

Four-spot megrim (*Lepidorhombus boscii*) in divisions 8.c and 9.a (southern Bay of Biscay and Atlantic Iberian waters East)

ICES advice on fishing opportunities

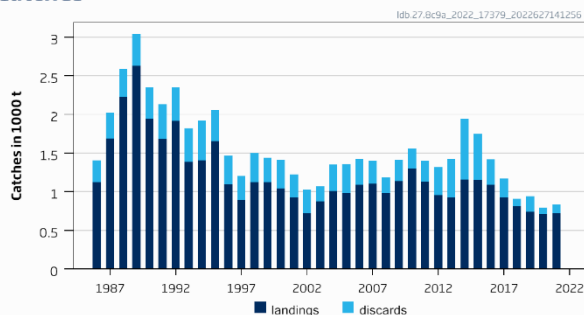
ICES advises that when the EU multiannual plan (MAP) for Western Waters and adjacent waters is applied, catches in 2023 that correspond to the F ranges in the MAP are between 1595 tonnes and 3421 tonnes. According to the MAP, catches higher than those corresponding to F_{MSY} (2282 tonnes) can only be 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—megrim (*Lepidorhombus whiffiagonis*) and four-spot megrim (*Lepidorhombus boscii*)—under a combined species TAC prevents effective control of the single-species exploitation rates and could lead to the overexploitation of either species.

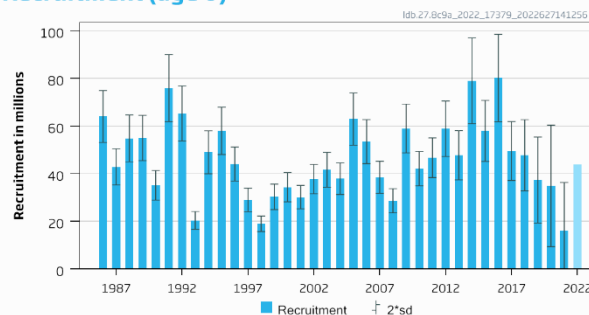
Stock development over time

The fishing pressure on the stock is below F_{MSY} ; spawning-stock size is above MSY $B_{trigger}$, B_{pa} , and B_{lim} .

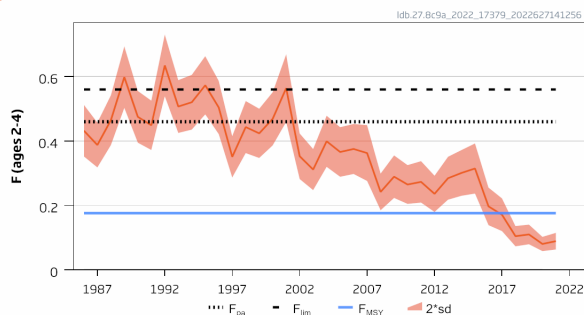
Catches



Recruitment (age 0)



F



SSB

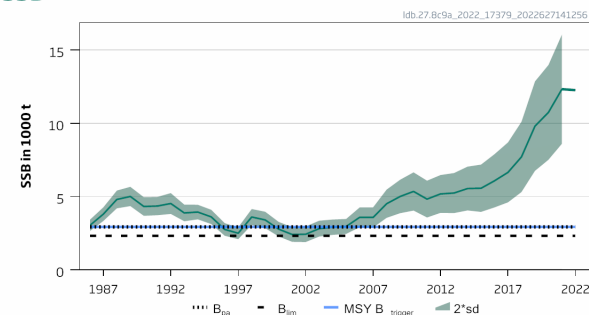


Figure 1 Four-spot megrim in divisions 8.c and 9.a. Summary of the stock assessment. The assumed recruitment value for 2022 is shaded in a lighter colour. The SSB in 2022 is a forecast.

Catch scenarios

Table 1 Four-spot megrim in divisions 8.c and 9.a. The basis of the catch scenarios.

Variable	Value	Notes
$F_{ages\ 2-4}$ (2022)	0.093	F_{sq} = average F (2019–2021).
SSB (2023)	12118	Short-term forecast (STF); in tonnes.
$R_{age\ 0}$ (2022–2023)	43826	Geometric mean 1990–2019; in thousands.
Total catch (2022)	1288	STF; in tonnes.
Projected landings (2022)	1118	STF assuming average landings ratio at age 2017–2021; in tonnes.
Projected discards (2022)	100	STF assuming average discards ratio at age 2017–2021; in tonnes.

Table 2 Four-spot 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 megrim species combined.

Basis	Total catch (2023)	Projected landings (2023)	Projected discards (2023)	F _{ages 2–4} Total (2023)	F _{ages 2–4} Projected landings (2023)	F _{ages 1–2} Projected discards (2023)	SSB (2024)	% SSB change*	% advice change ^{^^}
ICES advice basis									
EU MAP [^] : F _{MSY}	2282	2129	153	0.176	0.108	0.075	10295	–15.0	21
F = MAP [^] F _{MSY lower}	1595	1489	106	0.119	0.073	0.051	11023	–9.0	24 ^{^^}
F = MAP [^] F _{MSY upper}	3421	3187	234	0.28	0.173	0.119	9095	–25	26 ^{^^}
Other scenarios									
MSY approach = F _{MSY}	2282	2129	153	0.176	0.108	0.075	10295	–15.0	21
F = 0	0	0	0	0	0	0	12718	5.0	0
F _{pa}	5090	4730	360	0.46	0.28	0.195	7350	–39	169
SSB (2024) = B _{pa}	9444	8689	755	1.26	0.82	0.54	2932	–76	399
SSB (2024) = B _{lim}	10076	9248	828	1.48	0.96	0.63	2321	–81	433
SSB ₂₀₂₄ = SSB ₂₀₂₃	563	526	37	0.04	0.026	0.0170	12118	0	–70
SSB (2024) = MSY B _{trigger}	9444	8689	755	1.26	0.82	0.54	2932	–76	399
F = F ₂₀₂₂	1268	1184	84	0.093	0.057	0.040	11370	–6.2	–33

* SSB 2024 relative to SSB 2023.

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

^{^^} Advice value for 2023 relative to the advice value for 2022 for the F_{MSY lower} (1283 tonnes) and F_{MSY upper} (2724 tonnes).

^{^^^} Advice value for 2023 relative to advice value for 2022 (1892 tonnes).

The advice for 2023 is 21% higher than the advice for 2022. The stock was benchmarked in 2022 (ICES, 2022a) resulting in a new model and reference points for this stock.

Basis of the advice

Table 3 Four-spot megrim in divisions 8.c and 9.a. The basis of the advice.

Advice basis	Management plan approach
Management plan	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>In accordance with the MAP, “provided that the stock is above MSY B_{trigger}:</p> <ul style="list-style-type: none"> (a) if, on the basis of scientific advice or evidence, it is necessary for the achievement of the objectives laid down in Article 3 in the case of mixed fisheries; (b) if, on the basis of scientific advice or evidence, it is necessary to avoid serious harm to a stock caused by intra- or inter-species stock dynamics; or (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 Regulation 2019/472 (EU, 2019).</p>

Quality of the assessment

The stock was benchmarked in 2022 and this resulted in a different assessment model and revisions to data (ICES, 2022a). A Portuguese survey index is now included in the assessment and commercial abundance indices were removed. These changes triggered the calculation of new reference points. Such changes have lead to a different picture of the historical assessment results in comparison with previous years’ assessments. However the perception of the stock, in relation to reference points, does not change in relation to previous years’ assessments.

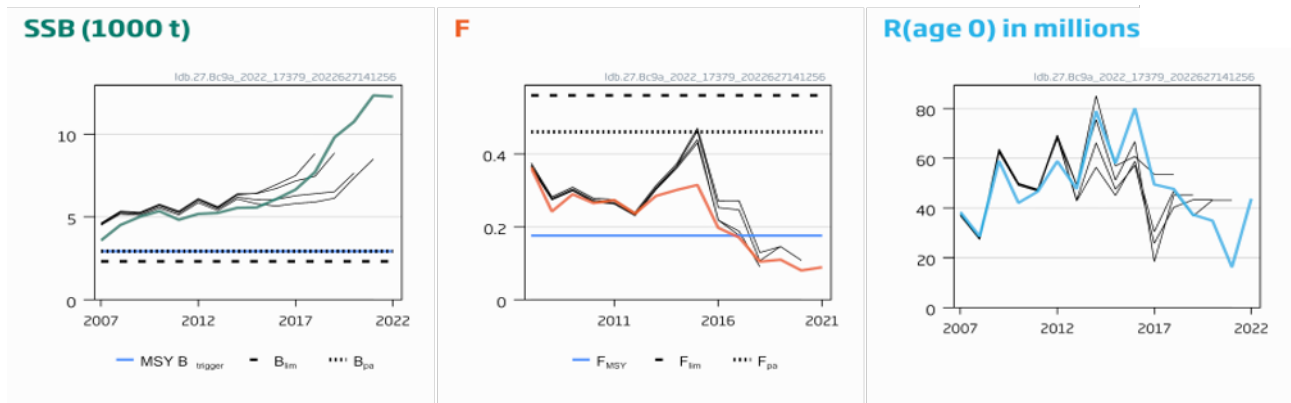


Figure 2 Four-spot megrim in divisions 8.c and 9.a. Historical assessment results (final-year recruitment assumptions included for each line). The reference points were revised in 2022 following a benchmark, and only the last assessment results should be compared to the reference points indicated.

Issues relevant for the advice

The two megrim species are not separated in the landings statistics, and species-specific landings are estimated by ICES. A single TAC covers both. 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. Mixed-fisheries advice for the two megrim species will be provided in the Iberian waters fisheries overview later in the year.

Reference points

Table 4 Four-spot megrim in divisions 8.c and 9.a. Reference points, values, and their technical basis.

Framework	Reference point	Value	Technical basis	Source
MSY approach	MSY B _{trigger}	2932	B _{pa} , in tonnes.	ICES (2022a)
	F _{MSY}	0.176	Stochastic simulations (EqSim) based on the recruitment period 1986–2020.	ICES (2022a)
Precautionary approach	B _{lim}	2321	B _{loss} , biomass in 2001 as estimated in 2022 ; in tonnes.	ICES (2022a)
	B _{pa}	2932	B _{lim} * exp(1.645 * σ), with $\sigma = 0.142$; in tonnes.	ICES (2022a)
	F _{lim}	0.56	The F that results in long-term probability (SSB < B _{lim}) = 50% (EqSim).	ICES (2022a)
	F _{pa}	0.46	F _{P05} with advice rule (AR): the F that provides a 95% probability for SSB to be above B _{lim} .	ICES (2022a)
Management plan	SSB _{mgt}	Not applicable		
	F _{mgt}	Not applicable		
	MAP MSY B _{trigger}	2932	MSY B _{trigger} , in tonnes	ICES (2022a), EU (2019)
	MAP B _{lim}	2321	B _{lim} ; in tonnes..	ICES (2022a), EU (2019)
	MAP F _{MSY}	0.176	F _{MSY}	ICES (2022a), EU (2019)
	MAP range F _{lower}	0.119	Consistent with ranges resulting in no more than 5% reduction in long-term yield compared with MSY.	ICES (2022a), EU (2019)
	MAP range F _{upper}	0.28	Consistent with ranges resulting in no more than 5% reduction in long-term yield compared with MSY.	ICES (2022a), EU (2019)

Basis of the assessment

Table 5 Four-spot megrim in divisions 8.c and 9.a. Basis of the assessment and advice.

ICES stock data category	1 (ICES, 2022b).
Assessment type	Age-based assessment (a4a; ICES, 2022c) that uses catches in the model and in the forecast.
Input data	Commercial catches (international landings, ages, and length frequencies from catch sampling); two survey indices, the Spanish North Coast Bottom Trawl Survey (SP-NSGFS-Q4 [G2784]) from 1988 to 2020 but excluding 2003 and 2013 and the Portuguese Crustacean Survey (PT-CTS -UWTV -FU 28-29 [G2913]) from 1997 to 2018; constant maturity ogive; 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 benchmarked in 2022 (ICES, 2022a).
Working group	Working Group for the Bay of Biscay and the Iberian Waters Ecoregion (WGBIE)

History of the advice, catch, and management

Table 6 Four-spot 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 for combined <i>Lepidorhombus</i> species *, **, ^	Catches corresponding to advice <i>L. boscii</i> **	Agreed TAC*, **	ICES landings (combined <i>Lepidorhombus</i> species)*	Landings <i>L. boscii</i>	Discards
1987	Not assessed			13000	2185	1688	333
1988	Not assessed			13000	3040	2223	363
1989	Not assessed			13000	3343	2629	408
1990	Not assessed			13000	2922	1945	409
1991	No advice			14300	2296	1682	447
1992	No advice			14300	2432	1916	437
1993	<i>L. boscii</i> no gain in increasing F; <i>L. whiff.</i> safe biological limits			8000	1767	1384	438
1994	No gains in increasing F			6000	1882	1403	517
1995	Concern about low SSB			6000	1870	1652	406
1996	Mixed fishing aspects			6000	1426	1098	368
1997	Reduce F by at least 50%			6000	1252	896	308
1998	Reduce F by at least 50%	900		6000	1569	1123	378
1999	Reduce F by at least 50%	1000		6000	1468	1125	317
2000	Reduce F by at least 20%	< 1500		5000	1294	1041	373
2001	No increase in F	1610		5000	1105	931	290
2002	No increase in F	1550		4000	837	720	308
2003	No increase in F	1550		2400	1009	876	191
2004	No increase in F	1380		1336	1155	1006	348
2005	No increase in F	1090		1336	1130	983	375
2006	No increase in F	1200		1269	1302	1092	335
2007	No increase in F	1440		1440	1259	1104	292
2008	No increase in F	1430		1430	1113	980	202
2009	Same advice as last year	1430		1430	1218	1134	279
2010	Reduce F to F _{0.1}	900		1287	1381	1297	265
2011	MSY framework	< 890	< 780	1094	1430	1128	269
2012	MSY framework	< 860	< 760	1214	1214	952	369
2013	MSY framework	< 890	< 780	1214	1163	931	496
2014	MSY approach	< 2257	< 1957	2257	1531	1154	788
2015	MSY approach	< 1013	< 821	1377	1424	1148	597
2016	MSY approach	≤ 1259	≤ 1072	1363	1322	1087	332
2017	MSY approach		≤ 1197	1159	1172	926	246
2018	MSY approach		≤ 1399	1387	1129	814	92
2019	MSY approach		≤ 1633	1872	981	742	201

Year	ICES advice	Landings corresponding to advice for combined <i>Lepidorhombus</i> species *, **, ^	Catches corresponding to advice <i>L. boscii</i> **	Agreed TAC*, **	ICES landings (combined <i>Lepidorhombus</i> species)*	Landings <i>L. boscii</i>	Discards
2020	Management plan		1885 (range 1275–2651)#	2322	1026	711	81
2021	Management plan		1690 (range 1148–2375)#	2158	985	723	109
2022	Management plan		1892 (range 1283–2724)#	2445			
2023	Management plan		2282 (range 1595–3421)#				

* For both megrim species combined.

** Advice was for landings until 2015, and advice is for catches from 2016 onward.

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

Catches corresponding to F_{MSY} ; EU MAP range in brackets (MAP; EU, 2019).

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

History of the catch and landings

Table 7 Four-spot megrim in divisions 8.c and 9.a. Catch distribution by fleet in 2021 as estimated by ICES. All weights are in tonnes.

Catch	Landings		Discards
831	89% bottom otter trawl	11% other gear types	109
	723		

Table 8 Four-spot 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			
	Div. 8.c	Div. 9.a *	Total	Div. 9.a			
1986	799	197	996	128	1124	284	1408
1987	995	586	1581	107	1688	333	2021
1988	917	1099	2016	207	2223	363	2586
1989	805	1548	2353	276	2629	408	3037
1990	927	798	1725	220	1945	409	2354
1991	841	634	1475	207	1682	447	2129
1992	654	938	1592	324	1916	437	2353
1993	744	419	1163	221	1384	438	1822
1994	665	561	1227	176	1403	517	1920
1995	685	826	1512	141	1652	406	2058
1996	480	448	928	170	1098	368	1466
1997	505	289	794	101	896	308	1204
1998	725	284	1010	113	1123	378	1501
1999	713	298	1011	114	1125	317	1442
2000	674	225	899	142	1041	373	1414
2001	629	177	807	124	931	290	1221
2002	343	247	590	130	720	308	1028
2003	393	314	707	169	876	191	1067
2004	534	295	829	177	1006	348	1354
2005	473	321	794	189	983	375	1358
2006	542	348	891	201	1092	335	1427
2007	591	295	886	218	1104	292	1396
2008	546	262	808	172	980	202	1182
2009	577	342	919	215	1134	279	1413
2010	616	484	1100	197	1297	265	1562
2011	390	384	774	181	1128	269	1397

Year	Official landings				ICES landings	Discards	ICES catch
	Spain			Portugal			
	Div. 8.c	Div. 9.a *	Total	Div. 9.a			
2012	240	239	479	98	952	369	1321
2013	338	283	621	80	931	496	1427
2014	427	313	739	142	1154	788	1942
2015	460	255	715	137	1148	597	1745
2016	403	276	679	105	1087	332	1419
2017	346	265	611	144	926	246	1172
2018	381	231	612	130	814	92	906
2019	385	240	625	118	742	201	943
2020	346 [#]	224 [#]	569 [#]	141 [#]	711	81	792
2021	368 [#]	222 [#]	590 [#]	132 [#]	723	109	831

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

[#] Preliminary.

Summary of the assessment

Table 9 Four-spot megrim in divisions 8.c and 9.a. Assessment summary. ‘High’ and ‘Low’ refer to two standard deviations (sd) confidence intervals. Weights are in tonnes and recruitment is in thousands.

Year	Recruitment (age 0)			Spawning-stock biomass			Landing	Discards	Fishing pressure (ages 2–4)		
	R	High	Low	SSB	High	Low			F	High	Low
	thousands			tonnes							
1986	64015	74909	53120	3034	3422	2645	1124	284	0.43	0.51	0.35
1987	42845	50427	35262	3803	4275	3332	1688	333	0.39	0.46	0.32
1988	54812	64668	44956	4804	5413	4194	2223	363	0.46	0.54	0.39
1989	54992	64503	45481	5008	5669	4347	2629	408	0.60	0.69	0.50
1990	35121	41355	28886	4323	4963	3683	1945	409	0.48	0.56	0.39
1991	75915	89999	61831	4352	4978	3726	1682	447	0.45	0.53	0.37
1992	65257	76803	53711	4526	5241	3812	1916	437	0.63	0.73	0.54
1993	20398	24142	16654	3883	4455	3312	1384	438	0.51	0.59	0.43
1994	48992	58007	39977	3944	4445	3443	1403	517	0.52	0.61	0.44
1995	57993	67937	48049	3612	4103	3122	1652	406	0.57	0.66	0.48
1996	44066	51194	36939	2756	3189	2323	1098	368	0.50	0.59	0.42
1997	29004	33937	24070	2499	2907	2091	896	308	0.35	0.42	0.29
1998	19002	22279	15725	3606	4153	3058	1123	378	0.44	0.52	0.36
1999	30271	35607	24935	3405	3970	2840	1125	317	0.42	0.50	0.35
2000	34347	40496	28199	2775	3276	2275	1041	373	0.47	0.55	0.39
2001	30174	35107	25241	2414	2920	1908	931	290	0.56	0.67	0.46
2002	37729	43890	31568	2430	2966	1894	720	308	0.35	0.42	0.28
2003	41618	48952	34284	2813	3356	2269	876	191	0.31	0.38	0.25
2004	37882	44528	31236	2910	3437	2383	1006	348	0.40	0.48	0.32
2005	62932	73898	51966	2960	3473	2447	983	375	0.37	0.44	0.29
2006	53446	62681	44211	3582	4260	2904	1092	335	0.38	0.45	0.30
2007	38465	45197	31733	3577	4270	2883	1104	292	0.36	0.45	0.28
2008	28638	33693	23583	4510	5478	3542	980	202	0.24	0.30	0.185
2009	58976	69210	48743	5006	6148	3863	1134	279	0.29	0.36	0.22
2010	42113	49339	34886	5350	6658	4042	1297	265	0.26	0.33	0.20
2011	46711	55008	38413	4827	6087	3568	1128	269	0.27	0.34	0.21
2012	58851	70488	47213	5180	6474	3886	952	369	0.24	0.29	0.180
2013	47725	58053	37397	5241	6609	3873	931	496	0.28	0.35	0.22
2014	79002	97012	60993	5547	7043	4051	1154	788	0.30	0.37	0.23
2015	57962	70775	45150	5567	7183	3951	1148	597	0.31	0.39	0.24

Year	Recruitment (age 0)			Spawning-stock biomass			Landing	Discards	Fishing pressure (ages 2–4)		
	R	High	Low	SSB	High	Low			F	High	Low
	thousands			tonnes							
2016	80149	98514	61784	6075	7895	4255	1087	332	0.197	0.26	0.139
2017	49510	61879	37141	6651	8700	4602	927	246	0.171	0.22	0.120
2018	47715	62675	32755	7705	10108	5302	814	92	0.105	0.136	0.073
2019	37332	55397	19268	9803	12858	6748	742	201	0.110	0.141	0.079
2020	34906	60404	9408	10743	13980	7506	711	81	0.080	0.103	0.058
2021	16219	36308	0	12329	16060	8598	722	109	0.089	0.115	0.063
2022	43826*			12259							

* Geometric mean (1990–2019).

Sources and references

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[Download the stock assessment data and figures.](#)

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