

## 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 EU multiannual plan (MAP) for Western waters and adjacent waters is applied, catches in 2020 that correspond to the F ranges in the MAP are between 357 tonnes and 648 tonnes. According to the MAP, catches higher than those corresponding to  $F_{MSY}$  (534 tonnes) can only be taken under conditions specified in the MAP, whilst the entire range is considered precautionary when applying the ICES advice rule.

Management of catches of the two megrim species, *L. whiffiagonis* and *L. boscii*, 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 2008 and is well above  $MSY B_{trigger}$  in 2019. 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 the last two years. Estimated recruitment (R) from 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 value is unshaded.

### Stock and exploitation status

ICES assesses that fishing pressure on the stock is below  $F_{MSY}$ ; 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		
		2016	2017	2018	2017	2018	2019
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	$F_{MGT}$	✗	✓	✓ Within the range	$B_{MGT}$	✓	✓ Above trigger

### Catch scenarios

**Table 2** Megrim in divisions 8.c and 9.a. Assumptions made for the interim year and in the forecast.

Variable	Value	Notes
F (2019)	0.191	Average $F_{2016-2018}$
SSB (2020)	2508	Tonnes; assessment forecast
Recruitment (2019-2020)	3542	Thousands; geometric mean 1998–2016
Total catch (2019)	522	Tonnes; based on $F_{2019}$
Landings (2019)	504	Tonnes; according to 2014–2018 average discard rates at age
Discards (2019)	18	Tonnes; according to 2014–2018 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 (*L. whiffiagonis* and *L. boscii*) combined.

Basis	Total catch (2020)	Wanted catch (2020)	Unwanted catch (2020)	$F_{total}$ (2020)	$F_{landings}$ (2020)	$F_{discards}$ (2020)	SSB (2021)	% SSB change *	% Advice change **
ICES advice basis									
EU MAP <sup>^</sup> : $F_{MSY}$	534	520	14	0.191	0.178	0.013	2330	-7%	24%
F = MAP $F_{MSY}$ lower	357	347	9	0.122	0.113	0.008	2542	1%	-17%
F = MAP $F_{MSY}$ upper	648	631	17	0.24	0.22	0.017	2195	-12%	50%
Other scenarios									
MSY approach = $F_{MSY}$	534	520	14	0.191	0.178	0.013	2330	-7%	24%
F = 0	0	0	0	0	0	0	2966	18%	-100%
$F_{pa}$	823	801	23	0.32	0.30	0.022	1990	-21%	91%
$F_{lim}$	1110	1079	31	0.45	0.42	0.031	1650	-34%	158%
SSB (2021) = $B_{lim}$	1910	1858	53	0.78	0.72	0.054	700	-72%	343%
SSB (2021) = $B_{pa}$	1674	1628	46	0.68	0.63	0.047	980	-61%	289%
SSB (2021) = MSY $B_{trigger}$	1674	1628	46	0.68	0.63	0.047	980	-61%	289%
F = $F_{2019}$	536	522	14	0.192	0.178	0.013	2328	-7%	24%

\* SSB 2021 relative to SSB 2020.

\*\* Catch advice value 2020 relative to catch advice value 2019 (431 tonnes).

<sup>^</sup> MAP multiannual plan (EU, 2019).

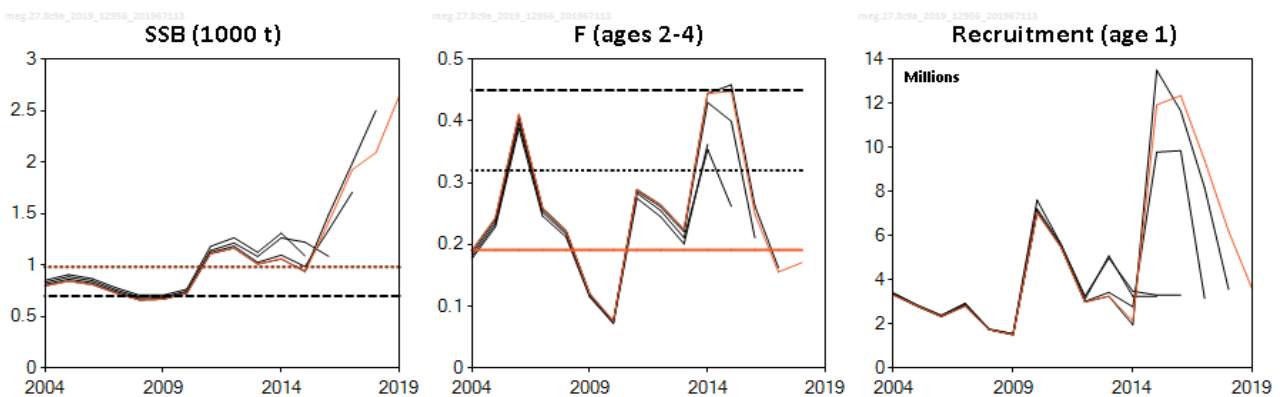
An increase in stock size, and higher than expected recruitment since 2015, results in a 24% increase in catch advice.

**Basis of the advice**

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

Advice basis	Management plan approach
Management plan	<p>The EU multiannual plan (MAP) for stocks in the Western Waters and adjacent waters applies to this stock. The plan specifies conditions for setting fishing opportunities depending on stock status and making use of the <math>F_{MSY}</math> range for the stock.</p> <p>In accordance with the MAP, catches higher than those corresponding to <math>F_{MSY}</math> can only be taken providing SSB is greater than <math>MSY_{Btrigger}</math>, and one of the following conditions is met:</p> <ul style="list-style-type: none"> <li>a) if it is necessary for the achievement of objectives of mixed fisheries;</li> <li>b) if it is necessary to avoid serious harm to a stock caused by intra- or inter-species stock dynamics;</li> <li>c) in order to limit variations in fishing opportunities between consecutive years to not more than 20%.</li> </ul> <p>ICES considers that the <math>F_{MSY}</math> range for this stock used in the MAP is precautionary.</p> <p>Full details of the plan are described in EU (2019).</p>

**Quality of the assessment**



**Figure 2** Megrim in divisions 8.c and 9.a. Historical assessment results. Final-year geometric mean recruitment included.

**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, and species-specific landings are estimated by ICES (ICES, 2019). ICES considers that management of the catches of the two megrim species under a combined TAC prevents effective control of single-species exploitation rates, and could lead to overexploitation of either species.

## 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 (2016)
	$F_{MSY}$	0.191	Stochastic simulations based on a segmented regression	ICES (2016)
Precautionary approach	$B_{lim}$	700	$B_{loss}$	ICES (2017)
	$B_{pa}$	980	$B_{pa} = B_{lim} \times \exp(\sigma \times 1.645)$ ; $\sigma = 0.2$	ICES (2017)
	$F_{lim}$	0.45	Based on a segmented regression simulation of recruitment, with $B_{lim}$ as the breakpoint and no error	ICES (2017)
	$F_{pa}$	0.32	$F_{pa} = F_{lim} \times \exp(-\sigma \times 1.645)$ ; $\sigma = 0.2$	ICES (2017)
Management plan	$SSB_{mgt}$	Not applicable		
	$F_{mgt}$	Not applicable		
	MAP	980	MSY $B_{trigger}$	ICES (2016), EU (2019)
	MSY $B_{trigger}$			
	MAP $B_{lim}$	700	$B_{lim}$	ICES (2017), EU (2019)
	MAP $F_{MSY}$	0.191	$F_{MSY}$	ICES (2016), EU (2019)
	MAP range $F_{lower}$	0.122	Consistent with ranges resulting in no more than 5% reduction in long-term yield compared with MSY (ICES, 2016).	ICES (2016), EU (2019)
	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, 2016).	ICES (2016), EU (2019)

## 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 ( <a href="#">ICES, 2018</a> ).
Assessment type	Age-based assessment (XSA; ICES, 2019) 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- Q4; 1988–2018, excluding 2003 and 2013); two commercial indices (SP-LCGOTBDEF (1986–2018) and SP-AVSOTBDEF (1986–2018)); 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	Last benchmark in 2014 (ICES, 2014).
Working group	Working Group for the Bay of Biscay and Iberian Waters Ecoregion ( <a href="#">WGBIE</a> ).

## Information from stakeholders

There is no additional available information.

**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	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

Year	ICES advice	Landings corresponding to advice *, **, ^	Catches corresponding to advice <i>L. whiffi.</i> **	Agreed TAC*, ***,	ICES landings*	ICES landings <i>L. whiffi.</i>	Discards
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	1129	315	37
2019	MSY approach		≤ 431	1872			
2020	Management plan		534 (range 357–648) #				

\* 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.

# Catches corresponding to  $F_{MSY}$ , EU MAP range in brackets.

^ 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 2018 as estimated by ICES.

Catch (2018)	Landings		Discards
352 tonnes	97% bottom otter trawl	3% other gear types	37 tonnes
	315 tonnes		

**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

Year	Official landings				ICES landings ***	Discards	ICES catch ***
	Spain			Portugal			
	Division 8.c	Division 9.a **	Total	Division 9.a			
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
2018 #	227	8	234	7	315	37	352

\* Data revised in 2012.

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

\*\*\* Unallocated/non-reported landings included.

# Preliminary.

### Summary of the assessment

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

Year	Recruitment (age 1)	SSB	Landings	Discards	F (ages 2–4)
1986	10112	2222	659	46	0.39
1987	13164	1868	497	40	0.36
1988	11867	2137	817	42	0.51
1989	10722	2298	714	47	0.44
1990	13292	2379	977	45	0.45
1991	6021	1610	614	41	0.47
1992	11820	1534	516	42	0.44
1993	5339	1399	383	38	0.33
1994	2284	1212	479	13	0.42
1995	9805	981	218	40	0.29
1996	9815	1323	329	44	0.25
1997	7595	1367	356	52	0.27
1998	4390	1358	446	36	0.41
1999	2746	1126	343	43	0.35
2000	3952	1199	253	35	0.33
2001	3469	900	175	19	0.27
2002	2925	839	117	19	0.167
2003	3026	947	134	15	0.179
2004	3304	797	149	11	0.191
2005	2805	842	147	19	0.24
2006	2334	809	210	16	0.41
2007	2809	727	155	0	0.26
2008	1734	660	133	11	0.22
2009	1504	667	84	11	0.120
2010	7041	727	83	5	0.076
2011	5481	1112	302	69	0.29
2012	2989	1164	262	31	0.26
2013	3259	1010	231	18	0.22
2014	2125	1062	377	23	0.44

Year	Recruitment (age 1)	SSB	Landings	Discards	F (ages 2–4)
2015	11934	931	276	21	0.45
2016	12357	1417	235	63	0.25
2017	9414	1927	247	41	0.155
2018	6196	2094	315	37	0.171
2019	3542*	2652			

\* Recruitment 2019 is the geometric mean (1998–2016).

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*Recommended citation:* ICES. 2019. Megrin (*Lepidorhombus whiffiagonis*) in divisions 8.c and 9.a (Cantabrian Sea and Atlantic Iberian waters). In Report of the ICES Advisory Committee, 2019. ICES Advice 2019 meg.27.8c9a, <https://doi.org/10.17895/ices.advice.4764>