ECOREGIONIceland and East GreenlandSTOCKSaithe in Division Va (Icelandic saithe)

Advice for 2014/2015

ICES advises on the basis of the Icelandic 2013 management plan (Annex 2.3.14) that the TAC in the fishing year 2014/2015 should be 58 000 t.

Stock status





The spawning stock of Icelandic saithe has been relatively large in recent years, near the maximum from 1980 to the present, and the harvest rate has declined from 27% to 19% (fishing mortalities 0.30 to 0.22) from 2009 to 2013. The year classes 1999–2000 and 2002 were large, and recruitment since then has generally been above average.

Management plan

In spring 2013, the Icelandic government adopted a management plan for managing the Icelandic saithe fishery. ICES has evaluated this management plan and concluded that it is in accordance with the precautionary approach and the ICES MSY framework. (see Annex 2.3.14).

Biology

Saithe is a migrating species and makes both vertical and long-distance feeding and spawning migrations. Evidence from tagging experiments shows some migrations along the Faroe–Iceland Ridge, as well as onto the East Greenland shelf.

Environmental influence on the stock

Icelandic saithe is near the northern boundary of its distribution, and a relatively small part of the stock inhabits the waters off the northern and eastern coasts of Iceland, except in warm years. The fishery and the survey show a more northerly distribution in recent years, possibly because of relative warming in the northern waters. Significant changes in the length- and weight-at-age have been observed in the Icelandic saithe. It is unknown whether these changes are fisheries or environmentally driven.

The fisheries

Saithe are caught in directed saithe fisheries, as well as in mixed demersal fisheries targeting cod. The fishery is regulated by TACs and minimum mesh size in fishing gears.

Catch distribution Total landings in 2013 were 58 kt, where 84% were caught by bottom trawl and 5% by gillnet, with jiggers and Danish seine taking the majority of the rest. 1–2% discards by numbers.

Quality considerations

The assessment of Icelandic saithe is relatively uncertain, due to fluctuations in the spring survey data and irregular changes in the fleet selectivity. The vertical distribution and migrating behaviour of saithe means that the bottom trawl survey does not produce reliable measurements of stock trends. There are also indications of time-varying selectivity, so changes in the commercial catch-at-age may not reflect changes in the age distribution of the population. The combination of fluctuating spring survey data and time-varying fleet selectivity leads to high uncertainty in the estimates of current SSB and fishing mortality.



Figure 2.3.14.2 Saithe in Division Va (Icelandic saithe). Historical assessment results (final-year recruitment estimates included).

Scientific Dasis	
Stock data category	1 (<u>ICES, 2014a</u>).
Assessment type	Separable statistical catch-at-age model, with changes in selectivity for three different time
	periods.
Input data	Catch-at-age and spring groundfish survey.
Discards and bycatch	Not included; considered negligible.
Indicators	None.
Other information	Benchmark performed in 2010, management plan adopted in 2013.
Working group	North-Western Working Group (<u>NWWG</u>).

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Reference points

	Туре	Value	Technical basis
MSY	MSY B _{trigger}	65 000 t	Stochastic evaluations.
Approach	HR _{MSY}	20%	Stochastic HCR evaluation (SSB 95% of the time over B _{lim}).
Precautionary	B _{lim}	61 000 t	B_{loss} as estimated in 2010.
approach	B_{pa}, F_{lim}, F_{pa}	Not defined.	
Management	HR _{MP}	20%	
plan			
	MP B _{trigger}	65 000 t	

(Last changed in: 2013)

Reference points from HCR evaluation (Hjörleifsson and Björnsson, 2013).

Outlook for 2015

Basis: F (2013) = 0.22; F (2014) = 0.23, based on landings $2014 = 58^{3}$; SSB (2015) = 157; B₄₊ (2015) = 272; N₃ (2014) = 18 million from assessment model.

Rationale	Landings (2014/2015)	Basis	F (2015)	SSB (2016)	%SSB change ¹⁾	% TAC change ²⁾
Management plan	58	20% HCR	0.24	157	0	-2

Weights in thousand tonnes.

¹⁾ SSB 2016 relative to SSB 2015.

²⁾ Landings 2015 relative to TAC 2014.

³⁾ Estimated from recorded landings/TAC to 31 August; predicted catch for the remainder of the calendar year.

Management plan

According to the adopted management plan in 2013, the TAC for the upcoming fishing year will be the average of 0.20 times the estimated current reference biomass (B_{4+}), which equals 296 kt in 2014, and the previous fishing year's TAC (57 kt), implying a TAC for the 2014/2015 fishing year of 58 kt.

Additional considerations

Information from the fishing industry

Commercial cpue from the most important fleets targeting saithe are available for 20 years or more. However, the potential for bias in commercial cpue (for example hyperstability) is a serious concern for shoaling species such as saithe. Therefore, although these indices have been explored for inclusion in the past, they were not considered in calibrating the present assessment, as they are considered unreliable as an indicator of abundance.

Uncertainties in assessment and forecast

The Icelandic discards monitoring programme has not detected large amounts of discards in the saithe fishery and they are considered negligible and not considered to cause a significant bias in the assessment and the advice.

The assessment is relatively uncertain, due to high variances in survey measurements, a lack of reliable recruitment estimates, and fleet selectivity that changes between years.

The default separable assessment model estimates the reference biomass (B_{4+}) larger than alternative assessment models, indicating that the current estimate is more likely to be an overestimate than an underestimate. When a separable assessment model was adopted in the last benchmark (ICES, 2010), it was not chosen as the most reliable assessment model for this stock, but rather as the most practical model for evaluating the performance of potential harvest control rules (Hjörleifsson and Björnsson, 2013). A third selectivity period was added to the model in 2011, but instead of such arbitrary cutting points, a model with continuous changes in selectivity might be statistically preferable. Each year, several different models are fitted to the saithe data and their results compared, partly to evaluate the overall uncertainty, and partly to evaluate which model might perform best as the main assessment model. The basis for the assessment has not changed from last year.

Sources

Hjörleifsson, E., and Björnsson, H. 2013. Report of the evaluation of the Icelandic saithe management plan. ICES CM 2013/ACOM:60.

ICES. 2010. Report of the Benchmark Workshop on Roundfish (WKROUND), 9–16 February 2010, Copenhagen, Denmark. ICES CM 2010/ACOM:36. 183 pp.

ICES. 2014a. Advice basis. *In* Report of the ICES Advisory Committee, 2014. ICES Advice 2014, Book 1, Section 1.2. ICES. 2014b. Report of the North-Western Working Group (NWWG), 24 April–1 May 2014, ICES Headquarters,

Copenhagen, Denmark. ICES CM 2014/ACOM:07. 902 pp.



Figure 2.3.14.3 Saithe in Division Va (Icelandic saithe). Stock–recruitment plot.



Figure 2.3.14.4 Saithe in Division Va (Icelandic saithe). Yield and SSB as a function of F₄₋₉, based on stochastic simulations from the WKROUND benchmark (ICES, 2010).

Year	ICES	Predicted catch	Agreed	Landings
	Advice	corresp. to advice	TAC	
1987 ^a	TAC	64	70	81
1988	TAC	64	80	77
1989	TAC	80	80	82
1990	TAC	80	90	98
1991	TAC	87	65	71
1991/92 ^b	TAC	70	75 ^b	88
1992/93	Marginal gains from increase in F	75 ^a	95 ^b	78
1993/94	No measurable gains from increase in F	84^{a}	85 ^b	69
1994/95	No measurable gains from increase in F	72ª	75 ^b	61
1995/96	No measurable gains from increase in F	65ª	70 ^b	41
1996/97	No measurable gains from increase in F	52 ^a	50 ^b	38
1997/98	F below $F_{med} = 0.23$	30	30 ^b	33
1998/99	F below 60% of F(97)	28	30 ^b	32
1999/00	F below 60% of F(98)	24	30 ^b	30
2000/01	F = 70% of F(99)	25	30 ^b	32
2001/02	No directed fishing	-	37 ^b	36
2002/03	$2/3 F_{pa}$ to rebuild stock	24	45	47
2003/04	No advice	-	50	56
2004/05	F _{pa}	69	70	71
2005/06	F _{pa}	78	80	78
2006/07	F_{pa}	81	80	66
2007/08	No advice	-	75	68
2008/09	Maintain SSB >Bpa	< 22	65	62
2009/10	F reduced below 0.22	< 34	50	54
2010/11	F _{MSY}	< 40	50	51
2011/12	F _{MSY}	\leq 45	52	51
2012/13	MSY framework [B-rule]	\leq 49	50	52
2013/14	Management plan [20% HCR]	57	57	
2014/15	Management plan [20% HCR]	58		

Table 2.3.14.1	Saithe in Division Va	(Icelandic saithe)	ICES advice.	management.	and catches.
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Weights in thousand tonnes. ^a Calendar year in 1987 to 1991. ^b National fishing year (1 September to 31 August) from 1991 onwards.

Table 2.3.14.2

Saithe in Icelandic waters (Division Va). Summary of the assessment. The recruitment column is aligned such that, e.g. the 2000 cohort is shown in the year 2000; this cohort size is the estimated N at age 3 in 2003.

	B ₄₊	SSB	Cohort	Y	F ₄₋₉	HR
1980	312	122	32	58	0.29	19%
1981	304	130	42	59	0.26	19%
1982	294	149	35	69	0.30	23%
1983	270	147	67	58	0.24	22%
1984	287	149	92	63	0.23	22%
1985	299	140	50	57	0.25	19%
1986	318	137	32	65	0.28	20%
1987	335	128	21	81	0.35	24%
1988	416	124	29	77	0.32	19%
1989	398	127	15	82	0.31	21%
1990	378	134	20	98	0.35	26%
1991	336	143	18	102	0.37	30%
1992	288	135	30	80	0.37	28%
1993	230	113	25	72	0.40	31%
1994	187	94	17	64	0.45	34%
1995	152	70	9	49	0.46	32%
1996	148	61	30	40	0.41	27%
1997	155	62	31	37	0.37	24%
1998	152	67	53	32	0.30	21%
1999	130	71	62	31	0.32	24%
2000	140	72	72	33	0.33	24%
2001	159	78	26	32	0.28	20%
2002	215	94	73	42	0.31	20%
2003	274	118	42	52	0.30	19%
2004	315	139	19	65	0.27	21%
2005	280	149	28	69	0.29	25%
2006	307	157	44	76	0.31	25%
2007	278	152	45	64	0.28	23%
2008	249	149	57	70	0.32	28%
2009	228	137	45	61	0.30	27%
2010	237	129	42	54	0.26	23%
2011	256	127	18	51	0.22	20%
2012	281	131	32	52	0.21	18%
2013	298	143	33	58	0.22	19%
2014	296	150	33	58	0.23	19%

Annex 2.3.14 The Icelandic management plan

In spring 2013, the Icelandic government adopted a harvest control rule for managing the Icelandic saithe fishery, similar to the 20% rule used for the Icelandic cod fishery. The TAC set in year t is valid for the upcoming fishing year, from 1 September in year t to 31 August in year t+1.

When SSB $\ge B_{trigger}$, the TAC set in year t equals the average of 0.20 times the current biomass and last year's TAC:

 $TAC_t = 0.5 \times 0.20B_{t,4+} + 0.5TAC_{t-1}$

When SSB is below $B_{trigger}$, the harvest rate is reduced below 0.20:

 $TAC_{t} = SSB_{t}/B_{trigger} [(1 - 0.5SSB_{t}/B_{trigger}) 0.20B_{t,4+}) + 0.5TAC_{t-1}].$