

2.3.5 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 precautionary approach is applied, the initial quota in the fishing season 2016/2017 should be zero tonnes. The initial quota should be revised based on in-season acoustic survey information in autumn 2016. The final TAC should be set on the basis of survey information in autumn 2016 and winter 2016/2017.

Stock development over time

The ICES assessment indicates a spawning-stock biomass (SSB) of 304 000 t at the time of spawning in 2016 (March–April), which corresponds to a greater than 95% probability of the SSB being above B_{lim} (150 000 t). The method to estimate natural mortality has been revised to take predator abundance into account. The historic SSB estimates have not been revised using the new method and the SSB estimate in 2016 is therefore not comparable with the historic SSB estimates. The estimates of the 2014 year class and immature 1- and 2-year-old capelin from the acoustic survey in autumn 2015 are low. However, because of incomplete survey coverage these are likely to be underestimates.

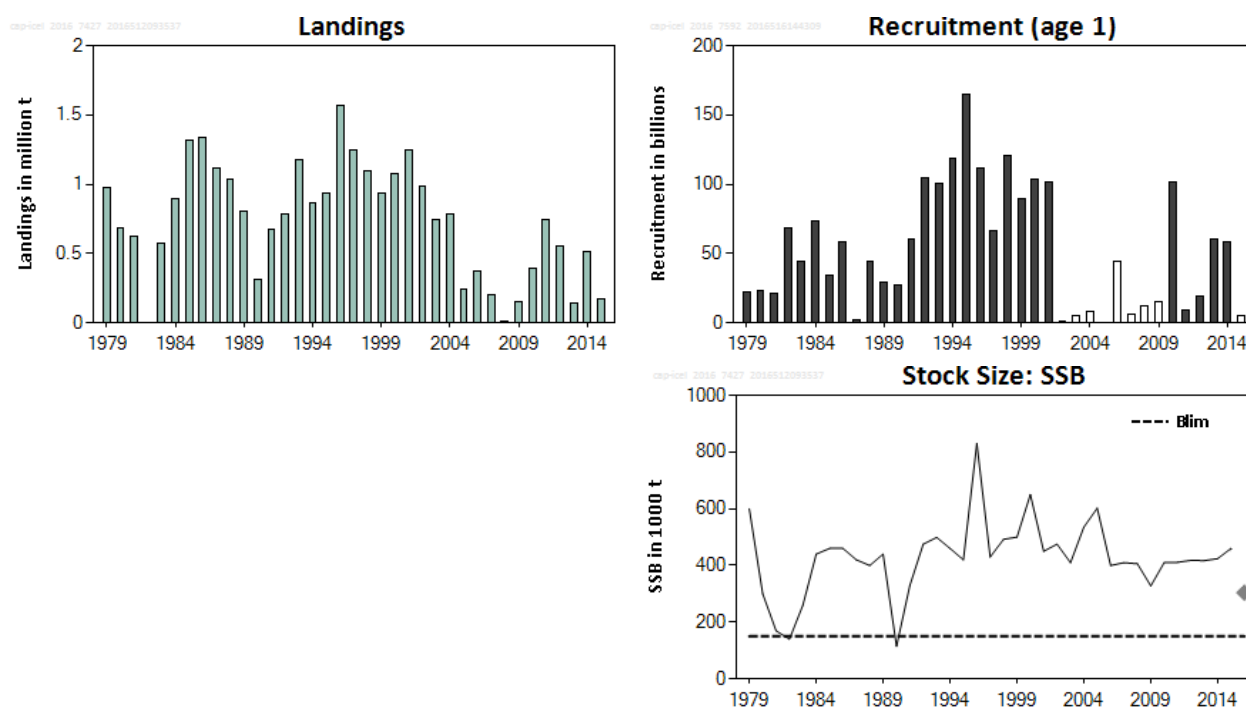


Figure 2.3.5.1 Capelin in subareas 5 and 14 and Division 2.a west of 5°W. Landings (million t) by fishing season (July–March of the following year). Recruitment-at-age 1 (numbers in billions) as acoustic index from autumn surveys (hollow bars indicate incomplete spatial coverage likely resulting in notable underestimation), and SSB (thousand t) at spawning time (March–April). Note that the SSB value for 2016 (grey diamond) is not directly comparable to historical values or B_{lim} because it is based on different assumptions about natural mortality.

Stock and exploitation status

Table 2.3.5.1 Capelin in subareas 5 and 14 and Division 2.a west of 5°W. State of the stock and the fishery relative to reference points.

		Fishing pressure				Stock size				
		2013	2014	2015		2014	2015	2016		
Maximum sustainable yield	F_{MSY}	?	?	?	Undefined	$MSY_{Btrigger}$?	?	?	Undefined
Precautionary approach	F_{pa} F_{im}	?	?	?	Undefined	B_{lim}	✓	✓	✓	Above B_{lim}
Management plan	F_{MGT}	?	?	?	Undefined	SSB_{MGT}	?	?	?	Undefined

Catch options

Table 2.3.5.2 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 (2015)	5.0 billion	ICES (2016a)	An index from the autumn acoustic survey 2015.
Immature age 2 (2015)	1.2 billion	ICES (2016a)	An index from the autumn acoustic survey 2015.

Table 2.3.5.3 Capelin in subareas 5 and 14 and Division 2.a west of 5°W. The catch options.

Catches in 2016/2017 (t)	Rationale	Basis
0	Advice for initial quota, precautionary considerations	Precautionary approach. ICES advice rule (ICES, 2015). See Table 2.3.5.4 and Figure 2.3.5.2.

Basis of the advice

The basis of this year’s advice is 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. ICES recommends that the initial quota is revised based on in-season acoustic survey information in autumn 2016 (intermediate quota), with the final TAC being set on the results of the autumn and/or winter surveys in 2016/2017.

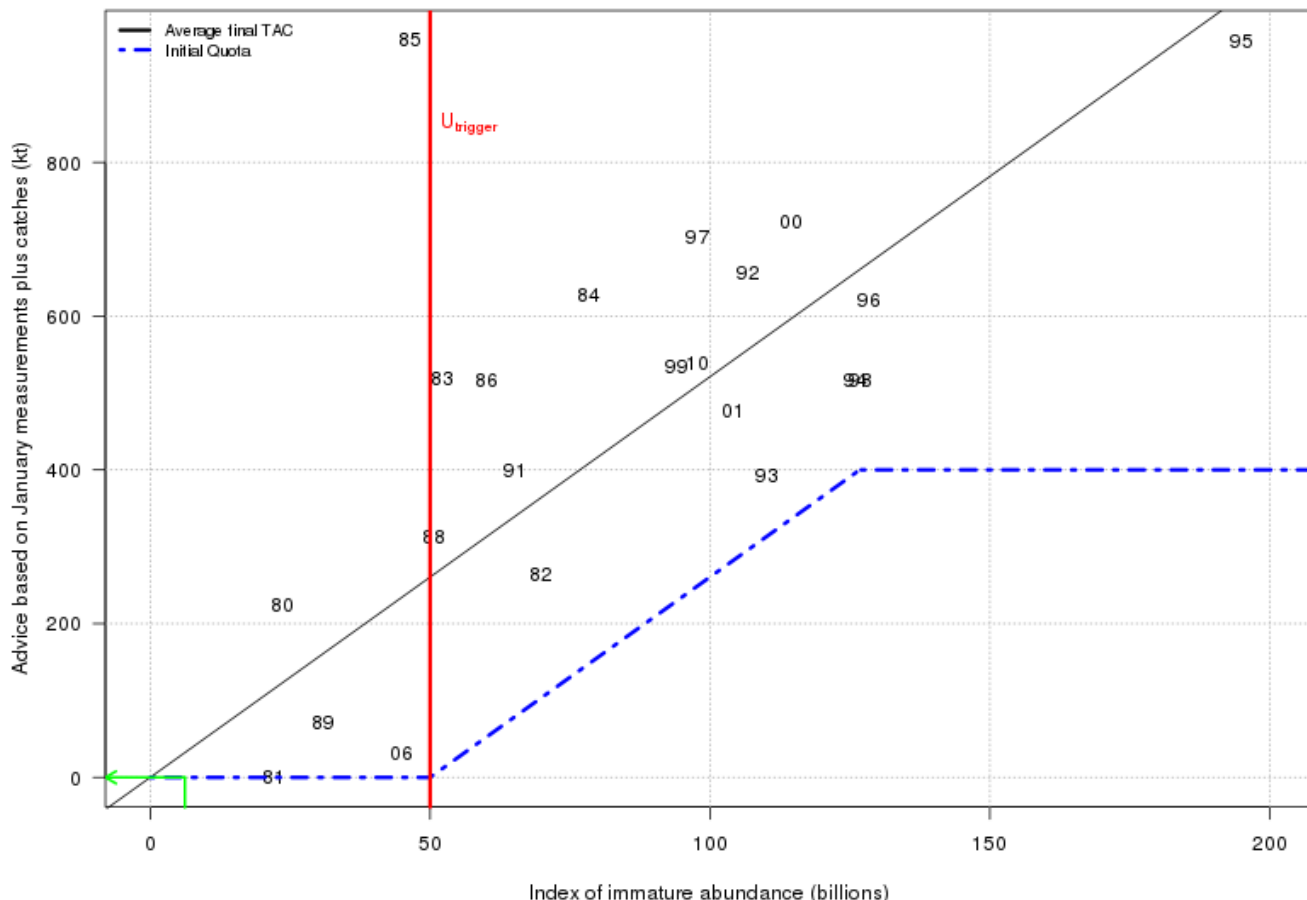


Figure 2.3.5.2 Capelin in subareas 5 and 14 and Division 2.a west of 5°W. Catch advice according to the ICES advice rule, based on the measured number of immature capelin the previous autumn (about 16 months earlier than the winter survey used for the final TAC). The black numbers are the estimated fishable 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 2015, with the corresponding initial quota for 2016/2017 shown on the y-axis.

Table 2.3.5.4 Capelin in subareas 5 and 14 and Division 2.a west of 5°W. The basis of the advice.

Advice basis	The basis is the precautionary approach, i.e. an initial quota is set with a very low probability of being higher than a regression estimated final TAC. A final TAC will be set in autumn and winter that will have a >95% probability of SSB being greater than or equal to B_{lim} at spawning time in 2017.
Management plan	There is no agreed management plan.

Quality of the assessment

The acoustic survey in September–October 2015 did not cover the entire spatial distribution of the capelin stock; the abundance estimate is therefore likely an underestimate. However, the immature abundance estimate (6.2 billion) is well below the trigger value ($U_{trigger} = 50$ billion) that would imply a quota greater than zero tonnes.

Issues relevant for the advice

This initial quota advice needs to be followed up with in-season revisions before setting a final TAC in the winter.

It should be noted that the historical estimates of SSB have not yet 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 2.3.5.5 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 $B_{trigger}$	Undefined		
	F_{MSY}	Undefined		
Precautionary approach	B_{lim}	150 000 t	B_{loss}	ICES (2015)
	B_{pa}	Undefined		
	F_{lim}	Undefined		
	F_{pa}	Undefined		
Management plan	SSB_{MGT}	Undefined		
	F_{MGT}	Undefined		

Basis of the assessment

Table 2.3.5.6 Capelin in subareas 5 and 14 and Division 2.a west of 5°W. The basis of the assessment.

ICES stock data category	1 (ICES, 2016b).
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 applying an advice rule designed to ensure a low risk of advised catch being higher than the final TAC (see WKICE; ICES, 2015).
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 available information.

History of advice, catch, and management

Table 2.3.5.7 Capelin in subareas 5 and 14 and Division 2.a west of 5°W. History of ICES initial quota advice, the agreed final TAC, and ICES estimates of landings. Weights in thousand tonnes.

Season	ICES advice	Initial quota advice [^]	Agreed final TAC ^{^^}	ICES landings ^{^^^}
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
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		

[^] 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 catch and landings

Table 2.3.5.8 Capelin in subareas 5 and 14 and Division 2.a west of 5°W. Catch distribution by fleet in 2015/2016 as estimated by ICES. Values are based on preliminary estimates.

Total catch (2015/2016)	Commercial landings		Commercial discards
	174 kt	93% purse seine	
174 kt		Negligible	

Table 2.3.5.9 Capelin in subareas 5 and 14 and Division 2.a west of 5°W. History of commercial catch and landings by calendar year; both the official and ICES estimated values are presented by season and country. Weights are in thousand tonnes.

Year	Winter season					Summer and autumn season						Total (calendar year)
	Iceland	Norway	Faroese	Greenland	Season total	Iceland	Norway	Faroese	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
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	-	-	-	-	-	-	-

* Preliminary.

Summary of the assessment

Table 2.3.5.10 Capelin in subareas 5 and 14 and Division 2.a west of 5°W. Assessment summary by fishing season: summer/winter. A fishing season, e.g. 1978/79, starts in July 1978 and ends in March 1979. Recruitment of 1-year-old fish (billions) is given for 1st of August at the beginning of the season. Spawning-stock biomass (thousand tonnes) is given at the time of spawning (at the end of the fishing season, March–April). Landings (thousand tonnes) are by season.

Season (summer/winter)	Recruitment (age 1)	Stock size (SSB)	Landings
	billions	thousand tonnes	thousand tonnes
1978/1979	-	600	1195
1979/1980	22	300	980
1980/1981	23.5	170	684
1981/1982	21	140	626
1982/1983	68	260	0
1983/1984	44.1	440	573
1984/1985	73.8	460	896
1985/1986	33.8	460	1312
1986/1987	58.6	420	1334
1987/1988	2.6	400	1116
1988/1989	43.9	440	1036
1989/1990	29.2	115	807
1990/1991	27.2	330	313
1991/1992	60	475	677
1992/1993	104.6	499	788
1993/1994	100.4	460	1178
1994/1995	119	420	864
1995/1996	165	830	930
1996/1997	111.9	430	1570
1997/1998	66.8	492	1246
1998/1999	121	500	1100
1999/2000	89.8	650	932
2000/2001	103.7	450	1071
2001/2002	101.8	475	1249
2002/2003	-	410	988
2003/2004	4.9	535	742
2004/2005	7.9	602	784
2005/2006	-	400	247
2006/2007	44.7	410	377
2007/2008	5.7	406	203
2008/2009	12.6	328	150
2009/2010	15.4	410	151
2010/2011	101.2	411	391
2011/2012	9.6	418	747
2012/2013	19.4	417	551
2013/2014	60.7	424	142
2014/2015	58	460	518
2015/2016	5.4	304*	174**
Average	56.27	425.0	765.8

*Based on predation model in current advice rule.

**Preliminary.

Sources and references

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