

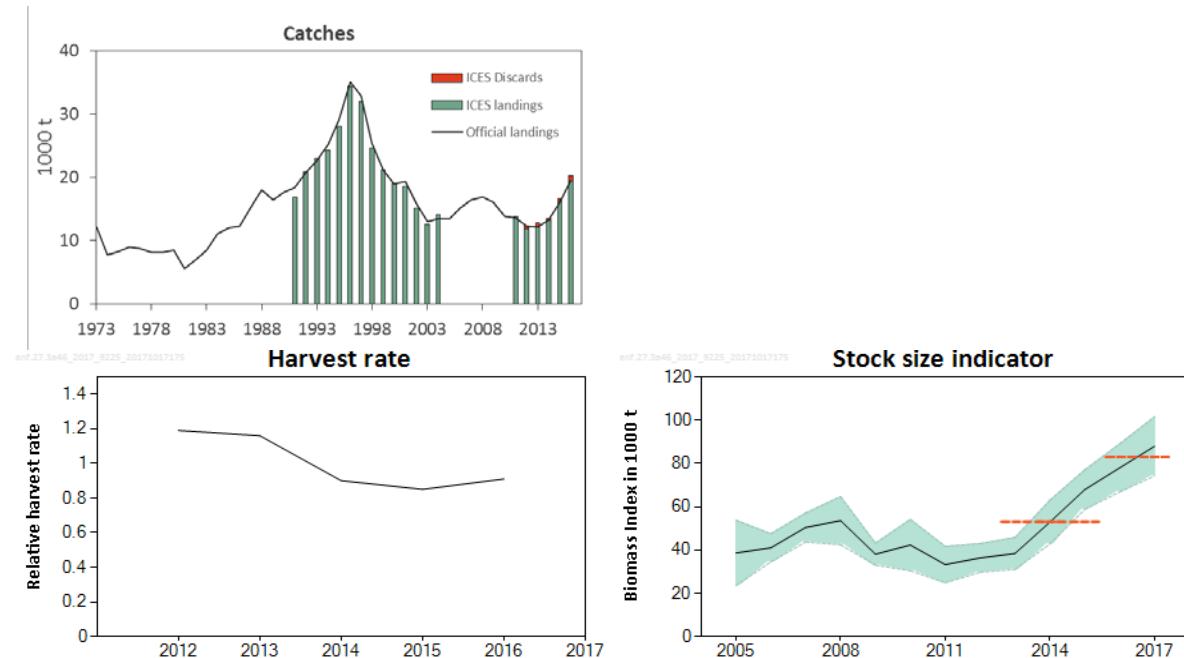
## Anglerfish (*Lophius budegassa*, *Lophius piscatorius*) in subareas 4 and 6 and Division 3.a (North Sea, Rockall and West of Scotland, Skagerrak and Kattegat)

### ICES stock advice

ICES advises that when the precautionary approach is applied, catches in 2018 should be no more than 26 408 tonnes. If discard rates do not change from the average of the last 3 years (2014–2016), this implies landings of no more than 25 563 tonnes.

### Stock development over time

The stock size indicator shows an increasing biomass since 2011. The relative harvest rate has been relatively stable since 2014.



**Figure 1** Anglerfish in subareas 4 and 6 and Division 3.a. Summary of the stock assessment. Top: Official and ICES landings and discards (thousand tonnes). Bottom left: Relative harvest rate (total catch/stock size indicator; normalized to the average harvest rate). Bottom right: Stock biomass (thousands tonnes) from SCO-IV-VI-AMISS-Q2. The dashed horizontal lines indicate the average of the most recent two years and the previous three years. The shaded area represents the 95% confidence interval.

## Stock and exploitation status

**Table 1** Anglerfish in subareas 4 and 6 and Division 3.a. State of the stock and fishery relative to reference points.

	Fishing pressure			Stock size		
	2014	2015	2016	2015	2016	2017
Maximum sustainable yield $F_{MSY}$	?	?	?	Undefined	MSY B <sub>trigger</sub>	?
Precautionary approach $F_{pa}, F_{lim}$	?	?	?	Undefined	B <sub>pa</sub> , B <sub>lim</sub>	?
Management plan $F_{MGT}$	—	—	—	Not applicable	B <sub>MGT</sub>	—
Qualitative evaluation	-	↙	↙	↗ Stable	-	↗ Increasing

## Catch options

The ICES framework for category 3 stocks was applied (ICES, 2012). The SCO-IV-VI-AMISS-Q2 survey was used as the index of stock development. The advice is based on a comparison of the two latest index values (index A) with the three preceding values (index B), multiplied by the recent advised landings.

The index is estimated to have increased by more than 20% and thus the uncertainty cap was applied. The stock status relative to candidate reference points is unknown. The index ratio has increased by more than 50%; therefore, no additional precautionary buffer was applied. The discard rate is 3.2 % of the total catch.

**Table 2** Anglerfish in subareas 4 and 6 and Division 3.a. The basis for the catch options.\*

Index A (2016, 2017)		82 921 t
Index B (2013, 2014, 2015)		53 065 t
Index ratio (A/B)		1.56
Uncertainty cap	Applied	1.2
Advised catch for 2017		22 007 t
Discard rate (average 2014–2016)		3.2%
Precautionary buffer	Not applied	-
Catch advice**		26 408 t
Landings corresponding to the advised catch***		25 563 t

\* The figures in the table are rounded. Calculations were done with unrounded inputs and computed values may not match exactly when calculated using the rounded figures in the table.

\*\* [(catch advice for 2017 × uncertainty cap)]

\*\*\* [(catch advice for 2018) \* (1-discard rate)]

## Basis of the advice

**Table 3** Anglerfish in subareas 4 and 6 and Division 3.a. The basis of the advice.

Advice basis	Precautionary approach
Management plan	ICES is not aware of any agreed precautionary management plan for anglerfish in this area.

## Quality of the assessment

The SCO-AMISS-IV-VI-Q2 survey does not cover divisions 3.a, 4.b, and 4.c, which collectively account for 9% of the landings. It is uncertain to what extent the lack of coverage of these areas affects the quality of the assessment. Discard data are available for most of the fleets except the gillnet fishery, which is not adequately sampled. This fishery accounts for 13% of the landings in 2016.

Since 2014 discard data have improved due to increased sampling as a result of a joint observer sampling scheme by Marine Scotland Science and the Scottish Fishermen's Federation.

## Issues relevant for the advice

The two TACs in this area do not match the stock unit. One TAC area covers Subarea 4 and Division 2.a (EC); the second covers Division 5.b (EC) and subareas 6, 12, and 14. There is no TAC for Division 3.a. As a result of this mismatch, there is a potential for catches to exceed advice.

Discard levels were higher in 2013 and in 2016 due to incoming high recruitment in these years. In addition, in 2016 quota restrictions, particularly in the prawn fisheries, have also resulted in discarding of marketable anglerfish.

## Reference points

No reference points are defined for this stock. MSY proxies were examined (ICES, 2016a) but no reliable proxy could be identified for this stock.

## Basis of the assessment

**Table 5** Anglerfish in subareas 4 and 6, and in Division 3.a. Basis of assessment and advice.

ICES stock data category	3 (ICES, 2016b)
Assessment type	Survey trends.
Input data	International catch information and dedicated industry-science anglerfish surveys in Subarea 6 and Division 4.a (SCO-IV-VI-AMISS-Q2).
Discards and bycatch	Discard estimates are available from 2012 onwards.
Indicators	Length distribution from SCO-IV-VI-AMISS-Q2 survey
Other information	Last benchmarked in 2013 (WKROUND; ICES, 2013), which did not result in a revision of the assessment method.
Working group	Working Group for the Celtic Seas Ecoregion (WGCSE)

## Information from stakeholders

There is no additional available information for this stock.

## History of the advice, catch, and management

**Table 6** Anglerfish in subareas 4 and 6 and Division 3.a. ICES advice and official landings. All weights are in tonnes.

Year	ICES advice	Predicted catch corresponding to advice		Predicted landings corresponding to advice	Agreed TAC*	Official landings	ICES landings	ICES discards
		Div. 3.a & Subarea 4	Subarea 6					
1990	Not assessed	-	-	-	8 600	17 605	-	-
1991	Not assessed	-	-	-	8 600	18 369	16 846	-
1992	Not assessed	-	-	-	8 600	20 807	20 934	-
1993	No long-term gain in increased F**	-	-	-	8 600	22 596	23 128	-
1994	No long-term gain in increased F**	-	-	-	8 600	25 155	24 246	-
1995	A precautionary TAC not exceeding recent catch levels**	-	-	-	8 600	29 055	28 090	-
1996	A precautionary TAC not exceeding recent catch levels**	-	-	-	8 600	35 039	34 398	-
1997	Reduction in fishing effort**	-	-	-	8 600	32 853	31 952	-
1998	Reduction in fishing effort**	-	-	-	30 700	25 471	24 667	-
1999	Reduce fishing effort, effective implementation of the TAC**	-	-	-	30 700	21 230	21 194	-
2000	40% reduction in catches	< 9 700	< 7 400	-	25 700	18 973	19 080	-
2001	2/3 of the catches in 1973–1990	5 700	4 300	-	20 500	19 304	18 536	-
2002	2/3 of the catches in 1973–1990	5 700	4 300	-	15 300	15 978	15 167	-
2003	Reduce F below $F_{pa}$	-	-	< 6 700***	10 200	13 004	12 539	-
2004	Reduce F below $F_{pa}$	-	-	< 8 800	10 200	13 496	14 210	-
2005	No effort increase	-	-	-	15 000	13 557	NA	-
2006	No effort increase	-	-	-	15 000	15 151	NA	-
2007	No effort increase	-	-	-	16 500	16 430	NA	-
2008	No effort increase	-	-	-	16 500	16 918	NA	-
2009	Same advice as last year	-	-	-	16 900	16 012	NA	-
2010	No effort increase	-	-	-	16 900	13 839	NA	-
2011	Decrease effort	-	-	-	15 100^	13 679	13 770	-
2012	Reduce catch	-	-	-	14 344^	12 265	11 894	498
2013	Decrease catches by 20%	-	-	-	13 627^	12 139	12 062	787
2014	Decrease catches by 20%	-	-	10 231	12 265^	13 287	13 211	416
2015	Increase landings by 20%			14 702	16 203^	16 043	16 132	420
2016	Precautionary approach (increase recent advised catch by no more than 20%)	$\leq 18\ 435$		17 642	19 142^	19 505^	19 446^	825^
2017	Precautionary approach	$\leq 22\ 007$		21 171	21 171^			
2018	Precautionary approach	$\leq 26\ 408$		$\leq 25\ 563$				

\* TAC for Subarea 4 and Division 2.a (EC) plus TAC for Division 5.b (EC) and Subareas 6, 12, and 14. Prior to 1998 TAC covered only Division 5.b (EC) and Subareas 6, 12, and 14.

\*\* For Subarea 6.

\*\*\* Advice for Division 3.a, Subarea 4, and Division 6.a.

^ An additional quota of 1 500 tonnes is also available for EU vessels fishing in the Norwegian zone of Subarea 4.

^^ Preliminary.

NA = not available.

## History of the catch and landings

**Table 7** Anglerfish in subareas 4 and 6 and Division 3.a. Catch distribution by fleet in 2016 as estimated by ICES.

Catch (2016)	Landings								Discards
	Division 3.a and Subarea 4				Subarea 6				
20 271 tonnes	Demersal trawls 79%	Gillnets 12%	Nephrops trawls 4%	Other 5%	Demersal trawls 74%	Gillnets 14%	Nephrops trawls 1%	Other 11%	
	19 446 tonnes								825 tonnes

**Table 8** Anglerfish in subareas 4 and 6 and Division 3.a. Official landings by ICES area and ICES estimates of landings and discards. All weights are in tonnes.

Year	3.a	4.a	4.b	4.c	6.a	6.b	4	6	Total (3.a, 4, 6)	ICES landings	ICES discards
1973	140	2 085	575	41	9 221	127	2 701	9 348	12 189	-	-
1974	202	2 737	1 171	39	3 217	435	3 947	3 652	7 801	-	-
1975	291	2 887	1 864	59	3 122	76	4 810	3 198	8 299	-	-
1976	641	3 624	1 252	49	3 383	72	4 925	3 455	9 021	-	-
1977	643	3 264	1 278	54	3 457	78	4 596	3 535	8 774	-	-
1978	509	3 111	1 260	72	3 117	103	4 443	3 220	8 172	-	-
1979	687	2 972	1 578	112	2 745	29	4 662	2 774	8 123	-	-
1980	652	3 450	1 374	175	2 634	200	4 999	2 834	8 485	-	-
1981	549	2 472	752	132	1 387	331	3 356	1 718	5 623	-	-
1982	529	2 214	654	99	3 154	454	2 967	3 608	7 104	-	-
1983	506	2 465	1 540	181	3 417	433	4 186	3 850	8 542	-	-
1984	568	3 874	1 803	188	3 935	707	5 865	4 642	11 075	-	-
1985	578	4 569	1 798	77	4 043	1 013	6 444	5 056	12 078	-	-
1986	524	5 594	1 762	47	3 090	1 326	7 403	4 416	12 343	-	-
1987	589	7 705	1 768	66	3 955	1 294	9 539	5 249	15 377	-	-
1988	347	7 737	2 061	95	6 003	1 730	9 893	7 733	17 973	-	-
1989	334	7 868	2 121	86	5 729	313	10 075	6 042	16 451	-	-
1990	570	8 387	2 177	34	5 615	822	10 598	6 437	17 605	-	-
1991	595	9 235	2 522	26	5 061	923	11 790	5 984	18 369	16 846	-
1992	938	10 209	3 053	39	5 479	1 089	13 301	6 568	20 807	20 934	-
1993	843	12 309	3 143	66	5 553	681	15 519	6 234	22 596	23 128	-
1994	811	14 505	3 445	210	5 273	909	18 162	6 182	25 155	24 246	-
1995	823	17 891	2 627	402	6 354	958	20 920	7 312	29 055	28 090	-
1996	702	25 176	1 847	304	6 408	602	27 327	7 010	35 039	34 398	-
1997	776	23 425	2 172	160	5 330	990	25 757	6 320	32 853	31 952	-
1998	626	16 859	2 088	78	4 506	1 313	19 026	5 819	25 471	24 667	-
1999	660	13 344	1 517	24	4 284	1 401	14 885	5 685	21 230	21 194	-
2000	602	12 338	1 617	31	3 311	1 074	13 986	4 385	18 973	19 080	-
2001	621	12 861	1 832	21	2 660	1 309	14 714	3 969	19 304	18 536	-
2002	667	11 048	1 244	21	2 280	718	12 313	2 998	15 978	15 167	-
2003	478	8 523	847	20	2 493	643	9 390	3 136	13 004	12 539	-
2004	519	8 987	851	15	2 453	671	9 853	3 124	13 496	14 210	-
2005	458	8 424	688	5	3 019	958	9 117	3 982	13 557	-	-
2006	425	10 339	683	3	2 785	915	11 026	3 700	15 151	-	-
2007	433	10 632	749	4	3 353	1 260	11 384	4 613	16 430	-	-
2008	486	11 038	769	5	3 373	1 247	11 812	4 620	16 918	-	-
2009	479	10 067	652	9	2 983	1 821	10 729	4 804	16 012	-	-
2010	434	8 134	614	11	3 040	1 606	8 759	4 646	13 839	-	-
2011	406	7 759	764	9	2 871	1 871	8 532	4 741	13 679	13 770	-
2012	422	6 460	714	3	2 835	1 831	7 177	4 666	12 265	11 894	498

Year	3.a	4.a	4.b	4.c	6.a	6.b	4	6	Total (3.a, 4, 6)	ICES landings	ICES discards
2013	407	6 392	546	4	2 666	2 124	6 943	4 789	12 139	12 062	787
2014	439	7 629	823	27	2 610	1 755	8 482	4 366	13 287	13 211	416
2015	480	9 668	961	9	3 365	1 559	10 639	4 924	16 043	16 132	420
2016*	586	11 671	1 194	12	4 676	1 368	12 877	6 042	19 505	19 446	825

\* Preliminary.

Na = not available.

### Summary of the assessment

**Table 9** Anglerfish in subareas 4 and 6, and in Division 3.a. Assessment summary. Weights are in tonnes.

Year	Official landings	ICES landings	ICES discards	Total catch	Survey Index	Survey index, high	Survey index, low	Relative harvest rate*
1973	12 189	-	-	-	-	-	-	-
1974	7 801	-	-	-	-	-	-	-
1975	8 299	-	-	-	-	-	-	-
1976	9 021	-	-	-	-	-	-	-
1977	8 774	-	-	-	-	-	-	-
1978	8 172	-	-	-	-	-	-	-
1979	8 123	-	-	-	-	-	-	-
1980	8 485	-	-	-	-	-	-	-
1981	5 623	-	-	-	-	-	-	-
1982	7 104	-	-	-	-	-	-	-
1983	8 542	-	-	-	-	-	-	-
1984	11 075	-	-	-	-	-	-	-
1985	12 078	-	-	-	-	-	-	-
1986	12 343	-	-	-	-	-	-	-
1987	15 377	-	-	-	-	-	-	-
1988	17 973	-	-	-	-	-	-	-
1989	16 451	-	-	-	-	-	-	-
1990	17 605	-	-	-	-	-	-	-
1991	18 369	16 846	-	-	-	-	-	-
1992	20 807	20 934	-	-	-	-	-	-
1993	22 596	23 128	-	-	-	-	-	-
1994	25 155	24 246	-	-	-	-	-	-
1995	29 055	28 090	-	-	-	-	-	-
1996	35 039	34 398	-	-	-	-	-	-
1997	32 853	31 952	-	-	-	-	-	-
1998	25 471	24 667	-	-	-	-	-	-
1999	21 230	21 194	-	-	-	-	-	-
2000	18 973	19 080	-	-	-	-	-	-
2001	19 304	18 536	-	-	-	-	-	-
2002	15 978	15 167	-	-	-	-	-	-
2003	13 004	12 539	-	-	-	-	-	-
2004	13 496	14 210	-	-	-	-	-	-
2005	13 557	-	-	-	38 617	53 755	23 479	-
2006	15 151	-	-	-	40 985	47 492	34 478	-
2007	16 430	-	-	-	50 392	57 108	43 676	-
2008	16 918	-	-	-	53 546	64 671	42 421	-
2009	16 012	-	-	-	38 060	43 133	32 987	-
2010	13 839	-	-	-	42 279	54 129	30 429	-
2011	13 679	13 770	-	-	33 254	41 662	24 846	-
2012	12 265	11 894	498	12 392	36 325	42 946	29 704	1.19

Year	Official landings	ICES landings	ICES discards	Total catch	Survey Index	Survey index, high	Survey index, low	Relative harvest rate*
2013	12 139	12 062	787	12 849	38 395	45 770	31 020	1.16
2014	13 287	13 211	416	13 627	52 884	62 999	42 769	0.90
2015	16 043	16 132	420	16 552	67 915	77 047	58 782	0.85
2016	19 505**	19 446**	825**	20 271**	77 946	89 060	66 831	0.91
2017	-	-	-		87 896	101 569	74 222	-

\* Calculated as total catch divided by survey index; normalized to the average harvest rate.

\*\*Preliminary

## Sources and references

ICES. 2012. ICES Implementation of Advice for Data-limited Stocks in 2012 in its 2012 Advice. ICES CM 2012/ACOM 68. 42 pp.

ICES. 2013. Report of the Benchmark Workshop on Roundfish Stocks (WKROUND), 4-8 February 2013, Aberdeen, Scotland, UK. ICES CM 2013/ACOM 47. 213 pp.

ICES. 2016a. Report of the Workshop to consider MSY proxies for stocks in ICES category 3 and 4 stocks in Western Waters (WKProxy), 3-6 November 2015, ICES Headquarters, Copenhagen. ICES CM 2015/ACOM 61. 183 pp.

ICES. 2016b. Advice basis. In Report of the ICES Advisory Committee, 2016. ICES Advice 2016, Book 1, Section 1.2.

ICES. 2017. Report of the Working Group on Celtic Seas Ecoregion (WGCSE), 9-18 May, ICES Headquarters, Copenhagen, Denmark. ICES CM 2017/ACOM 13. 1464 pp.