

Saithe (*Pollachius virens*) in Division 5.a (Iceland grounds)

ICES advice on fishing opportunities

ICES advises that when the Icelandic management plan is applied, catches in the fishing year 2022/2023 should be no more than 71 300 tonnes.

Stock development over time

Fishing pressure on this stock is above HR_{mgt} and HR_{MSY} but below HR_{pa} and HR_{lim} ; spawning-stock size is above $MSY B_{trigger}$, B_{pa} , and B_{lim} .

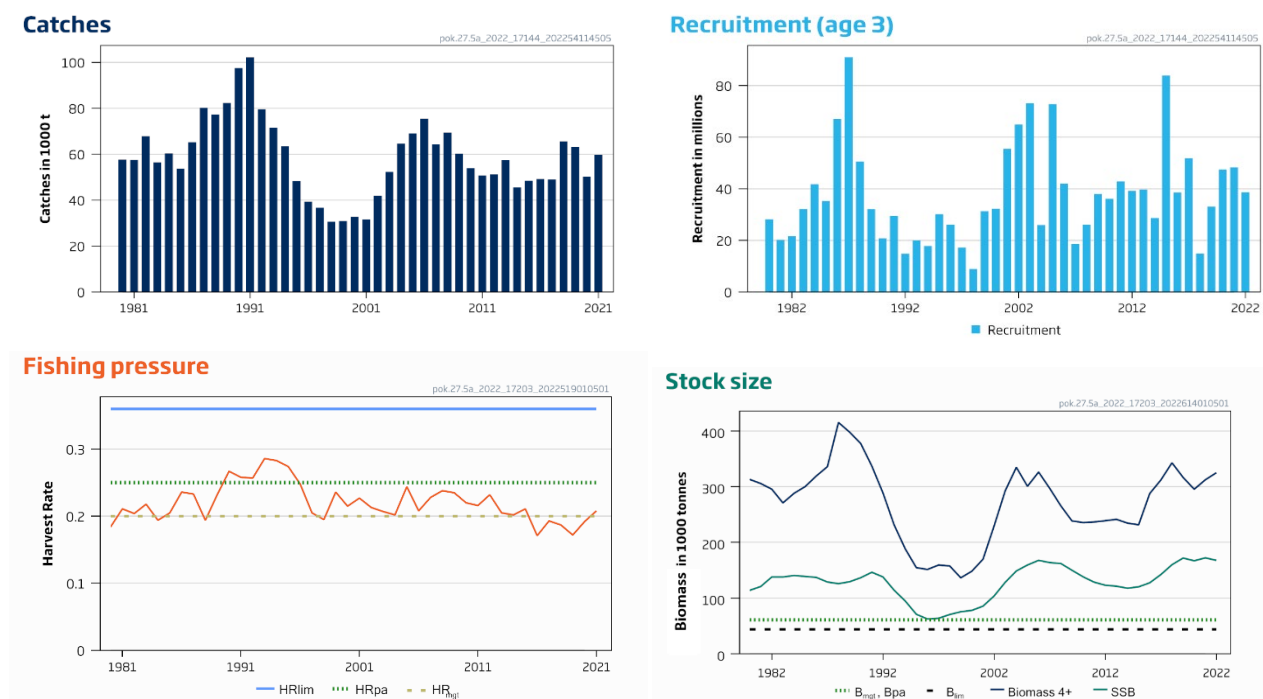


Figure 1 Saithe in Division 5.a. Summary of the stock assessment. Harvest rates are calculated based on biomass age 4+. All biomass reference points refer to SSB levels. For this stock, $MGT B_{trigger} = MSY B_{trigger} = B_{pa}$. $HR_{MSY} = HR_{mgt}$.

Catch scenarios

Table 1 Saithe in Division 5.a. Values in the forecast and for the interim year.

Variable	Value	Notes
HR (2022)	0.185	Based on a catch of 57726 in 2021/22; tonnes
B4+ (2022)	325190	From assessment model; tonnes
SSB (2023)	157132	Short-term forecast; tonnes
$R_{age\ 3}$ (2022)	38727	From assessment model; thousands
$R_{age\ 3}$ (2023)	36819	Geometric mean of recruitment in all years in the assessment; thousands
Total catch (2021/22)	57726	Based on development of landings compared to 2020/21; tonnes

* $HR(2022) = \text{catch}(2021/22)/B4+(2021)$.

Table 2 Saithe in Division 5.a. Annual catch scenarios. All weights are in tonnes.

ICES advice basis	Total catch (2022/2023)	HR (2023)	SSB (2024)	% SSB change*	% advice change**
Management plan	71300	0.219	148 194	-6	-8

* SSB 2024 relative to SSB 2023.

** Advised catches for 2022/2023 relative to advice for 2021/2022 (77 561 tonnes).

*** HR(2023) = Advised catches (2022/23)/B4+(2022) = 71 300/325 190.

Basis of the advice

Table 3 Saithe in Division 5.a. The basis of the advice.

Advice basis	Management plan (MII, 2019).
Management plan	<p>The Icelandic Ministry of Food Agriculture and Fisheries has a management plan for Icelandic saithe (MII, 2019). The plan aims at providing long-term maximum sustainable yield and has been evaluated by ICES (ICES, 2019a) to be precautionary. According to the management plan, the TAC for the fishing year Y/Y+1 (1 September of year Y to 31 August of year Y+1) is calculated as follows:</p> $\text{If } SSB_Y \geq \text{MGT } B_{\text{trigger}}: \quad TAC_{Y/Y+1} = 0.5 \times 0.2 B_{4+,Y} + 0.5 \times TAC_{Y-1/Y}$ $\text{If } SSB_Y < \text{MGT } B_{\text{trigger}}: \quad TAC_{Y/Y+1} = \frac{SSB_Y}{\text{MGT } B_{\text{trigger}}} \left\{ \left(1 - 0.5 \frac{SSB_Y}{\text{MGT } B_{\text{trigger}}} \right) 0.2 B_{4+,Y} + 0.5 TAC_{Y-1/Y} \right\}$ <p>where $B_{4+,Y}$ is the biomass of saithe aged 4 and older in year Y, 0.2 equates to the HR_{mgt}, and $\text{MGT } B_{\text{trigger}} = 61\,000$ tonnes.</p> <p>Realized harvest rates can range from 0.14 to 0.29.</p>

Quality of the assessment

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

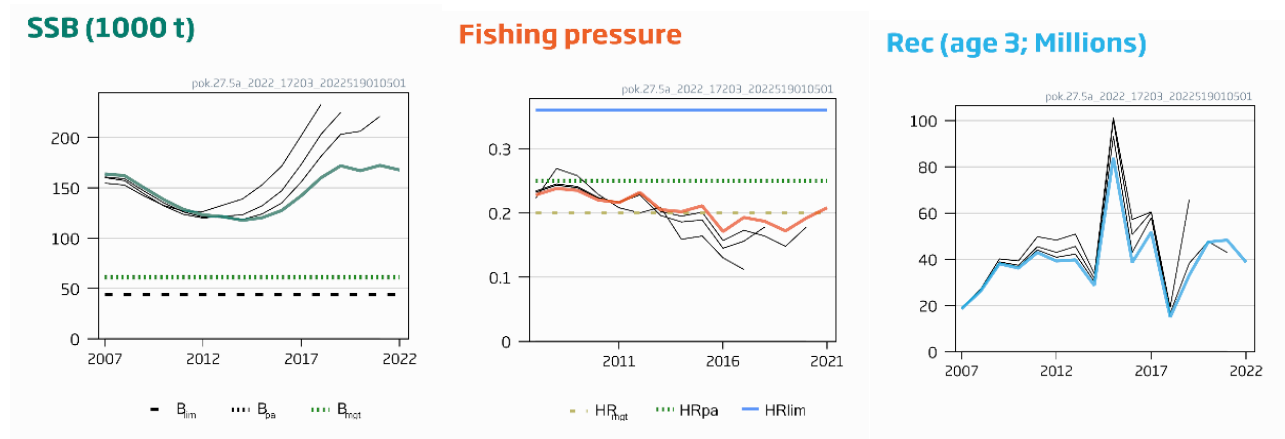


Figure 2 Saithe in Division 5.a. Historical assessment results. The reference points were revised in 2019 following a benchmark, and only assessment results from the last four years should be compared to the reference points indicated. No ICES assessment was conducted in 2020.

Issues relevant for the advice

The assessment for this year shows considerable reduction in stock size compared to recent assessments.

The trend for last five years has been overestimation, caused by very high survey indices in 2018 followed by a substantial decrease from 2019–2022. This follows periods of underestimation. The evaluation of the management plan incorporated uncertainties of this magnitude.

Reference points

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

Framework	Reference point	Value	Technical basis	Source
MSY approach	MSY $B_{trigger}$	61 000	B_{pa} ; in tonnes	ICES(2019b)
	HR_{MSY}	0.2	Stochastic HCR evaluation (SSB 95% of the time over B_{lim})	ICES (2019b)
Precautionary approach	B_{lim}	44 000	$B_{pa}/exp(1.645 \times \sigma)$, $\sigma = 0.2$; in tonnes	ICES (2019b)
	B_{pa}	61 000	B_{loss}	ICES (2019b)
	HR_{lim}	0.36	Equilibrium HR that will maintain the stock above B_{lim} with a 50% probability.	ICES (2019b)
	HR_{pa}	0.25	HR leading to $P(SSB > B_{lim}) > 95\%$ with $B_{trigger}$	ICES (2021)
Management plan	MGT $B_{trigger}$	61 000	From the management plan	ICES (2019b)
	HR_{mgt}	0.2	From the management plan	ICES (2019b)

Basis of the assessment

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

ICES stock data category	1 (ICES, 2022a)
Assessment type	Separable statistical catch-at-age model, with changes in selectivity for three different time periods, using catches in the model and in the forecast (ICES, 2022b)
Input data	Catch-at-age and age-disaggregated abundance indices from the Icelandic bottom trawl survey -Spring (IS-SMB [G3239])
Discards and bycatch	Discarding is considered negligible
Indicators	None
Other information	The stock was benchmarked and harvest control rules evaluated in 2019 (ICES, 2019a, 2019b)
Working group	Northwestern Working Group (NWWG)

History of the advice, catch, and management

Table 6 Saithe in Division 5.a. ICES advice, TACs, and catches (for fishing year after 1991). All weights are in tonnes.

Year	ICES advice	Catch corresponding to advice	Agreed TAC	ICES catch
1987*	TAC	64 000	70 000	80 531
1988*	TAC	64 000	80 000	77 247
1989*	TAC	80 000	80 000	82 411
1990*	TAC	80 000	90 000	98 127
1991*	TAC	87 000	65 000	102 737
1991/1992	TAC	70 000	75 000	88 000
1992/1993	Marginal gains from increase in F	75 000	95 000	78 000
1993/1994	No measurable gains from increase in F	84 000	85 000	69 000
1994/1995	No measurable gains from increase in F	72 000	75 000	61 000
1995/1996	No measurable gains from increase in F	65 000	70 000	41 000
1996/1997	No measurable gains from increase in F	52 000	50 000	38 000
1997/1998	F below $F_{med} = 0.23$	30 000	30 000	33 000
1998/1999	F below 60% of $F_{(97)}$	28 000	30 000	30 816
1999/2000	F below 60% of $F_{(98)}$	24 000	30 000	29 646
2000/2001	F = 70% of $F_{(99)}$	25 000	30 000	31 337
2001/2002	No directed fishing	-	37 000	36 230
2002/2003	2/3 F_{pa} to rebuild stock	24 000	45 000	47 471

Year	ICES advice	Catch corresponding to advice	Agreed TAC	ICES catch
2003/2004	No advice	-	50 000	55 953
2004/2005	F _{pa}	69 000	70 000	70 609
2005/2006	F _{pa}	78 000	80 000	77 882
2006/2007	F _{pa}	81 000	80 000	66 467
2007/2008	No advice	-	75 000	66 719
2008/2009	Maintain SSB > B _{pa}	< 22 000	65 000	61 981
2009/2010	F reduced below 0.22	< 34 000	50 000	57 404
2010/2011	F _{MSY}	< 40 000	50 000	51 592
2011/2012	F _{MSY}	≤ 45 000	52 000	49 664
2012/2013	MSY framework [B-rule]	≤ 49 000	50 000	51 275
2013/2014	Management plan [20% HCR]	57 000	57 000	54 335
2014/2015	Management plan [20% HCR]	58 000	58 000	52 033
2015/2016	Management plan [20% HCR]	55 000	55 000	49 253
2016/2017	Management plan [20% HCR]	< 55 000	55 000	44 980
2017/2018	Management plan [20% HCR]	60 237	60 237	59 018
2018/2019	Management plan	79 092	79 092	70 324
2019/2020	Management plan	≤ 80 588	80 588	53 221
2020/2021	No advice requested	**	78 574	56 333
2021/2022	Management plan	≤ 77 561	77 561	
2022/2023	Management plan	≤ 71 300		

* Calendar year.

** Advice for 2020/2021 was issued by MFRI based the same method agreed by ICES (78 574 tonnes).

History of the catch and landings

Table 7 Saithe in Division 5.a. Catch distribution by fleet in 2021 as estimated by ICES. All weights are in tonnes.

Catch (2021)	Landings			Discards
59774	Bottom trawl 89%	Gillnets 5%	Other 6%	Discarding is negligible
	59774			

Summary of the assessment

Table 8 Saithe in Division 5.a. Assessment summary. Weights are in tonnes.

Year	Recruitment (age 3) in thousands	Stock size		Harvest rate B ₄₊	Total catch
		SSB	Reference biomass ages 4+		
1980	28194	113844	313210	0.184	57659
1981	20200	120803	305796	0.211	57548
1982	21587	137948	295536	0.204	67865
1983	32176	137885	270934	0.218	56504
1984	41845	140591	288126	0.194	60405
1985	35340	138908	300230	0.205	53728
1986	67101	137191	319223	0.236	65230
1987	90981	128893	335997	0.233	80237
1988	50576	125932	415344	0.194	77244
1989	32086	129370	397933	0.232	82339
1990	20854	136640	377550	0.267	97537
1991	29494	146412	337083	0.258	102201
1992	14916	137968	288848	0.257	79568
1993	19972	114293	231610	0.286	71539
1994	17862	94886	188599	0.283	63559
1995	30190	71030	154737	0.274	48296
1996	26067	62499	151431	0.248	39352
1997	17231	63747	159365	0.205	36671
1998	8955	70538	157812	0.195	30657
1999	31354	75485	136435	0.236	30898
2000	32322	77980	148364	0.215	32751

Year	Recruitment (age 3) in thousands	Stock size		Harvest rate B_{4+}	Total catch
		SSB	Reference biomass ages 4+		
2001	55573	85582	169929	0.227	31570
2002	64990	103865	229739	0.213	41969
2003	73114	128421	292820	0.207	52306
2004	25973	148710	334806	0.202	64668
2005	72850	159450	300772	0.244	69054
2006	41946	167787	326328	0.208	75462
2007	18583	163771	297054	0.228	64261
2008	26069	162159	265710	0.238	69426
2009	38008	150028	238651	0.235	60266
2010	36151	138308	235635	0.22	53853
2011	42905	128618	236694	0.216	50769
2012	39235	123151	238935	0.232	51252
2013	39735	121399	241432	0.205	57522
2014	28627	117718	234649	0.202	45538
2015	83965	120310	231664	0.211	48476
2016	38622	127521	287821	0.171	49223
2017	51816	142285	312092	0.193	49054
2018	14939	160004	342972	0.187	65583
2019	33070	171929	316665	0.172	63130
2020	47444	167026	295506	0.192	50245
2021	48299	172309	312448	0.208	59774
2022	38727	167743	325190		

Sources and references

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[Download the stock assessment data and figures.](#)

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