ECOREGION   **Faroe Plateau ecosystem**
STOCK   **Saithe in Division Vb**

Advice for 2014

ICES advises on the basis of the MSY approach that effort should be reduced such that fishing mortality in 2014 will be no more than F = 0.28, corresponding to a 46% reduction in the present fishing mortality. All catches are assumed to be landed.

Stock status

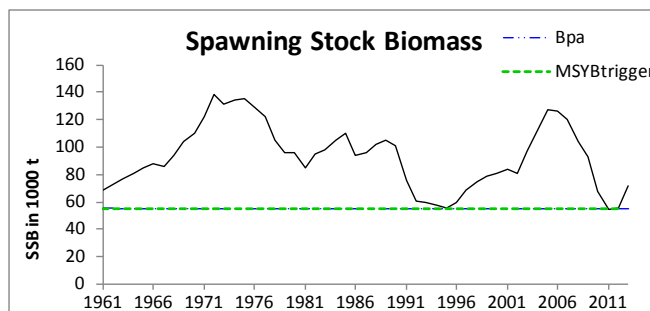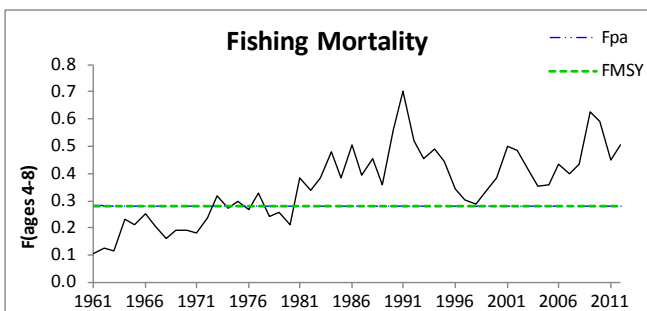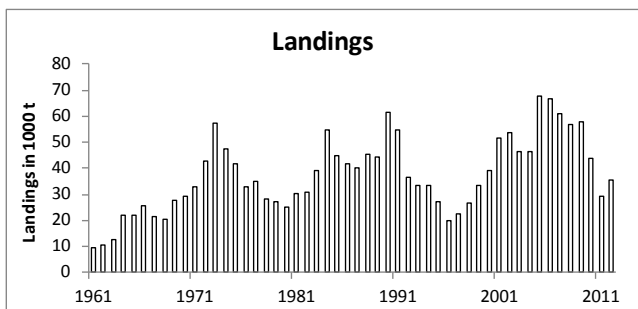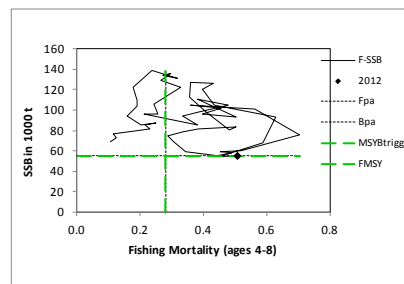|	F (Fishing Mortality)			
	2010	2011	**2012**	
MSY (F_{MSY})	❌	❌	❌	Above target
Precautionary approach (F_{pa})	❌	❌	❌	Harvested unsustainably
	SSB (Spawning-Stock Biomass)			
	2011	2012	**2012**	
MSY ($B_{trigger}$)	✅	✅	✅	Above trigger
Precautionary approach (B_{pa})	✅	✅	✅	Full reproductive capacity

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 2005 but is estimated to be slightly above MSY $B_{trigger}$. Predicted recruitment in 2012 was below average (32 million). Fishing mortality has decreased from 2009 to 2011, but it increased in 2012 reflecting the rise in catches and is estimated above F_{MSY}.

Management plans

There is no explicit management plan for this stock. A group representing the Ministry of Fisheries, the Faroe industry, the University of the Faroe Islands, and the Faroe Marine Research Institute has, however 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 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

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 (2012) is 35 kt, of which 92% was taken by pair trawlers, 2.3% by single trawlers, and 5.6% 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 2012 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.
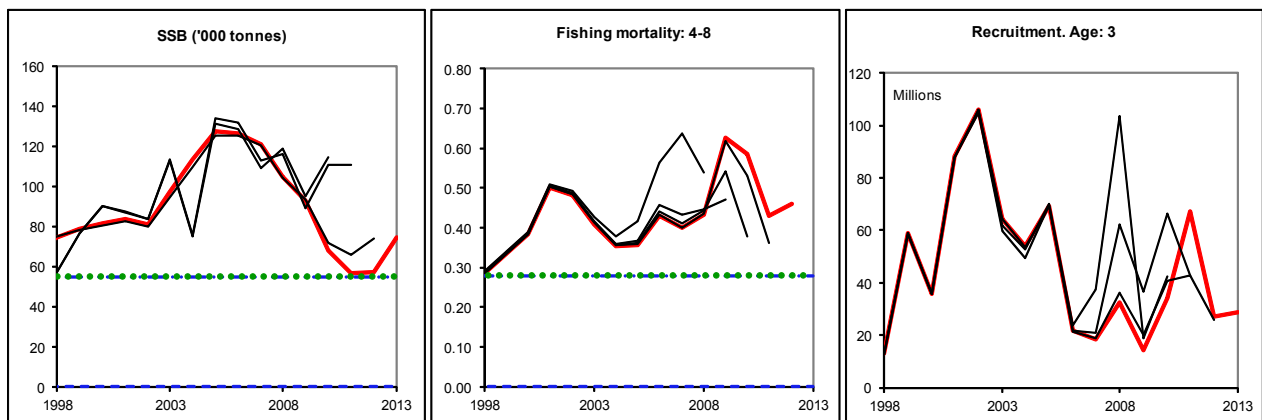

Figure 4.4.4.2   Saithe in Division Vb. Historical assessment results (final-year recruitment estimates included).

Scientific basis

Assessment type	XSA using landings-at- age data and age-disaggregated commercial and survey indices.
Stock data category	Category 1.
Input data	Commercial catches (Mainly Faroese catches, ages and length frequencies from catch sampling);
	survey indices FO-GFS-Q1;
	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, 2013).

ECOREGION   **Faroe Plateau ecosystem**
STOCK   **Saithe in Division Vb**

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 (performed in 2011).
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	0.49	1.31	1.93
F_{max}	0.47	1.31	2.04
$F_{0.1}$	0.19	1.19	5.21
F_{med}	0.30	1.28	3.40

Outlook for 2014

Basis: F (2013) = F (2010–2012) unscaled = 0.51; SSB (2014) = 75 kt; R (2013) (GM 2007–2011) = 28 million; catch (2013) = 54 kt.

Rationale	F (2014)	Catch (2014)	Basis	SSB (2015)	% SSB change [1]
MSY approach	0.28	29	F_{MSY} (= $F_{sq} \times 0.54$)	88	17
Precautionary Approach	0.28	29	F_{pa} (= $F_{sq} \times 0.54$)	88	17
Zero catch	0	0	F = 0	113	50
Status quo	0.13	15	$F_{sq} \times 0.25$	101	34
	0.26	27	$F_{sq} \times 0.50$	90	20
	0.39	39	$F_{sq} \times 0.75$	80	7
	0.46	45	$F_{sq} \times 0.90$	75	0
	0.51	49	F_{sq}	71	−5

Weights in thousand tonnes.
[1] SSB 2015 relative to SSB 2014.

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 the F_{pa} and F_{MSY} of 0.25. ICES considers this to be inconsistent with the PA and the MSY approaches. At present, there is no explicit management plan for this stock. A group representing the Ministry of Fisheries, the Faroese industry, the University of the Faroe Islands, and the Faroe Marine Research Institute has, however, 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_{MSY} at 0.28 (ICES, 2011). If the SSB declines below the MSY $B_{trigger}$, the fishing mortality will be reduced by the relationship $F_{MSY} \times B_{act}/B_{trigger}$ 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 (ICES, 2011), resulting in a reduction of 46% 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 46% in present fishing mortality.

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 tawlers. 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 are about 92%, 2.3%, and 2.4%, 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 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 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 with last year's assessment and advice

In addition to the pair trawler cpue the spring index was used in 2013 to calibrate the assessment. The commercial cpue was constructed as in previous years, i.e. taking into account the range of the spatial distribution of saithe using survey information.

In the 2012 assessment SSB was predicted at SSB (2012) = 74 000 t whereas the estimated value in the 2013 assessment was SSB (2012) = 57 000 t (23% overestimation). Fishing mortality was overestimated by 8% from Fbar = 0.5 to Fbar = 0.46 in the current assessment. Recruitment for 2012 was estimated at 26 million in the 2012 assessment. The estimated value in the 2013 assessment was 27 million.

Sources

ICES. 2011. Report of the North-Western Working Group (NWWG), 26 April–3 May 2011. ICES CM 2011/ACOM:07.
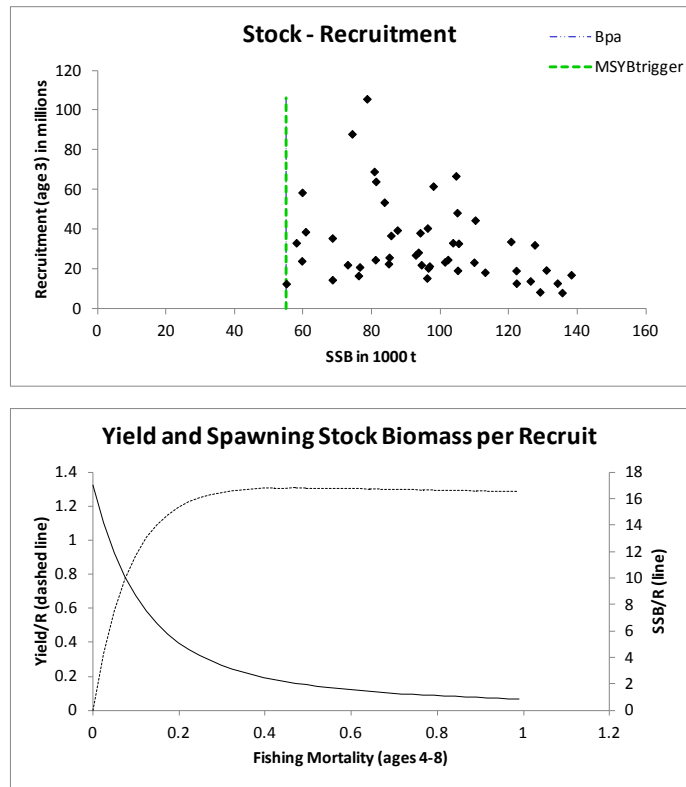ICES. 2013. Report of the North-Western Working Group (NWWG), 26 April–3 May 2013. ICES CM 2013/ACOM:07.

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

Table 4.4.4.1   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		35
2013	F<0.28	< 29.1		
2014	Reduce fishing effort to generate F below F_{MSY} (0.28)	< 29		

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, 1988–2012, as officially reported to ICES, and the ICES estimates.

Country	1988	1989	1990	1991	1992	1993	1994	1995	1996	1997	1998	1999	2000
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	32,439	
France [3]	313	-	-	-	120	75	19	10	12	9	17	-	273
Germany	-	-	-	32	5	2	1	41	3	5	-	100	230
German Dem.Rep.	-	9	-	-	-	-	-	-	-	-	-	-	-
German Fed. Rep.	74	20	15	-	-	-	-	-	-	-	-	-	-
Greenland	-	-	-	-	-	-	-	-	-	-	-	-	-
Ireland	-	-	-	-	-	-	-	-	-	-	-	0	0
Netherlands	-	22	67	65	-	-	-	-	-	-	-	160	72
Norway	52	51	46	103	85	32	156	10	16	67	53	-	-
Portugal	-	-	-	-	-	-	-	-	-	-	-	-	20
UK (Eng. & W.)	-	-	-	5	74	279	151	21	53	-	19	67	32
UK (Scotland)	92	9	33	79	98	425	438	200	580	460	337	441	534
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	33,207	1,161
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	33,207	39,020

Country	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010	2011	2012 [1]
Denmark	-	-	-	-	-	34	-					
Estonia	-	-	-	-	-	-						
Faroe Islands	49,676	55,165	47,933	48,222	71,496	70,696	64,552	61,117	61,889	46,686	31,439	38,336
France	934	607	370	147	123	315	108	97	68	46	94	40
Germany	667	422	281	186	1	49	3	3	0			
Greenland	-	125	-			73	239	0	1			2
Irland	5	-	-	-	-	-	-	-	-			
Iceland	-	-	-	-	-	-	-	-	148	-		
Netherlands	0	0	0	0	0	0	3	0	0	0		
Norway	60	77	62	82	82	35	81	38	23	28		
Portugal	-	-	-	5	-	-	-	-	-			
Russia	1	10	32	71	210	104	159	38	44	3		
UK (E/W/NI)	80	58	89	85	32	88	4	-	-			
UK (Scotland)	708	540	610	748	4,322	1,011	408	400	685			
United Kingdom	-	-	-	-	-	-	-	-	-	706	19	
Total	52,131	57,004	49,377	49,546	76,266	72,405	65,557	61,693	62,858	47,469	31,552	38,378
Working Group estimate [4,5,6,7]	51,786	53,546	46,555	46,355	67,967	66,902	60,785	57,044	57,949	43,885	29,087	35,463

[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.

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

Year	Recruitment Age 3 thousands	SSB tonnes	Landings tonnes	Mean F Ages 4–8
1961	7827	68552	9592	0.106
1962	12256	72979	10454	0.125
1963	19837	76518	12693	0.114
1964	14811	81092	21893	0.230
1965	22362	84947	22181	0.214
1966	21229	87493	25563	0.250
1967	24897	85639	21319	0.204
1968	22879	94142	20387	0.160
1969	39798	103696	27437	0.191
1970	37092	109878	29110	0.189
1971	38446	122171	32706	0.179
1972	33424	138219	42663	0.236
1973	23621	130940	57431	0.318
1974	19420	134184	47188	0.272
1975	17327	135577	41576	0.297
1976	19709	129106	33065	0.267
1977	13105	122237	34835	0.328
1978	8332	105352	28138	0.243
1979	8686	96138	27246	0.257
1980	13074	96286	25230	0.211
1981	33144	85127	30103	0.382
1982	15673	94503	30964	0.336
1983	40829	97961	39176	0.385
1984	26072	104927	54665	0.478
1985	22327	110189	44605	0.382
1986	61847	93579	41716	0.505
1987	48600	96440	40020	0.396
1988	44833	102160	45285	0.456
1989	28599	105002	44477	0.360
1990	20708	101255	61628	0.562
1991	24969	76097	54858	0.704
1992	19552	60634	36487	0.520
1993	23778	59544	33543	0.452
1994	16873	57948	33182	0.491
1995	38969	55018	27209	0.443
1996	24308	59642	20029	0.344
1997	33472	68591	22306	0.305
1998	12741	74351	26421	0.287
1999	58789	78536	33207	0.335
2000	35781	81162	39020	0.383
2001	87950	83682	51786	0.502
2002	105894	80682	53546	0.483
2003	64469	96734	46555	0.414
2004	53818	112908	46355	0.355
2005	69512	127357	67967	0.358
2006	21688	126180	66902	0.433
2007	18407	120552	60785	0.398
2008	32493	104483	57044	0.434
2009	13606	92801	57949	0.628
2010	27986	67499	43885	0.589
2011	73259	54354	29087	0.449
2012	28990	55251	35463	0.506
2013	27827	71784		
Average	31621	93058	37441	0.355