

Cod in Division 3M

Recommendation: Scientific Council notes that under all the scenarios projected ($F_{0.1}$, F_{max} and F_{2011}) the probability of 2014 SSB being below B_{lim} is low (less than 5%). Estimated F_{2011} is more than twice F_{max} . In the short term the stock can sustain high values of F , 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.

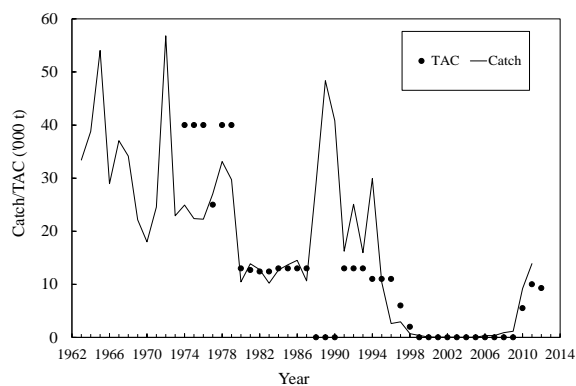
Background: The cod stock in Flemish Cap is considered to be a separate population.

Fishery and Catches: The cod fishery on Flemish Cap has traditionally been a directed fishery by Portuguese trawlers and gillnetters, Spanish pair-trawlers and Faroese longliners. Cod has also been taken as bycatch in the directed redfish fishery by Portuguese trawlers. Catches exceeded the TAC from 1988 to 1994. In 1999 the direct fishery was closed. The fishery was reopened in 2010 with 5 500 t TAC and a catch of 9 192 t was estimated by STACFIS. TAC for 2011 was set as 10 000 t. This year, STACFIS only had STATLANT 21A available as estimates of catches, which is inconsistent with the information used in previous assessments. The model used for the assessment of this stock estimated the 2011 catch to be 13 900 t. TAC for 2012 is 9 280 t.

Year	Catch ('000 t)		TAC ('000 t)	
	STACFIS	21	Recommended	Agreed
2008	0.9	0.4	Ndf	ndf
2009	1.2	1.2	Ndf	ndf
2010	9.2	4.4	4.1	5.5
2011	13.9 ¹	9.8	<10	10
2012			<=9.3	9.3

ndf: No directed fishing.

¹Estimated by the assessment model.



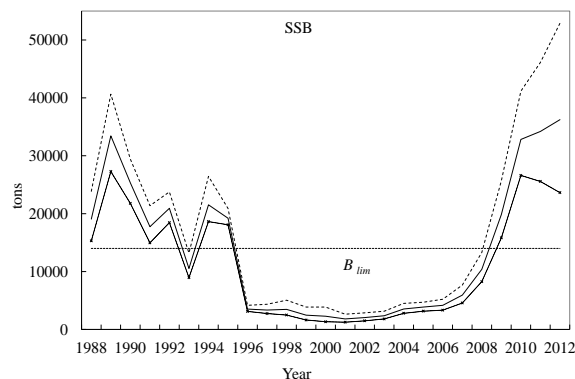
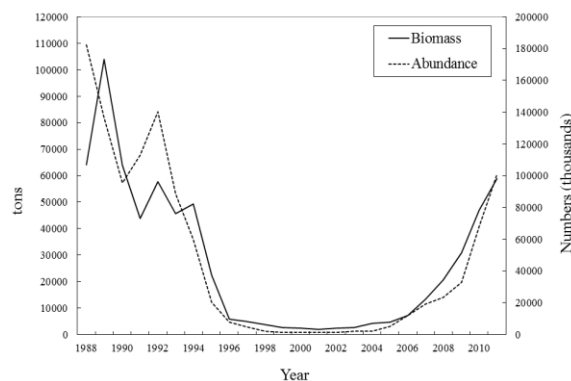
Data: For 2011, length sampling is available from Canada, EU-Estonia, EU-Lithuania, Norway, EU-Portugal, Russia, EU-Spain and EU-UK. Abundance

at age indices were available from the EU bottom trawl survey since 1988, covering the whole distribution area of the stock. In 2009-2011 age-length keys from Portuguese catch were available. Maturity ogives are available from the EU survey for the entire period.

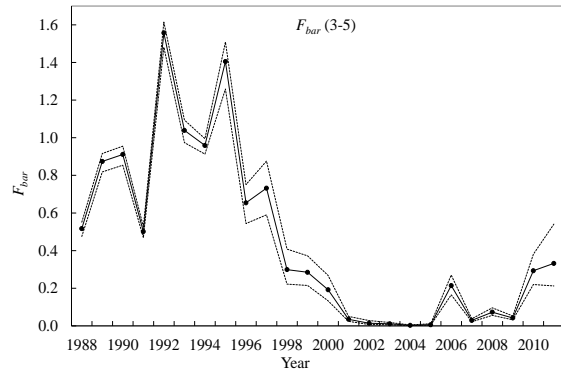
Assessment: An age-structured model was accepted to estimate the state of the stock.

Total Biomass and Abundance: Estimated total biomass and abundance show an increasing trend since the mid 2000s. Both values are this year around the level of the early 90s.

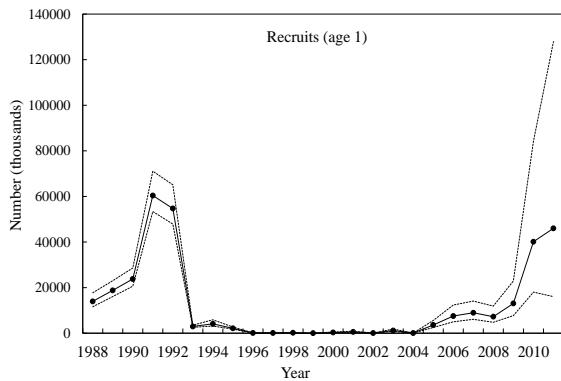
SSB: Estimated median SSB has increased since 2005 to the highest value of the time series and is now well above B_{lim} (14 000 t). The big increase in the last three years is largely due to six abundant year classes, those of 2005-2010, and to their early maturity.



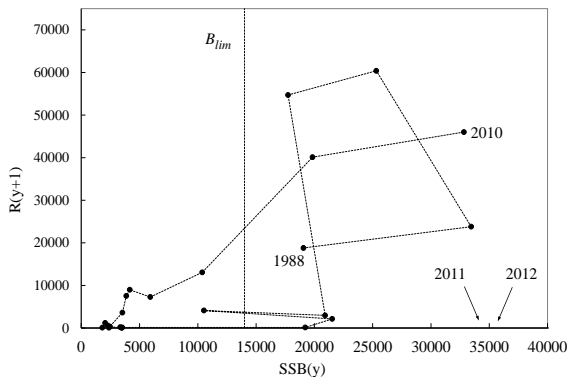
Fishing mortality: F increased in 2010 and 2011 with the opening of the fishery. F_{bar} in 2011 (0.339) was more than twice F_{max} (0.135).



Recruitment: After a series of recruitment failures between 1996 and 2004, recruitment at age 1 values in 2005-2011 are higher, especially the 2010 and 2011 values. There is a high uncertainty associated with those last values.



Reference Points: A spawning biomass of 14 000 t has been identified as B_{lim} for this stock. SSB is estimated to be well above B_{lim} in 2012.



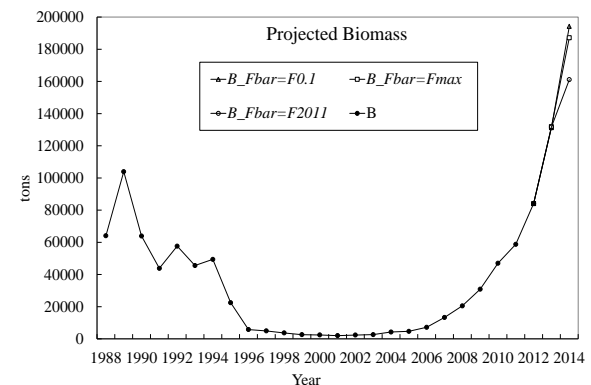
State of the Stock: SSB in 2011 is estimated to be well above B_{lim} . Recent recruitments are among the highest level of the time series, but these estimates are

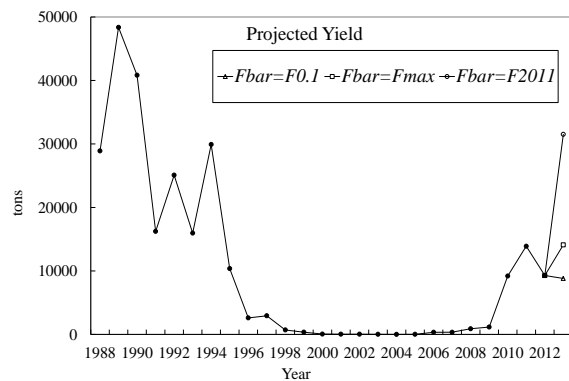
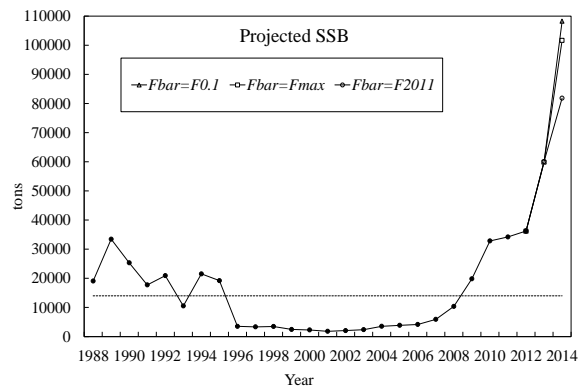
imprecise. Fishing mortality in 2011 is high, at the level of more than twice F_{max} .

Stock Projections: Stochastic projections to 2014 were conducted for three fishing mortality scenarios: (1) $F_{bar}=F_{0.1}$ (median=0.08); (2) $F_{bar}=F_{max}$ (median=0.135); (3) $F_{bar}=F_{2011}$ (median=0.339). All scenarios assumed that the Yield for 2012 is the established TAC (9 280 t).

Under all scenarios there is a low probability (<5%) of SSB being below B_{lim} .

	Total Biomass		SSB		Yield	
	50%	5%-95%	50%	5%-95%	50%	5%-95%
$F_{bar}=F_{0.1}$ (median=0.080)						
2012	84107	57101-124148	36244	23632-52898	9280	
2013	131265	86966-205140	60023	40960-86763	8813	4329-17173
2014	194218	129002-303926	108249	71615-167444		
$F_{bar}=F_{max}$ (median=0.135)						
2012	84093	57195-124008	36180	23675-52880	9280	
2013	131836	87216-205249	59851	41007-86906	14113	7129-26507
2014	187176	122645-294501	101670	66422-158863		
$F_{bar}=F_{2011}$ (median=0.339)						
2012	84039	57066-123950	36168	23699-53154	9280	
2013	131711	87025-204072	60087	40793-86622	31517	18535-53190
2014	161107	103948-256003	81850	51353-131261		





Special Comments: The next full assessment of this stock will be in 2013.

As the stock is quickly changing its biological parameters (mean weight at age and maturity at age), it resulted in a change of the SSB of the stock. In the previous assessment, SSB for 2011 was estimated as 50 000 t. This is now revised to 34 000 t because of differences between the maturities assumed for 2011 in the previous assessment and the estimated maturities available this year.

The exploitation pattern in 2011 is much different than that of 2010. This sudden change, combined with changes in weight-at-age causes significant revisions and uncertainty in the estimated yield per recruit reference points.

Sources of Information: SCR Doc. 12/26, 35, 37; SCS Doc. 12/05, 06, 08, 09, 14.