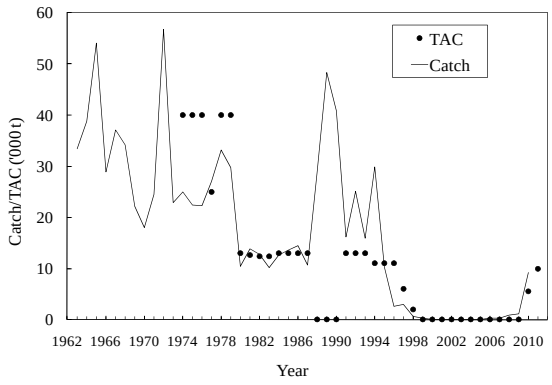
Cod in Division 3M

Background: The cod stock in Flemish Cap is considered to be a discrete 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. Estimated bycatch in shrimp fisheries is low. Large numbers of small fish were caught by the trawl fishery in the past, particularly during 1992-1994. Catches since 1996 were very small compared with previous years. Catches exceeded the TAC from 1988 to 1994, but were below the TAC from 1995 to 1998. In 1999 the direct fishery was closed and catches were estimated in that year as 353 t, most of them taken by non-Contracting Parties. Yearly bycatches between 2000 and 2005 were below 60 t, rising to 339 and 345 t in 2006 and 2007, respectively. In year 2008 and 2009 catches were increasing until 889 and 1161 t, respectively. The fishery has been reopened in 2010 with 5 500 t TAC and a catch of 9 192 t was estimated by STACFIS. A 10 000 t was established for 2011.

	Catch ('000 t)		TAC ('000 t)	
Year	STACFIS	21	Recommended	Agreed
2007	0.3	0.1	ndf	ndf
2008	0.9	0.4	ndf	ndf
2009	1.2	1.2	ndf	ndf
2010	9.2	4.4	4.1	5.5
2011			<10	10

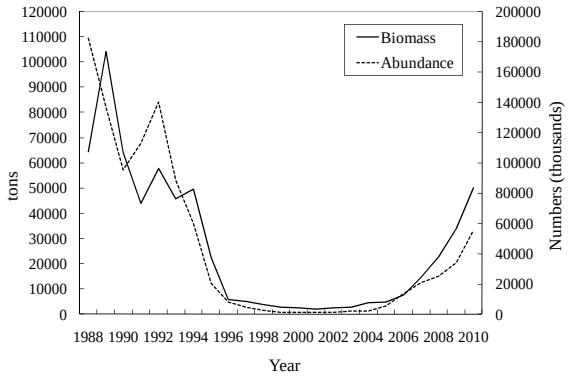
ndf No directed fishing.



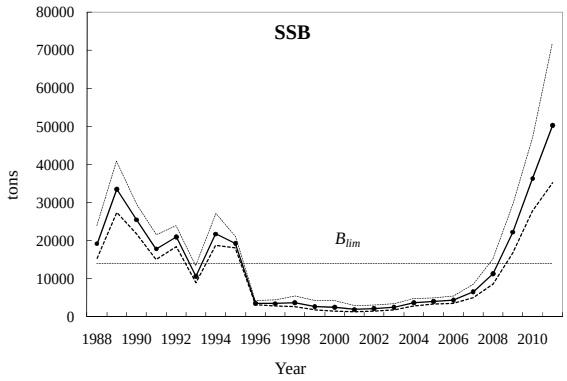
Data: Length and age compositions of the 2002-2005 commercial catches were not available. Length distributions were available for 2006-2009, although sampling levels were low. For 2010 there were samples for EU-Lithuania, Norway, EU-Portugal, EU-Spain and EU-UK. Abundance at age indices were available from the EU bottom trawl survey since 1988, covering the whole distribution area of the stock. Survey length-age keys were applied to the bycatch up to 2008. In 2009-2010 age-length keys from Portuguese catch were available. In 2010 there was an age-length key for another reader from Spanish catches. Maturity ogives are available from the EU survey for the entire period.

Assessment: A Bayesian assessment based on an age-structured model was accepted to estimate the state of the stock.

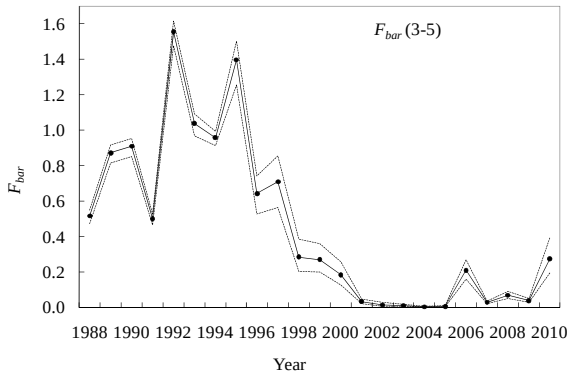
Total Biomass and Abundance: Estimated total biomass and abundance show an increasing trend in both values in recent years, being the increase in biomass higher than the one in abundance. While total biomass is at the level of the beginning of the 90´s, abundance is still below those values.



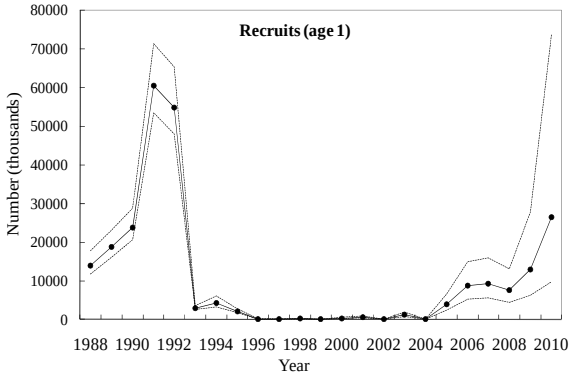
SSB: Spawning stock biomass increases from 2004, with the biggest increase taking place during 2008-2011. The big increase in the last four years is largely due to five reasonably abundant year classes, those of 2005-2009, as well as to the larger weight at age and the younger age of maturity observed in recent years.



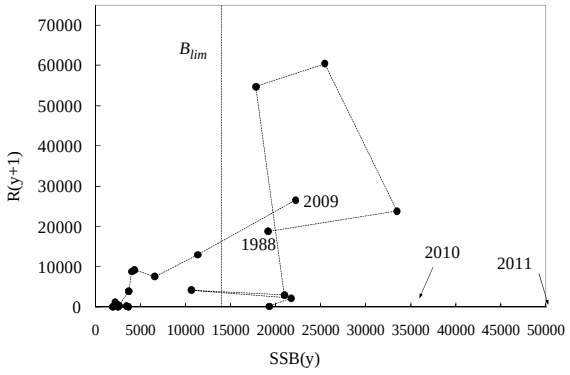
Fishing mortality: Very low from 2001 to 2009. In 2010 the F_{bar} level increased because of the reopening of the fishery. F_{2010} (0.28) exceed F_{max} (0.21).



Recruitment: After recruitment failures during 1996-2004, values are higher in 2005-2010, although still below the levels of the late 80´s.



Reference Points: A spawning biomass of 14 000 t has been identified as B_{lim} for this stock. SSB is well above B_{lim} in 2011.

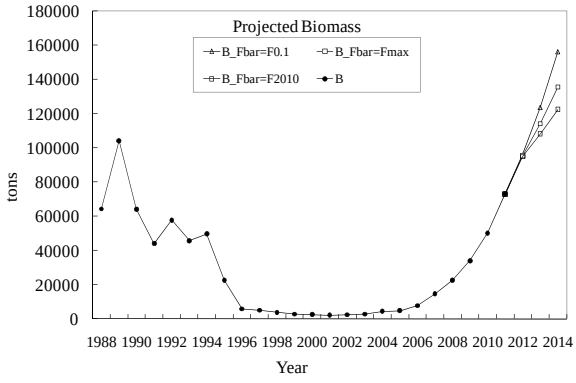


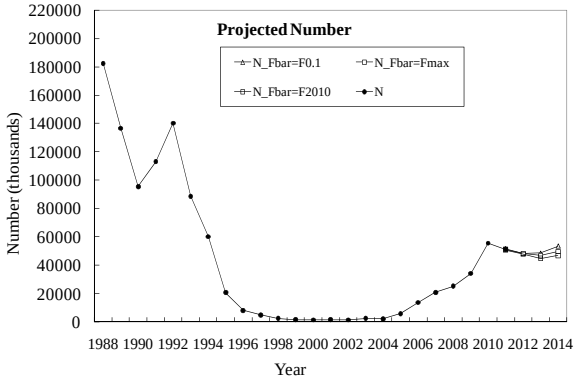
State of the Stock: There has been a significant spawning biomass increase, with levels much above B_{lim}, although abundance remains still lower than in the beginning of the time series. As a result of changes noted in weight and maturity, it is unclear whether the meaning of spawning biomass as an indicator of stock status is the same as in the earlier period. Whereas recruitment has been better during 2005-2010, it is below levels in the beginning of the assessment period.

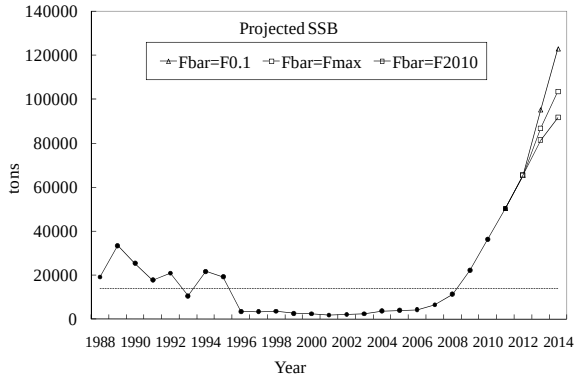
Stock Projections: Stochastic projections have been performed for 2012-2014 under three fishing mortality scenarios: (1) $F_{bar}=F_{0.1}$ (median=0.130); (2) $F_{bar}=F_{max}$ (median=0.210); (3) $F_{bar}=F_{2010}$ (median=0.280). All scenarios assumed that the Yield for 2011 is the established TAC (10 000 t).

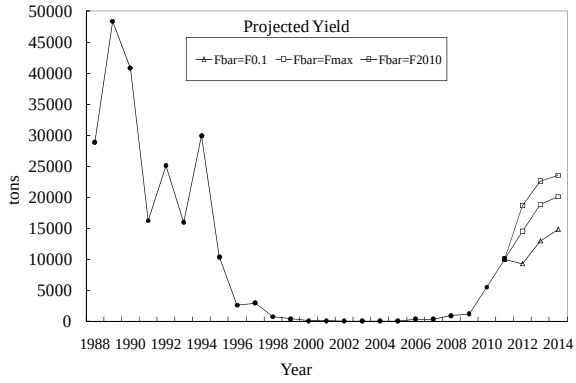
Under all scenarios, total biomass and SSB have a very high probability of reaching levels higher than all of the 1988-2011 estimates. However, this increase does not have a counterpart in terms of population abundances, which are projected to remain at levels below those of the late 80's. That is because the weights and maturities used in the projections were drawn from those of the last three years (much higher than those assumed in the earlier period). If these conditions do not persist, projection results will be overly optimistic.

s	Total Biomass		SSB		Yield	
	50%	5%-95%	50%	5%-95%	50%	5%-95%
$F_{bar}=F_{0.1}$ (median=0.130)						
2011	73189	52141-101986	50552	35462-71721	10000	
2012	95728	65344-146081	65356	46705-91368	9280	4877-17991
2013	123564	76249-205415	95086	63313-149647	12935	6202-27183
2014	156044	85810-280853	122833	71976-220543	14787	6328-34513
$F_{bar}=F_{max}$ (median=0.210)						
2011	73150	52454-102247	50463	35370-71771	10000	
2012	95261	64375-144784	65352	46342-90997	14495	7515-28156
2013	114011	69539-196493	86759	57873-138002	18822	9067-39858
2014	135456	72483-252292	103508	59071-189912	20077	8391-46941
$F_{bar}=F_{2010}$ (median=0.280)						
2011	72842	52567-101887	50469	35508-71210	10000	
2012	94806	64733-145854	65617	46182-91109	18657	11178-32741
2013	108131	66332-187147	81408	54863-129666	22596	12031-43942
2014	122401	65132-235496	91737	53843-167645	23519	10668-51584









Recommendation: Scientific Council advises that catches in 2012 should not exceed the level of $F_{0.1}$ (9 280 t).

Special Comments: The next full assessment of this stock will be in 2012.

Sources of Information: SCR Doc. 11/21, 28, 38; SCS Doc. 11/04, 05, 07.