

**Redfish (*Sebastes mentella* and *Sebastes fasciatus*) in Division 3M**

**Recommendation for 2018 and 2019**

In the short term (~2 years) the stock could sustain values of *F* at the current level corresponding to a TAC of 12 000 tonnes. However, under the present low recruitment regime, short term yields at levels higher than *F*0.1 (7 000 tonnes) are likely to induce medium term declines in abundance, exploitable biomass and spawning stock biomass. Therefore, if the objective is to maximize yields over the long term, TACs should be set at values closer to the lower end of the range 7 000 to 12 000 tonnes.

**Management objectives**

No explicit management plan or management objectives defined by Fisheries Commission. General convention objectives (NAFO/GC Doc 08/3) are applied.

<i>Convention objectives</i>	<i>Status</i>	<i>Comment/consideration</i>
Restore to or maintain at Bmsy	○	Bmsy unknown. Stock above historical average level
Eliminate overfishing	●	Fmsy unknown, catch at low level over past 21 years
Apply Precautionary Approach	●	Candidate reference points need to be confirmed.
Minimise harmful impacts on living marine resources and ecosystems	●	VME closures in effect, no specific measures, low bycatch reported.
Preserve marine biodiversity	○	Cannot be evaluated

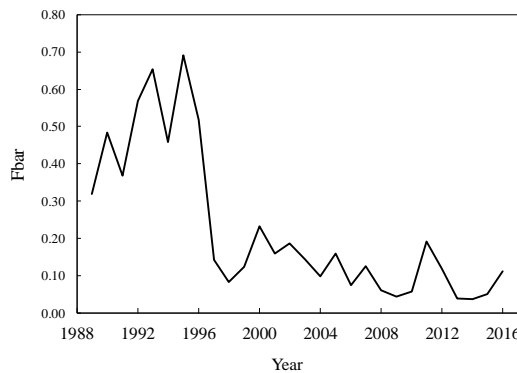
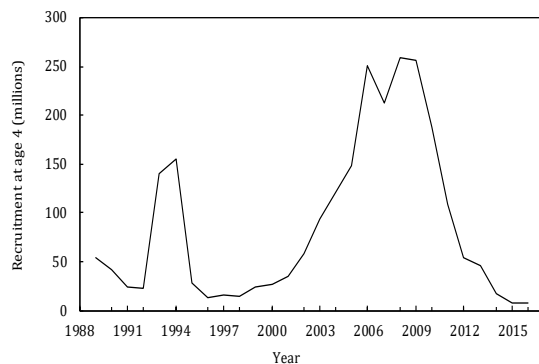
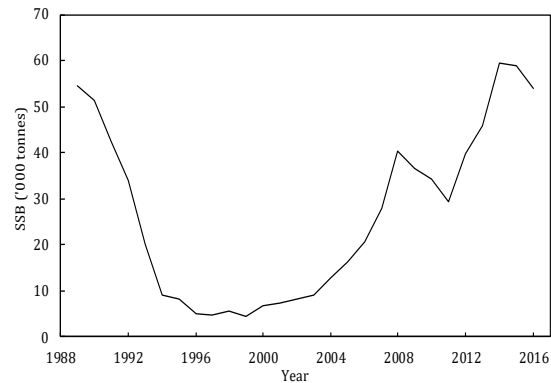
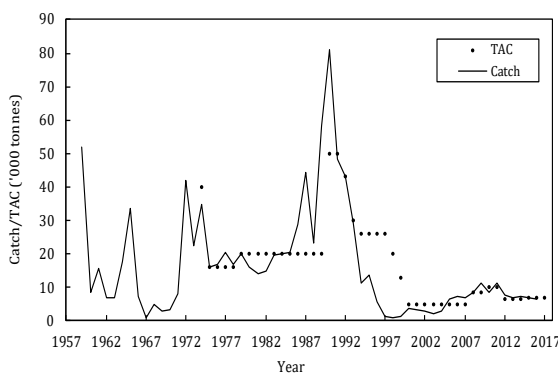
- OK
- Intermediate
- Not accomplished
- Unknown

**Management unit**

Catches of redfish in Div. 3M includes three species of the genus *Sebastes*; *S. mentella*, *S. marinus* (= *S. norvegicus*) and *S. fasciatus*. For management purposes they are considered as one stock (STACFIS 2017). Advice is based on data only for two species (*S. mentella* & *S. fasciatus*), labeled as Beaked redfish.

**Stock status**

As a result of high recruitment from 2002-2006, the stock currently has high biomass and spawning biomass but abundance and recruitment are declining. Year classes recruiting in 2015 and 2016 are among the lowest on record. Fishing mortality increased in 2015-2016 but is still low.



## Reference points

No reference points have been adopted.

## Assessment

Input data comes from EU Flemish Cap bottom trawl survey and the fishery and is considered good quality. A quantitative model (XSA) introduced in 2003 was used. Elevated natural mortality was assumed from 2006 to 2010 but was low (more typical of redfish) otherwise. In order to include an independent approach to natural mortality in the 2017 sensitivity M framework, the actual beaked redfish natural mortality has been estimated by a number of published models

The next full assessment of this stock will be in 2019.

## Projections

Short term (2018-2019) stochastic projections were carried out for female spawning stock biomass (SSB) and catch, under most recent level of natural mortality and considering four options for fishing mortality ( $F_0$ ,  $F_{\text{statusquo}}$ ,  $F_{0.1}$  and  $F_{\text{max}}$ ). Projections were initialized at the beginning of 2018 assuming  $F_{\text{statusquo}}$  during 2017. Recruitment entering in 2017 and 2018 is assumed constant at the geometric mean of below average recruitments (age 4 XSA, 1989-2014).

In all projections scenarios spawning biomass remains at relatively high levels.

SSB	$F_0$	$F_{2016}$	$F_{0.1}$	$F_{\text{max}}$
2020 <sub>50th % ile</sub>	64977	53964	58437	53319
2020 <sub>25th % ile</sub>	60681	50347	54611	49747
2016	54017			
Yield <sub>beaked redfish</sub>	$F_0$	$F_{2016}$	$F_{0.1}$	$F_{\text{max}}$
2018-2019		10248	5778	10230
2016	6232			
TAC	$F_0$	$F_{2016}$	$F_{0.1}$	$F_{\text{max}}$
2018-2019		12092	<b>6817</b>	12070
2016	7000			

average beaked redfish proportion in the 2015-20163M redfish catch

0.85

	$F_0$	$F_{2016}$	$F_{0.1}$	$F_{\text{max}}$
$P(\text{SSB}_{2020} > \text{SSB}_{2016})$	>95%	~50%	75%	~50%

## Human impact

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

## Biology and Environmental Interactions

Since 2004 a rapid increase was observed on survey biomass both of golden (*Sebastes marinus*) and Acadian (*Sebastes fasciatus*) redfish stocks. Due to their shallower depth distributions these two redfish species overlap with cod to an extent greater than deep sea redfish (*Sebastes mentella*). Since 2006, the cod stock started to recover, while those two redfish stocks declined sharply. Redfish is an important component in the diet of cod, especially on those years when successful recruitment events were observed in redfish stocks.

## Fishery

Redfish is nowadays caught in bottom trawl fisheries at intermediate depths. In turn, redfish are also caught as bycatch in fisheries directed for cod and Greenland halibut. The fishery in NAFO Div. 3M is regulated by minimum mesh size and quota.

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

	2008	2009	2010	2011	2012	2013	2014	2015	2016	2017
TAC	5	8.5	10.0	10.0	6.5	6.5	6.5	6.7	7.0	7.0
STATLANT 21 A	7.9	8.7	8.2	9.7	5.4	6.8	6.4	6.9	6.6	
STACFIS Total catch <sup>1,2</sup>	8.5	11.3	8.5	11.1	6.2	7.8	7.4	6.9	6.6	
STACFIS Catch <sup>2,3</sup>	4.3	3.7	5.4	9.0	6.3	5.2	4.6	5.2	6.2	

- <sup>1</sup> Estimated redfish catch of all three redfish species.
- <sup>2</sup> On 2011-2014 STACFIS catch estimates based on the average 2006-2010 bias.
- <sup>3</sup> STACFIS beaked redfish catch

### Effects of the fishery on the ecosystem

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

**Sources of information:** SCR Doc. 17/024, 032, 034, 038; SCS Doc. 17/ 04, 05, 09,011.