

Black-bellied anglerfish (*Lophius budegassa*) in divisions 8.c and 9.a (Cantabrian Sea, Atlantic Iberian waters)

ICES stock advice

ICES advises that when the MSY approach is applied, catches in 2018 should be no more than 2349 tonnes.

Stock development over time

The stock biomass (B) has been increasing since 2001 and is estimated to be above MSY B_{trigger} over most of the time-series. Fishing mortality (F) has decreased since 1999 and is estimated to have been below F_{MSY} since 2008.

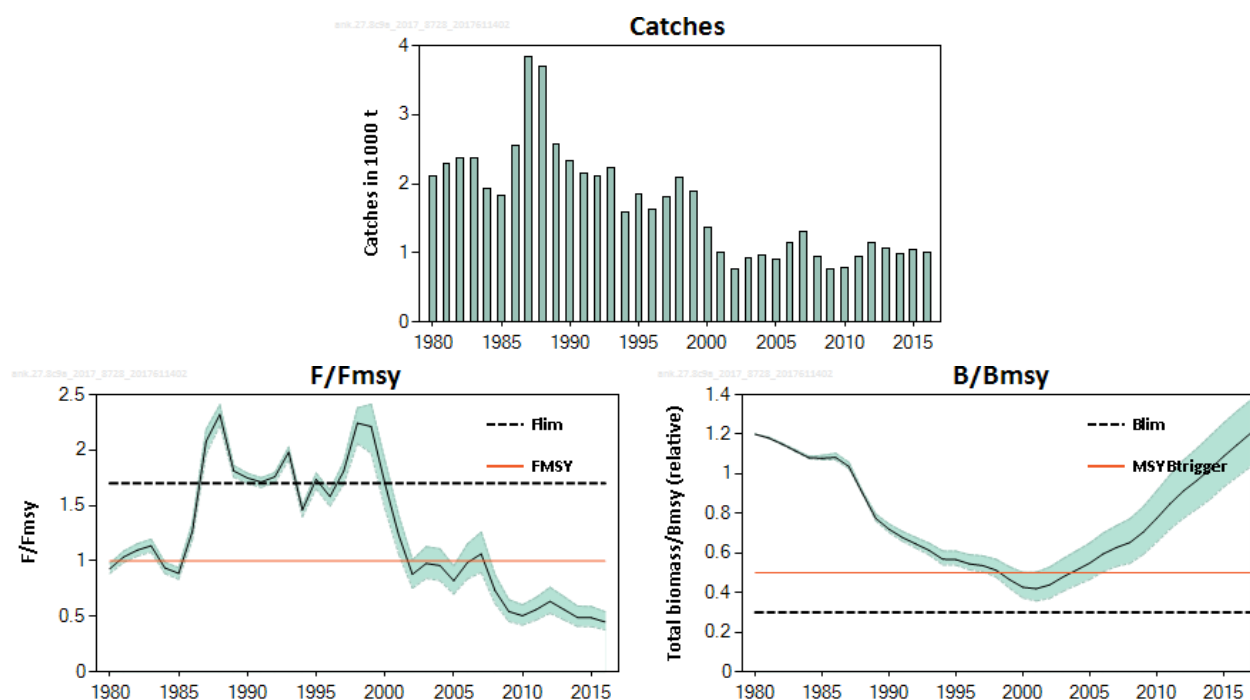


Figure 1 Black-bellied anglerfish in divisions 8.c and 9.a. Summary of the stock assessment: Catches (top left), F/F_{MSY} (bottom left), and B/B_{MSY} (bottom right) with 80% confidence intervals (shaded area).

Stock and exploitation status

Table 1 Black-bellied anglerfish in divisions 8.c and 9.a. State of the stock and fishery relative to reference points.

		Fishing pressure				Stock size		
		2014	2015	2016		2015	2016	2017
Maximum Sustainable Yield	F_{MSY}	✓	✓	✓	Below	MSY	✓	✓
						B_{Trigger}	✓	✓
Precautionary Approach	F_{pa}	✓	✓	✓	Harvested sustainably			
	F_{lim}					$B_{\text{pa}}, B_{\text{lim}}$	✓	✓
								✓
Management plan	F_{MGT}	—	—	—	Not applicable	B_{MGT}	—	—
								Not applicable

Catch options

Table 2 Black-bellied anglerfish in divisions 8.c and 9.a. The basis for the catch options.

Variable	Value	Source	Notes
$F(2017)/F_{MSY}$	0.477	ICES (2017a)	mean $F(2014-2016)/F_{MSY}$
$B(2018)/B_{MSY}$	1.252	ICES (2017a)	
Total catch (2017)	1116 t		Based on mean $F(2014-2016)/F_{MSY}$
Landings (2017)	1116 t		Discarding negligible
Discards (2017)	Negligible		Discarding negligible

Table 3 Black-bellied anglerfish in divisions 8.c and 9.a. Annual catch options. All weights are in tonnes.

Basis	Total catch (2018)	F_{2018}/F_{MSY}	B_{2019}/B_{MSY}	% B change *	% advice change **
ICES advice basis					
MSY approach: $F_{MSY} (F_{2017} \times 2.10)$	2349	1.000	1.214	-3	11
Other options					
$F = 0$	0	0.000	1.371	10	-100
Flim	3824	1.700	1.114	-11	80
$B(2019) = B_{lim}$	15 270	12.140	0.3	-76	620
$B(2019) = MSY B_{trigger}$	12 590	8.127	0.5	-60	493
$F = F_{2017}$	1157	0.477	1.294	3	-45
*** F multiplier for F_{MSY} of <i>L. piscatorius</i> ($F_{2017} \times 1.48$)	1682	0.703	1.259	1	-21

* Biomass 2019 relative to biomass 2018.

** Catch in 2018 relative to advice for 2017 (2122 t).

*** This catch option applies the same multiplicative factor to the current fishing mortality (F_{2017}) for both anglerfish species (*L. piscatorius* and *L. budegassa*). This year the *L. piscatorius* multiplier is used.

Basis of the advice

Table 4 Black-bellied anglerfish in divisions 8.c and 9.a. The basis of the advice.

Advice basis	MSY approach.
Management plan	There is no management plan for anglerfish in this area.

Quality of the assessment

The 2013–2016 values from the lpue series from Spain (A Coruña fleet) were not used in the assessment because of a change in the data source. As a consequence, commercial lpue indices from Portugal that cover only part of the stock distribution area were used as the only indices for 2013–2016, with possible implications for the quality of the assessment.

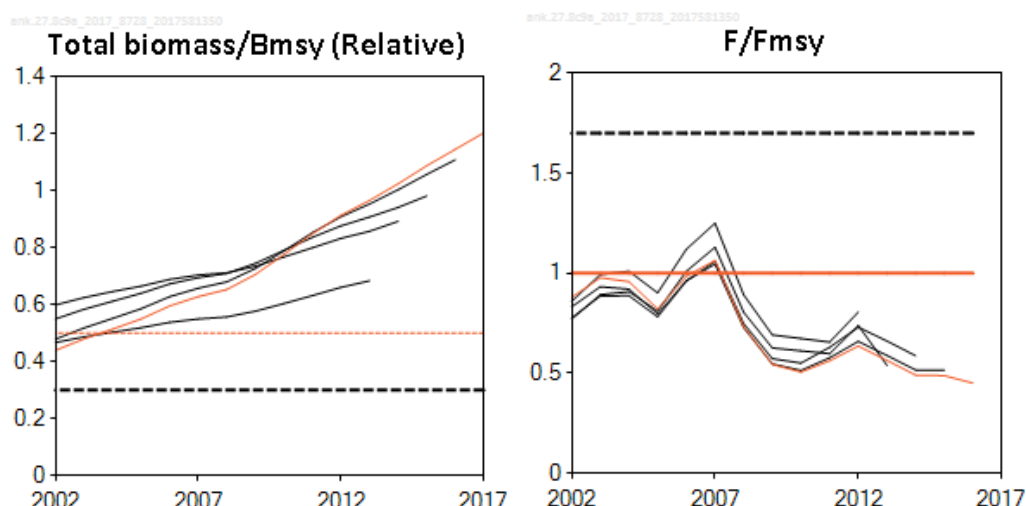


Figure 2 Black-bellied anglerfish in divisions 8.c and 9.a. Historical assessment results.

Issues relevant for the advice

The two anglerfish species (*L. piscatorius* and *L. budegassa*) are not totally separated in the landings and a single TAC covers both species. For these reasons, ICES advice in the past (prior to 2016) was based on a common multiplier of the current F for both anglerfish species; the value of the multiplier corresponded to that required to get fishing mortality for both stocks at or below F_{MSY} in the advice year. 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. Therefore, the advice since 2016 is based on the single-species F_{MSY} .

If the TAC continues to be set for both anglerfish species combined, then using the common F multiplier approach (as has been done in the ICES advice in the past), would result in combined anglerfish catches in 2018 of no more than:

3879 t (both anglerfish species) = 2197 t (*L. piscatorius* single-species catch advice) + 1682 t (*L. budegassa* catch resulting from the *L. piscatorius* F -multiplier).

A mixed-fisheries analysis covering the stocks in Iberian waters of hake, megrim, four-spot megrim, and white anglerfish is provided in ICES (2017b). However, the black-bellied anglerfish is not included in that analysis due to technical limitations of the model.

Reference points

Table 5 Black-bellied anglerfish in divisions 8.c and 9.a. Reference points, values, and their technical basis.

Framework	Reference point	Value	Technical basis	Source
MSY approach	MSY $B_{trigger}$	$0.5 \times B_{MSY} = 0.25 \times K^*$	Relative value. B_{MSY} is estimated directly from the assessment model and changes when the assessment is updated.	ICES (2012)
	F_{MSY}	$1 \times F_{MSY} = r/2^*$	Relative value. F_{MSY} is estimated directly from the assessment model and changes when the assessment is updated.	ICES (2012)
Precautionary approach	B_{lim}	$0.3 \times B_{MSY}^*$	Relative value (equilibrium yield at this biomass is 50% of MSY).	ICES (2016a)
	B_{pa}	Not defined		
	F_{lim}	$1.7 \times F_{MSY}^*$	Relative value (the F that drives the stock to B_{lim}).	ICES (2016a)
	F_{pa}	Not defined		
Management plan	SSB_{mgt}	Not applicable		
	F_{mgt}	Not applicable		

* Fishing mortality is estimated only in relation to F_{MSY} and total stock biomass is estimated only in relation to B_{MSY} . K is the carrying capacity and r is the intrinsic biomass growth rate.

Basis of the assessment

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

ICES stock data category	1 (ICES, 2016b).
Assessment type	Surplus production model (ASPIC; ICES, 2017a) that uses landings in the model and in the forecast.
Input data	Commercial catches (international landings); three commercial indices (SPCORT8c 1982–2012, PT.crust.tr 1989–2016, and PT.fish.tr 1989–2016).
Discards and bycatch	Discarding is assumed to be negligible.
Indicators	None.
Other information	This stock was benchmarked in 2012 (WKFLAT; ICES, 2012).
Working group	Working Group for the Bay of Biscay and the Iberian Waters Ecoregion (WGBIE)

Information from stakeholders

There is no information available.

History of the advice, catch, and management

Table 7 Black-bellied anglerfish in divisions 8.c and 9.a. ICES advice and official landings. All weights are in tonnes.

Year	ICES advice	Predicted landings corresp. to advice for combined <i>Lophius</i> species	Predicted landings corresp. to advice for <i>L. budegassa</i>	Agreed TAC*	ICES landings for combined <i>Lophius</i> species	ICES landings <i>L. budegassa</i>
1987	Not dealt with	-		12 000	8973	3832
1988	Not dealt with	-		12 000	10 021	3700
1989	Not dealt with	-		12 000	7574	2578
1990	Not dealt with	-		12 000	6124	2334
1991	No advice	-		12 000	5802	2162
1992	No advice	-		12 000	5493	2111
1993	No long-term gain in increasing F	-		13 000	4556	2227
1994	No advice	-		13 000	3587	1580
1995	If required a precautionary TAC	-		13 000	3677	1843
1996	If required a precautionary TAC	-		13 000	4584	1629
1997	If required a precautionary TAC	-		13 000	5527	1813
1998	Restrict catch to < 80% recent levels			10 000	5070	2089
1999	Reduce F to Fpa	4200		8500	3817	1879
2000	60% reduction in F	1600		6800	2628	1369
2001	50% reduction in F	2800		6000	1801	1013
2002	30% reduction in F	3500		4800	1802	770
2003	5% reduction in F	3200		4000	3203	926
2004	F = 0 or recovery plan**	0**		2300	4127	973
2005	F = 0 or recovery plan	0		2000	4541	897
2006	F = 0 or recovery plan	0		2000	4111	1148
2007	F = 0 or recovery plan	0		2000	3651	1301
2008	F = 0 or recovery plan	0		2000	3288	951
2009	Same advice as last year	0		1800	3049	769
2010	F = 0 or management plan	0		1500	2331	784
2011	MSY framework	1500	480	1571	2085	945
2012	MSY framework	3300	1100	3300	2519	1139
2013	MSY transition	2090	740	2475	2582	1066

Year	ICES advice	Predicted landings corresp. to advice for combined <i>Lophius</i> species	Predicted landings corresp. to advice for <i>L.</i> <i>budegassa</i>	Agreed TAC*	ICES landings for combined <i>Lophius</i> species	ICES landings <i>L.</i> <i>budegassa</i>
2014	MSY approach	2629	1153	2629	2989	988
2015	MSY approach	2987	1050	2987	2790	1042
2016	MSY approach^	≤ 2413	≤ 1070	2569	2802	1011
2017	MSY approach^		≤ 2122	3955		
2018	MSY approach^		≤ 2349			

* 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.

History of the catch and landings

Table 8 Black-bellied anglerfish in divisions 8.c and 9.a. Catch distribution by fleet in 2016 as estimated by ICES.

Table 8. Black beloned anguilliform in divisions 8.0 and 5.0: Catch distribution by fleet in 2016 as estimated by ICES.					
Catch (2016)	Landings				Discards
1011 tonnes	Bottom trawl 52%	Artisanal 25.4%	Gillnet 21.9%	Others 0.7%	negligible
	1011 tonnes				

Table 9 Black-bellied 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.

8	Division 8.c				Division 9.a						Divisions 8.c and 9.a		
	SPAIN				SPAIN			PORTUGAL		Div. 9.a TOTAL			
	Trawl	Gillnet	Others	TOTAL	Trawl	Gillnet	Others	Trawl	Artisanal		SUBTOTAL	Unallocated/ non-reported	TOTAL
1978	n/a	n/a		n/a	248			n/a	107	355	355		355
1979	n/a	n/a		n/a	306			n/a	210	516	516		516
1980	1203	207		1409	385			n/a	315	700	2110		2110
1981	1159	309		1468	505			n/a	327	832	2300		2300
1982	827	413		1240	841			n/a	288	1129	2369		2369
1983	1064	188		1252	699			n/a	428	1127	2379		2379
1984	514	176		690	558			223	458	1239	1929		1929
1985	366	123		489	437			254	653	1344	1833		1833
1986	553	585		1138	379			200	847	1425	2563		2563
1987	1094	888		1982	813			232	804	1849	3832		3832
1988	1058	1010		2068	684			188	760	1632	3700		3700
1989	648	351		999	764			272	542	1579	2578		2578
1990	491	142		633	689			387	625	1701	2334		2334
1991	503	76		579	559			309	716	1584	2162		2162
1992	451	57		508	485			287	832	1603	2111		2111
1993	516	292		809	627			196	596	1418	2227		2227
1994	542	201		743	475			79	283	837	1580		1580
1995	924	104		1029	615			68	131	814	1843		1843
1996	840	105		945	342			133	210	684	1629		1629
1997	800	198		998	524			81	210	815	1813		1813
1998	748	148		896	681			181	332	1194	2089		2089
1999	565	127		692	671			110	406	1187	1879		1879
2000	441	73		514	377			142	336	855	1369		1369
2001	383	69		452	190			101	269	560	1013		1013
2002	173	74		248	234			75	213	522	770		770
2003	279	49		329	305			68	224	597	926		926
2004	250	120		370	285			50	267	603	973		973
2005	273	97		370	283			31	214	527	897		897
2006	323	124		447	541			39	121	701	1148		1148
2007	372	68		440	684			66	111	861	1301		1301
2008	386	70		456	336			40	119	495	951		951
2009	301	148		449	172			34	114	320	769		769
2010	352	81		432	197			70	84	351	784		784
2011	214	115	32	361	157	60	98	75	119	510	871	74	945
2012	161	83	22	265	109	40	90	156	370	765	1030	109	1139
2013	221	135	14	370	95	55	90	100	258	598	968	98	1066
2014	187	126	7	319	120	47	4	113	286	569	888	100	988
2015	233	141	1	375	103	62	2	126	222	515	890	152	1042
2016	203	118	5	326	103	79	2	120	257	560	886	125	1011

Summary of the assessment

Table 10 Black-bellied anglerfish in divisions 8.c and 9.a. Assessment summary. Weights are in tonnes. High and low refer to 80% confidence intervals.

Year	Total biomass/B _{MSY}	High	Low	Landings	F/F _{MSY}	High	Low
	tonnes			tonnes	Relative		
1980	1.2	1.2	1.2	2110	0.93	0.977	0.887
1981	1.181	1.185	1.179	2300	1.036	1.088	0.986
1982	1.15	1.155	1.147	2370	1.098	1.155	1.044
1983	1.116	1.122	1.112	2380	1.137	1.196	1.08
1984	1.081	1.089	1.077	1930	0.937	0.988	0.887
1985	1.079	1.093	1.071	1830	0.888	0.94	0.835
1986	1.083	1.104	1.07	2560	1.267	1.345	1.188
1987	1.037	1.058	1.025	3830	2.077	2.186	1.961
1988	0.904	0.914	0.9	3700	2.32	2.408	2.223
1989	0.775	0.797	0.763	2580	1.812	1.862	1.756
1990	0.72	0.747	0.704	2330	1.749	1.791	1.699
1991	0.679	0.709	0.66	2160	1.712	1.75	1.663
1992	0.646	0.679	0.625	2110	1.759	1.797	1.705
1993	0.614	0.65	0.59	2230	1.981	2.027	1.911
1994	0.569	0.611	0.541	1580	1.46	1.5	1.398
1995	0.567	0.61	0.539	1840	1.737	1.792	1.652
1996	0.545	0.592	0.516	1630	1.581	1.64	1.492
1997	0.536	0.586	0.506	1810	1.81	1.891	1.691
1998	0.513	0.568	0.479	2090	2.243	2.38	2.059
1999	0.466	0.531	0.422	1880	2.212	2.413	1.972
2000	0.427	0.502	0.373	1370	1.697	1.905	1.473
2001	0.42	0.504	0.358	1010	1.233	1.41	1.062
2002	0.439	0.529	0.371	770	0.879	1.01	0.754
2003	0.48	0.572	0.407	926	0.978	1.129	0.842
2004	0.514	0.611	0.438	972	0.959	1.11	0.824
2005	0.55	0.651	0.467	897	0.822	0.954	0.702
2006	0.596	0.701	0.506	1150	0.986	1.153	0.839
2007	0.628	0.739	0.533	1300	1.064	1.261	0.897
2008	0.653	0.773	0.548	951	0.734	0.875	0.617
2009	0.706	0.834	0.594	769	0.545	0.652	0.455
2010	0.776	0.914	0.655	784	0.506	0.605	0.422
2011	0.849	0.996	0.721	945	0.562	0.672	0.468
2012	0.914	1.069	0.776	1140	0.636	0.763	0.529
2013	0.967	1.128	0.823	1070	0.564	0.68	0.47
2014	1.025	1.192	0.872	988	0.491	0.594	0.41
2015	1.088	1.257	0.934	1040	0.488	0.589	0.409
2016	1.146	1.316	0.984	1010	0.451	0.543	0.38
2017	1.204	1.371	1.035				

Sources and references

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