

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

ICES stock advice

ICES advises that when the MSY approach is applied, fishing mortality in 2018 should be no more than 0.30, corresponding to a catch of no more than 35 003 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 2011 to 2015, but is estimated to be above MSY $B_{trigger}$ in 2016 and 2017. Estimated recruitment has been well above the long-term average since 2015. Fishing mortality (F) has been above F_{MSY} since 1981.

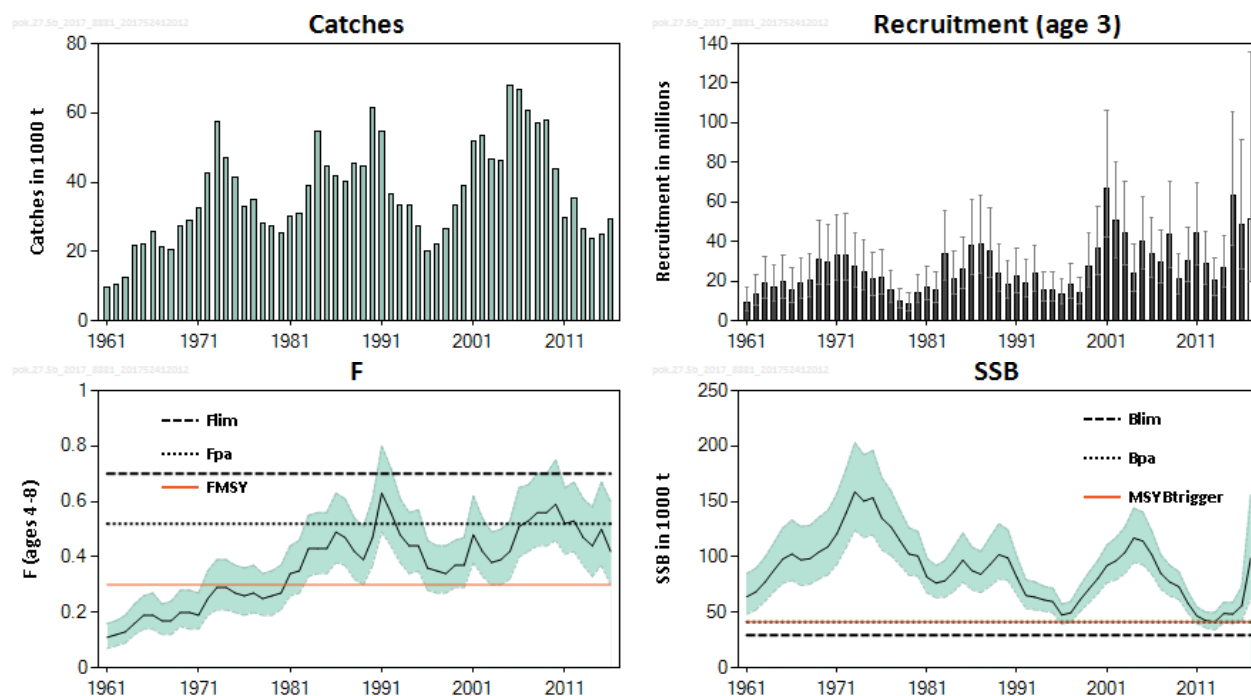


Figure 1 Saithe in Division 5.b. Summary of the stock assessment with point-wise 95% confidence intervals.

Stock and exploitation status

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

Catch options

Table 2 Saithe in Division 5.b. The basis for the catch options.

Variable	Value	Source	Notes
F ages 4–8 (2017)	0.42	ICES (2017a)	F ₂₀₁₇ as estimated by SAM.
SSB (2018)	117 718 t	ICES (2017a)	
R _{age 3} (2018)	29 029 thousand	ICES (2017a)	Median of resampled estimates from 2012 to 2016.
R _{age 3} (2019)	29 029 thousand	ICES (2017a)	Median of resampled estimates from 2012 to 2016.
Total catch (2017)	46 375 t	ICES (2017a)	Based on F = 0.42.

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

Basis	Total catch (2018)	F _{total} (2018)	SSB (2019)	% SSB change *
ICES advice basis				
MSY approach: F _{MSY} = 0.30	35003	0.30	157871	34
Other options				
F = 0	0	0	263553	124
F = F ₂₀₁₇	58934	0.42	130221	11
F = F _{pa}	66438	0.52	116354	-1
F = F _{lim}	71365	0.70	90018	-24

* SSB 2019 relative to SSB 2018.

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. A preliminary management plan was formulated in 2011, but has not been implemented.

Quality of the assessment

The stock was benchmarked in 2017 (ICES, 2017b). Input data and the assessment model were changed and, therefore, the historical stock perception has also changed.

The landings data are considered accurate. There are no strong incentives to discard fish under the current effort management system. The sampling of the landings is considered to be adequate.

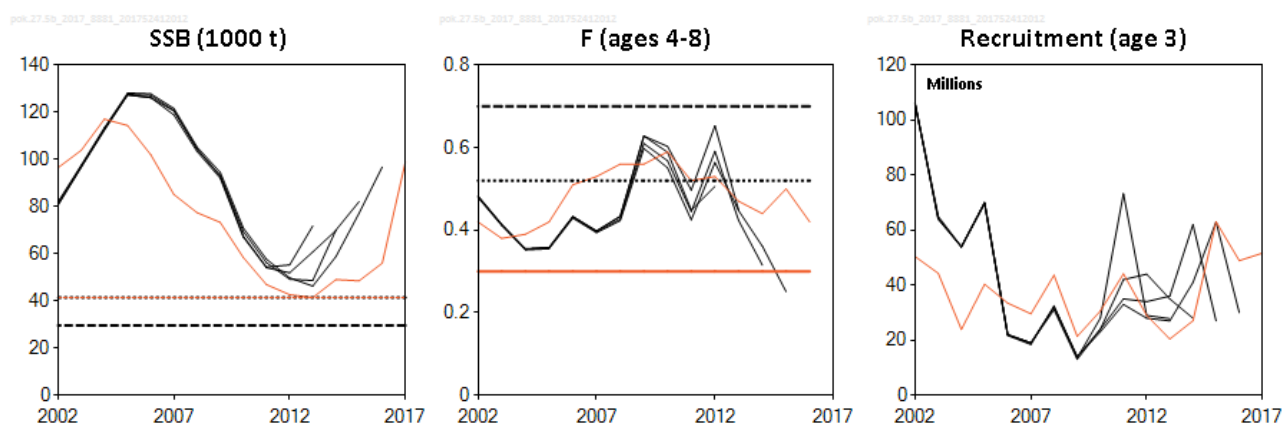


Figure 2 Saithe in Division 5.b. Historical assessment results.

Issues relevant for the advice

An effort management system has been used since 1996. The Faroese parliament decides the number of allocated fishing days for each new fishing season. In the 2015/2016 fishing year 20% of the allocated days for the trawl fleet were not used. With surplus allocated fishing days, current effort control is not limiting fishing pressure.

The Faroese parliament decided in 2007 to cancel all fishing licences for Faroese vessels in Faroese waters by 31 December 2017. A proposal for a new fisheries management system was delivered by the government to the Faroese parliament in May 2017. The new fisheries management system is supposed to be implemented on 1st of January 2018.

ICES has not quantified the relationship between effort and F for this stock, since there is no apparent relationship between effort and F in the available data.

The advice is given by calendar year, though the fishing year runs from 1 September to 31 August of the following year.

Reference points

Table 5 Saithe in Division 5.b. Reference points, values, and their technical basis.

Framework	Reference point	Value	Technical basis	Source
MSY approach	MSY $B_{trigger}$	41 400 t	B_{loss} .	ICES (2017a)
	F_{MSY}	0.30	Stochastic simulations	ICES (2017a)
Precautionary approach	B_{lim}	29 571 t	$B_{pa}/1.4$.	ICES (2017a)
	B_{pa}	41 400 t	B_{loss} .	ICES (2017a)
	F_{lim}	0.7	Stochastic simulations; F that gives a 50% probability of $SSB > B_{lim}$.	ICES (2017a)
	F_{pa}	0.52	$F_{lim} \times \exp(-1.645 \times \sigma)$, where $\sigma = 0.18$.	ICES (2017a)
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, 2016b).
Assessment type	State-space model (SAM) using catches in the model and in the forecast.
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. Bycatch is included.
Indicators	None.
Other information	A benchmark assessment was performed in 2017 (WKFAROE; ICES, 2017b).
Working group	North-Western Working Group (NWWG)

Information from stakeholders

No information is available.

History of the advice, catch, and management

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

Year	ICES advice	Predicted catch corresp. 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
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		
2018	MSY approach ($F \leq 0.30$)	≤ 35000		

* 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 2016 as estimated by ICES.

Catch (2016)	Landings		Discards
29 450 tonnes	96% pair trawler	4% Others	Negligible
	29 450 tonnes		

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

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Country	2003	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016*
Denmark	-	-	-	34	-	-	-	-	-	-	-			
Estonia	-	-	-	-	-	-	-	-	-	-	-			
Faroe Islands ##	47933	48222	71496	70696	64552	61117	61889	46686	32056	38175	28609	25474	26796	30837
France	370	147	123	315	108	97	68	46	135	40	31	0	122	336
Germany	281	186	1	49	3	3	0							
Greenland	-			73	239	0	1			1				
Ireland	-	-	-	-	-	-	-							
Iceland	-	-	-	-	-	-	148	-						19
Netherlands	0	0	0	0	3	0	0	0						1
Norway	62	82	82	35	81	38	23	28				165	40	198
Portugal	-	5	-	-	-	-	-							
Russian Federation	32	71	210	104	159	38	44	3			1			
UK (E/W/Nl)	89	85	32	88	4	-	-							
UK (Scotland)	610	748	4322	1011	408	400	685							
United Kingdom	-	-	-	-	-	-	-	706	19		1	340	304	601
Total	49377	49546	76266	72405	65557	61693	62858	47469	32210	38216	28642	25979	27262	31992
ICES estimate ^,^^, #	46555	46355	67967	66902	60785	57044	57949	43885	29658	35314	26463	23885	25128	29450

* 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 (Age 3)	Recruit. 97.5 percentile	Recruit. 2.5 percentile	SSB	SSB 97.5 percentile	SSB 2.5 percentile	Catch	Mean F (Ages 4–8)	Mean F 97.5 percentile	Mean F 2.5 percentile
	thousands			tonnes			tonnes			
1961	9177	16621	5067	64187	85139	48391	9592	0.11	0.16	0.07
1962	13633	23340	7963	68581	89804	52374	10454	0.12	0.17	0.08
1963	19085	32411	11238	77255	99598	59925	12693	0.13	0.19	0.09
1964	16987	28527	10115	88050	112686	68800	21893	0.16	0.23	0.12
1965	19533	32777	11640	98159	126212	76342	22181	0.19	0.26	0.14
1966	15728	26469	9345	102611	133240	79023	25563	0.19	0.27	0.14
1967	18999	31799	11351	97372	127520	74351	21319	0.17	0.23	0.12
1968	20467	34022	12313	98458	128401	75498	20387	0.17	0.24	0.12
1969	30773	50898	18605	104398	135763	80280	27437	0.2	0.28	0.15
1970	29881	48838	18282	109182	142040	83926	29110	0.2	0.28	0.14
1971	32953	53515	20291	120998	157023	93238	32706	0.19	0.27	0.14
1972	33356	53973	20614	139214	178701	108452	42663	0.25	0.35	0.19
1973	27643	44703	17094	158701	202969	124089	57431	0.29	0.39	0.21
1974	24930	40683	15277	150301	192105	117594	47188	0.29	0.39	0.21
1975	21118	34572	12900	153389	196044	120015	41576	0.27	0.37	0.2
1976	21977	36212	13338	134904	171271	106260	33065	0.26	0.36	0.19
1977	15562	25506	9495	127312	159751	101460	34835	0.27	0.37	0.2
1978	10008	16411	6103	114899	142178	92854	28138	0.25	0.34	0.19
1979	8721	14354	5298	102702	126325	83496	27246	0.26	0.35	0.19
1980	14406	23375	8878	100869	122980	82734	25230	0.27	0.37	0.21
1981	16977	27613	10438	81927	99116	67720	30103	0.34	0.44	0.26
1982	15202	24839	9304	76474	92234	63407	30964	0.35	0.46	0.27
1983	33557	55455	20306	78536	96719	63771	39176	0.43	0.55	0.33
1984	21488	34921	13223	86756	108911	69107	54665	0.43	0.56	0.34
1985	26325	42491	16309	97099	121709	77465	44605	0.43	0.56	0.34
1986	37796	61516	23223	87688	109057	70505	41716	0.49	0.63	0.38
1987	38941	63245	23977	84457	104962	67958	40020	0.47	0.61	0.37
1988	35160	57153	21630	92989	117601	73527	45285	0.42	0.54	0.32
1989	23896	38662	14770	102112	129849	80300	44477	0.39	0.51	0.3
1990	18530	29987	11450	99192	124616	78955	61628	0.47	0.61	0.37
1991	22840	36663	14229	81502	100388	66169	54858	0.63	0.8	0.49
1992	19263	30834	12035	65266	79420	53635	36487	0.56	0.72	0.44
1993	23782	38181	14813	63803	77560	52486	33543	0.48	0.61	0.38
1994	15380	24341	9718	61408	73488	51314	33182	0.44	0.56	0.34
1995	15426	24407	9750	59729	71844	49657	27209	0.44	0.57	0.35
1996	13385	21148	8472	47695	57420	39617	20029	0.36	0.46	0.28
1997	18244	28663	11613	49700	59821	41291	22306	0.35	0.44	0.27
1998	13878	21972	8766	61146	73925	50576	26421	0.34	0.44	0.27
1999	27472	44313	17032	71033	85975	58688	33207	0.37	0.46	0.29
2000	36497	57543	23148	80544	96756	67049	39020	0.37	0.47	0.29
2001	66997	106402	42186	92231	110745	76812	51786	0.48	0.62	0.38
2002	50405	80454	31580	96505	117356	79358	53546	0.42	0.54	0.33
2003	44313	70210	27968	103900	126900	85069	46555	0.38	0.49	0.3
2004	23904	39015	14645	117073	143996	95184	46355	0.39	0.5	0.3

* Version 2: Recruitment age and mean F ages corrected

Year	Recruitment (Age 3)	Recruit. 97.5 percentile	Recruit. 2.5 percentile	SSB	SSB 97.5 percentile	SSB 2.5 percentile	Catch	Mean F (Ages 4–8)	Mean F 97.5 percentile	Mean F 2.5 percentile
	thousands			tonnes			tonnes	per year		
2005	40340	62900	25871	114394	140379	93219	67967	0.42	0.53	0.32
2006	33478	51996	21555	102030	123198	84498	66902	0.51	0.65	0.4
2007	29571	45451	19239	85134	101893	71131	60785	0.53	0.66	0.42
2008	43606	70528	26960	77408	92387	64858	57044	0.56	0.7	0.44
2009	21348	33731	13510	73308	86855	61873	57949	0.56	0.7	0.44
2010	30629	47446	19772	58407	68686	49667	43885	0.59	0.75	0.46
2011	44110	69774	27885	46897	54884	40072	29658	0.52	0.65	0.41
2012	29029	45138	18669	42630	50195	36206	35314	0.53	0.67	0.42
2013	20413	32015	13015	41400	49805	34414	26463	0.47	0.61	0.37
2014	27040	43221	16917	49035	59209	40609	23885	0.44	0.58	0.33
2015	63047	105250	37766	48507	58887	39957	25128	0.5	0.67	0.37
2016	48906	91455	26152	56022	73550	42670	29450	0.42	0.6	0.3
2017	51644*	135814	19638	98930	155798	62820				

* Estimated in SAM.

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