

White anglerfish (*Lophius piscatorius*) in Subarea 7 and in divisions 8.a–b and 8.d (southern Celtic Seas, Bay of Biscay)

ICES stock advice

ICES advises that when the MSY approach is applied, catches in 2019 should be no more than 31 042 tonnes.

Management of *L. piscatorius* and *L. budegassa* 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 increasing since 2005 and is now estimated to be the highest in the time-series. Fishing mortality (F) has been above F_{MSY} but has trended downwards since the mid-2000s and is now at F_{MSY} . Recruitment has been variable over the time-series.

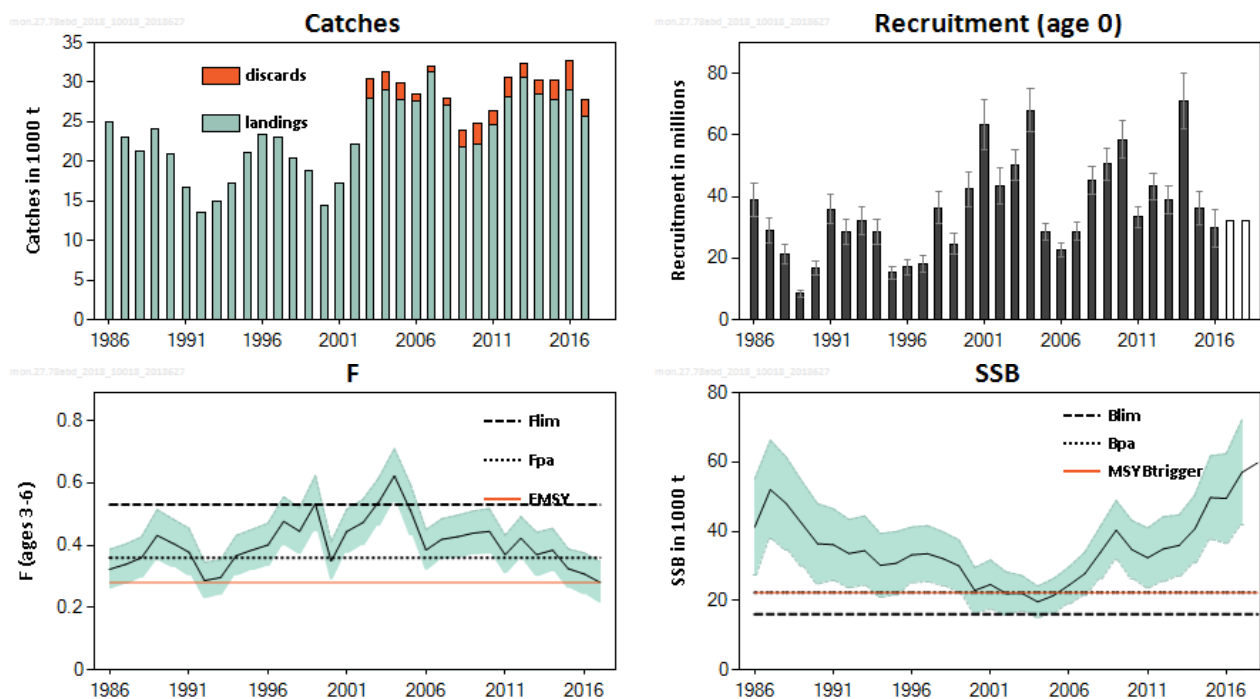


Figure 1 White anglerfish in Subarea 7 and in divisions 8.a–b and 8.d. Summary of the stock assessment (weights in thousand tonnes). Discard estimates are available only since 2003. The plots for recruitment, F, and SSB show the 95% confidence limits. Assumed recruitment values are unshaded.

Stock and exploitation status

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

Table 1 White anglerfish in Subarea 7 and in divisions 8.a–b and 8.d. 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}	✗	✗	✓	At	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 White anglerfish in Subarea 7 and in divisions 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
$F_{ages\ 3-6}$ (2018)	0.28	$F_{ages\ 3-6}$ (2017)
SSB (2019)	73972	Short-term forecast
$R_{age\ 0}$ (2018–2019)	32299	GM full time-series excluding the last 2 years (in thousands)
Catch (2018)	30397	Short-term forecast
Wanted catch (2018)	28414	Mean wanted catch proportion-at-age, last 3 years
Unwanted catch (2018)	1983	Mean unwanted catch proportion-at-age, last 3 years

Table 3 White anglerfish in Subarea 7 and in divisions 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 both species of anglerfish.

Basis	Total catch (2019)	Wanted catch (2019)	Unwanted catch* (2019)	F_{total} (2019)	F_{wanted} (2019)	$F_{unwanted}$ (2019)	SSB (2020)	% SSB change **	% Advice change ***
ICES advice basis									
MSY approach: F_{MSY}	31042	29293	1749	0.28	0.27	0.0063	80342	-0.63	9.7
Other Scenarios									
$F = 0$	0	0	0	0	-	-	105382	30.33	-100
F_{pa}	38487	36306	2182	0.36	0.35	0.0081	74462	-7.91	36
F_{lim}	52569	49551	3018	0.53	0.52	0.0119	63497	-21.47	86
SSB (2019) = B_{lim}	115618	108422	7196	2	1.96	0.045	18059	-77.66	306
SSB (2019) = $B_{pa} = MSY B_{trigger}$	109217	102494	6722	1.74	1.70	0.039	22278	-72.45	284
$F = F_{2018}$	31150	29395	1755	0.28	0.27	0.0063	80256	-0.74	10
$F = F_{MSY\ lower}$	21008	19834	1174	0.181	0.177	0.0041	88348	9.27	-26
$F = F_{MSY\ higher}$	41138	38800	2337	0.39	0.38	0.0088	72382	-10.48	45

* "Wanted catch" is predicted landed catch above minimum size (AMS landings). "Unwanted catch" is landings below minimum size (BMS) and discards.

**SSB 2020 relative to SSB 2019.

*** Percentage advice change refers to wanted catch (landings) for 2019 relative to landings advice for 2017 and 2018 (26 691 tonnes).

The wanted catch advice for 2019 is 9.7% higher than the landings advice for 2018. For 2018, the advice was based on a category 3 assessment; for 2019 the advice is based on a category 1 assessment (ICES, 2018a). Based upon the new assessment, F has declined in the last year and SSB has increased.

Basis of the advice

Table 4 White anglerfish in Subarea 7 and in divisions 8.a–b and 8.d. The basis of the advice.

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

Quality of the assessment

This is the first time since 2006 that ICES has provided advice based on an analytical assessment of this stock. Previously, the advice was based on a category 3 assessment. ICES (2018a) has shown that the estimated stock trends are robust to various assumptions on growth, natural mortality, the selection of tuning fleets, and model specification.

F_{MSY} appears to be sensitive to the retrospective pattern in SSB in the early part of the time-series. The current F_{MSY} of 0.28 is considered to be conservative because the stock has increased considerably during the last 15 years even though fishing mortality was well above F_{MSY} during that period.

The recruitment estimates are informed by the combined IE-IGFS-WIBTS-Q4 and FR-EVHOE-WIBTS-Q4 survey index, which was not available for 2017 because the FR-EVHOE-WIBTS-Q4 survey did not take place. Therefore the 2017 recruitment estimate was replaced with GM recruitment. The IE-IGFS-WIBTS-Q4 survey recorded above-average recruitment in 2017, so GM recruitment is likely to be conservative. Apart from the recruitment estimate for 2017, the missing EVHOE-WIBTS-Q4 index in 2017 is not thought to affect the current assessment.

Owing to a lack of French market sampling of length in Q1 and Q2 of 2017 (biological and onboard sampling was unaffected), some sampling strata length data were supplemented using data from the previous years, which is considered to have limited impact (ICES, 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 species and species-specific landings are estimated by ICES (ICES, 2018b). ICES considers that management of the two anglerfish 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 White anglerfish in Subarea 7 and in divisions 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 $B_{trigger}$	22278	B_{pa}	ICES (2018a)
	F_{MSY}	0.28	Median Eqsim estimate for landings	ICES (2018a)
Precautionary approach	B_{lim}	16032	B_{loss}	ICES (2018a)
	B_{pa}	22278	$B_{lim} \times \exp(1.645 \times 0.2)$	ICES (2018a)
	F_{lim}	0.53	F with 5% probability of $SSB < B_{lim}$	ICES (2018a)
	F_{pa}	0.36	$F_{lim} \times \exp(-1.645 \times 0.233)$	ICES (2018a)
Management plan	MAP MSY $B_{trigger}$	22278	MSY $B_{trigger}$	
	MAP B_{lim}	16032	B_{lim}	
	MAP F_{MSY}	0.28	F_{MSY}	
	MAP range F_{lower}	0.181	Consistent with ranges provided by ICES (2018a), resulting in no more than 5% reduction in long-term yield compared with MSY.	
	MAP range F_{upper}	0.39	Consistent with ranges provided by ICES (2018a), resulting in no more than 5% reduction in long-term yield compared with MSY.	

Basis of the assessment

Table 6 White anglerfish in Subarea 7 and in divisions 8.a–b and 8.d. The basis of the assessment.

ICES stock data category	1 (ICES, 2016a)
Assessment type	Age-based analytical assessment (a4a; ICES, 2018b).
Input data	Commercial landings and discards; three survey indices (combined FR-EVHOE-WIBTS-Q4 / IE-IGFS-WIBTS-Q4 index, SP-PORC-WIBTS-Q3 and Irish Monkfish Survey); weights- and numbers-at-age derived from catch and survey length-frequency distribution.
Discards and bycatch	Discards are available since 2003 and included in the assessment and forecast.
Indicators	None.
Other information	This stock was benchmarked in 2018 (ICES, 2018a).
Working group report	Working Group for the Bay of Biscay and the Iberian Waters Ecoregion (WGBIE)

Information from stakeholders

There is no additional information available.

History of the advice, catch, and management

Table 7 White anglerfish in Subarea 7 and in divisions 8.a–b and 8.d. History of ICES advice, the agreed TAC, and ICES estimates of landings. All weights are in tonnes.

Year	ICES advice	Catch corresponding to advice	Catch/ landings corresponding to advice (both <i>Lophius</i> species) *	Agreed TAC *,**	ICES landings (both <i>Lophius</i> species) *,***	Landings <i>L. piscatorius</i>	Catches <i>L. piscatorius</i>
1987	Not assessed	-	< 27600	39080	30709	23091	-
1988	Not assessed	-	< 19900	42990	29695	21314	-
1989	Not assessed	-	< 16400	42990	32836	24015	-
1990	Not assessed	-	< 26700	42990	30613	20982	-
1991	No advice	-	< 37800	42990	25542	16763	-
1992	No advice	-	< 33900	42990	21793	13617	-
1993	Concern about <i>L. pisc.</i> SSB decrease	-	< 36000	25100	21462	14895	-
1994	SSB decreasing, still inside safe biological limits	-	< 33000	23900	22946	17201	-
1995	No increase in F	-	< 33000	23200	27987	21033	-
1996	No increase in F	-	-	30400	31426	23333	-
1997	No increase in F	-	-	34300	31099	22983	-
1998	No increase in F	-	-	34300	29072	20474	-
1999	No increase in F	-	< 24800 ##	34300	25530	18792	-
2000	At least 20% decrease in F	-	< 37448 ##	29600	21095	14451	-
2001	Reduce F below F_{pa}	-	< 37448 ##	27600	23022	17294	-
2002	Reduce F below F_{pa}	-	< 37448 ##	23700	28588	22083	-
2003	At least 30% decrease in F	-	< 37448 ##	21000	36104	27933	30415
2004	At least 10% decrease in F	-	< 37448 ##	26700	36565	29028	31366
2005	Maintain F below F_{pa}	-	< 27600	31200	35056	27869	29931
2006	Maintain F below F_{pa}	-	< 19900	34000	33783	27652	28533
2007	Maintain F below F_{pa}	-	< 16400	36000	37821	31213	32014
2008	Less than average landings	-	< 26700	36000	34452	27053	28024
2009	Same advice as last year	-	< 37800	36000	30122	21835	23862
2010	No increase in effort	-	< 33900	41400	30841	22215	24799
2011	No increase in effort	-	< 36000	40900	34005	24657	26434
2012	Reduce catch	-	< 33000	38900	36617	28188	30522
2013	Reduce catch by the rate of biomass decrease (14% for <i>L. piscatorius</i> and 20% for <i>L. budegassa</i>)	17900 ##	< 24800 ##	36953	41086	30611	32293
2014	Increase landings by the rate of biomass increase (20% for <i>L. piscatorius</i> and 20% for <i>L. budegassa</i>)	< 26691##	< 37448 ##	42496	38306	28474	30328
2015	Same landings advice for <i>L. piscatorius</i> as in 2014	< 26691##	< 37448 ##	42496	37508	27859	30173
2016	Precautionary approach (same landings value as advised for 2014)	≤ 26691##	< 37448 ##	42496	39303	29083	32664
2017	Precautionary approach (same landings value as advised for 2016)	≤ 26691##	< 37448 ##	42496	37324	25634	27836
2018	Precautionary approach (same landings value as advised for 2016)	≤ 26691##	≤ 37448 ##	42496			
2019	MSY approach	≤ 31042	≤ 41841				

* Applies to the combined *Lophius* species.

** Includes Division 8.e.

*** Updated to include Division 7.a (ICES, 2018a).

Advice refers to landings, not catch.

History of catch and landings

Table 8 White anglerfish in Subarea 7 and in divisions 8.a–b and 8.d. Catch distribution by fleet in 2017 as estimated by ICES. All weights are in tonnes.

Total catch (2017)	Landings					Discards
27836	65% Otter trawl demersal fish	3.3% Otter trawl <i>Nephrops</i>	10.8% Beam trawl	20% Gillnet	1.04% Other	2202
	25634					

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

Year	France	Ireland	Spain	UK	Others**	Unallocated	Total landings in divisions 7.a–k	Total discards in divisions 7.a–k
1986	9797	1014	6223	3356	467	0	20858	-
1987	8549	928	5407	3382	96	0	18362	-
1988	8257	654	4615	3673	168	0	17366	-
1989	9536	1716	4926	4339	609	0	21126	-
1990	8773	1474	4284	2845	227	0	17602	-
1991	7228	1056	3707	2559	54	0	14604	-
1992	5595	1127	2669	2762	102	0	12255	-
1993	6290	1286	2851	2630	250	0	13307	-
1994	7358	2036	2856	2280	627	0	15156	-
1995	9563	1661	3240	2561	896	0	17921	-
1996	9832	1372	4097	3192	852	0	19345	-
1997	9557	1994	3548	3377	589	0	19065	-
1998	8484	1998	3586	3214	406	0	17687	-
1999	7870	3176	3050	2903	321	0	17319	-
2000	6411	1726	2274	2676	334	0	13420	-
2001	8096	1598	2493	3021	462	0	15670	-
2002	10496	1836	3480	3489	530	0	19832	-
2003	12080	1456	4662	2850	1569	0	22617	2063
2004	12281	1646	4507	2906	1743	0	23083	1917
2005	11137	2071	4663	3032	1469	0	22372	1743
2006	10607	2656	4589	3137	1375	0	22364	668
2007	12253	2902	5065	4036	1596	0	25852	610
2008	10871	2419	4107	2928	1062	0	21387	729
2009	8691	2048	2754	3013	857	0	17363	1477
2010	8188	2523	2353	3675	993	0	17732	1976
2011	9546	2304	2232	4287	1174	0	19542	1403
2012	12224	2648	1252	4028	1836	1313	23301	1841
2013	12767	2555	3313	4626	1624	1166	26052	1406
2014	11410	2707	1080	6129	1055	1148	23529	1443
2015	11722	2582	1770	5644	1284	337	23339	1793
2016	12667	2761	1692	6052	1578	414	25164	3058
2017*	11473	2543	1394	5222	1498	351	22481	1939

*Provisional.

** "Others" includes the landings in Division 7.a.

Table 9b White anglerfish in Subarea 7 and in divisions 8.a–b and 8.d. History of commercial catch and landings. For divisions 8.a, 8.b, and 8.d both the official and ICES estimated values are presented by country participating in the fishery. The final column shows the total for divisions 8.a–b and 8.d. All weights are in tonnes.

Year	France	Spain	Others	Unallocated	Total landings divisions 8.a–b and 8.d	Total discards divisions 8.a–b and 8.d
1986	3265	858	0	0	4123	-
1987	3955	774	0	0	4729	-
1988	3129	819	0	0	3948	-
1989	2264	625	0	0	2889	-
1990	2580	800	0	0	3380	-
1991	1657	502	0	0	2159	-
1992	1066	296	0	0	1362	-
1993	1314	274	0	0	1588	-
1994	1564	481	0	0	2045	-
1995	2402	482	0	228	3112	-
1996	2216	834	0	938	3988	-
1997	2143	707	0	1068	3918	-
1998	1534	711	0	542	2787	-
1999	924	549	0	0	1473	-
2000	690	341	0	0	1031	-
2001	1240	384	0	0	1624	-
2002	1737	514	0	0	2251	-
2003	4806	508	0	0	5314	419
2004	5227	718	0	0	5945	421
2005	4927	571	0	0	5498	318
2006	4819	420	48	0	5287	213
2007	4935	401	25	0	5361	190
2008	5132	527	7	0	5666	242
2009	4065	374	33	0	4472	550
2010	4043	367	73	0	4483	608
2011	4569	422	93	30	5114	373
2012	4221	430	194	41	4886	492
2013	4105	318	137	0	4560	276
2014	4279	408	174	84	4945	411
2015	4153	293	65	10	4521	521
2016	3561	283	69	5	3918	522
2017*	2886	203	66	0	3155	263

*Provisional.

Summary of the assessment

Table 10 White anglerfish in Subarea 7 and in divisions 8.a–b and 8.d. Assessment summary. Weights are in tonnes and recruitment in thousands. High and low refers to 95% confidence intervals.

Year	Recruitment age 0	High	Low	SSB	High	Low	Landings	Discards	F ages 3–6	High	Low
	thousands			tonnes			tonnes				
1986	38891	44320	33461	41196	55020	27371	24981		0.32	0.39	0.26
1987	28806	32931	24682	52019	66239	37799	23091		0.34	0.40	0.27
1988	21254	24301	18207	48033	61426	34641	21314		0.36	0.43	0.29
1989	8514	9747	7280	42234	54461	30008	24015		0.43	0.51	0.35
1990	16729	19095	14364	36409	47947	24871	20982		0.41	0.48	0.33
1991	35943	40879	31007	36130	46489	25771	16763		0.38	0.45	0.30
1992	28598	32521	24675	33575	43386	23765	13617		0.29	0.35	0.23
1993	32233	36690	27777	34388	44401	24376	14895		0.30	0.35	0.24
1994	28423	32393	24453	30164	39354	20973	17201		0.37	0.43	0.30
1995	15243	17374	13113	30753	39861	21644	21033		0.38	0.45	0.32
1996	17139	19575	14703	33183	41209	25158	23333		0.40	0.47	0.33
1997	18109	20669	15549	33509	41588	25431	22983		0.48	0.56	0.40
1998	36297	41404	31189	32057	39786	24327	20474		0.45	0.52	0.37
1999	24652	28105	21200	30017	37486	22547	18792		0.53	0.62	0.44
2000	42346	48090	36602	22922	29469	16376	14451		0.35	0.41	0.29
2001	63330	71606	55054	24626	31730	17523	17294		0.44	0.52	0.37
2002	43271	49123	37419	22032	28243	15822	22083		0.47	0.55	0.40
2003	50117	55106	45127	22133	27214	17051	27933	2482	0.54	0.62	0.46
2004	68030	75235	60825	19644	24152	15136	29028	2338	0.62	0.71	0.53
2005	28397	31133	25662	21398	26304	16491	27869	2062	0.51	0.60	0.43
2006	22530	24720	20339	24447	29715	19179	27652	881	0.38	0.45	0.32
2007	28742	31587	25897	27749	33938	21559	31213	801	0.42	0.49	0.35
2008	45276	49825	40727	33913	41443	26383	27053	971	0.43	0.50	0.36
2009	50478	55618	45338	40322	48876	31768	21835	2027	0.44	0.51	0.37
2010	58527	64608	52446	34704	43092	26315	22215	2584	0.44	0.52	0.37
2011	33335	36703	29968	32328	40937	23720	24657	1777	0.37	0.43	0.31
2012	43222	47596	38848	34889	44180	25598	28188	2334	0.42	0.49	0.35
2013	38901	43382	34420	35902	44713	27091	30611	1682	0.37	0.44	0.30
2014	70901	79920	61881	40669	50393	30946	28474	1854	0.38	0.45	0.31
2015	36082	41581	30583	49719	61764	37675	27859	2314	0.32	0.39	0.26
2016	29712	35916	23509	49468	62363	36573	29083	3581	0.31	0.38	0.24
2017	32299*			56963	72108	41817	25634	2202	0.28	0.35	0.21
2018	32299*			59751							

* Geometric mean 2003–2017.

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