

Saithe (*Pollachius virens*) in subareas 4 and 6, and in Division 3.a (North Sea, Rockall and West of Scotland, Skagerrak and Kattegat)

ICES advice on fishing opportunities

ICES advises that when the MSY approach is applied, catches in 2021 should be no more than 65 687 tonnes.

ICES notes the existence of a precautionary management plan, developed and adopted by one of the relevant management authorities for this stock.

Note: This advice sheet is abbreviated due to the COVID-19 disruption. The previous advice issued for 2020 is attached as Annex 1.

Stock development over time

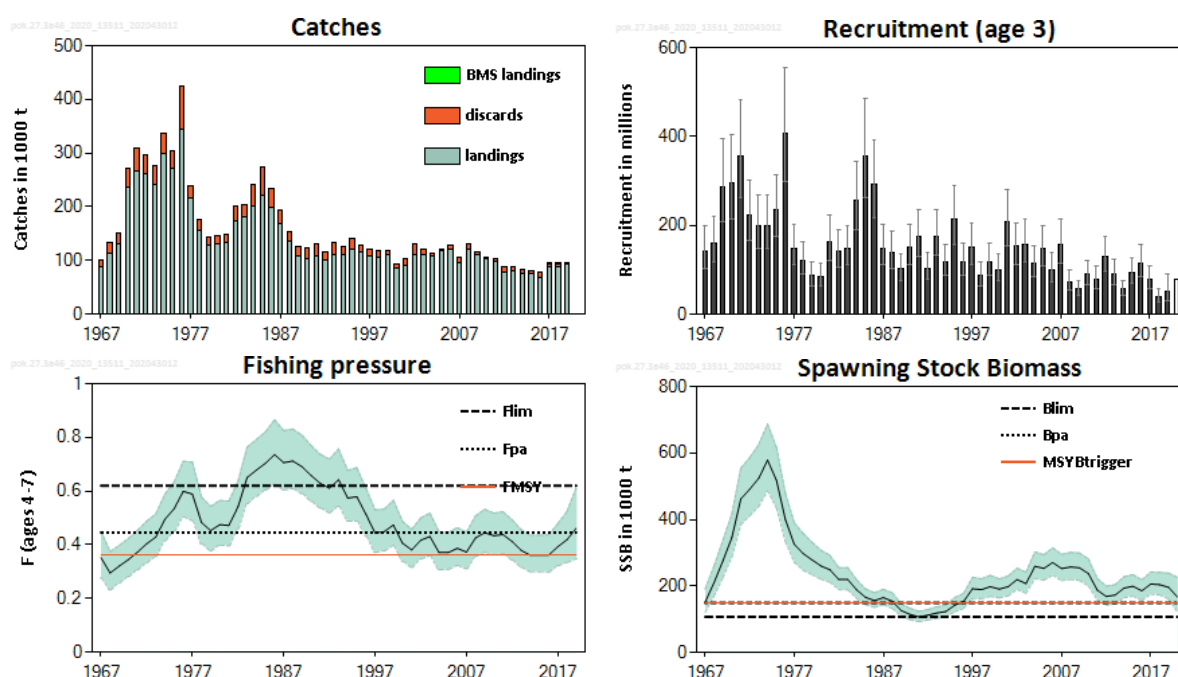


Figure 1 Saithe in subareas 4 and 6, and in Division 3.a. Summary of the stock assessment. Assumed recruitment value is unshaded. Shaded areas (F, SSB) and error bars (R) indicate 95% confidence intervals. Landings and discards are for ages 3–10+ only, as used in the assessment. Landings below minimum conservation reference size (BMS) are those officially reported.

Stock and exploitation status

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

		Fishing pressure			Stock size		
		2017	2018	2019	2018	2019	2020
Maximum sustainable yield	F_{MSY}	✗	✗	✗	MSY $B_{trigger}$	✓	✓
Precautionary approach	F_{pa}, F_{lim}	✓	✓	⚠	B_{pa}, B_{lim}	✓	✓
Management plan	F_{MGT}	—	—	—	B_{MGT}	—	—
				Above			Above trigger
				Increased risk			Full reproductive capacity
				Not applicable			Not applicable

Catch scenarios

Table 2 Saithe in subareas 4 and 6, and in Division 3.a. Assumptions made for the interim year and in the forecast. All weights are in tonnes, recruitment is in thousands.

Variable	Value	Notes
$F_{\text{ages 4-7}} (2020)$	0.46	Average exploitation pattern (2017–2019) scaled to F in 2019
SSB (2021)	151404	SSB at the beginning of the TAC year
$R_{\text{age 3}} (2020)$	78287	Geometric mean recruitment re-sampled from the years 2010–2019
$R_{\text{age 3}} (2021)$	77918	Geometric mean recruitment re-sampled from the years 2010–2019
Total catch (2020)	80363	Short-term forecast
Projected landings (2020)	75639	Assuming 2017–2019 average landing fraction by age from numbers
Projected discards (2020)	4724	Assuming 2017–2019 average discards fraction by age from numbers

Table 3 Saithe in subareas 4 and 6, and in Division 3.a. Annual catch scenarios. All weights are in tonnes.

Basis	Total catch (2021)	Projected landings * (2021)	Projected discards** (2021)	Projected landings *, ##		F _{total} (ages 4–7) (2021)	F _{projected} landings (ages 4–7) (2021)	F _{projected} discards (ages 4–7) (2021)	SSB (2022)	% SSB change ***	% TAC change #	% advice change ^
				Div. 3.a and Subarea 4	Subarea 6							
ICES advice basis												
MSY approach: F _{MSY}	65687	61056	4631	55317	5739	0.363	0.34	0.024	164624	8.7	–25	–25
Other scenarios												
F = MAP^^ F _{MSY lower}	40391	37551	2840	34021	3530	0.210	0.196	0.0140	187780	24	–54	–54
F = MAP^^ F _{MSY upper}	90731	84297	6434	76373	7924	0.536	0.50	0.035	142255	–6.0	3.0	3.0
F = 0	0	0	0	0	0	0.00	0.00	0.00	225332	49	–100	–100
F _{pa}	78122	72613	5509	65787	6826	0.446	0.42	0.030	153407	1.32	–11.3	–11.3
F _{lim}	101721	94499	7222	85616	8883	0.620	0.58	0.041	132683	–12.4	15.5	15.5
SSB ₂₀₂₂ = B _{lim}	131384	121862	9522	110407	11455	0.88	0.82	0.058	107297	–29	49	49
SSB ₂₀₂₂ = B _{pa}	83429	77541	5888	70252	7289	0.48	0.45	0.032	149098	–1.52	–5.3	–5.3
SSB ₂₀₂₂ = MSY B _{trigger}	83429	77541	5888	70252	7289	0.48	0.45	0.032	149098	–1.52	–5.3	–5.3
F = F ₂₀₂₀	80210	74548	5662	67540	7008	0.46	0.43	0.031	151564	0.106	–8.9	–8.9
TAC ₂₀₂₀	88093	81868	6225	74172	7696	0.52	0.48	0.034	144600	–4.5	0.00	0.00
TAC ₂₀₂₀ –15%	74879	69603	5276	63060	6543	0.42	0.40	0.028	156285	3.2	–15.0	–15.0
TAC ₂₀₂₀ +15%	101308	94102	7206	85256	8846	0.62	0.58	0.041	133033	–12.1	15.0	15.0
TAC ₂₀₂₀ –20%	70476	65513	4963	59355	6158	0.39	0.37	0.026	160238	5.8	–20.0	–20.0
TAC ₂₀₂₀ +25%	110117	102228	7889	92619	9609	0.69	0.64	0.045	125433	–17.2	25	25

* Marketable landings.

** Including BMS landings, assuming recent discard rate.

*** SSB_{2022} relative to SSB_{2021} .

Total catch in 2021 relative to the TAC in 2020 (88 093 tonnes).

Projected landings split according to the average in 1993–1998, as agreed by the relevant management authorities, i.e. 90.6% in Subarea 4 and Subdivision 3.a.20, and 9.4% in Subarea 6.

^ Total catch 2021 relative to the advice value 2020 (88 093 tonnes).

^^ EU multiannual plan (MAP) for the North Sea (EU, 2018).

The change in advice (–25%) is mainly due to the low incoming recruitment and the downscaling of SSB.

Quality of the assessment

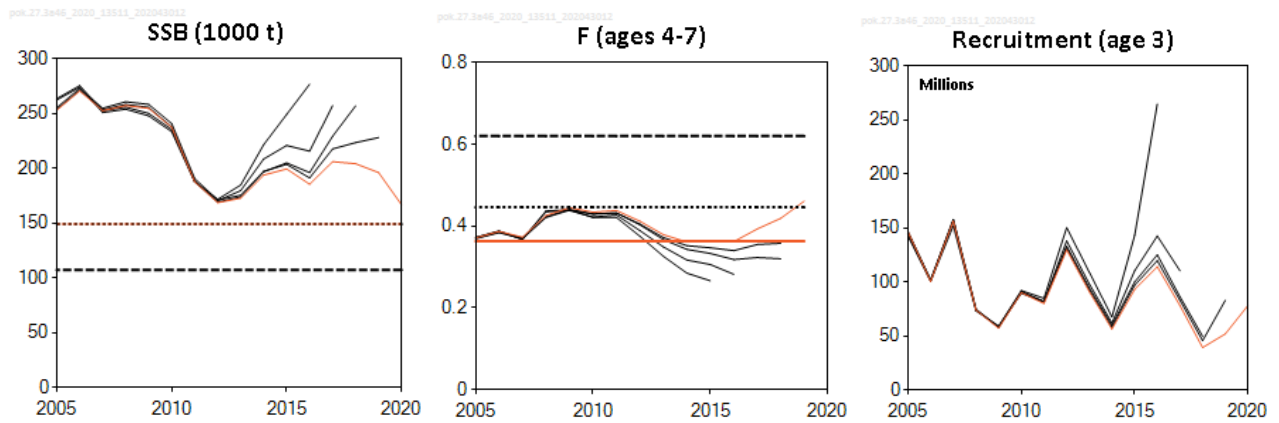


Figure 2 Saithe in subareas 4 and 6, and in Division 3.a. Historical assessment results (final-year recruitment included for each line, corresponding to the forecast recruitment in the interim year).

History of the advice, catch, and management

Table 4a Saithe in subareas 4 and 6, and in Division 3.a. **Subarea 4 (North Sea) and Division 3.a (Skagerrak and Kattegat)**. ICES advice, TAC, official landings, and ICES catch estimates. All weights are in tonnes. Values of official and ICES landings for the period 1987 to 2001 are presented to the nearest thousand tonnes in Subarea 4 and Division 3.a, and to the nearest hundred tonnes in Subarea 6. TAC values are presented to the nearest thousand tonnes. Note that before 2000, the advice was provided for two separate areas: Subarea 4 and Division 3.a, and Subarea 6.

Stock				Subarea 4 (North Sea) and Division 3.a (Skagerrak and Kattegat)				
Year	ICES advice	Total catch corresponding to advice	Landings corresponding to advice	Landings in Subarea 4 and Division 3.a calculated from the advice **	Agreed TAC	Official landings	ICES landings #	ICES discards ##
1987	Reduce F		< 198000		173000	154000	149000	
1988	60% of F (86); TAC		156000		165000	113000	107000	
1989	No increase in F; TAC		170000		170000	92000	92000	
1990	No increase in F; TAC		120000		120000	85000	88000	
1991	No increase in F; TAC		125000		125000	93000	99000	
1992	No increase in F; TAC		102000		110000	92000	92000	
1993	70% of F (91) ~ 93000 t		93000		93000	99000	105000	
1994	Reduce F by 30%		72000		97000	90000	102000	
1995	No increase in F		107000		107000	97000	113000	
1996	No increase in F		111000		111000	96000	110000	
1997	No increase in F		113000		115000	86000	103000	
1998	Reduce F by 20%		97000		97000	88000	100000	
1999	Reduce F to F_{pa}		104000		110000	108000	107000	
2000	Reduce F by 30%		81000	75000	85000	85000	87000	
2001	Reduce F by 20%		96000	87000	87000	88000	90000	
2002	$F < F_{pa}$		< 148000	< 135000	135000	115000	105632	18394
2003	$F < F_{pa}$		< 193000	< 175600	165000	107470	106257	9916
2004	$F < F_{pa}^*$		< 234000	< 211120	190000	103608	102746	7464
2005	F according to management plan *		< 150000	< 137000	145000	111970	113388	6558
2006	F according to management plan ($< F_{pa}$) *		< 135900	< 123300	123000	113354	111845	6909
2007	F according to management plan ($< F_{pa}$) *		< 136000	< 123800	123000	91778	92602	11828
2008	F according to management plan ($< F_{pa}$) *		< 150000	< 136500	136000	115414	115471	7378
2009	F according to management plan ($< F_{pa}$) *		< 139000	\leq 125900	126000	103883	105973	3774
2010	F according to management plan ($< F_{pa}$) *		< 118000	< 107100	107000	90755	96767	4071

Stock				Subarea 4 (North Sea) and Division 3.a (Skagerrak and Kattegat)				
Year	ICES advice	Total catch corresponding to advice	Landings corresponding to advice	Landings in Subarea 4 and Division 3.a calculated from the advice **	Agreed TAC	Official landings	ICES landings #	ICES discards ##
2011	See scenarios			-	93000	89427	91528	3837
2012^	F according to management plan ($< F_{pa}$) *		< 87550	< 79320	79000	68241	70864	6396
2013	Management plan (TAC +15%) *		< 100684	< 91219	91220	71516	71406	6392
2014	Management plan (TAC -15%) *		< 85581	< 77536	77536	68695	69372	5824
2015	Management plan	< 80097		< 66006	66006	69796	69403	4603
2016	EU-Norway management strategy	≤ 75049		≤ 62153	65696	62658	62504	10693
2017	MSY approach	≤ 140653		≤ 122122	100287 §	82203	81570	6339
2018	MSY approach	≤ 118460		≤ 93980	105793 §§	80704	81866	7004
2019 ^	MSY approach	≤ 103327		≤ 87178	93614	87473	87649	4595
2020	MSY approach	≤ 88093		≤ 73092	79813			
2021	MSY approach	≤ 65687		≤ 55317				

* Single-stock boundary and the exploitation of this stock should be conducted in the context of mixed fisheries.

** Split between areas according to the average in 1993–1998, as agreed by the relevant management authorities, i.e. 90.6% in Subarea 4 and Subdivision 3.a.20, and 9.4% in Subarea 6.

§ Includes top-up of 4.1%.

§§ Includes top-up of 12.57%.

Since 2016, landings include the Norwegian component of BMS landings.

Since 2016, discards include all BMS landings except the Norwegian component.

^ Values corrected in February 2019.

Table 4b Saithe in subareas 4 and 6, and in Division 3.a. **Subarea 6 (Rockall and West of Scotland)**. ICES advice, TAC, official landings, and ICES catch estimates. All weights are in tonnes. Values of official and ICES landings for the period 1987 to 2001 are presented to the nearest thousand tonnes in Subarea 4 and Division 3.a, and to the nearest hundred tonnes in Subarea 6. TAC values are presented to the nearest thousand tonnes. Note that before 2000, the advice was provided for two separate areas: Subarea 4 and Division 3.a, and Subarea 6.

Stock				Subarea 6 (Rockall and West of Scotland)				
Year	ICES advice	Total catch corresponding to advice	Landings corresponding to advice	Landings in Subarea 6 calculated from the advice **	Agreed TAC	Official landings	ICES landings #	ICES discards ##
1987	Reduce F		19000		27800	32500	31400	
1988	60% of F (86); TAC		35000		35000	32800	34200	
1989	No increase in F; TAC		20000		30000	22400	25600	
1990	No increase in F; TAC		24000		29000	18000	19900	
1991	No increase in F; TAC		21000		22000	17900	17000	
1992	No increase in F; TAC		< 19000		17000	10800	11800	
1993	70% of F (91) ~ 93000 t		6300		14000	14500	13900	
1994	Reduce F by 30%				14000	13000 \$	12800	
1995	No increase in F		-		16000	10600 \$	11800	
1996	No increase in F		10200 \$\$		13000	9400 \$	9400	
1997	No increase in F				12000	8600 \$	9400	
1998	Reduce F by 20%		4800		10900	7400 \$	8400	
1999	Reduce F to F_{pa}		4800		7500	6800	7300	
2000	Reduce F by 30%		81000	6000	7000	6400	5900	
2001	Reduce F by 20%		96000	9000	9000	8700	8400	
2002	$F < F_{pa}$		< 148000	< 13000	14000	5600	5519	3150
2003	$F < F_{pa}$		< 193000	< 17400	17100	5220	5789	2242
2004	$F < F_{pa}^*$		< 234000	< 20880	20000	4810	4982	620
2005	F according to management plan *		< 150000	< 14000	15000	8700	6456	1637
2006	F according to management plan ($< F_{pa}$) *		< 135900	< 12200	13000	9420	9474	1675
2007	F according to management plan ($< F_{pa}$) *		< 136000	< 12200	13000	6690	6602	584
2008	F according to management plan ($< F_{pa}$) *		< 150000	< 13500	14000	6010	6712	981
2009	F according to management plan ($< F_{pa}$) *		< 139000	< 13100	13000	6170	6294	521
2010	F according to management plan ($< F_{pa}$) *		< 118000	< 11100	11000	6220	6263	412
2011	See scenarios			-	10000	7310	6917	502
2012^	F according to management plan ($< F_{pa}$) *		< 87550	< 8230	8000	7560	7549	2887

Stock				Subarea 6 (Rockall and West of Scotland)				
Year	ICES advice	Total catch corresponding to advice	Landings corresponding to advice	Landings in Subarea 6 calculated from the advice **	Agreed TAC	Official landings	ICES landings #	ICES discards ##
2013	Management plan (TAC +15%) *		< 100684	< 9464	9464	8470	8653	1397
2014	Management plan (TAC-15%) *		< 85581	< 8045	8045	6829	7020	512
2015	Management plan	< 80097		< 6848	6848	7577	7534	405
2016	EU-Norway management strategy	≤ 75049		≤ 6448	6816	5852	5573	181
2017	MSY approach	≤ 140653		≤ 12670	10404 §	7391	7116	139
2018	MSY approach	≤ 118460		≤ 9751	10215 §§	7595	6641	322
2019 ^	MSY approach	≤ 103327		≤ 9045	9713	4787	4875	59
2020	MSY approach	≤ 88093		≤ 7584	8280			
2021	MSY approach	≤ 65687		≤ 5739				

* Single-stock boundary and the exploitation of this stock should be conducted in the context of mixed fisheries.

** Split between areas according to the average in 1993–1998, as agreed by relevant management authorities, i.e. 90.6% in Subarea 4 and Subdivision 3.a.20, and 9.4% in Subarea 6.

§ Incomplete data.

§§ *Status quo* catch.

Since 2016, landings include the Norwegian component of BMS landings.

Since 2016, discards include all BMS landings except the Norwegian component.

§ Includes top-up of 4.1%.

§§ Includes top-up of 4.76%.

^ Values corrected in February 2019.

Summary of the assessment

Table 5 Saithe in subareas 4 and 6, and in Division 3.a. Assessment summary. Recruitment is in thousands, weights are in tonnes. “High” and “Low” indicate 95% confidence intervals.

Year	Recruitment			Spawning-stock biomass			Landings ^	Discards ^	Official BMS landings	Fishing mortality		
	Age 3	High	Low	SSB	High	Low				ages 4–7	High	Low
	thousands			tonnes								
1967	141749	197785	101589	152252	191262	121198	88339	12992		0.35	0.45	0.28
1968	160573	220739	116806	210476	260580	170005	113741	20818		0.30	0.38	0.23
1969	287062	394767	208743	276585	338230	226175	130580	19713		0.32	0.40	0.26
1970	294929	403247	215707	346060	416611	287456	235012	35817		0.35	0.42	0.28
1971	356355	482628	263120	461829	554547	384613	265356	43821		0.37	0.45	0.31
1972	223448	300599	166099	491096	586090	411499	261914	34567		0.40	0.49	0.33
1973	200427	269386	149121	523606	624818	438789	242513	32651		0.43	0.52	0.36
1974	198604	267309	147558	578302	686903	486871	298347	38674		0.50	0.59	0.42
1975	234351	313915	174954	517934	616548	435093	271610	33035		0.53	0.63	0.45
1976	407390	554427	299348	399712	478599	333828	343898	79449		0.60	0.71	0.50
1977	149340	201431	110720	325413	390189	271390	216393	23520		0.59	0.71	0.49
1978	120146	161571	89343	297647	358230	247309	155124	21727		0.48	0.58	0.40
1979	87394	117949	64754	278532	331512	234019	128352	14295		0.45	0.54	0.38
1980	85398	115251	63278	260299	307454	220376	131897	13392		0.48	0.56	0.40
1981	164062	223041	120679	248762	292392	211641	132273	15971		0.47	0.56	0.40
1982	140997	189550	104881	219830	255052	189472	174336	27775		0.54	0.64	0.46
1983	148474	199744	110364	219780	255730	188883	180040	22978		0.65	0.76	0.55
1984	255333	344321	189343	188722	218683	162866	200843	39723		0.68	0.79	0.58
1985	356047	484913	261427	165894	191299	143863	220870	52802		0.70	0.82	0.60
1986	291152	392410	216022	156348	179960	135833	198605	34190		0.74	0.87	0.63
1987	149047	200695	110690	165251	190225	143555	167503	24877		0.71	0.83	0.61
1988	138414	185730	103152	154533	179738	132863	135176	19076		0.71	0.83	0.61
1989	102008	137028	75937	126333	146426	108997	108892	15707		0.69	0.81	0.59
1990	150308	202288	111684	114507	133004	98582	103831	20619		0.66	0.77	0.56
1991	175002	234610	130539	107232	123866	92832	108071	22902		0.63	0.74	0.54
1992	103513	138041	77622	112573	129254	98045	99745	15792		0.61	0.72	0.52
1993	176271	235705	131824	119161	137771	103065	111499	21119		0.64	0.76	0.54
1994	118068	157452	88535	123438	142517	106913	109621	17138		0.57	0.68	0.49
1995	213835	288839	158307	142510	165432	122764	121795	19395		0.58	0.69	0.49
1996	118651	160036	87968	153695	177989	132717	114968	13928		0.51	0.61	0.43
1997	150312	204061	110720	191980	226219	162923	107348	12755		0.44	0.53	0.37
1998	87577	118488	64730	189382	221784	161714	106126	11096		0.45	0.53	0.38
1999	117064	158892	86247	198039	232060	169005	110531	8936		0.47	0.57	0.40
2000	100942	136492	74652	190738	221257	164429	85781	8014		0.41	0.49	0.34
2001	207271	279565	153671	198099	230209	170468	91741	11118		0.38	0.46	0.32
2002	152571	206405	112778	219417	253839	189662	110911	18936		0.42	0.50	0.35
2003	158002	213785	116775	207366	241472	178076	110282	11374		0.43	0.52	0.36
2004	115544	155366	85928	259445	302741	222342	107356	6436		0.37	0.45	0.31
2005	146607	198625	108213	253086	294070	217814	118625	2592		0.37	0.45	0.31
2006	100552	138251	73133	270709	314984	232657	120414	8297		0.39	0.46	0.32
2007	156429	214477	114092	252682	295300	216215	94958	11375		0.37	0.45	0.31
2008	74067	99746	54998	257281	300962	219940	121618	8269		0.43	0.51	0.36
2009	57208	76928	42543	254800	299393	216849	110972	3548		0.45	0.53	0.37
2010	90078	121424	66823	237453	281506	200294	102128	2595		0.43	0.52	0.36
2011	80065	108780	58930	187777	222950	158153	98034	3972		0.44	0.52	0.37
2012	129691	174169	96572	168706	199716	142511	78144	8905		0.41	0.49	0.34

Year	Recruitment			Spawning-stock biomass			Landings ^	Discards ^	Official BMS landings	Fishing mortality		
	Age 3	High	Low	SSB	High	Low				ages 4–7	High	Low
	thousands			tonnes								
2013	90971	122458	67581	172703	204038	146181	79859	7412		0.38	0.46	0.32
2014	56389	76522	41553	193901	228069	164851	76057	6115		0.36	0.44	0.30
2015	93144	126573	68544	199500	234444	169764	76748	4697		0.36	0.44	0.30
2016	114203	155859	83680	185528	218552	157493	67620 *	10052 **	0	0.36	0.44	0.30
2017	78090	108575	56164	206143	242131	175503	88010 *	6571 **	0.5	0.39	0.48	0.32
2018	39247	58104	26511	204242	240829	173213	88328 *	7076 **	42	0.42	0.52	0.34
2019	51955	89889	30029	196167	238829	161126	92390 *	4224 **	19.85	0.46	0.61	0.35
2020	78287 ***			166726	226155	121412						

^ ICES estimates; landings, and discards for ages 3–10+ only, as used in the assessment.

* Since 2016, landings include the Norwegian component of BMS landings.

** Since 2016, discards minus BMS landings from EU fleets officially reported in logbooks.

*** Recruitment in 2020 is the geometric mean of re-sampled assessment recruitment estimates from 2010 to 2019.

Sources and references

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Annex 1

ICES Advice on fishing opportunities, catch, and effort
Celtic Seas, Faroes, and Greater North Sea ecoregions
Published 28 June 2019

Saithe (*Pollachius virens*) in subareas 4 and 6, and in Division 3.a (North Sea, Rockall and West of Scotland, Skagerrak and Kattegat)

ICES advice on fishing opportunities

ICES advises that when the MSY approach is applied, catches in 2020 should be no more than 88 093 tonnes.

Stock development over time

Spawning-stock biomass (SSB) has fluctuated without trend and has been above $MSY B_{trigger}$ since 1996. Fishing mortality (F) has decreased and stabilized at or below F_{MSY} since 2014. Recruitment (R) has shown an overall decreasing trend over time with lowest levels in the past 10 years.



Figure 1 Saithe in subareas 4 and 6, and in Division 3.a. Summary of the stock assessment. Predicted recruitment values are not shaded. Shaded areas (SSB) and error bars (R) indicate 95% confidence intervals. Landings and discards are for ages 3-10+ only, as used in the assessment. The unshaded recruitment is the median recruitment re-sampled from the years 2009-2018.

Stock and exploitation status

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

Table 1 Saithe in subareas 4 and 6, and in Division 3.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}	✓	✓	✓ At F_{MSY}	$MSY B_{trigger}$	✓	✓ 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 Saithe in subareas 4 and 6, and in Division 3.a. Assumptions made for the interim year and in the forecast.

Variable	Value	Notes
$F_{\text{ages 4-7}} (2019)$	0.36	Average exploitation pattern (2016–2018), scaled to F_{4-7} in 2019
SSB (2020)	217 356	SSB at the beginning of the TAC year; in tonnes.
$R_{\text{age 3}} (2019, 2020)$	83 040	Median recruitment re-sampled from the years 2009–2018; in thousands.
Total catch (2019)	88 709	Short-term forecast; in tonnes.
Wanted catch (2019)	81 897	Assuming average of 2016–2018 wanted catch fraction by age; in tonnes.
Unwanted catch (2019)	6 812	Assuming average of 2016–2018 unwanted catch fraction by age; in tonnes.

Table 3 Saithe in subareas 4 and 6, and in Division 3.a. Annual catch scenarios. All weights are in tonnes.

Basis	Total catch (2020)	Wanted catch* (2020)	Unwanted catch* (2020)	Wanted catch** 3a4	Wanted catch** 6	F_{total} (ages 4–7) (2020)	F_{wanted} (ages 4–7) (2020)	F_{unwanted} (ages 4–7) (2020)	SSB (2021)	% SSB change **	% TAC change ***	% advice change ^
ICES advice basis												
MSY approach: F_{MSY}	88093	80676	7417	73092	7584	0.363	0.3	0.032	213159	-1.93	-14.7	-14.7
Other scenarios												
$F = \text{MAP}^{\wedge\wedge}$ $F_{\text{MSY lower}}$	54430	49936	4494	45242	4694	0.210	0.191	0.0190	245209	12.8	-47	-47
$F = \text{MAP}^{\wedge\wedge}$ $F_{\text{MSY upper}}$	121041	110641	10400	100241	10400	0.536	0.46	0.048	182110	-16.2	17.1	17.1
$F = 0$	0	0	0	0	0	0	0	0	298215	37	-100	-100
F_{pa}	104446	95642	8804	86652	8990	0.47	0.41	0.040	197699	-9.0	1.08	1.08
F_{lim}	135413	123673	11740	112048	11625	0.520	0.56	0.055	168963	-22	31	31
$\text{SSB}_{2021} = B_{\text{lim}}$	203255	184872	18383	167494	17371	1.13	1.03	0.100	107297	-51	97	97
$\text{SSB}_{2021} = B_{\text{pa}}$	157456	143563	13893	130068	13495	0.76	0.70	0.068	149098	-31	52	52
$\text{SSB}_{2021} = \text{MSY } B_{\text{trigger}}$	157456	143563	13893	130068	13495	0.76	0.70	0.068	149098	-31	52	52
$F = F_{2019}$	86995	79683	7312	72193	7495	0.36	0.33	0.032	214145	-1.48	-15.8	-15.8
TAC_{2019}	103328	94616	8712	85722	8894	0.44	0.40	0.039	198740	-8.6	0	0
$\text{TAC}_{2019} - 15\%$	87828	80436	7392	72755	7561	0.36	0.33	0.032	213398	-1.82	-15.0	-15.0
$\text{TAC}_{2019} + 15\%$	118826	108650	10176	98434	10213	0.52	0.48	0.047	184174	-15.3	15.0	15.0
$\text{TAC}_{2019} - 20\%$	82662	75723	6939	72605	7118	0.34	0.31	0.030	218216	0.40	-20.0	-20.0
$\text{TAC}_{2019} + 25\%$	129159	117952	11277	106675	11087	0.58	0.53	0.052	174816	-19.6	25	25

* “Wanted” and “unwanted” catch are used to describe fish that would be landed and discarded in the absence of the EU landing obligation.

** SSB_{2021} relative to SSB_{2020} .

*** Total catch in 2020 relative to the TAC in 2019 (103 327 tonnes).

Wanted catch split according to the average in 1993–1998, i.e. 90.6% in Subarea 4 and Subdivision 3.a.20 and 9.4% in Subarea 6.

^ Total catch 2020 relative to the advice value 2019 (103 327 tonnes).

^^ EU multiannual plan (MAP) for the North Sea (EU, 2018).

The change in advice (-14.7%) is due mainly to a downward revision in stock size and low incoming recruitment.

Basis of the advice

Table 4 Saithe in subareas 4 and 6, and in Division 3.a. The basis of the advice.

Advice basis	MSY approach.
Management plan	An EU multiannual management plan (MAP) has been agreed by the EU for this stock (EU, 2018). This plan is not adopted by Norway; thus, it was not used as the basis of the advice for this shared stock. ICES was requested by the EC to provide advice based on the MSY approach and to include the MAP as a catch option. EU–Norway have requested an evaluation of multiple management strategies that are currently under consideration (ICES, 2019a).

Quality of the assessment

Commercial catch per unit of effort (CPUE) information for French, German, and Norwegian trawlers was combined into a single index of biomass of saithe. Factors such as vessel experience and fishing behaviour likely contribute to the variability in CPUE for all fleets, but these are not accounted for in the CPUE standardization. Conflicting signals between the survey and CPUE index contributes to the assessment uncertainty.

The survey index is uncertain because it is influenced by occasional large catches and does not cover the whole stock distribution; however, it is considered generally representative of the stock.

Recruitment values are highly uncertain. Estimates of recruitment for a given year class tend to be revised considerably with successive assessments (Figure 2); therefore, the associated short-term forecast is uncertain for this stock. There has recently been a tendency to overestimate spawning-stock biomass (SSB) and underestimate fishing mortality (F), although this was partly caused by an error in the assessment code impacting assessments prior to 2018.

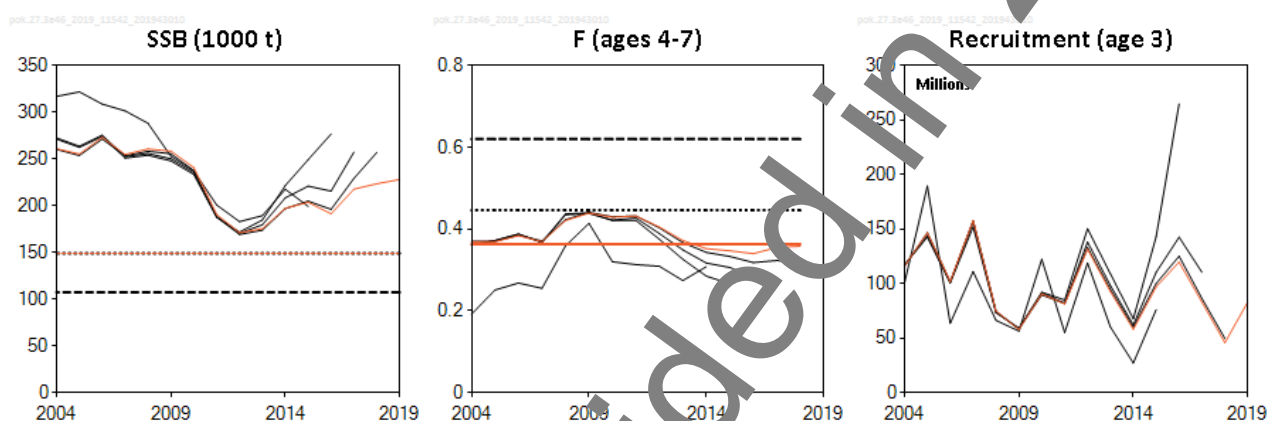


Figure 2 Saithe in subareas 4 and 6, and in Division 3.a. Historical assessment results.

Issues relevant for the advice

Below minimum size (BMS) landings reported to ICES in 2016–2018 were low. In 2018, saithe catches in all EU fleets of Subarea 4 and Division 3.a were subject to the EU landing obligation, with a *de minimis* exemption for saithe caught in crustacean fisheries. In Subarea 6, saithe was subject to the landing obligation in fisheries targeting saithe. Substantial discarding still continues in Subarea 4, based on observations from sampling programmes (estimated unwanted catch for 2018 is 7649 tonnes in Subarea 4 and Division 3.a, i.e. 8.7% of the total catch).

Reference points

Table 5 Saithe in subareas 4 and 6, and in Division 3.a. Reference points, values, and their technical basis. All weights are in tonnes.

Framework	Reference point	Value	Technical basis	Source
MSY approach	MSY $B_{trigger}$	149 098	B_{pa}	ICES (2019b)
	F_{MSY}	0.363	EQsim analysis based on the recruitment period 1998–2017.	ICES (2019b)
Precautionary approach	B_{lim}	107 297	B_{loss}	ICES (2019b)
	B_{pa}	149 098	$B_{lim} \times \exp(1.645 \times 0.2) \approx 1.4 \times B_{lim}$	ICES (2019b)
	F_{lim}	0.620	EQsim analysis based on the recruitment period 1998–2017.	ICES (2019b)
	F_{pa}	0.446	$F_{lim} \times \exp(-1.645 \times 0.2) \approx F_{lim} / 1.4$	ICES (2019b)
Management plan (MAP) *	MAP MSY $B_{trigger}$	149 098	MSY $B_{trigger}$	ICES (2019b)
	MAP B_{lim}	107 297	B_{lim}	ICES (2019b)
	MAP F_{MSY}	0.363	F_{MSY}	ICES (2019b)
	MAP range F_{lower}	0.210–0.363	Consistent with ranges provided by ICES, resulting in no more than 5% reduction in long-term yield compared with MSY.	ICES (2019b)
	MAP range F_{upper}	0.363–0.536	Consistent with ranges provided by ICES, resulting in no more than 5% reduction in long-term yield compared with MSY.	ICES (2019b)

* EU multiannual plan (MAP) for the North Sea (EU, 2018).

Basis of the assessment

Table 6 Saithe in subareas 4 and 6, and in Division 3.a. Basis of the assessment and advice.

ICES stock data category	1 (ICES, 2018).
Assessment type	Age-based analytical assessment S _{AM} (ICES, 2019c) that uses catches in the model and in the forecast.
Input data	Commercial catches (international landings, BMS landings, and discards, age frequencies from catch sampling); survey index (IRTS Q3, ages 3–8); combined commercial index scaled to the exploitable biomass (French, German, and Norwegian trawler fleets). Maturity-at-age and natural mortality are assumed to be constant. Stock weights are catch weights.
Discards, BMS landings, and bycatch	Discards were included and 41% of the landings had associated discarding information; 85% of the discards were observed and 15% were raised. Of the imported discards, 99% had been sampled for age information. BMS landings for Norway are included with landings in the assessment since 2016; all other BMS landings are included with the discards. Logbook-registered discards were 0 kg.
Indicators	None.
Other information	Benchmarked in 2016 (ICES, 2016a) with additional review (ICES, 2016b). An interbenchmark was conducted in 2019 (ICES, 2019a).
Working group	Working Group on the Assessment of Demersal Stocks in the North Sea and Skagerrak (WGNSSK)

Information from stakeholders

There is no additional available information for this stock.

History of the advice, catch, and management

Table 7 Saithe in subareas 4 and 6, and in Division 3.a. ICES advice, TAC, official landings, and ICES catch estimates. All weights are in tonnes. Values of official and ICES landings for the period 1987 to 2001 are presented to the nearest thousand tonnes in Subarea 4 and Division 3.a, and to the nearest hundred tonnes in Subarea 6. TAC values are presented to the nearest thousand tonnes. Note that before 2000, the advice was given for two separate areas: Subarea 4 and Division 3.a, and Subarea 6.

Stock				Subarea 4 (North Sea) and Division 3.a (Skagerrak and Kattegat)					
Year	ICES advice	Total catch corresponding to advice	Wanted catch corresponding to advice	Catch in Subarea 4 and Division 3.a calculated from the advice**	Wanted catch in Subarea 4 and Division 3.a calculated from the advice**	Agreed TAC	Official landings	ICES landings [#]	ICES discards ^{##}
1987	Reduce F		< 198000			173000	154000	149000	
1988	60% of F(86); TAC		156000			165000	113000	107000	
1989	No increase in F; TAC		170000			170000	92000	92000	
1990	No increase in F; TAC		120000			120000	85000	88000	
1991	No increase in F; TAC		125000			125000	93000	99000	
1992	No increase in F; TAC		102000			110000	92000	92000	
1993	70% of F(91) ~ 93000 t		93000			93000	99000	105000	
1994	Reduce F by 30%		72000			97000	90000	102000	
1995	No increase in F		107000			107000	97000	113000	
1996	No increase in F		111000			111000	96000	110000	
1997	No increase in F		113000			115000	86000	103000	
1998	Reduce F by 20%		97000			97000	88000	100000	
1999	Reduce F to F _{pa}		104000			110000	108000	107000	
2000	Reduce F by 30%		81000		75000	85000	85000	87000	
2001	Reduce F by 20%		96000		87000	87000	88000	90000	
2002	F < F _{pa}		< 148000		< 135000	135000	115000	105632	18394
2003	F < F _{pa}		< 193000		< 175600	165000	107470	106257	9916
2004	F < F _{pa} *		< 234000		< 211120	190000	103608	102746	7464
2005	F according to man. plan*		< 150000		< 137000	145000	111970	113388	6558
2006	F according to man. plan (< F _{pa})*		< 125000		< 123300	123000	113354	111845	6909
2007	F according to man. plan (< F _{pa})*		< 136000		< 123800	123000	91778	92602	11828
2008	F according to man. plan (< F _{pa})*		< 150000		< 136500	136000	115414	115471	7378
2009	F according to man. plan (< F _{pa})*		< 139000		≤ 125900	126000	103883	105973	3774
2010	F according to man. plan (< F _{pa})*		< 118000		< 107100	107000	90755	96767	4071

Stock				Subarea 4 (North Sea) and Division 3.a (Skagerrak and Kattegat)					
Year	ICES advice	Total catch corresponding to advice	Wanted catch corresponding to advice	Catch in Subarea 4 and Division 3.a calculated from the advice**	Wanted catch in Subarea 4 and Division 3.a calculated from the advice**	Agreed TAC	Official landings	ICES landings [#]	ICES discards ^{##}
2011	See scenarios					93000	89427	91528	3837
2012 [^]	F according to man. plan ($< F_{pa}$)*		< 87550		< 79320	79000	68241	70864	6396
2013	Management plan (TAC +15%)*		< 100684		< 91219	91220	71516	71406	6392
2014	Management plan (TAC-15%)*		< 85581		< 77536	77536	68695	69372	5824
2015	Management plan	< 80097		< 72211	< 66006	66006	69796	69403	4603
2016	EU-Norway management strategy	≤ 75049		≤ 67995	≤ 62153	65696	62658	62504	10693
2017 [^]	MSY approach	≤ 140653		≤ 127432	≤ 122122	100287 †	82203	81570	6339
2018	MSY approach	≤ 118460		≤ 107325	≤ 93980	105793 ‡	80704	80070 [#]	7649
2019 ^{^^}	MSY approach	≤ 103327		≤ 93614	≤ 87178	93614			
2020	MSY approach	≤ 88093		≤ 79012	≤ 73092				

* Single-stock boundary and the exploitation of this stock should be conducted in the context of mixed fisheries.

** Split between areas according to the average in 1993–1998, i.e. 90.6% in Subarea 4 and Subdivision 3.a.20 and 9.4% in Subarea 6.

† Includes top-up of 4.1%.

‡ Includes top-up of 12.57%.

[#] Since 2016, landings correspond to wanted catch, which includes the Norwegian component of BMS landings.

^{##} Since 2016, discards correspond to unwanted catch, including all BMS landings except the Norwegian component.

[^] The June advice was updated in November.

^{^^} Values corrected in February 2019.

Table 7 (cont') Saithe in subareas 4 and 6, and in Division 3.a. ICES advice, TAC, official landings, and ICES catch estimates. All weights are in tonnes. Values of official and ICES landings for the period 1987 to 2001 are presented to the nearest thousand tonnes in Subarea 4 and Division 3.a, and to the nearest hundred tonnes in Subarea 6. TAC values are presented to the nearest thousand tonnes. Note that before 2000, the advice was given for two separate areas: Subarea 4 and Division 3.a, and Subarea 6.

Stock				Subarea 6 (Rockall and West of Scotland)					
Year	ICES advice	Total catch corresponding to advice	Wanted catch corresponding to advice	Catch in Subarea 6 calculated from the advice**	Wanted catch in Subarea 6 calculated from the advice*	Agreed TAC	Official landings	ICES landings [#]	ICES discards ^{##}
1987	Reduce F		19000			27800	32500	31400	
1988	60% of F(86); TAC		35000			35000	32800	34200	
1989	No increase in F; TAC		20000			30000	22400	25600	
1990	No increase in F; TAC		24000			29000	18000	19900	
1991	No increase in F; TAC		21000			22000	17900	17000	
1992	No increase in F; TAC		< 19000			17000	10800	11800	
1993	70% of F(91) ~ 93000 t		6300			14000	14500	13900	
1994	Reduce F by 30%					14000	13000 [§]	12800	
1995	No increase in F		-			16000	10600 [§]	11800	
1996	No increase in F		10200~			13000	9400 [§]	9400	
1997	No increase in F					12000	8600 [§]	9400	
1998	Reduce F by 20%		4800			10900	7400 [§]	8400	
1999	Reduce F to F _{pa}		4800			7500	6800	7300	
2000	Reduce F by 30%		81000		6000	7000	6400	5900	
2001	Reduce F by 20%		96000		9000	9000	8700	8400	
2002	F < F _{pa}		< 148000		< 13000	14000	5600	5519	3150
2003	F < F _{pa}		< 193000		< 17400	17100	5220	5789	2242
2004	F < F _{pa} *		< 234000		< 20880	20000	4810	4982	620
2005	F according to man. plan*		< 150000		< 14000	15000	8700	6456	1637
2006	F according to man. plan (< F _{pa})*		< 135900		< 12200	13000	9420	9474	1675
2007	F according to man. plan (< F _{pa})*		< 130000		< 12200	13000	6690	6602	584
2008	F according to man. plan (< F _{pa})*		< 150000		< 13500	14000	6010	6712	981
2009	F according to man. plan (< F _{pa})*		< 139000		< 13100	13000	6170	6294	521
2010	F according to man. plan (< F _{pa})*		< 118000		< 11100	11000	6220	6263	412
2011	See scenarios				-	10000	7310	6917	502
2012 [^]	F according to man. plan (< F _{pa})*		< 87550		< 8230	8000	7560	7549	2887

Stock				Subarea 6 (Rockall and West of Scotland)					
Year	ICES advice	Total catch corresponding to advice	Wanted catch corresponding to advice	Catch in Subarea 6 calculated from the advice**	Wanted catch in Subarea 6 calculated from the advice**	Agreed TAC	Official landings	ICES landings [#]	ICES discards ^{##}
2013	Management plan (TAC +15%)*		< 100684		< 9464	9464	8470	8653	1397
2014	Management plan (TAC-15%)*		< 85581		< 8045	8045	6829	7020	512
2015	Management plan	< 80097		< 7492	< 6818	6848	7577	7534	405
2016	EU-Norway management strategy	≤ 75049		≤ 7054	≤ 6148	6816	5852	5573	181
2017 [^]	MSY approach	≤ 140653		≤ 13221	≤ 12670	10404 †	7391	7116	139
2018	MSY approach	≤ 118460		≤ 11135	≤ 9751	10215 ‡	7595	6754	359
2019 ^{^^}	MSY approach	≤ 103327		≤ 9713	≤ 9045	9713			
2020	MSY approach	≤ 88093		≤ 8281					

* Single-stock boundary and the exploitation of this stock should be conducted in the context of mixed fisheries.

** Split between areas according to the average in 1993–1998, i.e. 90.6% in Subarea 4 and Subdivision 3.a.20 and 9.4% in Subarea 6.

~ *Status quo* catch.

§ Incomplete data.

Since 2016, landings correspond to wanted catch, which includes the Norwegian component of BMS landings.

Since 2016, discards correspond to unwanted catch, including all BMS landings except the Norwegian component.

† Includes top-up of 4.1%.

‡ Includes top-up of 4.76%.

[^] The June advice was updated in November.

^{^^} Values corrected in February 2019.

History of the catch and landings

Table 8 Saithe in subareas 4 and 6, and in Division 3.a. Catch distribution by fleet in 2018 as estimated by ICES for ages 3–10+ only, as used in the assessment.

Catch (2018)	Wanted catch			Unwanted catch
94832 tonnes	Bottom trawl 90%	Gillnet 4.8%	Other 5.2%	8009 tonnes
	86824 tonnes			

Advice provided in 2019

Table 9 Saithe in subareas 4 and 6, and in Division 3.a. History of commercial landings; both the official and ICES estimated values are presented by area for each country participating in the fishery. All weights are in tonnes and over all age groups.

Subarea 4 and Division 3.a

Country	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016	2017*	2018*
Belgium	22	28	15	18	7	27	15	2	2	3	5	6	16	15	14
Denmark	7991	7498	7471	5443	8068	8802	8018	6331	5771	5695	4913	4512	4084	5689	7016
Faroe Isl.	558	463	60	15	108	841	146	2	8	3	1	0	18	16	4
France	13628	11830	16953	15083	15881	7203	4582*	13856*	14093*	8475	7910	11574	10794	10334	12598
Germany	9589	12401	14397	12791	14140	13410	11193	10234	1052	9690	8602	7954	6279	6629	7944
Greenland	403	1042	924	564	888	927	0	0	0	0	0	0	0	0	0
Ireland	1	0	0	0	0	1	0	0	0	0	0	0	0	0	0
Lithuania	0	149	0	0	0	0	0	0	0	0	0	0	0	0	0
Netherlands	3	40	28	5	3	16	3	24	34	168	43	75	112	190	264
Norway	62783	68122	61318	45396	61464	57708	52712	41809	33288	35701	37519	35631	31596	49580	39133
Poland	0	1100	1084	1384	1407	988	654	584	0	0	0	0	0	0	0
Portugal			228	68											
Russia	0	35	2	5	5	13	0	0	0	0	0	0	0	0	0
Sweden	2249	2132	1746	1381	1639	1363	154	1335	1306	1402	1329	1156	1198	1177	1316
UK (E/W/Ni)	457	960	9128**	9625**	11804**	12584**	11817*	10250**	7287**	10379**	687	8888**	8561**	8573**	12415**
UK (Scotland)	5924	6170									7686				
Total reported	103608	111970	113354	91778	115414	103883	96715	89427	69241	71516	68695	69796	62658	82203	80704
Unallocated	-862	1418	-1509	824	57	2090	6012	2101	1623	-110	677	-393	-152	-633	-634
BMS landings														< 1	11
ICES estimate	102746	113388	111845	92602	115471	105971	96767	91528	70864	71406	69372	69403	62506#	81570#	80070#
TAC	190000	145000	123250	135900	135900	125924	107000	93600	79320	91220	77536	66006	65696	100287#	105793#

* Official values are preliminary.

** Scotland+E/W/Ni combined.

Includes top-up (4.1% in 2017, 12.57% in 2018).

Since 2016, landings correspond to wanted catch, which includes the Norwegian component of BMS landings.

Subarea 6

Country	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016	2017*	2018*
Denmark	0	0	0	0	0	0	0	0	0	0	20	0	0	5	1
Faroe Islands	34	25	76	32	23	60	24	5	6	25	29	3	7	13	21
France	3053	3954	6092	4327	4170	2102	2008	2357	2612	3814	2904	3484	2299	3968	3626
Germany	4	373	532	580	148	298	257	0	0	0	0	0	9	<1	<1
Ireland	95	168	267	322	288	407	520	359	64	313	128	105	185	124	231
Netherlands	0	0	3	36	1	0	0	0	0	0	0	6	12	3	70
Norway	16	20	28	377	78	68	121	240	5	715	442	677	555	631	955
Russia	6	25	7	2	50	4	2	0	0	0	9	1	0	2	0
Spain	2	3	6	3	4	8	18	32	13	21	9	15	15	4	7
Sweden	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
UK (E/W/Ni)	37	133	2748**	1424**	2955**	3491**	3168**	4508**	4549**	3646**	97	3286**	2770**	2641**	2684**
UK (Scotland)	1563	2922									3191				
Total reported	4810	7623	9759	7103	7717	6438	6118	7192	7558	8534	6829	7577	5852	7391	7595
Unallocated	172	-1167	-1191	-501	-1005	-144	145	-575	-9	119	191	-43	-279	-275	-841
BMS landings														0	31
ICES estimate	4982	6456	8568	6602	6712	6294	6267	6917	7549	8653	7020	7534	5573 †	7116 †	6754 †
TAC	20000	15044	12787	14100	14100	13066	11000	9570	8230	9464	8045	6848	6816	10404 ‡	10215‡

*Official values are preliminary.

**Scotland+E/W/Ni combined.

† Does not include BMS landings.

‡ Includes top-up (4.1% in 2017, 4.76% in 2018).

Subareas 4 and 6 and Division 3.a

	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016	2017	2018
ICES estimate	107728	119844	121320	99204	122184	118267	103030	98446	78414	80059	76392	76936	68709 #	88686 #	86824 #
TAC	210000	160044	136037	150000	150000	139000	118000	103170	87550	100684	85581	72854	72512	110691 ‡	116008 ‡

‡ Agreed upon TAC including landings top-up.

Since 2016, landings correspond to wanted catch, which includes Norwegian component of BMS landings.

Summary of the assessment

Table 10 Saithe in subareas 4 and 6, and in Division 3.a. Assessment summary. Recruitment in thousands. Weights are in tonnes. “High” and “Low” indicate 95% confidence intervals.

Year	Recruitment			SSB			Landings ^A	Discards ^A	Official BMS Landings	F		
	Age 3	High	Low	SSB	High	Low				ages 3-7	High	Low
1967	141494	198062	101082	152179	191621	120855	88339	12992		0.35	0.43	0.28
1968	160626	221340	116566	210140	260771	169339	113741	20818		0.30	0.38	0.23
1969	285536	393742	207066	276167	338468	225333	130580	19713		0.42	0.40	0.26
1970	293885	402801	214420	345470	416722	286401	235012	35817		0.35	0.43	0.28
1971	355289	482335	261706	460888	554512	383072	265356	43821		0.37	0.46	0.31
1972	223760	301708	165950	489956	585832	409772	261914	34567		0.41	0.49	0.33
1973	200829	270557	149071	522340	624484	436902	242513	32657		0.43	0.52	0.36
1974	199146	268668	147614	577409	687054	485262	298347	38674		0.50	0.59	0.42
1975	234629	314939	174799	517619	617259	434064	271610	33055		0.53	0.63	0.45
1976	406509	554761	297875	399536	479219	333103	343898	79449		0.60	0.71	0.50
1977	149305	201820	110455	325613	391157	271051	216393	23520		0.59	0.71	0.49
1978	120267	162085	89239	297541	358782	246753	155124	17727		0.48	0.58	0.40
1979	87312	118110	64545	278406	331971	233484	128352	14257		0.45	0.54	0.38
1980	85442	115585	63160	260341	308074	220005	131857	13392		0.48	0.57	0.40
1981	163244	222487	119776	248847	293028	211327	132273	15771		0.47	0.56	0.40
1982	140924	189861	104600	219732	255341	189090	174336	17775		0.54	0.64	0.46
1983	148454	200146	110112	219760	256096	188580	160040	22978		0.65	0.76	0.55
1984	255728	345608	189223	188629	218875	162563	100844	39723		0.68	0.79	0.58
1985	356651	486871	261261	165846	191491	143635	120870	52802		0.70	0.82	0.60
1986	290211	391958	214876	156491	180356	135784	156057	34190		0.74	0.87	0.62
1987	148978	201026	110405	165328	190573	143427	167503	24877		0.71	0.83	0.60
1988	138223	185852	102799	154642	180143	132755	131176	19076		0.71	0.83	0.61
1989	102269	137687	75961	126330	146635	102237	108892	15707		0.69	0.81	0.59
1990	150675	203232	111710	114429	133104	98374	103831	20619		0.66	0.77	0.56
1991	175072	235328	130244	107236	124057	92695	108071	22902		0.63	0.74	0.54
1992	103616	138535	77498	112743	129693	95000	99745	15792		0.61	0.72	0.52
1993	175855	235807	131145	119462	138456	103043	111499	21119		0.64	0.76	0.54
1994	118210	158072	88400	123897	143399	107047	109621	17138		0.57	0.68	0.49
1995	213155	288825	157310	143022	166744	122926	121795	19395		0.58	0.69	0.49
1996	118789	160681	87819	154300	192119	132920	114968	13928		0.51	0.61	0.43
1997	149544	203637	109820	192734	227902	162971	107348	12755		0.44	0.53	0.37
1998	87766	119285	64576	190223	223556	161867	106126	11096		0.45	0.53	0.38
1999	116546	158601	85642	199013	254058	169351	110531	8936		0.47	0.56	0.39
2000	101190	137244	74608	191816	223430	164679	85781	8014		0.41	0.49	0.34
2001	206864	279866	152904	199501	232606	170473	91741	11118		0.38	0.46	0.31
2002	152635	207133	112475	220406	256208	189607	110911	18936		0.42	0.50	0.35
2003	158359	215478	116381	208320	243589	178165	110282	11374		0.43	0.52	0.36
2004	115926	156279	85993	261003	305836	222818	107356	6436		0.37	0.45	0.31
2005	146568	199075	105500	255341	298187	218652	118625	2592		0.37	0.44	0.31
2006	101835	140440	73802	273112	319375	233550	120414	8297		0.38	0.46	0.32
2007	157857	217143	107758	254900	299487	216950	94958	11375		0.37	0.45	0.31
2008	74781	101057	55553	260792	307154	221428	121618	8269		0.42	0.50	0.35
2009	57946	78160	40957	258473	305816	218460	110972	3548		0.44	0.53	0.37
2010	90504	123342	60952	240921	287975	201556	102128	2595		0.43	0.51	0.36
2011	81377	109501	59662	190672	228353	159208	98034	3972		0.43	0.52	0.36
2012	131577	174402	97589	171139	203888	143650	78144	8905		0.41	0.49	0.34
2013	92659	125098	68523	175410	208467	147594	79859	7412		0.37	0.45	0.31
2014	57900	79256	42407	197237	233313	166740	76057	6115		0.35	0.43	0.29
2015	97033	133381	70590	203685	240629	172413	76748	4697		0.35	0.42	0.29
2016	117787	168254	85281	191273	226994	161174	67620*	10052**	0	0.34	0.42	0.28
2017	83000	124105	55564	217740	258756	183226	88010*	6571**	0.5	0.36	0.45	0.28
2018	127722	80422	25938	223515	271665	183899	86540*	7752**	42	0.36	0.47	0.27
2019	83740***			228110								

^A ICES estimates; landings, and discards for ages 3–10+ only, as used in the assessment.

* Since 2016, landings correspond to wanted catch, which includes the Norwegian component of BMS landings.

** Since 2016, discards correspond to unwanted catch minus BMS landings from EU fleets officially reported in logbooks.

*** Recruitment in 2019 is the median of re-sampled assessment recruitment estimates from 2009–2018, required for stochastic projections.

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