

Megrim (*Lepidorhombus whiffiagonis*) in divisions 7.b–k, 8.a–b, and 8.d (west and southwest of Ireland, Bay of Biscay)

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 13 218 tonnes and 28 838 tonnes. According to the MAP, catches higher than those corresponding to F_{MSY} (19 982 tonnes) can only be taken under conditions specified in the MAP, while 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 been above $MSY B_{trigger}$ since 2008 and continues to increase. SSB is now at its highest point in the time series. The fishing mortality (F) has decreased since 2005, and it is below F_{MSY} in 2018. Recruitment (R) has been relatively stable throughout the time series, although the last two years are above the time series average.

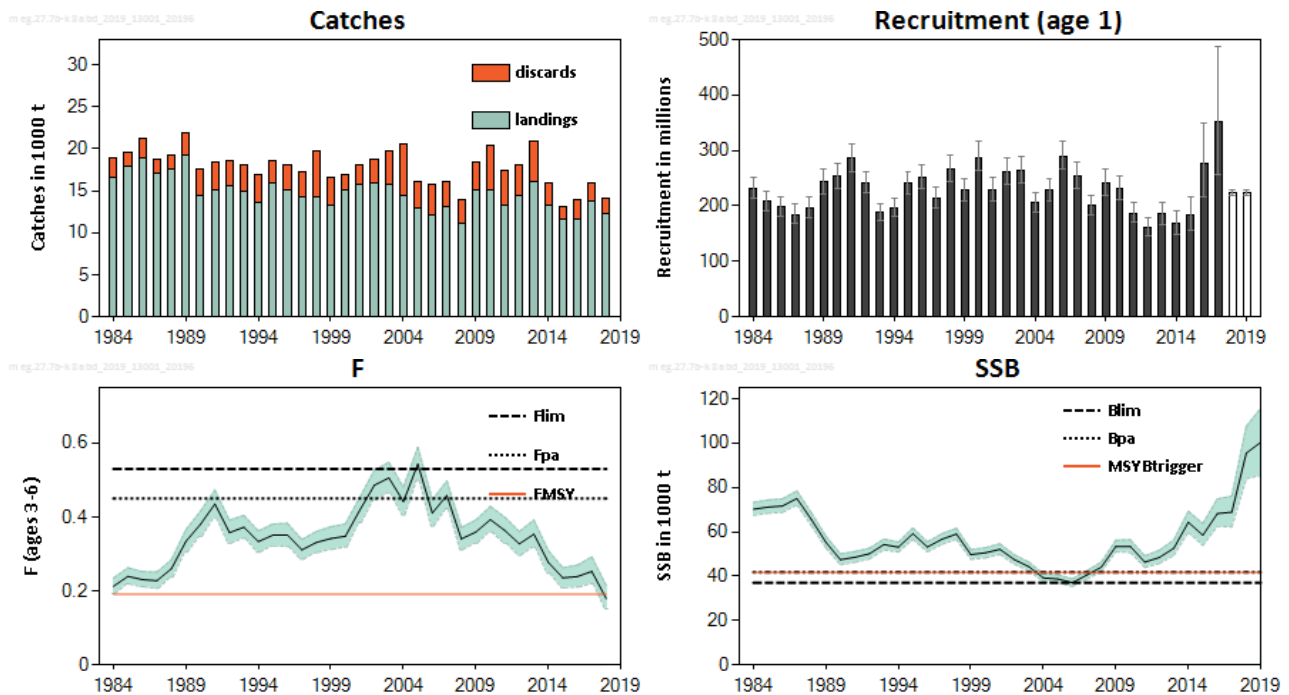


Figure 1 Megrim in divisions 7.b–k, 8.a–b, and 8.d. Summary of the stock assessment. Recruitment, F, and SSB are displayed with confidence intervals (95%). Assumed values of recruitment are unshaded.

Stock and exploitation status

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

Table 1 Megrim in divisions 7.b–k, 8.a–b, and 8.d. 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 7.b–k, 8.a–b, and 8.d. Assumptions made for the interim year and in the forecast. All weights are in tonnes, recruitment in thousands.

Variable	Value	Notes
F (2019)	0.18	Average F at age (2016–2018) rescaled to F_{2018}
SSB (2020)	112798	Tonnes; assessment forecast.
R (2018–2020)	223736	Thousands; geometric mean of recruitment (1984–2016).
Catch (2019)	16197	Tonnes; based on F(2019)
Wanted catch (2019)	12624	Tonnes; average landing rate of 2016–2018
Unwanted catch (2019)	3591	Tonnes; average discard rate of 2016–2018

Table 3 Megrim in divisions 7.b–k, 8.a–b, and 8.d. 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)	SSB (2021)	% SSB change *	% Advice change **
ICES advice basis							
EU MAP [^] : F_{MSY}	19982	16174	3808	0.191	118129	5%	6%
F = MAP F_{MSY} lower	13218	10720	2498	0.122	125760	11%	-30%
F = MAP F_{MSY} upper	28838	23285	5553	0.29	108262	-4%	53%
Other scenarios							
MSY approach = F_{MSY}	19982	16174	3808	0.191	118129	5%	6%
F = 0	0	0	0	0.0	140732	25%	-100%
F_{pa}	41586	33447	8139	0.45	94097	-17%	120%
F_{lim}	47214	37892	9323	0.53	87862	-22%	150%
SSB (2021) = B_{lim}	94951	73980	20970	1.74	37100	-67%	400%
SSB (2021) = B_{pa}	90276	70657	19619	1.54	41800	-63%	380%
SSB (2021) = MSY $B_{trigger}$	90276	70657	19619	1.54	41800	-63%	380%
F = F_{2019}	18959	15351	3608	0.180	119286	6%	0%

* SSB 2021 relative to SSB 2020.

** Catches in 2020 relative to the advised catch in 2019 (18976 tonnes).

[^] MAP multiannual plan (EU, 2019).

The decrease of fishing mortality and the above average recruitment in previous years has led to an increase in catch advice.

Basis of the advice

Table 4 Megrim in divisions 7.b–k, 8.a–b, and 8.d. 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 F_{MSY} range for the stock.</p> <p>In accordance with the MAP, catches higher than those corresponding to F_{MSY} can only be taken providing SSB is greater than $MSY_{Btrigger}$, and one of the following conditions is met:</p> <ul style="list-style-type: none"> a) if it is necessary for the achievement of objectives of mixed fisheries; b) if it is necessary to avoid serious harm to a stock caused by intra- or inter-species stock dynamics; c) in order to limit variations in fishing opportunities between consecutive years to not more than 20%. <p>ICES considers that the F_{MSY} 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

The 2018 recruitment value has high uncertainty and has been replaced with the geometric mean for the forecast.

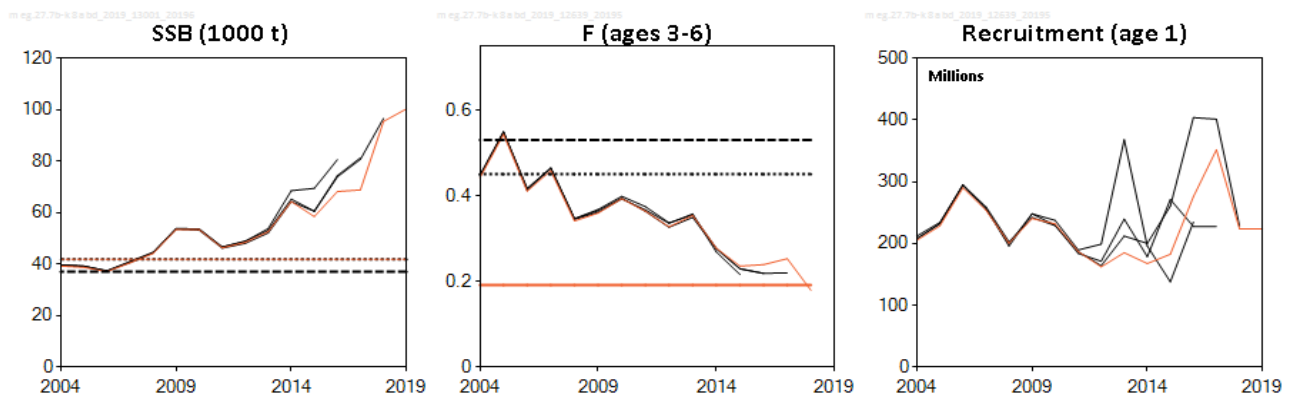


Figure 2 Megrim in divisions 7.b–k, 8.a–b, and 8.d. Historical assessment results (year 2018 and 2019 recruitment estimates included).

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 species and species-specific landings are estimated by ICES. ICES considers that management of the catches 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.

Reference points

Table 5 Megrim in divisions 7.b–k, 8.a–b, and 8.d. Reference points, values, and their technical basis. All weights are in tonnes.

Framework	Reference point	Value	Technical basis	Source
MSY approach	MSY $B_{trigger}$	41800	B_{pa}	ICES (2016a)
	F_{MSY}	0.191	Stochastic simulations based on a segmented regression, with the breakpoint fixed at the lowest observed biomass.	ICES (2016a)
Precautionary approach	B_{lim}	37100	B_{loss} , which is the lowest biomass observed, corresponding to year 2006.	ICES (2016a)
	B_{pa}	41800	$B_{lim}e^{1.645\sigma}$; $\sigma_B = 0.07$	ICES (2016a)
	F_{lim}	0.53	The F that gives 50% probability of SSB being above B_{lim} .	ICES (2016a)
	F_{pa}	0.45	$F_{lim}e^{-1.645\sigma}$; $\sigma_F = 0.102$	ICES (2016a)
Management plan	SSB _{mgt}	Not defined		ICES (2016a)
	F_{mgt}	Not defined		ICES (2016a)
	MAP MSY $B_{trigger}$	41800	MSY $B_{trigger}$	ICES (2016b) and EU (2019)
	MAP B_{lim}	37100	B_{lim}	ICES (2016b) and EU (2019)
	MAP F_{MSY}	0.191	F_{MSY}	ICES (2016b) and EU (2019)
	MAP range F_{lower}	0.122	Consistent with ranges provided by ICES (2016b), resulting in no more than 5% reduction in long-term yield compared with MSY.	ICES (2016b) and EU (2019)
	MAP range F_{upper}	0.29	Consistent with ranges provided by ICES (2016b) resulting in no more than 5% reduction in long-term yield compared with MSY.	ICES (2016b) and EU (2019)

Basis of the assessment

Table 6 Megrim in divisions 7.b–k, 8.a–b, and 8.d. Basis of the assessment and advice.

ICES stock data category	1 (ICES, 2018).
Assessment type	Bayesian statistical catch at age (ICES, 2019) using catches in the model and forecast.
Input data	Commercial catches (international landings, ages, and length frequencies from catch sampling). Survey indices: FR-EVHOE-WIBTS-Q4 and SP-PORC-WIBTS-Q3. Commercial indices: SP-VIGOTR7 (VIGO84, VIGO99), and IRTBB. Maturity ogive from Anon. (1998). Natural mortality: a fixed value of 0.2 is used for all age groups and all years.
Discards and bycatch	Discards are included in the assessment.
Indicators	None.
Other information	Last benchmark in 2016 (ICES, 2016a).
Working group	Working Group for the Bay of Biscay and the Iberian Waters Ecoregion (WGBIE)

Information from stakeholders

There is no additional available information.

History of the advice, catch, and management

Table 7 Megrim in divisions 7.b–k, 8.a–b, and 8.d. ICES advice and landings. All weights are in tonnes.

Year	ICES advice	Catch / landings corresponding to advice	Agreed TAC *	ICES landings	Discards	ICES catch
1987	Not assessed	-	16460	17114	1705	18819
1988	Not assessed	-	18100	17577	1725	19302
1989	Not assessed	-	18100	19233	2582	21815
1990	Not assessed	-	18100	14370	3284	17654
1991	No advice	-	18100	15094	3282	18376
1992	No advice	-	18100	15600	2988	18588
1993	Within safe biological limits	-	21460	14929	3108	18037
1994	Within safe biological limits	-	20330	13684	2700	16384
1995	No particular concern	-	22590	15862	3206	19068
1996	No long-term gain in increased F	16600	21200	15109	3026	18135
1997	No advice	14300	25000	14230	3066	17296
1998	No increase in F	15200	25000	14345	5371	19716
1999	Reduce F below F_{pa}	14600	20000	13305	3297	16601
2000	Reduce F below F_{pa}	< 14200	20000	15031	1870	16750
2001	Reduce F below F_{pa}	< 14100	16800	15778	2262	18040
2002	Reduce F below F_{pa}	< 13000	14900	15987	2813	18800
2003	Reduce F below F_{pa}	< 16100	16000	15711	4008	19719
2004	Reduce F below F_{pa}	< 20200	20200	14358	6243	20602
2005	Reduce F below F_{pa}	< 22600	21500	12888	3275	16163
2006	Reduce F below F_{pa}	<13600	20425	12037	3751	15788
2007	Less than average landings 2003–2005	< 14200	20425	13060	3033	16092
2008	Less than average landings 2004–2006	< 13000	20425	11048	2860	13908
2009	Same advice as last year	< 13000	20425	15064	3278	18342
2010	No increase in effort	< 13000	20425	15101	5343	20444
2011	See scenarios	-	20106	13226	4187	17413
2012	Catch and effort reduction	-	19101	14433	3704	18137
2013	Decrease landings by 4% (20% increase, followed by 20% PA reduction)	< 12000	19101	16025	4885	20910
2014	Same advice as 2013	< 12000	19101	13277	2569	15846
2015	Increase landings by no more than 13%	< 15180	19101	11569	1507	13076
2016	Precautionary approach (increase recent advised landings by no more than 20%)	≤ 18216	20056	11548	2445	13992
2017	MSY approach	≤ 16021 ***	15043	13784	2173	15957
2018	MSY approach	≤ 15720 ***	13528	12279	1855	14133

Year	ICES advice	Catch / landings corresponding to advice	Agreed TAC *	ICES landings	Discards	ICES catch
2019	MSY approach	≤ 18976 ***	19836			
2020	Management plan	19982 (range 13218–28838) **, ***				

* Includes *L. boschii* and divisions 7.a and 8.e.

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

*** Advice is for catches.

History of the catch and landings

Table 8 Megrim in divisions 7.b–k, 8.a–b, and 8.d. Catch distribution by fleet in 2018 as estimated by ICES.

Catch (2018)	Landings		Discards
14133 tonnes	97% Trawl	3% Other gears	1854 tonnes
	12279 tonnes		

Table 9 Megrim in divisions 7.b–k, 8.a–b, and 8.d. History of commercial catch and landings; ICES estimated values are presented by area for each country participating in the fishery. All weights are in tonnes.

Year	France	Spain	U.K. (England & Wales)	U.K. (Scotland)	Ireland	Belgium	Unallocated	ICES estimated landings	ICES estimated discards	ICES estimated catch
1984								16659	2169	18828
1985								17865	1732	19597
1986	4896	10242	2048		1563	178		18927	2321	21248
1987	5056	8772	1600		1561	125		17114	1705	18819
1988	5206	9247	1956		995	173		17577	1725	19302
1989	5452	9482	1451		2548	300		19233	2582	21815
1990	4336	7127	1380		1381	147		14370	3284	17654
1991	3709	7780	1617		1956	32		15094	3282	18376
1992	4104	7349	1982		2113	52		15600	2988	18588
1993	3640	6526	2131		2592	40		14929	3108	18037
1994	3214	5624	2309		2420	117		13684	2700	16384
1995	3945	6129	2658		2927	203		15862	3206	19068
1996	4146	5572	2493		2699	199		15109	3026	18135
1997	4333	5472	2875		1420	130		14230	3066	17296
1998	4232	4870	2492		2621	129		14345	5371	19716
1999	3751	4615	2193		2597	149		13305	3297	16601
2000	4173	6047	2185		2512	115		15031	1870	16750
2001	3645	7575	1710		2767	80		15778	2262	18040
2002	2929	8797	1787		2413	62		15987	2813	18800
2003	3227	8340	1732		2249	163		15711	4008	19719
2004	2817	7526	1622		2288	106		14358	6243	20602
2005	2972	5841	1764		2155	156		12888	3275	16163
2006	2763	5916	1509		1751	99		12037	3751	15788
2007	2745	6895	1462		1763	195		13060	3033	16092
2008	2578	5402	1387		1514	167		11048	2860	13908
2009	3032	8062	1840		1918	209		15064	3278	18342
2010	3651	7095	1805		2283	261		15101	5343	20444
2011	3235	3500	1845		2227	330	2089	13226	4187	17413
2012	4012	4055	1744		3047	609	966	14433	3704	18137
2013	4549	4982	2918		3038	538		16025	4885	20910
2014	4311	3318	2753	176	2391	179	150	13277	2569	15846
2015	3073	2864	2804	147	2436	246	1	11569	1507	13076

Year	France	Spain	U.K. (England & Wales)	U.K. (Scotland)	Ireland	Belgium	Unallocated	ICES estimated landings	ICES estimated discards	ICES estimated catch
2016	3141	2672	2694	145	2593	302	1	11548	2445	13992
2017	5101	3178	2512	176	2458	360		13784	2173	15957
2018 *	4812	2276	2337	118	2128	347	261	12279	1854	14133

* Preliminary.

Summary of the assessment

Table 10 Megrim in divisions 7.b–k, 8.a–b, and 8.d. Assessment summary. Highs and lows are confidence intervals (95%). All weights are in tonnes and recruitment is in thousands.

Year	Recruitment (Age 1)	High	Low	SSB	High	Low	Landings	Discards	F (Ages 3–6)	High	Low
1984	231583	252322	212755	70170	73263	67442	15951	2261	0.21	0.23	0.193
1985	208446	226579	191203	71135	74328	68328	17561	2539	0.24	0.26	0.22
1986	198323	217178	181461	71619	74834	68776	17075	2483	0.23	0.25	0.21
1987	184563	203041	167638	75015	78456	72109	15777	2575	0.23	0.25	0.21
1988	195641	216252	178581	65548	68584	62767	15738	2786	0.26	0.28	0.24
1989	243125	267248	221912	55274	58044	52731	17519	2923	0.33	0.37	0.31
1990	253201	277199	232097	47415	50068	45103	15444	2819	0.38	0.42	0.35
1991	285337	310882	261219	48531	51102	46258	15620	2898	0.44	0.47	0.40
1992	241829	262038	222479	50107	52572	47751	13860	2856	0.36	0.39	0.33
1993	187595	203669	172493	54241	56735	51862	14717	3173	0.37	0.40	0.34
1994	196774	213671	182018	53076	55348	50841	12793	2766	0.33	0.36	0.30
1995	240046	261611	221136	59159	61742	56593	15381	3001	0.35	0.38	0.32
1996	251308	274435	231178	53175	55481	50920	14633	2681	0.35	0.38	0.32
1997	212945	232860	195339	56650	59160	54320	13584	3105	0.31	0.34	0.29
1998	266058	290492	243463	58995	61605	56574	14967	4048	0.33	0.36	0.30
1999	227518	248601	207791	49731	52017	47538	13693	2813	0.34	0.37	0.31
2000	287337	315489	262707	50539	52796	48228	13923	2574	0.35	0.38	0.32
2001	228158	251542	207569	52117	54586	49805	15512	3566	0.42	0.45	0.39
2002	260985	286997	237663	47472	49640	45362	15614	3642	0.49	0.53	0.45
2003	263288	289517	240113	44304	46340	42399	15011	3432	0.51	0.55	0.47
2004	205143	224404	188643	39194	41103	37519	13286	2936	0.44	0.48	0.41
2005	228545	250041	209444	38711	40596	37017	13427	3623	0.54	0.59	0.50
2006	290202	316797	265881	37066	38806	35333	11721	2408	0.41	0.45	0.38
2007	254015	278648	232204	40479	42459	38630	12294	3113	0.46	0.50	0.42
2008	200480	219685	182831	44100	46364	42059	10659	2980	0.34	0.37	0.31
2009	240459	265823	219684	53399	56218	50957	13013	3983	0.36	0.39	0.33
2010	231803	253600	211350	53393	56375	50713	15106	3724	0.39	0.43	0.36
2011	187046	205797	169797	46324	49135	43902	13217	3311	0.36	0.40	0.33
2012	162159	179323	146794	48423	51680	45700	13510	2327	0.33	0.36	0.30
2013	185064	207340	165774	52601	56358	49356	15333	2708	0.35	0.39	0.32
2014	167519	190793	148082	64290	69266	59768	14040	2002	0.28	0.31	0.25
2015	182514	215112	155330	58462	63707	53855	10572	1349	0.24	0.26	0.21
2016	275797	350064	216482	68221	74825	62435	12649	2019	0.24	0.27	0.21
2017	352010	486122	255432	68846	76081	62185	12677	2145	0.25	0.29	0.22
2018	223736 *	229855	218099	95488	107587	83887	12320	2875	0.179	0.21	0.151
2019	223736 *	229855	218099	100393	115755	85459					

* Geometric mean of recruitment (1984–2016).

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Recommended citation: ICES. 2019. Megrin (*Lepidorhombus whiffiagonis*) in divisions 7.b-k, 8.a-b, and 8.d (west and southwest of Ireland, Bay of Biscay). In Report of the ICES Advisory Committee, 2019. ICES Advice 2019, meg.27.7b-k8abd, <https://doi.org/10.17895/ices.advice.4763>