ICES Advice on fishing opportunities, catch, and effort
Ecoregions in the Northeast Atlantic and adjacent seas
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**Spurdog (*Squalus acanthias*) in subareas 1–10, 12, and 14 (the Northeast Atlantic and adjacent waters)**

ICES advice on fishing opportunities

ICES advises that when the MSY approach is applied, catches in 2023 and 2024 should be no more than 17 353 tonnes and 17 855 tonnes, respectively.
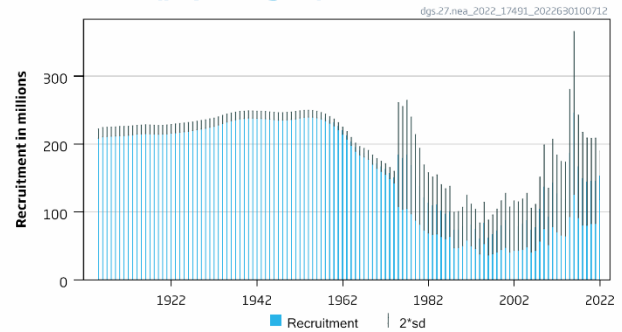
Stock development over time

Fishing pressure on the stock is below HR_{MSY}, and spawning-stock size is above MSY $B_{trigger}$, B_{pa}, and B_{lim}.
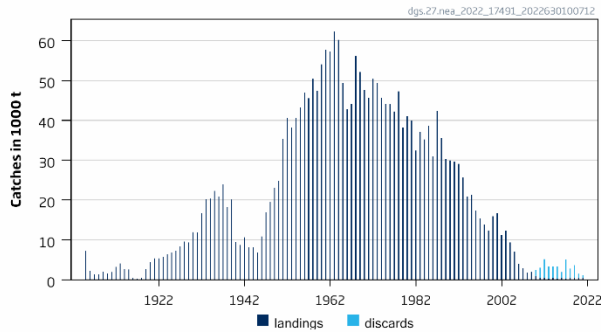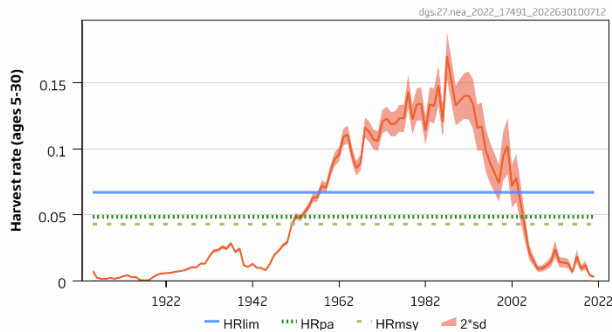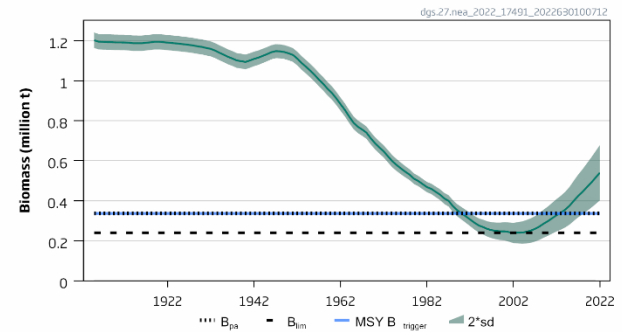

Figure 1   Spurdog in subareas 1–10, 12, and 14. Summary of the stock assessment. Long-term trends in catches (including assumed discards since 2010), mean harvest rate, recruitment, and total biomass. Horizontal lines indicate the associated reference points. The assumed recruitment in 2022 is shaded in a lighter colour.

Catch scenarios

Table 1   Spurdog in subareas 1–10, 12, and 14. Values in the forecast and for the interim year.

Variable	Value	Notes
Harvest rate (2022)	0.003	*Status quo* harvest rate (ages 5–30), assuming same proportional split among fleets as in 2021
B_{tot} (2023)	564 220	Short-term forecast total biomass; in tonnes
Recruitment (2022)	154	Modelled stock–recruitment relationship, based on the number of pregnant females in the
Recruitment (2023)	161	population (number of pups in millions)
Catch (2022)	1240	Short-term forecast catch resulting from status quo harvest rate; in tonnes

Table 2   Spurdog in subareas 1–10, 12, and 14. Annual catch scenarios. All weights are in tonnes.

Basis	Catch		Harvest rate* (ages 5–30)		B_{tot}		% B_{tot} change rel. to 2023		% advice change***
	2023	2024	2023	2024	2023	2024	2024 **	2025 **	
ICES advice basis									
MSY approach, HR = HR_{MSY}	17 353	17 855	0.044	0.044	571 234	577 201	1.24	2.3	-
Other scenarios									
HR = 0	0	0	0	0	588 776	612 807	4.4	8.6	-
HR_{sq}	1315	1399	0.003	0.003	587 446	610 058	4.1	8.1	-
Harvest rate = HR_{pa}	19 663	20 117	0.050	0.049	568 898	572 571	0.83	1.48	-
Harvest rate = HR_{lim}	27 528	27 622	0.069	0.069	560 941	556 990	−0.58	−1.28	-

* Harvest rates differ slightly between years owing to differences in age structure over time.

** Total biomass for 2024 or 2025 relative to the total biomass for 2023.

*** Advice value for 2023 and 2024 relative to advice value for 2021 and 2022 (0 tonnes).

The advice for 2023 and 2024 is a non zero catch because the recent benchmark has led to a change in the perception of the stock and reference points.

Basis of the advice

**Table 3**   Spurdog in the Northeast Atlantic. The basis of the advice.

Advice basis	ICES MSY approach
Management plan	ICES is not aware of any agreed precautionary management plan for spurdog in this area

Quality of the assessment

This stock was benchmarked in 2021 (ICES, 2021). There was a substantial improvement in data available for the assessment, including survey indices and associated length compositions covering a much larger area of the stock distribution, fecundity data spanning a much wider timeframe, fleet-based length data covering more countries than just the UK, and improved catch information since 2005. There remain some concerns about data quality and availability, including uncertainty in the historical level of catches because of misreporting and use of generic landings categories, and lack of data on dead discards.

The increased variance in estimated recruitment from 1975 onwards is due to there being sufficient information (survey indices, survey and fishery length composition data) from that period for its estimation while prior to that a single stock recruit relationship was used.
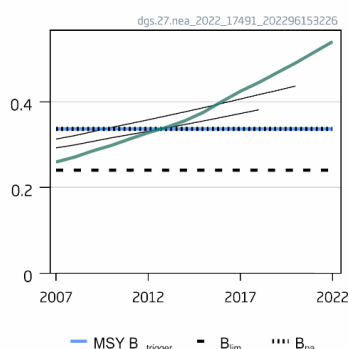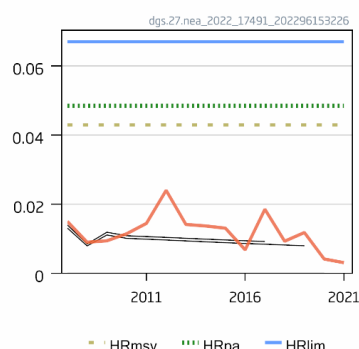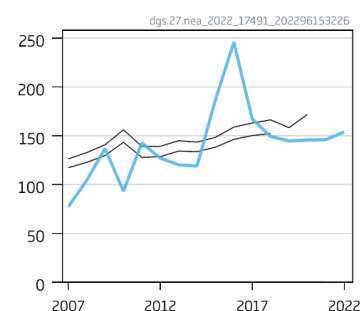
Figure 2   Spurdog in subareas 1–10, 12, and 14. Historical assessment results (final-year recruitment estimates are provisional, taken from the estimated stock–recruitment relationship). The reference points were revised in 2021 (ICES, 2021), and only assessment results from the last year should be compared to the reference points indicated.

Issues relevant for the advice

The harvest rate shown in Table 2 is a weighted average (weighted by population number-at-age) for ages 5–30; therefore, there is a slight difference between the resultant harvest rate for ages 5–30 and the reference point because of the slightly different age structure compared to equilibrium conditions.

While the increase in the stock biomass was already noticed in the previous assessment, the benchmark (and notably the revision of the reference points) have resulted in a changed perception of the stock.

Reference points

Table 4 Spurdog in subareas 1–10, 12, and 14. Reference points, values, and their technical basis. The reference points are estimated as part of the assessment model and reference points are updated with each assessment update.

Framework	Reference point	Value	Technical basis	Source
MSY approach	HR_{MSY} (MSY harvest rate)	0.043	Harvest rate (ages 5–30) that leads to B_{MSY}	ICES (2021); ICES (2022b)
	MSY $B_{trigger}$	336 796 tonnes	B_{pa}	ICES (2021); ICES (2022b)
Precautionary approach	B_{lim}	240 569 tonnes	$0.2 \times B_0$, where B_0 is the virgin total biomass	ICES (2021); ICES (2022b)
	B_{pa}	336 796 tonnes	$1.4 \times B_{lim}$	ICES (2021); ICES (2022b)
	HR_{lim}	0.067	Harvest rate that leads to B_{lim}	ICES (2021); ICES (2022b)
	HR_{pa}	0.049	$HR_{lim}/1.4$	ICES (2021); ICES (2022b)
Management plan	SSB_{MGT}	NA		
	F_{MGT}	NA		

NA = not available.

Basis of the assessment

Table 5 Spurdog in the Northeast Atlantic. Basis of assessment and advice.

ICES stock data category	1 (ICES, 2022a)
Assessment type	Age-length and sex-structured model (De Oliveira *et al*., 2013)
Input data	Three GAM-based delta-lognormal survey biomass indices, combined by quarter: Q1 (IBTSQ1[G1022], NO-shrimp-Q1, SCOWCGFS[G4748], SWC-IBTS[G1179]), Q3 (IBTSQ3[G2829]), Q4 (EVHOE[G9527], IE-IGFS[G7212], NIGFS[G7655], SCOWCGFS[G4815], SWC-IBTS[G4299]); length composition by sex associated with the three combined survey indices; fecundity-at-length; landings; length composition for bottom trawls (Ireland, Sweden, UK-Scotland), and gillnets and trammel nets (UK-England).
Discards and bycatch	Discarding considered negligible up to and including 2004; discards estimates included from 2005 onwards; for the assessment, average UK-England discards (2010, 2012, 2016–2019) assumed to deal with missing years of discards from UK-England (2011, 2013–2015). All discards are assumed to die.
Indicators	None
Other information	A benchmark assessment was carried out in 2021 (ICES, 2021).
Working group	Working Group on Elasmobranch Fishes (WGEF)

History of the advice, catch, and management

Table 6 Spurdog in subareas 1–10, 12, and 14. History of ICES advice, the agreed TAC, and ICES estimates of landings. Weights are in tonnes.

Year	ICES advice	Catch corresp. to advice	Agreed TAC	ICES landings ^^
1999	None		8900 *	12384
2000	None		8900 *	15890
2001	None		8900 *	16693
2002	None		7100 *	11170
2003	None		5600 *	12246
2004	None		4500 *	9365
2005	None		1100 *	7092
2006	F = 0	0	1100 *	3996
2007	No new advice, same as for 2006	0	3699 **	2892
2008	F = 0	0	2635 ***	1791

Year	ICES advice	Catch corresp. to advice	Agreed TAC	ICES landings ^^
2009	No fishery	0	1422**	1968
2010	No new advice, same as for 2009	0	0 ^	886
2011	F = 0	0	0	427
2012	F = 0	0	0	447
2013	F = 0	0	0	331
2014	No new advice, same as for 2013	0	0	381
2015	No target fishery, minimize bycatch	0	0	257
2016	No new advice, same as for 2015	0	0 ^^^	371
2017	PA approach (and no target fishery and medium-term projections)	≤ 2468 §	0 ^^^	294
2018	PA approach (and no target fishery and medium-term projections)	≤ 2468 §	0 ^^^	362
2019	PA approach (and no target fishery and medium-term projections)	≤ 2468 §	0 ^^^	455
2020	PA approach (and no target fishery and medium-term projections)	≤ 2468 §	0 ^^^	526
2021	PA approach (no targeted fisheries)	0	0 ^^^	539
2022	PA approach (no targeted fisheries)	0	0 ^^^	
2023	MSY approach	17353		
2024	MSY approach	17855		

* TAC for ICES Subarea 4 and Division 2.a (EC).

** Combined TAC for ICES Subarea 4 and Division 2.a (EC) and for ICES Division 3.a, as well as subareas 1, 5, 6, 7, 8, 12, and 14 (EU and international waters).

*** Combined TAC for ICES Subarea 4 and Division 2.a (EC) and for ICES subareas 1, 5, 6, 7, 8, 12, and 14 (EU and international waters).

^ Landing of bycatch permitted up to 10% of the 2009 quota.

^^ Landings for the total stock area, subareas 1–10, 12, and 14, excluding 8.c, 9.a and 10.a (due to mixed landings with *S. blainville*).

^^^ A bycatch quota of 270 tonnes was made available to those countries taking part in a pilot spurdog avoidance programme.

§ Assumed annual catch.

History of the catch and landings

The quantity of spurdog caught in the NEAFC Regulatory Area is uncertain.

Table 7   Spurdog in the Northeast Atlantic. Catch distribution by fleet in 2021 as estimated by ICES.

Total catch	Landings				Discards
1178 tonnes	Nets 88%	Bottom trawl 5%	Hooks and lines 6%	Other gears 1%	639 tonnes
	539 tonnes				

Table 8a Spurdog in the Northeast Atlantic. History of ICES landings for each country participating in the fishery *. Weights in tonnes. Blank = no data reported; 0 = value less than 0.5 t.

Country	1980	1981	1982	1983	1984	1985	1986	1987	1988	1989	1990	1991	1992	1993	1994	1995
Belgium	1097	1085	1110	1072	1139	920	1048	979	657	750	582	393	447	335	396	391
Denmark	1404	1418	1282	1533	1217	1628	1008	1395	1495	1086	1364	1246	799	486	212	146
Faroe Islands	0	22	0	0	0	0	0	0	0	6	2	3	25	137	203	310
France	17 514	19 067	12 430	12 641	8356	8867	7022	11 174	7872	5993	4570	4370	4908	4831	3329	1978
Germany	43	42	39	25	8	22	41	48	27	24	26	6	55	8	21	100
Iceland	36	22	14	25	5	9	7	5	4	17	15	53	185	108	97	166
Ireland	108	476	1268	4658	6930	8791	5012	8706	5612	3063	1543	1036	1150	2167	3624	3056
Netherlands	217	268	183	315	0	0	0	0	0	0	0	0	0	0	0	0
Norway	5925	3941	3992	4659	4279	3487	2986	3614	4139	5329	8104	9633	7113	6945	4546	3940
Poland	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Portugal	2	0	0	0	0	0	1	5	3	2	128	188	250	323	190	256
Russia	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Spain	0	0	8	653	0	0	0	0	0	0	0	0	0	0	0	0
Sweden	399	308	398	300	256	360	471	702	733	613	390	333	230	188	95	104
UK (E&W)	9229	9342	8024	6794	8046	7841	7047	7684	6952	5371	5414	3770	4207	3494	3462	2354
UK (Sc)	4994	3970	3654	4371	4957	6749	6267	8043	8075	8024	7768	8531	9677	6614	4676	8517
Total	40 968	39 961	32 402	37 046	35 193	38 674	30 910	42 355	35 569	30 278	29 906	29 562	29 046	25 636	20 851	21 318

Table 8a (cont.)   Spurdog in the Northeast Atlantic. History of ICES landings for each country participating in the fishery *. Weights in tonnes. Blank = no data reported; 0 = value less than 0.5 t.

Country	1996	1997	1998	1999	2000	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010
Belgium	430	443	382	354	400	410	23	11	13	21	17	11	12	7	1
Denmark	142	196	126	131	146	156	256	232	219	150	121	76	78	82	14
Faroe Islands	51	218	362	486	368	613	340	224	295						
France	1607	1555	1286	998	4342	4304	2569	1705	1062	945	700	504	368	412	164
Germany	38	21	31	54	194	304	121	98	138	140	7	3	5	2	1
Iceland	156	106	80	57	107	199	276	200	142	76	82	43	68	102	62
Ireland	2305	2214	1164	904	905	1227	1214	1416	1076	1022	859	651	137	175	26
Netherlands	0	0	0	0	28	39	27	10	25	31	23	25	18	5	7
Norway	2748	1567	1293	1461	1643	1424	1091	1119	1054	1016	790	615	711	543	540
Poland	0	0	0	0	0	0	0	0	0						
Portugal	120	100	46	21	2	3	4	4	9						
Russia	0	0	0	0	0	0	0	0	0						
Spain	0	0	28	95	372	363	306	135	17	41	40	71	39	14	2
Sweden	154	196	140	114	123	238	0	275	244	169	147	93	75	80	5
UK (E&W)	2670	3066	4480	4461	3654	4516	2823	3109	1729						
UK (Sc)	6873	5665	4501	3248	3606	2897	2120	3708	3342						
GBR										3481	1209	799	280	546	64
Total	17 294	15 347	13 919	12 384	15 890	16 693	11 170	12 246	9365	7092	3996	2892	1791	1968	886

Table 8a (cont.)   Spurdog in the Northeast Atlantic. History of ICES landings for each country participating in the fishery *. Weights in tonnes. Blank = no data reported; 0 = value less than 0.5 t.

Country	2011	2012	2013	2014	2015	2016	2017	2018	2019	2020	2021
Belgium	0	0	0								
Denmark	26	30	19	10	27	24	27	19	21	32	20
France	84	34	13	19	2	1	3	1			
Germany	1	1	0	1	0	2	0	1	0		0
Iceland	53	51	6	19	8	8	4	2	1	3	1
Ireland	13	37	34	18	2	34	1	24	11	3	
Netherlands	1	4	3	0	1	1	1	6	0	0	
Norway	247	285	250	313	217	270	222	271	370	409	367
Spain	2	3	0					0	0		0	
Sweden	0						0	0	0	0		0
UK (E&W)											151
GBR	1	3	6	0			30	37	38	52	79	
Total	427	447	331	381	257	371	294	362	455	526	539

* Landings for the total stock area, subareas 1–10, 12, and 14, excluding 8.c, 9.a, and 10.a (due to mixed landings with *S. blainville*).

Table 8b   Spurdog in the Northeast Atlantic. History of ICES discards for each country participating in the fishery *,**. Weights in tonnes. Blank = no data reported; 0 = value less than 0.5 t.

Country	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016	2017	2018	2019	2020	2021
Denmark	1	2		9	42	23	44	4	232	48	25	705	18	42	37	234	94
Germany	1	0	0	0		0	0	0	1	0	1	1	3	4	3		0
Ireland	11	0	28	31	7	151	53	63	33	39	96	30	291	211	122	181	10
Spain_IEO										1	4	9	2	2	2		
Spain_AZTI		0					1	1		11	6	87		1	36	13	
Spain																28	3
Sweden	2	0	5	4	7	22	8	33	37	132	19	12	142	9	66		
UK (England & Wales)	5	19	0	2	1	1161	***	4472	***	***	***	683	4090	1737	2406	256	59
UK (Scotland)					39	166	66	185	201	264	359	141	235	330	516	174	396
UK (Northern Ireland)																70	76
Total	20	22	34	46	96	1523	173	4757	514	490	591	1580	4781	2371	3165	942	639

* Discards for the total stock area, subareas 1–10, 12, and 14, excluding 8c, 9a, and 10a (due to mixed landings with *S. blainville*)

** Discards are estimated based on raised national data by fleet provided to the datacall of WKNSEA (ICES, 2021) and the WGEF datacall. Discards data prior to 2005 are incomplete and considered neglibible in relation to landings. The increase in discarding from 2005 onwards will have been influenced by the evolution of management measures.

*** Due to missing discards data from UK England & Wales for these years, the average for UK England & Wales for the years 2010, 2012, 2016–2019 (2425 t) was used in the assessment (Table 9) to represent discards from UK England & Wales.

Summary of the assessment

Table 9   Spurdog in subareas 1–10, 12, and 14. Summary table of estimates from the spurdog assessment: recruitment (millions of pups), total biomass (tonnes), harvest rate (assuming average selection over the ages 5–30), and the Working Group estimates of landings and catch (tonnes) used in the assessment. Estimates of precision (±2 standard deviation).

Year	Recruitment (pups at age 0)			Total biomass			Landings*	Discards*	Harvest rate		
	Millions	High	Low	Tonnes	High	Low	Tonnes	Tonnes	Ages 5–30	High	Low
1905	215	222	208	1 202 840	1 241 446	1 164 234	7248		0.0075	0.0080	0.0071
1906	217	224	211	1 195 900	1 234 508	1 157 292	2200		0.0023	0.0024	0.0022
1907	218	225	211	1 194 330	1 232 942	1 155 718	1428		0.00150	0.00158	0.00141
1908	218	225	211	1 193 710	1 232 322	1 155 098	1409		0.00148	0.00156	0.00139
1909	219	225	212	1 193 260	1 231 866	1 154 654	2022		0.0021	0.0022	0.0020
1910	219	226	212	1 192 390	1 230 986	1 153 794	1563		0.00164	0.00174	0.00155
1911	219	226	213	1 192 170	1 230 748	1 153 592	1957		0.0021	0.0022	0.00194
1912	220	226	213	1 191 750	1 230 306	1 153 194	3199		0.0034	0.0036	0.0032
1913	220	227	214	1 190 330	1 228 856	1 151 804	4050		0.0043	0.0045	0.0040
1914	221	228	214	1 188 350	1 226 840	1 149 860	2641		0.0028	0.0030	0.0026
1915	221	228	215	1 188 050	1 226 500	1 149 600	2602		0.0028	0.0029	0.0026
1916	222	228	215	1 188 010	1 226 412	1 149 608	534		0.00057	0.00060	0.00053
1917	222	228	215	1 190 140	1 228 486	1 151 794	339		0.00036	0.00038	0.00034
1918	221	228	215	1 192 500	1 230 782	1 154 218	451		0.00048	0.00050	0.00045
1919	221	227	214	1 194 740	1 232 954	1 156 526	2659		0.0028	0.0030	0.0027
1920	221	228	214	1 194 830	1 232 974	1 156 686	4396		0.0046	0.0049	0.0044
1921	222	228	215	1 193 330	1 231 404	1 155 256	5321		0.0056	0.0059	0.0053
1922	222	229	216	1 191 140	1 229 148	1 153 132	5401		0.0057	0.0060	0.0054
1923	223	230	216	1 189 110	1 227 058	1 151 162	5655		0.0060	0.0063	0.0057
1924	224	230	217	1 187 090	1 224 980	1 149 200	6355		0.0068	0.0072	0.0064
1925	224	231	218	1 184 670	1 222 504	1 146 836	6719		0.0072	0.0076	0.0068
1926	225	232	219	1 182 220	1 220 004	1 144 436	7277		0.0078	0.0082	0.0074
1927	226	233	220	1 179 590	1 217 324	1 141 856	8395		0.0090	0.0095	0.0085
1928	227	234	221	1 176 280	1 213 966	1 138 594	9522		0.0103	0.0109	0.0097
1929	228	235	222	1 172 340	1 209 978	1 134 702	9320		0.0101	0.0107	0.0096
1930	229	236	223	1 169 130	1 206 720	1 131 540	11 914		0.0130	0.0137	0.0123
1931	231	237	225	1 163 950	1 201 488	1 126 412	11 838		0.0130	0.0137	0.0123
1932	232	238	226	1 159 510	1 196 994	1 122 026	16 726		0.0185	0.0195	0.0175
1933	234	240	228	1 151 030	1 188 454	1 113 606	20 244		0.023	0.024	0.021
1934	236	242	230	1 140 090	1 177 448	1 102 732	20 378		0.023	0.024	0.022
1935	238	244	232	1 130 180	1 167 466	1 092 894	22 266		0.026	0.027	0.024
1936	240	246	234	1 119 590	1 156 792	1 082 388	20 925		0.024	0.026	0.023
1937	241	247	236	1 111 510	1 148 612	1 074 408	23 930		0.028	0.030	0.027
1938	242	248	237	1 101 620	1 138 600	1 064 640	18 196		0.022	0.023	0.021
1939	243	248	238	1 098 530	1 135 370	1 061 690	20 119		0.024	0.026	0.023
1940	244	249	238	1 094 410	1 131 082	1 057 738	9428		0.0115	0.0121	0.0109
1941	243	249	238	1 101 560	1 138 038	1 065 082	8740		0.0106	0.0112	0.0100
1942	243	248	238	1 109 620	1 145 876	1 073 364	10 625		0.0128	0.0135	0.0121
1943	243	248	238	1 115 920	1 151 934	1 079 906	8181		0.0098	0.0103	0.0093
1944	243	248	237	1 124 660	1 160 420	1 088 900	8151		0.0097	0.0102	0.0092
1945	242	247	237	1 133 270	1 168 770	1 097 770	6776		0.0080	0.0084	0.0076
1946	241	247	236	1 142 940	1 178 182	1 107 698	10 895		0.0127	0.0134	0.0121
1947	241	246	235	1 148 180	1 183 174	1 113 186	16 893		0.0196	0.0206	0.0186
1948	241	246	235	1 147 300	1 182 070	1 112 530	19 491		0.023	0.024	0.021
1949	241	247	236	1 143 900	1 178 476	1 109 324	23 010		0.027	0.028	0.025
1950	242	247	236	1 137 210	1 171 628	1 102 792	24 750		0.029	0.031	0.028
1951	242	248	237	1 129 140	1 163 432	1 094 848	35 301		0.042	0.044	0.040
1952	244	249	238	1 111 220	1 145 418	1 077 022	40 550		0.049	0.052	0.047
1953	244	250	239	1 089 130	1 123 262	1 054 998	38 206		0.047	0.050	0.045
1954	245	250	240	1 070 560	1 104 642	1 036 478	40 570		0.052	0.054	0.049
1955	244	249	239	1 050 780	1 084 812	1 016 748	43 127		0.056	0.059	0.053
1956	243	248	239	1 029 670	1 063 638	995 702	46 951		0.063	0.066	0.060
1957	242	246	237	1 005 990	1 039 872	972 108	45 570		0.063	0.067	0.060

Year	Recruitment (pups at age 0)			Total biomass			Landings*	Discards*	Harvest rate		
	Millions	High	Low	Tonnes	High	Low	Tonnes	Tonnes	Ages 5–30	High	Low
1958	239	244	234	984 917	1 018 683	951 151	50 394		0.072	0.076	0.068
1959	235	240	231	960 123	993 733	926 513	47 394		0.071	0.074	0.067
1960	232	237	227	939 333	972 747	905 919	53 997		0.083	0.087	0.078
1961	226	232	221	912 755	945 929	879 581	57 721		0.092	0.098	0.087
1962	220	225	214	883 194	916 092	850 296	57 256		0.096	0.101	0.090
1963	213	218	207	854 672	887 264	822 080	62 288		0.109	0.115	0.103
1964	204	210	198	821 452	853 714	789 190	60 146		0.111	0.118	0.104
1965	195	201	189	790 543	822 465	758 621	49 336		0.096	0.102	0.090
1966	190	196	184	770 392	801 978	738 806	42 713		0.085	0.091	0.080
1967	187	194	181	756 521	787 787	725 255	44 116		0.090	0.096	0.084
1968	184	191	177	740 700	771 676	709 724	56 043		0.116	0.124	0.109
1969	177	184	170	712 290	743 026	681 554	52 074		0.113	0.121	0.105
1970	171	178	164	687 337	717 909	656 765	47 557		0.107	0.115	0.100
1971	167	174	160	666 382	696 874	635 890	45 653		0.106	0.114	0.098
1972	163	171	155	646 798	677 306	616 290	50 416		0.120	0.129	0.112
1973	157	165	149	621 857	652 483	591 231	49 412		0.123	0.132	0.114
1974	151	160	143	597 366	628 220	566 512	45 684		0.119	0.128	0.110
1975	185	261	108	578 446	608 418	548 474	44 119		0.119	0.129	0.110
1976	180	255	104	561 313	590 429	532 197	44 064		0.123	0.134	0.113
1977	185	264	105	545 051	573 133	516 969	42 252		0.123	0.134	0.113
1978	168	240	97	530 362	557 574	503 150	47 235		0.143	0.156	0.131
1979	151	214	88	510 246	536 752	483 740	38 201		0.122	0.134	0.111
1980	138	194	82	498 816	524 792	472 840	40 968		0.134	0.146	0.121
1981	121	169	73	483 609	509 343	457 875	39 962		0.134	0.147	0.122
1982	113	158	69	468 454	494 218	442 690	32 402		0.114	0.125	0.103
1983	109	151	67	459 689	485 693	433 685	37 046		0.134	0.147	0.121
1984	111	155	67	445 241	471 675	418 807	35 194		0.133	0.146	0.119
1985	102	140	64	430 989	458 041	403 937	38 674		0.148	0.163	0.133
1986	97	134	61	411 799	439 573	384 025	30 910		0.120	0.133	0.108
1987	101	138	64	399 484	428 042	370 926	42 356		0.170	0.188	0.153
1988	73	100	47	373 256	402 678	343 834	35 569		0.151	0.168	0.135
1989	74	101	47	352 864	383 196	322 532	30 279		0.133	0.148	0.118
1990	79	107	50	337 154	368 430	305 878	29 906		0.137	0.153	0.121
1991	91	125	58	321 947	354 207	289 687	29 563		0.140	0.158	0.123
1992	81	111	50	306 159	339 451	272 867	29 046		0.140	0.159	0.122
1993	75	104	46	290 122	324 522	255 722	25 637		0.134	0.153	0.115
1994	61	84	38	276 352	311 872	240 832	20 851		0.116	0.134	0.099
1995	84	114	53	268 383	305 299	231 467	21 318		0.117	0.135	0.099
1996	62	88	36	258 755	297 085	220 425	17 295		0.098	0.115	0.082
1997	67	96	38	253 052	292 964	213 140	15 348		0.089	0.104	0.074
1998	72	104	41	249 330	291 018	207 642	13 919		0.082	0.096	0.067
1999	80	116	44	247 340	291 024	203 656	12 385		0.074	0.088	0.060
2000	88	127	48	247 396	293 286	201 506	15 891		0.095	0.113	0.076
2001	74	107	41	243 309	291 469	195 149	16 693		0.102	0.123	0.081
2002	80	116	43	238 878	289 480	188 276	11 170		0.072	0.088	0.056
2003	79	115	43	240 236	293 356	187 116	12 247		0.078	0.096	0.060
2004	82	119	45	240 941	296 663	185 219	9366		0.059	0.074	0.045
2005	88	127	49	245 140	303 572	186 708	7092	20	0.040	0.051	0.030
2006	73	106	41	250 868	311 962	189 774	3996	22	0.021	0.027	0.0160
2007	77	111	43	259 705	323 491	195 919	2892	34	0.0150	0.0189	0.0111
2008	104	151	57	271 053	337 839	204 267	1791	46	0.0090	0.0113	0.0067
2009	137	199	75	285 741	355 959	215 523	1968	96	0.0094	0.0119	0.0070
2010	93	135	52	298 310	371 716	224 904	886	1523	0.0115	0.0145	0.0084
2011	143	207	78	313 429	390 587	236 271	427	2597**	0.0145	0.0183	0.0106
2012	127	184	70	328 007	408 999	247 015	447	4757	0.024	0.031	0.0175

Year	Recruitment (pups at age 0)			Total biomass			Landings*	Discards*	Harvest rate		
	Millions	High	Low	Tonnes	High	Low	Tonnes	Tonnes	Ages 5–30	High	Low
2013	120	175	66	340 781	425 765	255 797	331	2939**	0.0142	0.0180	0.0103
2014	119	174	64	356 020	445 200	266 840	381	2915**	0.0137	0.0174	0.0100
2015	187	280	93	375 667	470 107	281 227	257	3016**	0.0131	0.0166	0.0095
2016	246	366	126	400 644	501 504	299 784	371	1580	0.0068	0.0086	0.0050
2017	167	243	91	424 577	531 507	317 647	294	4781	0.0186	0.024	0.0135
2018	149	217	81	445 023	558 055	331 991	362	2371	0.0093	0.0118	0.0068
2019	145	209	80	468 062	587 330	348 794	455	3165	0.0118	0.0150	0.0086
2020	145	208	83	490 739	616 453	365 025	526	942	0.0042	0.0053	0.0030
2021	146	209	83	515 588	647 800	383 376	539	639	0.0031	0.0039	0.0023
2022	154^	190^	118^	540 266	678 732	401 800					

* Landings are considered to represent catch for the years up to and including 2004, with discards considered negligible. Minor discrepancies between these values and those in earlier tables are due to rounding (but see footnote ** for discards).
** Due to missing discards data from UK England & Wales for these years, the average for UK England & Wales for the years 2010, 2012, 2016–2019 (2425 t) was used to represent discards from UK England & Wales.
^ Provisional values taken from the estimated stock–recruitment relationship.

Table 10   Spurdog in subareas 1–10, 12, and 14. Extension of short-term forecasts to the medium- to longer-term (3, 5, 10, and 30 years beyond 2022). Estimates of total biomass relative to the total biomass in 2022 for different future catch scenarios, assuming status quo harvest rate for 2022 (see Table 2 for the 2023 and 2024 catches for the different catch scenarios). Point estimates are shown in the upper third of the table, with corresponding lower and upper values (reflecting ±2 standard deviations) given in the middle and bottom third of the table.

	Medium-term projections				
	HR_{MSY}	Zero	HR_{sq}	HR_{pa}	HR_{lim}
Average catch *	20 296	0	2242	21 747	25 311
Point estimates: total future biomass/total biomass 2022					
+ 3 years	1.07	1.13	1.13	1.06	1.03
+ 5 years	1.09	1.22	1.21	1.07	1.01
+ 10 years	1.13	1.45	1.43	1.10	0.98
+ 30 years	1.31	2.26	2.19	1.20	0.87
Point estimates −2 standard deviations					
+ 3 years	1.04	1.11	1.11	1.03	1.00
+ 5 years	1.05	1.18	1.17	1.03	0.97
+ 10 years	1.05	1.36	1.34	1.02	0.90
+ 30 years	1.11	1.79	1.78	1.01	0.72
Point estimates +2 standard deviations					
+ 3 years	1.09	1.16	1.15	1.08	1.06
+ 5 years	1.13	1.26	1.25	1.11	1.06
+ 10 years	1.21	1.54	1.51	1.18	1.06
+ 30 years	1.50	2.74	2.61	1.38	1.03

* "Average catch" is the average for the projection period 2023–2051.

Sources and references

De Oliveira, J. A. A., Ellis, J. R., and Dobby, H. 2013. Incorporating density dependence in pup production in a stock assessment of NE Atlantic spurdog *Squalus acanthias*. ICES Journal of Marine Science, 70: 1341–1353. https://doi.org/10.1093/icesjms/fst080

ICES. 2021. Benchmark Workshop on North Sea Stocks (WKNSEA). ICES Scientific Reports. 3:25. 756 pp. https://doi.org/10.17895/ices.pub.7922

ICES. 2022a. Advice on fishing opportunities. *In* Report of the ICES Advisory Committee, 2022. ICES Advice 2022, section 1.1.1. https://doi.org/10.17895/ices.advice.19928060

ICES. 2022b. Working Group on Elasmobranch Fishes (WGEF). ICES Scientific Reports, 4:74. http://doi.org/10.17895/ices.pub.21089833. *In prep*.

Download the stock assessment data and figures.

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