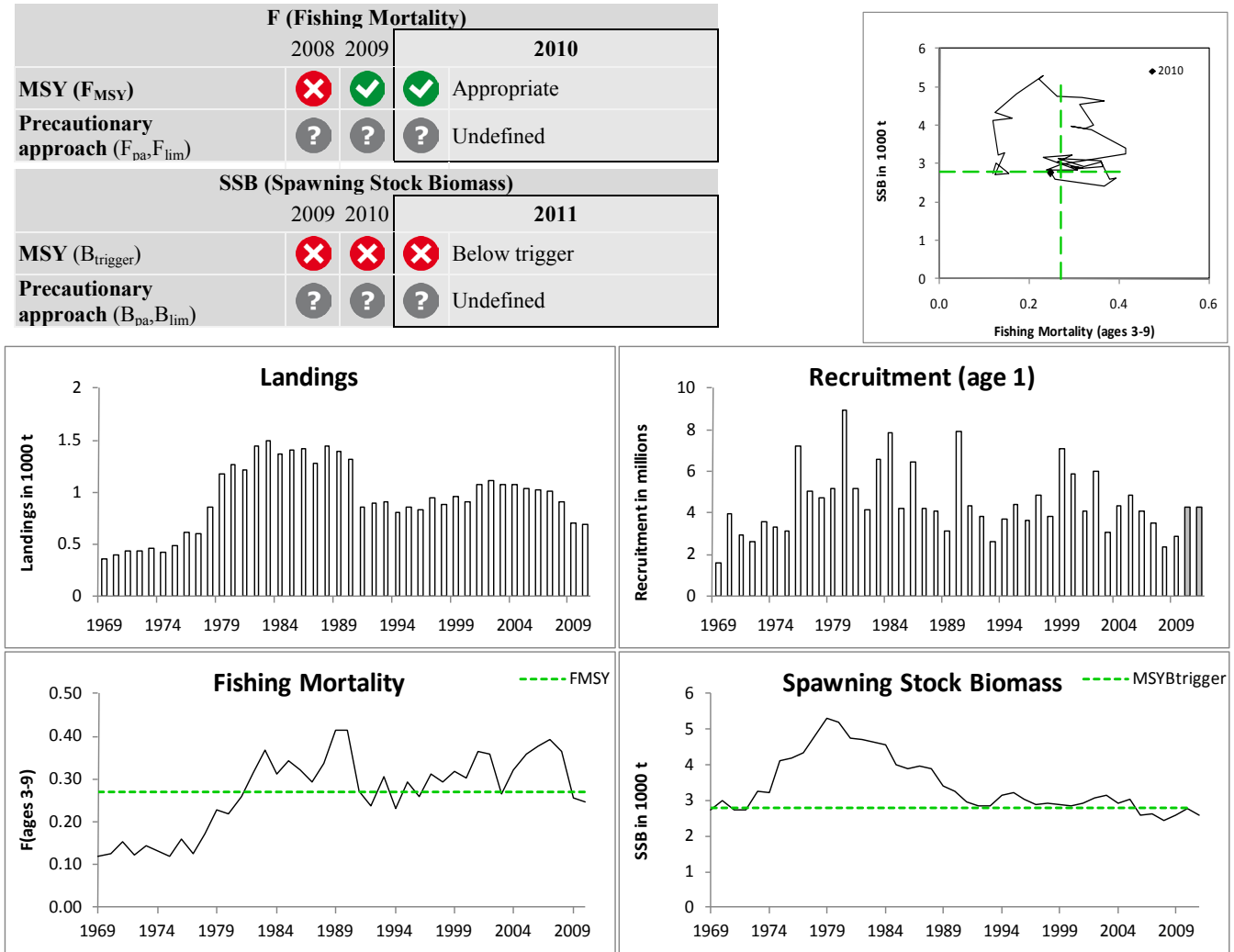


**ECOREGION** Celtic Sea and West of Scotland  
**STOCK** Sole in Division VIIe (Western Channel)

**Advice for 2012**

ICES advises on the basis of the MSY framework that landings in 2012 should be less than 740 t.

**Stock status**



**Figure 5.4.14.1** Sole in Division VIIe (Western Channel). Summary of stock assessment. Estimates are shaded. Top right: SSB and F over the years.

The significant reduction of F in 2009 reflects the reduction in fishing effort. SSB is around the lowest observed values in the time series. Recruitment has been fluctuating without trend.

**Management plans**

Council Regulation ([EC. No. 509/2007](#)) establishes a multi-annual plan for the sustainable exploitation of Division VIIe sole. This results in a TAC of 777 t in 2012. This plan has not been evaluated by ICES.

## The fisheries

The principal gears used for this stock are beam trawls, otter trawls, and gillnets. Sole is the target species of an offshore beam trawl fleet, which is concentrated off the south Cornish and Devon coast. This fishery also takes substantial catches of plaice, anglerfish, lemon sole, and cuttlefish. Otter trawlers and gillnetters take sole mainly as a bycatch fishery, and a targeted fishery at spawning time. Discarding of sole is considered small.

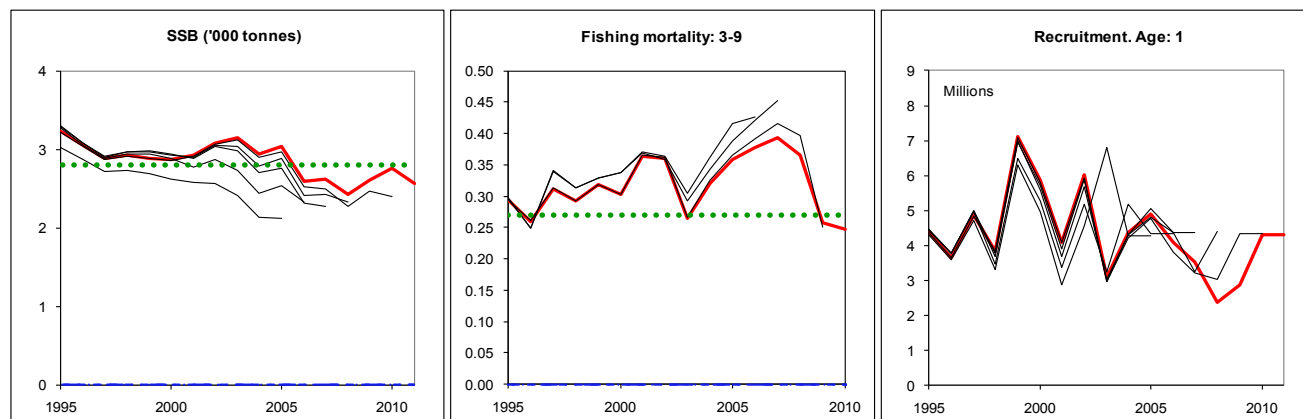
<b>Catch by fleet</b>	Landings in 2010 were 688 t (52% beam, 16% otter, 8% gillnets, 3% dredge, 21% other (mostly caught by the above gears, but not available separately by all countries))
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## Effects of the fisheries on the ecosystem

Beam trawling, especially using chain-mat gear, is known to have a significant impact on the benthic communities, although less so on soft substrates. Discard rates of non-commercial species and commercial species of unmarketable size are substantial. Some beam trawlers are experimenting with benthic drop-out panels that release about 75% of benthic invertebrates from the catches. Full square mesh codends are being tested in order to reduce the capture of benthos further and improve the selection profile of gadoids.

## Quality considerations

Key uncertainties with regards to the data quality / assessment quality of this stock are the uncertainty regarding the degree of mixing between this and adjacent stocks, particularly with regards to recruitments, and the fact that the survey covers only part of the stock. The 2009 yearclass was estimated to be strong by the assessment, but has been replaced in the assessment with  $GM_{69-08}$  due to uncertainties. This precautionary outlook is to some degree balanced by a likely underestimate of  $F_{sq}$  for 2011 which is the rescaled  $F_{2010}$  as neither  $F_{08-10}$  nor a TAC constraint could be scientifically supported.



**Figure 5.4.14.2** Sole in Division VIIe (Western Channel). Historical assessment results (final year recruitment estimate has been replaced by the  $GM_{69-08}$ ). Note that the age range for F changed from 3–7 to 3–9 in 2009.

## Scientific basis

<b>Assessment type</b>	Age based analytical assessment (XSA)
<b>Input data</b>	Commercial catch-at-age data, 1 survey index (UK-WEC-BTS) 2 current commercial tuning fleets (UK-CBT and UK-COT), 2 historic commercial tuning fleets prior to 1987 (UK-inshore and UK offshore)
<b>Discards and bycatch</b>	Not relevant (low discards) to the assessment
<b>Indicators</b>	Western Channel Sole and Plaice FSP survey
<b>Other information</b>	WKFLAT (ICES, 2009) rejected the assessment because of a retrospective pattern and removed the precautionary reference points. The assessment was accepted again in 2010 since the retrospective pattern was no longer apparent.
<b>Working group report</b>	<a href="#">WGCSE</a>

**ECOREGION** Celtic Sea and West of Scotland  
**STOCK** Sole in Division VIIe (Western Channel)

**Reference points**

	Type	Value	Technical basis
MSY Approach	MSY $B_{trigger}$	2800 t	Provisional based on former $B_{pa}$
	$F_{MSY}$	0.27	Provisionally based on STECF management plan impact assessment SG-MOS-1006 (Part C)
Precautionary approach	$B_{lim}$	Not defined	
	$B_{pa}$	Not defined	
	$F_{lim}$	Not defined	
	$F_{pa}$	Not defined	

(unchanged since: 2010)

*Yield and spawning biomass per Recruit F-reference points (2011):*

	Fish Mort Ages 3-9	Yield/R	SSB/R
Average last 3 years	0.29	0.22	0.72
$F_{max}^*$	-	-	-
$F_{0.1}$	0.11	0.20	1.63
$F_{med}$	0.28	0.22	0.76

\*  $F_{max}$  not well defined

**Outlook for 2012**

Basis:  $F(2011) = F_{sq} = F_{08-10}$  (rescaled to  $F_{2010}$ ) = 0.247;  $SSB(2012) = 2650$ ;  $R(2011) = GM_{69-08} = 4301$  thousand; landings (2011) = 670.

Rationale	Landings (2012)	Basis	F (2012)	SSB (2013)	%SSB change <sup>1)</sup>	% TAC change <sup>2)</sup>
MSY framework	740	$F_{MSY} * (SSB_{2012}/MSY B_{trigger})$ (= $F_{sq} * 1.03$ )	0.26	2810	+6	+4
$F_{MSY}$	780	$F_{MSY} (= F_{sq} * 1.09)$	0.27	2770	+5	+9
Management plan	777	$F_{MP} (= F_{MSY})$	0.27	2770	+5	+9
Zero catch	0	0	0.00	3520	+33	-100
Status quo	380	$F_{sq} * 0.5$	0.12	3150	+19	-46
	450	$F_{sq} * 0.6$	0.15	3090	+16	-36
	520	$F_{sq} * 0.7$	0.17	3020	+14	-27
	590	$eF_{sq} * 0.8$	0.20	2950	+12	-17
	605	TAC - 15% ( $F_{sq} * 0.83$ )	0.204	2940	+11	-15
	650	$F_{sq} * 0.9$	0.22	2890	+9	-8
	710	TAC <sub>sq</sub> ( $F_{sq} * 0.99$ )	0.244	2840	+7	0
	720	$F_{sq}$	0.25	2830	+7	+1
	817	TAC + 15% ( $F_{sq} * 1.16$ )	0.286	2730	+3	+15

Weights in tonnes.

<sup>1)</sup> SSB 2013 relative to SSB 2012.

<sup>2)</sup> Landings 2012 relative to TAC 2011.

**Management plan**

Council Regulation (EC) No. 509/2007 establishes a multi-annual plan for the sustainable exploitation of Division VIIe sole. Years 2007–2009 were deemed a recovery plan, with subsequent years being deemed a management plan. For 2010, 2011, and 2012 the TAC shall be set at the highest value resulting from either a 15% reduction in F compared to average F (2007–2009) or an F of 0.27, with a maximum TAC variation of no more than 15%.

Following the agreed management plan implies an F for 2011 of 0.27 ( $F_{MP}$ , the management plan long-term target), suggesting a TAC of 777 t in 2012 which is less than the 15% TAC increase cap in the plan. This is expected to lead to a SSB increase of 5% in 2013. This plan has not been evaluated by ICES.

### ***MSY approach***

Following the ICES MSY framework implies fishing mortality to be at 0.26 (6% lower than  $F_{MSY}$  because SSB is 6% below MSY  $B_{trigger}$ ). This implies landings of less than 740 t in 2012.

### **Additional considerations**

#### *Management considerations*

Sole are widespread and usually taken in conjunction with other species to varying degrees, dependent on location and season. Fisheries with beam trawls can target sole, anglerfish and cuttlefish depending on season and vessel size. The most productive sole fishery grounds are located close to ports, while the highest catches of anglerfish for example are taken further south and west in Division VIIe. Therefore, effort restrictions and/or high fuel costs will have a tendency to increase F in sole and reduce F in anglerfish. Area-misreported landings between Divisions VIId and VIIe have been a problem in the past, but the problem has largely been eliminated in recent years.

#### *Regulations and their effects*

In addition to the days-at-sea regulations there has been a recent UK decommissioning scheme that has reduced the number of beam trawlers in the southwest fleet. Fishing mortalities from 2009 onwards are estimated to have declined which is consistent with the decline in effort in the main fleet exploiting this stock.

Management of this stock is mainly by TAC, which has largely been ineffective at regulating the fishery prior to 2009. In 2005 effort restrictions were implemented for beam trawlers in this fishery in order to enforce the TAC and improve data quality. These restrictions were not been limiting this fishery despite a decommissioning scheme, in part due to the large numbers of days available, but also because in the UK fleet there appears to be some latent effort / over capacity in the beam trawl fleet. Since November 2008 the UK has been enforcing a single area licensing scheme which has been highly effective in reducing UK catches.

Technical measures applied to this stock include a minimum landing size (24 cm) and minimum mesh size of 80 mm for beam trawlers. Local regulations restricting certain gear and vessel types are also in place.

Discarding in the towed gears using 80mm mesh sizes, which are responsible for the large majority of the landings, is very small (<5% by number) by number and small (5-10%) for the much smaller gillnet fishery. Other spatially or temporally restricted métiers show higher values of discarding (10-40% averaged over years) have very limited effort and hence contribute only a very small percentage to the landings (<5%). The gears used to target sole are highly selective for fish above the minimum landing size, and only a few sporadic cases of high-grading (included in the numbers above) have been observed.

#### *Information from the fishing industry*

The fisheries science partnership, conducted cooperatively between CEFAS and the UK industry has provided evidence for the wide dispersal and broad age distribution for this stock.

#### *Comparison with previous assessment and advice*

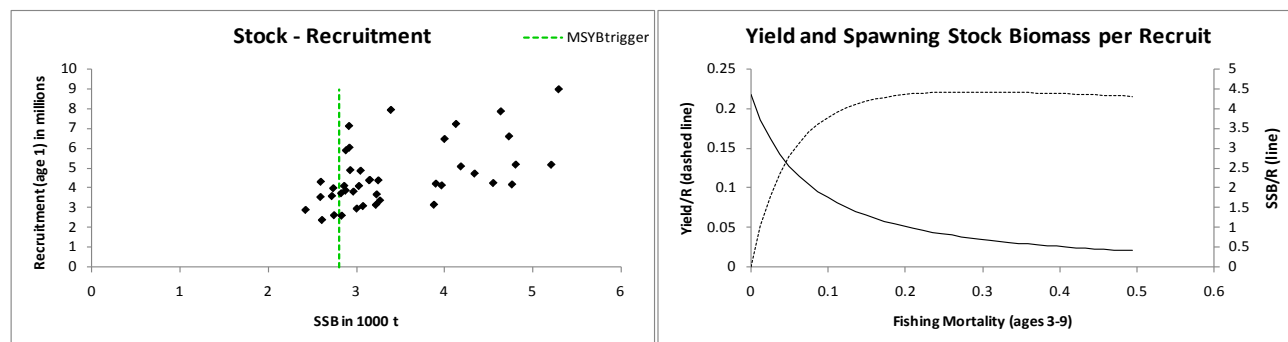
The  $F_{2009}$  is revised up by 2% and  $SSB_{2010}$  is revised up by 15% compared to last years assessment. These revisions are partly influenced by a 12% upward revision of the 2009 catch.

The basis for the advice this year is the same as last year and was based on the MSY framework.

## Sources

ICES. 2011. Report of the Working Group on the Celtic Seas Ecoregion (WGCSE), 11–19 May 2011, Copenhagen, Denmark. ICES CM 2010/ACOM:12.

ICES. 2009. Report of the Benchmark and Data Compilation Workshop for Flatfish (WKFLAT 2009), 6–13 February 2009, Copenhagen, Denmark. ICES CM 2009/ACOM:31.



**Figure 5.4.14.1** Sole in Division VIIe (Western Channel). Yield per recruit analysis and stock–recruitment plot.

**Table 5.4.14.1** Sole in Division VIIe (Western Channel). Advice, management, and landings.

Year	ICES Advice	Predicted catch corresp. to advice	Agreed TAC	Official landings	ICES Landings
1987	No increase in F	1.15	1.15	1.11	1.28
1988	No decrease in SSB; TAC	1.3	1.3	0.95	1.44
1989	No decrease in SSB; TAC	1	1	0.8	1.39
1990	SSB = 3000 t; TAC	0.9	0.9	0.75	1.31
1991	TAC	0.54	0.8	0.84	0.85
1992	70% of F(90)	0.77	0.8	0.77	0.89
1993	35% reduction in F	0.7	0.9	0.79	0.9
1994	No increase in F	1	1	0.84	0.8
1995	No increase in F	0.86	0.95	0.88	0.86
1996	F <sub>96</sub> < F <sub>94</sub>	0.68	0.7	0.74	0.83
1997	No increase in F	0.69	0.75	0.86	0.95
1998	No increase in F	0.67	0.67	0.77	0.88
1999	Reduce F below F <sub>pa</sub>	0.67	0.7	0.66	0.96
2000	Reduce F below F <sub>pa</sub>	< 0.64	0.64	0.66	0.92 <sup>1</sup>
2001	Reduce F below F <sub>pa</sub>	< 0.58	0.6	0.65	1.07
2002	Reduce F below F <sub>pa</sub>	< 0.45	0.53	0.54	1.11
2003	Rebuilding plan or F=0	-	0.39	0.62	1.08
2004	F=0 or recovery plan 1	0	0.3	0.49	1.08
2005	80% reduction in F or recovery plan	< 0.23	0.865	0.96	1.04
2006	80% reduction in F or recovery plan	< 0.24	0.94	0.97	1.02
2007	68% reduction in F or recovery plan	< 0.35	0.9	0.82	1.02
2008	75% reduction in F	< 0.26	0.765	0.67	0.91
2009	70% reduction in F	< 0.32	0.65	0.64 <sup>1</sup>	0.70 <sup>1</sup>
2010	Reduce fishing effort and catches	-	0.62	0.74 <sup>2</sup>	0.68 <sup>2</sup>
2011	MSY framework	< 0.66	0.71		
2012	MSY framework	< 0.74			

Weights in '000 t.

<sup>1)</sup> Revisions by WGCSE 2011.

<sup>2)</sup> Preliminary.

**Table 5.4.14.2** Sole in Division VIIe (Western Channel). Landings (in tonnes) as used by ICES. 2010 landings are preliminary.

Year	Belgium	Denmark	France	Netherlands	Ireland	Jersey	Guernsey	UK-E+W+Ni	UK-other	Unallocated	Total
1974			323							104	427
1975	3		271				2	215	2	0	491
1976	4		352				1	259	1	0	616
1977	3		331					272		0	606
1978	4		384					453		20	861
1979	1		515				2	663	2	0	1181
1980	45		447		13		1	763	1	0	1269
1981	16		415	1			4	784	4	-5	1215
1982	98		321				15	1013	15	-1	1446
1983	47		405	3		2	16	1025	18	0	1498
1984	48		421			9	14	878	23	0	1370
1985	58		130			9	8	894	17	310	1409
1986	62		467			3	6	831	9	50	1419
1987	48		432			1	5	626	6	168	1280
1988	67		98			0.5	4	780	4	495	1444
1989	69		112	6			3	610	3	590	1390
1990	41	0.5	81			1	3	632	4	556.5	1315
1991	35		325					477		15	852
1992	41		267				2	457	11	119	895
1993	59		236			1		479	19	111	904
1994	33		257					546	2	-38	800
1995	21		294			1	2	562	3	-24	856
1996	8		297					428	9	91	833
1997	13		348		1	13	13	470	26	91	949
1998	40		343			17	3	369	20	108	880
1999	13					18	3	375	21	548	957
2000	4		241			22	5	386	27	256	914
2001	19		224			20	5	382	25	419	1069
2002	33		198			15	5	289	20	566	1106
2003	1		363		1	15	5	235	20	458	1078
2004	7		302			7	6	172	13	581	1075
2005	26		406			17	5	505	22	80	1039
2006	32		357			4	4	568	8	57	1022
2007	34		383		2	2		525	5	69	1015
2008	28		183		0.3	2	6	463	8	230	908
2009	17		285			1	3	354	8	37	701
2010	17		359			1.5		362	1.5	-51.5	688

Table 5.4.14.2

Sole in Division VIIe (Western Channel). Assessment summary table.

Year	Recruitment Age 1 thousands	SSB tonnes	Landings tonnes	Mean F Ages 3-9
1969	1610	2742	353	0.119
1970	3976	3008	391	0.126
1971	2955	2751	432	0.154
1972	2619	2726	437	0.122
1973	3580	3270	459	0.144
1974	3357	3225	427	0.131
1975	3143	4131	491	0.118
1976	7206	4186	616	0.160
1977	5072	4341	606	0.124
1978	4714	4807	861	0.171
1979	5164	5293	1181	0.229
1980	8948	5209	1269	0.220
1981	5157	4765	1215	0.260
1982	4165	4731	1446	0.316
1983	6581	4638	1498	0.367
1984	7838	4552	1370	0.312
1985	4237	4001	1409	0.343
1986	6451	3903	1419	0.322
1987	4208	3969	1280	0.293
1988	4118	3881	1444	0.337
1989	3148	3394	1390	0.413
1990	7912	3252	1315	0.413
1991	4371	2970	852	0.270
1992	3806	2837	895	0.238
1993	2598	2832	904	0.307
1994	3723	3156	800	0.230
1995	4390	3233	856	0.294
1996	3666	3051	833	0.260
1997	4856	2881	949	0.312
1998	3854	2920	880	0.292
1999	7102	2886	957	0.318
2000	5881	2865	914	0.302
2001	4093	2924	1069	0.364
2002	6015	3078	1106	0.360
2003	3079	3149	1078	0.264
2004	4377	2934	1075	0.321
2005	4885	3032	1039	0.358
2006	4088	2597	1023	0.377
2007	3534	2614	1015	0.393
2008	2379	2428	908	0.366
2009	2886	2600	701	0.257
2010	4301 <sup>a)</sup>	2760	688	0.247
2011	4301 <sup>b)</sup>	2571		
Average	4520	3421	949	0.270

<sup>a)</sup> 2010 recruitment value from the XSA (8060) replaced by Geometric Mean <sub>(69-08)</sub>

<sup>b)</sup> Geometric Mean <sub>(69-08)</sub>