**Recommendation for 2015**

In the short term the stock can sustain values of $F$ up to $F_{max}$, however any fishing mortality over $F_{max}$ will result in an overall loss in yield in the long term. Scientific Council considers that yields at $F_{statusquo}$ are not a viable option. Projections are heavily influenced by the 2010 and 2011 year classes, which is estimated to be extremely large, but with high uncertainty. Given the uncertainty in the projections, Scientific Council makes recommendations for 2015 only. The stock should be reassessed in 2015.

**Management objectives**

A management strategy evaluation for this stock is being developed by Fisheries Commission and Scientific Council but is not yet being implemented. At this moment general convention objectives (NAFO/GC Doc 08/3) are applied.

| *Convention objectives* | *Status* | *Comment/consideration* |
|---|---|---|
| Restore to or maintain at $B_{msy}$ | | Stock increasing |
| Eliminate overfishing | | Current $F$ not sustainable in the long term |
| Apply Precautionary Approach | | $F_{lim}$ and $B_{lim}$ defined. HCR in development |
| Minimise harmful impacts on living marine resources and ecosystems | | No specific measures, general VME closures in effect |
| Preserve marine biodiversity | | Cannot be evaluated |

OK

Intermediate

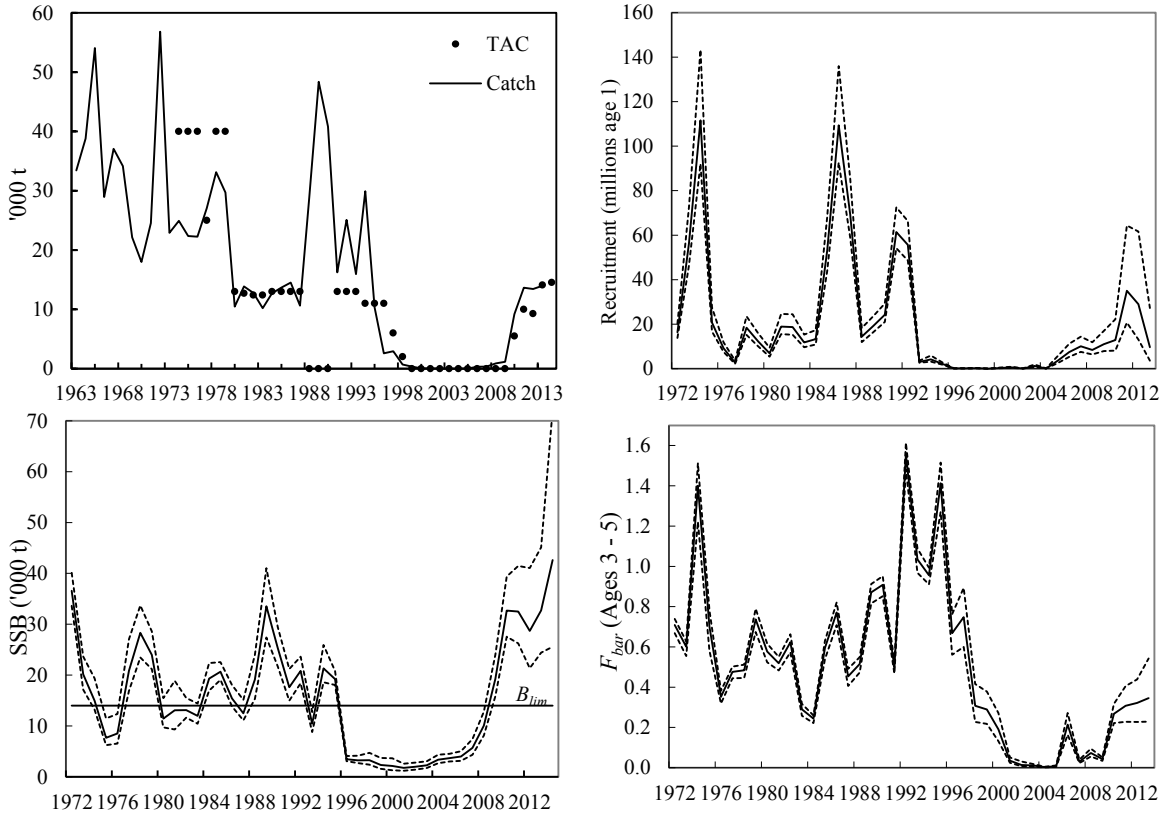
Not accomplished

Unknown

**Management unit**

The cod stock in Flemish Cap (NAFO Div. 3M) is considered to be a separate population.

**Stock status**



**Stock Status (cont.)**
Current SSB is estimated to be well above $B_{lim}$. Recent recruitments are relatively high, but these estimates are imprecise. Fishing mortality in 2013 is high, at the level of more than twice $F_{max}$.

**Reference points**

| | |
|---|---|
| $B_{lim}$: | 14 000 t of spawning biomass (Scientific Council 2008). |
| $F_{lim} = F_{msy}$ ($F_{30\%}$): | 0.13 (developed in Scientific Council 2014 – not used in assessment at this time) |
| $F_{max}$: | 0.145 |

**Projections**

| | B | | | SSB | | | Yield | | |
|---|---|---|---|---|---|---|---|---|---|
| | 5% | 50% | 95% | 5% | 50% | 95% | 5% | 50% | 95% |
| $F_{bar}=F_{0.1}$ (median = 0.090) | | | | | | | | | |
| 2014 | 45089 | 66953 | 100551 | 29651 | 44869 | 67628 | | 14521 | |
| 2015 | 51148 | 85726 | 141169 | 33526 | 58334 | 96126 | 3717 | 7091 | 13216 |
| 2016 | 80488 | 140565 | 242288 | 50201 | 84280 | 140612 | | | |
| $F_{bar} = F_{max}$ (median = 0.145) | | | | | | | | | |
| 2014 | 45089 | 66953 | 100551 | 29651 | 44869 | 67628 | | 14521 | |
| 2015 | 51007 | 85528 | 141921 | 33538 | 58341 | 96142 | 5804 | 10838 | 19894 |
| 2016 | 75911 | 134970 | 233068 | 47116 | 79646 | 133162 | | | |
| $F_{bar} = 2/3F_{max}$ (median = 0.097) | | | | | | | | | |
| 2014 | 45089 | 66953 | 100551 | 29651 | 44869 | 67628 | | 14521 | |
| 2015 | 51600 | 85659 | 140511 | 33564 | 58355 | 96133 | 3984 | 7463 | 13901 |
| 2016 | 79919 | 139414 | 241557 | 49720 | 83828 | 140158 | | | |
| $F_{bar} = 3/4F_{max}$ (median = 0.109) | | | | | | | | | |
| 2014 | 45089 | 66953 | 100551 | 29651 | 44869 | 67628 | | 14521 | |
| 2015 | 51451 | 85707 | 141013 | 33554 | 58302 | 96130 | 4449 | 8327 | 15461 |
| 2016 | 79064 | 138195 | 238799 | 49331 | 82737 | 138519 | | | |
| $F_{bar} = 0.85F_{max}$ (median = 0.123) | | | | | | | | | |
| 2014 | 45089 | 66953 | 100551 | 29651 | 44869 | 67628 | | 14521 | |
| 2015 | 50976 | 85605 | 140451 | 33567 | 58341 | 96114 | 4999 | 9351 | 17275 |
| 2016 | 77772 | 136555 | 239130 | 48233 | 81526 | 136327 | | | |
| $F_{bar} = 0.75F_{2013}$ (median = 0.259) | | | | | | | | | |
| 2014 | 45089 | 66953 | 100551 | 29651 | 44869 | 67628 | | 14521 | |
| 2015 | 50963 | 85988 | 141194 | 33526 | 58346 | 96068 | 12494 | 17926 | 27715 |
| 2016 | 68617 | 125904 | 226920 | 39178 | 70884 | 121773 | | | |
| $F_{bar} = F_{2013}$ (median = 0.346) | | | | | | | | | |
| 2014 | 45089 | 66953 | 100551 | 29651 | 44869 | 67628 | | 14521 | |
| 2015 | 51451 | 85545 | 141194 | 33526 | 58346 | 96068 | 12494 | 17926 | 27715 |
| 2016 | 64236 | 119001 | 216119 | 35038 | 65093 | 113266 | | | |
| $F_{bar} = 1.25F_{2013}$ (median = 0.432) | | | | | | | | | |
| 2014 | 45089 | 66953 | 100551 | 29651 | 44869 | 67628 | | 14521 | |
| 2015 | 51073 | 85533 | 139749 | 33535 | 58327 | 96233 | 18611 | 26799 | 40670 |
| 2016 | 59161 | 113669 | 207151 | 31681 | 60010 | 106017 | | | |

| | $p(B<B_{lim})$ | | | $p(F>F_{0.1})$ | | | $p(F>F_{max})$ | | | $p(B_{2016} > B_{2013})$ |
|---|---|---|---|---|---|---|---|---|---|---|
| | 2014 | 2015 | 2016 | 2014 | 2015 | 2016 | 2014 | 2015 | 2016 | |
| $F_{0.1}$ | <5% | <5% | <5% | | | | | | | >95% |
| $F_{max}$ | <5% | <5% | <5% | >95% | >95% | >95% | | | | >95% |
| $2/3F_{max}$ | <5% | <5% | <5% | >95% | >95% | >95% | | | | >95% |
| $3/4\ F_{max}$ | <5% | <5% | <5% | >95% | >95% | >95% | | | | >95% |
| $0.85F_{max}$ | <5% | <5% | <5% | >95% | >95% | >95% | | | | >95% |
| $0.75F_{2013}$ | <5% | <5% | <5% | >95% | >95% | >95% | >95% | >95% | >95% | >95% |
| $F_{2013}$ | <5% | <5% | <5% | >95% | >95% | >95% | >95% | >95% | >95% | >95% |
| $1.25F_{2013}$ | <5% | <5% | <5% | >95% | >95% | >95% | >95% | >95% | >95% | >95% |

**Assessment**
A quantitative model introduced in 2008 was used (Scientific Council 2008). Model settings were unchanged. Due to problems of estimating exact catches for 2011 and 2012, catches were estimated within the model. For 2013 catches, Scientific Council agreed Daily Catch Report (DCR) data were the best available estimate. The unavailability of independently verifiable catch estimates over 2011 – 2012 introduces an additional element of uncertainty in the assessment.

The next full assessment of this stock is planned for 2015.

*Human impact*
Mainly fishery related mortality. Other sources (e.g. pollution, shipping, oil-industry) are considered minor.

*Biological and environmental interactions*
Redfish, shrimp and smaller cod are important prey items for cod. Recent studies indicate strong trophic interactions between these species in the Flemish Cap.

**Fishery**
Cod is caught in a directed trawl fishery and as bycatch in the directed redfish fishery by trawlers. The fishery is regulated by quota. Recent catch estimates and TACs are as follows:

| | 2005 | 2006 | 2007 | 2008 | 2009 | 2010 | 2011 | 2012 | 2013 | 2014 |
|---|---|---|---|---|---|---|---|---|---|---|
| TAC | ndf | ndf | ndf | ndf | ndf | 5.5 | 10 | 9.3 | 14.1 | 14.5 |
| STATLANT 21 | 0.0 | 0.1 | 0.1 | 0.4 | 1.2 | 5.3 | 9.8 | 9.0 | 11.2 | |
| STACFIS | 0.0 | 0.3 | 0.3 | 0.9 | 1.2 | 9.2 | 13.6[1] | 13.4[1] | 14.0[2] | |

[1] Estimated via the assessment model
[2] Daily Catch Reports

**Effects of the fishery on the ecosystem**
No specific information available. General impacts of fishing gear on the ecosystem should be considered.

**Special comments**
In 2012 and 2013 the lack of length distributions and age-length keys from some contracting parties has further increased uncertainty in the current assessment.

Rapid changes in the biological parameters of this stock in recent years, and the sudden decrease in 2013 EU-survey indices, has led to the conclusion that last year's projections were overly optimistic. Similar revisions were noted in the 2012 assessment. If inter-annual variability continues, the accuracy of projections is reduced.

**Sources of information**
SCR Doc. 14/35, 14/17; SCS Doc. 14/06, 14/10, 14/13, 14/16, NAFO/GC Doc 08/3