ECOREGION Faroe Plateau ecosystem
STOCK Saithe in Division Vb

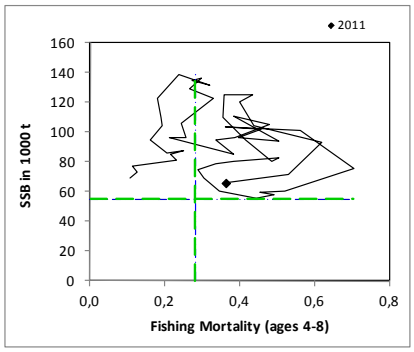
Advice for 2013

ICES advises on the basis of the MSY approach that effort should be reduced such that fishing mortality in 2013 will be no more than F = 0.28, corresponding to an 44% reduction in the present fishing mortality.

Stock status

F (Fishing Mortality)	2009	2010	2011	
MSY (F_{MSY})	✗	✗	✗	Above target
Precautionary approach (F_{pa})	✗	✗	✗	Harvested unsustainably

SSB (Spawning-Stock Biomass)	2010	2011	2012	
MSY ($B_{trigger}$)	✓	✓	✓	Above trigger
Precautionary approach (B_{pa})	✓	✓	✓	Full reproductive capacity



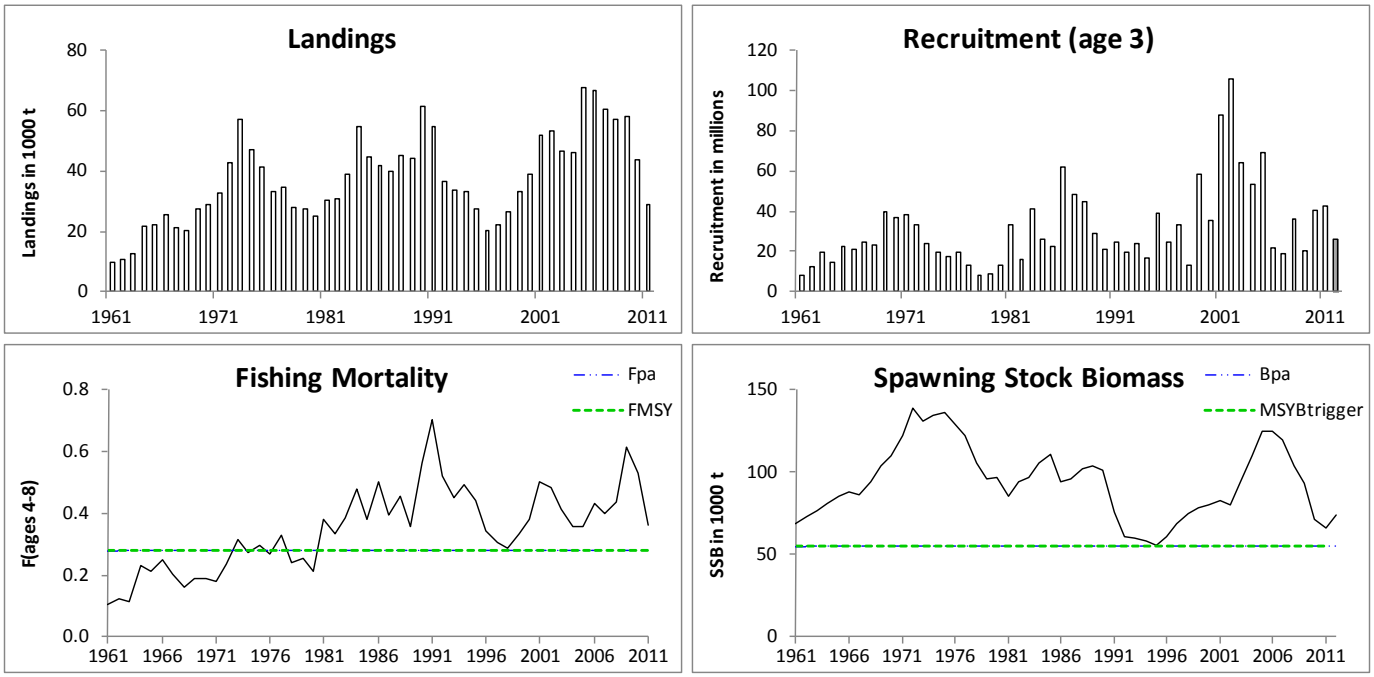


Figure 4.4.4.1 Saithe in Division Vb. Summary of stock assessment (weights in thousand tonnes). Top right: SSB/F for the time-series used in the assessment.

SSB has decreased substantially since 2006 but remains above MSY $B_{trigger}$. Recruitment in 2011 was above average. Fishing mortality has decreased since 2009 and is above F_{MSY}.

Management plans

A group representing the Ministry of Fisheries, the Faroe industry, the University of the Faroe Islands, and the Faroe Marine Research Institute has developed a management plan based on general maximum sustainable yield (MSY) principles developed by ICES. The plan has not yet been discussed by the political system.

Biology

Saithe in Division Vb is regarded as one management unit although tagging experiments have demonstrated migrations 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

Preliminary studies suggest a positive relationship between ocean productivity (gyre index) and the biomass of 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 landings (2011) are 29 kt, of which 91% was taken by pair trawlers, 4.5% by single trawlers, and 3.6% by jiggers.

Quality considerations

There are no incentives to discard fish under the effort management system. The sampling of the landings has increased since 2009 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.

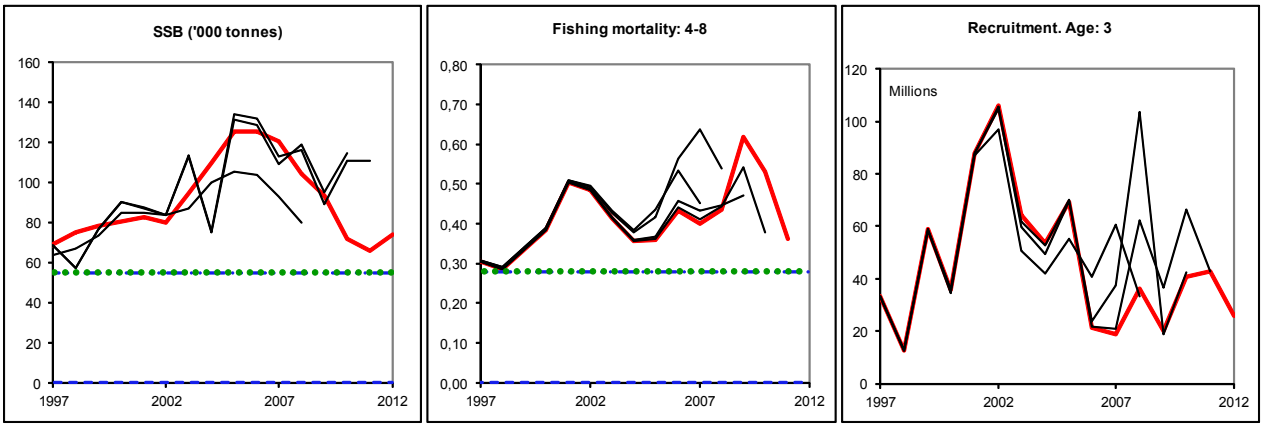


Figure 4.4.4.2 Saithe in Division Vb. Historical assessment results (final-year recruitment estimates included).

Scientific basis

Assessment type	Age-based analytical assessment – XSA.
Input data	Commercial catch-at-age data and an age-disaggregated pair trawlers series combined with survey data.
Discards and bycatch	There are no discard data, but discarding is not considered to be a major problem in this fishery.
Indicators	None.
Other information	A benchmark assessment was performed in 2010.
Working group report	NWWG

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Reference points

	Type	*Value*	*Technical basis*
MSY Approach	MSY $B_{trigger}$	55 000 t	Breakpoint in segmented regression.
	F_{MSY}	0.28	Provisional stochastic simulations.
Precautionary Approach	B_{lim}	Undefined	
	B_{pa}	55 000 t	B_{loss} in 2011.
	F_{lim}	Undefined	
	F_{pa}	0.28	Consistent with 1999 estimate of F_{med}.

(Unchanged since 2011)

Yield and spawning biomass per Recruit F-reference points (2012):

	Fish Mort Ages 4–8	Yield/R	SSB/R
Average last 3 years	0.50	1.33	1.97
F_{max}	0.44	1.33	2.26
$F_{0.1}$	0.18	1.21	5.65
F_{med}	0.31	1.32	3.29

Outlook for 2013

Basis: F (2012) = F (2009–2011) unscaled = 0.50; SSB (2013) = 72; R (2012) (GM2006–2010) = 26 million; catch (2012) = 51.1.

Rationale	**F (2013)**	**Landings (2013)**	**Basis**	**SSB (2014)**	**%SSB change [1)]**
MSY approach	0.28	29.1	F_{MSY} (=F_{sq}*0.56)	79	+10
Precautionary Approach	0.28	291	F_{pa} (=F_{sq} *0.56)	79	+10
Zero catch	0	0	F=0	105	+46
Status quo	0.15	16.6	F_{sq} * 0.30	92	+28
	0.25	26.4	F_{sq} * 0.50	84	+17
	0.35	35.3	F_{sq} * 0.70	76	+6
	0.45	43.2	F_{sq} * 0.90	70	-3
	0.50	46.9	F_{sq}	67	-7

Weights in thousand tonnes.

[1)] SSB 2014 relative to SSB 2013.

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% of the haddock exploitable stock in numbers would be harvested annually. This translates into an average F of 0.45, above the F_{pa} and F_{MSY} of 0.25. ICES considers this to be inconsistent with the PA and the MSY approaches. Work is ongoing in the Faroes to move away from the F_{target} of 0.45 to be consistent with the ICES advice. This management plan includes a stepwise reduction of the fishing mortality to F_{MSY} in 2015 and a recovery plan if the SSB declines below the MSY $B_{trigger}$. The MSY $B_{trigger}$ has been defined at 55 kt (the former B_{pa}) and F_{MSY} at 0.28. If the SSB declines below the MSY $B_{trigger}$, the fishing mortality will be reduced by the relationship F_{MSY} * $B_{act}/B_{trigger}$ 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 2013 should be no more than F_{MSY} = 0.28, resulting in a reduction of 44% in the present fishing mortality.

Precautionary approach

Following the precautionary approach implies that fishing mortality in 2013 should be no more than F_{pa} = 0.28, resulting in a reduction of 44% in present fishing mortality.

Additional considerations

Management considerations

The number of fishing days for pair trawlers was reduced by 10% for the fishing year (2010/2011), but 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 are about 78%, 17%, and 4%, respectively. The pair trawlers, jiggers, and single trawlers are regulated by 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 from 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. Presently, ICES is not able to quantify these changes.

Uncertainties in the assessment and forecast

The potential for bias in commercial cpue (for example hyper-stability) is a serious concern for shoaling species such as saithe. For this assessment, in addition to the pairtrawler cpue, which is a measure of saithe density in its core area of distribution, the range of the spatial distribution of saithe was considered, using survey information, when constructing an abundance index for saithe. This approach is considered to reduce the bias. The assessment is very uncertain, with large revisions from year to year. Recruitment indices are only available from age 3 and this is a source of uncertainty in recent recruitment estimates and forecast.

Comparison with last year's assessment and advice

SSB in 2010 and 2011 has been revised downwards by 35% and 40%, respectively, compared to last year's estimates. F in 2009 and 2010 has been revised upwards by 14% and 40%, respectively. The basis for the advice is the same as last year.

Sources

ICES. 2012. Report of the North-Western Working Group (NWWG), 26 April–3 May 2012. ICES CM 2012/ACOM:07.

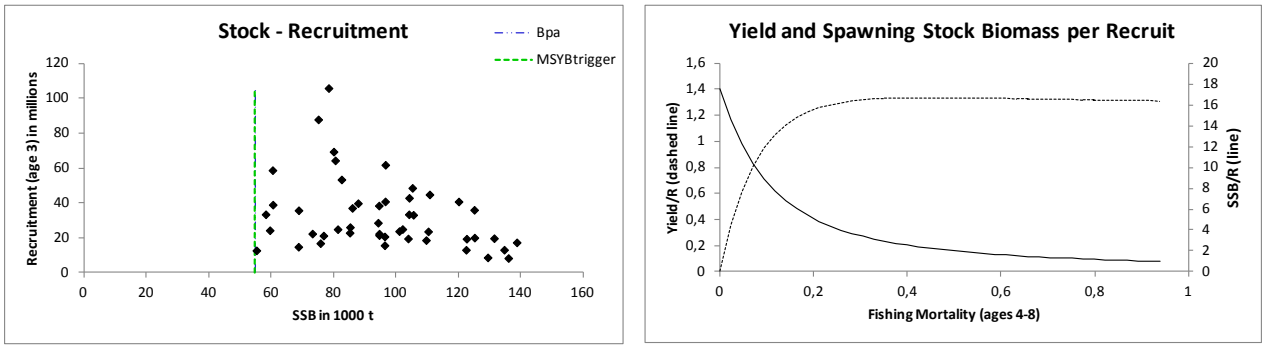

Figure 4.4.4.3 Saithe in Division Vb. Left: Stock–recruitment plot, SSB at spawning time. Right: Yield and spawning-stock biomass-per-recruit plot.

Table 4.4.4.1 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[1]	33
1995	TAC	<22	39[1]	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		
2013	F<0.28	<29.1		

Weights in thousand tonnes.
Fishing year: 1 September–31 August the following year.
[1)] In the quota year 1 September–31 August the following year.

Table 4.4.4.2 Saithe in Division Vb. Nominal catches (tonnes round weight) by countries, 1988–2011, as officially reported to ICES, and the ICES estimates.

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Country	1988	1989	1990	1991	1992	1993	1994	1995	1996	1997	1998		
Denmark	94	-	2	-	-	-	-	-	-	-	-		
Estonia	-	-	-	-	-	-	-	-	-	16	-		
Faroe Islands	44402	43,624	59,821	53,321	35,979	32,719	32,406	26,918	19,267	21,721	25,995		
France [3]	313	-	-	-	120	75	19	10	12	9	17		
Germany	-	-	-	32	5	2	1	41	3	5	-		
German Dem.Rep.	-	9	-	-	-	-	-	-	-	-	-		
German Fed. Rep.	74	20	15	-	-	-	-	-	-	-	-		
Greenland	-	-	-	-	-	-	-	-	-	-	-		
Ireland	-	-	-	-	-	-	-	-	-	-	-		
Netherlands	-	22	67	65	-	-	-	-	-		-		
Norway	52	51	46	103	85	32	156	10	16	67	53		
Portugal	-	-	-	-	-	-	-	-	-	-	-		
UK (Eng. & W.)	-	-	-	5	74	279	151	21	53	-	19		
UK (Scotland)	92	9	33	79	98	425	438	200	580	460	337		
USSR/Russia [2]	-	-	30	-	12	-	-	-	18	28	-		
Total	45027	43,735	60,014	53,605	36,373	33,532	33,171	27,200	19,949	22,306	26,065		
Working Group estimate [4,5]	45285	44,477	61,628	54,858	36,487	33,543	33,182	27,209	20,029	22,306	26,421		

Country	1999	2000	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010	2011 [1]
Denmark	-	-	-	-	-	-	-	34	-				
Estonia	-	-	-	-	-	-	-	-	-				
Faroe Islands	32,439		49,676	55,165	47,933	48,222	71,496	70,696	64,552	61,116	61,889	46,686	31,439
France	-	273	934	607	370	147	123	315	108	97	68	46	
Germany	100	230	667	422	281	186	1	49	3	3	0		
Greenland	-	-	-	125	-			73	239	0	1		6
Irland	-	-	5	-	-	-	-	-	-	-	-		
Iceland	-	-	-	-	-	-	-	-	-	-	148	-	
Netherlands	0	0	0	0	0	0	0	0	3	0	0	0	
Norway	160	72	60	77	62	82	82	35	81	38	23	28	
Portugal	-	-	-	-	-	5	-	-	-	-	-		
Russia	-	20	1	10	32	71	210	104	159	38	44	3	
UK (E/W/NI)	67	32	80	58	89	85	32	88	4	-	-		
UK (Scotland)	441	534	708	540	610	748	4,322	1,011	408	400	684		
United Kingdom	-	-	-	-	-	-	-	-	-	-	-	706	
Total	33,207	1,161	52,131	57,004	49,377	49,546	76,266	72,405	65,557	61,692	62,857	47,469	31,445
Working Group estimate [4,5,6,7]	33,207	39,020	51,786	53,546	46,555	46,355	67,967	66,902	60,785	57,043	57,949	43,885	29,087
							30.135	200.57	69.109	0	1	74.018	

[1] Preliminary.

[2] As from 1991.

[3] Quantity unknown 1989-91.

[4] Includes catches from Sub-division Vb2 and Division IIa in Faroese waters.

[5] Includes French, Greenlandic, Russian catches from Division Vb, as reported to the Faroese coastal guard service.

[6] Includes Faroese, French, Greenlandic catches from Division Vb, as reported to the Faroese coastal guard service.

[7] The 2001-2008 catches from Faroe Islands, as stated from Faroese coastal guard service, are corrected in order to be consistent with procedures used previous years.

Table 4.4.4.3 Saithe in Division Vb. Summary of the assessment (weights in tonnes).

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Year	Recruitment Age 3 thousands	SSB tonnes	Landings tonnes	Mean F Ages 4–8
1961	7827	68804	9592	0.106
1962	12256	73260	10454	0.125
1963	19837	76841	12693	0.114
1964	14811	81392	21893	0.230
1965	22362	85254	22181	0.214
1966	21229	87908	25563	0.250
1967	24897	86057	21319	0.204
1968	22879	94602	20387	0.160
1969	39798	104218	27437	0.191
1970	37092	110399	29110	0.189
1971	38446	122699	32706	0.179
1972	33424	138788	42663	0.236
1973	23621	131517	57431	0.318
1974	19420	134752	47188	0.272
1975	17327	136090	41576	0.297
1976	19709	129480	33065	0.267
1977	13105	122531	34835	0.328
1978	8332	105627	28138	0.243
1979	8686	96431	27246	0.257
1980	13074	96614	25230	0.211
1981	33144	85351	30103	0.382
1982	15672	94692	30964	0.336
1983	40828	96673	39176	0.385
1984	26072	105324	54665	0.478
1985	22325	110840	44605	0.382
1986	61844	94321	41716	0.505
1987	48593	96432	40020	0.396
1988	44826	102149	45285	0.456
1989	28598	103956	44477	0.360
1990	20707	101103	61628	0.562
1991	24968	75841	54858	0.704
1992	19542	60601	36487	0.521
1993	23777	59632	33543	0.452
1994	16871	58310	33182	0.492
1995	38968	55355	27209	0.443
1996	24290	60512	20029	0.344
1997	33451	68864	22306	0.305
1998	12740	75171	26421	0.287
1999	58774	78479	33207	0.335
2000	35754	80603	39020	0.383
2001	87894	82618	51786	0.503
2002	105884	80090	53546	0.484
2003	64371	94680	46555	0.415
2004	53416	109720	46355	0.356
2005	69410	125154	67967	0.359
2006	21483	125234	66902	0.434
2007	18628	120163	60785	0.400
2008	36005	104291	57043	0.437
2009	20054	93514	57950	0.617
2010	40771	71601	43885	0.531
2011	42887	65919	29087	0.362
2012	25956*	74151		
Average	31474	94127	37480	0,349

* GM 2006–2010.