

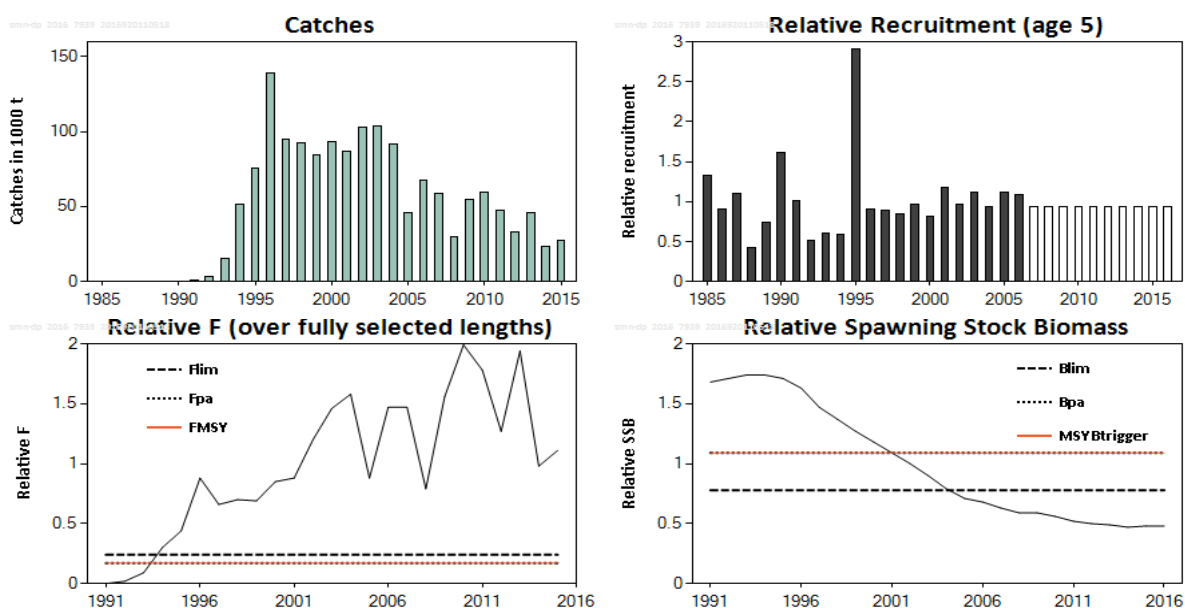
### 2.3.12 Beaked redfish (*Sebastes mentella*) in ICES subareas 5, 12, and 14 (Iceland and Faroes grounds, north of Azores, east of Greenland) and NAFO subareas 1+2 (deep pelagic stock > 500 m)

#### ICES stock advice

ICES advises that when the MSY approach is applied, there should be zero catch in each of the years 2017 and 2018.

#### Stock development over time

The SSB has decreased since 1994 and is now below  $B_{lim}$ . Since the start of the fishery in 1991 fishing mortality increased sharply and has been high and fluctuating since the early 2000s. Fishing mortality has exceeded  $F_{lim}$  since 1994. Recruitment has been overall stable with a few good year classes (corresponding to age 5 recruitment in 1990 and 1995) that presently contribute to the fishable biomass.



**Figure 2.3.12.1** Beaked redfish in ICES subareas 5, 12, and 14 and NAFO subareas 1+2 (deep pelagic stock > 500 m). Top left: Catches (thousand tonnes). Top right: recruitment (R) at age 5. R since 2007 is assumed to be at the geometric mean of 1985–2006. Bottom left: fishing mortality (F). Bottom right: spawning-stock biomass (SSB). R, F, and SSB are expressed relative to the average of the time-series (1985–2016 for R, 1991–2015 for F, and 1991–2016 for SSB).

#### Stock and exploitation status

**Table 2.3.12.1** Beaked redfish in ICES subareas 5, 12, and 14 and NAFO subareas 1+2 (deep pelagic stock > 500 m). State of the stock and fishery, relative to reference points.

		Fishing pressure			Stock size			
		2013	2014	2015	2014	2015	2016	
Maximum sustainable yield	$F_{MSY}$	✗	✗	✗	MSY	✗	✗	Above
Precautionary approach	$F_{pa}$ , $F_{lim}$	✗	✗	✗	$B_{pa}$ , $B_{lim}$	✗	✗	Harvested unsustainably
Management plan	$F_{MGT}$	-	-	-	$SSB_{MGT}$	-	-	Not applicable
								Below trigger
								Reduced reproductive capacity
								Not applicable

**Catch options**

**Table 2.3.12.2** Beaked redfish in ICES subareas 5, 12, and 14 and NAFO subareas 1+2 (deep pelagic stock > 500 m). Basis for the catch options. All values, except for the catch, are relative to the average of the time-series in the stock assessment (see Table 2.3.12.12).

Variable	Value	Source	Notes
Relative F (fully selected lengths)(2016)	1.17	ICES (2016a)	F corresponding to the assumed catch in 2016.
Relative SSB (2017)	0.47	ICES (2016a)	
Relative R <sub>ages</sub> (2017)	0.94	ICES (2016a)	Geometric mean 1985–2006
Relative R <sub>ages</sub> (2018)	0.94	ICES (2016a)	Geometric mean 1985–2006
Total catch (2016)	29 000 t	ICES (2016a)	Reported catches by mid-July plus 1000 t (as the fishery is almost completed by mid-July).

**Table 2.3.12.3** Beaked redfish in ICES subareas 5, 12, and 14 and NAFO subareas 1+2 (deep pelagic stock > 500 m). Catch options. The values in the columns “Relative F” and “Relative SSB” are relative to the average of the time-series in the stock assessment (see Table 2.3.12.12). Catch is in tonnes.

Rationale	Basis	Relative F (2017)	Catch (2017)	Relative SSB (2018)	Relative F (2018)	Catch (2018)	Relative SSB (2019)	%SSB change*
MSY approach	Zero catch	0	0	0.508	0	0	0.548	17
Other options	$F_{MSY} \times SSB^{**} / MSY B_{trigger}$	0.08	1953	0.506	0.08	2378	0.540	15
	$F_{MSY}$	0.17	4386	0.502	0.17	4978	0.535	14
	$0.1 \times F_{2016}$	0.12	3011	0.504	0.12	3439	0.539	15
	$0.2 \times F_{2016}$	0.23	5908	0.500	0.23	6658	0.531	13
	$0.3 \times F_{2016}$	0.35	8695	0.496	0.35	9672	0.523	11
	$0.4 \times F_{2016}$	0.47	11378	0.493	0.47	12498	0.516	10
	$0.5 \times F_{2016}$	0.59	13961	0.489	0.59	15148	0.509	8
	$0.6 \times F_{2016}$	0.70	16449	0.486	0.70	17637	0.502	7
	$0.7 \times F_{2016}$	0.82	18846	0.483	0.82	19974	0.496	6
	$0.8 \times F_{2016}$	0.93	21155	0.479	0.93	22172	0.489	4
	$0.9 \times F_{2016}$	1.05	23381	0.476	1.05	24240	0.484	3
$1 \times F_{2016}$	1.17	25531	0.474	1.17	26187	0.478	2	

\* SSB in 2019 relative to SSB in 2017.

\*\* This formula is applied with SSB(2017) to calculate F in 2017, and with SSB(2018) to calculate F in 2018.

**Basis of the advice**

**Table 2.3.12.4** Beaked redfish in ICES subareas 5, 12, and 14 and NAFO subareas 1+2 (deep pelagic stock > 500 m). The basis of the advice.

Advice basis	MSY approach (ICES, 2016b).
Management plan	There is no management plan for the stock.

**Quality of the assessment**

A fishery-independent time-series from an international trawl–acoustic survey is available from 1999 and provides a biomass index every two years. The last available data point is from 2015. The survey coverage, although variable, is considered to be adequate.

For the first time an age–length-based assessment model has been applied to give relative estimates of abundance and exploitation rates for this stock. This model utilizes age and length information from the fishery in addition to the biomass index and lengths from the trawl–acoustic survey. Even though the time-series available from the fishery and the survey are

short relative to the life-time of the species, the assessment captures trends in stock biomass and fishing mortality reliably and this framework is considered a major improvement to the quality of the assessment. As some aspects of the assessment and short-term forecast still require further exploration and the data presently available cover only a short period relative to the life-span of the species, ICES presently considers this assessment to be in Category 2.

Recruitment (age 5) estimates from the assessment take about 8–10 years to stabilize. For this reason, the original recruitment estimates obtained from the assessment model for the years 2007 and onwards have been replaced with the geometric mean of the estimates from 1985–2006. This has resulted in a 7% increase in the SSB and harvestable biomass estimates in 2016 in comparison with the estimates obtained from the assessment model without replacing recruitment. The assumed year classes, corresponding to fish at ages less than or equal to 15 in 2017, constitute approximately 55% of the SSB and 30% of the harvestable biomass in 2017. While this indicates uncertainty in the catch and SSB values presented in the catch options table (Table 2.3.12.3), the conclusion that the SSB will remain below  $B_{lim}$  even without any catches in 2017 and 2018 is still valid.

The fishery targets pelagic aggregating fish. CPUE data are not considered for the assessment of this stock because it is not known to what extent CPUE reflects changes in the stock status of the deep pelagic *S. mentella* stock.

Allocation of redfish catches to individual stocks requires information on the depth of catches. ICES could not obtain catch data disaggregated by depth from the Russian Federation, who contributed between 40% and 70% of the deep pelagic catches in 2010–2015, with the highest proportion being taken in 2015. Therefore, the disaggregation by depth has been carried out using information from other fleets fishing at approximately the same location. ICES recommends that all nations should report depth information on a haul basis in accordance with the NEAFC logbook format. In addition, NEAFC should ensure that age and length data are provided for Russian catches as these catches constitute the majority of the catches.

### Issues relevant for the advice

The next available survey will be in 2018. Since no new significant information is expected to become available before that time to alter the perception of the stock status, ICES is now providing advice for 2017 and 2018.

SSB is forecasted to remain below  $B_{lim}$  in 2019, even with no catches being taken in 2017 and 2018. Therefore, ICES advises a zero catch for 2017 and 2018.

The Russian Federation has decided on a unilateral quota since 2011 that considered both redfish management units (shallow and deep pelagic redfish in ICES subareas 5, 12, and 14 and NAFO subareas 1+2) as a single stock. In recent years the total catches by all countries fishing for pelagic redfish have considerably exceeded the sum of ICES advised catch for both stocks. Since ICES now advises zero catch for both management units this implies catch advice of zero for a combined unit.

**Reference points**

**Table 2.3.12.5** Beaked redfish in ICES subareas 5, 12, and 14 and NAFO subareas 1+2 (deep pelagic stock > 500 m). Reference points, relative values, and their technical basis.

Framework	Reference point	Relative value*	Technical basis	Source
MSY approach	MSY $B_{trigger}$	1.09	$B_{pa}$	ICES (2016a)
	$F_{MSY}$	0.17	Maximizes long-term yield in stochastic simulations based on recruitment estimates from 1985 to 2006, while being constrained to remain less than or equal to $F_{pa}$ .	ICES (2016a)
Precautionary approach	$B_{lim}$	0.78	Proxy set at $B_{pa}/1.4$	ICES (2016a)
	$B_{pa}$	1.09	$B_{loss}$ , in the absence of any evidence of recruitment impairment = SSB in 2001 (the minimum biomass from the years corresponding to the year classes with reliable recruitment estimates, 1990–2001).	ICES (2016a)
	$F_{lim}$	0.24	The F that leads to $B_{lim}$ in the long term. From stochastic simulations.	ICES (2016a)
	$F_{pa}$	0.17	$F_{lim} / 1.4$	ICES (2016a)
Management plan	$SSB_{MGT}$	Not defined		
	$F_{MGT}$	Not defined		

\* All values are relative to the average of the time-series in the stock assessment (see Table 2.3.12.12).

**Basis of the assessment**

**Table 2.3.12.6** Beaked redfish in ICES subareas 5, 12, and 14 and NAFO subareas 1+2 (deep pelagic stock > 500 m). The basis of the assessment.

ICES stock data category	2 ( <a href="#">ICES, 2016b</a> ).
Assessment type	Analytical age-length structured assessment (Gadget model) that uses catches in the model and in the forecast.
Input data	Commercial catches (international landings); length and age data from catches; survey index and length data (International Acoustic and Trawl Survey for redfish); natural mortality is assumed to be 0.05 for all ages and years.
Discards and bycatch	Not included, considered negligible.
Indicators	None.
Other information	Benchmarked in 2016 (WKDEEPRED, ICES 2016a).
Working group	North-Western Working Group ( <a href="#">NWWG</a> ).

**Information from stakeholders**

There was no available information.

**History of advice, catch, and management**

**Table 2.3.12.7** Beaked redfish in ICES subareas 5, 12, and 14 and NAFO subareas 1+2 (deep pelagic stock > 500 m). History of ICES advice, the agreed TAC, and ICES estimates of catch.

Year	ICES advice*	Predicted catch corresp. to advice*	TAC*	Total deep and shallow pelagic TAC**	Unilateral Russian Federation TAC #	ICES catch* –Total	ICES catch – deep pelagic stock
1991	TAC	66				28	0
1992	Preference for no major expansion of the fishery	-				66	3
1993	TAC	50				116	16
1994	TAC	100				148	52
1995	TAC	100				176	78
1996	No specific advice	-		153		180	139
1997	No specific advice	-		153–158		123	95
1998	TAC not over recent (1993–1996) levels of 150 000 t			153		117	93
1999	TAC to be reduced from recent (1993–1996) levels of 150 000 t			153		110	84
2000	TAC set lower than recent (1997–1998) catches of 120 000 t	85		120		126	93
2001	TAC less than 75% of catch 1997–1999	< 85		95		129	88
2002	TAC less than 75% of catch 1997–1999 – Revised to be below current catch levels	< 85		95##		146	103
2003	TAC not to exceed current catch levels	119		119##		161	104
2004	TAC not to exceed current catch levels	120		120##		126	92
2005	Limit catch to 41 kt	41	75	116##		74	45
2006	Catch less than 41 kt	41	62	99##		83	67
2007	No fishery until clear indications of recovery of the stock	0	46	73##		64	59
2008	Starting point for adaptive management strategy	20	46	73##		32	30
2009	Starting point for adaptive management strategy	20	46	78##		54	52
2010	Reducing fishing: Starting point for adaptive management strategy	20	46	78##		59	57
2011	Reducing fishing: Starting point for adaptive management strategy	20	38	60##	30	48	47
2012	Reducing fishing: Starting point for adaptive management strategy	20	32	54	30	36	33
2013	Precautionary considerations. Management plan to be developed and implemented	20	26	48	27	48	46
2014	Same advice as last year	20	20	43	27	30	24
2015	Precautionary consideration	< 10	9.5	35	27	33	27
2016	Reduce catches significantly	< 10	8.5	34	27		
2017	MSY approach	0					
2018	MSY approach	0					

Weights in thousand tonnes.

\* Until 2009 the advice and TAC was given for shallow and deep stocks combined.

\*\* Sum of all quotas in force, for both shallow and deep pelagic stocks.

# Unilateral Russian Federation TAC for both shallow and deep pelagic stocks.

## No agreed NEAFC proposal.

### History of catch and landings

**Table 2.3.12.8** Beaked redfish in ICES subareas 5, 12, and 14 and NAFO subareas 1+2 (deep pelagic stock > 500 m). Catch distribution by fleet in 2015 as estimated by ICES.

Total catch (2015)	Commercial landings	Commercial discards
27.4 kt	100% pelagic trawl	Negligible
	27.4 kt	

**Table 2.3.12.9** Beaked redfish in ICES subareas 5, 12, and 14 and NAFO subareas 1+2 (deep pelagic stock > 500 m). History of commercial catch (t); ICES estimated values are presented by area.

Year	Division 5.a	Subarea 12	Subarea 14	NAFO Division 1F	Total
1991	0	7	52	0	59
1992	1862	280	1257	0	3398
1993	2603	6068	6393	0	15064
1994	14807	16977	20036	0	51820
1995	1466	53141	21100	0	75707
1996	4728	20060	113765	0	138552
1997	14980	1615	78485	0	95079
1998	40328	444	52046	0	92818
1999	36359	373	47421	0	84153
2000	41302	0	51811	0	93113
2001	27920	0	59073	0	86993
2002	37269	2	65858	0	103128
2003	46627	21	57648	0	104296
2004	14446	0	77508	0	91954
2005	11726	0	33759	0	45485
2006	16452	51	50531	254	67288
2007	17769	0	40748	0	58516
2008	4602	0	25443	0	30045
2009	16828	4658	32920	0	54406
2010	8552	0	50736	0	59288
2011	0	7	47326	0	47333
2012	5530	608	26668	0	32806
2013	5274	0	40778	0	46052
2014	603	0	23152	0	23755
2015	1821	0	25612	0	27433

1991–1996: Estimates are based on different sources.

1997–2014: Calculations based on joint catches by depth database from some countries and total catch of “deep” and “shallow” pelagic *S. mentella*.

**Table 2.3.12.10** Beaked redfish in ICES subareas 5, 12, and 14 and NAFO subareas 1+2 (deep pelagic stock > 500 m). Catches inside and outside the NEAFC Regulatory Area (RA) as estimated by ICES. Weights are in tonnes.

Year	Inside the NEAFC RA (t)	Outside the NEAFC RA (t)	Catches (t)
2012	27276	5530	32806
2013	40778	5274	46052
2014	23152	603	23755
2015	25612	1821	27433

**Table 2.3.12.11** Beaked redfish in ICES subareas 5, 12, and 14 and NAFO subareas 1+2 (deep pelagic stock > 500 m). History of commercial catch (t), ICES estimated values are presented by country.

Year	Bulgaria	Canada	Estonia	Faroes	France	Germany	Greenland	Iceland	Japan	Latvia	Lithuania	Netherlands	Norway	Poland	Portugal	Russia	Spain	UK	Ukraine	Total
1991								59												59
1992								3398												3398
1993				310		1135		12741					878							15064
1994						2019		47435					523		377	1465				51820
1995	1140	181	5056	1572	68	8271	1579	25898	396	1501	6868	4	3169		2955	15868	227		956	75707
1996	1654	307	3351	3748		15549	1671	57143	196	512	5031		5161		1903	36400	5558	123	245	138552
1997		9	315	435		11200		36830	3				2849		3307	33237	6895			95079
1998			76	4484		8368	302	46537	1		34		438		4073	25748	2758			92818
1999			53	3466		8218	3271	40261					3337		4240	11419	9885	5		84153
2000			7733	2367		6827	3327	41466			0		3108		3694	14851	9740			93113
2001			878	3377		5914	2360	27727			7515		4275		2488	23810	8649			86993
2002			15	3664		7858	3442	39263			9771		4197		2208	25309	7402			103128
2003				3938		7028	3403	44620			0		5185		2109	28638	9374			104296
2004				4670		2251	2419	31098			0		6277	1889	2286	31067	9996			91954
2005				1800		1836	1431	12919			1027		3950	1240	1088	16323	3871			45485
2006				3498		1830	744	20942			1294		5968	1356	1313	23670	6673			67288
2007				2902		1110	1961	18097		575	1394		4628	636	2067	21337	3810			58516
2008				2632			1170	6723			749		571	219	1733	15106	1142			30045
2009				3206			1519	15125		1355	2613			178	1596	25309	2907			54006
2010				3195			1932	14772		1963	2228		2388	3	2203	22803	7801			59288
2011				2028		1787		11994		845	1348		1066		1540	22364	4361			47333
2012				1438		1523		5912		724	558		3362		250	18377	632			32806
2013				1882		1176		8545		1200	1163		2979			26463	2644*			46052
2014				721		890		2081		867	1024		1965			15475	732*			23755
2015**				779		918		1968			330		1547		202	20214	1475*			27433

\* Official Spanish catch data were lower than the data provided by NEAFC and the WG decided to use the highest catch data as a precautionary measure.

\*\* Provisional.

**Summary of the assessment**

**Table 2.3.12.12** Beaked redfish in ICES subareas 5, 12, and 14 and NAFO subareas 1+2 (deep pelagic stock > 500 m). Assessment summary. Values of recruitment, total biomass, SSB, and F are relative to the average of the time-series. Catch is in tonnes.

Year	Relative recruitment* (age 5)	Relative total biomass	Relative SSB	Catch (t)	Relative F (fully selected lengths)
1985	1.33				
1986	0.90				
1987	1.10				
1988	0.42				
1989	0.74				
1990	1.61				
1991	1.01	1.63	1.68	59	0.00
1992	0.52	1.65	1.71	3398	0.02
1993	0.61	1.66	1.74	15064	0.09
1994	0.59	1.65	1.74	51820	0.30
1995	2.91	1.65	1.71	75707	0.44
1996	0.90	1.58	1.63	139000	0.88
1997	0.89	1.43	1.47	95079	0.66
1998	0.85	1.33	1.37	92818	0.70
1999	0.97	1.24	1.27	84153	0.69
2000	0.82	1.16	1.18	93113	0.85
2001	1.17	1.08	1.09	86993	0.88
2002	0.97	1.00	1.00	103000	1.20
2003	1.11	0.91	0.90	104000	1.46
2004	0.93	0.81	0.79	91954	1.58
2005	1.12	0.74	0.71	45485	0.88
2006	1.08	0.72	0.68	67288	1.47
2007	0.94	0.67	0.63	58516	1.47
2008	0.94	0.64	0.59	30045	0.79
2009	0.94	0.63	0.59	54406	1.56
2010	0.94	0.60	0.56	59288	1.99
2011	0.94	0.57	0.52	47333	1.78
2012	0.94	0.54	0.50	32806	1.27
2013	0.94	0.54	0.49	46052	1.94
2014	0.94	0.52	0.47	23755	0.98
2015	0.94	0.53	0.48	27433	1.11
2016	0.94	0.53	0.48		
AVERAGE	1.00	1.00	1.00		1.00

\* Recruitment in 2007 and later years has been set at the geometric mean of the period 1985–2006 because of unreliable estimates in the assessment. F and SSB from 2007 onwards have been recalculated according to these average recruitment values.



## Sources and references

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