

Capelin (*Mallotus villosus*) in subareas 5 and 14 and Division 2.a west of 5°W (Iceland and Faroes grounds, East Greenland, Jan Mayen area)

ICES stock advice

ICES advises that when the harvest control rule agreed by the Coastal states is applied, the initial quota in the fishing season 2017/2018 should be zero tonnes. The initial quota should be revised based on in-season acoustic survey information in autumn 2017. The final TAC should be set on the basis of survey information in autumn 2017 and winter 2017/2018.

Stock development over time

The spawning-stock biomass (SSB) was estimated at 361 000 tonnes at the time of spawning in March 2017, which corresponds to a greater than 95% probability of the SSB being above B_{lim} (150 000 t). The estimates of SSB from 2016 onwards are based on a new method with different assumptions about natural mortality. Therefore, they are not comparable with the historic SSB estimates. The estimates of the immature 1- and 2-year-old capelin from the acoustic survey in autumn 2016 are low.

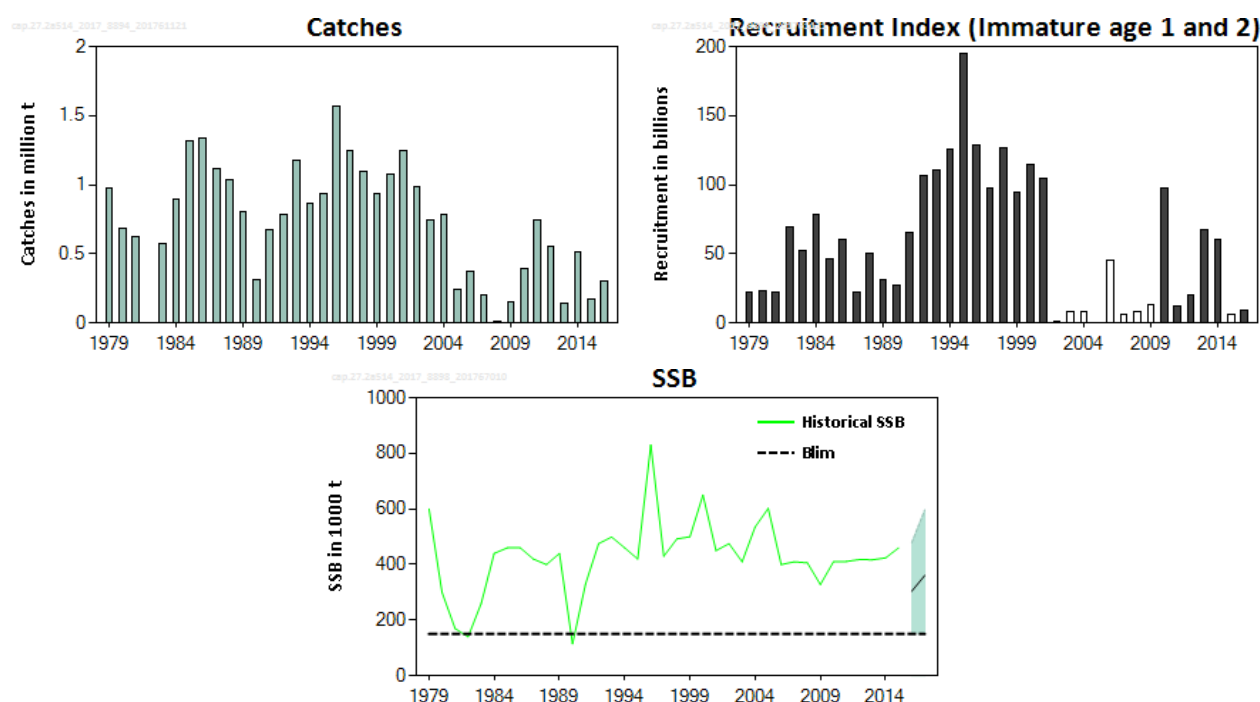


Figure 1 Capelin in subareas 5 and 14 and Division 2.a west of 5°W. Summary of the stock assessment. Catches (million t) by fishing season (July–March of the following year). Recruitment (immature-at-age 1 and 2; numbers in billions) as acoustic index from autumn surveys (hollow bars indicate incomplete spatial coverage likely resulting in notable underestimation), and SSB (thousand t; with 90% confidence intervals for the last two years) at spawning time (March–April). Note that the SSB values for 2016 and onwards are not directly comparable to historical values or B_{lim} because they are based on different assumptions about natural mortality.

Stock and exploitation status

Table 1 Capelin in subareas 5 and 14 and Division 2.a west of 5°W. State of the stock and fishery relative to reference points.

		Fishing pressure				Stock size				
		2014	2015	2016		2015	2016	2017		
Maximum Sustainable Yield	F _{MSY}	?	?	?	Undefined	MSY B _{Trigger}	?	?	?	Undefined
Precautionary Approach	F _{pa} , F _{lim}	?	?	?	Undefined	B _{pa} , B _{lim}	?	✓	✓	Full reproductive capacity
Management plan	F _{MGT}	?	?	?	Undefined	B _{MGT}	?	✓	✓	Above

Catch options

Table 2 Capelin in subareas 5 and 14 and Division 2.a west of 5°W. The basis for the catch options.

Variable	Value	Source	Notes
Immature age 1 (2016)	8.7 billion	ICES (2017a)	Index from the autumn acoustic survey 2016
Immature age 2 (2016)	0.7 billion	ICES (2017a)	Index from the autumn acoustic survey 2016

Table 3 Capelin in subareas 5 and 14 and Division 2.a west of 5°W. The catch options.

Catches in 2017/2018 (t)	Rationale	Basis
0	Advice for initial quota, precautionary considerations	Harvest control rule agreed by the Coastal states (precautionary approach for initial quota). ICES advice rule (ICES, 2015). See Table 4 and Figure 2.

Basis of the advice

The basis of this year's advice is the harvest control rule agreed by the Coastal States in 2015. This implies applying the advice rule established by ICES in 2015 (ICES, 2015) for setting an initial quota on the basis of immature abundance (ages 1–2) in the autumn acoustic survey (Figure 2). ICES recommends that the initial quota is revised based on in-season acoustic survey information in autumn 2017 (intermediate quota), with the final TAC being set on the results of the autumn and/or winter surveys in 2017/2018.

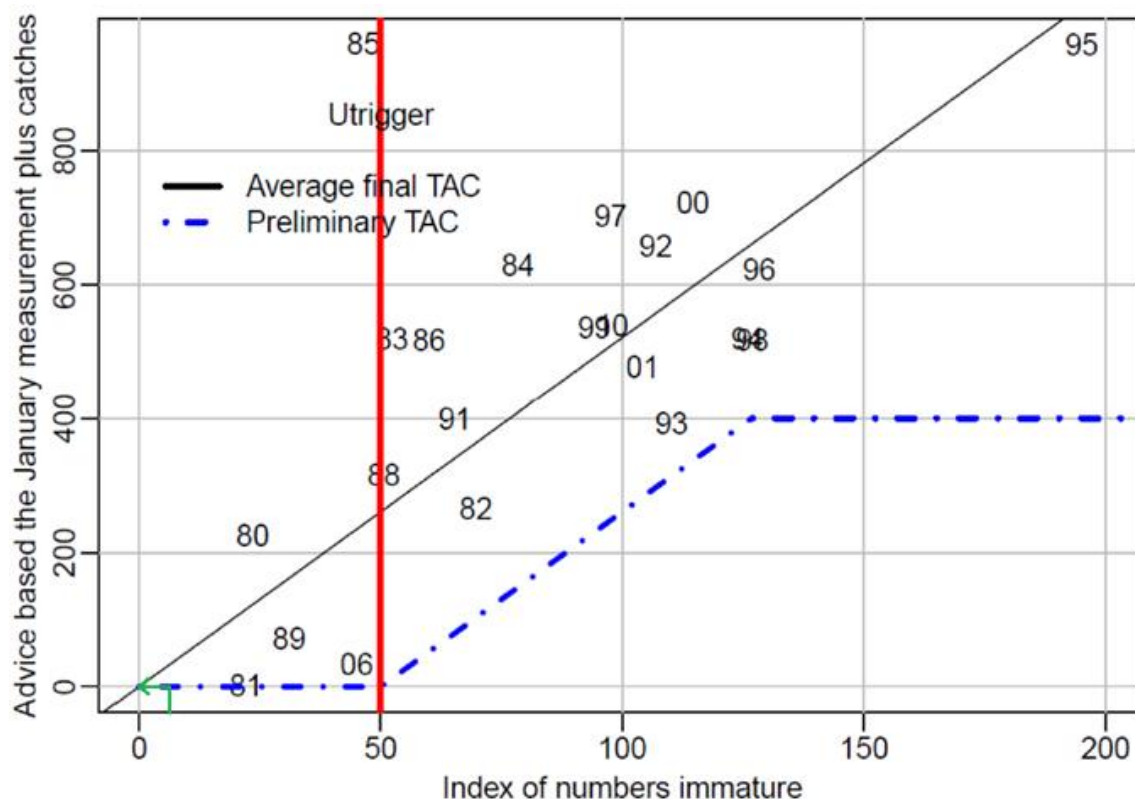


Figure 2 Capelin in subareas 5 and 14 and Division 2.a west of 5°W. Catch advice (initial quota, labelled “Preliminary TAC” in the figure) according to the ICES advice rule, based on the measured number of immature capelin the previous autumn (about 16 months earlier than the winter survey used for the final TAC). The black numbers are the estimated fishable biomass projected from the survey estimates of immature capelin in the survey year. The predicted final TAC is shown as the black solid line and the initial quota as the blue dashed line. The latter is set using an index abundance trigger point ($U_{trigger}$, red vertical line) of 50 billion immature fish, with a cap on the initial quota of 400 kt. The green lines show the index value from the autumn acoustic survey in 2016, with the corresponding initial quota for 2017/2018 shown on the y-axis.

Table 4 Capelin in subareas 5 and 14 and Division 2.a west of 5°W. The basis of the advice.

Advice basis	Harvest control rule agreed by the Coastal states (precautionary approach for initial quota)
Management plan	The Coastal states, Iceland, Greenland and Norway, have agreed (Coastal State Consultations, 2015) to use the following Harvest Control Rule as the basis for management: an initial quota (labelled “Preliminary TAC” in Figure 2) is set following the rule developed by ICES (2015), with a very low probability of being higher than a regression estimated final TAC. This is followed by an intermediate TAC set in the autumn and a final TAC set in winter, that will have a >95% probability of SSB being greater than or equal to B_{lim} at spawning time in the following spring.

Quality of the assessment

The autumn survey in 2016 had more extensive spatial coverage than in many years before. Hence, although there was more than a 4-day delay due to bad weather, the observed low abundance estimates of immature fish demonstrate a very low stock size.

Issues relevant for the advice

This initial quota advice will be followed up with in-season revisions by a national institute leading to a final TAC within the fishing season.

It should be noted that the historical estimates of SSB have not been updated to take into account the revised process for estimating natural mortality. The update will not have any implications for this advice.

Reference points

Table 5 Capelin in subareas 5 and 14 and Division 2.a west of 5°W. Reference points, values, and their technical basis.

Framework	Reference point	Value	Technical basis	Source
MSY approach	MSY $B_{trigger}$			
	F_{MSY}			
Precautionary approach	B_{lim}	150000 t	B_{loss}	ICES (2015)
	B_{pa}			
	F_{lim}			
	F_{pa}			
Management plan	SSB_{mgt}	150000 t	B_{lim}	Coastal States Consultations (2015)
	F_{mgt}			

Basis of the assessment

Table 6 Capelin in subareas 5 and 14 and Division 2.a west of 5°W. Basis of assessment and advice.

ICES stock data category	1 (ICES, 2016)
Assessment type	The final TAC is based on a model which takes into account uncertainty in surveys and predation from cod, haddock, and saithe on capelin to ensure that the advised catch will result in a less than 5% chance of SSB going below B_{lim} . The initial quota advice is set by applying an advice rule designed to ensure a low risk of advised catch being higher than the final TAC (see WKICE; ICES, 2017).
Input data	The abundance estimate of immature capelin of ages 1 and 2 from acoustic surveys in autumn
Discards and bycatch	Not included, considered negligible
Indicators	None
Other information	Last benchmarked in 2015 (ICES, 2015)
Working group	North-Western Working Group (NWWG)

Information from stakeholders

There is no information available.

History of the advice, catch, and management

Table 7 Capelin in subareas 5 and 14 and Division 2.a west of 5°W. ICES advice and catch. All weights are in thousand tonnes.

Season	ICES advice	Initial quota advice [^]	Agreed final TAC ^{^^}	ICES catch ^{^^^}
1986/1987	TAC	1100	1290	1333
1987/1988	TAC	500	1115	1116
1988/1989	TAC	900	1065	1036
1989/1990	TAC	900	900	808
1990/1991	TAC	600	250	314
1991/1992	No fishery pending survey results	0	740	677
1992/1993	Precautionary TAC [^]	500	900	788

Season	ICES advice	Initial quota advice [^]	Agreed final TAC ^{^^}	ICES catch ^{^^^}
1993/1994	TAC	900	1250	1179
1994/1995	Apply the harvest control rule	950	850	864
1995/1996	Apply the harvest control rule	800	1390	930
1996/1997	Apply the harvest control rule	1100	1600	1571
1997/1998	Apply the harvest control rule	850	1265	1245
1998/1999	Apply the harvest control rule	950	1200	1100
1999/2000	Apply the harvest control rule	866	1000	934
2000/2001	Apply the harvest control rule	650	1090	1071
2001/2002	Apply the harvest control rule	700	1300	1250
2002/2003	Apply the harvest control rule	690	1000	988
2003/2004	Apply the harvest control rule	555	900	741
2004/2005	Apply the harvest control rule	335	985	784
2005/2006	Apply the harvest control rule	No fishery	235	238
2006/2007	Apply the harvest control rule	No fishery	385	377
2007/2008	Apply the harvest control rule	207	207	202
2008/2009	Apply the harvest control rule	No fishery	0*	15
2009/2010	Apply the harvest control rule	No fishery	150	151
2010/2011	Apply the harvest control rule	No fishery	390	391
2011/2012	Set the TAC at 50% of the initial quota in the HCR	366	765	747
2012/2013	Precautionary approach	No fishery	570	551
2013/2014	Precautionary approach	No fishery	160	142
2014/2015	Set the initial quota at 50% of the predicted quota in the HCR	225	580	517
2015/2016	Precautionary approach**	53.6	173	174
2016/2017	Precautionary approach**	0	299	300
2017/2018	Harvest control rule agreed by Coastal States**	0		

[^] Advised for the early part of the season.

^{^^} Final TAC recommended by national scientists for the whole season.

^{^^^} July–March of the following year.

* Only scouting quota was allocated in the latter half of February 2009.

** Initial quota advice based on low probability of advised catch being higher than the final TAC.

History of the catch and landings

Table 8 Capelin in subareas 5 and 14 and Division 2.a west of 5°W. Catch distribution by fleet in 2016 as estimated by ICES.

Catch (2016)	Landings		Discards
300 000 tonnes	Purse seine 97%	Pelagic trawl 3%	Negligible
	300 000 tonnes		

Table 9 Capelin in subareas 5 and 14 and Division 2.a west of 5°W. History of commercial catch and landings; both the official and ICES estimated values are presented by area for each country participating in the fishery. All weights are in thousand tonnes.

Year	Winter season					Summer and autumn season						Total (calendar year)
	Iceland	Norway	Faroes	Greenland	Season total	Iceland	Norway	Faroes	Greenland	EU	Season total	
1964	8.6	-	-	-	8.6	-	-	-	-	-	-	8.6
1965	49.7	-	-	-	49.7	-	-	-	-	-	-	49.7
1966	124.5	-	-	-	124.5	-	-	-	-	-	-	124.5
1967	97.2	-	-	-	97.2	-	-	-	-	-	-	97.2
1968	78.1	-	-	-	78.1	-	-	-	-	-	-	78.1
1969	170.6	-	-	-	170.6	-	-	-	-	-	-	170.6
1970	190.8	-	-	-	190.8	-	-	-	-	-	-	190.8
1971	182.9	-	-	-	182.9	-	-	-	-	-	-	182.9
1972	276.5	-	-	-	276.5	-	-	-	-	-	-	276.5
1973	440.9	-	-	-	440.9	-	-	-	-	-	-	440.9
1974	461.9	-	-	-	461.9	-	-	-	-	-	-	461.9
1975	457.1	-	-	-	457.1	3.1	-	-	-	-	3.1	460.2
1976	338.7	-	-	-	338.7	114.4	-	-	-	-	114.4	453.1
1977	549.2	-	24.3	-	573.5	259.7	-	-	-	-	259.7	833.2
1978	468.4	-	36.2	-	504.6	497.5	154.1	3.4	-	-	655.0	1 159.6
1979	521.7	-	18.2	-	539.9	442.0	124.0	22.0	-	-	588.0	1 127.9
1980	392.1	-	-	-	392.1	367.4	118.7	24.2	-	17.3	527.6	919.7
1981	156.0	-	-	-	156.0	484.6	91.4	16.2	-	20.8	613.0	769.0
1982	13.2	-	-	-	13.2	-	-	-	-	-	-	13.2
1983	-	-	-	-	-	133.4	-	-	-	-	133.4	133.4
1984	439.6	-	-	-	439.6	425.2	104.6	10.2	-	8.5	548.5	988.1
1985	348.5	-	-	-	348.5	644.8	193.0	65.9	-	16.0	919.7	1 268.2
1986	341.8	50.0	-	-	391.8	552.5	149.7	65.4	-	5.3	772.9	1 164.7
1987	500.6	59.9	-	-	560.5	311.3	82.1	65.2	-	-	458.6	1 019.1
1988	600.6	56.6	-	-	657.2	311.4	11.5	48.5	-	-	371.4	1 028.6
1989	609.1	56.0	-	-	665.1	53.9	52.7	14.4	-	-	121.0	786.1
1990	612.0	62.5	12.3	-	686.8	83.7	21.9	5.6	-	-	111.2	798.0
1991	202.4	-	-	-	202.4	56.0	-	-	-	-	56.0	258.4
1992	573.5	47.6	-	-	621.1	213.4	65.3	18.9	0.5	-	298.1	919.2
1993	489.1	-	-	0.5	489.6	450.0	127.5	23.9	10.2	-	611.6	1 101.2
1994	550.3	15.0	-	1.8	567.1	210.7	99.0	12.3	2.1	-	324.1	891.2
1995	539.4	-	-	0.4	539.8	175.5	28.0	-	2.2	-	205.7	745.5
1996	707.9	-	10.0	5.7	723.6	474.3	206.0	17.6	15.0	60.9	773.8	1 497.4
1997	774.9	-	16.1	6.1	797.1	536.0	153.6	20.5	6.5	47.1	763.6	1 561.5
1998	457.0	-	14.7	9.6	481.3	290.8	72.9	26.9	8.0	41.9	440.5	921.8
1999	607.8	14.8	13.8	22.5	658.9	83.0	11.4	6.0	2.0	-	102.4	761.3
2000	761.4	14.9	32.0	22.0	830.3	126.5	80.1	30.0	7.5	21.0	265.1	1 095.4
2001	767.2	-	10.0	29.0	806.2	150.0	106.0	12.0	9.0	17.0	294.0	1 061.2
2002	901.0	-	28.0	26.0	955.0	180.0	118.7	-	13.0	28.0	339.7	1 294.7
2003	585.0	-	40.0	23.0	648.0	96.5	78.0	3.5	2.5	18.0	198.5	846.5
2004	478.8	15.8	30.8	17.5	542.9	46.0	34.0	-	12.0	-	92.0	634.9
2005	594.1	69.0	19.0	10.0	692.0	9.0	-	-	-	-	9.0	701.1
2006	193.0	8.0	30.0	7.0	238.0	-	-	-	-	-	-	238.0
2007	307.0	38.0	19.0	12.8	376.8	-	-	-	-	-	-	376.8
2008	149.0	37.6	10.1	6.7	203.4	-	-	-	-	-	-	203.4

Year	Winter season					Summer and autumn season						Total (calendar year)
	Iceland	Norway	Faroes	Greenland	Season total	Iceland	Norway	Faroes	Greenland	EU	Season total	
2009	15.1	-	-	-	15.1	-	-	-	-	-	-	15.1
2010	110.6	28.3	7.7	4.7	150.7	5.4	-	-	-	-	5.4	156.1
2011	321.8	30.8	19.5	13.1	385.2	8.4	58.5	-	5.2	-	72.1	457.3
2012	576.2	46.2	29.7	22.3	674.4	9	-	-	1	-	10.0	684.4
2013	454.0	40.0	30.0	17.0	541.0	-	-	-	-	-	-	541.0
2014	111.4	6.2	8.0	16.1	141.7	-	30.5	-	5.3	9.7	45.5	187.2
2015	353.6	50.6	29.9	37.9	471.9	-	-	-	2.5	-	2.5	474.4
2016*	101.1	58.2	8.5	3.3	171.1	-	-	-	-	-	-	171.1
2017*	196.8	60.4	15.0	27.4	299.8							

* Preliminary.

Summary of the assessment

Table 10 Capelin in subareas 5 and 14 and Division 2.a west of 5°W. Assessment summary. Weights are in thousand tonnes.

Season (summer/winter)	Recruitment Index (Immature age 1 and 2)	SSB*	SSB* 95 th percentile	SSB* 5 th percentile	Historical SSB estimates	Catch
	thousands	tonnes			tonnes	tonnes
1978/1979					600000	980000
1979/1980	22000000				300000	684000
1980/1981	23500000				170000	626000
1981/1982	22100000				140000	0
1982/1983	69700000				260000	573000
1983/1984	52300000				440000	896000
1984/1985	78400000				460000	1312000
1985/1986	46400000				460000	1334000
1986/1987	60000000				420000	1116000
1987/1988	22000000				400000	1036000
1988/1989	50600000				440000	807000
1989/1990	31000000				115000	313000
1990/1991	27200000				330000	677000
1991/1992	65300000				475000	788000
1992/1993	106900000				499000	1178000
1993/1994	110200000				460000	864000
1994/1995	125900000				420000	930000
1995/1996	195100000				830000	1570000
1996/1997	128300000				430000	1246000
1997/1998	97600000				492000	1100000
1998/1999	126900000				500000	932000
1999/2000	94200000				650000	1071000
2000/2001	114600000				450000	1249000
2001/2002	104200000				475000	988000
2002/2003	1500000				410000	742000
2003/2004	8000000				535000	784000
2004/2005	8000000				602000	247000
2005/2006					400000	377000
2006/2007	45000000				410000	203000

2007/2008	5800000				406000	15000
2008/2009	7900000				328000	151000
2009/2010	13000000				410000	391000
2010/2011	97900000				411000	747000
2011/2012	12600000				418000	551000
2012/2013	20500000				417000	142000
2013/2014	67000000				424000	518000
2014/2015	60300000				460000	174000
2015/2016	6200000	304000	478000	150000		300000**
2016/2017	9400000	361000	596000	150000		

*Based on predation model in current advice rule, not directly comparable to Historical SSB values because it is based on different assumptions about natural mortality.

**Preliminary.

Sources and references

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