

**Cod in Division 3M**

Advice June 2024 for 2025-2026











**Recommendation for 2025 and 2026**

Catches up to  $3/4 F_{lim}$  are projected to result in a very low probability ( $\leq 10\%$ ) of the stock going below  $B_{lim}$  and of fishing mortality exceeding  $F_{lim}$ . SSB is projected to increase with a probability of more than 50% under all fishing scenarios with fishing mortality less than  $0.56 F_{lim}$ .

Scientific Council recommends a level of  $F$  that promotes SSB growth.

**Management objectives**

No explicit management plan or management objectives have been defined by the Commission. General principles from the *Convention on Cooperation in the Northwest Atlantic Fisheries* are applied.

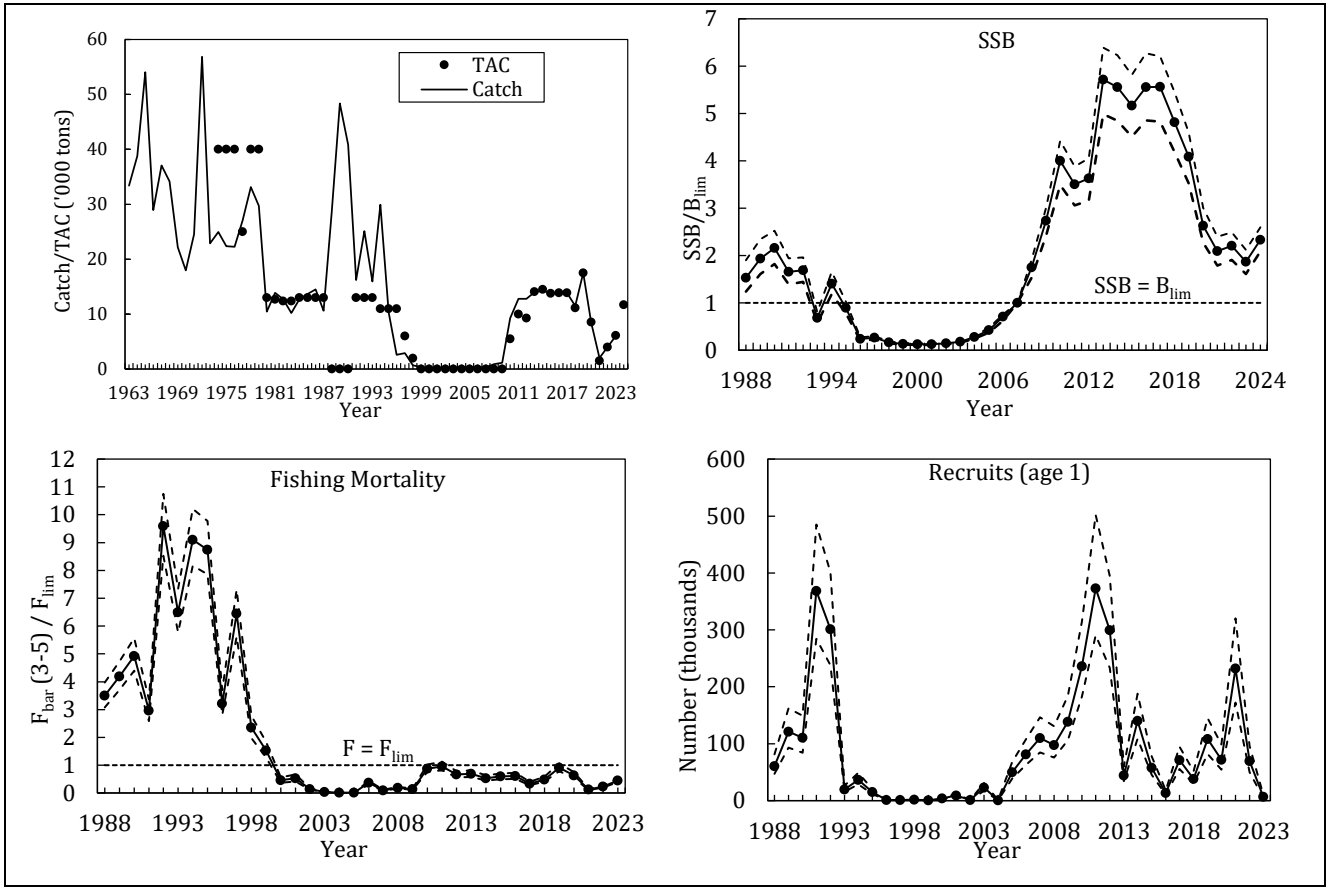
Convention Principle	Status	Comment	
Restore to or maintain at $B_{msy}$		$B_{msy}$ undefined, $B > B_{lim}$	 OK
Eliminate Overfishing (Stock)		$F < F_{lim}$	 Intermediate
Eliminate Overfishing (Ecosystem)		Total EPU catches $< 2TCI$	 Not accomplished
Apply Precautionary Approach		$B_{lim}$ and $F_{lim}$ defined	 Unknown
Minimize harmful impacts on living marine resources and ecosystems		Directed fishery, VME closures in effect, effectiveness of bycatch regulations uncertain	
Preserve marine biodiversity		Cannot be evaluated	

**Management unit**

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

**Stock status**

SSB declined rapidly since 2017 but has remained stable during the last 4 years and is estimated to be above  $B_{lim}$ . Since 2013, recruitment has varied at intermediate levels but much lower than those observed in 2011-2012. In 2021, a good recruitment was observed, while in 2023 is at a very low level. Fishing mortality has remained below  $F_{lim}$  since the fishery reopened in 2010. In 2021, the minimum level of  $F$  since the re-opening was reached, increasing since then. In 2023,  $F$  is below  $F_{lim}$  with high probability.



**Reference points**

$B_{lim} = SSB_{2007}$ : Median = 14 632 tons of spawning biomass (Scientific Council, 2024).  
 $F_{lim} = F_{30\%SPR}$ : Median = 0.153 (Scientific Council, 2024).



**Projections**

Stochastic projections of the stock dynamics from 2024 to the start of 2027 were conducted.  $F_{bar}$  is the mean of the  $F$  at ages 3-5 and is used as the indicator of overall fishing mortality;  $F_{sq}$  is the status quo  $F$ , calculated as the mean of the last three years  $F_{bar}$  (2021-2023).

	B		SSB		Yield
Median and 80% CI					
$F_{bar} = 0$					
2024	69964	(61172 - 80992)	34191	(30581 - 37965)	11708
2025	71077	(58334 - 87704)	38180	(32789 - 44159)	0
2026	85529	(70215 - 108862)	54962	(47380 - 63261)	0
2027	97470	(75277 - 128007)	56346	(49099 - 64824)	
$F_{bar} = F_{sq}$ (median = 0.042)					
2024	69964	(61172 - 80992)	34191	(30581 - 37965)	11708
2025	71077	(58334 - 87704)	38180	(32789 - 44159)	5580
2026	79679	(64255 - 102904)	49425	(42014 - 57552)	7112
2027	84088	(62475 - 114436)	44197	(36922 - 52632)	
$F_{bar} = 1/2 F_{lim}$ (median = 0.076)					
2024	69964	(61172 - 80992)	34191	(30581 - 37965)	11708
2025	71077	(58334 - 87704)	38180	(32789 - 44159)	9786
2026	75187	(59830 - 98431)	45287	(37898 - 53368)	11351
2027	74899	(53930 - 104982)	36282	(28988 - 44515)	
$F_{bar} = 0.56 F_{lim}$ (median = 0.086)					
2024	69964	(61172 - 80992)	34191	(30581 - 37965)	11708
2025	71077	(58334 - 87704)	38180	(32789 - 44159)	10913
2026	73981	(58650 - 97233)	44158	(36816 - 52286)	12310
2027	72678	(51812 - 102907)	34312	(27034 - 42517)	
$F_{bar} = F_{2024}$ (median = 0.093)					
2024	69964	(61172 - 80992)	34191	(30581 - 37965)	11708
2025	71077	(58334 - 87704)	38180	(32789 - 44159)	11613
2026	73231	(57914 - 96493)	43491	(36115 - 51656)	12820
2027	71372	(50559 - 101399)	33209	(25935 - 41462)	
$F_{bar} = 2/3 F_{lim}$ (median = 0.102)					
2024	69964	(61172 - 80992)	34191	(30581 - 37965)	11708
2025	71077	(58334 - 87704)	38180	(32789 - 44159)	12613
2026	72160	(56868 - 95434)	42483	(35219 - 50627)	13622
2027	69541	(48765 - 99338)	31548	(24214 - 39695)	
$F_{bar} = 3/4 F_{lim}$ (median = 0.114)					
2024	69964	(61172 - 80992)	34191	(30581 - 37965)	11708
2025	71077	(58334 - 87704)	38180	(32789 - 44159)	13949
2026	70731	(55473 - 94021)	41172	(33870 - 49383)	14558
2027	67180	(46452 - 96710)	29424	(22151 - 37537)	
$F_{bar} = F_{lim}$ (median = 0.153)					
2024	69964	(61172 - 80992)	34191	(30581 - 37965)	11708
2025	71077	(58334 - 87704)	38180	(32789 - 44159)	17711
2026	66783	(51499 - 90043)	37545	(30323 - 45626)	16719
2027	60872	(40592 - 90361)	23935	(16734 - 32123)	



	Yield			P(SSB < SSB <sub>lim</sub> )				P(F > F <sub>lim</sub> )			P(SSB <sub>27</sub> > SSB <sub>24</sub> )
	2024	2025	2026	2024	2025	2026	2027	2024	2025	2026	
F = 0	11708	0	0	<1%	<1%	<1%	<1%	<1%	<1%	<1%	100%
F <sub>sq</sub> = 0.042	11708	5580	7112	<1%	<1%	<1%	<1%	<1%	<1%	<1%	100%
1/2F <sub>lim</sub> = 0.076	11708	9786	11351	<1%	<1%	<1%	<1%	<1%	<1%	<1%	66%
0.56 F <sub>lim</sub> = 0.086	11708	10913	12310	<1%	<1%	<1%	<1%	<1%	<1%	<1%	50%
F <sub>2024</sub> = 0.093	11708	11613	12820	<1%	<1%	<1%	<1%	<1%	<1%	<1%	41%
2/3F <sub>lim</sub> = 0.102	11708	12613	13622	<1%	<1%	<1%	<1%	<1%	<1%	2%	29%
3/4F <sub>lim</sub> = 0.114	11708	13949	14558	<1%	<1%	<1%	1%	<1%	2%	10%	18%
F <sub>lim</sub> = 0.152	11708	17711	16719	<1%	<1%	<1%	4%	<1%	50%	50%	3%

The results indicate that under all scenarios with  $F_{bar} \leq F_{2024}$ , total biomass during the projected years will increase, whereas the SSB is projected to increase in 2027 from 2024 with a probability higher than 50% under scenarios with  $F_{bar} < 0.56 F_{lim}$ . The probability of SSB being below  $B_{lim}$  is very low ( $\leq 4\%$ ) in all the scenarios.

Under all scenarios, the probability of  $F_{bar}$  exceeding  $F_{lim}$  is less than or equal to 10% in 2026.

### Assessment

A Bayesian SCAA model, introduced at the 2018 benchmark, was used as the basis for the assessment of this stock with data from 1988 to 2023.

The next full assessment for this stock will be in 2026.

### 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. There are strong trophic interactions between these species in the Flemish Cap.

The Flemish Cap (3M) Ecosystem Production Unit (EPU), with the exception of a short-lived increase in 2005-2009, has shown a fairly stable total biomass over time despite the changes in individual stocks. This indicates no major changes in overall ecosystem productivity.

### Ecosystem sustainability of catches

The impact of bottom fishing activities on VMEs in the NRA was last assessed in 2021. The risk of Significant Adverse Impacts (SAIs) on sponge and large gorgonian VMEs was assessed to be low, while this risk for sea pen VMEs has been assessed as intermediate. The risks of SAIs on small gorgonian, black coral, bryozoan and sea squirt VMEs were assessed as high. A number of areas in the Flemish Cap (3M) EPU have been closed to bottom fishing to protect VMEs.

3M cod is included in the piscivores guild of the Flemish Cap (3M) Ecosystem Production Unit (EPU). Other NAFO managed stocks in this guild and EPU are 3M redfish and 2+3KLMNOPs Greenland halibut. The Catch/TCI in 2023 was below the 2TCI ecosystem reference point (3M Piscivore Catch<sub>2023</sub>/TCI=1.12).

### 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. New technical regulations were introduced in 2021, in particular a closure of the directed fishery in the first quarter as well as sorting grids to protect juveniles.

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

	2015	2016	2017	2018	2019	2020	2021	2022	2023	2024
TAC	13.8	13.9	13.9	11.1	17.5	8.5	1.5	4.0	6.1	11.7
STATLANT 21	12.8	13.3	13.9	11.2	17.4	8.5	1.9	NA <sup>1</sup>	NA <sup>1</sup>	
STACFIS	13.8	14.0	13.9	11.5	17.5	8.5	2.1	4.0	6.2	

<sup>1</sup> NA - In 2022-2023, STATLANT 21 information is incomplete.

### Special comments

Scientific Council proposes to conduct a full assessment of Atlantic cod in Division 3M every two years, since biological parameters and the stock status have remained quite stable in recent years. For this reason, this year SC is providing advice for this stock for the next two years. The stock will be monitored via IMR in interim years and an assessment can be triggered by Scientific Council if changes are observed

### Sources of information

SCS Doc. 24/06, 08, 10, 11; SCR Doc. SCR 24/05, 16.