

Cod in Division 3M

Advice June 2017 for 2018

Recommendation for 2018

Scientific Council considers that yields at F_{lim} and $F_{2014-16}$ are not sustainable. For $\frac{3}{4} F_{lim}$, the probability of F_{2018} exceeding F_{lim} is 35%. Under all projection scenarios, there is a relatively high probability of stock decline in the near term. Scientific Council recommends that the TAC be no more than the catch corresponding to $\frac{3}{4} F_{lim}$, ie. 8182 t in 2018.

Management objectives

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

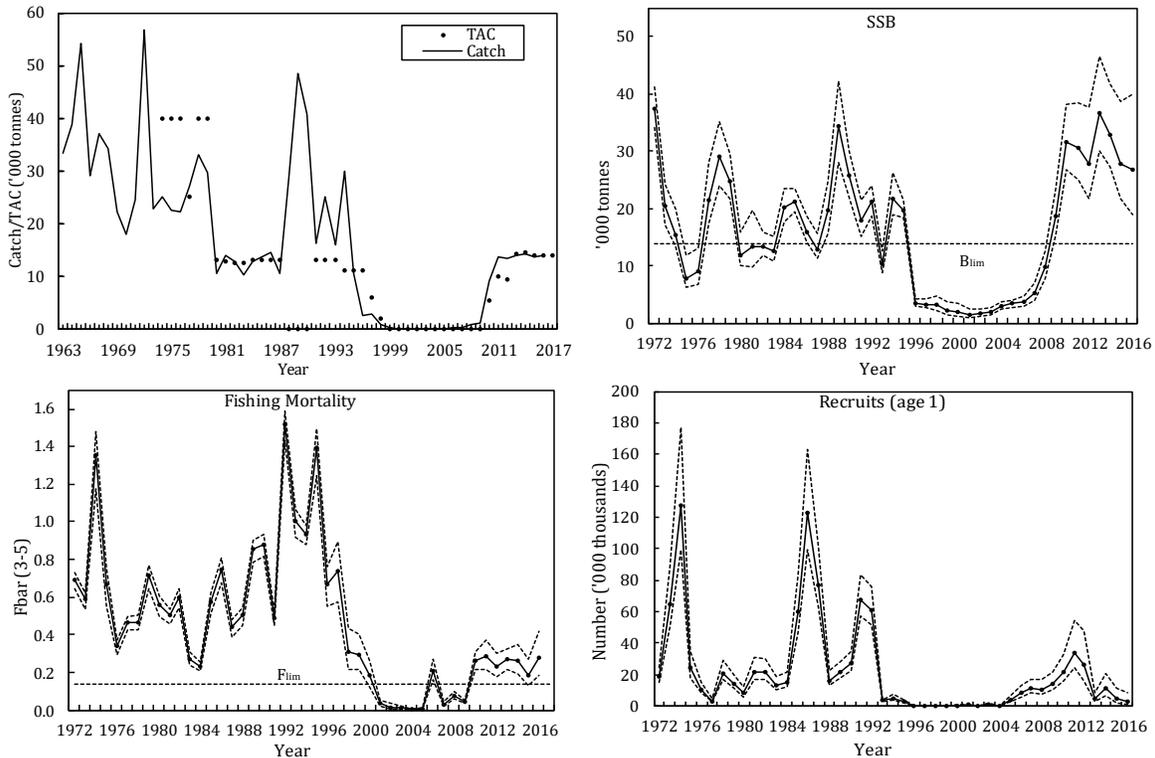
Convention objectives	Status	Comment/consideration	
Restore to or maintain at B_{msy}	●	Stock well above B_{lim} . B_{msy} is unknown	● OK
Eliminate overfishing	●	$F > F_{msy}$ Current F not sustainable	● Intermediate
Apply Precautionary Approach	●	F_{lim} and B_{lim} defined, HCR in development	● Not accomplished
Minimise harmful impacts on living marine resources and ecosystems	●	VME closures in effect, no specific measures.	○ Unknown
Preserve marine biodiversity	○	Cannot be evaluated	

Management unit

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

Stock status

Current SSB is estimated to be well above B_{lim} . However, since 2013 recruitment has decreased, and in 2016 was at levels similar to those observed during the period 1996 to 2004. Since 2010, F has remained stable at a level around twice F_{lim} .



Reference points

B_{lim} : 14 000 t of spawning biomass (Scientific Council, 2008).
 $F_{lim} = F_{30\%SPR}$: 0.139 (using method applied by Scientific Council, 2014)

Projections

	B		SSB		Yield
Median and 90% CI					
$F_{bar}=F_{lim}$ (median=0.139)					
2017	36314	(23245 - 55649)	27187	(15371 - 45374)	13931
2018	30508	(12993 - 57331)	23634	(7923 - 49139)	10297
2019	27754	(4121 - 62281)	22913	(1799 - 55727)	
$F_{bar}=3/4F_{lim}$ (median=0.104)					
2017	36314	(23245 - 55649)	27187	(15371 - 45374)	13931
2018	30508	(12993 - 57331)	23634	(7923 - 49139)	8182
2019	30703	(6907 - 65109)	25658	(3973 - 58324)	
$F_{bar}=F_{2012-2014}$ (median=0.241)					
2017	36314	(23245 - 55649)	27187	(15371 - 45374)	13931
2018	30508	(12993 - 57331)	23634	(7923 - 49139)	15127
2019	21265	(1644 - 55804)	16653	(229 - 49345)	
$F_{bar}=3/4F_{2012-2014}$ (median=0.180)					
2017	36314	(23245 - 55649)	27187	(15371 - 45374)	13931
2018	30508	(12993 - 57331)	23634	(7923 - 49139)	12435
2019	24854	(2298 - 59365)	20105	(320 - 52774)	

	Yield		P(B < B_{lim})			P(F > F_{lim})		P(B_{19} > B_{16})
	2017	2018	2017	2018	2019	2017	2018	
F_{lim}	13931	10297	3%	18%	27%	67%	50%	35%
$3/4F_{lim}$	13931	8182	3%	18%	21%	67%	35%	44%
$F_{2014-2016}$	13931	15127	3%	18%	43%	67%	76%	21%
$3/4F_{2014-2016}$	13931	12435	3%	18%	34%	67%	63%	28%

The results indicate that under all scenarios total biomass during the projected years will decrease. Under all scenarios the probability of being below B_{lim} at the beginning of 2019 is higher than 20% and the probability of F exceeding F_{lim} is at least 35%.

Assessment

A quantitative model introduced in 2008 was used (Scientific Council, 2008). Model settings were unchanged. Some concerns about the Bayesian model used in the assessment have been raised by Scientific Council. Scientific Council approved the assessment to perform the projections despite the issues encountered taking into account that the results of the assessment are in line with the survey trends. The impact of this issue will be studied in the April 2018 benchmark.

The next full assessment of this stock is planned for 2018.

Human impact

Mainly fishery related mortality. Other sources (e.g. pollution, shipping, oil-industry) are undocumented.

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 directed trawl and longline fisheries and as bycatch in the directed redfish fishery by trawlers. The fishery is regulated by quota.



Recent catch estimates and TACs ('000 tonnes) are as follows:

,000 tons	2008	2009	2010	2011	2012	2013	2014	2015	2016	2017
TAC	ndf	ndf	5.5	10.0	9.3	14.1	14.5	13.8	13.9	13.9
STATLANT 21	0.4	1.2	5.3	9.8	9.0	11.2	10.5	12.8	13.8	
STACFIS	0.9	1.2	9.2	13.6	13.4	14.0	14.3	13.8	14.0	

Effects of the fishery on the ecosystem

General impacts of fishing gear on the ecosystem should be considered. A large area of Div. 3M has been closed to protect sponge, seapens and coral.

Special comments

Given the trends in projected biomass and the fact that the stock will be benchmarked in 2018, Scientific Council considered one year projections only.

Sources of information

SCR Doc. 17/17, 17/24, 17/38; SCS Doc. 17/04, 17/05, 17/06, 17/09, 17/11, NAFO SC Reports 2014, 2008, NAFO/GC Doc 08/3