ICES Advice on fishing opportunities, catch, and effort
Celtic Seas ecoregion
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Cod (*Gadus morhua*) in Division 7.a (Irish Sea)

ICES advice on fishing opportunities

ICES advises that when the MSY approach and precautionary considerations are applied, there should be zero catch in 2023.

ICES notes the existence of a precautionary management plan, developed and adopted by one of the relevant management authorities for this stock.

Stock development over time

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

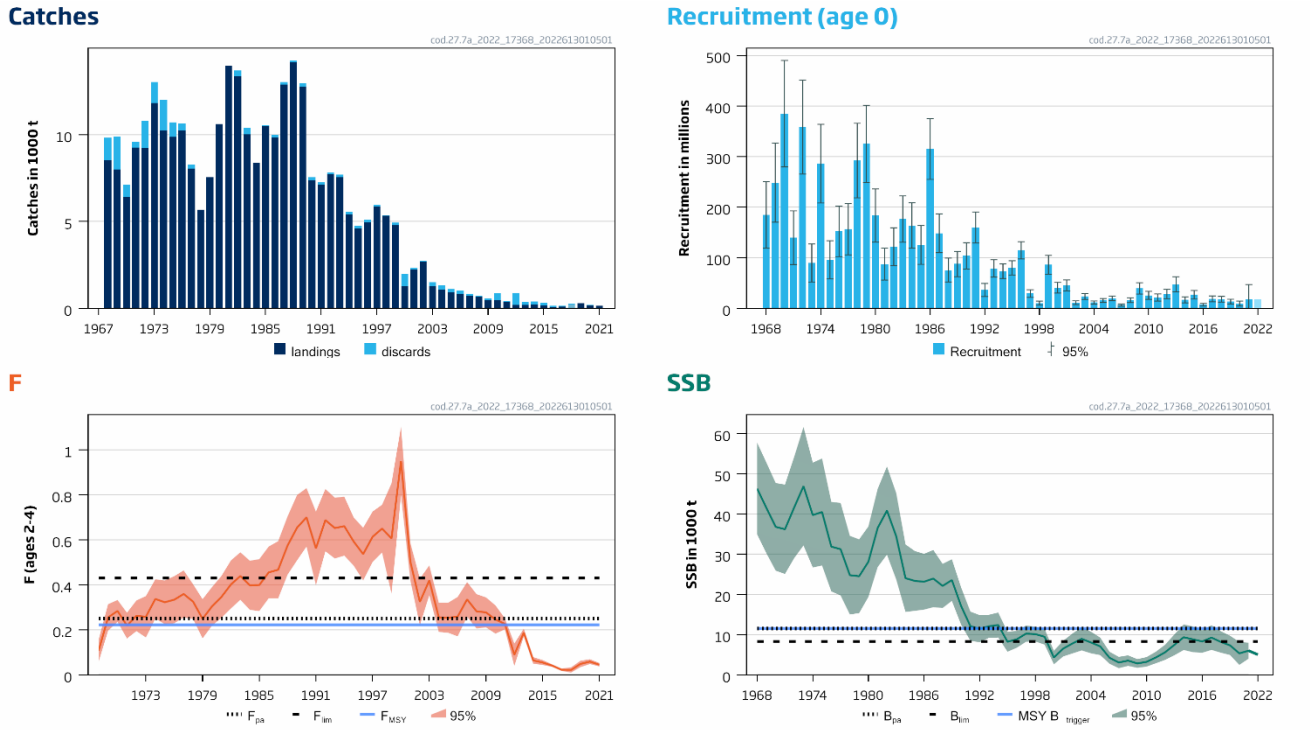

Figure 1 Cod in Division 7.a. Summary of the stock. The assumed recruitment value for 2022 is shaded in a lighter colour. The SSB in 2022 is forecasted.

Catch scenarios

Table 1 Cod in Division 7.a. Values in the forecast and for the interim year.

Variable	Value	Notes
$F_{ages\ 2–4}$ (2022)	0.038	$F_{sq} = F_{average(2018,2019,2021)}$*
SSB (2023)	4 842	Short-term forecast fishing at F_{sq}; in tonnes
$R_{age\ 0}$ (2022 and 2023)	17 989	Geometric mean (2002–2019); in thousands
Total catch (2022)	165	Fishing at F_{sq}; in tonnes
Projected landings (2022)	159	Short-term forecast assuming average landing pattern (2019–2021); in tonnes
Projected discards (2022)	6	Short-term forecast assuming average discard pattern (2019–2021); in tonnes

* F in 2020 was assumed to be unrepresentative because of the COVID-19 disruption and hence F_{sq} was calculated as $F_{average\ (2018,2019,2021)}$.

Table 2[†] Cod in Division 7.a. Annual catch scenarios. All weights are in tonnes.

Basis	Total catch (2023)	Projected landings (2023)	Projected discards (2023)	F_{total} (2023)	$F_{projected\ landings}$ (2023)	$F_{projected\ discards}$ (2023)	SSB (2024)	% SSB change*	% TAC change^	% advice change^^
ICES advice basis										
MSY approach: F = 0	0	0	0	0	0	0	5930	9.8	−100	−100
Other scenarios										
F = 0	0	0	0	0	0	0	5930	9.8	−100	−100
F_{MSY} × SSB (2023)/MSY $B_{trigger}$	448	424	23	0.104	0.099	0.0040	5410	0.19	117	510
EU MAP**: $F_{MSY\ lower}$ × SSB (2023)/MSY $B_{trigger}$	343	325	18	0.079	0.076	0.0030	5532	2.44	66	364
EU MAP**: $F_{MSY\ lower}$	704	667	37	0.168	0.162	0.0065	5116	−5.3	242	850
$F = F_{MSY}$	908	861	48	0.22	0.21	0.0086	4882	−9.6	340	1130
$F = F_{pa}$	1011	958	53	0.25	0.24	0.0097	4766	−11.7	390	1270
$F = F_{MSY\ upper}$	1093	1035	58	0.27	0.26	0.0106	4673	−13.5	430	1380
$F = F_{2022}$	170	161	9	0.038	0.037	0.00148	5732	6.1	−17.5	130
$F = F_{lim}$	1612	1526	86	0.43	0.41	0.0166	4092	−24	680	2100
$F=F_{eco}$	788	747	41	0.19	0.183	0.0074	5019	−7.1	280	960
F_{eco} × SSB (2023)/MSY $B_{trigger}$	386	366	20	0.089	0.085	0.0034	5482	1.52	87	423
SSB (2024) = SSB (2023)	457	433	24	0.106	0.102	0.0041	5400	0	122	520
SSB (2024) = B_{lim} ***										
SSB(2024)=B_{pa} = MSY $B_{trigger}$ ***										

* SSB 2024 relative to SSB 2023.
** EU multiannual plan (MAP) for the Western Waters (EU, 2019).
*** The B_{lim}, B_{pa}, and MSY $B_{trigger}$ options were left blank because none of them can be achieved in 2024, even with zero catches.
^ Total TAC in 2023 relative to the TAC in 2022 (206 tonnes).
^^ Total advice in 2023 relative to advice in 2022 (74 tonnes).

The stock is estimated to be below B_{lim}. There are no catch scenarios that will rebuild the stock above B_{lim} by 2024 and therefore ICES advises zero catch.

Basis of the advice

Table 3 Cod in Division 7.a. The basis of the advice.

Advice basis	MSY approach
Management plan	ICES is aware of the multiannual management plan (MAP) which has been adopted by the EU for this stock (EU, 2019) and which ICES considers to be precautionary. There is no agreed shared management plan with UK for this stock, and ICES provides advice according to ICES MSY approach. Catch scenarios consistent with the MAP F_{MSY} ranges are provided.

Quality of the assessment

The assessment was benchmarked in 2022 and changed from category 3 to category 1 (ICES, 2022a); therefore, historical assessments are not comparable.

Recreational removals were not included in the 2022 assessment owing to uncertainty around their calculations and selectivity patterns. This exclusion makes minor changes to the perception of the stock.

Issues relevant for the advice

The advice is for Division 7.a, excluding the rectangles 33E2 and 33E3 in the Irish Sea.

[†] Version 2: Correction to the + group weights which affects slightly the values in table 2 but does not affect the advice.

Landings have been adjusted since 2003 to exclude those taken from the southern rectangles (33E2 and 33E3) in the Irish Sea; these landings are not believed to be part of this stock (Table 8) but rather of the stock in divisions 7.e–k (western English Channel and southern Celtic Seas). The advice thus excludes these two southern rectangles for cod in Division 7.a but includes them in the assessment and advice for cod in divisions 7.e–k. This should be considered when setting TACs for the two management areas for cod in both 7.a and 7.e–k. In total, 38.8% of total Irish Sea ICES landings are reallocated, accounting for 8.2% of ICES landings in divisions 7.e–k.

During the benchmark the existence of recreational fishery for cod was noted. The relative contribution of the recreational fishery to the total catch may have increased.

A new reference point, F_{eco}, was introduced during the benchmark (ICES, 2022a). F_{eco} falls in the pre-defined F_{MSY} range and it should provide in the long-term better yield and lower risk. For Irish Sea cod, F_{eco} was derived from the inverse of sea surface temperature. This indicator is updated annually (ICES, 2019, 2020).

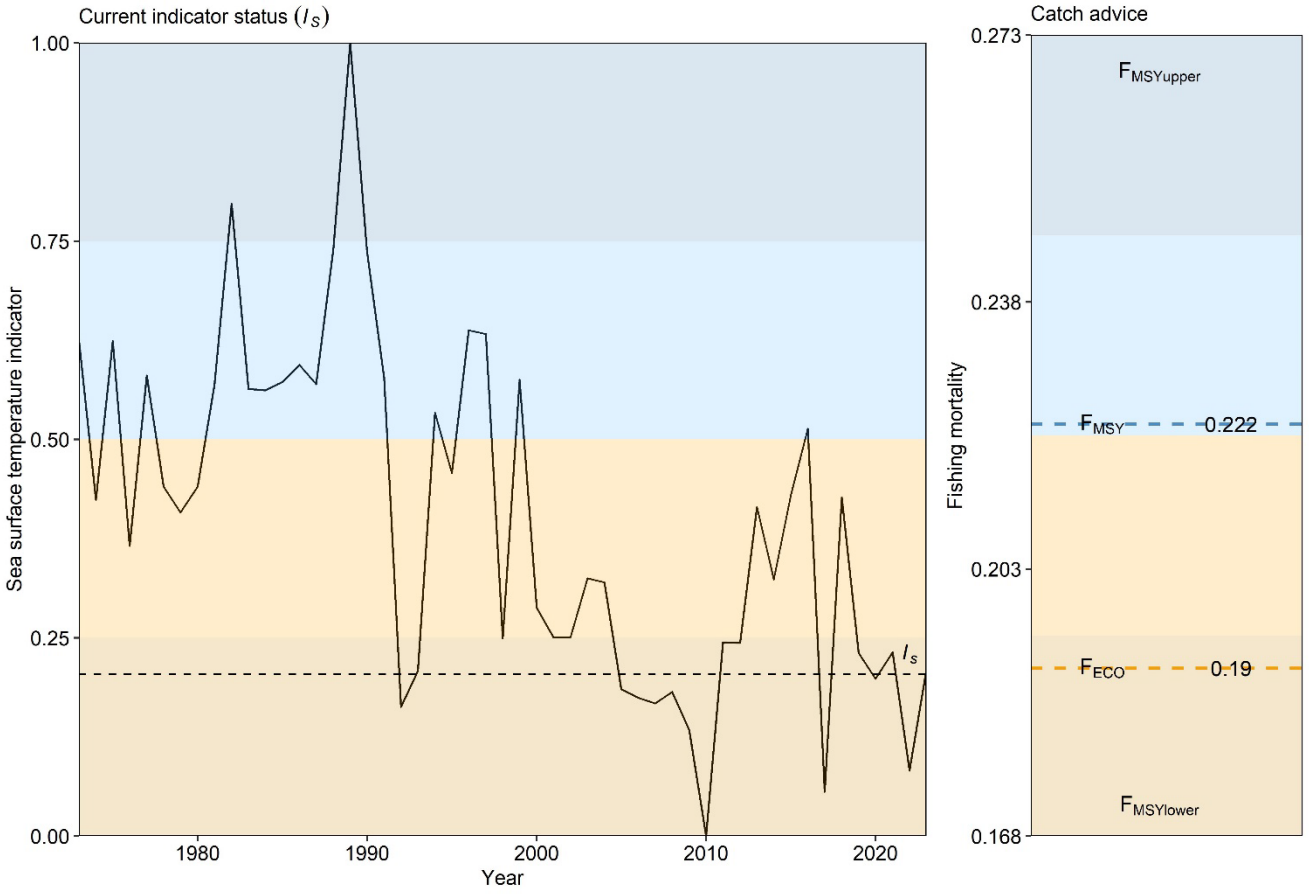

Figure 2 Derivation of F_{eco} for Irish Sea cod. Left: time-series of inverted SST (three-year lag) *I* rescaled between zero and one which informs the status of the indicator (I_s) in 2023 compared with previous years. Right: the status of the indicator determines the placement of the F_{eco} reference point within F_{MSY} ranges (ICES, 2019,2020).

Reference points

Table 4 Cod in Division 7.a. Reference points, values, and their technical basis.

Framework	Reference point	Value	Technical basis	Source
MSY approach	MSY $B_{trigger}$	11 538	B_{pa}	ICES (2022a)
	F_{MSY}	0.222	Based on a simulation using model averaged combined stock–recruitment relationship (EqSim)	ICES (2022a)
	F_{eco}	0.19	Ecosystem indicator (I_s); $F_{eco} = F_{MSY\ lower} + ([F_{MSY\ upper} - F_{MSY\ lower}]*I_s)$	ICES (2022a)
Precautionary approach	B_{lim}	8 303	Lowest SSB with above-average recruitment	ICES (2022a)
	B_{pa}	11 538	$B_{lim} \times \exp(1.645 \times \sigma)$, $\sigma = 0.20$; in tonnes	ICES (2022a)
	F_{lim}	0.43	F with 50% probability of SSB > B_{lim}	ICES (2022a)
	F_{pa}	0.25	F_{P05}; the F that leads to SSB > B_{lim} with 95% probability	ICES (2022a)
EU Management Plan (MAP)*	MAP MSY $B_{trigger}$	11 538	MSY $B_{trigger}$; in tonnes	ICES (2022a)
	MAP B_{lim}	8 303	B_{lim}; in tonnes	ICES (2022a)
	MAP F_{MSY}	0.222	F_{MSY}	ICES (2022a)
	MAP range F_{lower}	0.168	F at 95% MSY (below F_{MSY}), based on simulation using a model average combined stock–recruitment relationship (EqSim)	ICES (2022a)
	MAP range F_{upper}	0.273	F at 95 % MSY (above F_{MSY}), based on simulation using model averaged combined stock–recruitment relationship (EqSim)	ICES (2022a)

* EU multiannual plan (MAP) for the Western Waters (EU, 2019).

Basis of the assessment

Table 5 Cod in Division 7.a. Basis of assessment and advice.

ICES stock data category	1 (ICES, 2022b)
Assessment type	Age-based stochastic analytical assessment (SS3; ICES, 2022a, 2022c)
Input data	Northern Ireland Groundfish Survey quarter 1 (G7144; 1995–2021) ages 1–4, and quarter 4 (G7655; 1995–2021) age 0 recruitment index, Fishery science partnership survey UKFSP (B7897; ages 2–6, 2004–2021, excluding 2014), commercial catches (age composition of landings and discards), annual maturity from the G7144 survey and commercial landings, natural mortality estimated from tagging data (ICES, 2022a)
Discards and bycatch	Discards available since 2007, prior to 2007 are reconstructed (ICES, 2017)
Indicators	Sea surface temperature (Rayner, 2003)
Other information	This stock was benchmarked in 2022 (ICES, 2022a)
Working group	Working Group for the Celtic Seas Ecoregion

History of the advice, catch, and management

Table 6 Cod in Division 7.a. ICES advice and official landings. All weights are in tonnes.

Year	ICES advice, with single-stock exploitation boundaries since 2004	Catch corresponding to advice	Agreed TAC	Official landings	ICES landings ***	ICES discards
1987	No increase in F; interaction with *Nephrops*	10300	15000	13200	12900	
1988	No increase in F; interaction with *Nephrops*	10100	15000	15800	14200	
1989	No increase in F	13400	15000	11300	12800	
1990	F at F_{med}; TAC	15300	15300	9900	7400	
1991	Stop SSB decline; TAC	6000	10000	7000	7100**	
1992	20% of F(90) ~ 10 000 tonnes	10000	10000	7400	7700**	
1993	F_{med} ~ 10 200 tonnes	10200	11000	5900	7600**	
1994	60% reduction in F	3700	6200	4500	5400**	
1995	50% reduction in F	3900	5800	4500	4600**	
1996	30% reduction in F	5400	6200	5303	4964**	
1997	30% reduction in F	5900	6200	4441	5859**	
1998	No increase in F	6200	7100	4962	5318**	
1999	Reduce F below F_{pa}	4900	5500	2875	4784**	

Year	ICES advice, with single-stock exploitation boundaries since 2004	Catch corresponding to advice	Agreed TAC	Official landings	ICES landings ***	ICES discards
2000	Lowest possible F	0	2100	1417	1274	
2001	Lowest possible F	0	2100	2026	2252	
2002	Establish recovery plan	-	3200	2715	2695	
2003	Closure of all fisheries for cod	-	1950	1477	1285	
2004	Zero catch	0	2150	1179	1072	
2005	Zero catch	0	2150	967	910	
2006	Zero catch	0	1828	948	840	
2007	Zero catch	0	1462	1117	702	148
2008	Zero catch	0	1199	1224	661	62
2009	Zero catch	0	899	765	468	60
2010	Zero catch	0	674	594	464	377
2011	Zero catch	0	506	485	368	43
2012	Zero catch	0	380	326	198	658
2013	No directed fisheries, minimize bycatch and discards	0	285	281	206	118
2014	No directed fisheries, minimize bycatch and discards	0	228	236	213	149
2015	No directed fisheries, minimize bycatch and discards	0	182	199	161	224
2016	No directed fisheries, minimize bycatch and discards	0	146	122	82	60
2017	MSY approach	0	146	103	84	59
2018	MSY approach	≤ 1073	695	235	215	42
2019	MSY approach	≤ 807	807	205†	295	7
2020	Precautionary approach	≤ 116	257	252*	181	25
2021	Precautionary approach	≤ 93	206	184*	133	4
2022	Precautionary approach	≤ 74	206			
2023	MSY approach and precautionary considerations	0				

* Preliminary.
** Includes sample-based estimates of landings into three ports.
*** Excludes landings reported from rectangles 33E2 and 33E3 since 2004.
† Incomplete/missing as a result of part of the data being unavailable under data confidentiality clauses.

History of the catch and landings

Table 7 Cod in Division 7.a. Catch distribution by fleet in 2021 as estimated by ICES.

<table>
<tr><td>Catch</td><td colspan="5">Landings</td></tr>
<tr><td rowspan="8">137 tonnes</td><td colspan="2">Otter trawls</td><td>Midwater trawl</td><td>Beam trawls</td><td>Other gear types</td></tr>
<tr><td>Nephrops directed
33%</td><td>Demersal fish directed
37%</td><td>18.7%</td><td>9.4%</td><td>1%</td></tr>
<tr><td colspan="5">133 tonnes</td></tr>
<tr><td colspan="5">Discards</td></tr>
<tr><td colspan="2">Otter trawls</td><td>Midwater trawl</td><td>Beam trawls</td><td>Other gear types</td></tr>
<tr><td>Nephrops directed
77%</td><td>Demersal fish directed
< 1%</td><td>< 1%</td><td>22%</td><td>1%</td></tr>
<tr><td colspan="5">4 tonnes</td></tr>
</table>

Table 8 Cod in Division 7.a. History of commercial catches; official landings by country and ICES estimates of total landings and discards. All weights are in tonnes, minor differences in total value are due to rounding.

Year	Belgium	France	Ireland	Netherlands	Spain	UK (England Wales, & NI)	UK (Isle of Man)	UK (Scotland)	Total	Landings in rectangles 33E2 & 33E3***	ICES Landings	ICES discards
1996	142	148	2476	25	-	2359	27	126	5303		4964**	
1997	183	268	1492	29	-	2370	19	80	4441		5859**	
1998	316	269	1739	20	-	2517	34	67	4962		5318**	
1999	150	n/a	966	5	-	1665	9	80	2875		4784**	
2000	60	53	455	1	-	799	11	38	1417		1274	
2001	283	74	751	-	-	885	1	32	2026		2252	
2002	318	116	1111	-	-	1134	7	29	2715		2695	
2003	183	151	594	-	14	505	7	23	1477		1285	
2004	104	29	380	-	-	646	5	15	1179	108	1072	
2005	115	35	220	-	-	594	n/a	3	967	54	910	
2006	60	18**	275	-	-	589	n/a	6	948	103	840	
2007	67	17**	608	-	-	423	n/a	2	1117	527	702	148
2008	26	3	618**	-	-	543	22	12	1224	558	661	62
2009	19	12	323**	-	-	387	12	12	765	193	468	60
2010	21	1	289	-	-	282	1	-	594	143	464	377
2011	36	3	275	-	-	169	1	-	485	147	368	43
2012	23	1	193	-	-	109	< 1	-	326	85	198	658
2013	13	< 1	160			107	< 1	-	281	76	206	118
2014	9	< 1	148	-	-	79	< 1	-	236	24	213	149
2015	12	< 1	137	-	-	50	< 1	-	199	39	161	224
2016	3	< 1	84	-	-	35	< 1	-	122	40	82	60
2017	5	< 1	57	-	-	41	< 1	< 1	103	19	84	59
2018	2	< 1	105	-	-	128	< 1	< 1	235	20	215	42
2019	10	< 1	†	-	-	195	< 1	< 1	205†	37	295	7
2020*	10	0	76	-	-	95	< 1	< 1	252	71	181	25
2021*	3	0	93	-	-	89	<1	<1	184	52	133	4

* Preliminary official landings.

** Includes sample-based estimates of landings into ports.

*** Landings in the southern part of Division 7.a (rectangles 33E2 and 33E3) are not included in the assessment and are considered to be part of the cod stock in divisions 7.e–k.

† Incomplete/missing as a result of part of the data being unavailable under data confidentiality clauses.

Summary of the assessment

Table 9 Cod in Division 7.a. Assessment summary. All weights are in tonnes, recruitment (age 0) in thousands. 'Low' and 'High' refer to 95% confidence intervals.

Year	Recruitment age 0			SSB			Landings	Discards	Fishing mortality ages 2–4		
	Low	Value	High	Low	Value	High			Low	Value	High
1968	146962	212818	278674	34934	46341	57748	8541	1285	0.059	0.108	0.156
1969	134614	212818	291022	30242	41512	52782	7991	1898	0.196	0.26	0.31
1970	79297	184549	289801	25921	36819	47717	6426	708	0.24	0.28	0.33
1971	195211	248327	301443	25101	36214	47328	9246	363	0.162	0.22	0.28
1972	292036	384744	477452	29061	41664	54267	9234	1546	0.194	0.26	0.33
1973	102005	139637	177269	32188	46927	61667	11819	1222	0.166	0.26	0.35
1974	280484	358296	436108	26715	39749	52783	10251	1749	0.25	0.34	0.42
1975	51901	89533	127165	27201	40510	53818	9863	857	0.23	0.32	0.42
1976	235851	286027	336203	20762	31895	43028	10247	381	0.23	0.33	0.44
1977	45127	95891	146655	19752	31257	42762	8054	201	0.25	0.36	0.46
1978	78345	152041	225737	15019	24799	34579	5662	0	0.25	0.33	0.4
1979	80263	156311	232359	15368	24541	33713	7548	0	0.162	0.25	0.34

Year	Recruitment age 0			SSB			Landings	Discards	Fishing mortality ages 2–4		
	Low	Value	High	Low	Value	High			Low	Value	High
1980	239567	292095	344623	19393	28154	36916	10599	0	0.22	0.3	0.39
1981	293444	325000	356556	26816	36538	46259	13958	0	0.25	0.35	0.44
1982	146139	183575	221011	29889	40865	51841	13381	313	0.29	0.4	0.51
1983	41580	87444	133308	23719	34460	45201	10015	372	0.33	0.44	0.54
1984	77218	121906	166594	15660	24049	32437	8383	2	0.29	0.4	0.51
1985	138125	176541	214957	15943	23371	30800	10483	61	0.28	0.4	0.51
1986	103594	163766	223938	16236	23174	30112	9852	154	0.34	0.45	0.57
1987	87022	125242	163462	16830	23944	31059	12894	128	0.34	0.47	0.59
1988	291263	314979	338695	16638	22126	27614	14168	109	0.45	0.57	0.7
1989	123188	148276	173364	18403	23577	28751	12751	202	0.51	0.65	0.8
1990	49786	75658	101530	12468	17093	21719	7379	159	0.57	0.7	0.83
1991	57023	87599	118175	8473	12099	15725	7095	163	0.4	0.56	0.73
1992	90849	103824	116799	8115	11486	14857	7735	98	0.55	0.69	0.83
1993	142592	159860	177128	9225	12087	14948	7555	155	0.52	0.65	0.79
1994	21708	36349	50990	9303	12400	15497	5402	142	0.53	0.66	0.79
1995	64909	79041	93172	5765	8234	10704	4587	166	0.48	0.59	0.7
1996	56511	73406	90302	6747	8845	10942	4964	140	0.42	0.54	0.65
1997	72462	79988	87515	8237	10256	12274	5859	120	0.5	0.61	0.73
1998	110742	114682	118622	8309	10136	11963	5318	29	0.54	0.65	0.76
1999	10399	29215	48031	7531	9471	11412	4784	159	0.36	0.61	0.85
2000	0	10300	20943	2628	4321	6015	1274	699	0.8	0.95	1.1
2001	75200	85980	96760	4576	6527	8477	2252	64	0.42	0.5	0.58
2002	36988	40830	44672	5337	7807	10276	2695	46	0.22	0.32	0.43
2003	39805	45489	51173	6084	8965	11846	1285	215	0.35	0.42	0.49
2004	8044	11180	14316	5367	8052	10737	1072	254	0.191	0.26	0.32
2005	19426	23209	26992	4919	7094	9270	910	204	0.187	0.25	0.32
2006	6928	11475	16022	2764	4255	5747	840	185	0.171	0.26	0.35
2007	13523	15620	17718	1671	3072	4473	702	145	0.26	0.34	0.41
2008	15086	19634	24181	2236	3544	4851	662	61	0.21	0.28	0.36
2009	0	6406	17461	1764	2840	3916	466	88	0.21	0.28	0.34
2010	8238	16137	24036	2064	3242	4420	464	386	0.183	0.25	0.31
2011	32304	39400	46495	2888	4322	5757	365	48	0.2	0.23	0.25
2012	16258	25608	34957	3736	5617	7499	198	678	0.039	0.089	0.139
2013	6289	21342	36395	4879	7466	10053	206	152	0.171	0.188	0.21
2014	22163	28200	34236	6188	9363	12538	213	184	0.05	0.064	0.079
2015	38890	47279	55668	5646	8841	12036	161	147	0.044	0.055	0.066
2016	13938	16662	19387	5511	8313	11116	82	60	0.036	0.041	0.047
2017	20971	26831	32692	6213	9270	12328	84	59	0.0175	0.023	0.028
2018	1441	7164	12887	5531	8196	10862	215	42	0.01	0.022	0.033
2019	14158	18842	23527	4945	7336	9727	295	7	0.035	0.049	0.063
2020	12947	17867	22787	2483	5345	8206	181	25	0.048	0.059	0.07
2021	0	13315	42715	4034	6014	7994	133	4	0.037	0.045	0.053
2022		17989*			5029						

*Geometric mean 2002–2019.

Sources and references

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Download the stock assessment data and figures.

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