# Striped red mullet (*Mullus surmuletus*) in Subarea 4 and divisions 7.d and 3.a (North Sea, eastern English Channel, Skagerrak and Kattegat)

ICES stock advice

ICES advises that when the precautionary approach is applied, catches should be no more than 465 tonnes in each of the years 2018 and 2019. All catches are assumed to be landed.

Stock development over time

The assessment is indicative of trends only. Biomass estimates and landings showed increases in 2014–2015. Based on survey indices and landings-at-age structure, this increase was caused by a strong recruitment in 2014. Spawning-stock biomass decreased in 2016 as a consequence of the poor recruitment and high catches seen since 2015.
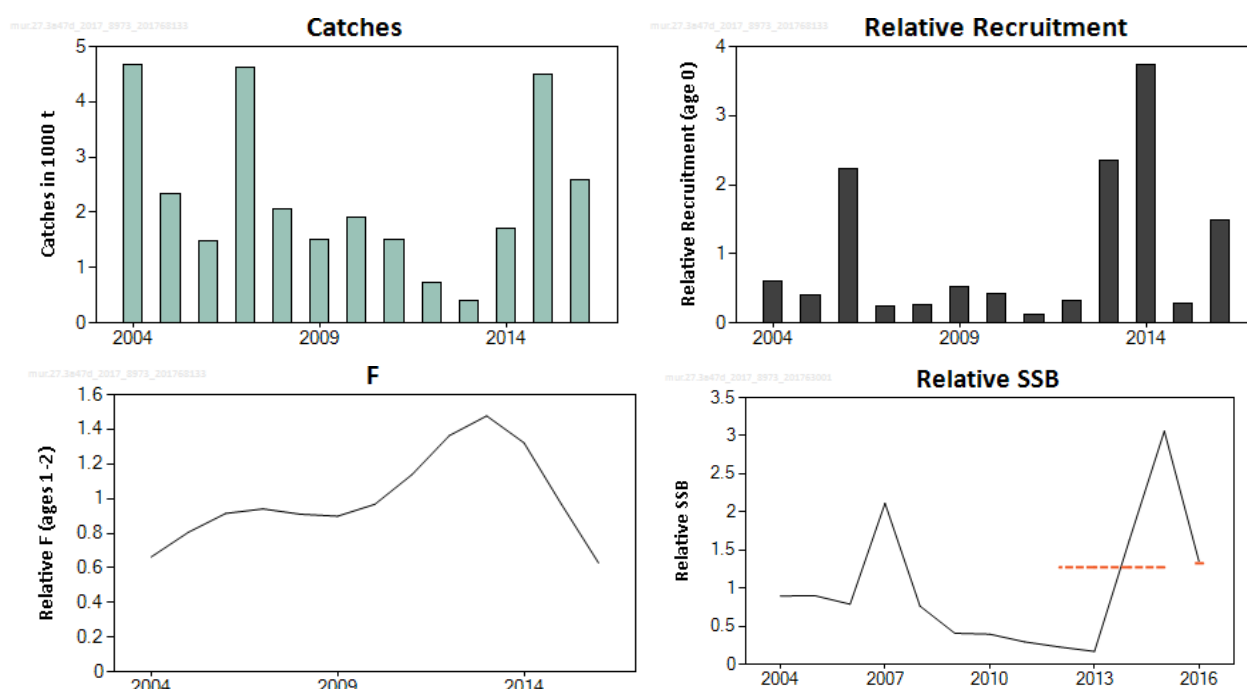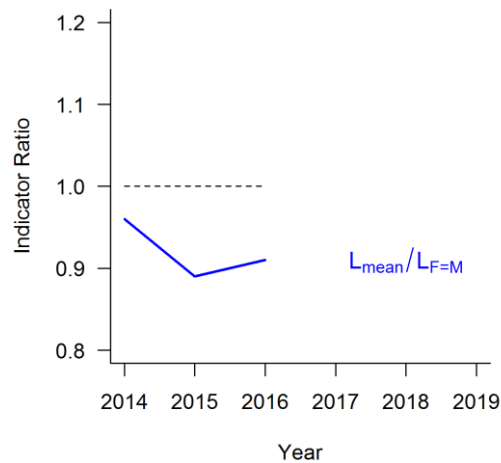

Figure 1   Striped red mullet in Subarea 4 and divisions 7.d and 3.a. Summary of the stock assessment.

Stock and exploitation status

Table 1   Striped red mullet in Subarea 4 and divisions 7.d and 3.a. State of the stock and fishery relative to reference points. The fishing pressure indicators are based on the length-based analyses shown in Table 2.

		Fishing pressure				Stock size			
		2014	2015	2016			2014	2015	2016
Maximum sustainable yield	$F_{MSY\ proxy}$	❌	❌	❌ Above	MSY $B_{trigger}$		❓	❓	❓ Undefined
Precautionary approach	F_{pa}, F_{lim}	❓	❓	❓ Undefined	B_{pa}, B_{lim}		❓	❓	❓ Undefined
Management plan	F_{MGT}	—	—	— Not applicable	B_{MGT}		—	—	— Not applicable
Qualitative evaluation	-	—	—	— -	-		↗	↗	↘ Decreasing

Figure 2   Striped red mullet in Subarea 4 and divisions 7.d and 3.a. The index ratio $L_{mean}/L_{F=M}$ is taken from the length-based indicator (LBI; ICES, 2015a) method used for the evaluation of the exploitation status. The exploitation status is below the F_{MSY} proxy when the index ratio value is higher than 1.

Catch options

The ICES framework for category 3 stocks was applied (ICES, 2012). The aged-based model SSB results were used as an index of stock development. The advice is based on a comparison of the latest index values (index A) with the four preceding values (index B), multiplied by the recent advised catch. The index is estimated to have increased by less than 20% and thus the uncertainty cap is not applied.

Fishing mortality is above proxies of the MSY reference points (as indicated by a length-based analysis). The stock size relative to reference points is unknown. For these reasons, the precautionary buffer, which was last applied in 2013, was applied again in this assessment.

Table 2   Striped red mullet in Subarea 4 and divisions 7.d and 3.a. The basis for the catch options.*

Index A (2016)		2.2
Index B (2012–2015)		0.68
Index ratio (A/B)		1.05
Uncertainty cap	Not applied	-
Advised catch for 2016–2017		552 tonnes
Discard rate		Negligible
Precautionary buffer	Applied	0.80
Catch advice**		465 tonnes

* The figures in the table are rounded. Calculations were done with unrounded inputs and computed values may not match exactly when calculated using the rounded figures in the table.

** [Advised catch for 2016–2017] × [uncertainty cap] × [precautionary buffer].

Basis of the advice

Table 3   Striped red mullet in Subarea 4 and divisions 7.d and 3.a. The basis of the advice.

Advice basis	Precautionary approach.
Management plan	ICES is not aware of any agreed precautionary management plan for striped red mullet in this area.

Quality of the assessment

This stock was benchmarked in 2015 (ICES, 2015b). The SSB trend estimated by the age-based model was considered to be a more reliable indicator of stock status than direct use of the survey indices.

The assessment, however, only relies on information collected in the eastern English Channel, on age-structured data provided by France, and on length data provided by France and the UK. The percentage of landings covered by length sampling is around 20%, with only 17% covered by age sampling. Length and age structures of the main fleets are needed to avoid any bias in the assessment.

Issues relevant for the advice

Landings are assumed to be catches because there is no minimum landing size and there is a market for small fish.

The age structure is truncated and recent catches of this stock mainly consist of age 0 and age 1 fish. There is no evidence of a strong incoming recruitment in 2016.The fishery for striped red mullet would benefit from improved technical measures such as sorting grids, increased mesh size, and spatial and temporal closures. These measures could reduce the catches of small fish and contribute to more stable yields.

The basis for the advice changed from a comparison of the two latest index values with the three preceding values to a comparison of the latest index values with the four preceding values. The reason for this change is that striped red mullet is a relatively short-lived species.

Reference points

Table 4   Striped red mullet in Subarea 4 and divisions 7.d and 3.a. Reference points, values, and their technical basis.

Framework	Reference point	Value	Technical basis	Source
MSY approach	MSY $B_{trigger_{proxy}}$	Not defined		
	$F_{MSY_{proxy}}$	24.6 cm (2015–2016)	Expected mean length of catch above L_c when F = M, assuming M/K = 1.5.	ICES (2017)
Precautionary approach	B_{lim}	Not defined		
	B_{pa}	Not defined		
	F_{lim}	Not defined		
	F_{pa}	Not defined		
Management plan	SSB_{MGT}	Not defined		
	F_{MGT}	Not defined		

Basis of the assessment

Table 5   Striped red mullet in Subarea 4 and divisions 7.d and 3.a. Basis of the assessment and advice.

ICES stock data category	3 (ICES, 2016).
Assessment type	Age-based assessment (a4a; Jardim *et al.*, 2015) indicative of trends (ICES, 2017).
Input data	Commercial landings (age frequencies from landings sampling in Division 7.d), survey index (CGFS). Natural mortality and maturity-at-age are assumed constant.
Discards and bycatch	Not included, are considered negligible.
Additional indicators	Length-based indicators.
Other information	Benchmarked in 2015 (ICES, 2015b).
Working group	Working Group on the Assessment of Demersal Stocks in the North Sea and Skagerrak (WGNSSK)

Information from stakeholders

There is no additional available information.

History of the advice, catch, and management

Table 6   Striped red mullet in Subarea 4 and divisions 7.d and 3.a. ICES advice and official landings. All weights are in tonnes.

Year	ICES advice	Predicted catch corresp. to advice	Official landings	ICES estimates
2006		-	1724	1483
2007		-	5328	4610
2008		-	5365	2066
2009		-	2026	1518
2010		-	2166	1920
2011		-	1817	1512
2012	No increase in catch	-	893	726
2013	No increase in catches (average 2009–2010)	< 1700	461	409
2014	Reduce catches by 36% compared to 2012	< 460	2002	1718
2015	No new advice, same as for 2014	< 460	4161	4487
2016	Precautionary approach (increase catches by no more than 20%)	< 552	2609	2579
2017	Precautionary approach (same advised catch value as given for 2016)	< 552		
2018	Precautionary approach	≤ 465		
2019	Precautionary approach	≤ 465		

History of the catch and landings

Table 7   Striped red mullet in Subarea 4 and divisions 7.d and 3.a. Catch distribution by fleet in 2016 as estimated by ICES.

Catch (2016)	Landings			Discards
2579 tonnes	Danish seine 63%	Otter trawl 26%	Others 11%	negligible
	2579 tonnes			

Table 8   Striped red mullet in Subarea 4 and divisions 7.d and 3.a. History of commercial landings; both the official and ICES estimated values are presented by area for each country participating in the fishery. All weights are in tonnes.

Year	Belgium	France	Netherlands	UK	Total official landings	Total landings (ICES estimates)
2004	31	4137	1148	129	5445	4674
2005	29	1918	914	136	2997	2350
2006	16	1145	466	97	1724	1483
2007	16	3982	1147	183	5328	4610
2008	19	3723	1270	353	5365	2066
2009	17	827	889	293	2026	1518
2010	80	947	802	337	2166	1920
2011	97	705	771	244	1817	1512
2012	52	170	525	146	893	726
2013	40	121	260	40	461	409
2014	79	765	912	242	2002	1718
2015	211	1598	1996	356	4161	4487
2016	147	556	1421	485	2609	2579

Summary of the assessment

Table 9   Striped red mullet in Subarea 4 and divisions 7.d and 3.a. Assessment summary. Weights are in tonnes.

Year	Relative F Ages 1–2	Relative recruitment Age 0	Relative SSB	Catches tonnes
2004	0.66	0.61	0.90	4674
2005	0.81	0.39	0.90	2350
2006	0.91	2.2	0.79	1483
2007	0.94	0.25	2.1	4610
2008	0.91	0.27	0.77	2066
2009	0.90	0.53	0.41	1518
2010	0.97	0.43	0.40	1920
2011	1.14	0.117	0.30	1512
2012	1.36	0.32	0.23	726
2013	1.48	2.3	0.170	409
2014	1.32	3.7	1.63	1718
2015	0.97	0.28	3.1	4487
2016	0.63	1.49	1.34	2579

Sources and references

ICES. 2012. ICES Implementation of Advice for Data-limited Stocks in 2012 in its 2012 Advice. ICES CM 2012/ACOM:68. 42 pp.

ICES. 2015a. Report of the Fifth Workshop on the Development of Quantitative Assessment Methodologies based on Life-history Traits, Exploitation Characteristics and other Relevant Parameters for Data-limited Stocks (WKLIFE V), 5–9 October 2015, Lisbon, Portugal. ICES CM 2015/ACOM:56. 157 pp.

ICES. 2015b. Report of the Benchmark Workshop on North Sea Stocks (WKNSEA), 2–6 February 2015, Copenhagen, Denmark. ICES CM 2015/ACOM:32. 253 pp.

ICES. 2016. Advice basis. *In* Report of the ICES Advisory Committee, 2016. ICES Advice 2016, Book 1, Section 1.2.

ICES. 2017. Report of the Working Group on the Assessment of Demersal Stocks in the North Sea and Skagerrak (WGNSSK), 26 April–5 May 2017, ICES Headquarters, Copenhagen, Denmark. ICES CM 2017/ACOM:21.

Jardim, E., Millar, C. P., Mosqueira, I., Scott, F., Osio, G. C., Ferretti, M., Alzorriz, N., and Orio, A. 2015. What if stock assessment is as simple as a linear model? The a4a initiative. ICES Journal of Marine Science, 72: 232–236.