ECOREGION Widely distributed and migratory stocks
STOCK Blue ling (*Molva dypterygia*) in Division Vb and Subareas VI and VII

Advice for 2015 and 2016

Based on the ICES MSY approach ICES advises that annual catches should not be more than 5046 tonnes. All catches are assumed to be landed.

Stock status

Fishing pressure	2011	2012	2013	
MSY (F_{MSY})	✓	✓	✓	Below target
Precautionary approach (F_{pa},F_{lim})	?	?	?	Not defined

Stock size	2012	2013	2014	
MSY ($B_{trigger}$)	?	?	?	Undefined
Precautionary approach (B_{pa},B_{lim})	?	?	?	Undefined
Qualitative evaluation	↗	↗	↗	Increasing

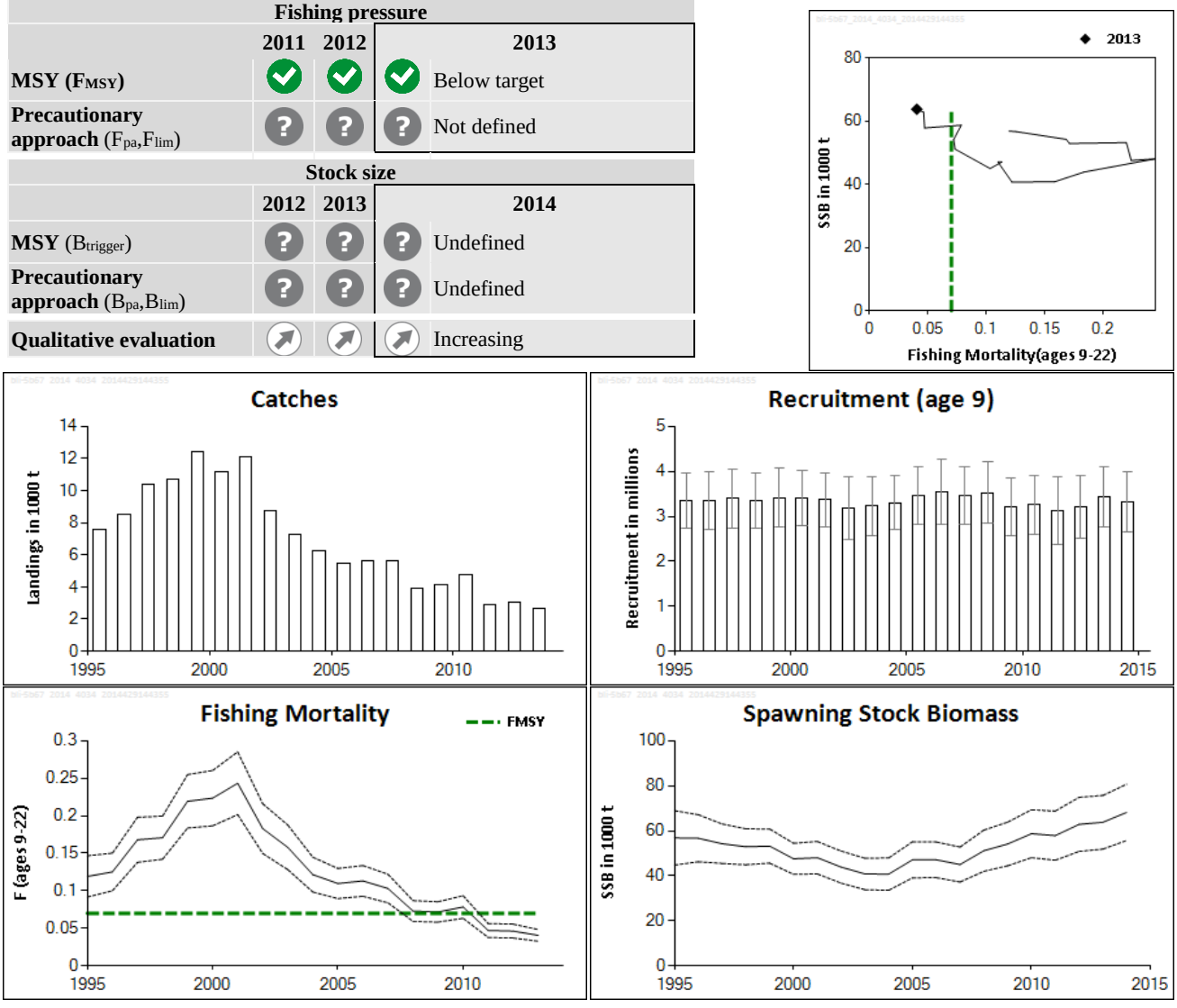

Figure 9.3.16.2.1 Blue ling in Division Vb and Subareas VI and VII. Left: Catches (thousand tonnes) and Fishing mortality from the MYCC model. Right: Recruitment estimated by the MYCC model and Spawning-stock biomass (ages 9+) from the MYCC. Top right: SSB and F for the time-series used in the assessment.

The fishing mortality has been decreasing since 2001and is currently below F_{MSY}. The biomass has been increasing since 2004. Recruitment has been estimated as stable over the full time-series.

Management plans

No specific management objectives are known to ICES.

Biology

See Section 9.3.16 for details on biology.

The fisheries

The main fisheries are those by Faroese trawlers in Division Vb and French trawlers in Subarea VI and, to a lesser extent, Division Vb. Total international landings from Subarea VII are very small, as are bycatches in other fisheries. The bulk of the catch is from trawl fisheries. Landings by Faroese trawlers are mostly taken in the spawning season. Historically, this was also the case for French trawlers fishing in Division Vb and Subarea VI. However, in recent years the French fleet caught blue ling mainly in a mixed fishery with roundnose grenadier and black scabbardfish.

Catch distribution	Total catches (2013) were 2685 t. Discards were < 1% and considered negligible

Effects of the fisheries on the ecosystem

Deep-water bottom trawls impact the seabed, causing potential damage to deep-water coral communities. This is mitigated by closed areas to protect vulnerable marine ecosystems (VMEs). As this fishery is part of a mixed fisheries, any effort on blue ling also impacts other commercial and non-commercial deep-water species.

Quality considerations

The assessment model uses age distributions for the years 2009–2013, so variation of the estimated recruitment over the full time-series may not be well captured.

Age estimation was resumed in 2009 in France through the EU Data Collection Framework (DCF), after a disruption from 1994. Age readings from 1988–1994 are no longer considered reliable and have not been used in this years' assessment.

Scientific basis

Stock data category	1 (ICES, 2014a).
Assessment type	Multi-Year Catch Curves (MYCC), a model fitted to age composition and total catch in order to estimate annual total mortality (Z).
Input data	International landings 1995–2013; age composition of French landings (2009–2013).
Discards and bycatch	Not included, considered negligible.
Indicators	None.
Other information	A benchmark was performed in 2014 (WKDEEP; ICES, 2014b).
Working group report	Working Group on the Biology and Assessment of Deep-Sea Fisheries Resources (WGDEEP).

ECOREGION Widely distributed and migratory stocks
STOCK Blue ling (*Molva dypterygia*) in Division Vb and Subareas VI and VII

Reference points

	Type	*Value*	*Technical basis*
MSY approach	MSY $B_{trigger}$	Not defined.	Undefined.
	F_{MSY}	0.07	Based on $F_{50\%\ SPR}$.
Precautionary approach	B_{lim}	Not defined.	
	B_{pa}	Not defined.	
	F_{lim}	Not defined.	
	F_{pa}	Not defined.	

(Last changed in: 2014)

F reference points were estimated based on yield-per-recruit during the 2014 WKDEEP benchmark and revised in WGDEEP 2014 and ADGDEEP. The YPR suggest that $F_{0.1}$ would drive the SSB to 0.31 of the unexploited SSB, which was considered too low. At equilibrium $F_{50\%SPR}$ corresponds to a yield of about 8200 t. Therefore, $F_{50\%SPR}$ is considered an appropriate proxy for F_{MSY}.

Yield and spawning biomass per Recruit F-reference points:

	Fish Mort Ages 9–22
F_{max}	0.31
$F_{0.1}$	0.12
$F_{50\%SPR}$	0.07

Outlook for 2015 and 2016

Basis: F (2014) = F (2013) = 0.04; SSB (2015) = 74.2 kt; Recruitment (age 9) = geometric mean for 1995–2013 = 3.3 millions; catch (2014) =2.9.

Rationale	**Catches (2015)**	**Basis**	**F (2015)**	**SSB (2016)**	**%SSB change [1)]**	**% ICES advice change [2)]**
ICES–MSY approach	5.05	F_{MSY}	0.07	74.6	+0.6%	+29%
zero catch	0	F=0	0.00	79.8	+7%	−100%
Other options	2.9	F_{2014}	0.04	76.8	+4%	0%
	8.45	$F_{0.1}$	0.12	71.2	−4%	+116%

Weights in thousand tonnes.
[1)] SSB 2016 relative to SSB 2015.
[2)] Catch 2015 relative to ICES predicted catch in 2014.

MSY approach

MSY $B_{trigger}$ has not been defined; recent exploitation has declined since 2001 and has been at or below the F_{MSY} proxy for 6 years. The F_{MSY} proxy is considered to be sufficiently precautionary so that it can be used as the MSY target at the current biomass, which is the highest in the last 20 years.

Following the ICES MSY approach implies fishing mortality to be increased to 0.07 resulting in total catches of no more than 5046 t in 2015 and 2016. This is expected to lead to a SSB of 74 600 t in 2016.

All catches are expected to be landed.

Additional considerations

Last year's advice was based on ICES approach to data-limited stocks. This year´s assessment is based on analytical assessment and the advice on the ICES MSY approach, this results in an estimate of fishing mortality that has been decreasing since 2001 and is currently well below F_{MSY}. The biomass has been increasing since 2004. MSY advice implies substantial increase in fishing mortality and therefore advised catches.

Blue ling is susceptible to sequential depletion of spawning aggregations. Maintaining the current closed areas will provide protection for the spawning aggregations. This may not be needed if the current TAC management regime is effective in limiting fishing mortalities as intended and if highly aggregated fisheries in these areas do not cause local depletion.

The western part of Hatton Bank (ICES Division XIIb) is contiguous to the eastern part of Hatton Bank (ICES Division VIb). Catches in ICES Division XIIb are likely to come from the same stock as catches in Division Vb and Subareas VI and VII. Catch data from Division XIIb are not considered reliable and not used in the assessment.

Data and methods

The stock was benchmarked in 2014 (WKDEEP 2014; ICES, 2014b). Two methods, a Stock Reduction Analysis (SRA) and a Multi-Year Catch Curve Model (MYCC) are used to assess the stock. The same models were used in 2012. The advice is based on MYCC; however, both models show similar stock dynamics.

Comparison of the basis of previous assessment and advice

Last year's advice was based on ICES approach to data-limited stocks. This year´s assessment is based on analytical assessment and the advice on ICES MSY approach.

Sources

ICES. 2014a. Advice basis. *In* Report of the ICES Advisory Committee, 2014. ICES Advice 2014, Book 1, Section 1.2.

ICES. 2014b. Report of the Benchmark Workshop on Deep-sea Stocks (WKDEEP), 3–7 February 2014, Copenhagen, Denmark. ICES CM 2014/ACOM:44.

ICES. 2014c. Report of the Working Group on the Biology and Assessment of Deep-Sea Fisheries Resources (WGDEEP), 4–11 April 2014, ICES Headquarters, Copenhagen. ICES CM 2014/ACOM:17.

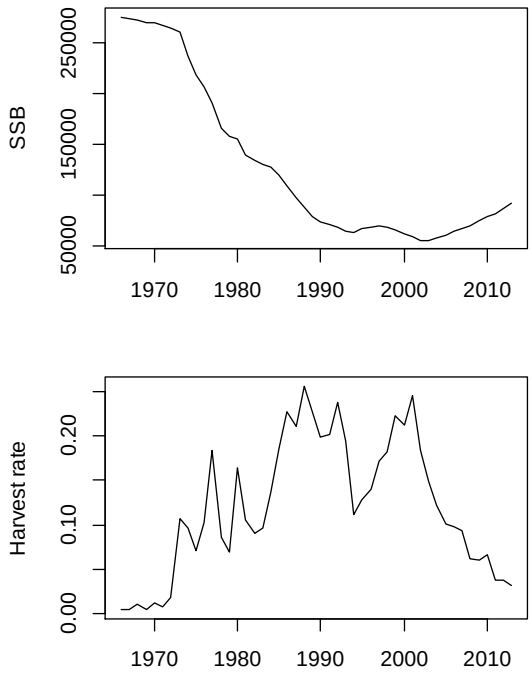

Figure 9.3.16.2.2 Blue ling in Division Vb and Subareas VI and VII. Spawning-stock biomass (SSB, tonnes) and harvest rate from 1966 (onset of the fishery) to 2013 estimated by the stock reduction analysis (SRA).

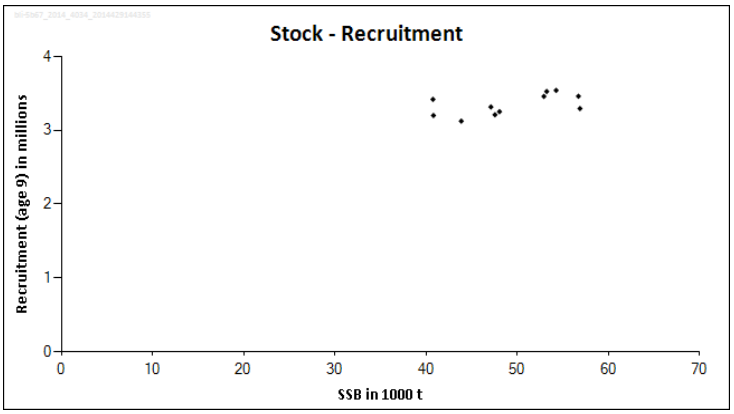

Figure 9.3.16.2.3 Blue ling in Division Vb and Subareas VI and VII. Stock–recruitment plot.

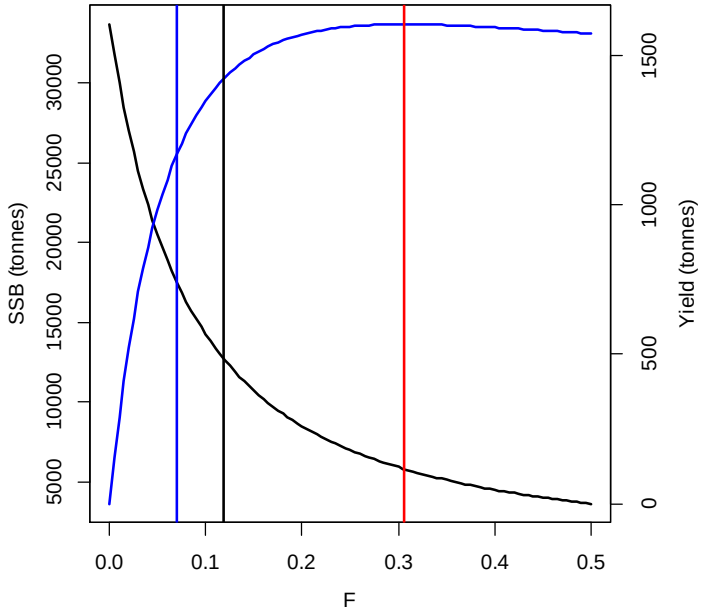

Figure 9.3.16.2.4 Blue ling in Division Vb and Subareas VI and VII, yield-per-recruit curves and reference points (blue: $F_{50\%spr}$ = 0.07, black: $F_{0.1}$ = 0.12, red: F_{max} = 0.31).

Table 9.3.16.2.1 Blue ling in Division Vb and Subareas VI and VII. ICES advice, management, and catches.

Year	ICES Advice	Predicted catch corresp. to advice	TAC EU Vb (Faroese waters)[1]	TAC EU VI and VII	TAC Faroese VI and VII	TAC Norway IIa, Vb, IV, VI, and VII	ICES catches Vb, VI, and VII
2003	No direct fisheries[2]		3.24	3.678	0.94		7.4
2004	Biennial		3.24	3.678	0.9	-	6.2
2005	No direct fisheries[2]	-	3.24	3.137	0.9	0.2	5.5
2006	Biennial	-	3.065	3.137	0.4	0.2	5.7
2007	No direct fisheries	-	3.065	2.510	0.2	0.16	5.7
2008	Biennial	-	3.065	2.009	0.2	0.15	3.9
2009	No direct fisheries	-	3.065	2.009	0.15	0.15	4.1
2010	Biennial	-	2.700	1.732	0.150	0.150	4.8
2011	No direct fishery and effort to limit bycatch. A reduction in catches should be considered	-	0	1.717	0	0.150	2.9
2012	No new advice, same as 2011		0	1.882	0	0.150	2.0
2013	Average catch 2008 to 2011	3.9	0	2.540	0	0.150	2.7
2014	No new advice, same as 2013	3.9		2.540			
2015	MSY approach	< 5.050					
2016	No new advice, same as 2015	< 5.050					

Weights in thousand tonnes.
[1]TAC for ling and blue ling. Including a bycatch of roundnose grenadier and black scabbardfish.
[2] Advice for blue ling in the Northeast Atlantic (not split by different assessment units).

Table 9.3.16.2.2 Blue ling in Division Vb and Subareas VI and VII. ICES estimates of catches used for assessment (tonnes).

Year	**Vb**	**VI**	**VII**	**Total**
1966	1269	20		**1289**
1967	1244	72		**1316**
1968	2661	126		**2787**
1969	1101	118		**1219**
1970	3066	176		**3242**
1971	1924	15		**1939**
1972	3933	710		**4643**
1973	7147	18025		**25172**
1974	3798	16777		**20575**
1975	6186	8007		**14193**
1976	12938	6310		**19248**
1977	21318	9031		**30349**
1978	4898	8102		**13000**
1979	4878	5209		**10087**
1980	10019	12268		**22287**
1981	5027	8168		**13195**
1982	6457	4455		**10912**
1983	5724	5708		**11432**
1984	8094	7343		**15437**
1985	6054	13151		**19205**

Year	**Vb**	**VI**	**VII**	**Total**
1986	7821	13197		**21018**
1987	7139	10291		**17430**
1988	9526	9294	22	**18842**
1989	5266	9556	294	**15116**
1990	4799	7405	223	**12427**
1991	2962	9011	212	**12185**
1992	4702	8550	407	**13659**
1993	2836	7632	321	**10789**
1994	1644	4334	339	**6317**
1995	2440	4900	230	**7570**
1996	1602	6564	365	**8531**
1997	2798	7186	383	**10367**
1998	2584	7497	601	**10682**
1999	2931	9085	390	**12406**
2000	2524	8352	284	**11160**
2001	2114	9178	835	**12127**
2002	2024	6053	676	**8753**
2003	3815	3338	122	**7275**
2004	2700	3459	63	**6222**
2005	2516	2891	74	**5481**
2006	2850	2733	67	**5650**
2007	3296	2188	164	**5648**
2008	2060	1846	34	**3940**
2009	1461	2649	11	**4121**
2010	2244	2478	37	**4759**
2011	1469	1343	49	**2861**
2012	1447	1539	45	**3031**
2013*	1170	1483	32	**2685**

*Preliminary.

Table 9.3.16.2.3 Blue ling in Division Vb and Subareas VI and VII. Summary of the assessment.

Year	Recruitment	High	Low	SSB	High	Low	Catches	Mean F	High	Low
	Age 9							Ages 9–22		
	thousands			tonnes			tonnes			
1995	3347	3970	2725	56874	68967	44781	7570	0.119	0.147	0.092
1996	3360	3999	2720	56701	67154	46247	8531	0.125	0.15	0.1
1997	3394	4050	2738	54263	63031	45496	10367	0.168	0.198	0.138
1998	3349	3974	2724	52920	60911	44929	10682	0.171	0.2	0.142
1999	3419	4078	2760	53217	60813	45622	12406	0.219	0.255	0.184
2000	3404	4023	2784	47557	54456	40658	11160	0.224	0.261	0.187
2001	3370	3967	2773	48052	55252	40853	12127	0.244	0.285	0.202
2002	3191	3890	2492	43865	50997	36734	8753	0.183	0.216	0.15
2003	3231	3880	2582	40815	47814	33815	7275	0.158	0.188	0.128
2004	3297	3896	2697	40760	47954	33565	6222	0.122	0.145	0.098
2005	3464	4099	2829	47100	55135	39065	5481	0.11	0.13	0.09
2006	3544	4259	2829	47090	55022	39158	5650	0.113	0.134	0.093
2007	3462	4093	2831	45022	52800	37244	5648	0.103	0.122	0.084
2008	3529	4221	2837	51166	60330	42002	3940	0.073	0.087	0.059
2009	3213	3864	2562	54155	63861	44449	4121	0.072	0.085	0.058
2010	3255	3899	2610	58725	69386	48064	4759	0.078	0.093	0.063
2011	3126	3882	2370	57862	68804	46921	2861	0.047	0.056	0.038
2012	3203	3907	2500	62854	74888	50820	3031	0.046	0.055	0.037
2013	3422	4091	2752	63803	75730	51875	2685	0.041	0.048	0.033
2014	3319	3981	2657	68213	80731	55695				
Average	**3345**	**4001**	**2689**	**52551**	**61702**	**43400**	**7014**	**0.127**	**0.15**	**0.104**