

6.4.12 Saithe in Subarea IV (North Sea), Division IIIa (Skagerrak), and Subarea VI (West of Scotland and Rockall)

State of the stock

Spawning biomass in relation to precautionary limits	Fishing mortality in relation to precautionary limits	Fishing mortality in relation to high long-term yield	Fishing mortality in relation to agreed target	Comment
Full reproductive capacity	Harvested sustainably	Appropriate	Appropriate	

Based on the most recent estimates of SSB (in 2009) and fishing mortality (in 2008), ICES classifies the stock as having full reproductive capacity and being harvested sustainably. SSB is estimated to have been above B_{pa} since 2001. From 2001 onwards, F has been at or below the target fishing mortality of 0.3.

Management objectives

The agreed EU–Norway management plan (Annex 6.4.12) includes: 1) Maintain the SSB above 106 000 t, and 2) exploitation at $F = 0.3$ when the stock is above B_{pa} . The management plan was evaluated by ICES in 2008 (ICES Advice 2008, Book 6, Section 6.3.3.3), and the management plan is considered by ICES to be consistent with the precautionary approach in the short term (< 5 years).

Reference points

	Type	Value	Technical basis
Precautionary approach	B_{lim}	106 000 t	$B_{loss} = 106\ 000$ t (estimated in 1998).
	B_{pa}	200 000 t	affords a high probability of maintaining SSB above B_{lim} .
	F_{lim}	0.6	F_{loss} the fishing mortality estimated to lead to stock falling below B_{lim} in the long term.
	F_{pa}	0.4	implies that $B_{eq} > B_{pa}$ and $P(SSB_{MT} < B_{pa}) < 10\%$.
Targets	F_{mgt}	0.3	EU-Norway management plan

(unchanged since 1998)

Yield and spawning biomass per Recruit F -reference points (2009):

	Fish Mort	Yield/R	SSB/R
Ages 3-6			
Average last 3 years	0.29	0.82	1.81
F_{max}	0.32	0.82	1.55
$F_{0.1}$	0.14	0.74	3.87
F_{med}	0.36	0.82	1.34

HCR evaluation has shown that candidates for reference points consistent with high long-term yields and a low risk of depleting the productive potential of the stock are around $F = 0.3$.

Single-stock exploitation boundaries

Considering the options below, ICES advises on the basis of the agreed management plan that the landings should be no more than 118 000 t in 2010.

Exploitation boundaries in relation to existing management plans

At the present SSB level, F should be no more than 0.3 to be in accordance with the management plan. This would give a 24% reduction in the TAC. However, there is a 15% TAC constraint when the stock is above B_{pa} and applying this corresponds to landings of 118 000 t in 2010.

Exploitation boundaries in relation to high long-term yield, low risk of depletion of production potential, and considering ecosystem effects

The current fishing mortality (2006-2008 average) is estimated at 0.29, which is close to the management plan target rate expected to lead to high long-term yields ($F = 0.3$).

Exploitation boundaries in relation to precautionary limits

An increase of F to 0.39 is possible while keeping SSB above B_{pa} in 2011. This corresponds to landings of less than 132 000 t in 2010.

Short-term implications

Outlook for 2010

Basis: $F(2009) = F_{06-08} = 0.287$; $R_{09-11} = GM_{88-06} = 122$; $SSB(2010) = 235$; landings (2009) = 110.

Rationale	landings 2010	landings IIIa&IV 2010 ¹⁾	landings VI 2010 ¹⁾	Basis	F 2010	SSB 2011	%SSB change ²⁾	% TAC change ³⁾
Zero catch	0	0	0	$F=0$	0	320	36	-100
Management plan	118	107.1	11.1	$0.85 * TAC_{09}$ ($1.19 * F_{sq}$)	0.34	212	-9	-15
Precautionary approach	132	119.6	12.4	B_{pa} ($1.37 * F_{sq}$)	0.39	200	-15	-5
<i>Status quo</i>	39	35.6	3.7	$0.35 * F_{sq}$	0.10	283	21	-72
	57	51.9	5.4	$0.52 * F_{sq}$	0.15	267	14	-59
	74	67.4	7.0	$0.70 * F_{sq}$	0.20	251	7	-46
	102	92.2	9.6	F_{sq}	0.29	227	-3	-27
	106	95.9	9.9	$F_{MPtarget}$	0.30	223	-5	-24
	110	100.0	10.4	$1.1 * F_{sq}$	0.32	219	-7	-21
	119	107.4	11.1	$1.2 * F_{sq}$	0.34	212	-10	-15
127	114.7	11.9	$1.3 * F_{sq}$	0.37	205	-13	-9	

Weights in '000 t.

¹⁾ Landings split according to the average in 1993–1998, i.e. 90.6% in Subarea IV and Division IIIa and 9.4% in Subarea VI.

²⁾ SSB 2011 relative to SSB 2010.

³⁾ Landings 2010 relative to TAC 2009.

Management considerations

The ICES advice applies to saithe in the three areas; Division IIIa, and Subareas IV and VI.

Natural fluctuations in recruitment will result in a reduction of SSB to around B_{pa} over the next few years. This is likely to lead to a decline in TAC advice. Following the management plan should provide an appropriate response.

The reported landings have been lower than the TACs during the past seven years. Information from fishers indicates that this is due to very low prices for saithe combined with high fuel prices. However, there are also claims that the abundance of saithe has been reduced in the most recent years.

By-catch of other demersal fish species occurs in some trawl fishery for saithe. Saithe is also taken as unintentional by-catch in other fisheries, and discards may occur if the vessels do not have a saithe quota.

Impacts of fisheries on the ecosystems

The effect on the benthic invertebrate community in the northern North Sea from all otter trawling is estimated to represent an annual mortality of approximately 25% of the standing-crop biomass. The MAFCONS and STECF dataset suggests that otter trawl effort directed at fish has declined since 1999 (Greenstreet *et al.*, 2007).

Factors affecting the fisheries and the stock

Regulations and their effects

In January 2002 the minimum mesh size (in bottom trawls for human consumption) was changed from 100 to 110 mm in EU waters and from 100 to 120 mm in Norwegian waters (the minimum mesh size for Norwegian vessels was set to 120 mm in both Norwegian and EU waters). In 2003 the mesh sizes were harmonized to 120 mm with the exception of the targeted saithe fishery (less than 3% cod bycatch), which remains at 110 mm. These variations might have contributed to changes in the exploitation pattern.

Impacts of the environment on the fish stock

A decrease in the mean weight-at-age has been observed in the past eleven years, but there is insufficient information to establish whether these reductions are linked to changes in the environment. The effects of a possible further decline in growth rates needs attention. There is no indication that the observed decline in weight-at-age is density dependent.

Scientific basis

Data and methods

The stock is assessed using an age-based model (XSA), calibrated by two commercial cpue series and two survey indices.

There are no discard estimates for the majority of this fishery. Discarding of saithe occurs in the non-targeted fisheries, but the level of discard is considered to be small compared to the total catch of saithe.

Information from the fishing industry

The reported landings in the last years have been lower than the TACs. Information from fishers indicates that very low prices on saithe, coupled with high fuel prices, are causing these reductions in targeted fisheries.

Uncertainties in assessment and forecast

The major uncertainty is the lack of information on year-class strength for ages 1–3. Therefore, IMR in Bergen, Norway began an acoustic survey along the western coast of Norway in 2006 to measure the relative abundance of saithe between 2 and 4 years old (when the saithe is distributed along the coast). However, the Norwegian acoustic survey will not be conducted in 2009.

Another important problem with this assessment is the necessity to use commercial cpue for tuning as the survey series only contains usable information for ages 3-6.

Since recruitment at age 3 tends to be poorly estimated in the XSA, the size of the 2005 year class is uncertain. Only very large relative errors will make a large impact on the forecast.

Comparison with previous assessment and advice

Compared to last years assessment, SSB in 2008 has been revised downwards by 14% and F in 2007 has been revised upwards by 6%. Recruitment in 2007 has been estimated 21% lower in this years assessment. The basis of the advice is unchanged.

Sources of information

Report of the Working Group on the Assessment of Demersal Stocks in the North Sea and Skagerrak, 6-12 May 2009 (ICES CM 2009/ACFM:10).

Report of the Working Group on the Assessment of Demersal Stocks in the North Sea and Skagerrak, 6-12 May 2009 (ICES CM 2009/ACOM:10).

ICES. 2008. Norway and EC request on management plan for saithe in the North Sea and West of Scotland. ICES Advice, 2008. Book 6.

Greenstreet, S. P. R., Robinson, L. A., Piet, G. J., Craeymeersch, J., Callaway, R., Reiss, H., Ehrich, S., *et al.* 2007. The ecological disturbance caused by fishing in the North Sea. FRS Collaborative Report, 04/07. 169 pp.

STECF. 2007. Report of the First and Fourth meeting of the Subgroup on Review of Stocks (SGRST-05-01 and SGRST-05-04) of STECF, Evaluation of the Cod recovery plan, Ispra, 13-17 June and 19-21 September 2005.

Saithe in IIIa and IV

Year	ICES Advice 2004 onwards: Single-Stock Exploitation Boundaries	Predicted landings corresp. to advice	Predicted landings corresp. to single-stock exploitation boundaries	Agreed TAC	Official landings	ICES landings
1987	Reduce F	<198		173	154	149
1988	60% of F(86); TAC	156		165	113	107
1989	No increase in F; TAC	170		170	92	92
1990	No increase in F; TAC	120		120	85	88
1991	No increase in F; TAC	125		125	93	99
1992	No increase in F; TAC	102		110	92	92
1993	70% of F(91) ~ 93 000 t	93		93	99	105
1994	Reduce F by 30%	72		97	90	102
1995	No increase in F	107		107	97	113
1996	No increase in F	111		111	96	110
1997	No increase in F	113		115	86	103
1998	Reduce F by 20%	97		97	88	100
1999	Reduce F to F_{pa}	104		110	108	107
2000	Reduce F by 30 %	75		85	85	87
2001	Reduce F by 20 %	87		87	88	90
2002	$F < F_{pa}$	<135		135	113	117
2003	$F < F_{pa}$	<176		165	105	102
2004	$F < F_{pa}$		<211	190	87	100
2005	F according to man. plan	*	<137	145	111	112
2006	F according to man. plan ($<F_{pa}$)	*	<123	123	111	117
2007	F according to man. plan ($<F_{pa}$)	*	<124	123	87	94
2008	F according to man. plan ($<F_{pa}$)	*	<137	136	115	112
2009	F according to man. plan ($<F_{pa}$)	*	<126	126		
2010	F according to man. plan ($<F_{pa}$)	*	<107			

Weights in '000 t.

* Single-stock boundary and the exploitation of this stock should be conducted in the context of mixed fisheries.

Saithe in VI

Year	ICES Advice 2004 onwards: Single-Stock Exploitation Boundaries*	Predicted landings corresp. to advice	Predicted catch corresp to single-stock exploitation boundaries	Agreed TAC	Official landings	ICES landings
1987	F reduced towards F_{max}	19		27.8	32.5	31.4
1988	80% of F(86); TAC	35		35	32.8	34.2
1989	F < 0.3; TAC	20		30	22.4	25.6
1990	80% of F(88); TAC	24		29	18.0	19.9
1991	Stop SSB decline; TAC	21		22	17.9	17.0
1992	Avoid further reduction in SSB	<19		17	10.8	11.8
1993	F = 0.21	6.3		14	14.5	13.9
1994	Lowest possible F			14	13.0 ²	12.8
1995	Significant reduction in effort	-		16	10.6 ²	11.8
1996	No increase in F	10.2 ¹		13	9.4 ²	9.4
1997	Significant reduction in F			12	8.6 ²	9.4
1998	60% Reduction in F	4.8		10.9	7.4 ²	8.4
1999	60% reduction in F	4.8		7.5	6.8	7.3
2000	Reduce F by 30%	6.0		7	6.4	5.9
2001	Reduce F by 20%	9.0		9	8.7	8.4
2002	F < F_{pa}	<13		14	5.6	5.2
2003	F < F_{pa}	<17		17.1	5.0	5.3
2004	F < F_{pa}	<21	<21	20	1.6	4.4
2005	F according to man. plan (< F_{pa})	<14	< 14	15	8.7	5.7
2006	F according to man. plan (< F_{pa}) [*]	*	<12	13	9.4	8.6
2007	F according to man. plan (< F_{pa})	*	<12	13	6.7	6.8
2008	F according to man. plan (< F_{pa})	*	<14	14	6.0	7.1
2009	F according to man. plan (< F_{pa})	*	<13	13		
2010	F according to man. plan (< F_{pa})	*	<11			

Weights in '000 t.

¹ *Status quo* catch.

² Incomplete data.

* Single-stock boundary and the exploitation of this stock should be conducted in the context of mixed fisheries.

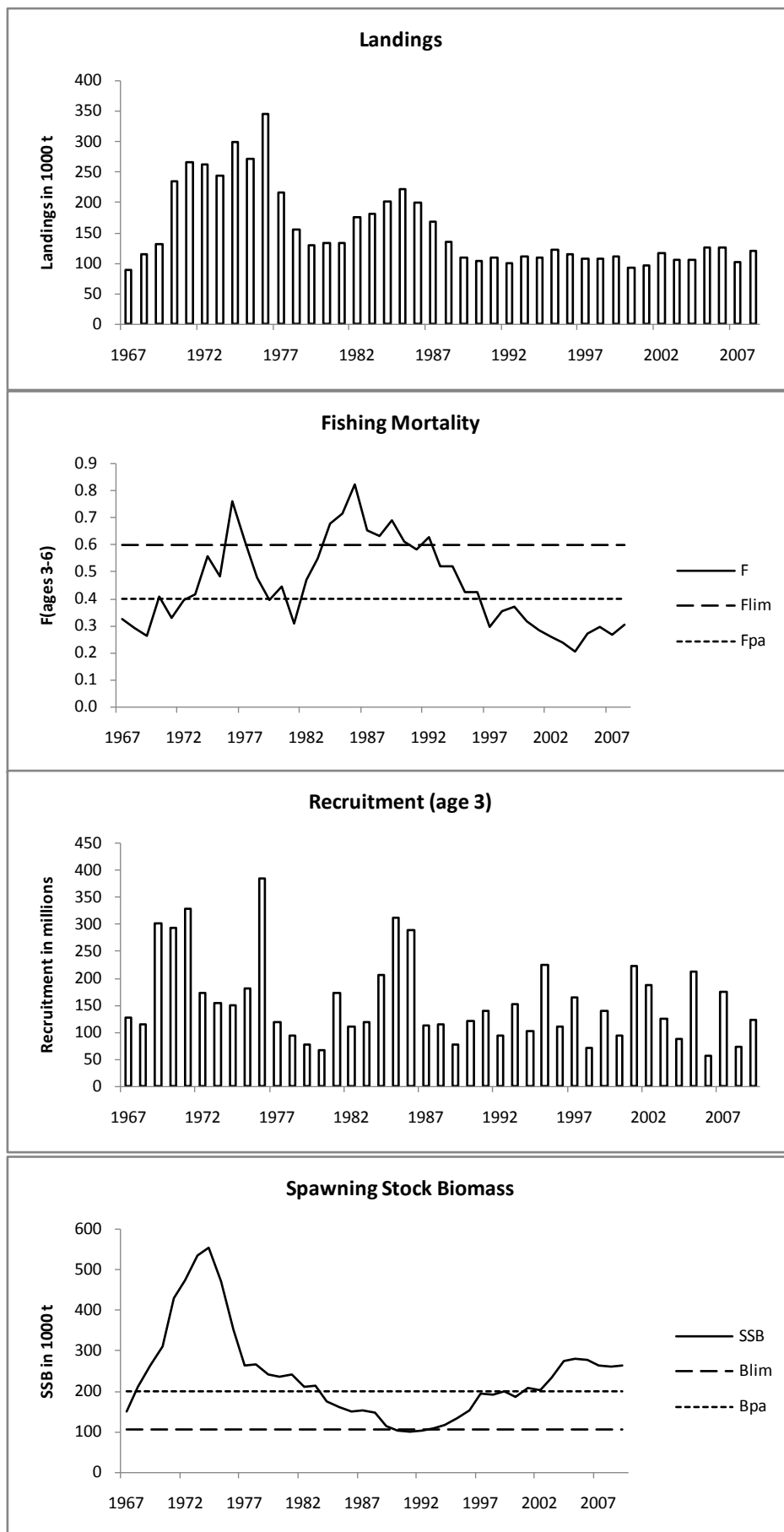


Figure 6.4.12.1 Saithe in Subarea IV, Division IIIa (Skagerrak), and Subarea VI. Landings, fishing mortality, recruitment, and SSB.

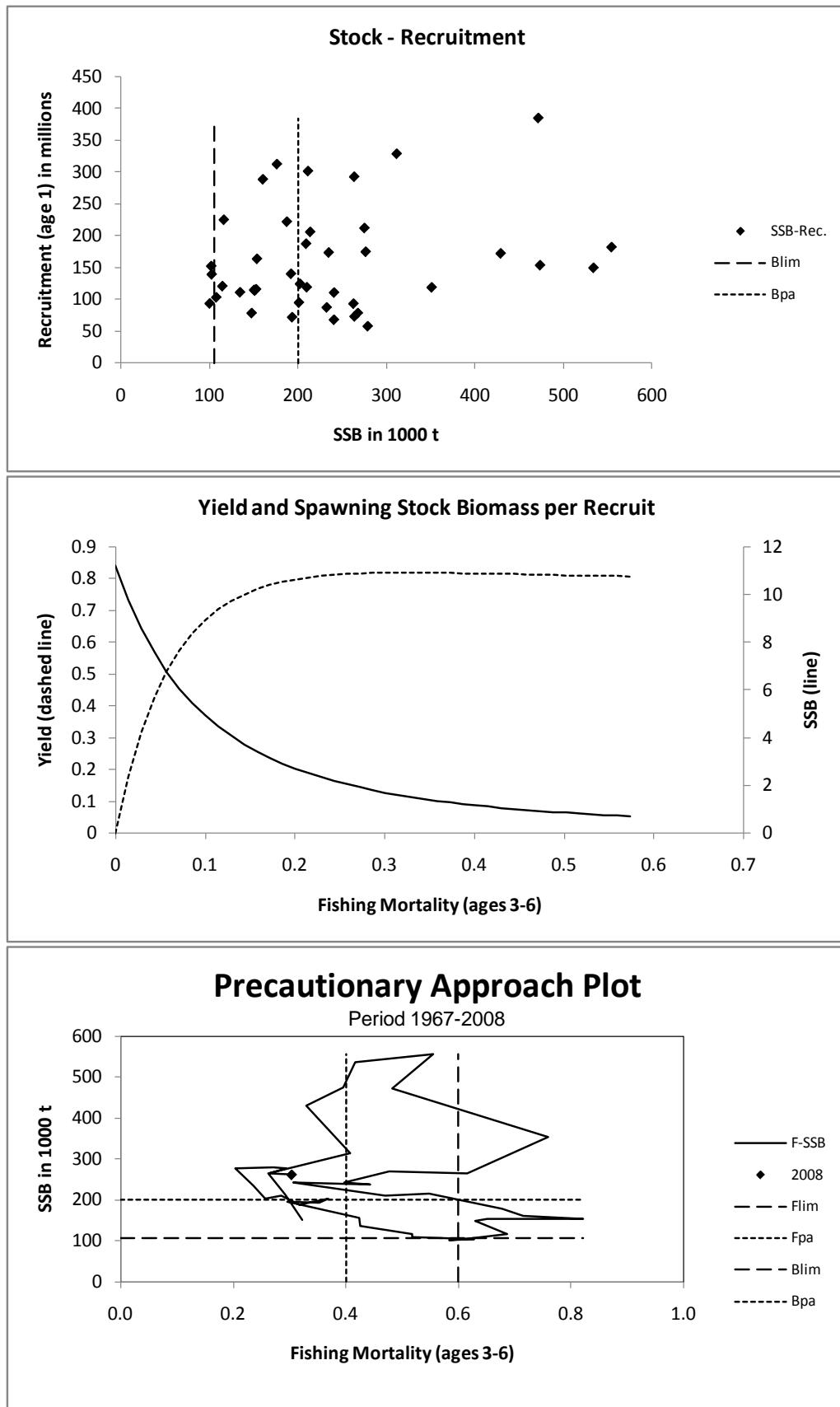


Figure 64.12.2 Saithe in Subareas IV and VI, and Division IIIa. Precautionary approach plot, yield-per-recruit analysis, and stock-recruitment plot.

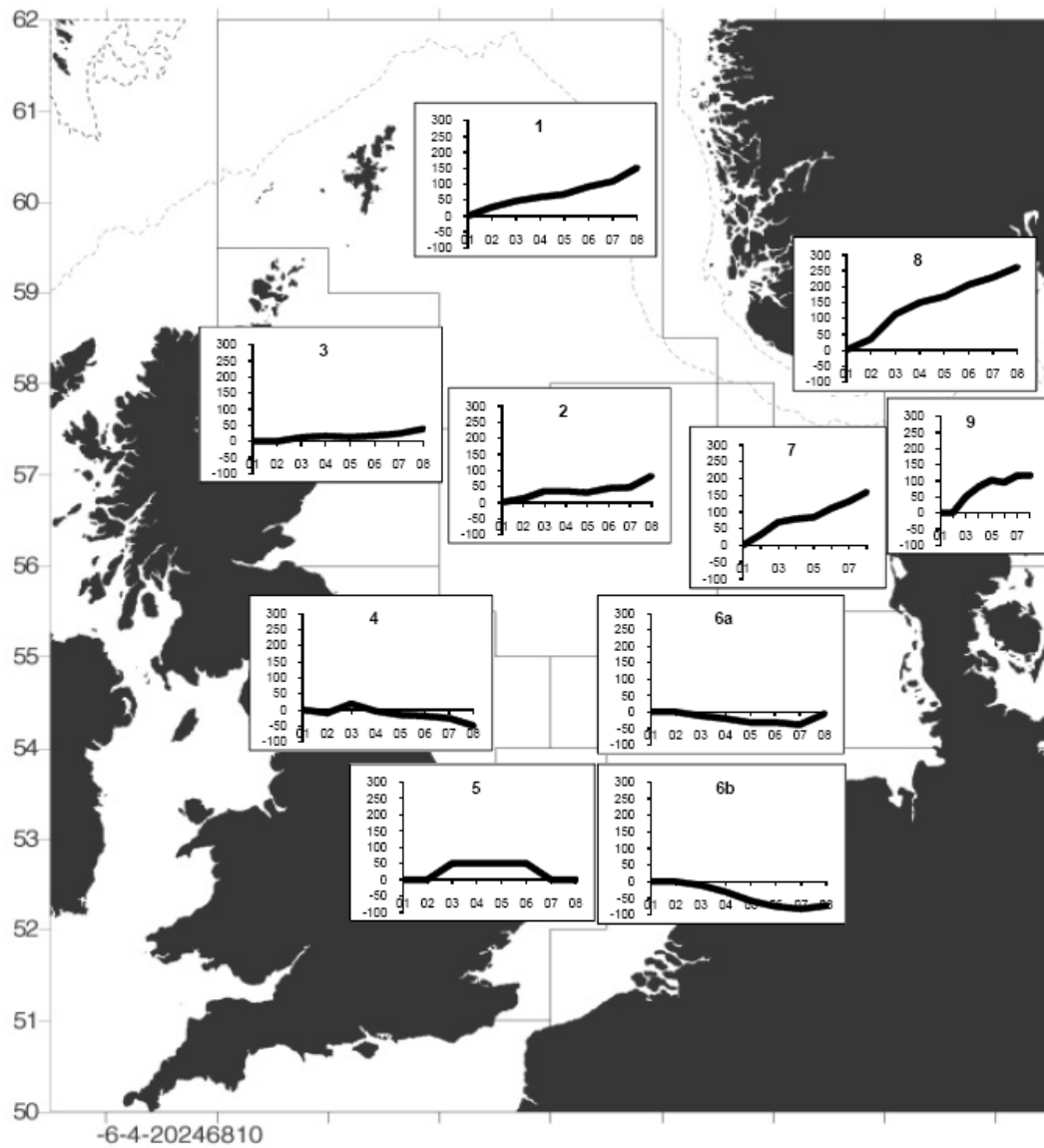


Figure 6.4.123 Saithe (in Subareas IV and VI, and Division IIIa. Results of the North Sea Commission fishers' survey 2008.

Saithe in Subarea IV (North Sea) Division IIIa West (Skagerrak) and Subarea VI (West of Scotland and Rockall)

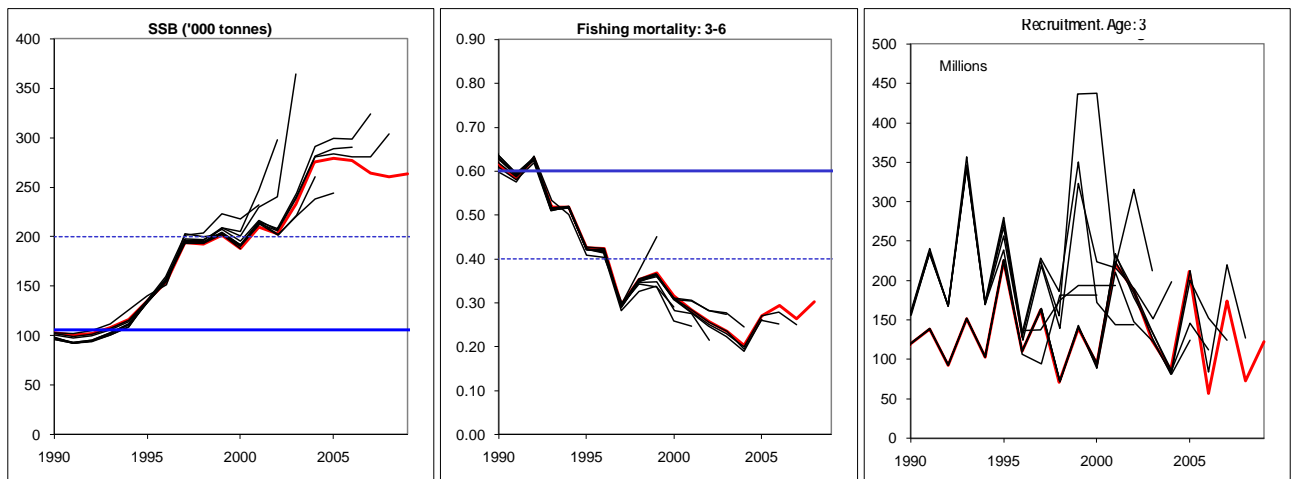


Figure 6.4.124 Saithe in Subareas IV and VI, and Division IIIa. Historical performance of the assessments. Note: recruitment age was changed from 1 to 3 in 2004.

Table 6.4.12.1 Saithe in Subarea IV, Division IIIa (Skaerrak), and Subarea VI. Landings in tonnes.

Saithe IV and IIIa										
Country	1999	2000	2001	2002	2003	2004*	2005*	2006	2007*	2008*
Belgium	200	122	24	107	45	22	28	16	18	7
Denmark	4494	3529	3575	5668	6954	7991	7498	7471	5458	8069
Faroe Islands	1101	-	289	872	495	558	184	62	15	108
France	24305 ^{1*}	19200	20472	25441	18001	13628	10768	15739	13043	15302
Germany	10481	9273	9479	10999	8956	9589	12401	14390	12790	14141
Greenland	-	601 ^{2*}	1526 ^{2*}	62	1616	403	-	-	-	-
Ireland	-	1	-	-	-	1	-	0	-	81
Netherlands	7	11	20	6	1*	3	40	28	5	3
Norway	56150	43665	44397	60013	61735	62783	67365	61268	45395	62055
Poland	862	747	727	752	734*	0	1100	-	-	1407
Russia	-	67	-	-	-	-	35	2	5	5
Sweden	1929	1468	1627	1863	1876	2249	2114	1695	1380	1639
UK (E/W/NI)	2874	1227	1186	2521	1215	457	1190	9129**	9628**	11701**
UK (Scotland)	5420	5484	5219	6596	5829	5924	7703			
Total reported	107823	85395	88541	114900	107467	103608	110575	109800	87377	114517
Unallocated	-509	2281	1030	1291	-5809	-3646	968	7312	6241	-2263
W.G. Estimate	107314	87676	89571	116191	101658	99962	111543	117112	93618	112254
TAC	110000	85000	87000	135000	165000	190000	145000	123250	123250	135900

*Preliminary, ¹reported by TAC area, IIa(EC), IIIa-d(EC) and IV, ²Preliminary data reported in IVa

**Scotland+E/W/NI combined

Saithe VI

Country	1999	2000	2001	2002	2003	2004*	2005*	2006	2007*
Faroe Islands	2	-	-	-	2	34	21	76	32
France	3467 ^{1*}	3310	5157	3062	3499	3053	3452	5782	3956
Germany	250	305	466	467	54	4	373	532	580
Ireland	320	410	399	91	170	95	168	243	322
Netherlands	-	-	-	-	-	-	-	-	-
Norway	126	58	31	12	28	16	20	28	377
Russia	3	25	1	1	6	6	25	7	2
Spain	23	3	15	4	6	2	3	-	-
UK (E/W/NI)	503	276	273	307	263	37	203	2748**	1419**
UK (Scotland)	2084	2463	2246	1567	1189	1563	4433		
Total reported	6778	6850	8588	5513	5215	4810	8699	9416	6688
Unallocated	564	-960	-1770	-327	35	-296	-2960	848	98
W.G. Estimate	7342	5890	6818	5186	5250	4514	5739	8568	6786
TAC	7500	7000	9000	14000	17119	20000	15044	12787	12787

*Preliminary, ¹reported by TAC area, IIa(EC), IIIa-d(EC) and IV

**Scotland+E/W/NI combined

SAITHE IV, IIIa and VI

	1999	2000	2001	2002	2003	2004	2005	2006	2007
WG estimate	114656	93566	96389	121377	106908	104476	117282	125680	100404
TAC	117500	92000	96000	149000	182119	210000	160044	136037	136037

Table 6.4.12.2 Saithe in Subarea IV, Division IIIa (Skagerrak), and Subarea VI. Summary of stock assessment.

Year	Recruitment Age 3 thousands	SSB tonnes	Landings tonnes	Mean F Ages 3-6
1967	127456	150838	88326	0.322
1968	114114	211723	113751	0.292
1969	300688	263959	130588	0.262
1970	291835	312007	234962	0.408
1971	327931	429569	265381	0.329
1972	171372	474093	261877	0.395
1973	152852	534485	242499	0.416
1974	148740	554906	298351	0.556
1975	181239	472066	271584	0.482
1976	384110	351532	343967	0.760
1977	118014	263121	216395	0.615
1978	92451	268089	155141	0.477
1979	77643	241049	128360	0.396
1980	67133	235143	131908	0.443
1981	172784	241188	132278	0.306
1982	109900	210413	174351	0.469
1983	118183	214208	180044	0.548
1984	205166	176557	200834	0.678
1985	311635	160711	220869	0.716
1986	287798	151680	198596	0.822
1987	112969	153043	167514	0.651
1988	115054	148010	135172	0.630
1989	77604	114932	108877	0.687
1990	119906	102875	103800	0.611
1991	138452	100562	108048	0.583
1992	92781	102305	99742	0.628
1993	151493	108043	111491	0.517
1994	102360	116568	109622	0.518
1995	224246	134909	121810	0.425
1996	110295	154066	114997	0.423
1997	162820	193789	107327	0.296
1998	71182	192533	106123	0.353
1999	139349	201499	110716	0.368
2000	94158	187822	91322	0.316
2001	221180	209592	95042	0.284
2002	186590	202663	115395	0.256
2003	123594	232871	105569	0.235
2004	86544	275550	104237	0.203
2005	211248	279259	124532	0.270
2006	56975	276982	125680	0.293
2007	173990	264365	101202	0.264
2008	72416	260586	119305	0.303
2009	122000*	263377		
Average	156471	237059	154228	0.448

*GM(1988-2006)

Annex 6.4.12 Management plan

In 2008 EU and Norway renewed the existing agreement on “a long-term plan for the saithe stock in the Skagerrak, the North Sea and west of Scotland, which is consistent with a precautionary approach and designed to provide for sustainable fisheries and high yields. The plan shall consist of the following elements.

1. Every effort shall be made to maintain a minimum level of Spawning Stock Biomass (SSB) greater than 106,000 tonnes (B_{lim}).
2. Where the SSB is estimated to be above 200,000 tonnes the Parties agreed to restrict their fishing on the basis of a TAC consistent with a fishing mortality rate of no more than 0.30 for appropriate age groups.
3. Where the SSB is estimated to be below 200,000 tonnes but above 106,000 tonnes, the TAC shall not exceed a level which, on the basis of a scientific evaluation by ICES, will result in a fishing mortality rate equal to $0.30 - 0.20 * (200,000 - SSB) / 94,000$.
4. Where the SSB is estimated by the ICES to be below the minimum level of SSB of 106,000 tonnes the TAC shall be set at a level corresponding to a fishing mortality rate of no more than 0.1.
5. Where the rules in paragraphs 2 and 3 would lead to a TAC which deviates by more than 15 % from the TAC of the preceding year the Parties shall fix a TAC that is no more than 15 % greater or 15 % less than the TAC of the preceding year.
6. Notwithstanding paragraph 5 the Parties may where considered appropriate reduce the TAC by more than 15 % compared to the TAC of the preceding year.
7. A review of this arrangement shall take place no later than 31 December 2012.
8. This arrangement enters into force on 1 January 2009.”