

ECOREGION Faroe Plateau ecosystem
STOCK Saithe in Division Vb

Advice for 2015

ICES advises on the basis of the MSY approach that effort should be reduced such that fishing mortality in 2015 will be no more than $F_{MSY} = 0.30$, corresponding to a 44% reduction in the present fishing mortality. All catches are assumed to be landed.

Stock status

F (Fishing Mortality)			
	2011	2012	2013
MSY (F_{MSY})	✗	✗	✗ Above target
Precautionary approach (F_{pa})	✗	✗	✗ Harvested unsustainably
SSB (Spawning-Stock Biomass)			
	2012	2013	2014
MSY ($B_{trigger}$)	✗	✓	✓ Above trigger
Precautionary approach (B_{pa})	✗	✓	✓ Full reproductive capacity

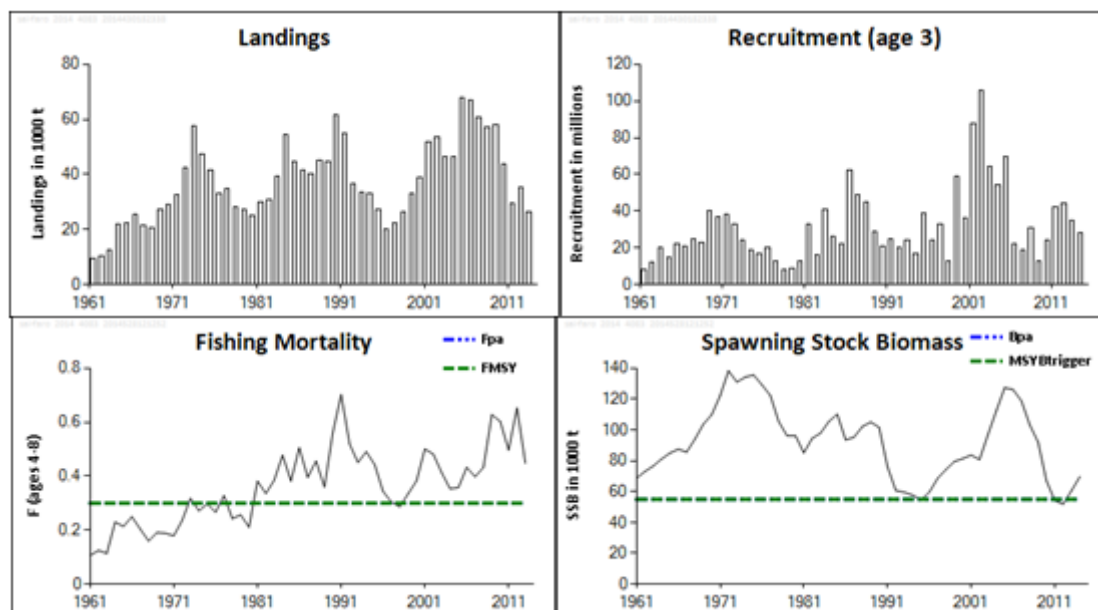
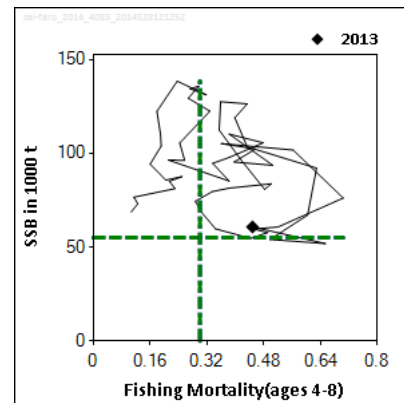


Figure 4.3.4.1 Saithe in Division Vb. Summary of stock assessment (weights in thousand tonnes). Top right: SSB/F for the time-series used in the assessment. ($MSY B_{trigger} = B_{pa}$, $F_{pa} = F_{MSY}$).

SSB has decreased substantially since 2005. In 2013 SSB is estimated at around 60 kt, above $MSY B_{trigger} = 55$ kt. Predicted recruitment in 2013 was above average (31 million). Fishing mortality has decreased from 2012 to 2013 due to decreasing landings and is estimated at $F(2013) = 0.45$ and well above $F_{MSY} = 0.30$.

Management plans

There is no explicit management plan for this stock. However, a group representing the Ministry of Fisheries, the Faroe industry, and the Faroe Marine Research Institute has proposed a management plan based on general maximum sustainable yield (MSY) principles developed by ICES. The plan has not yet been approved by the authorities.

Biology

Saithe in Division Vb is currently treated as one management unit although results from tagging experiments have indicated some migration between the Faroes, Iceland, Norway, west of Scotland, and the North Sea. Nursery areas for saithe are found very close to land (in the littoral zone). These areas are not covered by the existing surveys and therefore recruitment estimates are not available until saithe enter the fishery at age 3; this hampers the prediction of biomass and catch.

Environmental influence on the stock

A positive relationship between ocean productivity (gyre index) and biomass has been established for Faroe saithe.

The fisheries

Saithe are mainly caught in a directed trawl fishery (pair and single trawlers), with bycatches of cod and haddock.

Catch distribution Total catch (2013) was 26 kt, of which 94% was taken by pair trawlers, 2% by single trawlers, and 4% by jiggers and other fishing fleets.

Quality considerations

There are no incentives to discard fish under the effort management system. The sampling of the landings in 2013 was 5% and is considered to be adequate. Recruitment indices are only available from age 3 and this is a source of uncertainty in recent recruitment estimates and forecast.

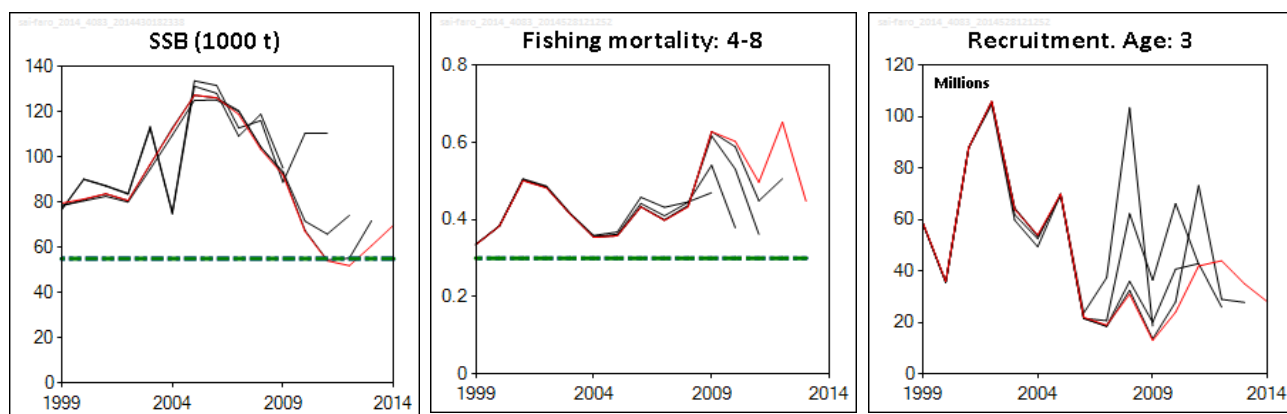


Figure 4.3.4.2 Saithe in Division Vb. Historical assessment results (final-year recruitment estimates included).

Scientific basis

Stock data category	1 (ICES, 2014a).
Assessment type	XSA using landings-at-age data and age-disaggregated commercial indices.
Input data	Commercial catches (mainly Faroese catches, ages and length frequencies from catch sampling); commercial indices: pair-trawler fleet; annual maturity data from FO-GFS-Q1 (commercial catch during surveys); natural mortalities set at $M = 0.2$.
Discards and bycatch	Discards are not included and are assumed negligible.
Indicators	Primary production and gyre indexes.
Other information	A benchmark assessment was performed in 2010.
Working group report	NWWG (ICES, 2014b).

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Reference points

	<i>Type</i>	<i>Value</i>	<i>Technical basis</i>
MSY	MSY B_{trigger}	55 000 t.	Breakpoint in segmented regression.
	F_{MSY}	0.30	Stochastic simulations (ICES, 2014c).
Precautionary approach	B_{lim}	Undefined.	
	B_{pa}	55 000 t.	B_{loss} in 2011.
	F_{lim}	Undefined.	
	F_{pa}	0.30	Consistent with 2013 estimate of F_{med} .

(last changed in 2014)

Yield and spawning biomass per recruit F -reference points (2013):

	Fish Mort	Yield/R	SSB/R
	Ages 4–8		
Average last 3 years	0.53	1.30	1.74
F_{max}	0.46	1.31	2.05
$F_{0.1}$	0.19	1.18	5.31
F_{med}	0.30	1.28	3.30

Outlook for 2015

Basis: F (2014) = F (2011–2013) un-scaled = 0.53; SSB (2015) = 72; R (2014) (GM 2008–2012) = 28 million; catch (2014) = 38.

Rationale	F (2015)	Catch (2015)	Basis	SSB (2016)	% SSB change ¹⁾
Zero catch	0	0	$F = 0$	115	51
MSY approach	0.30	26	$F_{\text{MSY}} (= F_{\text{sq}} \times 0.66)$	89	16
<i>Status quo</i>	0.53	41	F_{sq}	73	–2

Weights in thousand tonnes.

¹⁾ SSB 2016 relative to SSB 2015.

Management plan

A management system based on number of fishing days, closed areas, and other technical measures was introduced in 1996 to ensure sustainable demersal fisheries in Division Vb. This was before ICES introduced precautionary approach (PA) and MSY reference values, and at that time it was believed that the purpose was achieved if the total allowable number of fishing days was set such that on average 33% in numbers of the saithe exploitable stock would be harvested annually. This translates into an average F of 0.45, above both the new $F_{\text{pa}} = 0.30$ and $F_{\text{MSY}} = 0.30$. ICES considers this to be inconsistent with the PA and the MSY approaches. At present, there is no explicit management plan for this stock. However, a group representing the Ministry of Fisheries, the Faroese industry, and the Faroe Marine Research Institute has proposed a management plan based on general maximum sustainable yield (MSY) principles developed by ICES. The MSY B_{trigger} has been defined at 55 kt (the former B_{pa}) and $F_{\text{MSY}} = 0.30$. If the SSB declines below the MSY B_{trigger} , the fishing mortality will be reduced by the relationship $F_{\text{MSY}} \times B_{\text{act}}/B_{\text{trigger}}$ until the SSB has increased again above the MSY B_{trigger} and is thereafter kept at F_{MSY} .

MSY approach

Following the ICES MSY framework implies that fishing mortality in 2015 should be no more than $F_{\text{MSY}} = 0.30$, resulting in a reduction of 44% in the present fishing mortality.

Precautionary approach

As F_{pa} equals F_{MSY} , advice under the precautionary approach is the same as under the MSY approach this year.

Additional considerations

Management considerations

In the fishing year 2011/2012, the pair trawlers (Group 2 in the management system) and the large otter board trawlers (Group 1) were merged into one group (Group 2) and now almost all saithe fishing is performed by pair trawlers. It is not clear what effect this has on the fishing mortality on saithe. However, a further reduction of effort is required to bring F at or below F_{MSY} . The present spawning closures should be maintained for pair trawlers and applied for other fleets also.

Regulations and their effects

The principal fleets fishing for saithe are pair trawlers, single trawlers, and jiggers. The average annual landings from these fleets since the introduction of the present management system (1996) are about 79%, 15%, and 6%, respectively. The pair trawlers, jiggers, and single trawlers are regulated by the total number of allocated fishing days and by area closures.

Limited sampling in the blue whiting fishery in Faroese waters indicates that bycatches of saithe have been minor since the mandatory use of sorting grids was introduced in 15 April 2007 in the areas west and northwest of the Faroe Islands.

Changes in fishing technology and fishing patterns

The effort management system can lead to improvement of fishing technology and efficiency. When such improvements have been documented, the effort needs to be adjusted to take account of the increased catchability. Presently, ICES is not able to quantify these changes.

Uncertainties in the assessment and forecast

The assessment is relatively uncertain. Recruitment indices are only available from age 3 and this is a source of uncertainty in recent recruitment estimates and forecast.

Comparison of the basis of previous assessment and advice

The basis of the assessment is the same as last year.

This year's advice has the same basis as last year's advice, i.e. ICES MSY approach. The F_{MSY} reference point has been updated since last year, from 0.28 to 0.30.

Sources

- ICES. 2011. Report of the North Western Working Group (NWWG), 26 April–3 May 2011, ICES Headquarters, Copenhagen. ICES CM 2011/ACOM:7. 975 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.
- ICES. 2014c. Report of the Workshop to consider reference points for all stocks (WKMSYREF2). 8–10 January 2014, ICES Headquarters, Copenhagen, Denmark. ICES CM 2014/ACOM:47, Section 7.3. 91 pp.

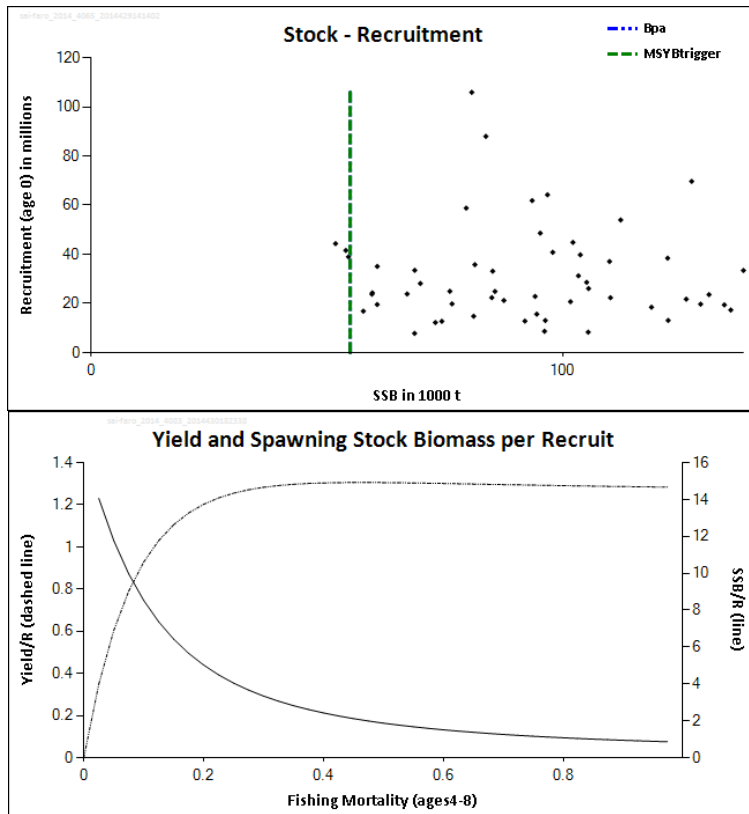


Figure 4.3.4.3 Saithe in Division Vb. Top: Stock–recruitment plot, SSB at spawning time. Bottom: Yield- and spawning-stock biomass-per-recruit plot.

Table 4.3.4.1

Saithe in Division Vb. ICES advice, management, and landings.

Year	ICES Advice	Predicted catch corresp. to advice	Agreed TAC	ICES landings
1987	No increase in F	< 32		40
1988	No increase in F	< 32		45
1989	Reduction in F	< 40		44
1990	Reduction in F	< 41		62
1991	TAC	< 30		55
1992	Reduction in F	< 27		36
1993	Reduction in F	< 37		34
1994	TAC	< 26	42 ^a	33
1995	TAC	< 22	39 ^a	27
1996	TAC	< 39	-	20
1997	20% reduction in F from 1995 level	< 21	-	22
1998	30% reduction in effort from 1996/97 level	-	-	26
1999	F below F_{pa} (0.28)	< 14		33
2000	F below than F_{pa} (0.28)	< 15		39
2001	Reduce fishing effort to generate F well below F_{pa} (0.28)	< 17		52
2002	Reduce fishing effort to generate F below F_{pa} (0.28)	< 28		54
2003	Reduce fishing effort to generate F below F_{pa} (0.28)	< 47		47
2004	Reduce fishing effort to generate F below F_{pa} (0.28)	< 48		46
2005	Reduce fishing effort to generate F below F_{pa} (0.28)	< 32		68
2006	Reduce fishing effort to generate F below F_{pa} (0.28)	< 24		67
2007	Average catch considerations	40		61
2008	Do not increase effort	-		57
2009	Reduce fishing effort by around 20%	-		58
2010	Reduce fishing effort by around 20%	-		44
2011	Reduce fishing effort to generate F below F_{pa} (0.28)	< 38		29
2012	Reduce fishing effort to generate F below F_{MSY} (0.28)	< 40		35
2013	$F < 0.28$	< 29.1		26
2014	Reduce fishing effort to generate F below F_{MSY} (0.28)	< 29		
2015	Reduce fishing effort to generate F below F_{MSY} (0.30)	< 26		

Weights in thousand tonnes.

^aIn the quota year 1 September–31 August the following year.

The fishing year runs from 1 September to 31 August the following year.

Table 4.3.4.2

Saithe in Division Vb. Nominal catches (tonnes round weight) by country, 1988–2013, as officially reported to ICES, and the ICES estimates.

Country	1988	1989	1990	1991	1992	1993	1994	1995	1996	1997	1998	1999	2000	2001
Denmark	94	-	2	-	-	-	-	-	-	-	-	-	-	-
Estonia	-	-	-	-	-	-	-	-	-	16	-	-	-	-
Faroe Islands	44,402	43,624	59,821	53,321	35,979	32,719	32,406	26,918	19,267	21,721	25,995	32,439		49,676
France ³	313	-	-	-	120	75	19	10	12	9	17	-	273	934
Germany	-	-	-	32	5	2	1	41	3	5	-	100	230	667
German Dem.Rep.	-	9	-	-	-	-	-	-	-	-	-	-	-	-
German Fed. Rep.	74	20	15	-	-	-	-	-	-	-	-	-	-	5
Greenland	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Ireland	-	-	-	-	-	-	-	-	-	-	-	0	0	0
Netherlands	-	22	67	65	-	-	-	-	-	-	-	160	72	60
Norway	52	51	46	103	85	32	156	10	16	67	53	-	-	-
Portugal	-	-	-	-	-	-	-	-	-	-	-	-	20	1
UK (Eng. & W.)	-	-	-	5	74	279	151	21	53	-	19	67	32	80
UK (Scotland)	92	9	33	79	98	425	438	200	580	460	337	441	534	708
USSR/Russia ²	-	-	30	-	12	-	-	-	18	28	-	-	-	-
Total	45,027	43,735	60,014	53,605	36,373	33,532	33,171	27,200	19,949	22,306	26,065	33,207	1,161	52,131
Working Group estimate ^{4,5}	45,285	44,477	61,628	54,858	36,487	33,543	33,182	27,209	20,029	22,306	26,421	33,207	39,020	51,786

Country	2002	2003	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013 ¹
Denmark	-	-	-	-	34	-	-	-	-	-	-	-
Estonia	-	-	-	-	-	-	-	-	-	-	-	-
Faroe Islands	55,165	47,933	48,222	71,496	70,696	64,552	61,117	61,889	46,686	32,056	38,175	28,391
France	607	370	147	123	315	108	97	68	46	135	40	31
Germany	422	281	186	1	49	3	3	0				
Greenland	125	-			73	239	0	1			1	
Ireland	-	-	-	-	-	-	-	-				
Iceland	-	-	-	-	-	-	-	148	-			
Netherlands	0	0	0	0	0	3	0	0	0			
Norway	77	62	82	82	35	81	38	23	28			
Portugal	-	-	5	-	-	-	-	-				
Russia	10	32	71	210	104	159	38	44	3			1
UK (E/W/NI)	58	89	85	32	88	4	-	-				
UK (Scotland)	540	610	748	4,322	1,011	408	400	685				
United Kingdom	-	-	-	-	-	-	-	-	706	19		1
Total	57,004	49,377	49,546	76,266	72,405	65,557	61,693	62,858	47,469	32,210	38,216	28,424
Working Group estimate ^{4,5,6,7}	53,546	46,555	46,355	67,967	66,902	60,785	57,044	57,949	43,885	29,658	35,314	26,262

¹ Preliminary.

² As from 1991.

³ Quantity unknown 1989–1991.

⁴ Includes catches from Subdivision Vb₂ and Division IIa in Faroese waters.

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

⁶ Includes Faroese, French, and Greenlandic catches from Division Vb, as reported to the Faroese coast guard.

⁷ 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.

Table 4.3.4.3

Saithe in Division Vb. Summary of the assessment (weights in tonnes).

Year	Recruits (age 3)	SSB (tonnes)	Yield (tonnes)	Yield/SSB	$F_{\text{bar}(4-8)}$
1961	7827	68639	9592	0.13	0.106
1962	12256	73051	10454	0.153	0.125
1963	19837	76590	12693	0.173	0.114
1964	14811	81173	21893	0.272	0.23
1965	22362	85017	22181	0.283	0.214
1966	21229	87577	25563	0.299	0.25
1967	24897	85686	21319	0.24	0.204
1968	22879	94206	20387	0.212	0.16
1969	39798	103791	27437	0.274	0.191
1970	37092	109980	29110	0.275	0.189
1971	38446	122330	32706	0.244	0.179
1972	33424	138383	42663	0.307	0.236
1973	23621	131083	57431	0.438	0.318
1974	19420	134334	47188	0.351	0.272
1975	17327	135715	41576	0.306	0.297
1976	19709	129311	33065	0.256	0.267
1977	13106	122418	34835	0.273	0.328
1978	8332	105467	28138	0.265	0.243
1979	8686	96193	27246	0.276	0.257
1980	13074	96358	25230	0.264	0.211
1981	33144	85199	30103	0.369	0.382
1982	15675	94576	30964	0.34	0.336
1983	40829	97964	39176	0.4	0.385
1984	26074	105540	54665	0.518	0.478
1985	22329	110195	44605	0.43	0.382
1986	61852	93587	41716	0.473	0.505
1987	48610	95294	40020	0.437	0.396
1988	44846	102233	45285	0.446	0.456
1989	28600	105133	44477	0.436	0.36
1990	20710	101702	61628	0.618	0.562
1991	24970	76133	54858	0.725	0.703
1992	19563	60736	36487	0.572	0.52
1993	23779	59601	33543	0.553	0.451
1994	16875	57762	33182	0.561	0.491
1995	38971	54632	27209	0.488	0.443
1996	24325	59706	20029	0.325	0.344
1997	33492	68667	22306	0.325	0.304
1998	12743	74420	26421	0.347	0.287
1999	58805	79584	33207	0.41	0.335
2000	35803	81424	39020	0.472	0.383

Year	Recruits (age 3)	SSB (tonnes)	Yield (tonnes)	Yield/SSB	$F_{\text{bar}}(4-8)$
2001	87985	83758	51786	0.617	0.501
2002	105929	80773	53546	0.663	0.482
2003	64204	96838	46555	0.48	0.414
2004	53976	112362	46355	0.411	0.354
2005	69681	127416	67967	0.534	0.358
2006	21754	126255	66902	0.532	0.433
2007	18500	118881	60785	0.513	0.398
2008	31252	103392	57044	0.547	0.433
2009	12851	92055	57949	0.622	0.628
2010	23875	67055	43885	0.654	0.603
2011	41580	54076	29658	0.548	0.497
2012	44344	51900	35314	0.68	0.653
2013	35084	60727	26262	0.432	0.448
2014	28152	69868	38254		0.533
2015	28152	71812	38651		0.533
2016	28152	70140			
Average	31342	92771	37238	0.41	0.36