

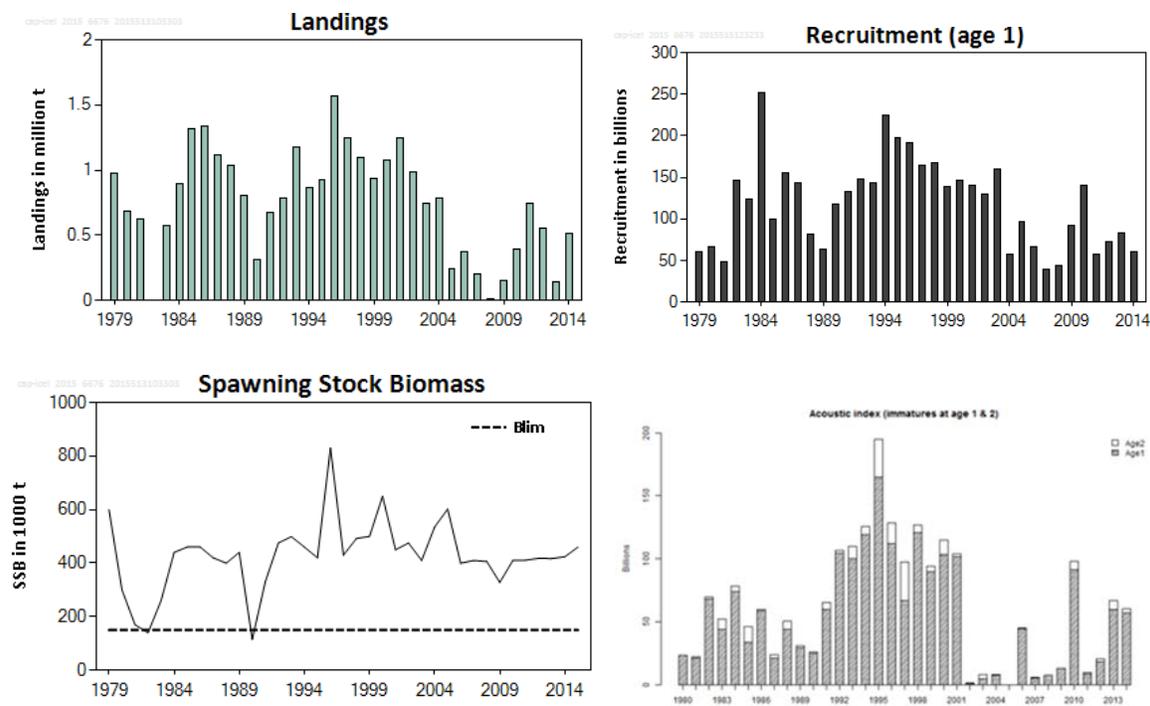
### 2.3.5 Capelin (*Mallotus villosus*) in Subareas V and XIV and Division IIa west of 5°W (Iceland and Faroes grounds, East Greenland, Jan Mayen area)

#### ICES stock advice

ICES advises that when the precautionary approach is applied, the initial quota in the fishing season 2015/2016 should be no more than 53 600 tonnes. The initial quota should be revised based on in-season acoustic survey information in autumn 2015. The final TAC should be set on the basis of survey information in autumn 2015 and winter 2015/2016.

#### Stock development over time

The maturing component of the stock in winter 2014/2015 was estimated to be 971 000 t by the Icelandic annual acoustic winter survey that took place in January 2015. It is estimated that 460 000 t spawned in March 2015 which is the average of the last ten years. The autumn 2014 acoustic survey estimate of the immature 1- and 2-year-old capelin is close to the long-term average. Recruitment in the last 11 years has been around 50% of the previous 25 years.



**Figure 2.3.5.1** Capelin in Subareas V and XIV and Division IIa west of 5°W. Landings (million t) by fishing season. Recruitment at age 1 (numbers in billions) on 1st of August, and SSB (thousand t) at spawning time (March–April). Acoustic index of immature capelin at ages 1 and 2 (numbers in billions) from autumn surveys.

**Stock and exploitation status**

**Table 2.3.5.1** Capelin in Subareas V and XIV and Division IIa west of 5°W. State of the stock and the fishery, relative to reference points.

|                           |                         | Fishing pressure |      |      | Stock size |               |      |   |   |            |
|---------------------------|-------------------------|------------------|------|------|------------|---------------|------|---|---|------------|
|                           |                         | 2012             | 2013 | 2014 | 2013       | 2014          | 2015 |   |   |            |
| Maximum Sustainable Yield | $F_{MSY}$               | ?                | ?    | ?    | undefined  | $B_{trigger}$ | ?    | ? | ? | undefined  |
| Precautionary approach    | $F_{pa}$ ,<br>$F_{lim}$ | ?                | ?    | ?    | undefined  | $B_{lim}$     | ?    | ? | ? | undefined* |
| Management Plan           | $F_{MGT}$               | ?                | ?    | ?    | undefined  | $SSB_{MGT}$   | ?    | ? | ? | undefined  |

\* Undefined because  $B_{pa}$  is not defined; the state of the stock thus depends on the precision of the estimate of SSB which is not available this year.

**Catch options**

**Table 2.3.5.2** Capelin in Subareas V and XIV and Division IIa west of 5°W. The basis for the catch options.

| Variable         | Value | Source      | Notes                                      |
|------------------|-------|-------------|--|
| $R_{age1}(2014)$ | 57.0  | ICES, 2015a | An index from acoustic autumn survey 2014. |
| $R_{age2}(2014)$ | 3.3   | ICES, 2015a | An index from acoustic autumn survey 2014. |

**Table 2.3.5.3** Capelin in Subareas V and XIV and Division IIa west of 5°W. The catch options.

| Rationale   | Catches (2015/2016) | Basis  | Notes  |
|---|---------------------|--|--|
| Initial quota, precautionary considerations   | 53 600 t            | For the basis see Table 2.3.5.4. For this year’s value see Figure 2.3.5.2. | Benchmark approved method (ICES, 2015c)                                |
| Initial quota according to current management plan (two-thirds of predicted TAC). * | 346 000 t           | $B_{escapement}$ (400 kt) and old regression method.                       | The approach based on this old method is not considered precautionary. |

\*This option is requested by coastal states.

**Basis of the advice**

**Table 2.3.5.4** Capelin in Subareas V and XIV and Division IIa west of 5°W. The basis of the advice.

|                 |   |
|-----------------|---|
| Advice basis    | The basis is the precautionary approach, i.e. an initial TAC 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 $B_{lim}$ . |
| Management plan | A management plan has been implemented but has not been fully evaluated by ICES, though part of the procedure is not considered precautionary.  |

**Quality of the assessment**

The basis of this year’s advice is the short-term prediction model established at WKICE 2015 for setting an initial quota for the capelin. The initial quota is expected to be revised, based on in-season acoustic survey information in the autumn. The final TAC is expected to be set on the basis of survey information in the following winter. Last year’s advice was based on a biomass escapement of 400 kt; this year’s advice is based on an initial TAC set with a very low probability of being higher than the final TAC. A final TAC is set with a >95% probability of SSB being greater than  $B_{lim}$ .

The acoustic survey in September-October 2014 had a good coverage of the spatial distribution of the capelin stock. The uncertainty of the immature capelin estimate, which is used as an input for the prediction, is considered low (CV = 18%).

**Issues relevant for the advice**

Capelin is a very important forage species in the ecosystems of Greenland and Iceland.

**Reference points**

**Table 2.3.5.5** Capelin in Subareas V and XIV and Division IIa west of 5°W. Reference points, values, and their technical basis.

| Framework              | Reference point   | Value       | Technical basis | Source      |
|------------------------|-------------------|-------------|-----------------|-------------|
| MSY approach           | MSY $B_{trigger}$ | Not defined |                 |             |
|                        | $F_{MSY}$         | Not defined |                 |             |
| Precautionary approach | $B_{lim}$         | 150 000 t   | $B_{loss}$      | ICES, 2015c |
|                        | $B_{pa}$          | Not defined |                 |             |
|                        | $F_{lim}$         | Not defined |                 |             |
|                        | $F_{pa}$          | Not defined |                 |             |
| Management plan        | $SSB_{MGT}$       | Not defined |                 |             |
|                        | $F_{MGT}$         | Not defined |                 |             |

**Basis of the assessment**

**Table 2.3.5.6** Capelin in Subareas V and XIV and Division IIa west of 5°W. The basis of the assessment.

|                          |  |
|--------------------------|--|
| ICES stock data category | 1 ( <a href="#">ICES 2015b</a> ).  |
| Assessment type          | The final TAC is based on a model which takes into account CV in surveys and predation from cod, haddock, and saithe of capelin and $p(SSB < B_{lim}   Catch) < 0.05$ . The initial quota is set such that there is low risk of exceeding the final TAC (see WKICE – ICES, 2015c). |
| Input data               | An index of immature fish ages 1 and 2 from Icelandic acoustic surveys in autumn.  |
| Discards and bycatch     | Not included, considered negligible.   |
| Indicators               | None.  |
| Other information        | Last benchmark in 2015 (ICES, 2015c).  |
| Working group            | North-Western Working Group ( <a href="#">NWWG</a> ).  |

**Information from stakeholders**

There is no available information.

## History of advice, catch, and management

**Table 2.3.5.7** Capelin in Subareas V and XIV and Division IIa west of 5°W. History of ICES advice, the agreed TAC, and ICES estimates of landings. (Weights in thousand tonnes.)

| Year    | ICES advice  | Predicted catch <sup>1)</sup><br>corresp. to advice | Agreed <sup>2)</sup> TAC | ICES landings <sup>3)</sup> |
|---------|--|---|--------------------------|-----------------------------|
| 1986    | TAC  | 1100  | 1290                     | 1333                        |
| 1987    | TAC <sup>1)</sup>  | 500   | 1115                     | 1116                        |
| 1988    | TAC <sup>1)</sup>  | 900   | 1065                     | 1036                        |
| 1989    | TAC <sup>1)</sup>  | 900   | *                        | 808                         |
| 1990    | TAC <sup>1)</sup>  | 600   | 250                      | 314                         |
| 1991    | No fishery pending survey results <sup>1)</sup>              | 0   | 740                      | 677                         |
| 1992    | Precautionary TAC <sup>1)</sup>                              | 500   | 900                      | 788                         |
| 1993    | TAC <sup>1)</sup>  | 900   | 1250                     | 1179                        |
| 1994    | Apply the harvest control rule                               | 950   | 850                      | 864                         |
| 1995    | Apply the harvest control rule                               | 800   | 1390                     | 930                         |
| 1996    | Apply the harvest control rule                               | 1100  | 1600                     | 1571                        |
| 1997    | Apply the harvest control rule                               | 850   | 1265                     | 1245                        |
| 1998    | Apply the harvest control rule                               | 950   | 1200                     | 1100                        |
| 1999    | Apply the harvest control rule                               | 866   | 1000                     | 934                         |
| 2000    | Apply the harvest control rule                               | 650   | 1090                     | 1071                        |
| 2001    | Apply the harvest control rule                               | 700   | 1300                     | 1250                        |
| 2002    | Apply the harvest control rule                               | 690   | 1000                     | 988                         |
| 2003    | Apply the harvest control rule                               | 555   | 900                      | 741                         |
| 2004    | Apply the harvest control rule                               | *335  | 985                      | 784                         |
| 2005    | Apply the harvest control rule                               | *No fishery   | 235                      | 238                         |
| 2006/07 | Apply the harvest control rule                               | *No fishery   | 385                      | 377                         |
| 2007/08 | Apply the harvest control rule                               | *207  | 207                      | 202                         |
| 2008/09 | Apply the harvest control rule                               | *No fishery   |                          | **15                        |
| 2009/10 | Apply the harvest control rule                               | *No fishery   | 150                      | 151                         |
| 2010/11 | Apply the harvest control rule                               | *No fishery   | 390                      | 391                         |
| 2011/12 | Set the TAC at 50% of the initial quota in the HCR           | *366  | 765                      | 747                         |
| 2012/13 | Precautionary approach                                       | *No fishery   | 570                      | 551                         |
| 2013/14 | Precautionary approach                                       | *No fishery   | 160                      | 142                         |
| 2014/15 | Set the initial TAC at 50% of the predicted quota in the HCR | *225  | 580                      | 517                         |
| 2015/16 | Precautionary approach                                       | ***54   |                          |                             |

<sup>1)</sup> Initial TAC, advised for the early part of the season, has been the same as the predicted catch corresponding to the advice since 1992..

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

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

\* Initial TAC set according to the results of a preliminary assessment.

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

\*\*\* Initial advice based on low probability of exceeding final TAC.

**History of catch and landings**

**Table 2.3.5.8** Capelin in Subareas V and XIV and Division IIa west of 5°W. Catch distribution by fleet in 2014/15 as estimated by ICES.

| Total catch (2014/15) | Commercial landings |                   | Commercial discards |
|-----------------------|---------------------|-------------------|---------------------|
| 517 kt                | 88% purse seine     | 12% pelagic trawl | negligible          |
|                       | 517 kt              |                   |                     |

**Table 2.3.5.9** Capelin in Subareas V and XIV and Division IIa west of 5°W. History of commercial catch and landings, both official and ICES estimated values by season and country.

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

\* Preliminary.

**Summary of the assessment**

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

| Season (Summer/winter) | Recruitment (age 1) | Landings | Spawning-stock biomass |
|------------------------|---------------------|----------|------------------------|
| 1978/79                | 164                 | 1195     | 600                    |
| 1979/80                | 60                  | 980      | 300                    |
| 1980/81                | 66                  | 684      | 170                    |
| 1981/82                | 49                  | 626      | 140                    |
| 1982/83                | 146                 | 0        | 260                    |
| 1983/84                | 124                 | 573      | 440                    |
| 1984/85                | 251                 | 897      | 460                    |
| 1985/86                | 99                  | 1312     | 460                    |
| 1986/87                | 156                 | 1333     | 420                    |
| 1987/88                | 144                 | 1116     | 400                    |
| 1988/89                | 81                  | 1037     | 440                    |
| 1989/90                | 64                  | 808      | 115                    |
| 1990/91                | 118                 | 314      | 330                    |
| 1991/92                | 133                 | 677      | 475                    |
| 1992/93                | 148                 | 788      | 499                    |
| 1993/94                | 144                 | 1179     | 460                    |
| 1994/95                | 224                 | 864      | 420                    |
| 1995/96                | 197                 | 929      | 830                    |
| 1996/97                | 191                 | 1571     | 430                    |
| 1997/98                | 165                 | 1245     | 492                    |
| 1998/99                | 168                 | 1100     | 500                    |
| 1999/00                | 138                 | 933      | 650                    |
| 2000/01                | 146                 | 1071     | 450                    |
| 2001/02                | 140                 | 1249     | 475                    |
| 2002/03                | 130                 | 988      | 410                    |
| 2003/04                | 160                 | 741      | 535                    |
| 2004/05                | 57                  | 783      | 602                    |
| 2005/06                | 97                  | 238      | 400                    |
| 2006/07                | 66                  | 377      | 410                    |
| 2007/08                | 39                  | 202      | 406                    |
| 2008/09                | 44                  | 15       | 328                    |
| 2009/10                | 92                  | 151      | 410                    |
| 2010/11                | 140                 | 391      | 411                    |
| 2011/12                | 58                  | 747      | 418                    |
| 2012/13                | 72                  | 551      | 417                    |
| 2013/14                | 83*                 | 142      | 424                    |
| 2014/15*               | 61*                 | 517*     | 460*                   |

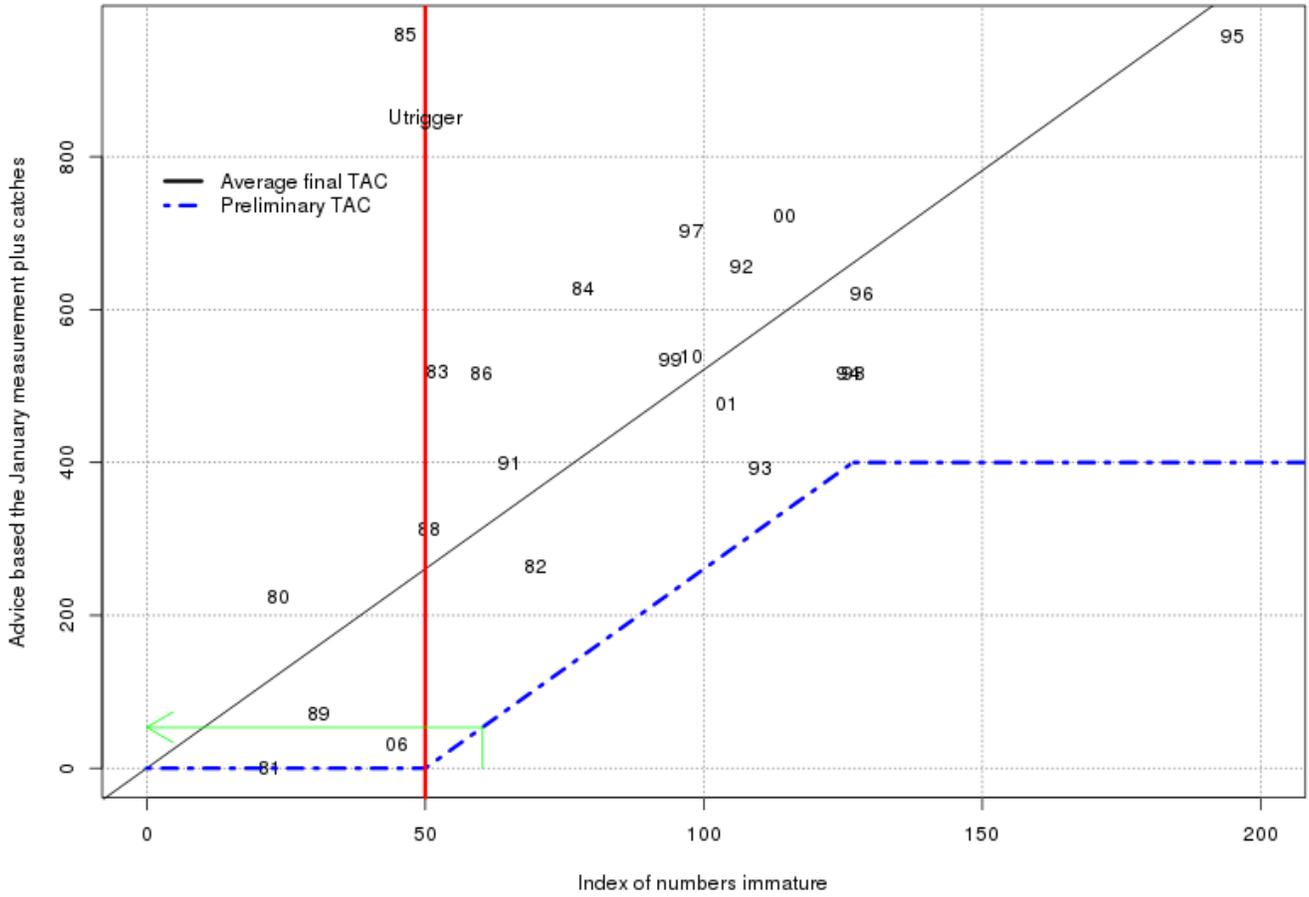
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**Figure 2.3.5.2** Catch advice according to the proposed stochastic HCR, based on the measured number of immature capelin about 15 months earlier. The figure shows the estimated final TAC (black unbroken line) and the preliminary TAC (blue dashed line). The latter is set using a  $U_{trigger}$  (red vertical line) of 50 billion immature fish, with a cap on the initial or preliminary TAC of 400 kt. The green lines show the index value from the autumn survey 2014, with the corresponding initial TAC for 2015/2016 shown on the y-axis. (See Table 2.3.5.4 for the basis of the advice.)