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12 Capelin in the Iceland–East Greenland–Jan Mayen area

12.1 Stock description and management units

See stock-annex.

12.2 Fishery independent abundance surveys

The capelin stock in Iceland-East Greenland-Jan Mayen area has been assessed by acoustics annually since 1978. The surveys have been conducted in autumn (September-December) and in winter (January-February). An overview is given in the stock annex.

12.2.1 Autumn survey during 10. September – 4. October 2016

The survey was conducted with the aim of assessing both the immature and the maturing part of the stock. Since 2010 the autumn surveys have started in September, a month earlier than in previous years because of difficulties in covering the stock due to drift ice and weather during later months The survey was conducted on the research vessels Arni Fridriksson (10. September – 4. October) and Bjarni Saemundsson (10. – 29. September).

The survey area was on and along the shelf edge off East Greenland from about 73°30´N to about 63°15´ N, also covering the Denmark Strait and the slope off western and north Iceland to about 17°W. The Iceland Sea west of Jan Mayen ridge was also scouted (Bardarson and Jonsson 2016).

Both research vessels had to abort from an attempt to calibrate the echosounders in Hvalfjordur due to wind in the fjord. Hence, calibration settings for echosounders of both vessels during the survey were from a calibration in May 2016. Post survey calibrations of the echosounders of both vessels showed that the echosounders of both vessels were stable.

Bjarni Saemundsson started in the southwestern part of the survey area and measured northeastwards (Red track lines on Figure 12.2.1). Arni Fridriksson scouted through the area west of Jan Mayen ridge while heading to the northernmost part of the survey area and then measured southwards along the Greenland shelf edge (blue track lines on Figure 12.2.1).

There was no drift ice in the survey area, but weather conditions were at times adverse, and due to heavy storms in the Denmark Strait Arni had to seek shelter in Scoresby Sound from the evening of 21st until the morning of 26th September and for same reason Bjarni had to stop and eventually end the cruise on 22nd September. During 26st September – 4th October Arni Fridriksson continued and finished the acoustic measurements by covering Denmark Strait and the area off north Iceland reaching just east of Kolbeinsey-ridge.

Capelin was observed in scattered and generally low concentrations along the East Greenlandic continental shelf while very little was found off Vestfirdir peninsula and nothing along the continental shelf off northern Iceland (Figure 12.2.1). The total estimate of immature capelin (excluding age 0) was only 9.4 billion whereof 8.7 billion were 1 year olds) (Tables 12.2.1 and 12.2.2 and Figure 12.2.2). Immature capelin was generally found in the southwestern part of the surveyed area. Further north along the Greenland shelf up to 72°30´N older, maturing capelin predominated (Figure 12.2.2). Interestingly maturing capelin predominated in the southernmost sample, only about 20 miles from the Greenlandic coast although acoustic scatter showed very low concentrations. No capelin was recorded off N-Iceland east of 22° W. The distribution of capelin was westerly as in recent years while, similar to last year, no capelin was recorded in traditional areas north of Iceland.

Age and length disaggregated abundance is shown in table 12.2.1. The total number of capelin amounted to only 14.8 billion whereof the 1-group was estimated to 9.2 billion. The total estimate of 2-group capelin was about 4.7 billion. The total biomass estimate was 225 000 tonnes of which about

138 000 tonnes were 2 years and older. About 5.9 % in numbers of the 1- group was estimated to be maturing to spawn, about 85 % of the 2 year old and 99 % of the 3 year old appeared to be maturing. This gives 137 000 tonnes of maturing 1 - 3 year old capelin.

Tables 12.2.2 and 12.2.3 show the historic time series of abundance and mean weights by age and maturity in autumn.

The observed low capelin abundance estimates were at the time believed to demonstrate a very low stock size, because this autumn survey had an extensive spatial coverage and the estimates were in accordance with the low immature estimates from autumn 2015.

On the basis of the estimate of the maturing part of the stock the Marine and Freshwater Research Institute recommended no fishery (intermediate TAC of 0 t) for the fishing season 2016/2017 (Anon 2016). This recommendation was in accordance with existing HCR and management plan between Iceland, Norway and Greenland.

12.2.2 Surveys in winter 2017

Two winter surveys were conducted in 2017 with the aim of assessing the maturing part of the stock.

12.2.2.1 Winter survey during 11. – 21. January.

The survey was conducted by the research vessels Arni Fridriksson and Bjarni Saemundsson and the pelagic fishing vessel Polar Amaroq. Five Scientists from the Marine Research Institute of Iceland were onboard each vessel. The echosounders were calibrated and the acoustic measurements from all vessels were used in the stock assessment.

The original plan was to use four vessels (2 research vessels and 2 pelagic fisheries vessels) for acoustic measurements assisted by two more fisheries vessels for scouting. The aim was to map the capelin distribution beforehand by scouting vessels and then measure the areas containing capelin thoroughly by the four vessels equipped by calibrated acoustic echosounders, further assisted with two more scouting vessels. Emphasis was set on waiting for good weather forecast for several adjacent days to facilitate a full coverage of the area of interest in favourable weather conditions, because in this region the rare periods of calm seas are usually short. However, due to strike of Icelandic fishermen, all the Icelandic fishing vessels meant to participate in this project could not leave harbour. Consequently only 3 ships (two research vessels and one Greenlandic fishing vessel hired for the project) could participate.

The 10th of January the echosounder of Polar Amaroq was successfully calibrated in Nordfjordur. Echosounders of the research ships had already been calibrated before the cruise.

First coverage

The vessels were planned to be stand by in the period 7th – 17th January, waiting for promising weather forecasts. Arni Fridriksson and Bjarni Saemundsson surveyed eastward from Denmark Strait towards Kolbeinsey-ridge while Polar Amaroq covered the regions east of Kolbeynsey-ridge. Since no scouting had been performed, the three vessels had to cover a large area with rather coarse coverage to manage to get continuous coverage of measurements during the limited time of good weather conditions. Although, transect intervals were tighter in the north-western area where occurrence of mature capelin was believed to be more likely. Drift ice hindered the vessels only farthest off shore in Denmark Strait in areas where no capelin was observed and was not considered to affect the stock estimate of maturing capelin. The vessels just manged to join and finish their coverage in the Kolbeinsey-ridge area before they had to seek shelter in Siglufjordur the 16th January due to a storm. Mature capelin was mainly observed along the continental shelf edges north of the Vestfjords peninsula extending eastwards to about 40 nmi west of Kolbeinsey-ridge. Further east there was almost total absence of mature capelin. Immature capelin was more dominant in the western part of Denmark Strait.

Second coverage

The 17th January the three vessels left shelter in Siglufjordur to measure the north-western area where mature capelin had been observed in the earlier coverage. Since the research area had been narrowed down the three vessels could measure more thoroughly with about 10 nmi intervals between transects in relatively short time period. The 18th January both Bjarni Saemundsson and Polar Amaroq had to halt their survey for few hours due to bad weather but otherwise the survey extended fast and effectively westwards. Around 22°30′ W drift Ice started to limit the coverage of the vessels. Ice had drifted into the Denmark Strait and hindered measurements in the northern part of the planned coverage of the Denmark Strait. Capelin soundings were observed close to the ice edge. In general immature capelin dominated farthest to the west while mature capelin dominated further east.

The total number of capelin amounted to 26.7 billions whereof 7.2 billions were immature. About 26.6 % of the maturing stock was 2 years old while 54.4 % were 3 years old and 19 % were 4 years old. In total 446 000 tonnes of capelin (at age 2-5) were estimated to be maturing to spawn next spring. Further details are shown in Bardarson and Jonsson 2017a.

The double coverage (eastward and westward survey directions) should even out bias due to surveying with or against the prevailing migration direction. The big increase in SSB estimate compared to the autumn survey estimate suggested that considerable part of the spawning stock had not been covered in the autumn. Hence, TAC was updated only based on this survey. On the basis of this estimate of the mature stock and catch taken between autumn and winter survey the Marine Research Institute recommended a TAC of 57 000 t for the fishing season 2016/2017 (Anon 2017a). This recommendation was in accordance with existing HCR established by WKICE (ICES, 2015).

12.2.2.2 Winter survey during 1. – 11. February

The capelin spawning stock had been estimated as 446 000 tonnes in a 3 ship survey conducted 11.-21. January, but it was decided to undertake second winter survey e.g. since there were limitations in coverage due to drift ice. This survey was financed by the pelagic fisheries industry.

The survey was conducted by the research vessel Arni Fridriksson and the Greenlandic pelagic fishing vessel Polar Amaroq. The research vessel Bjarni Saemundsson was simultaneously on a hydrographic survey but assisted by acoustic measurements in Eyjafjordur and proximity. There were 3-5 Scientist from the Marine Research Institute of Iceland on board each vessel. Echosounders of all participating vessels had been calibrated before the cruise.

The vessels were standby from late January waiting for promising weather conditions for acoustic measurements. Polar Amaroq left harbour from Neskaupstadur the 31. January with 3 scientists on-board although weather forecasts were not promising for coming days. This way the ship could go fishing while at the same time observing the eastern forefront of migrating capelin. Following fishing and biological sampling in the area, Polar Amaroq started acoustic sampling on the 3. of February along transects east of the Langanes peninsula. The same day Arni Fridriksson left harbour in Reykjavik to join Polar Amaroq and measure the capelin stock from east to west. Bjarni Saemundsson measured the Eyjafjordur and Eyjafjardarall areas in 8.-9. February.

The weather conditions were variable but generally rough in large parts of the survey area north of Iceland due to a series of lows passing the area. Still the vessels managed to get conditions for a continuous coverage of acoustic measurements from east to west with only few occasions where measurements had to be halted for few hours.

Capelin was observed along the continental slopes while also large quantities were found in shallow waters mainly north off Skagafjordur and Thistilfjordur (Fig. 12.2.3). Immature capelin predominated in the western part of the survey area, mainly by the shelf slopes north of Hunafloi, while larger

maturing capelin dominated further east and in the shallow areas off north- and northeast-Iceland. Further details are shown in Bardarson and Jonsson 2017b.

12.3 % of the maturing stock was 2 years old while 56.1 % were 3 years old and 31.6 % were 4 years old. This shift in age distribution compared to the first winter survey indicated that older capelin had immigrated in the period between surveys.

The winter survey in February only measured the capelin in a westward direction. Simultaneous eastward migration of the capelin might have led to an underestimation of the stock size. Both the age composition and the considerable increase in estimated abundance suggest additional migration of capelin into the area after the January survey. Consequently, the TAC was updated only based on this survey.

On the basis of this estimate of the mature stock and catch taken between autumn and winter survey the Marine Research Institute recommended a TAC of 299 000 t for the fishing sea-son 2016/2017 (Anon 2017b). This recommendation was in accordance with existing HCR established by WKICE (ICES, 2015).

12.3 The fishery (fleet composition, behaviour and catch)

No initial catch quota was recommended for the 2016/2017 fishing season. The intermediate TAC advice based on the autumn survey also recommended no catches, but this advice was updated to a final quota of 299 000 t in winter 2017. In total, 300 000 t were caught in the 2016/2017 fishing season.

No summer or autumn fishery took place in 2016.

The distribution of the winter catches, based on logbooks for the Icelandic fleet, is shown in Figure 12.3.1.

The Norwegian fleet caught all of its quota in February, mainly north and east of Iceland. The Icelandic fleet started fishing the 20th of February targeting schools of capelin close to shore south off Iceland. This migration and the fishery moved westward and in the beginning of March it had reached west of Breidafjordur and Latrabjarg. In middle of March there was still ongoing some fishery west of Westfjords and north of northern coast of Iceland. In general this spawning migration was composed of large and dense schools.

The total annual catch of capelin in the Iceland-East Greenland-Jan Mayen area since 1964 is given by weight, season, and nationality of the vessels in Table 12.3.1 and Figure 12.3.2. Samples from Icelandic and Greenlandic vessels have been analysed by MRI in Iceland (length measured and age read), although samples from Norway and Faroes have not yet been processed.

The total catches in numbers by age during the summer/autumn since 1985 are given in Table 12.3.2 and for the winter since 1986 in Table 12.3.3. Similar age distribution was observed in the catches 2017 as in the survey in February 2017.

Preliminary and final TAC as well as landings for the fishing seasons since 1992/93 are given in Table 12.3.4.

12.4 Biological data

12.4.1 Growth

Seasonal growth pattern, with considerably increased growth rate during summer and autumn has been observed in this capelin stock in a study of the period 1979—1992. Where immature fish had slower growth during winter, the maturing fish had faster summer growth that continued throughout the winter until spawning in March/April, followed by almost 100% spawning mortality

(Vilhjalmsson, 1994). Further examination of the growth of immature capelin at age 1 in autumn to mature at age 2 in autumn the year after in the period 1979—2013 showed on average almost 4 fold weight increase during one year (Gudmundsdottir and Thorsteinsson, WD in 2014). This considerable weight increase and seasonal pattern in growth the year before spawning should be taken into account when deciding the timing of the capelin fisheries.

Seasonal variation of fat content is also observed. During the summer period, the fat content rises from approximately 5% to 20% in late autumn before spawning (Engilbertsson et. al. 2012). In the fall and winter the fat content slowly declines, until the spawning migration begins in early January where the fat content drops drastically from about 15% to 5% in mid-April. Immature capelin has much lower fat content, usually less than 3-4%.

12.5 Methods

The objective of the HCR for the stock is to leave at least 150 000 t (=B_{lim}) for spawning (escapement strategy). The initial (preliminary), intermediate and final TAC's are based on acoustic surveys.

a) The initial TAC advice for the coming fishing season is issued by ICES in May based autumn survey abundance estimate of immature 1 and 2 year old capelin. Starting in autumn 2017, this advice will be issued earlier (in December).

b) The intermediate TAC advice is issued by MRI in autumn based on the biomass estimate of maturing capelin.

c) The final TAC advice is issued by MRI in January/February based on the biomass estimate of maturing capelin.

The initial (preliminary) quota follows a simple forecast that is based on the relation between historic observations of the abundance of 1 and 2 year old juveniles from the acoustic autumn surveys and the corresponding final TAC's nearly 1½ year later. This rule was applied by ICES NWWG 2016 to set the initial quota for the fishing season 2016/17. Figure 12.8.1 shows this relation and the associated precautionary initial quota (blue line).

The intermediate and final TAC's are set so that there is at least 95 % probability that there will be at least 150 000 t (=B_{lim}) of mature capelin left for spawning at the spawning time (15 march). This was done for the first time in 2015/2016 by the Icelandic Marine Research Institute and was not evaluated by ICES.

These methods were endorsed by the benchmark working group WKICE in 2015. See WKICE (ICES, 2015) and the Stock Annex for the capelin in the Iceland-East Greenland-Jan Mayen area.

Previously, (since early 1980s) the stock has been managed according to an escapement strategy, leaving 400 thousand t to spawning (uncertainty of the estimates were not considered). To predict the TAC for the next fishing season a model was developed in the early 1990s. These models were not endorsed by the benchmark working group WKSHORT 2009.

12.6 Reference points

During WKICE, a B_{lim} of 150 000 t was defined (ICES, 2015). No other reference points are defined for this stock.

12.7 State of the stock

The spawning stock biomass (SSB) was estimated to 815 000 t in February 2017. The predation model (ICES 2015), accounting for the catches of 300 000 t and predation between survey and spawning by cod, saith and haddock, estimated that 361 000 t were left for spawning in spring 2017 (Table 12.7.1).

Given the uncertainty estimates, there was 95 % probability that at least 150 000 t was left far spawning. This was therefore in accordance to the sustainable HCR. Acoustic estimation of the immature part of the stock in autumn 2016 indicated very low abundance of immature capelin. Short term forecast

The acoustic estimate of immature capelin at age 1 and 2 from the autumn survey in September 2016 was 9.4 billions. The estimate is well below the trigger value of 50 billions and the initial advice according to the HCR is therefore 0 t in the fishing season 2017/18 (Figure 12.8.1).

12.8 Uncertainties in assessment and forecast

The uncertainty of the assessment and forecast depends largely on the quality of the acoustic surveys in terms of coverage, conditions for acoustic measurements and the aggregation of the capelin.

The uncertainty, mainly deriving from the aggregation behaviour of the capelin (high patchiness leads to high variance), is estimated by bootstrapping (see stock annex). The CV for the immature abundance was estimated to 0.32 in the 2016 autumn survey. The CV for the mature biomass was estimated to 0.46 in the 2016 autumn survey and 0.18 in the 2017 winter (February) survey.

The autumn survey in 2016 had more extensive spatial coverage than has been covered for many years before. Hence, although there was more than 4 day delay due to bad weather the observed low abundance estimates of both immature and maturing stock components were at the time believed to demonstrate a very low stock size. This was in line with the low number of 1 year olds measured in autumn 2015. However, a southward migration of the maturing stock component during the bad weather delays might have led to an overestimation of the spawning stock size.

The winter survey in January included a double, eastward and westward coverage that should even out bias due to eastward spawning migration in the surveyed area. During the second January coverage a drift ice caused some limitations in coverage in Denmark Strait. The big increase in SSB estimate compared to the autumn survey estimate suggests that there was considerable under estimate in the autumn.

The winter survey in February only measured the capelin in a westward direction. Simultaneous eastward migration of the capelin might have led to an underestimation of the stock size. Both age composition and considerable increase in estimated abundance suggest additional migration of capelin into the area after the January survey.

12.9 Comparison with previous assessment and forecast

For the fishing season 2016/2017 no initial or intermediate quota was advised while the final TAC was set to 299 000 t. The landings were 299 832 t. This is the second year in a row where the initial quota has been set to zero, but later revised to a final quota In autumn 2015 there were severe spatial limitations in coverage of immature capelin distribution while in autumn 2016 the coverage was far more extensive.

12.10 Management plans and evaluations

See section 12.5.

12.11 Management considerations

The fishing season for capelin has since 1975 started in the period from late June to July/August when surveys on the juvenile part of the stock the year before have resulted in the setting of an initial (preliminary) catch quota. During summer, the availability of plankton is at its highest and the fishable stock of capelin is feeding very actively over large areas between Iceland, Greenland and Jan Mayen, increasing rapidly in length, weight and fat content. By late September/beginning of October this

period of rapid growth is over. The growth is fastest the first two years, but the weight increase is most in the year before spawning (Vilhjálmsson. 1994. The Icelandic Capelin Stock).

Given the large weight increase in the summer before spawning (section 12.4) it is likely that there will be more biomass of maturing fish in autumn than in summer, even though the level of natural mortality is not well known during this time period. This should be considered for optimal timing of fishery in relation to yield and ecological impact. This is also supported by information for the Barents Sea capelin where it has been shown that fishing during autumn would maximize the yield, but from the ecosystem point of view a winter fishery were preferable (Gjøsæter *et.al.*, 2002). As the biology and role in the ecosystem of these two capelin stocks are similar, this is considered to be also valid for the Icelandic capelin.

During the autumn surveys juvenile and adult capelin are often found together. This should be considered during summer fishing because the survival rate of juvenile capelin that escape through the trawl net is unknown.

12.12 Ecosystem considerations

Capelin is an important forage fish and its dynamics are expected to have implications on the productivity of their predators (see further in section 7.3).

The importance of capelin in East Greenlandic waters remains to be investigated.

In Icelandic waters, capelin is the main single item in the diet of Icelandic cod, a key prey to several species of marine mammals and seabirds and also important as food for several other commercial fish species (see e.g. Vilhjálmsson, 2002).

12.13 Regulations and their effects

Over the years the fishery has been closed during April - late June and the season has started in July/August or later, depending on the state of the stock.

Areas with high abundances of juvenile age 1 and 2 capelin (on the shelf region off NW-, N- and NE-Iceland) have usually been closed to the summer and autumn fishery.

It is permissible to transfer catches from the purse-seine of one vessel to another vessel, in order to avoid slippage. However, if the catches are beyond the carrying capacity of the vessel and no other vessel is nearby, slippage is allowed. In recent years, reporting of such slippage has not been frequent. Industrial trawlers do not have the permission to slip capelin in order to harmonize catches to the processing.

In Icelandic waters, fishing with pelagic trawl is only allowed in limited area off the NE-coast (fishing in January) to protect juvenile capelin and to reduce the risk of affecting the spawning migration route (shuttering of migrating capelin schools by pelagic trawling has been hypothesized).

Consistent with ICES recommendations on taking precautionary measures to protect juvenile capelin, the coastal states (Iceland, Greenland and Norway) have agreed to prohibit the use of pelagic trawl in the summer fishery. Iceland has stated intention not to conduct summer fishing nor allow summer fishing in the Icelandic Economic zone. Furthermore, the coastal states have agreed to put in place closures in their respective zones when the proportion of juvenile capelin (defined as shorter than 14 centimetres) in the catch exceeds 20%. An area closure shall be enforced for up to 2 weeks.

12.14 Changes in fishing technology and fishing patterns

The landings in 2016/17 (300 kt, preliminary numbers) was primarily taken by purse-seining (97%). Only 3 % was caught by pelagic trawl, buthistorically a variable amounts of the catches have been taken with pelagic trawl through the fishing seasons. Discards are considered negligible.

12.15 Changes in the environment

Icelandic and East Greenlandic 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. Since 1996 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, as well as on the spawning grounds at South- and Southwest Iceland. It has been put forward in the 2000s that this temperature increase, may have led to a spatial shift in spawning and nursery areas (Vilhjálmsson, 2007). The acoustic surveys in autumn 2010, 2012-2014 confirmed this change in distribution of immatures and maturing capelin. In autumn 2015 large part of the immatures was not detected, indicating uncertainty in location of the nursery areas. Fisheries data suggests that the major part of the spawning still takes place on the usual grounds by the South and Southwest coasts of Iceland and to some extent also by the North coast of Iceland.

More detailed environmental description is in section 7.3.

12.16 Recommendations

In coming years when experience of the new HCR will be gained it is recommended that assumptions and practical operation of the HCR will be evaluated. E.g. by refining the model for the initial TAC, reviewing the predation/prey relationships and how SSB estimates from autumn and winter surveys should be weighted when final TAC is calculated.

Studies of optimal harvesting of capelin should be conducted. These estimates should take account of growth, mortality and gear selection in relation to the timing of the fishery.

Profound changes in the distribution, migration and productivity of this capelin stock, likely caused by environmental changes, urge the need for further biological studies i.e. regarding life history (including changes in spawning grounds, larval drift and migration at times not observed by autumn and winter surveys) and the role of capelin (predation/prey relationships) as a key species in the ecosystem.

The assessment and advice on the final TAC for capelin based on the autumn and winter surveys are issued directly to the Coastal States by the Icelandic Marine Research Institute. This process is not internationally peer reviewed prior to the release of the advice. Among the reasons for using this process is the need for fast advice once the survey result is available. The ICES ACOM procedure is more time consuming. NWWG therefore recommends that a fast track workflow based on online meetings is established if possible.

When planning acoustic surveys for capelin stock assessment, allocation of effort in terms of ship time, number of ships and manpower, should be sufficient for a likely full coverage in the first attempt given the demanding weather and ice conditions during autumn and winter surveys.

Table 12.2.1 Capelin. Acoustic assessment of capelin in the Iceland/Greenland/Jan Mayen area, by r/v Arni Fridriksson and r/v Bjarni Saemundsson 10/9-4/10 2016 (Numbers in billions, biomass in tonnes).

	Length	Numbers at Age (10^9)				Numbers	Biomass	Mean
	(cm)	1	2	3	4	(10^9)	(10^3 t)	weight (g)
	9.5	0.03	0.00	0.00	0.00	0.03	0.09	3.0
	10	0.07	0.00	0.00	0.00	0.07	0.28	3.9
	10.5	0.40	0.00	0.00	0.00	0.40	1.82	4.6
	11	0.63	0.00	0.00	0.00	0.63	3.48	5.5
	11.5	0.93	0.00	0.00	0.00	0.93	6.18	6.6
	12	1.42	0.01	0.00	0.00	1.44	10.80	7.5
	12.5	1.69	0.07	0.00	0.00	1.76	15.69	8.9
	13	1.46	0.13	0.00	0.00	1.59	16.21	10.2
	13.5	1.24	0.13	0.01	0.00	1.38	16.05	11.6
	14	0.65	0.18	0.00	0.00	0.83	10.75	12.9
	14.5	0.46	0.25	0.00	0.00	0.71	10.56	14.8
	15	0.17	0.35	0.00	0.00	0.52	8.94	17.0
	15.5	0.06	0.41	0.01	0.00	0.47	9.11	19.5
	16	0.02	0.70	0.05	0.00	0.77	17.26	22.4
	16.5	0.00	0.73	0.12	0.00	0.85	21.19	24.9
	17	0.00	0.80	0.13	0.00	0.93	26.06	27.9
	17.5	0.00	0.54	0.22	0.00	0.76	24.39	32.2
	18	0.00	0.29	0.20	0.00	0.49	17.81	36.0
	18.5	0.00	0.06	0.12	0.01	0.18	7.17	39.2
	19	0.00	0.01	0.01	0.00	0.01	0.47	36.3
	19.5	0.00	0.00	0.01	0.00	0.01	0.27	42.1
TSN (10^9)		9.24	4.66	0.88	0.01	14.8		
TSB (10^3 t)		87	110	28	0.3		224.58	
Mean W (g)		9.4	23.6	31.5	39.2			15.2
Mean L (cm)	13.7	12.6	16.1	17.4	18.5			
%TSN		62.5	31.5	5.9	0.0			
SSN (10^9)		0.5	4.0	0.9	0.01	5.4		
SSB (10^3 t)		8.3	101.0	27.6	0.3		**137.1**	
SMean W (g)		15.1	25.5	31.7	39.2			25.4
SMean L (cm)	16.4	14.4	16.5	17.4	18.5			
%SSN		10.2	73.6	16.1	0.1			
ISN (10^9)		8.7	0.7	0.0	0.0	**9.4**		
ISB (10^3 t)		78.3	9.1	0.1	0.0		87.5	
IMean W (g)		9.0	13.1	11.5				9.3
IMean L (cm)	12.6	12.5	13.9	13.5				
%ISN		92.5	7.4	0.1	0.0			

Table 12.2.2. Icelandic Capelin. Abundance of age-classes in numbers (10^9) measured in acoustic surveys in autumn.

Year	Mon	Day	Age1	Age1	Age2	Age2	Age3	Age3	Age4	Age5
			Imm.	Mat.	Imm.	Mat.	Imm.	Mat	Mat.	Mat.
1978	10	16				60.0		13.9	0.4	
1979	10	14	10.0			49.7		9.1	0.4	
1980	10	11	23.5			19.5		4.8		
1981	11	26	21.0		1.1	11.9		0.6		
1982	10	2	68.0		1.7	15.0		1.6		
1983	10	3	44.1		8.2	58.6		5.6	0.1	
1984	11	1	73.8		4.6	31.9		10.3	0.3	
1985	10	8	33.8		12.6	43.7		14.4	0.4	0.1
1986	10	4	58.6		1.4	19.9		29.8	0.3	
1987	11	18	21.3		2.5	52.0		13.5		
1988	10	6	43.9		6.7	53.0		17.0	0.4	
1989	10	26	29.2		1.8	2.9		0.6		
1990	11	8	24.9		1.3	16.4		2.7	0.1	
1991	11	15	60.0		5.3	44.7		4.2		
1992	10	13	104.6		2.3	54.5		4.3	0.1	
1993	11	18	100.4		9.8	55.1		4.9		
1994	11	25	119.0		6.9	29.2		4.4		
1995	11	30	165.0		30.1	84.6		7.0		
1996	11	27	111.9		16.4	70.0		15.9		
1997	11	1	66.8		30.8	52.5		8.5		
1998	11	13	121.0		5.9	20.5		3.3		
1999	11	15	89.8		4.4	18.1		0.9		
2000	11	10	103.7		10.9	11.6	0.1	0.6		
2001	11	12	101.8		2.4	22.1	0.0	0.7		
2002	11	12	1.0		0.5					
2003	11	6	4.9		3.1	1.7	0.1	0.2		
2004	11	22	7.9		0.1	7.3		0.8	0.0	
2005	11									
2006	11	6	44.7		0.3	5.2		0.4		
2007	11	7	5.7		0.1	1.3		0.0		
2008	11	17	7.5	5.1	0.4	12.1		1.8		
2009	11	24	13.0	2.4		5.0		0.7		
2010	10	1	91.6	9.6	6.3	25.8	0.1	0.8	0.02	
2011	11	29	9.0	0.6	3.6	19.9	0.05	2.1		
2012	10	3	18.5	0.9	2.0	21.2	0.07	11.4	0.1	
2013	9	17	60.1	0.6	6.9	25.0	1.3	6.9	0.1	
2014	9	16	57.0	1.0	3.3	26.5	0.2	7.6	0.1	
2015	9	16	5.0	0.4	1.2	21.2		6.7		
2016	9	10	8.7	0.5	0.7	4.5	0.0	0.9	0.01	

1987 - The number at age 1 was from survey earlier in autumn.

2005 - Scouting vessels searched for capelin. r/s ÁF measured. No samples taken for age determination. Estimated to be < 50 thous. tonnes.

2011-Only limited coverage of the traditional capelin distribution area.

2001-2009 and 2016 – Not full coverage of stock.

Table 12.2.3. Icelandic Capelin. Mean weight (g) of age-classes measured in acoustic surveys in autumn. (imm=immature, mat=mature). See footnotes in table 12.2.2.

Year	Mon.	Age1	Age1	Age2	Age2	Age3	Age3	Age4	Age5
		Imm.	Mat.	Imm.	Mat.	Imm.	Mat.	Mat.	Mat.
1978	10				19.8		25.4	26.3	
1979	10	6.2			15.7		23.0	20.8	
1980	10	7.3			19.4		26.7		
1981	11	3.6		12.3	19.4		22.5		
1982	10	3.8		8.5	16.5		24.1		
1983	10	5.1		9.5	16.8		22.5	23.0	
1984	11	2.9		8.3	15.8		25.7	23.2	
1985	10	3.8		8.5	15.5		23.8	29.5	31.0
1986	10	4.0		6.1	18.1		24.1	28.8	
1987	11	2.8		8.7	17.9		25.8		
1988	10	3.0		8.0	15.4		23.4	20.9	
1989	10	3.5		8.0	12.9		24.0		
1990	11	3.9		8.4	18.0		25.5	36.0	
1991	11	4.7		7.9	16.3		25.4		
1992	10	3.7		8.6	16.5		22.6	22.0	
1993	11	3.6		8.9	16.2		23.3		
1994	11	3.3		7.9	15.9		23.6		
1995	11	3.7		7.0	14.0		20.8		
1996	11	3.1		7.4	15.8		20.6		
1997	11	3.3		8.5	14.3		20.1		
1998	11	3.5		9.9	13.7		18.8		
1999	11	3.6		8.0	15.4		19.5		
2000	11	3.9		8.5	13.4	13.0	20.8		
2001	11	3.8		8.8	16.3	15.7	23.9		
2002	11								
2003	11	7.2		14.9	17.0	22.6	23.7		
2004	11	7.4		7.6	16.0		18.0	14.5	
2005									
2006	11	3.7		7.9	15.0		16.7		
2007	11	5.5		8.6	14.9		15.8		
2008	11	6.2	11.0	6.9	18.6		22.4		
2009	11	5.1	9.8		20.0		23.8		
2010	10	5.8	12.9	12.2	19.0	12.9	24.0	21.2	
2011	11	6.8	11.4	11.1	18.7	15.8	24.4		
2012	10	6.5	16.0	15.3	22.0	22.4	28.0	26.6	
2013	9	5.8	12.6	10.9	18.0	11.2	20.9	23.6	
2014	9	4.2	9.9	12.7	18.3	16.6	21.2	25.0	
2015	9	8.5	12.3	13.4	18.4	21.5	23.1		
2016	9	9.0	15.1	13.1	25.5	11.5	31.7	39.2	

Table 12.2.4. Icelandic Capelin. Assessment of mature capelin in the Iceland/EastGreenland/Jan Mayen area in February 2017 (Numbers in billions, biomass in tonnes).

	Length	Numbers at Age (10^9)					Numbers	Biomass	Mean
	(cm)	1	2	3	4	5	(10^9)	(10^3 t)	weight (g)
	10.5	0.02	0.00	0.01	0.00	0.00	0.03	0.10	3.3
	11	0.00	0.00	0.02	0.00	0.00	0.02	0.09	4.4
	11.5	0.00	0.02	0.00	0.00	0.00	0.02	0.09	5.0
	12	0.00	0.01	0.00	0.00	0.00	0.01	0.08	7.0
	12.5	0.00	0.09	0.02	0.00	0.00	0.11	0.80	7.6
	13	0.00	0.29	0.02	0.00	0.00	0.30	2.72	8.9
	13.5	0.00	0.89	0.16	0.00	0.00	1.05	10.70	10.2
	14	0.00	1.03	0.36	0.00	0.00	1.38	16.30	11.8
	14.5	0.00	1.03	0.57	0.00	0.00	1.60	21.25	13.3
	15	0.00	0.82	1.29	0.00	0.00	2.11	32.02	15.1
	15.5	0.00	0.44	1.80	0.07	0.00	2.31	39.76	17.2
	16	0.00	0.58	2.25	0.21	0.00	3.04	59.41	19.5
	16.5	0.00	0.34	3.24	0.56	0.03	4.17	91.07	21.8
	17	0.00	0.14	3.12	1.52	0.02	4.80	121.07	25.2
	17.5	0.00	0.00	2.76	2.31	0.03	5.11	144.33	28.3
	18	0.00	0.03	1.95	2.20	0.03	4.22	134.34	31.9
	18.5	0.00	0.00	0.84	1.70	0.02	2.56	89.78	35.1
	19	0.00	0.00	0.32	1.16	0.02	1.49	57.34	38.4
	19.5	0.00	0.00	0.04	0.46	0.00	0.50	20.53	40.8
	20	0.00	0.00	0.00	0.06	0.00	0.06	2.77	47.7
TSN (10^9)		0.02	5.70	18.75	10.24	0.16	34.9		
TSB (10^3 t)		0	82	441	316.8	4.8		844.56	
Mean W (g)		3.3	14.3	23.5	30.9	29.4			24.2
Mean L (cm)	16.3	10.5	14.6	16.6	17.9	17.6			
%TSN		0.1	16.3	53.8	29.4	0.5			
SSN (10^9)		0.0	4.0	18.1	10.22	0.16	32.3		
SSB (10^3 t)		0.0	61.1	432.8	316.5	4.8		**815.1**	
SMean W (g)		#DIV/0!	15.4	23.9	31.0	29.4			25.2
SMean L (cm)	16.8	#DIV/0!	14.9	16.7	17.9	17.6			
%SSN		0.0	12.2	55.8	31.5	0.5			
ISN (10^9)		0.0	1.7	0.6	0.0		2.4		
ISB (10^3 t)		0.1	20.0	9.1	0.4			29.5	
IMean W (g)		3.3	11.6	14.6	21.5				12.4
IMean L (cm)	14.4	10.5	14.1	15.1	17.0				
%ISN		0.8	72.5	26.0	0.8				

Table 12.3.1 Capelin. The international catch since 1964 (thousand tonnes).

	Winter season					Summer and autumn season						
Year	Iceland	Norway	Faroes	Greenland	Season total	Iceland	Noway	Faroes	Greenland	EU	Season total	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

	Winter season					Summer and autumn season						
Year	Iceland	Norway	Faroes	Greenland	Season total	Iceland	Noway	Faroes	Greenland	EU	Season total	Total
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	-	-	-	-	-	-	171.1
2017*	196.8	60.4	15.0	27.4	299.8							

***preliminary, provided by working group members.**

Table 12.3.2 Icelandic capelin. The total international catch of capelin in the Iceland-East Greenland-Jan Mayen area by age group in numbers (billions) and the total catch by numbers and weight (thousand tonnes) in the autumn season (August-December) since 1985.

Year	Age 1	Age 2	Age 3	Age 4	Age 5	Total number	Total weight
1985	0.8	25.6	15.4	0.2		42.0	919.7
1986	+	10.0	23.3	0.5		33.8	772.9
1987	+	27.7	6.7	+		34.4	458.6
1988	0.3	13.6	5.4	+		19.3	371.4
1989	1.7	6.0	1.5	+		9.2	121.0
1990	0.8	5.9	1.0	+		7.7	111.2
1991	0.3	2.7	0.4	+		3.4	56.0
1992	1.7	14.0	2.1	+		17.8	298.1
1993	0.2	24.9	5.4	0.2		30.7	611.6
1994	0.6	15.0	2.8	+		18.4	324.1
1995	1.5	9.7	1.1	+		12.3	205.7
1996	0.2	25.2	12.7	0.2		38.4	773.7
1997	1.8	33.4	10.2	0.4		45.8	763.6
1998	0.9	25.1	2.9	+		28.9	440.5
1999	0.3	4.7	0.7	+		5.7	102.4
2000	0.2	12.9	3.3	0.1		16.5	265.1
2001	+	17.6	1.2	+		18.8	294.0
2002	+	18.3	2.5	+		20.8	339.7
2003	0.3	11.8	1	+		14.3	199.5
2004	+	5.3	0.5	-		5.8	92.0
2005	-	0.4	+	-		0.4	9.0
2006	-	-	-	-		-	-
2007	-	-	-	-		-	-
2008	-	-	-	-		-	-
2009	-	-	-	-		-	-
2010	0.01	0.23	0.02	-		0.25	5.4
2011	-	2.45	1.61	-	0.08	4.13	72.1
2012	-	0.2	0.2	-	-	0.4	10.4
2013	-	-	-	-	-	-	-
2014	0.01	2.22	0.6	0.02	-	2.8	45.5
2015	0.03	0.08	0.03			1.4	2.5
2016	-	-	-	-	-	-	-

Table 12.3.3 Icelandic capelin. The total international catch of capelin in the Iceland-East Greenland-Jan Mayen area by age group in numbers (billions) and the total catch by numbers and weight (thousand tonnes) in the winter season (January-March) since 1986.

Year	age 1	age 2	age 3	age 4	age 5	Total number	Total weight
1986		0.1	9.8	6.9	0.2	17.0	391.8
1987		+	6.9	15.5	-	22.4	560.5
1988		+	23.4	7.2	0.3	30.9	657.2
1989		0.1	22.9	7.8	+	30.8	665.1
1990		1.4	24.8	9.6	0.1	35.9	686.8
1991		0.5	7.4	1.5	+	9.4	202.4
1992		2.7	29.4	2.8	+	34.9	621.1
1993		0.2	20.1	2.5	+	22.8	489.6
1994		0.6	22.7	3.9	+	27.2	567.1
1995		1.3	17.6	5.9	+	24.8	539.8
1996		0.6	27.4	7.7	+	35.7	723.6
1997		0.9	29.1	11	+	41.0	797.6
1998		0.3	20.4	5.4	+	26.1	481.3
1999		0.5	31.2	7.5	+	39.2	658.9
2000		0.3	36.3	5.4	+	42.0	830.3
2001		0.4	27.9	6.7	+	35.0	787.2
2002		0.1	33.1	4.2	+	37.4	955.0
2003		0.1	32.2	1.9	+	34.4	648.0
2004		0.6	24.6	3	+	28.3	542.9
2005		0.1	31.5	3.1	-	34.7	692.0
2006		0.1	10.4	0.3	-	10.8	230.0
2007		0.3	19.5	0.5	-	20.3	376.8
2008		0.5	10.6	0.4	-	11.5	202.4
2009		0.1	0.6	0.1	-	0.7	15.1
2010		0.7	5.3	0.9	0.01	6.9	150.7
2011		0.1	16.2	0.6	-	17.0	385.2
2012	0.02	0.6	25.0	6.1	0.02	31.8	674.4
2013	-	0.3	12.1	9.7	0.2	22.3	541.0
2014	-	0.1	4.8	1.3	+	6.1	141.8
2015	-	0.3	17.5	4.7	0.1	22.7	471.9
2016		0.4	5.5	2.0	0.02	8.0	171.1
2017		0.4	5.4	4.1	0.1	10.0	299.8

Table 12.3.4. Initial quota and final TAC by seasons.

Fishing season	Initial advice	Final TAC	Landings
1992/93[1]	500	900	788
1993/94[1]	900	1250	1179
1994/95	950	850	842
1995/96[1]	800	1390	930
1996/97[1]	1100	1600	1571
1997/98	850	1265	1245
1998/99	950	1200	1100
1999/00	866	1000	934
2000/01	650	1090	1065
2001/02	700	1300	1249
2002/03	690	1000	988
2003/04[2]	555	900	741
2004/05[3]	335	985	783
2005/06	No fishery	235	238
2006/07	No fishery	385	377
2007/08	207	207	202
2008/09[4]	No fishery		15
2009/10	No fishery	150	151
2010/11	No fishery	390	391
2011/12	366	765	747
2012/13	No fishery	570	551
2013/14[1]	No fishery	160	142
2014/15	225[5]	580	517
2015/16	No fishery[5]	173	174
2016/17[6]	No fishery[5]	299	300

1) The final TAC was set on basis of autumn surveys in the season.

2) Indices from April 2003 were projected back to October 2002.

3) The initial quota was set on a basis of an acoustic survey in June/July 2004

4) No fishery was allowed, 15 000 t was assigned to scouting vessels.

5) Initial advice based on low probability of exceeding final TAC.

6) Preliminary landings.

Table 12.7.1 Icelandic capelin in the Iceland-East Greenland-Jan Mayen area since the fishing season 1978/79. (A fishing season e.g. 1978/79 starts in summer 1978 and ends in March 1979). Recruitment of 1 year old fish (unit 10^9) as measured in autumn survey. Spawning stock biomass ('000 t) is given at the time of spawning at the end of the fishing season. Landings ('000 t) are the sum of the total landings in the season

Season (Summer/winter)	Recruitment	Landings	Spawning stock biomass
1978/79	-	1195	600
1979/80	22	980	300
1980/81	23.5	684	170
1981/82	21	626	140
1982/83	68	0	260
1983/84	44.1	573	440
1984/85	73.8	896	460
1985/86	33.8	1312	460
1986/87	58.6	1334	420
1987/88	2.6	1116	400
1988/89	43.9	1036	440
1989/90	29.2	807	115
1990/91	27.2	313	330
1991/92	60	677	475
1992/93	104.6	788	499
1993/94	100.4	1178	460
1994/95	119	864	420
1995/96	165	930	830
1996/97	111.9	1570	430
1997/98	66.8	1246	492
1998/99	121	1100	500
1999/00	89.8	932	650
2000/01	103.7	1071	450
2001/02	101.8	1249	475
2002/03	-	988	410
2003/04	4.9	742	535
2004/05	7.9	784	602
2005/06	-	247	400
2006/07	44.7	377	410
2007/08	5.7	203	406
2008/09	12.6	150	328
2009/10	15.4	151	410
2010/11	101.2	391	411
2011/12	9.6	747	418
2012/13	19.4	551	417
2013/14	60.7	142	424
2014/15	58	518	460
2015/16	5.4	174	304*
2016/17	9.4	300**	361*

***Based on predation model in current HCR. ** preliminary**

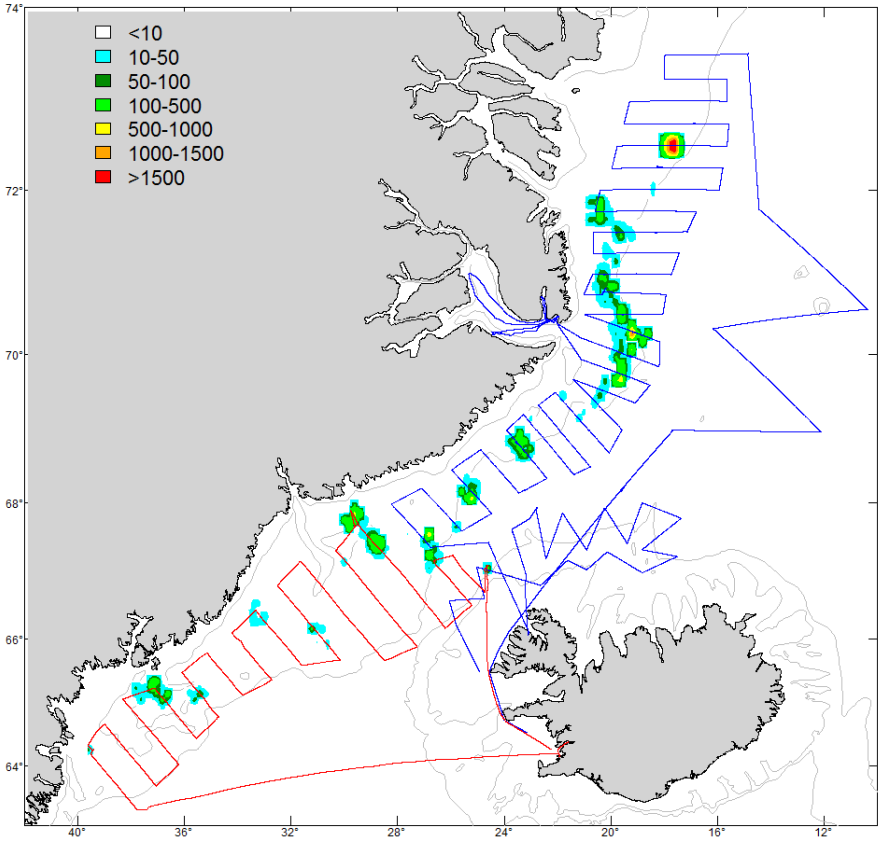

Figure 12.2.1. Icelandic capelin. Cruise tracks, relative density and distribution of capelin during an acoustic survey by r/v Arni Fridriksson (blue) and Bjarni Saemundsson (red) during 10 September - 4 October 2016.

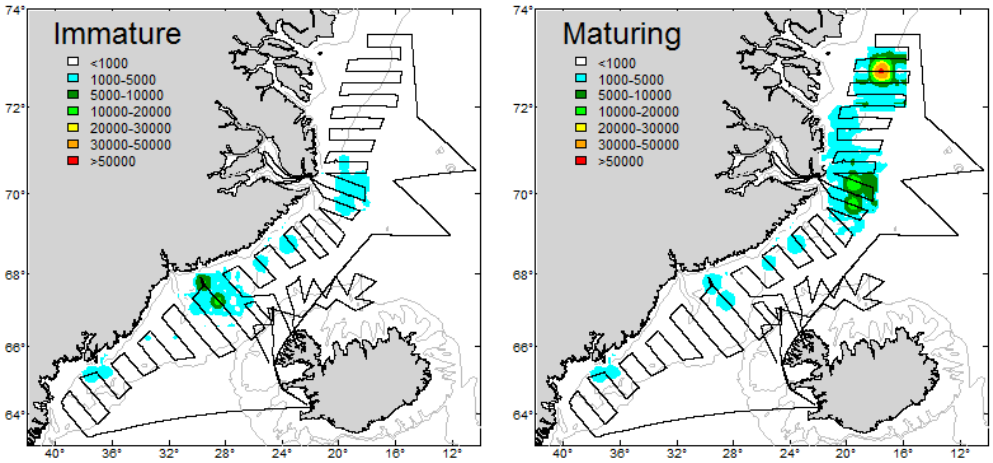

Figure 12.2.2. Icelandic capelin. Distribution of immature and maturing capelin biomass during the acoustic survey 10 September - 4 October 2016.

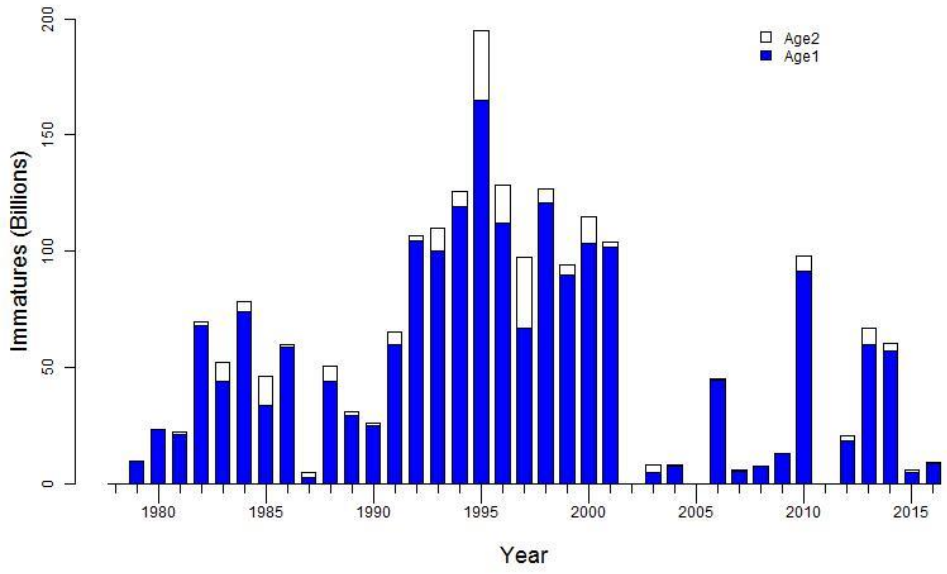

Figure 12.2.2. Icelandic capelin. Indices of immature 1 and immature 2 years old capelin from acoustic surveys in autumn since 1979.

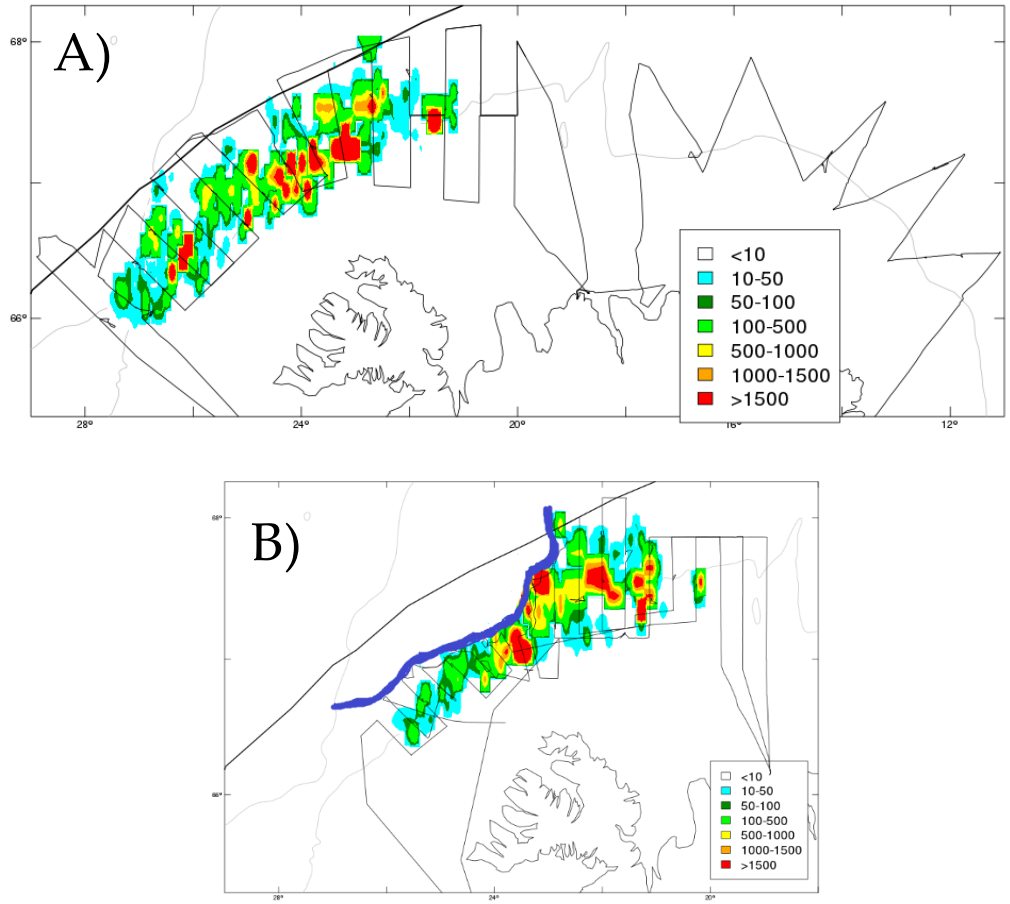

Figure 12.2.3. Icelandic capelin. Survey tracks of r/s Arni Fridriksson, Polar Amaroq and Bjarni Saemundssson during 11. – 21. January 2017. A) First coverage, B) Second coverage.

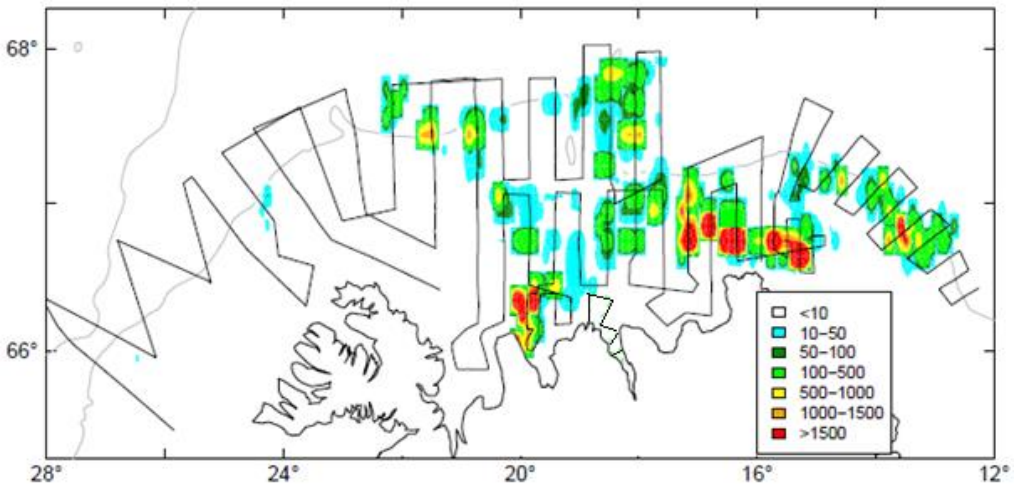

Figure 12.2.3. Icelandic capelin. Survey tracks of r/s Arni Fridriksson, Polar Amaroq and Bjarni Saemundssson during 1. – 11. February 2017.

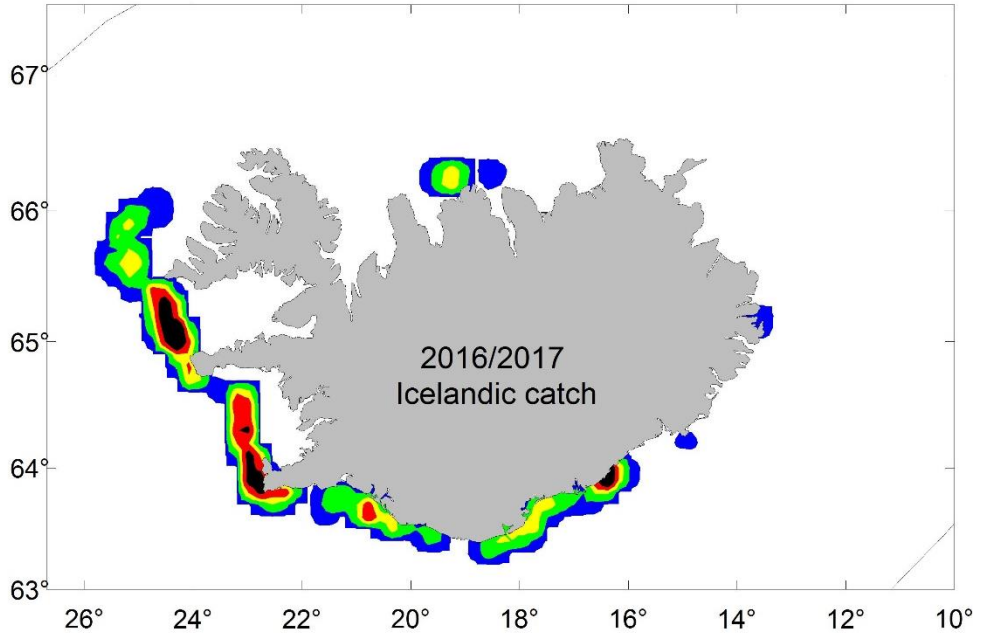

Figure 12.3.1. Icelandic capelin. Distribution of the catches in the fishing season 2016/17 based on data from logbooks of the Icelandic fleet.

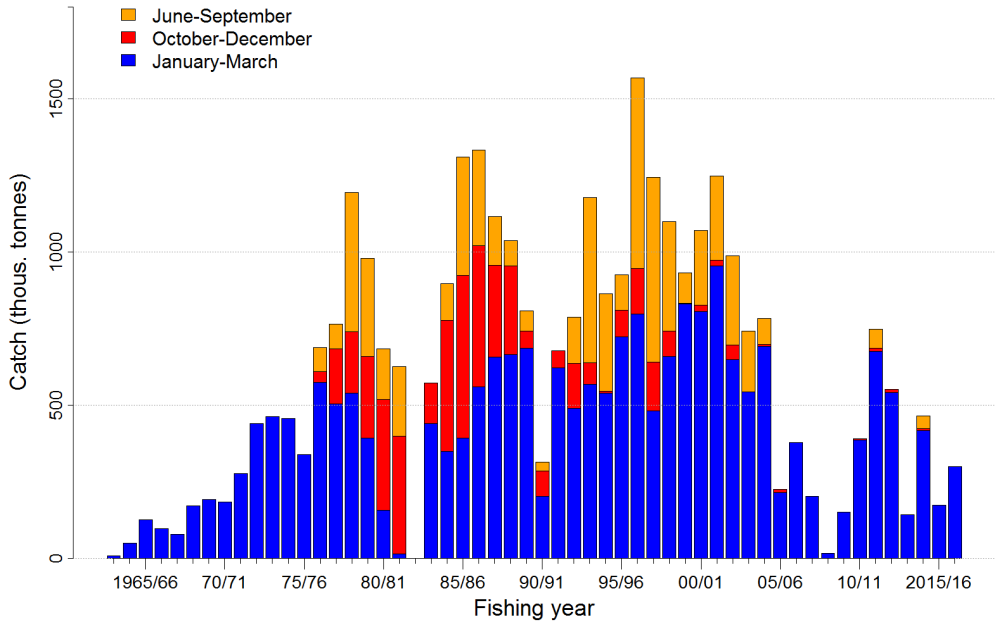

Figure 12.3.2. Icelandic capelin. The total catch (in thousand tonnes) of the Icelandic capelin since 1963/64 by season.

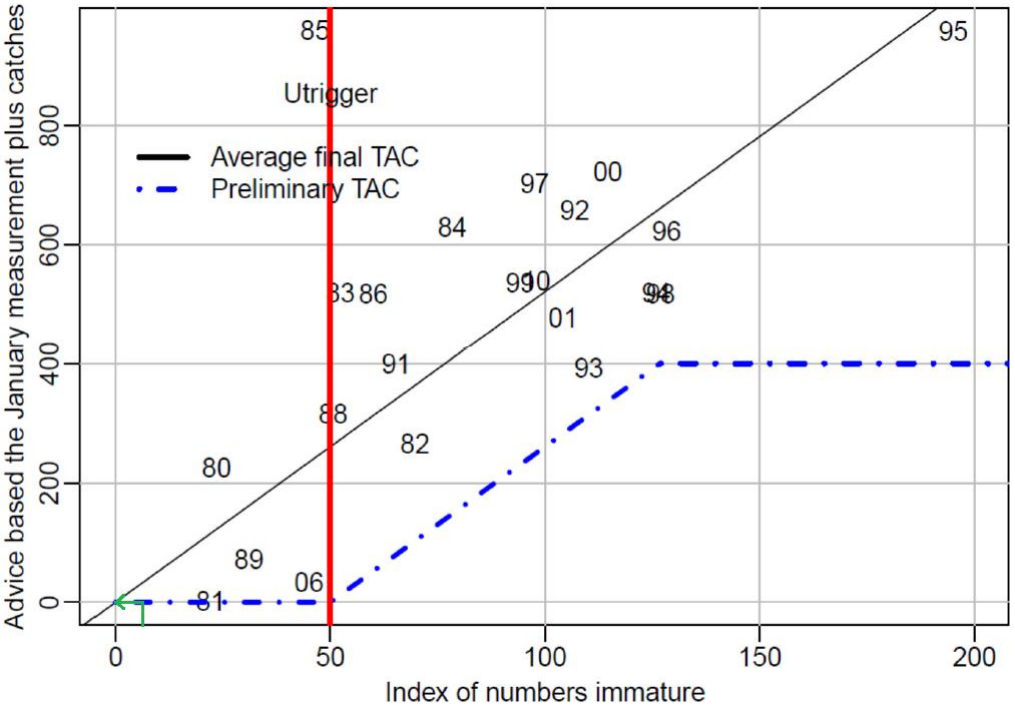

Figure 12.8.1 **Capelin in Subareas 5 and 14 and Division 2.a west of 5°W. Catch advice according to the proposed stochastic HCR, based on the measured number of immature capelin about 15 months earlier. The figure shows the estimated final TAC (black unbroken line) and the initial (preliminary) TAC (blue dashed line). The latter is set using a $U_{trigger}$ (red vertical line) of 50 billion immature fish, with a cap on the initial (preliminary) TAC of 400 kt. The green lines show the index value from the autumn survey 2015, with the corresponding initial TAC for 2016/2017 shown on the y-axis. (The figure adapted from stock-annex, WKICE 2015).**