

Cod (*Gadus morhua*) in subareas 1 and 2 (Northeast Arctic)

ICES advice on fishing opportunities

ICES advises that when the Joint Norwegian–Russian Fisheries Commission (JRNFC) management plan is applied, catches in 2022 should be no more than 708 480 tonnes.

Stock development over time

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

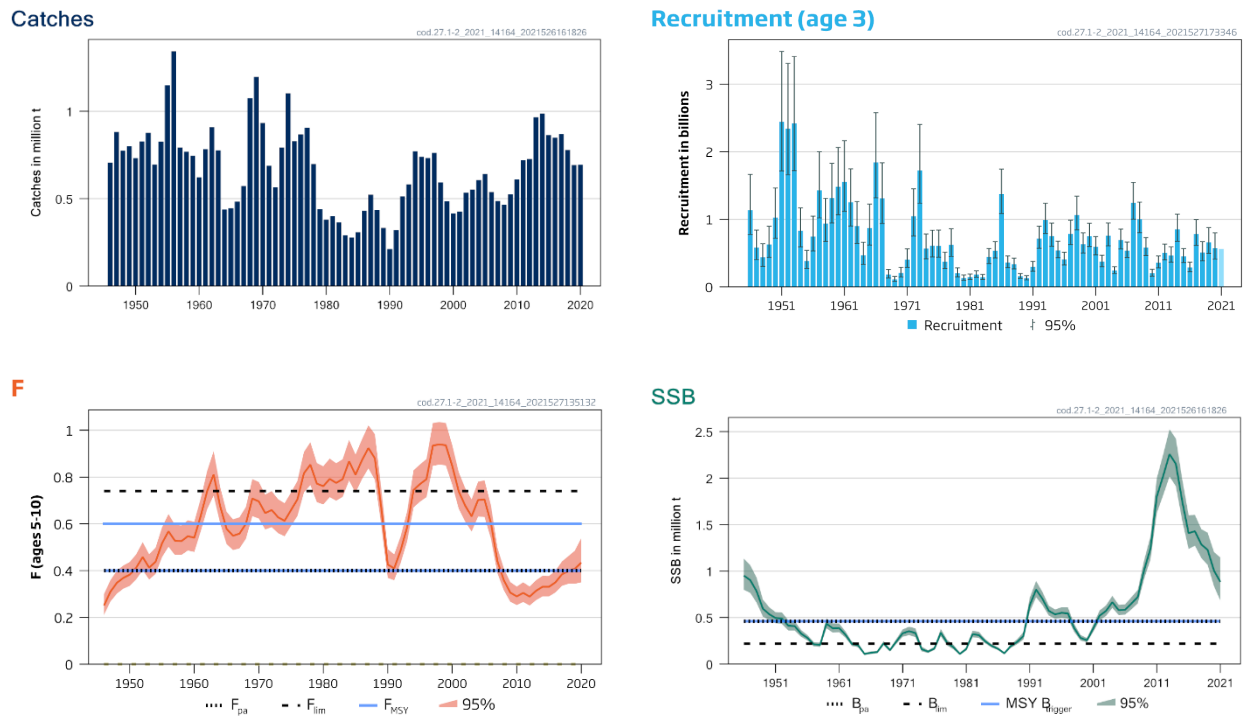


Figure 1 Cod in subareas 1 and 2 (Northeast Arctic). Catch, recruitment, F , and SSB. For this stock, F_{MSY} and F_{MGT} ranges from 0.40 to 0.60, and there are three SSB_{MGT} values (460 000, 920 000 and 1 380 000 tonnes) which are not shown.

Catch scenarios

Table 1 Cod in subareas 1 and 2 (Northeast Arctic). Values in the forecast and for the interim year.

Variable	Value	Notes
$F_{ages\ 5-10}$ (2021)	0.646	Based on a catch of 885 600 t for 2021.
SSB (2022)	681 435	From assessment; tonnes
$R_{age\ 3}$ (2021)	561 000	From recruitment model; thousands
$R_{age\ 3}$ (2022)	621 000	From recruitment model; thousands
$R_{age\ 3}$ (2023)	548 000	From recruitment model; thousands
Total catch (2021)	885 600	TAC; tonnes

Table 2 Cod in subareas 1 and 2 (Northeast Arctic). Annual catch scenarios. All weights are in tonnes.

Basis	Total catch (2022)	Ftotal (2022)	SSB (2023)	% SSB change *	% TAC change **	% Advice change **
ICES advice basis						
Management plan ^	708 480	0.61	567 229	-17	-20	-20
Other scenarios						
MSY approach: FMSY	505 902	0.40	705 261	3	-43	-43
F = 0	0	0	1 082 377	59	-100	-100
F = F ₂₀₂₀	540 813	0.43	680 872	0	-39	-39
F _{pa}	505 902	0.40	705 261	3	-43	-43
F _{lim}	812 446	0.74	499 914	-27	-8	-8

* SSB 2023 relative to SSB 2022.

** Advice value for 2022 relative to TAC and advice value for 2021 (885 600 tonnes).

^ Since SSB in 2022 is between $B_{pa} = 460\,000$ tonnes and $2 \times B_{pa} = 920\,000$ tonnes, $F = 0.40$ is used in the 3-year prediction, giving catches of 505 902, 531 017 and 561 983 tonnes in 2022, 2023, and 2024, respectively. The average of this is 532 968 tonnes. According to the harvest control rule (HCR), the maximum decrease in TAC is limited by 20%, giving a catch of 708 480 tonnes, which corresponds to an F of 0.50 in 2022.

The advice for 2022 is 20% lower than the advice for 2021 due to a declining stock trend and the application of the 20% TAC change constraint.

Basis of the advice

Table 3 Cod in subareas 1 and 2 (Northeast Arctic). The basis of the advice.

Advice basis	Joint Russian–Norwegian Fisheries Commission management plan
Management plan	<p>At the 46th meeting of the Joint Russian–Norwegian Fisheries Commission (JRNFC) in October 2016, the previously used management plan was amended, and the current plan is as follows:</p> <p>The TAC is calculated as the average catch predicted for the coming three years, using the target level of exploitation (F_{tr}).</p> <p>The target level of exploitation is calculated according to the spawning-stock biomass (SSB) in the first year of the forecast as follows:</p> <ul style="list-style-type: none"> - if $SSB < B_{pa}$, then $F_{tr} = SSB/B_{pa} \times F_{MSY}$; - if $B_{pa} \leq SSB \leq 2 \times B_{pa}$, then $F_{tr} = F_{MSY}$; - if $2 \times B_{pa} < SSB < 3 \times B_{pa}$, then $F_{tr} = F_{MSY} \times (1 + 0.5 \times (SSB - 2 \times B_{pa})/B_{pa})$; - if $SSB \geq 3 \times B_{pa}$, then $F_{tr} = 1.5 \times F_{MSY}$; <p>where $F_{MSY} = 0.40$ and $B_{pa} = 460\,000$ tonnes.</p> <p>If the SSB in the present year, the previous year, and each of the three years of prediction is above B_{pa}, the TAC should not be changed by more than $\pm 20\%$ compared with the previous year's TAC. In this case, however, F_{tr} should not be below 0.30.</p> <p>In 2014, JRNFC decided that from 2015 onwards, Norway and Russia can transfer to or borrow from the following year up to 10% of their country's quota.</p> <p>ICES evaluated this harvest control rule in 2016 (ICES, 2016a) and 2021 (ICES, 2021a) and concluded that it is precautionary.</p>

Quality of the assessment

Input data and assessment model settings were changed at the benchmark (ICES, 2021a), and this resulted in a downward revision of SSB.

All surveys, in particular the ecosystem survey, indicate a decrease in abundance from 2020 to 2021 that is larger than expected and therefore the assessment is more uncertain than usual.

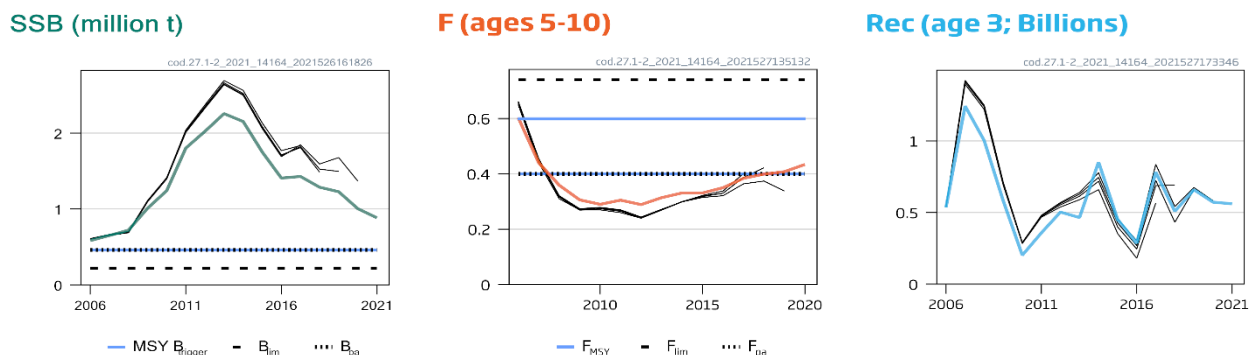


Figure 2 Cod in subareas 1 and 2 (Northeast Arctic). Historical assessment results. There was a benchmark revision in 2021.

Issues relevant for the advice

Fisheries targeting Northeast Arctic (NEA) cod take as bycatch a considerable part of the total golden redfish (*Sebastes norvegicus*) catch, and this bycatch is still above any sustainable catch level. Measures to minimize bycatch levels are essential.

Bycatch of coastal cod should be kept as low as possible in order to promote rebuilding of the coastal cod (*Gadus morhua*) stock.

The advice this year is considerably lower than last year. The stock abundance is revised downwards due to both a downward revision following the benchmark (ICES, 2021a) and to unexpectedly low survey indices.

The advice for 2022 is robust to the intermediate year catch assumption due to the 20% constraint on annual TAC change.

Reference points

Table 4 Cod in subareas 1 and 2 (Northeast Arctic). Reference points, values, and their technical basis.

Framework	Reference point	Value	Technical basis	Source
MSY approach	MSY $B_{trigger}$	460 000 t	B_{pa} and trigger point in HCR	ICES (2003, 2021a)
	F_{MSY}	0.40–0.60	Long-term simulations	ICES (2003, 2021a)
Precautionary approach	B_{lim}	220 000 t	Change point regression	ICES (2003, 2021a)
	B_{pa}	460 000 t	The lowest SSB estimate having > 90% probability of remaining above B_{lim}	ICES (2003, 2021a)
	F_{lim}	0.74	F corresponding to an equilibrium stock = B_{lim}	ICES (2003, 2021a)
	F_{pa}	0.40	The highest F estimate having > 90% probability of remaining below F_{lim}	ICES (2003, 2021a)
Management plan	SSB_{mgt}	460 000 t	Two-step (double hockey stick) HCR, see Table 3	ICES (2017)
	F_{mgt}	0.40–0.60	Two-step (double hockey stick) HCR, see Table 3	ICES (2017)

Basis of the assessment

Table 5 Cod in subareas 1 and 2 (Northeast Arctic). Basis of the assessment and advice.

ICES stock data category	1 (ICES, 2021b).
Assessment type	Age-based analytical assessment (SAM; ICES, 2021c) that uses catches in the model and in the forecast
Input data	Commercial catches (international landings, ages and length frequencies from catch sampling); four survey indices (Joint Norwegian-Russian survey Barents Sea, Feb–Mar (G5348) bottom trawl (BTr) and acoustic (Aco) indices; Russian bottom trawl survey, Oct–Dec (G5348); Joint Norwegian-Russian Ecosystem survey (A5216; Btr)); annual maturity data from the four surveys; natural mortalities from annual stomach sampling.
Discards and bycatch	Discarding is considered negligible in recent years (below 5%). Bycatch is included.
Indicators	None.
Other information	Last benchmarked in February 2021 (ICES, 2021a).
Working group	Arctic Fisheries Working Group (AFWG).

History of the advice, catch, and management

Table 6 Cod in subareas 1 and 2 (Northeast Arctic). ICES advice, agreed TACs, the official and unreported landings, and ICES catches. All weights are in tonnes.

Year	ICES advice	Catch corresponding to advice	Agreed TAC	Official catches	Unreported landings (included in ICES catches)	ICES catches
1987	Gradual reduction in F	595000	560000	552000		523071
1988	F = 0.51; TAC (Advice November 1987, revised advice May 1988)	530000 (320000–360000)	590000 (451000)	459000		434939
1989	Large reduction in F	335000	300000	348000		332481
1990	F at Flow; TAC	172000	160000	210000	25000	212000
1991	F at Flow; TAC	215000	215000	294000	50000	319158
1992	Within safe biological limits	250000	356000	421000	130000	513234
1993	Healthy stock	256000	500000	575000	50000	581611
1994	No long-term gains in increased F	649000	700000	795000	25000	771086
1995	No long-term gains in increased F	681000	700000	763000		739999
1996	No long-term gains in increased F	746000	700000	759000		732228
1997	Well below F_{med}	< 993000	850000	792000		762403
1998	F less than F_{med}	514000	654000	615000		592624
1999	Reduce F to below F_{pa}	360000	480000	506000		484910
2000	Increase B above B_{pa} in 2001	110000	390000			414870
2001	High probability of $SSB > B_{pa}$ in 2003	263000	395000			426471
2002	Reduce F to well below 0.25	181000	395000		90000	535045
2003	Reduce F to below F_{pa}	305000	395000		115000	551990
2004	Reduce F to below F_{pa}	398000	486000		117000	606445
2005	Take into account coastal cod and redfish bycatches; apply catch rule	485000	485000		166000	641276
2006	Take into account coastal cod and redfish bycatches; apply amended catch rule	471000	471000		67100	537642
2007	Take into account coastal cod and redfish bycatches; F_{pa}	309000	424000		41087	486883
2008	Take into account coastal cod and redfish bycatches; apply catch rule	409000	430000		15000	464171
2009	Take into account coastal cod and redfish bycatches; apply catch rule	473000	525000		0	523431
2010	Take into account coastal cod and redfish bycatches; apply catch rule.	577500	607000		0	609983
2011	Take into account coastal cod and redfish bycatches; apply catch rule	703000	703000		0	719829

Year	ICES advice	Catch corresponding to advice	Agreed TAC	Official catches	Unreported landings (included in ICES catches)	ICES catches
2012	Take into account coastal cod and redfish bycatches; apply catch rule	751000	751000		0	727663
2013	Take into account coastal cod and <i>S. marinus</i> ^^ bycatches; apply catch rule	940000	1000000		0	966209
2014	Take into account coastal cod and <i>S. marinus</i> ^^ bycatches; apply catch rule	993000	993000		0	986449
2015	Take into account coastal cod and <i>S. norvegicus</i> bycatches. Apply catch rule.	894000	894000		0	864384
2016	Take into account coastal cod and <i>S. norvegicus</i> bycatches; apply catch rule	805000	894000		0	849422
2017	Take into account coastal cod and <i>S. norvegicus</i> bycatches; apply management plan	≤ 805000	890000 ^		0	868276
2018	Take into account coastal cod and <i>S. norvegicus</i> bycatches; apply management plan	712000	775000		0	778627
2019	Take into account coastal cod and <i>S. norvegicus</i> bycatches; apply management plan	674678	725000		0	692609
2020	Apply management plan	≤ 689672	738000		0	692903
2021	Apply management plan	≤ 885600	885600			
2022	Apply management plan	≤ 708480				

^ The 2017 TAC was set according to the management plan agreed by JNRFC in October 2016.

^^ Until 2014 this species was named *Sebastes marinus*, thereafter *Sebastes norvegicus*.

History of the catch and landings

Table 7 Cod in subareas 1 and 2 (Northeast Arctic). Catches inside and outside the NEAFC Regulatory Area (RA) as estimated by ICES.

Year	Inside the NEAFC RA (tonnes)	Outside the NEAFC RA (tonnes)	Total catches (tonnes)	Proportion inside the NEAFC RA (%)
2018	1726	776901	778627	0.22%
2019	1094	691515	692609	0.16%
2020	1616	691296	692903	0.23%

Table 8 Cod in subareas 1 and 2 (Northeast Arctic). Catch distribution by fleet in 2020 as estimated by ICES.

Catch (2020)	Landings		Discards
	74% demersal trawls	26 % other gear types	
692 903 tonnes	692 903 tonnes		Unknown, but discarding is considered to be negligible

Table 9 Cod in subareas 1 and 2 (Northeast Arctic). History of commercial landings by country. All weights are in tonnes.

Year	Faroe Islands	France	German Dem. Rep.	Fed.Rep.Germany	Greenland	Iceland	Norway	Poland	United Kingdom	Russia**	Spain	Others	Total
1961	3934	13755	3921	8129			268377	-	158113	325780		1212	783221
1962	3109	20482	1532	6503			225615	-	175020	476760		245	909266
1963	-	18318	129	4223			205056	108	129779	417964		-	775577
1964	-	8634	297	3202			149878	-	94549	180550		585	437695
1965	-	526	91	3670			197085	-	89962	152780		816	444930
1966	-	2967	228	4284			203792	-	103012	169300		121	483704
1967	-	664	45	3632			218910	-	87008	262340		6	572605
1968	-	-	225	1073			255611	-	140387	676758		-	1074084
1969	29374	-	5907	5543			305241	7856	231066	612215		133	1197226
1970	26265	44245	12413	9451			377606	5153	181481	276632		-	933246
1971	5877	34772	4998	9726			407044	1512	80102	144802		215	689048
1972	1393	8915	1300	3405			394181	892	58382	96653		166	565287
1973	1916	17028	4684	16751			285184	843	78808	387196		276	792686
1974	5717	46028	4860	78507			287276	9898	90894	540801		38453	1102434
1975	11309	28734	9981	30037			277099	7435	101843	343580		19368	829377
1976	11511	20941	8946	24369			344502	6986	89061	343057		18090	867463
1977	9167	15414	3463	12763			388982	1084	86781	369876		17771	905301
1978	9092	9394	3029	5434			363088	566	35449	267138		5525	698715
1979	6320	3046	547	2513			294821	15	17991	105846		9439	440538
1980	9981	1705	233	1921			232242	3	10366	115194		8789	380434
1981	12825	3106	298	2228			277818		5262	83000	14500	-	399037
1982	11998	761	302	1717			287525		6601	40311	14515	-	363730
1983	11106	126	473	1243			234000		5840	22975	14229	-	289992
1984	10674	11	686	1010			230743		3663	22256	8608	-	277651
1985	13418	23	1019	4395			211065		3335	62489	7846	4330	307920
1986	18667	591	1543	10092			232096		7581	150541	5497	3505	430113
1987	15036	1	986	7035			268004		10957	202314	16223	2515	523071
1988	15329	2551	605	2803			223412		8107	169365	10905	1862	434939
1989	15625	3231	326	3291			158684		7056	134593	7802	1273	332481
1990	9584	592	169	1437			88737		3412	74609	7950	510	187000
1991	8981	975		2613			126226		3981	119427***	3677	3278	269158
1992	11663	2		3911	3337		168460		6120	182315	6217	1209	383234
1993	17435	3572		5887	5389	9374	221051		11336	244860	8800	3907	531611
1994	22826	1962		8283	6882	36737	318395		15579	291925	14929	28568	746086
1995	22262	4912		7428	7462	34214	319987		16329	296158	15505	15742	739999
1996	17758	5352		8326	6529	23005	319158		16061	305317	15871	14851	732228
1997	20076	5353		6680	6426	4200	357825		18066	313344	17130	13303	762403
1998	14290	1197		3841	6388	1423	284647		14294	244115	14212	8217	592624
1999	13700	2137		3019	4093	1985	223390		11315	210379	8994	5898	484910
2000	13350	2621		3513	5787	7562	192860		9165	166202	8695	5115	414870
2001	12500	2681		4524	5727	5917	188431		8698	183572	9196	5225	426471
2002	15693	2934		4517	6419	5975	202559		8977	184072	8414	5484	445045
2003	19427	2921		4732	7026	5963	191977		8711	182160	7924	6149	436990
2004	19226	3621		6187	8196	7201	212117		14004	201525	11285	6082	489445
2005	16273	3491		5848	8135	5874	207825		10744	200077	9349	7660	475276
2006	16327	4376		3837	8164	5972	201987		10594	203782	9219	6271	470527

Year	Faroe Islands	France	German Dem. Rep.	Fed. Rep. Germany	Greenland	Iceland	Norway	Poland	United Kingdom	Russia**	Spain	Others	Total
2007	14788	3190		4619	5951	7316	199809		9298	186229	9496	5101	445796
2008	15812	3149		4955	5617	7535	196598		8287	190225	9658	7336	449171
2009	16905	3908		8585	4977	7380	224298		8632	229291	12013	7442	523431
2010	15977	4499		8442	6584	11299	264701		9091	267547	12657	9185	609983
2011	13429	1173		4621	7155	12734	331535		8210	310326	13291	17354^	719829
2012	17523	2841		8500	8520	9536	315739		11166	329943	12814	11081	727663
2013	13833	7858		8010	7885	14734	438734		12536	432314	15042	15263	966209
2014	33298	8149		6225	10864	18205	431846		14762	433479	16378	13243	986449
2015	26568	7480		6427	7055	16120	377983		11778	381778	19905	9880	864384
2016	24084	7946		6336	8607	16031	348949		13583	394107	14640	15139	849422
2017	28637	9554		5977	13638	11925	357419		16731	396180	14414	13802	868276
2018	26152	6605		9768	12743	10708	333539		11533	340364	13143	14071	778627
2019	22270	6371		8470	7553	12294	282120		11214	316813	13939	11565	692609
2020*	21679	5796		9725	7391	9734	289472		12113	312683	11403	12908	692903

* Provisional figures.

** USSR prior to 1991.

*** Includes Baltic countries.

^ Includes unspecified EU catches.

Summary of the assessment

Table 10 Cod in subareas 1 and 2 (Northeast Arctic). Assessment summary. High and low refer to 95% confidence bounds.

Year	Recruitment			Spawning-stock biomass			Total catch tonnes	Fishing mortality		
	Recruitment (Age 3)	High	Low	SSB	High	Low		F (ages 5–10)	High	Low
	thousands			tonnes						
1946	1135788	1664641	774950	951257	1133533	798292	706000	0.25	0.30	0.21
1947	581941	841062	402652	903002	1064717	765848	882017	0.31	0.36	0.27
1948	438495	638891	300955	784808	931879	660949	774295	0.35	0.40	0.30
1949	625699	896565	436666	595004	693457	510529	800122	0.37	0.42	0.32
1950	1026289	1465231	718842	535963	610710	470364	731982	0.38	0.44	0.34
1951	2445052	3484922	1715470	494928	557494	439384	827180	0.41	0.47	0.36
1952	2343271	3308238	1659772	489062	555019	430943	876795	0.46	0.52	0.40
1953	2420871	3410679	1718314	411896	470326	360725	695546	0.41	0.47	0.36
1954	831333	1169521	590939	407928	462073	360127	826021	0.44	0.50	0.39
1955	383557	539913	272481	328216	366186	294183	1147841	0.52	0.59	0.46
1956	746609	1048359	531712	281791	312910	253767	1343068	0.57	0.64	0.50
1957	1428442	2000983	1019721	212420	236428	190851	792557	0.53	0.60	0.47
1958	937440	1308913	671393	205292	230823	182585	769313	0.53	0.59	0.47
1959	1314694	1828304	945368	434170	490464	384337	744607	0.55	0.62	0.49
1960	1483389	2063268	1066484	384244	437167	337727	622042	0.54	0.61	0.48
1961	1554485	2164675	1116299	386337	435683	342580	783221	0.63	0.71	0.57
1962	1252375	1745547	898540	315428	351278	283236	909266	0.74	0.83	0.66
1963	900621	1262597	642420	216372	240425	194725	776337	0.81	0.91	0.72
1964	468028	661072	331357	200639	223973	179735	437695	0.68	0.76	0.60
1965	870506	1225311	618440	108010	121592	95944	444930	0.58	0.65	0.51
1966	1842715	2578813	1316729	120906	134592	108613	483711	0.55	0.62	0.49
1967	1311586	1835731	937097	128596	143254	115438	572605	0.56	0.63	0.50
1968	183717	257574	131039	222794	245129	202494	1074084	0.60	0.67	0.54
1969	110450	154977	78715	149048	165481	134247	1197226	0.71	0.79	0.63
1970	205641	289041	146305	242300	269291	218014	933246	0.70	0.78	0.62
1971	402577	563251	287738	330605	372388	293509	689048	0.65	0.73	0.58
1972	1045979	1452288	753344	353303	401038	311249	565254	0.66	0.74	0.59
1973	1723668	2404245	1235743	334009	384618	290059	792685	0.63	0.71	0.56
1974	568211	781895	412924	158889	186444	135406	1102433	0.61	0.69	0.55
1975	608710	838387	441954	133446	149262	119306	829377	0.66	0.73	0.59
1976	607084	841886	437768	167169	184555	151421	867463	0.71	0.78	0.63
1977	372778	512487	271156	336183	377479	299405	905301	0.82	0.91	0.73
1978	622679	859883	450910	228078	260627	199594	698715	0.85	0.95	0.77
1979	202675	279887	146764	180492	206950	157416	440538	0.77	0.86	0.69
1980	130292	175662	96640	108433	121644	96657	380434	0.76	0.85	0.68
1981	143781	190257	108658	161314	178315	145935	399038	0.79	0.88	0.71
1982	183737	238268	141687	321065	358026	287919	363730	0.78	0.86	0.70
1983	141514	183503	109133	311275	346173	279896	289992	0.79	0.88	0.72
1984	442251	567445	344678	243575	267022	222187	277651	0.87	0.96	0.79
1985	534310	669848	426198	195200	213927	178113	307920	0.81	0.90	0.73
1986	1374917	1743543	1084228	164255	179742	150103	430113	0.87	0.96	0.79
1987	360087	457366	283499	115231	126903	104632	523071	0.92	1.02	0.84
1988	335536	425190	264787	191380	211961	172797	434939	0.88	0.98	0.79
1989	157635	197892	125568	236896	264926	211832	332481	0.67	0.75	0.59
1990	130130	166231	101870	300543	343183	263200	212000	0.43	0.49	0.37
1991	295846	375874	232858	631789	712739	560033	319158	0.41	0.47	0.36
1992	715916	896927	571434	801116	893363	718393	513234	0.49	0.55	0.43
1993	988150	1237652	788945	700998	775715	633477	581611	0.59	0.65	0.53
1994	752473	943811	599924	571721	627114	521221	771086	0.75	0.83	0.67
1995	539384	676057	430341	534198	586922	486211	739999	0.77	0.85	0.70
1996	407389	512091	324094	550491	610704	496215	732228	0.79	0.88	0.71

Year	Recruitment			Spawning-stock biomass			Total catch	Fishing mortality		
	Recruitment (Age 3)	High	Low	SSB	High	Low		F (ages 5–10)	High	Low
	thousands			tonnes			tonnes			
1997	785420	987794	624507	545261	610522	486976	762403	0.94	1.03	0.85
1998	1063528	1342402	842587	385646	431005	345060	592624	0.94	1.03	0.85
1999	632034	798219	500448	280650	312405	252123	484910	0.94	1.03	0.85
2000	749727	942410	596440	255508	279285	233755	414868	0.85	0.94	0.77
2001	593152	744898	472318	382986	423867	346048	426471	0.74	0.82	0.67
2002	374202	469241	298412	520717	576557	470284	535045	0.68	0.75	0.61
2003	756675	946143	605148	570925	630534	516951	551990	0.63	0.70	0.57
2004	242069	298301	196437	665416	733570	603594	606445	0.70	0.78	0.63
2005	693264	856072	561419	578794	636415	526390	641276	0.70	0.79	0.63
2006	536630	663341	434123	583476	641018	531100	537642	0.60	0.68	0.54
2007	1243906	1546048	1000811	650377	719226	588119	486883	0.44	0.50	0.39
2008	1002761	1254884	801293	721138	797338	652220	464171	0.36	0.41	0.32
2009	581758	729770	463766	1009877	1114614	914981	523430	0.31	0.35	0.27
2010	201832	260315	156488	1241679	1372239	1123541	609983	0.29	0.33	0.25
2011	358117	457721	280187	1803005	2000646	1624888	719830	0.31	0.35	0.27
2012	503017	632480	400055	2022883	2253301	1816027	727663	0.29	0.33	0.25
2013	464921	591670	365324	2257041	2525118	2017425	966209	0.31	0.36	0.27
2014	852202	1077288	674144	2153272	2424858	1912104	986449	0.33	0.38	0.29
2015	452019	567491	360043	1750900	1987381	1542558	864384	0.33	0.38	0.29
2016	286334	364533	224909	1407673	1600721	1237907	849422	0.35	0.40	0.31
2017	781901	996228	613683	1428859	1604313	1272593	868276	0.38	0.44	0.34
2018	508296	670345	385420	1286834	1451531	1140824	778627	0.40	0.46	0.34
2019	659091	877788	494881	1227414	1413261	1066007	692609	0.41	0.49	0.34
2020	572413	798337	410424	1004037	1205047	836557	692903	0.43	0.54	0.35
2021	561000*			883880	1145476	682026				

* Recruitment model estimate.

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