Sandeel (*Ammodytes* spp.) in divisions 4.a–b and Subdivision 20, Sandeel Area 3r (northern and central North Sea, Skagerrak)

ICES advice on fishing opportunities

ICES advises that when the MSY approach is applied, there should be zero catch in 2024.

ICES non-fisheries conservation considerations

ICES advises that any activity leading to the degradation of sandeel habitat should be avoided.

Stock development over time

Spawning-stock size in 2024 is above MSY $B_{escapement}$, B_{pa}, and B_{lim}. No reference points for fishing pressure have been defined for this stock.

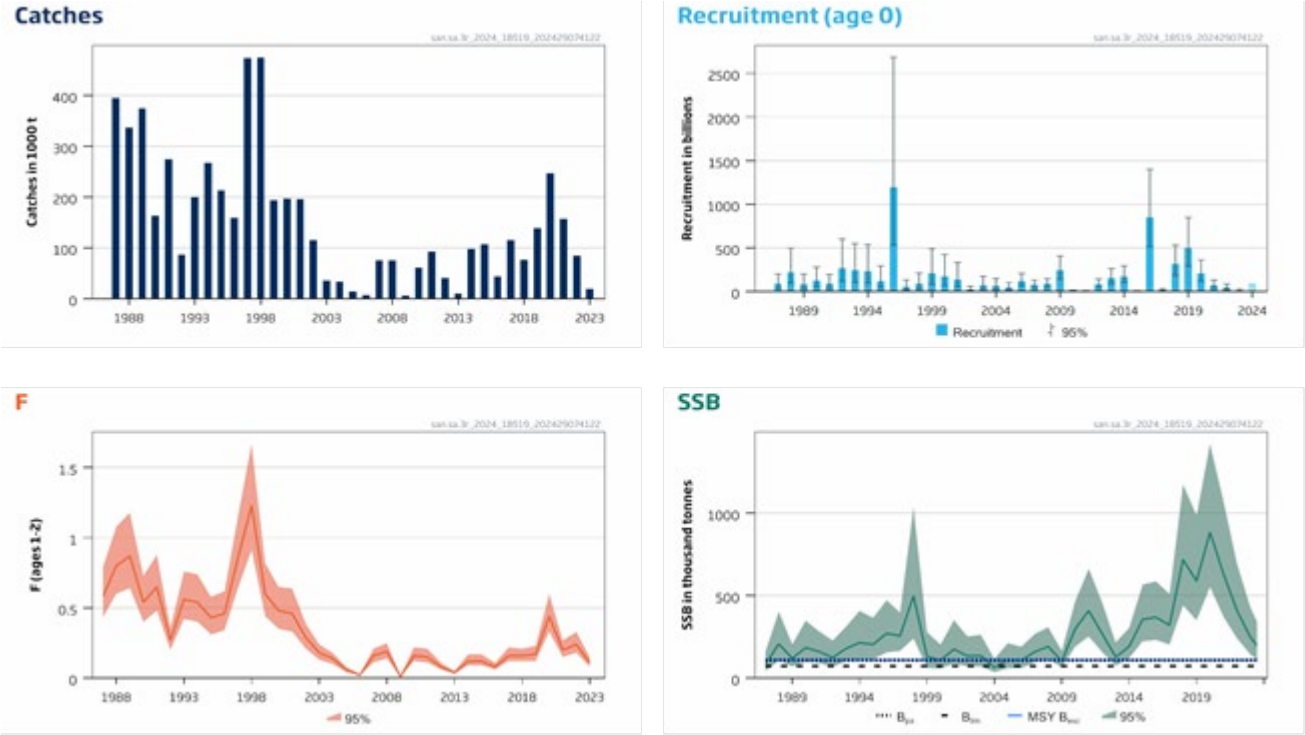

Figure 1 Sandeel in divisions 4.a–b and Subdivision 20, Sandeel Area 3r. Summary of the stock assessment. The assumed recruitment value for 2024 is shaded in a lighter colour.

Conservation status

Ammodytes tobianus is listed on the IUCN Red List as data deficient (Collette *et al*., 2014); however, the dominant species in the catches, *A. marinus*, is not included in the list.[1]

[1] This is for information purposes, and ICES does not formally endorse the methods used by third parties to create lists

Catch scenarios

Table 1 Sandeel in divisions 4.a–b and Subdivision 20, Sandeel Area 3r. Values in the forecast.

Variable	Value	Notes
F (2023)	0.13	Assessment model estimate
Recruitment (2024)	99 870 116	Geometric mean 1987–2022; thousands
SSB (2024)	145 862	Assessment model estimate; tonnes

Table 2 Sandeel in divisions 4.a–b and Subdivision 20, Sandeel Area 3r. Annual catch scenarios. All weights are in tonnes.

Basis	Total catch (2024)	F_{total} (2024)	SSB (2025)	% SSB change*	% TAC change**	% advice change***
ICES advice basis						
$SSB_{2025} \geq MSY\ B_{escapement} = B_{pa}$	0	0	107 627	−26	-100	−100
Other scenarios						
F = 0	0	0	107 627	−26	-100	−100
$SSB_{2025} = B_{lim}$	68 509	0.51	72 713	−50	10	124
$F = F_{2023}$	17 553	0.13	98 555	−32	-72	−43
Monitoring TAC	5000	0.03	105 035	-28	-92	-84

* SSB_{2025} relative to SSB_{2024}.
** Catch scenario for 2024 relative to the TAC in 2023 (62 446 t = the sum of the Norwegian [60 000 t], EU–UK TAC [2446 t]).
*** Advice value 2024 relative to advice value 2023 (30 570 t).

The zero-catch advice is a result of low estimated recruitment and declining SSB.

Basis of the advice

Table 3 Sandeel in divisions 4.a–b and Subdivision 20, Sandeel Area 3r. The basis of the advice for fishing opportunities.

Advice basis	MSY approach (escapement strategy with F_{cap})
Management plan	ICES is not aware of any agreed precautionary management plan for sandeel in this area

Quality of the assessment

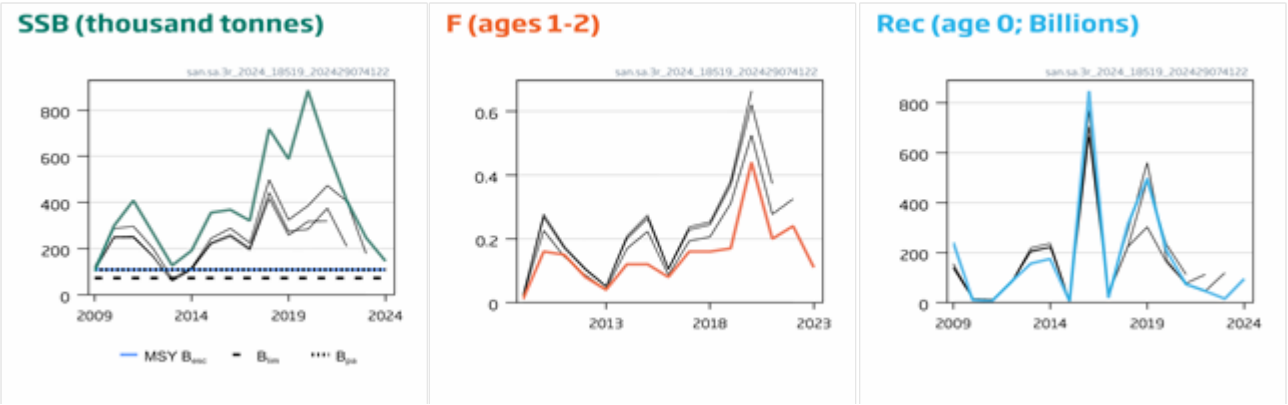

Figure 2 Sandeel in divisions 4.a–b and Subdivision 20, Sandeel Area 3r. Historical assessment results (final-year recruitment is the geometric mean). The biomass reference points were updated at the benchmark, and only the assessment results from the last year should be compared to the reference points indicated. The stock was benchmarked in 2023.

This stock was benchmarked in 2023. The 2024 assessment has updated the natural mortalities from the 2023 Working Group on Multispecies Assessment Methods (WGSAM; ICES, 2024a) key-run to account for predation.

Issues relevant for the advice

On fishing opportunities

The change in the advice from year to year is caused by the marked interannual variability of recruitment and biomass as well as early maturation, both of which are typical for a short-lived species.

The management strategy evaluation (MSE) conducted at the benchmark evaluated interannual quota transfer arrangements for this fishery and found that this marginally increased risk of SSB falling below B_{lim} (0.2% higher risk at F_{cap}).

In order to obtain samples to assess the status of the stock in 2025, ICES recommends a monitoring TAC in 2024. Catches should not exceed 5 000 tonnes and should have an associated sampling protocol in the fishery (ICES, 2024b).

Most of Sandeel Area 3r is within the Norwegian Exclusive Economic Zone (EEZ), where fisheries are managed by areas that are alternately open and closed based on an acoustic measurement of the stock each May and the setting of minimum biomass limits. ICES has not been requested to evaluate this management approach.

ICES notes the announcement by the UK to close it's waters of ICES subarea 4 to sandeel fishing, and while no account has been made of this in the assessment or the forecast it would be expected to have an effect on the distribution of fishing activity.

On conservation aspects

The lesser sandeel (*A. marinus*) spends large parts of its life burrowed in sandy seabed, where the proportion of silt is low. During spawning, sandeel eggs are glued to the sand. After hatching, the larvae are dispersed by oceanographic processes. Following metamorphosis, juveniles settle in the same sandy habitats as adults. The strong habitat preference (Wright *et al*., 2000) makes post-settled lesser sandeel stationary and vulnerable to seabed deterioration, climate changes (Régnier *et al*., 2019), and oil pollution (Golet *et al*., 2002). The effect of activities that might have a negative impact on sandeel habitats (e.g., extraction of gravel, offshore wind development, and oil exploration) should be assessed.

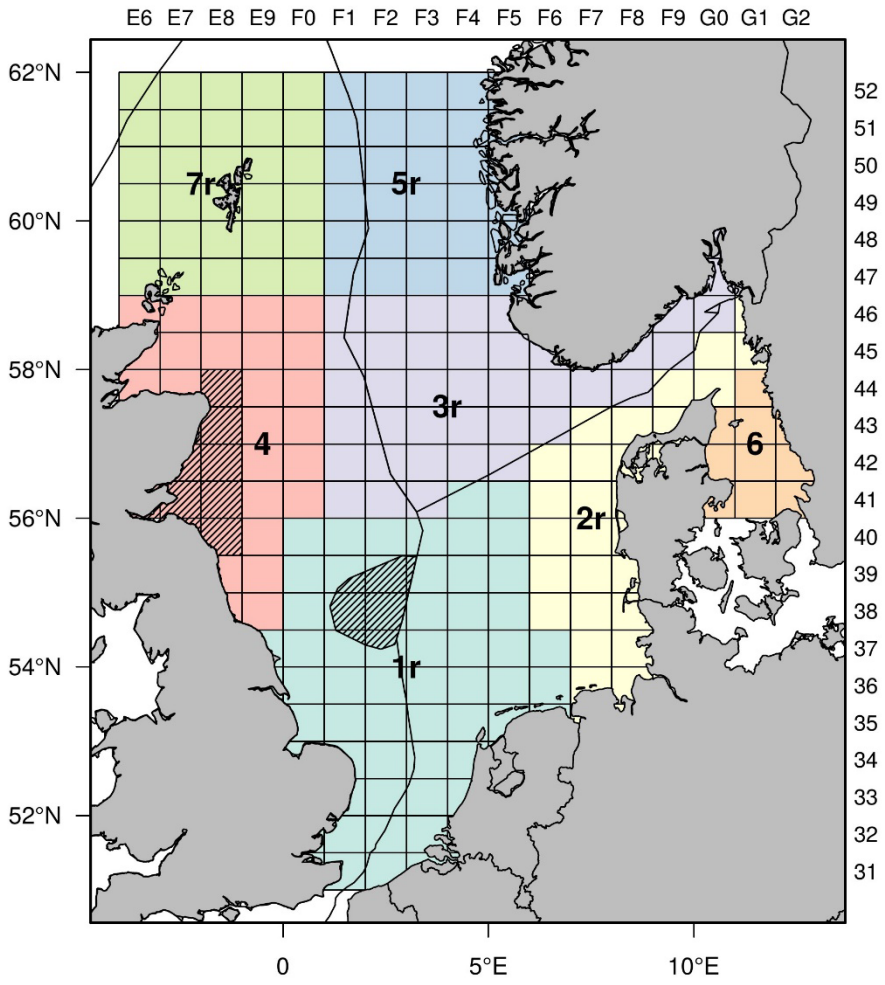

Figure 3 Sandeel in divisions 4.a–b and Subdivision 20, Sandeel Area 3r. Stock areas for the seven sandeel stocks. The borders of the Norwegian Exclusive Economic Zone (EEZ) and the UK Exclusive Econonmic Zone are shown as a black line. The closed part of Sandeel Area 1 (Dogger Bank) and 4 is shown with hatched markings.

Reference points

Table 4 Sandeel in divisions 4.a–b and Subdivision 20, Sandeel Area 3r. Reference points, values, and their technical basis.

Framework	Reference point	Value	Technical basis	Source
MSY approach	MSY $B_{escapement}$	108 978	B_{pa}; tonnes	ICES (2024c)
	F_{MSY}	Not defined		
	F_{cap}*	0.47	The maximum F, as estimated from the management strategy evaluation (MSE), that results in < 5% probability of SSB < B_{lim}	ICES (2024c)
Precautionary approach	B_{lim}	72 713	The average of SSB in 2013 and 2009, the lowest SSBs that still result in above median recruitment	ICES (2024c)
	B_{pa}	108 978	$B_{pa} = B_{lim} \times \exp(\sigma \times 1.645)$, with $\sigma = 0.25$ estimated from the assessment uncertainty in the terminal year; tonnes	ICES (2024c)
	F_{lim}	Not defined		
Management plan	SSB_{MGT}	Not defined		
	F_{MGT}	Not defined		

* Not used as a biological reference point but used in ICES MSY approach for stocks of short-lived species.

Basis of the assessment

Table 5 Sandeel in divisions 4.a–b and Subdivision 20, Sandeel Area 3r**.** The basis of the assessment and advice.

ICES stock data category	1 (see ICES, 2023)
Assessment type	Age-structured model (SMS-effort) with half-yearly time-step (ICES, 2024c)
Input data	Acoustic survey index (A6823; 2009–2023) and dredge survey index (D9376; 2006–2023); total international catch and fishing effort; maturity-at-age estimated from the dredge survey; natural mortality estimated from multispecies assessment (ICES, 2024a); age frequencies from catch sampling
Discards and bycatch	Discarding is considered to be negligible
Indicators	None
Other information	Last benchmarked in 2023 (ICES, 2024c).
Working group	Herring Assessment Working Group (HAWG)

History of advice, catch, and management

Table 6 Sandeel in divisions 4.a–b and Subdivision 20, Sandeel Area 3r. History of ICES advice, the agreed TAC, and ICES estimates of catch. All weights are in tonnes. Values of catch for the period 2005 to 2015 are presented to the nearest thousand tonnes.

Year	ICES advice	Catch corresponding to advice	EU & UK zone TAC	Norwegian zone TAC	ICES catch SA 3	ICES catch SA 3r	Total ICES catch (SAs 1r–7r)
2005*	Exploitation to be kept below the level of 2003. Adjustment to be made conditional on the abundance of the 2004 year class	-	661000**	10000***	30000		177000
2006*	The fishery should remain closed until information is available which assures that the stock can be rebuilt to B_{pa} by 2007	-	300000**	0	19000		293000
2007*	The fishery should remain closed until information is available which assures that the stock can be rebuilt to B_{pa} by 2008	-	173000**	51000	114000		230000
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	-	375000**	128000	95000		348000
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	-	377000**	0	34000		353000

Year	ICES advice	Catch corresponding to advice	EU & UK zone TAC	Norwegian zone TAC	ICES catch SA 3	ICES catch SA 3r	Total ICES catch (SAs 1r–7r)
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	-	377000**	50000	81000		414000
2011	No fishery	0	10000	90000	95000		438000
2012	Catches for monitoring purposes should not exceed 5 000 t	< 5000	5000	42000	46000		102000
2013	MSY approach: allow for sufficient stock (MSY $B_{escapement}$) to remain for successful recruitment	< 78331	40000	20000	39000		278000
2014	MSY approach: allow for sufficient stock (MSY $B_{escapement}$) to remain for successful recruitment	< 270000	140000	90000	143000		264000
2015	MSY approach: allow for sufficient stock (MSY $B_{escapement}$) to remain for successful recruitment, with additional F_{cap}	< 370000	190000	100000	122000		312000
2016	MSY approach: allow for sufficient stock (MSY $B_{escapement}$) to remain for successful recruitment	≤ 123135	63000	40000	50737	44074	75405
2017^	MSY approach: allow for sufficient stock (MSY $B_{escapement}$) to remain for successful recruitment	≤ 74176	0	120000		115642	517499
2018^	MSY approach: allow for sufficient stock (MSY $B_{escapement}$) to remain for successful recruitment	≤ 108365	8669	70000		75143	269579
2019^	MSY approach: allow for sufficient stock (MSY $B_{escapement}$) to remain for successful recruitment	≤ 133610	10689	125000		136901	235537
2020^	MSY approach: allow for sufficient stock (MSY $B_{escapement}$) to remain for successful recruitment	≤ 155072	12406	250000		247411	446765
2021^	MSY approach: allow for sufficient stock (MSY $B_{escapement}$) to remain for successful recruitment	≤ 161335	12907	145000		157524	232610
2022^	MSY approach: allow for sufficient stock (MSY $B_{escapement}$) to remain for successful recruitment	≤ 85559	6845	95000		84240	166628
2023^	MSY approach: allow for sufficient stock (MSY $B_{escapement}$) to remain for successful recruitment	≤ 30570	2446	60000		18955^^	164535^^
2024^	MSY approach: zero catch	0					

* Advice for Subarea 4, excluding the Shetland area.
** Set for EU waters of divisions 2.a and 3.a, and Subarea 4.
*** TAC for EU fisheries set at 10 000 t; seasonal effort limitations set for Norwegian fisheries.
^ ICES statistical rectangles included in this sandeel area have changed with the 2017 assessment and advice.
^^ Preliminary.

History of catch and landings

Table 7 Sandeel in divisions 4.a–b and Subdivision 20, Sandeel Area 3r**.** Catch distribution by fleet in 2023 as estimated by ICES (in tonnes).

Total catch (2023)	Landings	Discards
18 955	100% industrial trawl fisheries	Discarding is considered negligible
	18 955	

Summary of the assessment

Table 8 Sandeel in divisions 4.a–b and Subdivision 20, Sandeel Area 3r**.** Assessment summary with weights (in tonnes) and recruitment (at age 0, in thousands). The SSB is estimated for 1 January. "High" and "Low" refer to 95% confidence intervals.

Year	Recruitment (age 0)			SSB			Total catch	Fishing pressure ages 1–2		
	Low	Mid-point	High	Low	Mid-point	High		Low	Mid-point	High
	thousands			tonnes			tonnes			
1987	37307674	86715893	201557628	42121	81993	159608	395298	0.43	0.58	0.79
1988	97242639	219977880	497623967	105291	206315	404266	336919	0.60	0.80	1.08
1989	35459943	84317199	200490736	70061	119958	205389	374252	0.64	0.87	1.18
1990	55709692	125005644	280497173	97522	184435	348808	163224	0.40	0.54	0.73
1991	38610365	87163822	196774414	90737	160422	283624	274839	0.48	0.65	0.88
1992	117435976	265964656	602346919	68197	124843	228539	87022	0.20	0.27	0.36
1993	106242636	241912613	550830768	102839	179449	313129	200123	0.42	0.56	0.76
1994	100385048	232731426	539561597	112762	214617	408473	267281	0.40	0.54	0.74
1995	49105909	120214686	294293921	113712	204034	366099	213168	0.31	0.43	0.58
1996	534270888	1197825192	2685501350	155581	271160	472601	159304	0.34	0.46	0.62
1997	22873507	55247762	133443252	164675	256093	398263	474093	0.64	0.86	1.16
1998	36337534	87991855	213073531	238820	497937	1038192	474843	0.91	1.23	1.67
1999	87067647	206799693	491182595	61080	130751	279894	193621	0.44	0.60	0.82
2000	69557797	172160493	426109460	57121	107942	203979	196525	0.35	0.48	0.65
2001	56524968	137530718	334625546	87860	175928	352272	196209	0.33	0.46	0.64
2002	10229255	25139688	61783961	70528	133675	253360	115207	0.21	0.29	0.39
2003	31069394	73649650	174585667	69524	135149	262720	35365	0.130	0.180	0.24
2004	27213236	63755131	149365431	35412	64462	117340	33658	0.100	0.140	0.180
2005	21055387	46410572	102298817	59296	112206	212327	13994	0.040	0.060	0.080
2006	67838714	118784433	207989518	59715	106750	190830	7094	0.020	0.020	0.030
2007	43835962	76088361	132070529	94754	159355	267998	75376	0.110	0.160	0.21
2008	51003180	86967836	148292803	118013	191104	309464	74943	0.140	0.190	0.25
2009	142468509	241108896	408044556	63389	102535	165855	6161	0.0100	0.0100	0.020
2010	5558932	9748930	17097105	191159	299208	468329	60542	0.120	0.160	0.22
2011	3051080	5427574	9655124	251783	408934	664169	92450	0.110	0.150	0.21
2012	48956819	83632997	142870356	157504	268840	458877	40141	0.060	0.080	0.110
2013	93060248	156484318	263134286	74720	127421	217290	9838	0.030	0.040	0.050
2014	103923277	175105274	295043206	120174	191651	305641	98055	0.090	0.120	0.170
2015	2822682	4875538	8421378	223179	356106	568208	106703	0.090	0.120	0.170
2016	512939365	848067977	1402152657	231513	368589	586827	44074	0.060	0.080	0.110
2017	10492993	18292832	31890586	202137	321290	510678	115642	0.120	0.160	0.22
2018	184942312	313817694	532498725	439596	718756	1175192	76656	0.120	0.160	0.21
2019	291956031	497920180	849184395	349934	588119	988426	138674	0.120	0.170	0.23
2020	119020271	207650536	362280681	551188	885195	1421602	247411	0.33	0.44	0.60
2021	41694712	74536731	133247697	370985	631739	1075770	157524	0.150	0.20	0.27
2022	24408740	46067439	86944633	240493	409270	696494	84240	0.180	0.24	0.33
2023	7367464	15134722	31090727	142234	247285	429921	18955^	0.080	0.110	0.150
2024		94904752*		84806**	145862**	250877**				

* Geometric mean (1987–2022).
** Using mean weight-at-age from 2019 to 2023.
^ Preliminary.

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Download the stock assessment data and figures.

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