ICES Advice on fishing opportunities, catch, and effort
Bay of Biscay and the Iberian Coast ecoregion
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White anglerfish (*Lophius piscatorius*) 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 1519 tonnes and 2813 tonnes. According to the MAP, catches higher than those corresponding to F_{MSY} (2146 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 anglerfish species, *Lophius budegassa* and *L. piscatorius,* 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 spawning-stock biomass (SSB) has been increasing since 1994 and has been above MSY $B_{trigger}$ since 2005. Fishing mortality (F) has been decreasing and below F_{MSY} since 2010. Recruitment (R) has been low in recent years, with no evidence of strong year classes since 2001.
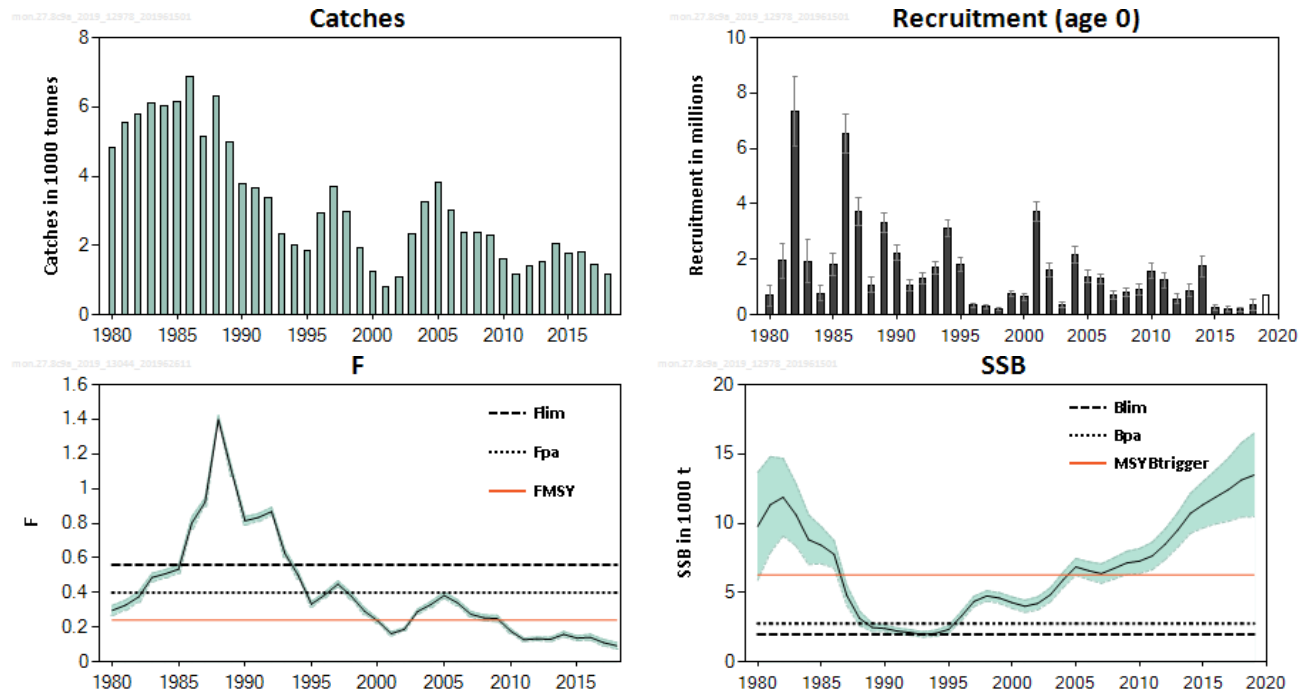

Figure 1   White anglerfish in divisions 8.c and 9.a. Summary of stock assessment (weights in thousand tonnes). Assumed recruitment values are unshaded. Confidence intervals are 95%. F confidence intervals derived from standard deviations calculated internally by the model for F at-age values.

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 White anglerfish 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}	✅	✅	✅ Below the range		B_{MGT}	✅	✅	✅ Above trigger

Catch scenarios

Table 2 White anglerfish 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
$F_{30-130\ cm}$ (2019)	0.093	Average exploitation pattern (2016–2018) scaled to $F_{30-130\ cm}$ in F_{2018}
SSB (2020)	13250	Assessment forecast; in tonnes.
$R_{age\ 0}$ (2019, 2020)	712000	Geometric mean (2003–2018); in thousands.
Total catch (2019)	1050	Discarding is assumed to be negligible; in tonnes.
Landings (2019)	1050	Assuming average of 2016–2018 fishing pattern, scaled to 2018; in tonnes.
Discards	0	Discarding is assumed to be negligible; in tonnes.

Table 3 White anglerfish in divisions 8.c and 9.a. Annual catch scenarios. All weights are in tonnes. The % change in TAC is not computed because the TAC is for the two species (*L. piscatorius* and *L. budegassa*) combined.

Basis	Total catch (2020)	F_{total} (2020)	SSB (2021)	% SSB change *	% Advice change **
ICES advice basis					
EU MAP^: F_{MSY}	2146	0.24	11251	−15.1	−0.33
F = MAP $F_{MSY\ lower}$	1519	0.164	12013	−9.3	−29
F = MAP $F_{MSY\ upper}$	2813	0.33	10437	−21	31
Other scenarios					
MSY approach = F_{MSY}	2146	0.24	11251	−15.1	−0.33
F = 0	0	0	13857	4.6	−100
F_{pa}	3296	0.40	9846	−26	53
F_{lim}	4105	0.53	8855	−33	91
SSB (2021) = B_{lim}	9570	2.8	1993	−85	340
SSB (2021) = B_{pa}	8972	2.2	2769	−79	320
SSB (2021) = MSY $B_{trigger}$	6187	0.97	6283	−53	187
F = F_{2019}	890	0.093	12777	−3.6	−59

* SSB 2021 relative to SSB 2020.
** Catch in 2020 relative to advice for 2019 (2153 tonnes).
^ MAP multiannual plan (EU, 2019).

The advice is similar to last year (0.33% decrease). Recent low recruitment (2015–2018) is expected to contribute little to the stock, with stock size dependent on the existing population.

Basis of the advice

Table 4   White anglerfish 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. 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: 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%. ICES considers that the F_{MSY} range for this stock used in the MAP is precautionary. Full details of the plan are described in EU (2019).

Quality of the assessment

This stock was benchmarked in 2018 (ICES, 2018a).

Despite the low recruitment observed in the last four years a steady increase of SSB was estimated by the model. This can be explained by the delay of 4–5 years for a cohort to recruit to the SSB. The reduction of F in recent years has allowed part of the population to keep growing in size and weight, while also contributing to the increase in SSB.

Figure 2   White anglerfish in divisions 8.c and 9.a. Historical assessment results. This stock was benchmarked in 2018.

Issues relevant for the advice

The two anglerfish species (*L. piscatorius* and *L. budegassa*) 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 anglerfish 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   White anglerfish 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 $B_{trigger}$	6283	5th percentile of the SSB when fishing at F_{MSY}.	ICES (2018a)
	F_{MSY}	0.24	Stochastic simulations based on a segmented regression.	ICES (2018a)
Precautionary approach	B_{lim}	1993	B_{loss} (lowest observed SSB value).	ICES (2018a)
	B_{pa}	2769	$B_{lim} \times \exp(\sigma \times 1.645)$, where $\sigma = 0.2$.	ICES (2018a)
	F_{lim}	0.56	Stochastic simulations where F_{lim} corresponds to 50% probability of SSB < B_{lim}.	ICES (2018a)
	F_{pa}	0.40	$F_{lim} \times \exp(-\sigma \times 1.645)$, where $\sigma = 0.2$.	ICES (2018a)
Management plan	SSB_{mgt}	Not applicable		
	F_{mgt}	Not applicable		
	MAP MSY $B_{trigger}$	6283	MSY $B_{trigger}$	ICES (2018a) and EU (2019)
	MAP B_{lim}	1993	B_{lim}	ICES (2018a) and EU (2019)
	MAP F_{MSY}	0.24	F_{MSY}	ICES (2018a) and EU (2019)
	MAP range F_{lower}	0.164	Consistent with ranges resulting in no more than 5% reduction in long-term yield compared with MSY (ICES, 2018a).	ICES (2018a) and EU (2019)
	MAP range F_{upper}	0.33	Consistent with ranges resulting in no more than 5% reduction in long-term yield compared with MSY (ICES, 2018a).	ICES (2018a) and EU (2019)

Basis of the assessment

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

ICES stock data category	1 (ICES, 2018b).
Assessment type	Length-based model (SS3; ICES, 2018a, 2019) that uses landings in the model and in the forecast.
Input data	Landings, length distribution; commercial catches (international official landings); one survey index (SP-NSGFS-WIBTS-Q4 1983–2018); two commercial indices (LPUE series from SP-CORUTR8c 1982–2012 and SP-CEDGNS8c 1999–2011); assumed constant natural mortality.
Discards and bycatch	Discarding is not quantified, assumed to be negligible.
Indicators	None.
Other information	The most recent benchmark was in 2018 (ICES, 2018a).
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   White anglerfish in divisions 8.c and 9.a. ICES advice and official catches. All weights are in tonnes.

Year	ICES advice	Catches corresponding to advice for combined *Lophius* species	Catches corresponding to advice for *L. piscatorius*	Agreed TAC*	ICES catches for combined *Lophius* species	ICES catches for *L. piscatorius*
1987	Not dealt with		-	12000	8973	5141
1988	Not dealt with		-	12000	10021	6321
1989	Not dealt with		-	12000	7574	4996

Year	ICES advice	Catches corresponding to advice for combined *Lophius* species	Catches corresponding to advice for *L. piscatorius*	Agreed TAC*	ICES catches for combined *Lophius* species	ICES catches for *L. piscatorius*
1990	Not dealt with	-		12000	6124	3790
1991	No advice	-		12000	5802	3640
1992	No advice	-		12000	5493	3382
1993	No long-term gain in increasing F	-		13000	4556	2329
1994	No advice	-		13000	3587	2007
1995	If required a precautionary TAC	-		13000	3677	1834
1996	If required a precautionary TAC	-		13000	4584	2955
1997	If required a precautionary TAC	-		13000	5527	3714
1998	Restrict catch to < 80% recent levels			10000	5070	2981
1999	Reduce F to F$_{pa}$	4200		8500	3817	1938
2000	60% reduction in F	1600		6800	2628	1259
2001	50% reduction in F	2800		6000	1801	788
2002	30% reduction in F	3500		4800	1900	1090
2003	5% reduction in F	3200		4000	3258	2324
2004	F = 0 or recovery plan**	0**		2300	4250	3257
2005	F = 0 or recovery plan	0		2000	4757	3824
2006	F = 0 or recovery plan	0		2000	4158	2997
2007	F = 0 or recovery plan	0		2000	3684	2378
2008	F = 0 or recovery plan	0		2000	3328	2371
2009	Same advice as last year	0		1800	3080	2306
2010	F = 0 or management plan	0		1500	2372	1618
2011	MSY framework	1500	1000	1571	2179	1157
2012	MSY framework	3300	2200	3300	2645	1395
2013	MSY transition	2090	1350	2475	2710	1541
2014	MSY approach	2629	1476	2629	3130	2032
2015	MSY approach	2987	1937	2987	2970	1771
2016	MSY approach^	≤ 2413	≤ 1343	2569	2948	1809
2017	MSY approach^		≤ 2253	3955	2307	1446
2018	MSY approach^		≤ 2197	3955	1916	1153
2019	MSY approach^		≤ 2153	4166		
2020	Management plan		2146 (range 1519–2813) #			

* For *Lophius piscatorius* and *L. budegassa* combined. 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.

^ Advice is for catch.

\# Catches corresponding to F$_{MSY}$, EU MAP range in brackets.

History of the catch and landings

Table 8   White anglerfish in divisions 8.c and 9.a. Catch distribution by fleet in 2018 as estimated by ICES.

Catch	Landings					Discards
1153 tonnes	57% gillnets	31% trawl	8% artisanal	3% others	1% unallocated	Discarding is negligible
	1153 tonnes					

Table 9 White anglerfish 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 | Division 8.c | | | | | Division 8.c | Division 9.a | | | | | Division 9.a | Divisions 8.c and 9.a | |
| | Spain | | | France | | | Spain | | | Portugal | | | | |
	Trawl	Gillnet	Other	Trawl	Gillnet	Total	Trawl	Gillnet	Other	Trawl	Artisanal	Total	Subtotal	Unallocated Non-reported	Total
1978	n/a	n/a				n/a	258				115	373			
1979	n/a	n/a				n/a	319				225	544			
1980	2806	1270				4076	401				339	740	4816	0	4816
1981	2750	1931				4681	535				352	887	5568	0	5568
1982	1915	2682				4597	875				310	1185	5782	0	5782
1983	3205	1723				4928	726				460	1186	6114	0	6114
1984	3086	1690				4776	578			186	492	1256	6032	0	6032
1985	2313	2372				4685	540			212	702	1454	6139	0	6139
1986	2499	2624				5123	670			167	910	1747	6870	0	6870
1987	2080	1683				3763	320			194	864	1378	5141	0	5141
1988	2525	2253				4778	570			157	817	1543	6321	0	6321
1989	1643	2147				3790	347			259	600	1206	4996	0	4996
1990	1439	985				2424	435			326	606	1366	3790	0	3790
1991	1490	778				2268	319			224	829	1372	3640	0	3640
1992	1217	1011				2228	301			76	778	1154	3382	0	3382
1993	844	666				1510	72			111	636	819	2329	0	2329
1994	690	827				1517	154			70	266	490	2007	0	2007
1995	830	572				1403	199			66	166	431	1834	0	1834
1996	1306	745				2050	407			133	365	905	2955	0	2955
1997	1449	1191				2640	315			110	650	1075	3714	0	3714
1998	912	1359				2271	184			28	497	710	2981	0	2981
1999	545	1013				1558	79			9	285	374	1932	0	1932
2000	269	538				808	107			4	340	451	1259	0	1259
2001	231	294				525	57			16	190	263	788	0	788
2002	385	341		51	7	784	110			29	168	307	1090	0	1090
2003	911	722		46	0	1679	312			29	305	645	2324	0	2324
2004	1262	1269		73	27	2631	264			27	335	626	3257	0	3257
2005	1378	1622		134	46	3180	371			29	244	643	3824	0	3824
2006	1166	1247		60	5	2478	260			29	230	519	2997	0	2997
2007	955	1009		22	6	1992	181			13	192	386	2378	0	2378
2008	894	1168		26	8	2096	138			11	127	275	2371	0	2371
2009	850	1058		17	9	1935	213			10	148	371	2306	0	2306

| Year | Division 8.c | | | | | Division 8.c | Division 9.a | | | | | Division 9.a | | Divisions 8.c and 9.a | |
| | Spain | | | France | | | Spain | | | Portugal | | | | | |
	Trawl	Gillnet	Other	Trawl	Gillnet	Total	Trawl	Gillnet	Other	Trawl	Artisanal	Total	Subtotal	Unallocated Non-reported	Total
2010	370	955		12	2	1339	158			2	119	279	1618	0	1618
2011	243	483	73	15	2	816	59	28	48	46	80	260	1077	80	1157
2012	271	527	67	12	2	880	54	20	42	6	163	285	1165	230	1395
2013	274	718	38	19	6	1054	47	30	50	15	154	296	1350	190	1541
2014	358	947	28	25	9	1368	91	47	4	27	122	291	1659	374	2032
2015	324	802	4	11	12	1152	86	53	2	34	200	375	1527	244	1771
2016	376	846	3	10	8	1243	76	67	1.47	8	120	273	1516	294	1809
2017	248	726	1	3	8	986	106	66	0.87	30	138	341	1327	119	1446
2018	227	614	34	9	11	895	117	35	1	6	94	253	1148	4	1153

n/a = not available.

Summary of the assessment

Table 10 White anglerfish in divisions 8.c and 9.a. Assessment summary. High and low refer to 95% confidence intervals. All weights are in tonnes and recruitment is in thousands.

Year	Recruitment (Age 0)	High	Low	SSB	High	Low	Catches	F (length 30–130 cm)	High	Low
1980	686	1082	291	9772	13657	5887	4817	0.30	0.33	0.27
1981	1941	2576	1305	11344	14803	7885	5566	0.33	0.36	0.30
1982	7335	8583	6086	11876	14668	9084	5782	0.38	0.41	0.34
1983	1932	2713	1151	10628	12873	8383	6113	0.49	0.51	0.46
1984	777	1063	492	8815	10607	7023	6031	0.51	0.53	0.48
1985	1828	2239	1417	8412	9750	7074	6139	0.54	0.56	0.51
1986	6525	7230	5820	7763	8752	6774	6870	0.80	0.84	0.77
1987	3721	4241	3201	4798	5513	4084	5139	0.92	0.95	0.90
1988	1074	1344	805	3145	3673	2616	6321	1.40	1.42	1.37
1989	3336	3685	2987	2481	2775	2186	4995	1.09	1.12	1.07
1990	2231	2522	1940	2413	2646	2180	3790	0.81	0.84	0.79
1991	1063	1250	877	2217	2442	1993	3640	0.83	0.86	0.81
1992	1320	1504	1135	2118	2323	1912	3382	0.87	0.89	0.84
1993	1700	1933	1468	1976	2171	1782	2329	0.63	0.65	0.60
1994	3131	3436	2825	2069	2296	1842	2007	0.50	0.52	0.48
1995	1819	2077	1562	2337	2612	2061	1835	0.33	0.35	0.32
1996	335	426	244	3298	3634	2962	2956	0.39	0.40	0.37
1997	283	343	223	4366	4734	3998	3715	0.45	0.47	0.43
1998	225	281	168	4757	5130	4384	2981	0.38	0.40	0.36
1999	744	840	649	4602	4987	4217	1933	0.29	0.31	0.27
2000	648	782	514	4268	4676	3860	1256	0.24	0.25	0.22
2001	3722	4062	3381	4012	4449	3575	788	0.163	0.175	0.151
2002	1615	1881	1349	4215	4684	3746	1093	0.188	0.198	0.178
2003	349	465	233	4840	5348	4332	2326	0.29	0.31	0.28
2004	2178	2469	1888	5913	6466	5361	3258	0.33	0.35	0.31
2005	1376	1616	1136	6855	7460	6251	3827	0.38	0.40	0.36
2006	1298	1485	1110	6577	7220	5934	2998	0.34	0.36	0.32
2007	724	875	573	6368	7066	5671	2377	0.28	0.29	0.26
2008	796	956	636	6741	7506	5976	2372	0.25	0.27	0.24
2009	909	1089	730	7140	7970	6310	2307	0.25	0.27	0.23
2010	1580	1853	1306	7272	8172	6372	1620	0.178	0.192	0.164
2011	1243	1512	974	7640	8631	6648	1156	0.128	0.138	0.118
2012	563	741	385	8466	9567	7365	1396	0.133	0.144	0.122
2013	882	1107	657	9502	10745	8258	1540	0.130	0.142	0.118
2014	1740	2098	1382	10714	12153	9274	2033	0.159	0.176	0.142
2015	262	371	154	11339	13011	9667	1771	0.137	0.151	0.123
2016	212	296	129	11896	13839	9953	1809	0.142	0.161	0.123
2017	185	262	108	12432	14716	10147	1447	0.111	0.130	0.092
2018	353	537	168	13116	15790	10443	1153	0.093	0.112	0.074
2019	712*			13477	16490	10464				

*Geometric mean 2003–2018.

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