

6.3.41 Sandeel (*Ammodytes* spp.) in Divisions IVb and IVc, SA 1 (Central and South North Sea, Dogger Bank)

ICES stock advice

ICES advises that when the MSY approach is applied, catches in 2015 should be no more than 133 000 t to maintain SSB in 2016 above MSY $B_{escapement}$.

Stock development over time

The stock in sandeel area 1 (SA 1) was below the lower biomass limit (B_{lim}) in 2014 and is estimated to be below the precautionary biomass level ($B_{pa} = MSY B_{escapement}$) in 2015. Recruitment in 2014 was average.

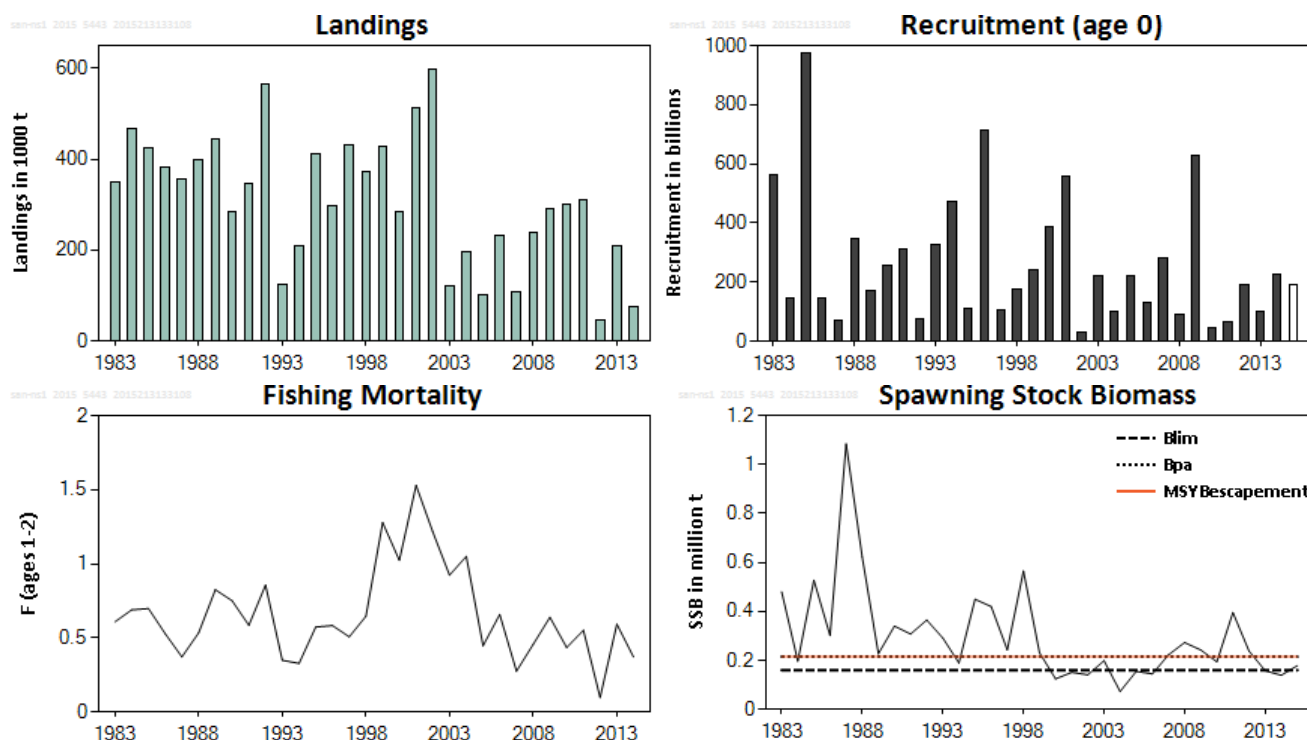


Figure 6.3.41.1 Sandeel in the Dogger Bank area (SA 1). Historical development of the stock from the summary of the stock assessment. Predicted values are not shaded.

Stock and exploitation status

Table 6.3.41.1 Sandeel in the Dogger Bank area (SA 1). State of the stock and fishery, relative to reference points.

		Fishing pressure			Stock size		
		2012	2013	2014	2013	2014	2015
Maximum Sustainable Yield	F_{MSY}	?	?	?	MSY	?	?
Precautionary approach	F_{pa}, F_{lim}	?	?	?	$B_{escapement}$	✗	✗
Management plan	F_{MGT}	?	?	?	B_{pa}, B_{lim}	✗	✗
					SSB_{MGT}	?	?
							✗ Below escapement
							○ Increased risk
							?
							?

Catch options

Table 6.3.41.2 Sandeel in the Dogger Bank area (SA 1). The basis for the catch options.

Variable	Value	Source	Notes
F (2014)	0.31	ICES, 2015a	Sum of half-yearly Fs
R (2014)	229 billion	ICES, 2015a	
R (2015)	193 billion	ICES, 2015a	Geometric mean (1983–2013)
SSB (2015)	179 kt	ICES, 2015a	

Table 6.3.41.3 Sandeel in the Dogger Bank area (SA 1). Annual catch options. All weights are in thousand tonnes.

Rationale	Catches (2015)	Basis	F (2015)	SSB (2016)	%SSB change*	%TAC change**
MSY approach	133	$SSB_{2016} = MSY B_{\text{escapement}}$	0.35	215	20%	133%
Zero catch	0	$F = 0$	0	291	63%	-100%
Other options	32	$F_{2014} \times 0.25$	0.08	272	52%	-44%
	63	$F_{2014} \times 0.5$	0.15	255	42%	11%
	91	$F_{2014} \times 0.75$	0.23	238	33%	60%
	118	$F_{2014} \times 1$	0.31	223	25%	107%
	144	$F_{2014} \times 1.25$	0.38	209	17%	153%
	167	$F_{2014} \times 1.5$	0.46	196	9%	193%

* SSB 2016 relative to SSB 2015.

** Catch option for 2015 relative to TAC in 2014 (57 kt).

Basis of the advice

Table 6.3.41.4 Sandeel in the Dogger Bank area (SA 1). The basis of the advice.

Advice basis	MSY approach (Escapement strategy)
Management plan	There is no management plan for sandeel in this area.

Quality of the assessment

The quality of the assessment is considered to be good. The assessment relies on the assumption that the age selectivity of the fishery has remained the same since 1999 and that the commercial fishery supplies sufficient sampling information on older age groups which are not caught representatively in the survey. Observed changes in fleet structure during the last decade may have changed the fishing selection pattern to some extent. The assessment is considered to be robust to moderate changes in the selection pattern.

The preliminary catches in 2013 reported to ICES for the 2014 assessment were 14% lower than the subsequently reported catches, leading to a substantial upwards adjustment of F in 2013 and downwards adjustment of SSB at the beginning of 2014 in this year's assessment (Figure 6.3.41.2).

The assessment is considered to be more uncertain this year due to area misreporting in 2014. An examination of the spatial distribution of reported catches, fishing days, and VMS data indicated that there was likely to have been substantial misreporting of catches taken in SA 1, but reported to SA 3. ICES has reallocated from SA 3 to SA 1 a total of 44 000 t associated with obvious misreporting.

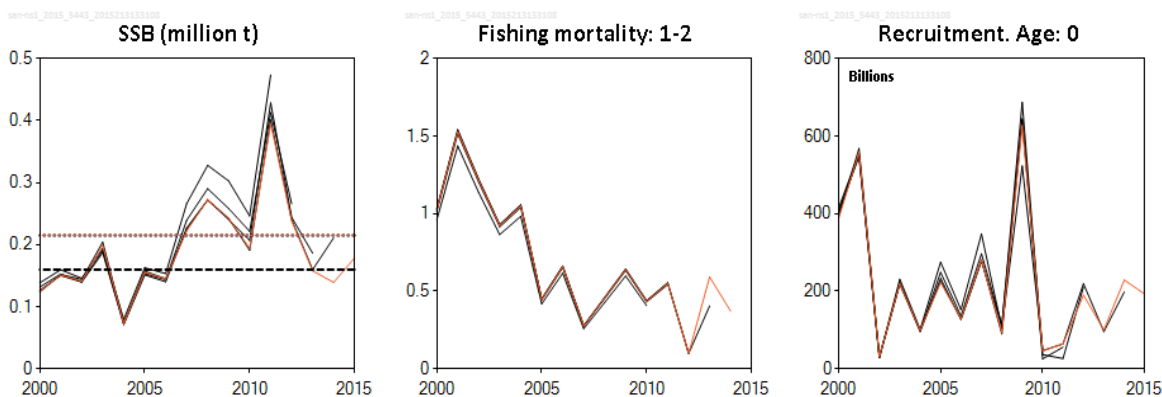


Figure 6.3.41.2 Sandeel in the Dogger Bank area (SA 1). Historical assessment results (final-year recruitment estimates included).

Issues relevant for the advice

The catches from SA 1 in 2014 were revised based on information from VMS and previous catch distributions to account for substantial area misreporting of catches taken in SA 1, but reported to SA 3. Management measures should be taken to avoid similar misreporting in the future.

With the average recruitment estimated for 2014, the escapement strategy results in $F = 0.35$ in 2015. This is well below the long-term average F and does not suggest a high risk of overfishing. Additional precautionary measures, such as an F_{cap} , are not necessary.

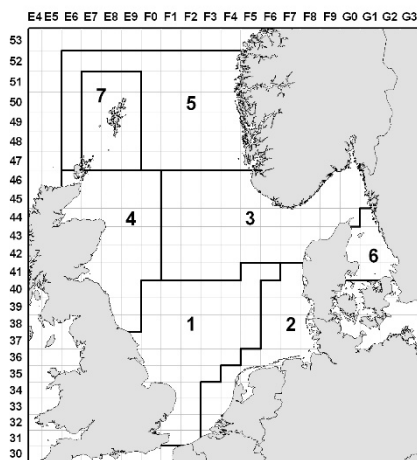


Figure 6.3.41.3 Sandeel in the Dogger Bank area (SA 1). Sandeel are largely sedentary after settlement and form a complex of local (sub-) stocks in the North Sea. To avoid local depletion, ICES advice for sandeel is provided separately for seven areas in Division IIIa and Subarea IV. Advice for sandeel in the Dogger Bank area (SA 1) specifically applies to sandeel in rectangles 31–34 E9–F2; 35 E9–F3; 36 E9–F4; 37 E9–F5; 38–40 F0–F5; and 41 F5–F6.

Reference points

Table 6.3.41.5 Sandeel in the Dogger Bank area (SA 1). Reference points, values, and their technical basis.

Framework	Reference point	Value	Technical basis	Source
MSY approach	MSY	215 000 t	= B_{pa}	ICES, 2010
	$B_{escapement}$			
	F_{MSY}	Not defined.		
Precautionary approach	B_{lim}	160 000 t	Median SSB in the years 2000–2006 of lowest SSB and no impaired recruitment.	ICES, 2010
	B_{pa}	215 000 t	$B_{pa} = B_{lim} \times \exp(\sigma \times 1.645)$, with $\sigma = 0.18$ estimated from assessment uncertainty in the terminal year.	ICES, 2010
	F_{lim}	Not defined.		
	F_{pa}	Not defined.		
Management plan	SSB_{MGT}	Not defined.		
	F_{MGT}	Not defined.		

Basis of the assessment

Table 6.3.41.6 Sandeel in the Dogger Bank area (SA 1). The basis of the assessment and advice.

ICES stock data category	1 (see ICES, 2015b).
Assessment type	Seasonal age-based analytical (SMS-effort) (ICES, 2015a).
Input data	One survey index in December (dredge survey since 2004). Total international catch and fishing effort. Annual maturity data from the dredge survey. Natural mortality estimated from multispecies assessment (assumed constant over time). Age and length frequencies from catch sampling.
Discards and bycatch	Discarding is considered to be negligible.
Indicators	None.
Other information	Last benchmark in 2010 (ICES, 2010).
Working group	Herring Assessment Working Group (HAWG).

Information from stakeholders

Fishing industry representatives indicated that area misreporting occurred in 2014 and was in the order of magnitude as estimated by ICES. They reported that in 2014 the management system operated with individual vessel quotas by sandeel area (SA), which created the incentive and opportunity for misreporting through allocating small shares to vessels in the low TAC areas.

History of the advice, catch, and management

Table 6.3.41.7 Sandeel in the Dogger Bank area (SA 1). History of ICES advice, the agreed TAC, and ICES estimates of catch. All weights are in thousand tonnes.

Year	ICES advice	Catch corresponding to advice	TAC	ICES catch SA 1	Total ICES catch (SAs 1–7)
2005 *	Exploitation to be kept below the level of 2003. Adjustment to be made conditional on the abundance of the 2004 year class.	-	661 **	104	177
2006 *	The fishery should remain closed until information is available which assures that the stock can be rebuilt to B_{pa} by 2007.	-	300 **	238	293
2007 *	The fishery should remain closed until information is available which assures that the stock can be rebuilt to B_{pa} by 2008.	-	173 **	109	230
2008 *	The fishery should only be allowed if monitoring information is available and shows that the stock can be rebuilt to B_{pa} by 2009.	-	375 **	239	348
2009 *	The fishery should only be allowed if monitoring information is available and shows that the stock can be rebuilt to B_{pa} by 2010.	-	377 **	309	353
2010 *	The fishery should only be allowed if monitoring information is available and shows that the stock can be rebuilt to B_{pa} by 2011.	-	377 **	301	414
2011	MSY approach: allow for sufficient stock ($MSY B_{escapement}$) to remain for successful recruitment.	< 320	320	312	438
2012	MSY approach: allow for sufficient stock ($MSY B_{escapement}$) to remain for successful recruitment.	< 23	23	46	102
2013	MSY approach: allow for sufficient stock ($MSY B_{escapement}$) to remain for successful recruitment.	< 224.544	225	210	278
2014	MSY approach: allow for sufficient stock ($MSY B_{escapement}$) to remain for successful recruitment.	< 57	57	96 ***	262 ***
2015	MSY approach: allow for sufficient stock ($MSY B_{escapement}$) to remain for successful recruitment.	< 133			

* Advice for Subarea IV, excluding the Shetland area.

** Set for EU waters of Divisions IIa and IIIa and Subarea IV.

*** Preliminary.

History of catch and landings

Table 6.3.41.8 Sandeel in the Dogger Bank area (SA 1). Catch distribution by fleet in 2014 as estimated by ICES.

Total catch (2014)	Landings	Discards
96 kt	100% industrial trawl fisheries	Negligible
	96 kt	

Table 6.3.41.9 Sandeel in the Dogger Bank area (SA 1). History of total ICES estimated catch (tonnes).

Year	Catch (tonnes)
1982	429675
1983	377559
1984	491950
1985	436214
1986	389081
1987	360867
1988	401551
1989	445586
1990	283259
1991	346621
1992	564285
1993	136538
1994	209632
1995	410687
1996	324561
1997	431871
1998	371060
1999	428307
2000	363356
2001	521724
2002	599586
2003	150711
2004	206696
2005	103777
2006	238296
2007	109363
2008	238523
2009	308596
2010	301304
2011	311945
2012	45562
2013	210080
2014	95730

Summary of the assessment

Table 6.3.41.10 Sandeel in the Dogger Bank area (SA 1). Assessment summary with weights (in tonnes), recruits (at age 0, in thousands). The SSB is estimated for 1st of January. Yield values used for the assessment do not include catches of age 0 in the 1st half of the year and, hence, may differ slightly from the ICES catch estimates presented in other tables.

Year	Recruitment Age 0 (thousands)	SSB (tonnes)	Catch (tonnes)	Mean F Ages 1–2
1983	562353000	480314	349232	0.609
1984	148548000	197045	467609	0.689
1985	972353000	527023	424114	0.698
1986	145804000	301174	382735	0.528
1987	73150000	1083510	357671	0.372
1988	348220000	621681	398271	0.534
1989	172062000	227186	445695	0.825
1990	256402000	339874	283040	0.751
1991	312929000	307524	347096	0.585
1992	77823000	364432	564298	0.856
1993	327071000	290834	124082	0.349
1994	470495000	189148	209538	0.328
1995	111001000	449298	410513	0.573
1996	714145000	419711	298702	0.583
1997	105482000	243092	431808	0.507
1998	175692000	564665	371117	0.646
1999	239541000	231090	427691	1.278
2000	386786000	124471	284521	1.024
2001	559020000	151279	513068	1.529
2002	31240000	141090	596049	1.214
2003	219405000	198647	121863	0.923
2004	99359000	72820	195274	1.050
2005	222376000	155409	100835	0.447
2006	129394000	144669	231448	0.658
2007	280982000	222246	108600	0.276
2008	9296100	272757	237447	0.457
2009	627765000	242752	291247	0.639
2010	45959000	194187	300954	0.435
2011	63898000	394970	311542	0.551
2012	190121000	238271	45642	0.098
2013	100134000	157920	209176	0.592
2014	228863000	139141	76077	0.371
2015	192733000 **	178712 *		
Average	265354000	298998	309905	0.656

* Using mean weight-at-age from 2012 to 2014 and proportion mature from December 2014.

** Geometric mean (1983–2013).

Sources and references

ICES. 2010. Report of the Benchmark Workshop on Sandeel (WKSAN), 6–10 September 2010, Copenhagen, Denmark. ICES CM 2010/ACOM:57. 201 pp.

ICES. 2015a. Sandeel in Divisions IIIa and IV. *In* Report of the Herring Assessment Working Group for the Area South of 62°N (HAWG), 10–19 March 2015, ICES HQ, Denmark. ICES CM 2015/ACOM:06.

ICES. 2015b. General context of ICES advice. *In* Report of the ICES Advisory Committee, 2015. ICES Advice 2015, Book 1, Section 1.2.