

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 precautionary approach is applied, there should be no targeted fisheries on this stock in 2021 and 2022.

Note: This advice sheet is abbreviated due to the COVID-19 disruption. The previous advice issued for 2019 and 2020 is attached as Annex 1.

Stock development over time

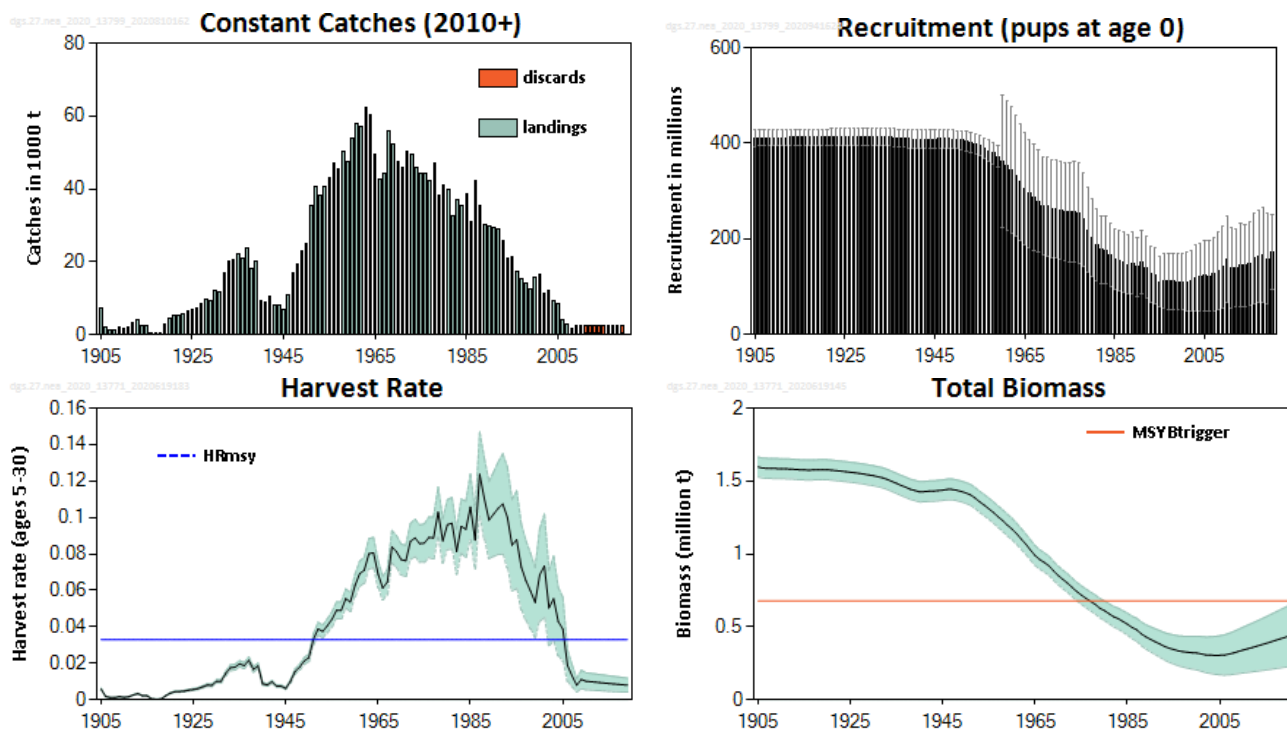


Figure 1 Spurdog in subareas 1–10, 12, and 14. Summary of the stock assessment. Long-term trends in catches (including assumed discards since 2010), mean harvest rate (average ages 5–30), recruitment (number of pups), and total biomass. Shaded areas in the bottom panels reflect estimates of precision (± 2 standard deviation) and horizontal lines indicate the associated MSY reference points. The final-year recruitment estimate is provisional, taken from the estimated stock–recruitment relationship.

Stock and exploitation status

Table 1 Spurdog in subareas 1–10, 12, and 14. State of the stock and the fishery relative to reference points.

		Fishing pressure			Stock size		
		2017	2018	2019	2018	2019	2020
Maximum sustainable yield	HR_{msy}	✓	✓	✓ Below	MSY $B_{trigger}$	✗	✗ Below trigger
Precautionary approach	HR_{pa}, HR_{lim}	✓	✓	✓ Below possible reference points	B_{pa}, B_{lim}	?	? Undefined
Management plan	F_{MGT}	—	—	— Not applicable	B_{MGT}	—	— Not applicable

Catch scenarios

Table 2 Spurdog in subareas 1–10, 12, and 14. Assumptions made for the interim year and in the forecast.

Variable	Value	Notes
Harvest rate (2020)	0.0078	The harvest rate (ages 5–10) associated with a total catch of 2468 tonnes (average catch in 2007–2009)
B _{tot} (2021)	447720	Total biomass; in tonnes
Recruitment (2020)	171756	Modelled stock–recruitment relationship, based on the number of pregnant females in the population (number of pups in thousands)
Catch (2020)	2468	Average catch in 2007–2009; in tonnes

Table 3 Spurdog in subareas 1–10, 12, and 14. Annual catch scenarios. All weights are in tonnes.

Basis	Catch		Harvest rate		B _{tot}		% B _{tot} change rel. to 2021		% advice change	
	2021	2022	2021	2022	2022	2023	2022 *	2023 *	2021 **	2022 **
ICES advice basis										
Zero catch	0	0	0	0	461188	474888	3.0	6.1	-100	-100
Other scenarios										
Average catch 2007–2009 = 2468	2468	2468	0.0076	0.0075	458701	469925	2.5	5.0	0	0
Harvest rate = HR _{MSY} × B _{tot} (2021 or 2022) / MSY B _{trigger}	7264	7430	0.022	0.023	453868	460111	1.37	2.8	194	201
TAC 2009 = 1422	1422	1422	0.0044	0.0043	459755	472029	2.7	5.4	-42	-42
Harvest rate = HR _{MSY} (0.033)	10985	10963	0.034 ***	0.034	450117	452813	0.54	1.14	345	344
SSB ₂₀₂₂ = MSY B _{trigger} ^										

* Total biomass for 2022 or 2023 relative to the total biomass for 2021.

** Catch for 2020 or 2021 relative to the advice value for 2019 and 2020 (2468 tonnes).

*** The harvest rate shown 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 HR_{MSY} because of the slightly different age structure compared to equilibrium conditions.

^The MSY B_{trigger} option was left blank because MSY B_{trigger} cannot be achieved in 2022, even with zero catch.

Quality of the assessment

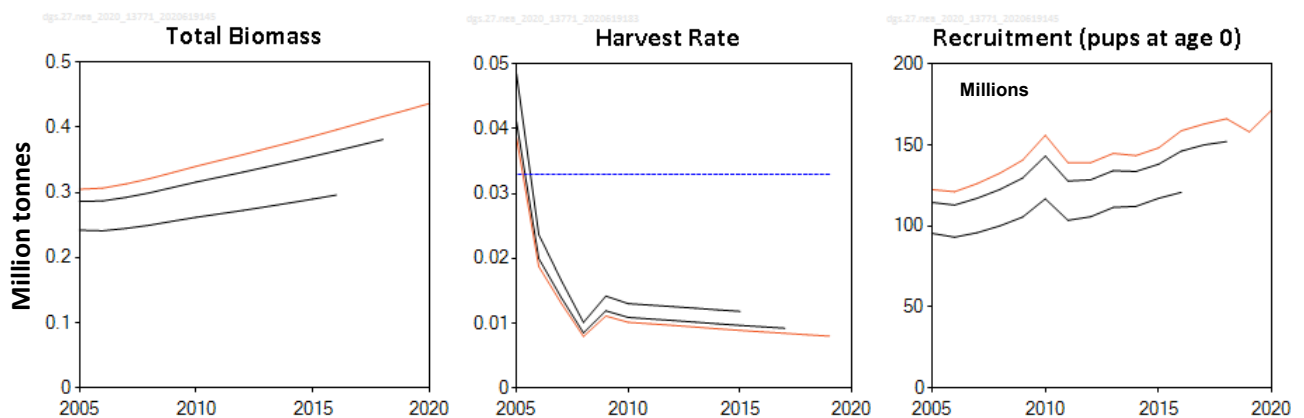


Figure 2 Spurdog in subareas 1–10, 12, and 14. Historical assessment results (final-year recruitment estimates are provisional, taken from the estimated stock–recruitment relationship). The blue dotted line is HR_{MSY} = 0.033.

Issues relevant for the advice

Based on medium-term projections (30 years), annual catches at the recent assumed level (2468 tonnes) would allow the stock to increase at a rate that is similar (8% lower) to that estimated with zero catches; therefore, ICES considers that bycatch should not exceed the recent assumed level of total catches of 2468 tonnes.

Reference points

Table 4 Spurdog in subareas 1–10, 12, and 14. Reference points, values, and their technical basis.

Framework	Reference point	Value	Technical basis	Source
MSY approach	HR _{MSY} (MSY harvest rate)	0.033	Catch as a proportion of the total biomass, assuming average selection over the ages 5–30, reflecting a non-target selection pattern	ICES (2020)
	MSY B _{trigger}	677068 tonnes	MSY B _{trigger} = B _{MSY} /1.4 (in terms of total biomass), representing a proxy for the 5th percentile of the distribution of B _{MSY}	ICES (2020)
Precautionary approach	B _{lim}	Not defined		
	B _{pa}	Not defined		
	F _{lim}	Not defined		
	F _{pa}	Not defined		
Management plan	SSB _{MGT}	NA		
	F _{MGT}	NA		

NA = not available.

History of the advice, catch, and management

Table 5 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 *	12385
2000	None		8900 *	15891
2001	None		8900 *	16693
2002	None		7100 *	11170
2003	None		5600 *	12247
2004	None		4500 *	9366
2005	None		1100 *	8426
2006	F = 0	0	1100 *	4109
2007		0	3700 **	2929
2008	F = 0	0	2600 ***	1836
2009	No fishery	0	1422	2640
2010	No new advice, same as for 2009	0	1422 [^]	1249
2011	F = 0	0	0	580
2012	F = 0	0	0	261
2013	F = 0	0	0	333
2014	No new advice, same as for 2013	0	0	383
2015	No target fishery, minimize bycatch	0	0	263
2016	No new advice, same as for 2015	0	0 ^{^^^}	373
2017	PA approach (and no target fishery and medium-term projections)	≤ 2468 [§]	0 ^{^^^}	296

Year	ICES advice	Catch corresp. to advice	Agreed TAC	ICES landings ^^
2018	PA approach (and no target fishery and medium-term projections)	≤ 2468 §	0 ^^^	363
2019	PA approach (and no target fishery and medium-term projections)	≤ 2468 §	0 ^^^	454
2020	PA approach (and no target fishery and medium-term projections)	≤ 2468 §	0 ^^^	
2021	PA approach (no targeted fisheries)	0		
2022	PA approach (no targeted fisheries)	0		

* 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 1–9.

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

§ Assumed annual catch.

Summary of the assessment

Table 6 Spurdog in subareas 1–10, 12, and 14. Summary table of estimates from the spurdog assessment: recruitment (number 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	411	428	393	1595770	1664076	1527464	7248		0.0059	0.0064	0.0054
1906	411	429	393	1588700	1657008	1520392	2200		0.00179	0.00196	0.00163
1907	411	429	394	1586910	1655222	1518598	1428		0.00117	0.00127	0.00106
1908	411	429	394	1586010	1654328	1517692	1409		0.00115	0.00126	0.00105
1909	411	429	394	1585210	1653534	1516886	2022		0.00165	0.00180	0.00151
1910	411	429	394	1583890	1652220	1515560	1563		0.00128	0.00140	0.00116
1911	411	429	394	1583140	1651476	1514804	1957		0.00160	0.00175	0.00146
1912	411	429	394	1582090	1650434	1513746	3199		0.0026	0.0029	0.0024
1913	412	429	394	1579920	1648272	1511568	4050		0.0033	0.0036	0.0030
1914	412	429	394	1577080	1645440	1508720	2641		0.0022	0.0024	0.00198
1915	412	429	394	1575800	1644172	1507428	2602		0.0021	0.0023	0.00195
1916	412	429	394	1574690	1643072	1506308	534		0.00044	0.00048	0.00040
1917	412	429	394	1575710	1644104	1507316	339		0.00028	0.00030	0.00025
1918	412	429	394	1576930	1645334	1508526	451		0.00037	0.00040	0.00034
1919	412	429	394	1578020	1646432	1509608	2659		0.0022	0.0024	0.00199
1920	412	429	394	1576950	1645372	1508528	4396		0.0036	0.0039	0.0033
1921	412	430	394	1574250	1642684	1505816	5321		0.0044	0.0048	0.0040
1922	412	430	394	1570800	1639246	1502354	5401		0.0045	0.0049	0.0041
1923	412	430	394	1567480	1635942	1499018	5655		0.0047	0.0051	0.0043
1924	412	430	394	1564130	1632608	1495652	6355		0.0053	0.0058	0.0048
1925	412	430	395	1560310	1628808	1491812	6719		0.0056	0.0061	0.0051
1926	412	430	395	1556390	1624910	1487870	7277		0.0061	0.0066	0.0055
1927	412	430	395	1552190	1620734	1483646	8395		0.0070	0.0077	0.0064
1928	413	430	395	1547190	1615760	1478620	9522		0.0080	0.0087	0.0073
1929	413	430	395	1541420	1610020	1472820	9320		0.0079	0.0086	0.0072
1930	413	431	395	1536230	1604866	1467594	11914		0.0101	0.0110	0.0092
1931	413	431	395	1528870	1597544	1460196	11838		0.0101	0.0110	0.0092
1932	413	431	395	1522050	1590770	1453330	16726		0.0144	0.0157	0.0131
1933	413	431	395	1510900	1579672	1442128	20244		0.0175	0.0191	0.0159
1934	412	430	394	1496970	1565806	1428134	20378		0.0178	0.0194	0.0162
1935	412	430	394	1483690	1552600	1414780	22266		0.0197	0.021	0.0179
1936	411	430	393	1469350	1538348	1400352	20925		0.0187	0.020	0.0170
1937	411	429	392	1457160	1526260	1388060	23930		0.022	0.024	0.0197
1938	410	428	391	1442760	1511976	1373544	18196		0.0166	0.0181	0.0151

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
1939	409	428	390	1434840	1504186	1365494	20119		0.0185	0.020	0.0168
1940	408	427	389	1425580	1495068	1356092	9428		0.0087	0.0095	0.0079
1941	408	427	389	1427420	1497062	1357778	8740		0.0081	0.0088	0.0074
1942	408	427	389	1430070	1499872	1360268	10625		0.0098	0.0107	0.0089
1943	408	427	389	1430890	1500862	1360918	8181		0.0075	0.0082	0.0069
1944	408	427	389	1434180	1504328	1364032	8151		0.0075	0.0082	0.0068
1945	408	427	389	1437440	1507768	1367112	6776		0.0062	0.0068	0.0057
1946	409	428	390	1441960	1512472	1371448	10895		0.0100	0.0108	0.0091
1947	409	428	390	1442270	1512970	1371570	16893		0.0154	0.0168	0.0140
1948	409	428	390	1436660	1507554	1365766	19491		0.0179	0.0195	0.0163
1949	408	427	389	1428730	1499826	1357634	23010		0.021	0.023	0.0193
1950	407	426	388	1417670	1488976	1346364	24750		0.023	0.025	0.021
1951	406	426	387	1405370	1476898	1333842	35301		0.033	0.036	0.030
1952	404	424	384	1383230	1454998	1311462	40550		0.039	0.042	0.035
1953	401	421	381	1356810	1428846	1284774	38206		0.037	0.041	0.034
1954	398	418	377	1333780	1406112	1261448	40570		0.041	0.044	0.037
1955	394	415	373	1309360	1382020	1236700	43127		0.044	0.048	0.040
1956	390	411	368	1283370	1356398	1210342	46951		0.049	0.054	0.044
1957	384	406	362	1254530	1327976	1181084	45570		0.049	0.054	0.044
1958	379	401	356	1228030	1301950	1154110	50394		0.055	0.061	0.050
1959	372	395	349	1197550	1272008	1123092	47394		0.054	0.059	0.048
1960	361	501	222	1170610	1243972	1097248	53997		0.063	0.069	0.057
1961	353	489	217	1137680	1209960	1065400	57721		0.069	0.076	0.062
1962	343	475	211	1101580	1172764	1030396	57256		0.071	0.078	0.064
1963	332	459	204	1066370	1136422	996318	62288		0.080	0.088	0.072
1964	318	441	196	1026380	1095288	957472	60146		0.081	0.089	0.072
1965	305	422	188	988655	1056455	920855	49336		0.069	0.076	0.062
1966	295	408	181	961705	1028487	894923	42713		0.061	0.068	0.055
1967	287	397	176	941045	1006923	875167	44116		0.065	0.071	0.058
1968	279	386	172	918435	983535	853335	56043		0.084	0.093	0.075
1969	269	372	165	883291	947769	818813	52074		0.081	0.090	0.072
1970	267	371	163	852149	916139	788159	47557		0.077	0.085	0.068
1971	263	366	161	825341	888973	761709	45653		0.076	0.085	0.068
1972	262	365	159	800439	863831	737047	50416		0.087	0.097	0.077
1973	259	362	157	770761	834057	707465	49412		0.089	0.099	0.078
1974	256	359	154	742290	805622	678958	45684		0.086	0.096	0.075
1975	255	359	152	717939	781461	654417	44119		0.086	0.096	0.075
1976	257	363	152	695762	759634	631890	44064		0.089	0.100	0.078
1977	254	359	149	674032	738418	609646	42252		0.089	0.100	0.077
1978	240	338	142	653852	718964	588740	47235		0.103	0.117	0.089
1979	218	307	129	628008	694082	561934	38201		0.087	0.099	0.075
1980	202	284	120	610689	677885	543493	40968		0.096	0.110	0.082
1981	186	261	112	589858	658338	521378	39962		0.097	0.111	0.083
1982	177	248	106	569390	639310	499470	32402		0.081	0.094	0.069
1983	176	247	104	556001	627501	484501	37046		0.095	0.110	0.080
1984	166	233	99	536749	609947	463551	35194		0.094	0.109	0.078
1985	156	219	93	518118	593102	443134	38674		0.106	0.124	0.088
1986	154	218	91	495329	572237	418421	30910		0.088	0.103	0.072
1987	152	215	89	479593	558511	400675	42356		0.124	0.147	0.101
1988	146	209	84	451678	532748	370608	35569		0.110	0.132	0.088
1989	149	214	84	430545	513951	347139	30279		0.099	0.120	0.078
1990	141	204	79	414059	499825	328293	29906		0.102	0.125	0.079
1991	150	217	83	398381	486767	309995	29563		0.105	0.130	0.080
1992	140	205	75	382497	473599	291395	29046		0.107	0.135	0.080
1993	125	184	67	366360	460200	272520	25637		0.100	0.128	0.072
1994	123	180	65	353561	450309	256813	20851		0.085	0.110	0.060
1995	110	164	56	344800	444410	245190	21318		0.088	0.115	0.061
1996	111	168	54	335472	438124	232820	17295		0.073	0.096	0.049

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
1997	111	170	53	329881	435699	224063	15348		0.065	0.087	0.043
1998	111	170	51	325745	434777	216713	13919		0.060	0.080	0.039
1999	109	168	50	322461	434711	210211	12385		0.053	0.073	0.034
2000	110	170	51	320323	435845	204801	15891		0.069	0.094	0.043
2001	109	171	48	314278	433130	195426	16693		0.073	0.102	0.045
2002	112	176	47	307387	429723	185051	11170		0.050	0.071	0.030
2003	117	186	49	306239	432239	180239	12247		0.055	0.079	0.032
2004	120	191	48	304086	433908	174264	9366		0.043	0.062	0.024
2005	122	196	49	304972	438766	171178	8426		0.039	0.056	0.021
2006	121	195	48	306748	444604	168892	4109		0.0187	0.027	0.0102
2007	126	203	49	313169	455299	171039	2929		0.0131	0.0191	0.0071
2008	133	213	52	321145	467793	174497	1836		0.0079	0.0116	0.0043
2009	141	225	56	330671	482107	179235	2640		0.0111	0.0162	0.0060
2010	156	247	65	340320	497076	183564	1249 **	1219 ***	0.0101	0.0148	0.0055
2011	139	223	56	349172	510840	187504	580 **	1888 ***	0.0099	0.0145	0.0053
2012	139	222	57	358102	524758	191446	261 **	2207 ***	0.0097	0.0141	0.0052
2013	145	231	58	367455	539295	195615	333 **	2135 ***	0.0094	0.0138	0.0050
2014	143	228	59	376770	553790	199750	383 **	2085 ***	0.0091	0.0135	0.0048
2015	148	237	60	386343	568641	204045	263 **	2205 ***	0.0089	0.0131	0.0046
2016	159	253	64	396400	584192	208608	373 **	2095 ***	0.0087	0.0128	0.0045
2017	163	260	66	406569	599885	213253	296 **	2172 ***	0.0084	0.0125	0.0044
2018	166	266	66	416836	615682	217990	363 **	2105 ***	0.0082	0.0122	0.0042
2019	158	253	64	426532	630632	222432	454 **	2014 ***	0.0080	0.0119	0.0041
2020	172 ^	250 ^	94 ^	436999	646599	227399					

* Catch data used in the assessment: before 2010, landings are assumed to represent catch; since 2010, when the TAC was first reduced by 90% (2010) and then set to zero (2011 onwards), landings are no longer considered to be representative of catch because of unquantified amounts of discarding.

** Landings considered unrepresentative of catch since 2010.

*** Discards are the difference between assumed catch (average landings 2007–2009 = 2468 tonnes are assumed to represent catches since 2010) and landings.

^ Provisional values taken from the estimated stock–recruitment relationship.

Table 7 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 2020). Estimates of total biomass relative to the total biomass in 2020 for different future catch scenarios, assuming that the catch in 2020 is 2468 tonnes (see Table 3 for the 2021 and 2022 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				
	MSY approach	Zero	TAC 2009	Average catch 2007–2009	MSY harvest rate
Average catch *	10327	0	1422	2468	12011
Point estimates					
+ 3 years	1.05	1.09	1.08	1.08	1.04
+ 5 years	1.08	1.15	1.14	1.13	1.05
+ 10 years	1.16	1.32	1.29	1.27	1.09
+ 30 years	1.42	2.15	2.05	1.98	1.28
Point estimates –2 standard deviations					
+ 3 years	1.02	1.06	1.06	1.05	1.01
+ 5 years	1.03	1.11	1.10	1.09	1.01
+ 10 years	1.05	1.25	1.22	1.20	1.02
+ 30 years	1.11	1.86	1.81	1.76	1.10
Point estimates +2 standard deviations					
+ 3 years	1.08	1.11	1.10	1.10	1.06
+ 5 years	1.13	1.19	1.17	1.16	1.09
+ 10 years	1.26	1.40	1.36	1.34	1.17
+ 30 years	1.74	2.43	2.29	2.19	1.45

* "Average catch" is the average for the projection period 2021–2049.

Sources and references

ICES. 2020. Working Group on Elasmobranch Fishes (WGEF). ICES Scientific Reports, 2:77. <http://doi.org/10.17895/ices.pub.7470>.

Recommended citation: ICES. 2020. Spurdog (*Squalus acanthias*) in subareas 1–10, 12, and 14 (the Northeast Atlantic and adjacent waters). In Report of the ICES Advisory Committee, 2020. ICES Advice 2020, dgs.27.nea. <https://doi.org/10.17895/ices.advice.5820>.