2006/07	Apply the harvest control rule	**No fishery	385	377
2007/08	Apply the harvest control rule	207	207	202
2009	Apply the harvest control rule	***No fishery		

Weights in '000 t.

<sup>1</sup>TAC advised for the July–December part of the season.

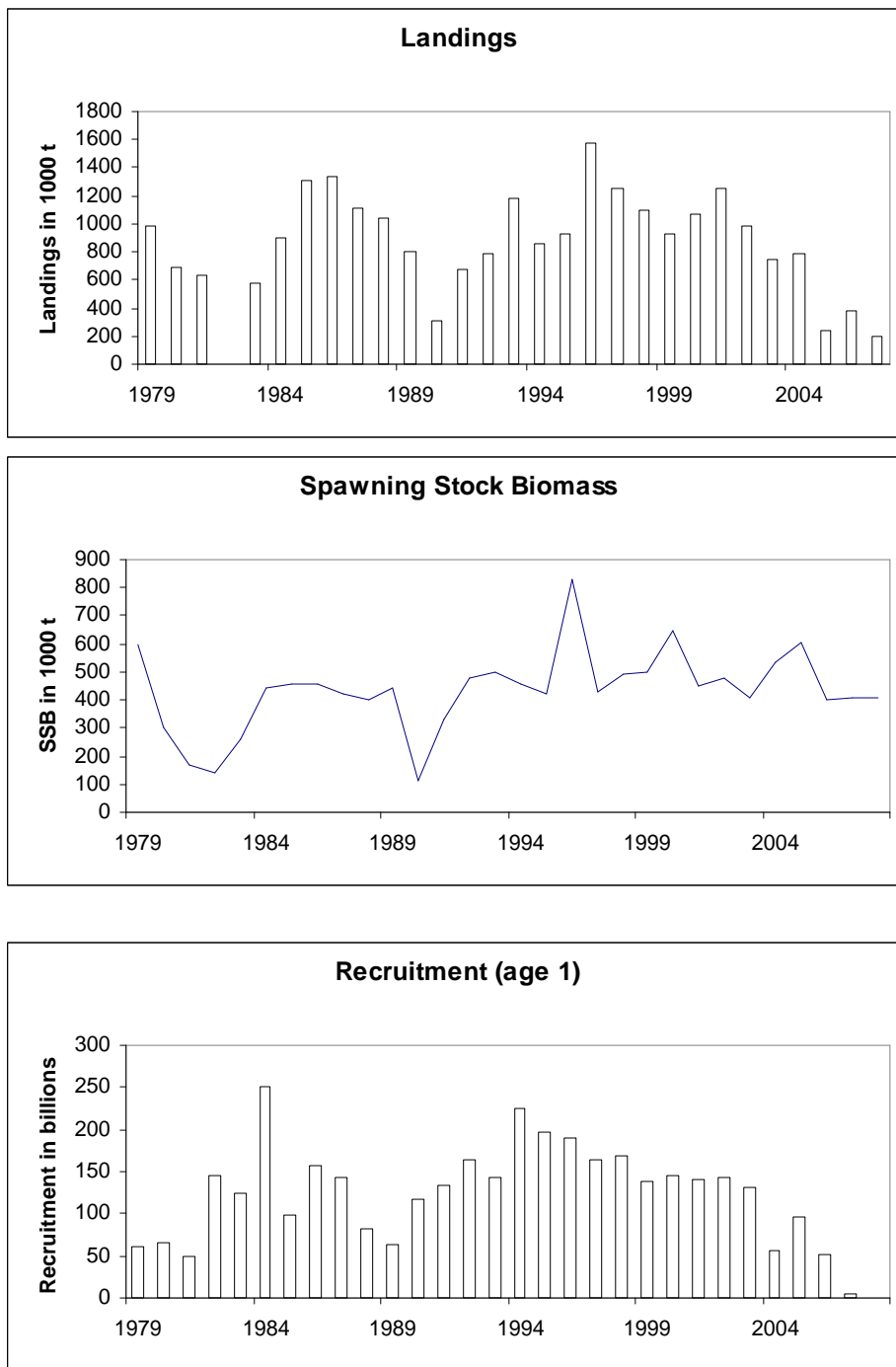
<sup>2</sup>Final TAC recommended by national scientists for the whole season.

<sup>3</sup>July–March of following year.

\*Preliminary TAC set according to the results of an assessment survey in late June/early July 2004.

\*\*All surveys of the prospective 2005/06 fishable stock abundance during the 2004/2005 season were unsuccessful. The advice is preliminary and subject to revision following results of further surveys.

\*\*\* Surveys in autumn 2007 located only very few immature capelin.



**Figure 2.4.11.1** Capelin in the Iceland–East Greenland–Jan Mayen area (Subareas V and XIV and Division IIa west of 5°W). Landings in the fishing season, starting in the year given, Recruitment, and Spawning-stock biomass.

**Table 2.4.11.1**

Capelin in the Iceland–East Greenland–Jan Mayen area 1978/79–2007/08. Recruitments of 1-year-old fish (unit 10<sup>9</sup>) are given for 1 August. Spawning-stock biomass ('000 t) is given at the time of spawning (March next year). Landings ('000 t) are the sum of the total landings in the season, starting in the summer/autumn of the year indicated and ending in March of the following year.

Year	Recruitment Age 1 thousands	SSB tonnes	Landings tonnes
1979	60000000	600000	980000
1980	66000000	300000	684000
1981	49000000	170000	626000
1982	146000000	140000	
1983	124000000	260000	573000
1984	251000000	440000	897000
1985	99000000	460000	1312000
1986	156000000	460000	1333000
1987	144000000	420000	1116000
1988	81000000	400000	1037000
1989	64000000	440000	808000
1990	118000000	115000	314000
1991	133000000	330000	677000
1992	163000000	475000	788000
1993	144000000	499000	1179000
1994	224000000	460000	864000
1995	197000000	420000	929000
1996	191000000	830000	1571000
1997	165000000	430000	1245000
1998	168000000	492000	1100000
1999	138000000	500000	933000
2000	146000000	650000	1071000
2001	140000000	450000	1249000
2002	142000000	475000	988000
2003	132000000	410000	741000
2004	57000000	535000	783000
2005	95000000	602000	238000
2006	51000000	400000	377000
2007	5000000	410000	202000
2008*		406000	
Average	121666667	432633	848793

\*Preliminary number.