

Saithe (*Pollachius virens*) in Division 5.b (Faroes grounds)

ICES advice on fishing opportunities

Please note: This advice was updated in December 2018 (ICES, 2018c)

ICES advises that when the MSY approach is applied, catches in 2019 should be no more than 27 280 t. ICES is not in a position to advise on the corresponding level of fishing effort.

Stock development over time

The spawning-stock biomass (SSB) was below MSY $B_{trigger}$ from 2012 to 2013, but is estimated to be above MSY $B_{trigger}$ since 2014. Recruitment has fluctuated without trend since 2000 and it is estimated below historical average in 2018. Fishing mortality (F) has been above F_{MSY} since 1981.

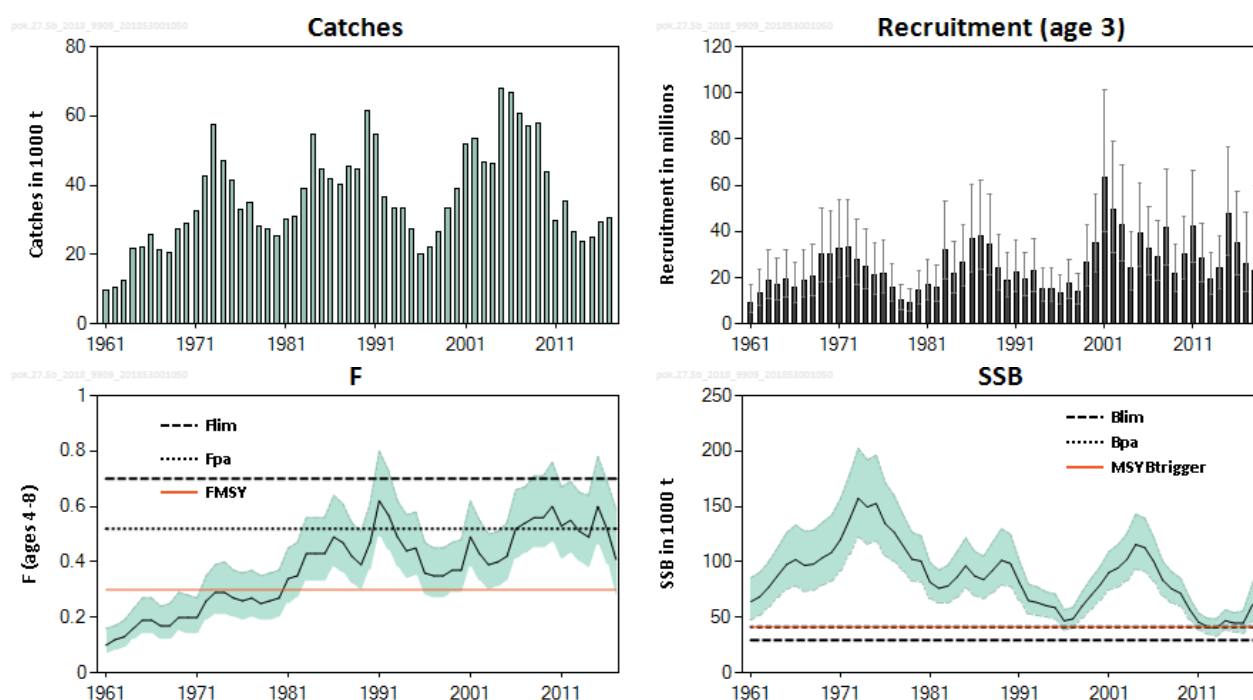


Figure 1 Saithe in Division 5.b. Summary of the stock assessment with point-wise 95% confidence intervals.

Stock and exploitation status

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

Table 1 Saithe in Division 5.b. 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}	✗	✗	✗	Above	✓	✓	✓
Precautionary approach	F_{pa}, F_{lim}	○	✓	✓	Harvested sustainably	✓	✓	✓
Management plan	F_{MGT}	—	—	—	Not applicable	—	—	—
	MSY $B_{trigger}$	✓	✓	✓	Above trigger	✓	✓	✓
	B_{pa}, B_{lim}	✓	✓	✓	Full reproductive capacity	✓	✓	✓
	B_{MGT}	—	—	—	Not applicable	—	—	—

Catch scenarios

Table 2 Saithe in Division 5.b. Assumptions made for the interim year and in the forecast. All weights are in tonnes.

Variable	Value	Notes
$F_{\text{ages 4-8}}$ (2018)	0.43	$F_{2014-2017}$ (SAM)
SSB (2019)	80592	
$R_{\text{age 3}}$ (2019)	25724 thousand	Median of resampled estimates from 2013 to 2017.
$R_{\text{age 3}}$ (2020)	25724 thousand	Median of resampled estimates from 2013 to 2017.
Total catch (2018)	35614	Based on $F = 0.43$

Table 3 Saithe in Division 5.b. Annual catch scenarios. All weights are in tonnes.

Basis	Total catch (2019)	F_{total} (2019)	SSB (2020)	% SSB change *	% Advice change **
ICES advice basis					
MSY approach: $F_{\text{MSY}} = 0.30$	27280	0.30	95163	18	-22
Other scenarios					
$F = 0$	0	0	124294	54	-100
$F = F_{2018}$	36802	0.43	84166	4.4	5.1
$F = F_{\text{pa}}$	42457	0.52	78341	-2.8	21
$F = F_{\text{lim}}$	52484	0.7	66473	-17.5	50

* SSB 2020 relative to SSB 2019.

** Advice value for 2019 relative to advice value for 2018.

The decrease in catch advice is due to a decreased perception of stock biomass with respect to last year.

Basis of the advice

Table 4 Saithe in Division 5.b. The basis of the advice.

Advice basis	MSY approach
Management plan	There is no management plan for this stock.

Quality of the assessment

The stock was benchmarked in 2017 and the assessment model and input data were changed. As a result, the historical stock perception has changed markedly.

The combination of uncertain survey indices, particularly for recruitment leads to high uncertainty in the estimates of current SSB and fishing mortality.

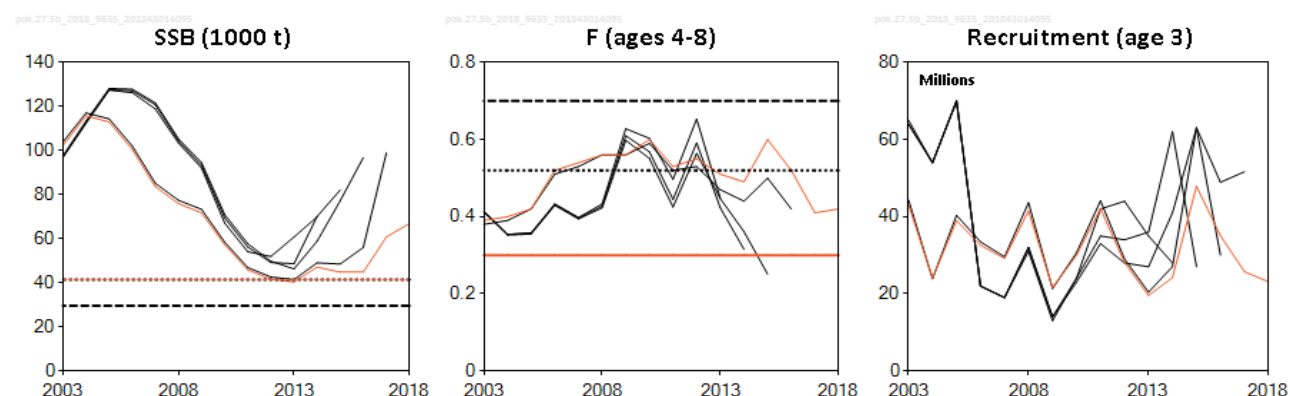


Figure 2 Saithe in Division 5.b. Historical assessment results.

Issues relevant for the advice

An effort management system has been in place from 1996 to 2018. A new management system will be implemented for cod, haddock and saithe after 1 January 2019. This management system operates with catch quotas for large vessels (trawlers and longliners) whereas it operates with fishing days for the small vessels (mainly longliners). The catch quota for the small vessels needs to be converted into fishing days. However, ICES is currently not in a position to quantify the relationship between effort and F for this stock.

Reference points

Table 5 Saithe in Division 5.b. Reference points, values, and their technical basis. All weights are in tonnes.

Framework	Reference point	Value	Technical basis	Source
MSY approach	MSY $B_{trigger}$	41400	B_{loss}	ICES (2017)
	F_{MSY}	0.30	Stochastic simulations	ICES (2017)
Precautionary approach	B_{lim}	29571	$B_{pa}/1.4$	ICES (2017)
	B_{pa}	41400	B_{loss}	ICES (2017)
	F_{lim}	0.70	Stochastic simulations; F that gives a 50% probability of $SSB > B_{lim}$	ICES (2017)
	F_{pa}	0.52	$F_{lim} \times \exp(-1.645 \times \sigma)$, where $\sigma = 0.18$	ICES (2017)
Management plan	SSB_{mgt}	Not applicable		
	F_{mgt}	Not applicable		

Basis of the assessment

Table 6 Saithe in Division 5.b. Basis of the assessment and advice.

ICES stock data category	1 (ICES, 2016)
Assessment type	State-space model (SAM) using catches in the model and in the forecast (ICES, 2018a)
Input data	Commercial catches (mainly Faroese catches, ages and length frequencies from catch sampling); Faroese bottom-trawl surveys FO-GFS-Q1 and FO-GFS-Q3; annual maturity data from FO-GFS-Q1; natural mortalities set at $M = 0.2$.
Discards and bycatch	Discarding is considered negligible.
Indicators	None.
Other information	A benchmark assessment was performed in 2017 (WKFAROE; ICES, 2018b).
Working group	North-Western Working Group (NWWG)

Information from stakeholders

No additional information is available.

History of the advice, catch, and management

Table 7 Saithe in Division 5.b. ICES advice, TACs and catch. All weights are in tonnes.

Year	ICES advice	Catch corresponding to advice	Agreed TAC*	ICES catch
1987	No increase in F	< 32000		40020
1988	No increase in F	< 32000		45285
1989	Reduction in F	< 40000		44477
1990	Reduction in F	< 41000		61628
1991	TAC	< 30000		54858
1992	Reduction in F	< 27000		36487
1993	Reduction in F	< 37000		33543
1994	TAC	< 26000	42000**	33182
1995	TAC	< 22000	39000**	27209
1996	TAC	< 39000	-	20029

Year	ICES advice	Catch corresponding to advice	Agreed TAC*	ICES catch
1997	20% reduction in F from 1995 level	< 21000	-	22306
1998	30% reduction in effort from 1996/1997 level	-	-	26421
1999	F below F_{pa} (0.28)	< 14000		33207
2000	F below than F_{pa} (0.28)	< 15000		39020
2001	Reduce fishing effort to generate F well below F_{pa} (0.28)	< 17000		51786
2002	Reduce fishing effort to generate F below F_{pa} (0.28)	< 28000		53546
2003	Reduce fishing effort to generate F below F_{pa} (0.28)	< 47000		46555
2004	Reduce fishing effort to generate F below F_{pa} (0.28)	< 48000		46355
2005	Reduce fishing effort to generate F below F_{pa} (0.28)	< 32000		67967
2006	Reduce fishing effort to generate F below F_{pa} (0.28)	< 24000		66902
2007	Average catch considerations	40000		60785
2008	Do not increase effort	-		57044
2009	Reduce fishing effort by around 20%	-		57949
2010	Reduce fishing effort by around 20%	-		43885
2011	Reduce fishing effort to generate F below F_{pa} (0.28)	< 38000		29658
2012	Reduce fishing effort to generate F below F_{MSY} (0.28)	< 40000		35314
2013	$F < 0.28$	< 29100		26463
2014	Reduce fishing effort to generate F below F_{MSY} (0.30)	< 29000		23885
2015	Reduce fishing effort to generate F below F_{MSY} (0.30)	< 26000		25128
2016	Reduce fishing effort to generate F below F_{MSY} (0.30)	< 36000		29450
2017	MSY approach ($F \leq 0.30$)	≤ 46000		30637
2018	MSY approach ($F \leq 0.30$)	≤ 35003		
2019	MSY approach	≤ 27280		

* Not applicable since 1997.

** In the quota year 1 September–31 August the following year.

History of the catch and landings

Table 8 Saithe in Division 5.b. Catch distribution by fleet in 2017 as estimated by ICES. All weights are in tonnes.

Catch (2017)	Landings		Discards
30637	98% pair trawler	2% Others	Negligible
	30637		

Table 9 Saithe in Division 5.b. 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.

Country	1989	1990	1991	1992	1993	1994	1995	1996	1997	1998	1999	2000	2001	2002	2003
Denmark	-	2	-	-	-	-	-	-	-	-	-	-	-	-	-
Estonia	-	-	-	-	-	-	-	-	16	-	-	-	-	-	-
Faroe Islands	43624	59821	53321	35979	32719	32406	26918	19267	21721	25995	32439	^^^	49676	55165	47933
France	***	***	***	120	75	19	10	12	9	17	-	273	934	607	370
Germany	-	-	32	5	2	1	41	3	5	-	100	230	667	422	281
German Dem. Rep.	9	-	-	-	-	-	-	-	-	-	-	-	-	125	-
German Fed. Rep.	20	15	-	-	-	-	-	-	-	-	-	-	5	-	-
Greenland	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Ireland	-	-	-	-	-	-	-	-	-	-	0	0	0	0	0
Netherlands	22	67	65	-	-	-	-	-	-	-	160	72	60	77	62
Norway	51	46	103	85	32	156	10	16	67	53	-	-	-	-	-
Portugal	-	-	-	-	-	-	-	-	-	-	-	20	1	10	32
UK (Eng. & W.)	-	-	5	74	279	151	21	53	-	19	67	32	80	58	89
UK (Scotland)	9	33	79	98	425	438	200	580	460	337	441	534	708	540	610
USSR/Russian Fed. **	-	30	-	12	-	-	-	18	28	-	-	-	-	-	-
Total	43735	60014	53605	36373	33532	33171	27200	19949	22306	26065	33207	1161	52131	57004	49377
ICES estimate ^^^	44477	61628	54858	36487	33543	33182	27209	20029	22306	26421	33207	39020	51786	53546	46555

Country	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016	2017*	
Denmark	-	-	34	-	-	-	-	-	-	-					
Estonia	-	-	-	-	-	-	-	-	-	-					
Faroe Islands ##	48222	71496	70696	64552	61117	61889	46686	32056	38175	28609	25474	26796	30837	32776	
France	147	123	315	108	97	68	46	135	40	31	0	122	336		
Germany	186	1	49	3	3	0									
Greenland			73	239	0	1			1						
Ireland	-	-	-	-	-	-									
Iceland	-	-	-	-	-	148	-						19		
Netherlands	0	0	0	3	0	0	0						1		
Norway	82	82	35	81	38	23	28				165	40	198	27	
Portugal	5	-	-	-	-	-									
Russian Federation	71	210	104	159	38	44	3			1					
UK (E/W/Nl)	85	32	88	4	-	-									
UK (Scotland)	748	4322	1011	408	400	685									
United Kingdom	-	-	-	-	-	-	706	19		1	340	304	601	292	
Total	49546	76266	72405	65557	61693	62858	47469	32210	38216	28642	25979	27262	31992	33095	
ICES estimate ^^^#	46355	67967	66902	60785	57044	57949	43885	29658	35314	26463	23885	25128	29450	30637	

* Preliminary.

** As from 1991.

*** Quantity unknown 1989–1991.

^ Includes catches from Subdivision 5.b.2 and Division 2.a in Faroese waters.

^^ Includes French, Greenlandic, and Russian catches from Division 5.b, as reported to the Faroese coast guard.

^^^ No official catches reported.

Includes Faroese, French, and Greenlandic catches from Division 5.b, as reported to the Faroese coast guard.

The 2001–2008 catches from Faroe Islands, as stated from the Faroese coast guard, have been corrected to be consistent with procedures used in previous years.

Summary of the assessment

Table 10 Saithe in Division 5.b. Assessment summary. Weights are in tonnes.

Year	Recruitment			SSB			Catch	F		
	Age 3 thousands	97.5 percentile	2.5 percentile	SSB	97.5 percentile	2.5 percentile		Mean F ages 4–8	97.5 percentile	2.5 percentile
1961	9393	17158	5142	64272	85799	48146	9592	0.100	0.160	0.070
1962	13585	23338	7907	68693	90495	52143	10454	0.120	0.170	0.080
1963	18660	31783	10955	77344	100298	59643	12693	0.130	0.190	0.090
1964	16945	28521	10067	87803	112975	68240	21893	0.160	0.23	0.120
1965	19177	32253	11402	97757	126352	75634	22181	0.190	0.27	0.140
1966	15879	26808	9406	102078	133238	78204	25563	0.190	0.27	0.140
1967	18935	31776	11284	96905	127578	73607	21319	0.170	0.24	0.120
1968	20603	34336	12362	98049	128565	74776	20387	0.170	0.25	0.120
1969	30262	50178	18251	103771	135700	79355	27437	0.20	0.29	0.150
1970	29940	49043	18278	108416	141830	82875	29110	0.20	0.28	0.140
1971	32823	53447	20157	120033	156607	92001	32706	0.20	0.27	0.140
1972	33117	53775	20395	137983	178035	106941	42663	0.26	0.35	0.190
1973	27806	45163	17119	157477	202425	122509	57431	0.29	0.39	0.21
1974	25008	41045	15237	149501	192052	116378	47188	0.29	0.40	0.21
1975	21364	35194	12968	152741	196207	118904	41576	0.27	0.37	0.20
1976	21774	36122	13125	134470	171567	105393	33065	0.26	0.36	0.190
1977	15607	25714	9472	126831	159923	100586	34835	0.27	0.37	0.20
1978	10258	16910	6222	114637	142539	92197	28138	0.25	0.35	0.190
1979	9028	14938	5457	102469	126667	82894	27246	0.26	0.36	0.190
1980	14256	23174	8770	100840	123587	82279	25230	0.27	0.37	0.20
1981	16907	27549	10376	81729	99428	67181	30103	0.34	0.45	0.25
1982	15587	25530	9516	76304	92534	62920	30964	0.35	0.47	0.27
1983	31921	52896	19264	78285	97001	63180	39176	0.43	0.56	0.33
1984	21847	35578	13415	86016	108698	68067	54665	0.43	0.56	0.33
1985	26297	42546	16253	96533	121772	76525	44605	0.43	0.56	0.33
1986	36970	60386	22634	87393	109427	69796	41716	0.49	0.64	0.38
1987	38100	62106	23373	84050	105122	67203	40020	0.47	0.61	0.36
1988	34399	56088	21097	92333	117560	72519	45285	0.42	0.54	0.32
1989	23911	38792	14738	101491	130009	79229	44477	0.39	0.51	0.30
1990	18784	30494	11571	98617	124822	77914	61628	0.47	0.61	0.37
1991	22433	36074	13950	81321	100901	65541	54858	0.62	0.80	0.49
1992	19215	30800	11988	65207	79861	53242	36487	0.57	0.73	0.44
1993	22858	36742	14221	63367	77461	51838	33543	0.49	0.62	0.38
1994	15216	24121	9599	60567	72805	50386	33182	0.44	0.57	0.34
1995	15109	23990	9516	58848	71079	48721	27209	0.45	0.58	0.35
1996	13157	20923	8274	46889	56742	38746	20029	0.36	0.47	0.28
1997	17606	27790	11155	48798	59056	40321	22306	0.35	0.45	0.27
1998	13790	22041	8627	60119	73039	49485	26421	0.35	0.45	0.27
1999	26494	43023	16315	69869	84992	57437	33207	0.37	0.47	0.29
2000	35277	55845	22284	79146	95528	65573	39020	0.37	0.48	0.29
2001	63457	101520	39665	90572	109289	75061	51786	0.49	0.62	0.38
2002	49173	79036	30594	94618	115526	77493	53546	0.43	0.55	0.33
2003	43070	68608	27038	102247	125458	83330	46555	0.39	0.50	0.30
2004	24076	39687	14606	115754	143069	93654	46355	0.40	0.51	0.31
2005	38959	60926	24912	112995	139391	91598	67967	0.42	0.54	0.33
2006	32561	50535	20980	100458	121947	82756	66902	0.52	0.66	0.41
2007	29158	44880	18944	83624	100619	69500	60785	0.54	0.67	0.43
2008	41494	67074	25670	75908	91075	63267	57044	0.56	0.71	0.45
2009	21587	34149	13646	71702	85349	60237	57949	0.56	0.71	0.45
2010	29965	46409	19347	57255	67637	48466	43885	0.60	0.76	0.47
2011	42097	66598	26609	45845	53882	39006	29658	0.53	0.67	0.41

Year	Recruitment			SSB			Catch	F		
	Age 3 thousands	97.5 percentile	2.5 percentile	SSB	97.5 percentile	2.5 percentile		Mean F ages 4–8	97.5 percentile	2.5 percentile
2012	28138	43576	18169	41571	49104	35194	35314	0.55	0.69	0.43
2013	19553	30501	12535	40331	48627	33450	26463	0.51	0.65	0.40
2014	24210	38060	15400	47109	56897	39006	23885	0.49	0.64	0.38
2015	47882	76859	29830	44826	54108	37136	25128	0.60	0.78	0.46
2016	35061	57576	21350	44811	55892	35927	29450	0.52	0.69	0.39
2017	25724	48044	13773	60782	79595	46416	30637	0.41	0.59	0.28
2018	23094	59532	8959	66903	98923	45248				

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