

Megrim (*Lepidorhombus whiffiagonis*) in divisions 8.c and 9.a (Cantabrian Sea and Atlantic Iberian waters)

ICES advice on fishing opportunities

ICES advises that when the MSY approach is applied, catches in 2019 should be no more than 431 tonnes.

Management of megrim and four-spot megrim under a combined species TAC prevents effective control of the single-species exploitation rates and could lead to overexploitation of either species.

Stock development over time

The spawning-stock biomass (SSB) has generally increased from a minimum in 2009 and is now above MSY $B_{trigger}$. Large variation is evident in fishing mortality (F) for much of the time-series. F has declined from F_{lim} in 2014 to below F_{MSY} in 2017. Estimated recruitment (R) in 2015 to 2017 is the highest since the mid-1990s.



Figure 1 Megrim in divisions 8.c and 9.a. Summary of the stock assessment. Assumed recruitment values are unshaded.

Stock and exploitation status

ICES assesses that fishing pressure on the stock is below F_{MSY} , F_{pa} and F_{lim} , and that spawning stock size is above $MSY B_{trigger}$, B_{pa} , and B_{lim} .

Table 1 Megrim in divisions 8.c and 9.a. State of the stock and fishery relative to reference points.

	Fishing pressure					Stock size			
		2015	2016	2017			2016	2017	2018
Maximum sustainable yield	F_{MSY}	✗	✗	✓	Below	$MSY B_{trigger}$	✓	✓	✓ Above trigger
Precautionary approach	F_{pa}, F_{lim}	✗	✓	✓	Harvested sustainably	B_{pa}, B_{lim}	✓	✓	✓ Full reproductive capacity
Management plan	F_{MGT}	—	—	—	Not applicable	B_{MGT}	—	—	— Not applicable

Catch scenarios

Table 2 Megrim in divisions 8.c and 9.a. Assumptions made for the interim year and in the forecast. All weights are in tonnes, recruitment in numbers.

Variable	Value	Notes
F (2018)	0.29	Average $F_{2015-2017}$
SSB (2019)	2241	Assessment forecast
Recruitment (2018–2019–2020)	3559000	GM 1998–2015
Total catch (2018)	642	Based on F_{2018}
Landings (2018)	612	According to 2013–2017 average discard rates at age
Discards (2018)	30	According to 2013–2017 average discard rates at age

Table 3 Megrim in divisions 8.c and 9.a. Annual catch scenarios. All weights are in tonnes. Note: The % change in TAC is not computed because the TAC is for the two species (names) combined.

Basis	Total catch (2019)	Wanted catch (2019)	Unwanted catch (2019)	F_{total} (2019)	$F_{landings}$ (2019)	$F_{discards}$ (2019)	SSB (2020)	% SSB change *	% Advice change **
ICES advice basis									
MSY approach: $F_{MSY} = F_{2018} \times 0.649$	431	417	14	0.191	0.181	0.010	2129	–5.0	48
Other scenarios									
$F = 0$	0	0	0	0	0	0	2633	17.5	–100
F_{pa}	669	647	23	0.32	0.30	0.017	1850	–17.5	129
F_{lim}	878	846	32	0.45	0.43	0.025	1608	–28	201
$SSB (2020) = B_{lim}$	1656	1596	61	0.91	0.86	0.050	700	–69	467
$SSB (2020) = B_{pa}$	1417	1365	52	0.78	0.74	0.043	980	–56	385
$SSB (2020) = MSY B_{trigger}$	1417	1365	52	0.78	0.74	0.043	980	–56	385
$F = F_{2018}$	626	605	21	0.29	0.28	0.016	1900	–15.2	114
$F_{MSY lower}$	286	277	9	0.122	0.115	0.007	2297	2.5	–2.1
$F_{MSY upper}$ (without advice rule)	526	509	17	0.24	0.23	0.013	2017	–10.0	80
MSY approach: $F_{MSY lower}$	286	277	9	0.122	0.115	0.007	2297	2.5	–2.1
MSY approach: $F_{MSY upper}$	526	509	17	0.24	0.23	0.013	2017	–10.0	80

* SSB 2020 relative to SSB 2019.

** Catch advice value 2019 relative to catch advice value 2018 (292 tonnes).

Recent high recruitment has contributed to increasing SSB and decreasing fishing mortality, resulting in a 48% increase in catch advice for 2019.

Basis of the advice

Table 4 Megrim in divisions 8.c and 9.a. The basis of the advice.

Advice basis	MSY approach
Management plan	ICES is not aware of any currently agreed precautionary management plans for megrim in this area. The European Commission has proposed a multiannual management plan (MAP) for the Western Waters, which is not yet finalised (EU, 2018).

Quality of the assessment

Retrospective patterns tend to be consistent with an overestimation of SSB and underestimation of fishing mortality.

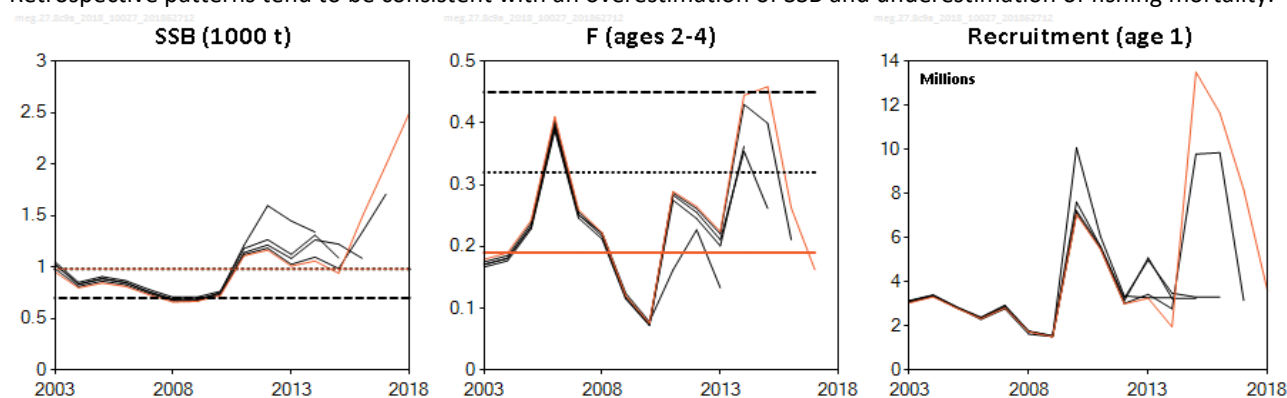


Figure 2 Megrim in divisions 8.c and 9.a. Historical assessment results.

Issues relevant for the advice

The two megrim species (*L. whiffiagonis* and *L. boscii*) are not totally separated in the landings. A single TAC covers both species and species specific landings are estimated by ICES (ICES, 2018a). ICES considers that management of the two megrim species under a combined TAC prevents effective control of the single-species exploitation rates and could lead to overexploitation of either species. Therefore, the advice since 2016 is based on the single-species F_{MSY} .

A mixed-fisheries analysis covering the stocks in Iberian waters of hake, megrim, four-spot megrim, and white anglerfish is provided in ICES (2018b).

Reference points

Table 5 Megrim in divisions 8.c and 9.a. Reference points, values, and their technical basis. All weights are in tonnes.

Framework	Reference point	Value	Technical basis	Source
MSY approach	MSY $B_{trigger}$	980	B_{pa}	ICES (2016a)
	F_{MSY}	0.191	Stochastic simulations based on a segmented regression	ICES (2016a)
Precautionary approach	B_{lim}	700	B_{loss}	ICES (2016b)
	B_{pa}	980	$B_{pa} = B_{lim} \times \exp(\sigma \times 1.645)$; $\sigma = 0.2$	ICES (2016b)
	F_{lim}	0.45	Based on a segmented regression simulation of recruitment, with B_{lim} as the breakpoint and no error	ICES (2016b)
	F_{pa}	0.32	$F_{pa} = F_{lim} \times \exp(-\sigma \times 1.645)$; $\sigma = 0.2$	ICES (2016b)
Management plan	SSB_{mgt}	Not applicable		
	F_{mgt}	Not applicable		
	MAP MSY $B_{trigger}$	980	MSY $B_{trigger}$	
	MAP B_{lim}	700	B_{lim}	
	MAP F_{MSY}	0.191	F_{MSY}	
	MAP range F_{lower}	0.122	Consistent with ranges resulting in no more than 5% reduction in long-term yield compared with MSY (ICES, 2016a).	
	MAP range F_{upper} (without advice rule)	0.24	Consistent with ranges resulting in no more than 5% reduction in long-term yield compared with MSY (ICES, 2016a).	

Basis of the assessment

Table 6 Megrim in divisions 8.c and 9.a. Basis of the assessment and advice.

ICES stock data category	1 (ICES, 2016c)
Assessment type	Age-based assessment (XSA; ICES, 2018a) that uses catches in the model and in the forecast.
Input data	Commercial catches (international landings, ages, and length frequencies from catch sampling); one survey index (SpNSGFS-WIBTS-Q4; 1988–2017, excluding 2003 and 2013); two commercial indices (SP-LGOTBDEF (1986–2017) and SP-AVSOTBDEF (1986–2017)); constant maturity ogive (Anon., 1998); assumed natural mortality of 0.2.
Discards and bycatch	Included in the assessment for all data series from the majority of the fleet.
Indicators	None
Other information	This stock was benchmarked in 2014 (ICES, 2014).
Working group	Working Group for the Bay of Biscay and Iberian Waters Ecoregion (WGBIE)

Information from stakeholders

There is no additional information available.

History of the advice, catch, and management

Table 7 Megrim in divisions 8.c and 9.a. ICES advice and official landings. All weights are in tonnes.

Year	ICES advice	Total landings corresponding to advice*, **, ^^	Catches corresponding to advice <i>L. whiffi.</i> **	Agreed TAC*, ***	ICES landings*	ICES landings <i>L. whiffi.</i>	Discards
1987	Not dealt with			13000	2185	497	40
1988	Not dealt with			13000	3040	817	42
1989	Not dealt with			13000	3343	714	47
1990	Not dealt with			13000	2922	977	45
1991	No advice			14300	2296	614	41
1992	No advice			14300	2432	516	42
1993	<i>L. boscii</i> no gain in increasing F, <i>L. whiffi.</i> safe biological limits			8000	1767	383	38
1994	No gains in increasing F			6000	1882	479	13
1995	Concern about low SSB			6000	1870	218	40
1996	Mixed fishing aspects			6000	1426	329	44
1997	Reduce F by at least 50%			6000	1252	356	52
1998	Reduce F by at least 50%	900		6000	1569	446	36
1999	Reduce F by at least 50%	1000		6000	1468	343	43
2000	Reduce F by at least 20%	< 1500		5000	1294	253	35
2001	No increase in F	1610		5000	1105	175	19
2002	No increase in F	1550		4000	837	117	19
2003	No increase in F	1550		2400	1009	134	15
2004	No increase in F	1380		1336	1155	149	11
2005	No increase in F ^	1090		1336	1130	147	19
2006	No increase in F	1200		1269	1302	210	16
2007	No increase in F	1440		1440	1259	155	0.4
2008	No increase in F	1430		1430	1113	133	11
2009	Same advice as last year	1430		1430	1218	84	11
2010	Reduce F to F _{0.1}	900		1287	1381	83	5
2011	MSY framework	< 890	< 110	1094	1430	302	69
2012	MSY framework	< 860	< 100	1214	1214	262	31
2013	MSY framework	< 890	< 110	1214	1163	231	18
2014	MSY approach	< 2257	< 300	2257	1531	377	23
2015	MSY approach	< 1013	< 192	1377	1424	276	21
2016	MSY approach	≤ 1259	≤ 186	1363	1322	235	63
2017	MSY approach		≤ 211	1159	1173	247	41
2018	MSY approach		≤ 292	1387			
2019	MSY approach		≤ 431				

* For both megrim species combined.

** Advice was for landings until 2015; for catches from 2016 onward.

*** For Division 8.c and subareas 9 and 10; EU waters of CECAF 34.1.1.

^ Single-stock boundary and the exploitation of this stock should be conducted in the context of mixed fisheries, protecting stocks outside safe biological limits.

^^ The advice for 2017 onward is for single species only.

History of the catch and landings

Table 8 Megrim in divisions 8.c and 9.a. Catch distribution by fleet in 2017 as estimated by ICES. All weights are in tonnes.

Catch (2017)	Landings		Discards
288	97% bottom otter trawl	3% other gears	41
	247		

Table 9 Megrim in divisions 8.c and 9.a. History of commercial catch and 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	Official landings				ICES landings ***	Discards ***	ICES catch ***
	Spain			Portugal			
	Division 8.c	Division 9.a**	Total	Division 9.a			
1986	508	98	606	53	659	46	705
1987	404	46	450	47	497	40	537
1988	657	59	716	101	817	42	859
1989	533	45	578	136	714	47	761
1990	841	25	866	111	977	45	1022
1991	494	16	510	104	614	41	655
1992	474	5	479	37	516	42	558
1993	338	7	345	38	383	38	421
1994	440	8	448	31	479	13	492
1995	173	20	193	25	218	40	258
1996	283	21	305	24	329	44	373
1997	298	12	310	46	356	52	408
1998	372	8	380	66	446	36	482
1999	332	44	336	7	343	43	386
2000	238	5	243	10	253	35	288
2001	167	2	169	5	175	19	193
2002	112	3	115	3	117	19	137
2003	113	3	116	17	134	15	148
2004	142	1	144	5	149	11	159
2005	120	1	121	26	147	19	166
2006	173	2	175	35	210	16	226
2007	139	2	141	14	155	0.4	155
2008*	114	2	116	17	133	11	144
2009	74	2	77	7	84	11	94
2010	66	8	74	10	83	5	88
2011	242	0	242	34	302	69	371
2012	151	11	161	18	262	31	293
2013	128	3	131	11	231	18	250
2014	225	5	231	30	377	23	399
2015	188	2	190	23	276	21	297
2016	171	1	172	15	235	63	298
2017	189	4	193	16	247	41	288

* Data revised in 2012.

** Division 9.a, excluding the Gulf of Cadiz until 2016.

*** Unallocated/non-reported landings included.

Summary of the assessment

Table 10 Megrim in divisions 8.c and 9.a. Assessment summary. All weights are in tonnes.

Table 10

Weight in divisions 0.0 and 0.1. Assessment summary. All weights are in tonnes.

Year	Recruitment age 1	SSB	Landings	Discards	Mean F ages 2–4
	thousands	tonnes			
1986	10125	2232	659	46	0.39
1987	13173	1878	497	40	0.36
1988	11873	2143	817	42	0.51
1989	10720	2307	714	47	0.44
1990	13299	2382	977	45	0.45
1991	6022	1613	614	41	0.47
1992	11824	1538	516	42	0.44
1993	5328	1400	383	38	0.33
1994	2277	1213	479	13	0.42
1995	9827	983	218	40	0.29
1996	9847	1324	329	44	0.25
1997	7634	1369	356	52	0.27
1998	4419	1361	446	36	0.40
1999	2733	1130	343	43	0.35
2000	3945	1212	253	35	0.33
2001	3483	908	175	19	0.27
2002	2933	846	117	19	0.167
2003	3036	953	134	15	0.179
2004	3309	797	149	11	0.190
2005	2792	844	147	19	0.24
2006	2322	811	210	16	0.41
2007	2808	728	155	0	0.26
2008	1729	660	133	11	0.22
2009	1500	666	84	11	0.120
2010	7049	724	83	5	0.076
2011	5482	1109	302	69	0.29
2012	2991	1164	262	31	0.26
2013	3250	1009	231	18	0.22
2014	1954	1059	377	23	0.44
2015	13514	939	276	21	0.46
2016	11660	1490	235	63	0.26
2017	8173	1991	247	41	0.162
2018	3559*	2503			

* Recruitment 2018 is the GM (1998–2015).

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