

IMR/PINRO

8

2023

Joint Report Series

# JOINT



## Advice on fishing opportunities for Barents Sea capelin in 2024

ICES subareas 1 and 2 excluding  
Division 2.a west of 5°W



Institute of Marine Research – IMR



Polar branch of the FSBSI "VINRO" ("PINRO")

**Title (English and Norwegian):**

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**Subtitle (English and Norwegian):**

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**Report series:**

IMR-PINRO

**Year - No.:**

2023-8

**Date:**

16.10.2023

**Author(s):**

Joint Russian-Norwegian Working Group on Arctic Fisheries (JRN-AFWG)

Approved by: Research Director(s): Geir Huse Program leader(s):

**Distribution:**

Open

**Program:**

Barentshavet og Polhavet

**Research group(s):**

Pelagisk fisk

**Number of pages:**

14

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# Stock Name: Barents Sea capelin (ICES subareas 1 and 2 excluding Division 2.a west of 5°W )

Released 16 October 2023

## Advice on fishing opportunities

The Joint Russian-Norwegian Working Group on Arctic Fisheries (JRN-AFWG) advises that when the Joint Norwegian–Russian Fisheries Commission management plan is applied, catches in 2024 should be no more than 196 000 tonnes.

## Stock development over time

Spawning-stock size is above  $B_{lim}$ . No reference points for fishing pressure have been defined for this stock.



Figure 1. Barents Sea capelin (ICES subareas 1 and 2, excluding Division 2.a west of 5°W). Catch, recruitment, survey biomass (age 1+, maturing (> 14cm) and immature (< 14 cm) stock biomass), and SSB (1 April) with 5 and 95 % confidence limits. The biomass reference points relate to SSB. Survey biomass and recruitment values are estimates from the acoustic survey completed by the beginning of October. The recruitment plot is shown only from 1981 onwards since earlier estimates of age 1 capelin are based on incomplete survey coverage. SSB estimates are shown only from 1989 onwards because a different model was used previously, and uncertainty estimates are only available from 2018 onwards. The 2022 estimate of recruitment, maturing and immature stock biomass has not been corrected for incomplete survey coverage. Incomplete survey coverage in 2018 might also have led to recruitment underestimation.

## Catch scenarios

Calculations of catch scenarios are based on a forward projection from the autumn acoustic survey. It involves that SSB for April 2024 is calculated by taking into account predation by immature cod and other sources of natural mortality. A

catch scenario that results in SSB greater than 200 000 tonnes with 95% probability corresponds to the JNRFC Management Plan.

Table 1. Barents Sea capelin (ICES subareas 1 and 2, excluding Division 2.a west of 5°W). Assumptions made for the interim year and in the forecast. All weights are in tonnes.

| Variable                                                               | Value    | Notes                                                                                                                                                                         |
|------------------------------------------------------------------------|----------|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Maturing stock biomass 2023                                            | 1285 890 | Median biomass of fish above the length-at-maturity (14 cm), estimated based on the autumn acoustic survey 1 October 2023. These fish will be spawning in April 2024; tonnes. |
| Predation by immature cod January–March 2024; from the predation model | 296 000  | Based on the prediction of cod abundance in 2024 from the 2023 cod stock assessment (Anon, 2023a); tonnes.                                                                    |

Table 2. Barents Sea capelin (ICES subareas 1 and 2, excluding Division 2.a west of 5°W). Annual catch scenarios. *P* = probability. All weights are in tonnes.

| Basis                                                 | Total catch (2024 ) | Median SSB (2024 ) | P (SSB 2024 > 200 000 t) in % | % TAC change* | % advice change** |
|-------------------------------------------------------|---------------------|--------------------|-------------------------------|---------------|-------------------|
| ICES advice basis                                     |                     |                    |                               |               |                   |
| MP harvest control rule,<br>P (SSB > 200 000 t) = 95% | 196 000             | 590 000            | 95                            | +216          | +216              |
| Other scenarios                                       |                     |                    |                               |               |                   |
| No fishing                                            | 0                   | 785 000            | 99.8                          | -100          | -100              |

\* TAC (2024) vs. TAC (2023).

\*\* Advice (2024) vs Advice (2023).

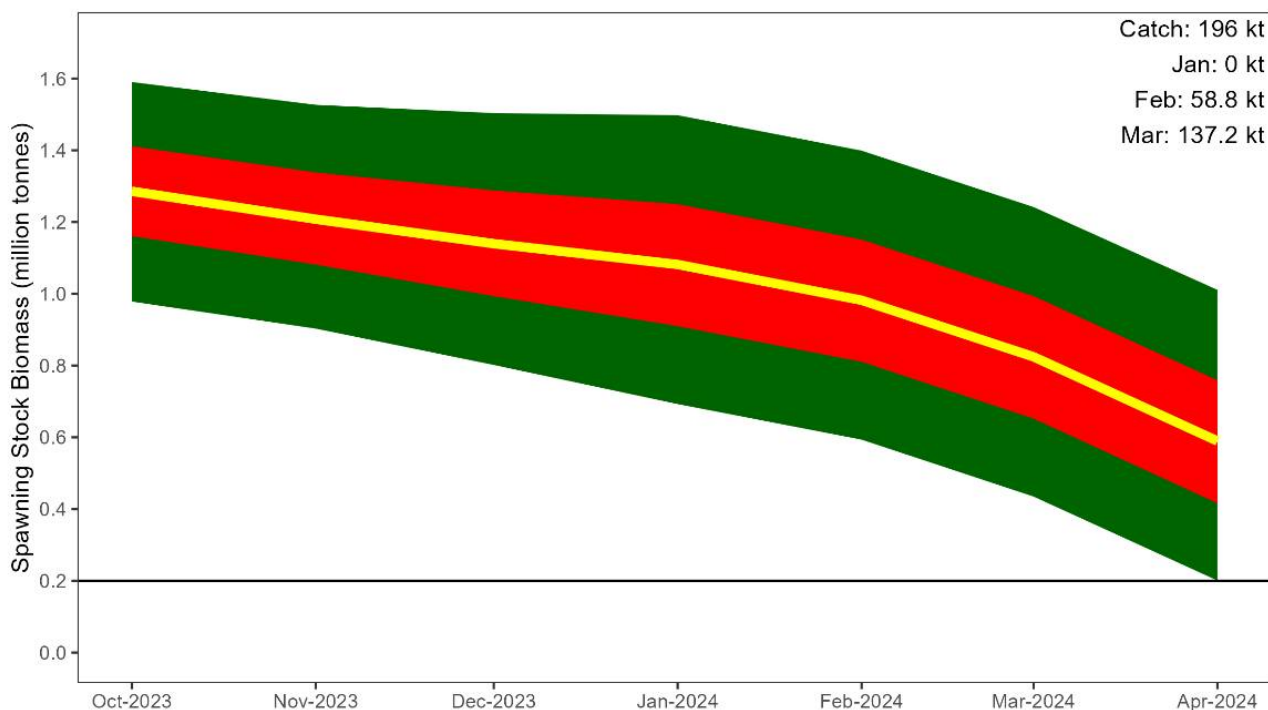


Figure 2. Barents Sea capelin (ICES subareas 1 and 2, excluding Division 2.a west of 5°W). Probabilistic prognosis of SSB for the maturing stock from 1 October 2023 to 1 April 2024, based on the acoustic survey estimate from autumn 2023 assuming a catch of 196 000 tonnes. The median and the 5th, 25th, 75th, and 95th percentiles of the distribution are shown.

Basis of the advice

Table 3. Barents Sea capelin (ICES subareas 1 and 2, excluding Division 2.a west of 5°W). The basis of the advice.

|                 |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    |
|-----------------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Advice basis    | Management plan                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    |
| Management plan | In 2002, the Joint Norwegian–Russian Fisheries Commission (JNRFC) adopted the following harvest control rule (HCR) for Barents Sea capelin: ‘The TAC for the following year should be set so that, with 95% probability, at least 200 000 tonnes of capelin ( $B_{lim}$ ) will be allowed to spawn’. ICES evaluated this HCR as well as alternative HCRs suggested by JNRFC in 2016 (ICES, 2016), and only the existing HCR was found to be precautionary. Following ICES evaluation, the JNRFC decided to maintain the existing HCR (JNRFC, 2016).It should be noted that the term $B_{lim}$ in the harvest control rule is replaced by $B_{escapement}$ in the latest benchmark report (ICES, 2023), and $B_{escapement}$ is set to 200 000 tonnes (cf Table 4). |

Quality of the assessment

The geographical survey coverage of the Barents Sea capelin stock during the BESS in 2023 was close to complete (Figure 3); the capelin distribution might have continued a little bit further northwards in the north-east.

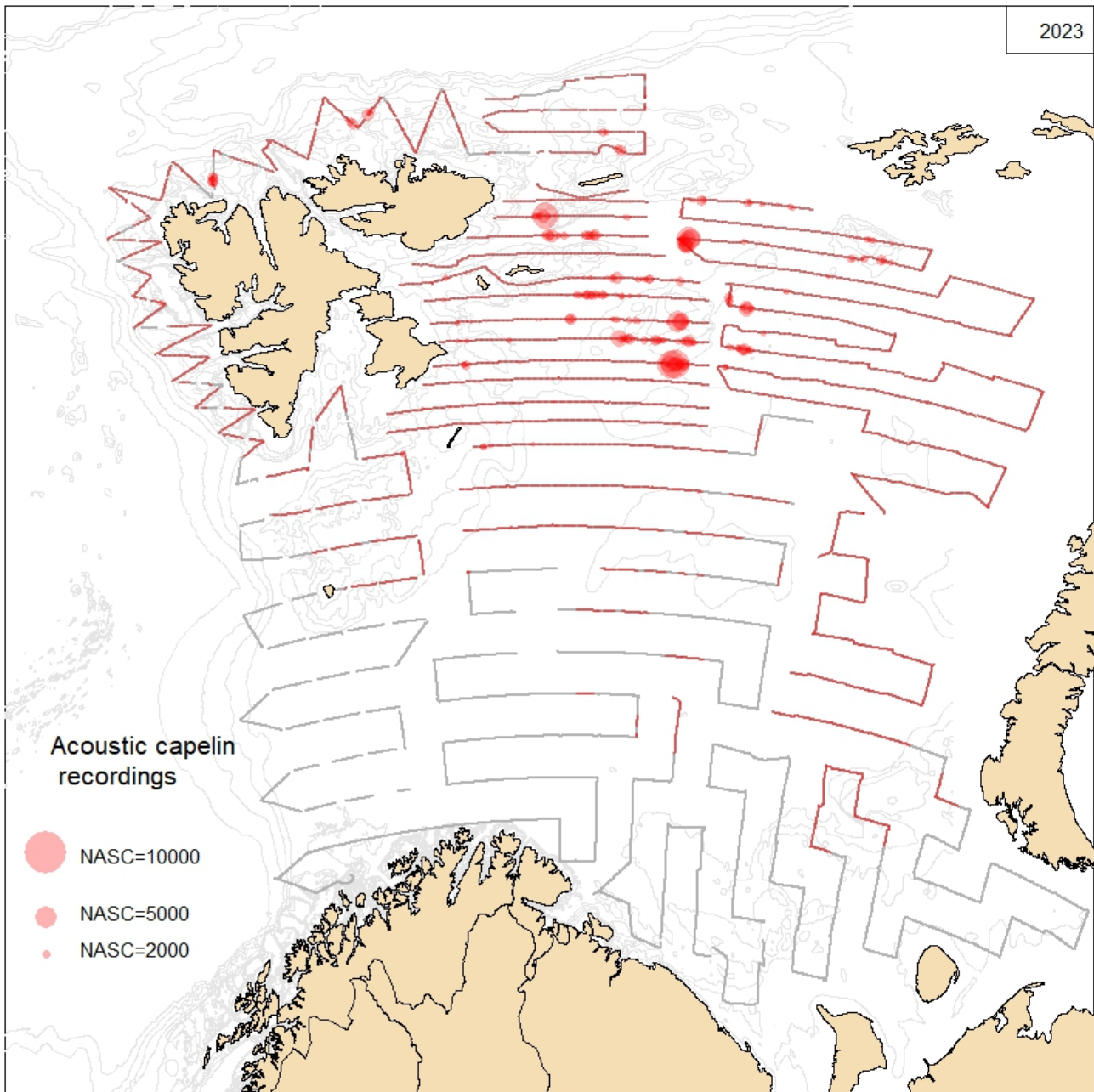


Figure 3. Survey coverage and geographical distribution of acoustic recordings of capelin in autumn 2023. The size of the circles corresponds to nautical acoustic scattering coefficient (NASC;  $m^2/nmi^2$ ) per 1 nautical mile. Gray dots mark transects or transect sections without capelin recordings.

## Issues relevant for the advice

Due to the temporary suspension of Russian scientists from ICES, this assessment was conducted by a Joint Russian-Norwegian working group on Arctic Fisheries (JRN-AFWG) consisting of scientists from VNIRO (Russia) and IMR (Norway) (Anon., 2023b). This advice has been conducted outside ICES and should not be considered as ICES advice.

However, this assessment and advice has been produced following the new methodology agreed and described in detail at the recent ICES benchmark in 2022 (ICES, 2023), which is thus used for the first time.

## Reference points

Table 4. Barents Sea capelin (ICES subareas 1 and 2, excluding 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 | $B_{lim}$         | 68 000 t  | SSB <sub>1990</sub> , which was the lowest SSB after the herring collapse that has produced a good year class. SSB estimated on April 1.                                                     | ICES (20 23 )             |
|                        | $B_{pa}$          |           |                                                                                                                                                                                              |                           |
|                        | $F_{lim}$         |           |                                                                                                                                                                                              |                           |
|                        | $F_{pa}$          |           |                                                                                                                                                                                              |                           |
| Management plan        | $B_{escapement}$  | 200 000 t | Reference point defining the SSB-level used in the HCR. The HCR determines that TAC shall not be set higher than that there is at least 95% probability that SSB is above $B_{escapement}$ . | JNRFC (2016), ICES (2023) |
|                        | $F_{mgt}$         |           |                                                                                                                                                                                              |                           |

## Basis of the assessment

Table 5. Barents Sea capelin (ICES subareas 1 and 2, excluding Division 2.a west of 5°W). Basis of the assessment and advice.

|                          |                                                                                                                                                                                                                                                                                   |
|--------------------------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| ICES stock data category | 1 ( <a href="#">ICES, 2021b</a> ).                                                                                                                                                                                                                                                |
| Assessment type          | Model based on acoustic survey and prediction six months ahead to calculate spawning biomass. Target escapement strategy used.                                                                                                                                                    |
| Input data               | Norwegian–Russian acoustic survey in September. Model estimates of maturation based on survey data. Natural mortalities from multispecies model (predation by immature cod on prespawning capelin based on information on cod distribution, abundance and stomach content data) . |
| Discards and bycatch     | All catches are assumed to be landed. The amount of bycaught capelin in other fisheries is very low.                                                                                                                                                                              |
| Indicators               | None.                                                                                                                                                                                                                                                                             |
| Other information        | Latest benchmark was in 2022 (ICES, 2023).                                                                                                                                                                                                                                        |
| Working group            | Joint Russian-Norwegian working group on Arctic Fisheries (JRN-AFWG).                                                                                                                                                                                                             |

## History of the advice, catch, and management

Table 6. Barents Sea capelin (ICES subareas 1 and 2, excluding Division 2.a west of 5°W). Advice, agreed TAC, and catch. All weights are in tonnes.

| Year | ICES advice                                  | Catch corresponding to advice | Agreed TAC | ICES catch |
|------|----------------------------------------------|-------------------------------|------------|------------|
| 1987 | Catches at the lowest practical level        | 0                             | 0          | 0          |
| 1988 | No catch                                     | 0                             | 0          | 0          |
| 1989 | No catch                                     | 0                             | 0          | 0          |
| 1990 | No catch                                     | 0                             | 0          | 0          |
| 1991 | TAC                                          | 1000000                       | 900000     | 933000     |
| 1992 | SSB > 400 000–500000 t                       | 834000                        | 1100000    | 1123000    |
| 1993 | A cautious approach, SSB > 400 000–500 000 t | 600000                        | 630000     | 586000     |

| Year | ICES advice                       | Catch corresponding to advice | Agreed TAC | ICES catch |
|------|-----------------------------------|-------------------------------|------------|------------|
| 1994 | No fishing                        | 0                             | 0          | 0          |
| 1995 | No fishing                        | 0                             | 0          | 0          |
| 1996 | No fishing                        | 0                             | 0          | 0          |
| 1997 | No fishing                        | 0                             | 0          | 1000       |
| 1998 | No fishing                        | 0                             | 0          | 3000       |
| 1999 | SSB > 500 000 t                   | 79000                         | 80000      | 101000     |
| 2000 | 5% probability of SSB < 200 000 t | 435000                        | 435000     | 414000     |
| 2001 | 5% probability of SSB < 200 000 t | 630000                        | 630000     | 568000     |
| 2002 | 5% probability of SSB < 200 000 t | 650000                        | 650000     | 651000     |
| 2003 | 5% probability of SSB < 200 000 t | 310000                        | 310000     | 282000     |
| 2004 | No fishing                        | 0                             | 0          | 0          |
| 2005 | No fishing                        | 0                             | 0          | 1000*      |
| 2006 | No fishing                        | 0                             | 0          | 0          |
| 2007 | No fishing                        | 0                             | 0          | 4000*      |
| 2008 | No fishing                        | 0                             | 0          | 12000*     |
| 2009 | 5% probability of SSB < 200 000 t | 390000                        | 390000     | 307000     |
| 2010 | 5% probability of SSB < 200 000 t | 360000                        | 360000     | 323000     |
| 2011 | 5% probability of SSB < 200 000 t | 380000                        | 380000     | 360000     |
| 2012 | 5% probability of SSB < 200 000 t | 320000                        | 320000     | 296000     |
| 2013 | 5% probability of SSB < 200 000 t | 200000                        | 200000     | 177000     |
| 2014 | 5% probability of SSB < 200 000 t | 65000                         | 65000      | 66000      |
| 2015 | 5% probability of SSB < 200 000 t | 6000                          | 120000     | 115000     |
| 2016 | Zero catch                        | 0                             | 0          | 0          |
| 2017 | Zero catch                        | 0                             | 0          | 0          |
| 2018 | 5% probability of SSB < 200 000 t | 205000                        | 205000     | 194520     |
| 2019 | Zero catch                        | 0                             | 0 **       | 53*        |
| 2020 | Management plan                   | 0                             | 0**        | 31*        |
| 2021 | Management plan                   | 0                             | 0**        | 10*        |
| 2022 | Management plan                   | ≤ 70000                       | 70000      | 65246***   |
| 2023 | Management plan ***               | ≤ 62000***                    | 62000      | 60692***   |
| 2024 | Management plan ***               | ≤ 196000***                   |            |            |

\* Research catch and bycatches in other fisheries.

\*\* Up to 500 tonnes was allowed for research survey catches.

\*\*\* In 2022 and 2023 assessment and advice was carried out by the Joint Russian-Norwegian working group on Arctic Fisheries (JRN-AFWG) which compiled catches and gave advice.

## History of catch and landings

Table 7. Barents Sea capelin (ICES subareas 1 and 2, excluding Division 2.a west of 5°W). The history of official catches is presented for each country participating in the fishery. All weights are in tonnes.

| Year | Winter  |        |        |         | Summer–Autumn |        |         | Year total |
|------|---------|--------|--------|---------|---------------|--------|---------|------------|
|      | Norway  | Russia | Others | Total   | Norway        | Russia | Total   |            |
| 1965 | 217000  | 7000   | 0      | 224000  | 0             | 0      | 0       | 224000     |
| 1966 | 380000  | 9000   | 0      | 389000  | 0             | 0      | 0       | 389000     |
| 1967 | 403000  | 6000   | 0      | 409000  | 0             | 0      | 0       | 409000     |
| 1968 | 460000  | 15000  | 0      | 475000  | 62000         | 0      | 62000   | 537000     |
| 1969 | 436000  | 1000   | 0      | 437000  | 243000        | 0      | 243000  | 680000     |
| 1970 | 955000  | 8000   | 0      | 963000  | 346000        | 5000   | 351000  | 1314000    |
| 1971 | 1300000 | 14000  | 0      | 1314000 | 71000         | 7000   | 78000   | 1392000    |
| 1972 | 1208000 | 24000  | 0      | 1232000 | 347000        | 13000  | 360000  | 1591000    |
| 1973 | 1078000 | 34000  | 0      | 1112000 | 213000        | 12000  | 225000  | 1337000    |
| 1974 | 749000  | 63000  | 0      | 812000  | 237000        | 99000  | 336000  | 1148000    |
| 1975 | 559000  | 301000 | 43000  | 903000  | 407000        | 131000 | 538000  | 1441000    |
| 1976 | 1252000 | 228000 | 0      | 1480000 | 739000        | 368000 | 1107000 | 2587000    |
| 1977 | 1441000 | 317000 | 2000   | 1760000 | 722000        | 504000 | 1226000 | 2986000    |
| 1978 | 784000  | 429000 | 25000  | 1238000 | 360000        | 318000 | 678000  | 1916000    |
| 1979 | 539000  | 342000 | 5000   | 886000  | 570000        | 326000 | 896000  | 1782000    |
| 1980 | 539000  | 253000 | 9000   | 801000  | 459000        | 388000 | 847000  | 1648000    |
| 1981 | 784000  | 429000 | 28000  | 1241000 | 454000        | 292000 | 746000  | 1986000    |
| 1982 | 568000  | 260000 | 5000   | 833000  | 591000        | 336000 | 927000  | 1760000    |
| 1983 | 751000  | 373000 | 36000  | 1160000 | 758000        | 439000 | 1197000 | 2357000    |
| 1984 | 330000  | 257000 | 42000  | 629000  | 481000        | 368000 | 849000  | 1477000    |
| 1985 | 340000  | 234000 | 17000  | 591000  | 113000        | 164000 | 277000  | 868000     |
| 1986 | 72000   | 51000  | 0      | 123000  | 0             | 0      | 0       | 123000     |
| 1987 | 0       | 0      | 0      | 0       | 0             | 0      | 0       | 0          |
| 1988 | 0       | 0      | 0      | 0       | 0             | 0      | 0       | 0          |
| 1989 | 0       | 0      | 0      | 0       | 0             | 0      | 0       | 0          |
| 1990 | 0       | 0      | 0      | 0       | 0             | 0      | 0       | 0          |
| 1991 | 528000  | 159000 | 20000  | 707000  | 31000         | 195000 | 226000  | 933000     |
| 1992 | 620000  | 247000 | 24000  | 891000  | 73000         | 159000 | 232000  | 1123000    |
| 1993 | 402000  | 170000 | 14000  | 586000  | 0             | 0      | 0       | 586000     |
| 1994 | 0       | 0      | 0      | 0       | 0             | 0      | 0       | 0          |
| 1995 | 0       | 0      | 0      | 0       | 0             | 0      | 0       | 0          |
| 1996 | 0       | 0      | 0      | 0       | 0             | 0      | 0       | 0          |
| 1997 | 0       | 0      | 0      | 0       | 0             | 1000   | 1000    | 1000       |
| 1998 | 0       | 2000   | 0      | 2000    | 0             | 1000   | 1000    | 3000       |
| 1999 | 50000   | 33000  | 0      | 83000   | 0             | 22000  | 22000   | 105000     |
| 2000 | 279000  | 94000  | 8000   | 381000  | 0             | 29000  | 29000   | 410000     |
| 2001 | 376000  | 180000 | 8000   | 564000  | 0             | 14000  | 14000   | 578000     |
| 2002 | 398000  | 228000 | 17000  | 643000  | 0             | 16000  | 16000   | 659000     |

| Year | Winter |        |        |        | Summer–Autumn |        |       | Year total |
|------|--------|--------|--------|--------|---------------|--------|-------|------------|
|      | Norway | Russia | Others | Total  | Norway        | Russia | Total |            |
| 2003 | 180000 | 93000  | 9000   | 282000 | 0             | 0      | 0     | 282000     |
| 2004 | 0      | 0      | 0      | 0      | 0             | 0      | 0     | 0          |
| 2005 | 1000   | 0      | 0      | 1000   | 0             | 0      | 0     | 1000       |
| 2006 | 0      | 0      | 0      | 0      | 0             | 0      | 0     | 0          |
| 2007 | 2000   | 2000   | 0      | 4000   | 0             | 0      | 0     | 4000       |
| 2008 | 5000   | 5000   | 0      | 10000  | 0             | 2000   | 2000  | 12000      |
| 2009 | 233000 | 73000  | 0      | 306000 | 0             | 1000   | 1000  | 307000     |
| 2010 | 246000 | 77000  | 0      | 323000 | 0             | 0      | 0     | 323000     |
| 2011 | 273000 | 87000  | 0      | 360000 | 0             | 0      | 0     | 360000     |
| 2012 | 228000 | 68000  | 0      | 296000 | 0             | 0      | 0     | 296000     |
| 2013 | 116000 | 60000  | 0      | 177000 | 0             | 0      | 0     | 177000     |
| 2014 | 40000  | 26000  | 0      | 66000  | 0             | 0      | 0     | 66000      |
| 2015 | 71000  | 44000  | 0      | 115000 | 0             | 0      | 0     | 115000     |
| 2016 | 0      | 0      | 0      | 0      | 0             | 0      | 0     | 0          |
| 2017 | 0      | 0      | 0      | 0      | 0             | 0      | 0     | 0          |
| 2018 | 128520 | 66000  | 0      | 194520 | 0             | 0      | 0     | 194520     |
| 2019 | 5      | 0      | 0      | 0      | 0             | 0      | 0     | 53         |
| 2020 | 9      | 0      | 0      | 9      | 0             | 21     | 0     | 31         |
| 2021 | 2      | 0      | 0      | 2      | 0             | 8      | 0     | 10         |
| 2022 | 42597  | 22646  | 0      | 65243  | 0             | 3*     | 3*    | 65246*     |
| 2023 | 37652  | 23040  | 0      | 60692  |               |        |       |            |

\* Bycatch in other fisheries; values are preliminary.

## Summary of the assessment

Table 8. Barents Sea capelin (ICES subareas 1 and 2, excluding Division 2.a west of 5°W). Assessment summary. Weights are in tonnes, recruitment in thousands. Recruitment and stock biomass in 1985 and earlier are survey estimates, back-calculated to 1 August (before the autumn fishing season); from 1986 and later, these values are based on the survey estimates with no back-calculation. Maturing biomass is the survey estimate of fish above the length-at-maturity (14 cm). Predicted SSB is the modelled stochastic spawning-stock biomass (after the winter fishery)

| Year | Predicted SSB assuming catch = advised catch, 1 April |                |                 | Recruitment from autumn acoustic survey, 1 October | Stock biomass from autumn acoustic survey, 1 October |                  | Catch   |
|------|-------------------------------------------------------|----------------|-----------------|----------------------------------------------------|------------------------------------------------------|------------------|---------|
|      | Median                                                | 5th percentile | 95th percentile |                                                    | Immature                                             | Maturing biomass |         |
|      | tonnes                                                |                |                 | Age 1, thousands                                   | tonnes                                               |                  |         |
| 1972 |                                                       |                |                 |                                                    | 3873000                                              | 2727000          | 1591000 |
| 1973 |                                                       |                |                 |                                                    | 3794000                                              | 1350000          | 1337000 |
| 1974 |                                                       |                |                 |                                                    | 4826000                                              | 907000           | 1148000 |
| 1975 |                                                       |                |                 |                                                    | 4890000                                              | 2916000          | 1441000 |
| 1976 |                                                       |                |                 |                                                    | 3217000                                              | 3200000          | 2587000 |
| 1977 |                                                       |                |                 |                                                    | 2120000                                              | 2676000          | 2986000 |
| 1978 |                                                       |                |                 |                                                    | 2845000                                              | 1402000          | 1916000 |

| Year | Predicted SSB assuming catch = advised catch, 1 April |                |                 | Recruitment from autumn acoustic survey, 1 October | Stock biomass from autumn acoustic survey, 1 October |                  | Catch   |
|------|-------------------------------------------------------|----------------|-----------------|----------------------------------------------------|------------------------------------------------------|------------------|---------|
|      | Median                                                | 5th percentile | 95th percentile |                                                    | Immature                                             | Maturing biomass |         |
|      | tonnes                                                |                |                 | Age 1, thousands                                   | tonnes                                               |                  |         |
| 1979 |                                                       |                |                 |                                                    | 2935000                                              | 1227000          | 1782000 |
| 1980 |                                                       |                |                 |                                                    | 2802000                                              | 3913000          | 1648000 |
| 1981 |                                                       |                |                 | 402600000                                          | 2344000                                              | 1551000          | 1986000 |
| 1982 |                                                       |                |                 | 528300000                                          | 2188000                                              | 1591000          | 1760000 |
| 1983 |                                                       |                |                 | 514900000                                          | 2901000                                              | 1329000          | 2357000 |
| 1984 |                                                       |                |                 | 154800000                                          | 1756000                                              | 1208000          | 1477000 |
| 1985 |                                                       |                |                 | 387000000                                          | 575000                                               | 285000           | 868000  |
| 1986 |                                                       |                |                 | 6000000                                            | 55000                                                | 65000            | 123000  |
| 1987 |                                                       |                |                 | 376000000                                          | 84000                                                | 17000            | 0       |
| 1988 |                                                       |                |                 | 21000000                                           | 228000                                               | 200000           | 0       |
| 1989 | 84000                                                 |                |                 | 189200000                                          | 689000                                               | 175000           | 0       |
| 1990 | 92000                                                 |                |                 | 700400000                                          | 3214000                                              | 2617000          | 0       |
| 1991 | 643000                                                |                |                 | 402100000                                          | 5039000                                              | 2248000          | 933000  |
| 1992 | 302000                                                |                |                 | 351300000                                          | 2922000                                              | 2228000          | 1123000 |
| 1993 | 293000                                                |                |                 | 2200000                                            | 466000                                               | 330000           | 586000  |
| 1994 | 139000                                                |                |                 | 19800000                                           | 106000                                               | 94000            | 0       |
| 1995 | 60000                                                 |                |                 | 7100000                                            | 75000                                                | 118000           | 0       |
| 1996 | 60000                                                 |                |                 | 81900000                                           | 255000                                               | 248000           | 0       |
| 1997 | 85000                                                 |                |                 | 98900000                                           | 597000                                               | 312000           | 1000    |
| 1998 | 94000                                                 |                |                 | 179000000                                          | 1124000                                              | 932000           | 3000    |
| 1999 | 382000                                                |                |                 | 156000000                                          | 1057000                                              | 1718000          | 105000  |
| 2000 | 599000                                                |                |                 | 449200000                                          | 2175000                                              | 2098000          | 410000  |
| 2001 | 626000                                                |                |                 | 113600000                                          | 1611000                                              | 2019000          | 578000  |
| 2002 | 496000                                                |                |                 | 59700000                                           | 919000                                               | 1291000          | 659000  |
| 2003 | 427000                                                |                |                 | 82400000                                           | 253000                                               | 280000           | 282000  |
| 2004 | 94000                                                 |                |                 | 606 00000                                          | 289000                                               | 224000           | 0       |
| 2005 | 122000                                                |                |                 | 1 6900000                                          | 139000                                               | 348000           | 1000    |
| 2006 | 72000                                                 |                |                 | 51400000                                           | 288000                                               | 348000           | 0       |
| 2007 | 189000                                                |                |                 | 194900000                                          | 970000                                               | 846000           | 4000    |
| 2008 | 330000                                                |                |                 | 289200000                                          | 1765000                                              | 2185000          | 12000   |
| 2009 | 517000                                                |                |                 | 171800000                                          | 1355000                                              | 1892000          | 307000  |
| 2010 | 504000                                                |                |                 | 241900000                                          | 1576000                                              | 2248000          | 323000  |
| 2011 | 487000                                                |                |                 | 193900000                                          | 1545000                                              | 2059000          | 360000  |
| 2012 | 504000                                                |                |                 | 174500000                                          | 1461000                                              | 1996000          | 296000  |
| 2013 | 479000                                                |                |                 | 321100000                                          | 2248000                                              | 1725000          | 177000  |
| 2014 | 399000                                                |                |                 | 102700000                                          | 904000                                               | 785000           | 66000   |

| Year | Predicted SSB assuming catch = advised catch, 1 April |                |                 | Recruitment from autumn acoustic survey, 1 October | Stock biomass from autumn acoustic survey, 1 October |                  | Catch  |
|------|-------------------------------------------------------|----------------|-----------------|----------------------------------------------------|------------------------------------------------------|------------------|--------|
|      | Median                                                | 5th percentile | 95th percentile |                                                    | Immature                                             | Maturing biomass |        |
|      | tonnes                                                |                |                 |                                                    | Age 1, thousands                                     |                  |        |
| 2015 | 504000                                                |                |                 | 39000000                                           | 448000                                               | 434000           | 115000 |
| 2016 | 82000                                                 |                |                 | 32600000                                           | 164000                                               | 153000           | 0      |
| 2017 | 37000                                                 |                |                 | 115300000                                          | 881000                                               | 1547000          | 0      |
| 2018 | 462000                                                | 200000         | 930000          | 58700000                                           | 541000                                               | 1100000          | 194520 |
| 2019 | 317000                                                | 168282         | 613733          | 17900000                                           | 111000                                               | 302000           | 53     |
| 2020 | 85110                                                 | 38830          | 171850          | 369700000                                          | 1348000                                              | 542000           | 31     |
| 2021 | 156376                                                | 75197          | 314559          | 222200000                                          | 2527000                                              | 1459000          | 10     |
| 2022 | 423751                                                | 201897         | 838670          | 75460000*                                          | 1357000                                              | 817000           | 65246  |
| 2023 | 534000                                                | 201000         | 1250000         | 108509000                                          | 1666000                                              | 1286000          | 60692  |
| 2024 | 590000                                                | 201000         | 1011000         |                                                    |                                                      |                  |        |

\*Not adjusted for incomplete survey coverage.

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