ICES Advice on fishing opportunities, catch, and effort
Arctic Ocean, Barents Sea, and Norwegian Sea ecoregions
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Cod (*Gadus morhua*) in subareas 1 and 2 (Northeast Arctic)

ICES advice on fishing opportunities

ICES advises that when the Joint Russian–Norwegian Fisheries Commission management plan is applied, catches in 2020 should be no more than 689 672 tonnes.

Stock development over time

The spawning-stock biomass (SSB) has been above MSY $B_{trigger}$ since 2002. The SSB reached a peak in 2013 and now shows a downward trend. Fishing mortality (F) was reduced from well above F_{lim} in 1997 to below F_{MSY} in 2008. It remained below F_{MSY} until 2018 when it increased to slightly above F_{MSY}. There has been no strong recruitment since the 2004 and 2005 year classes.
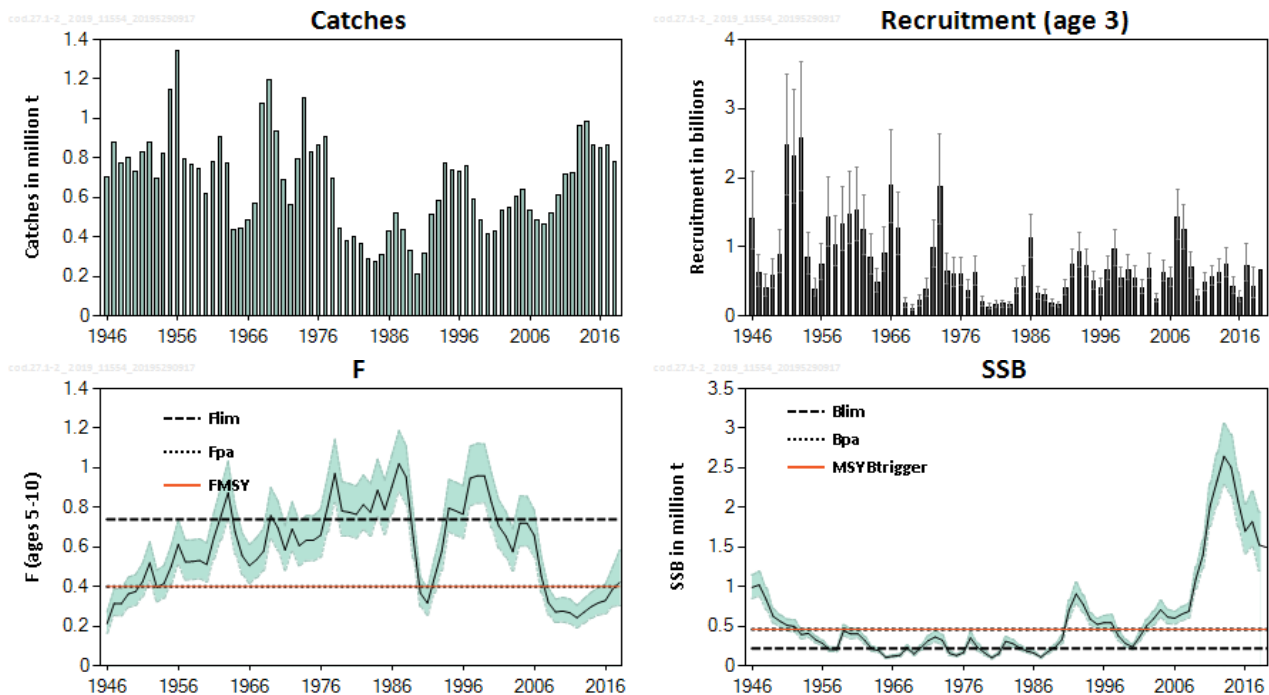
Figure 1   Cod in subareas 1 and 2 (Northeast Arctic). Catch, recruitment, F, and SSB. Recruitment, F, and SSB have confidence intervals (95%) in the plot. For this stock, F_{MGT} ranges from 0.40 to 0.60 (not shown) and there are two SSB_{MGT} values (460 000 tonnes and 920 000 tonnes).

Stock and exploitation status

ICES assesses that fishing pressure on the stock is above F_{MSY} and between F_{pa} and F_{lim}, while the spawning stock size is above MSY $B_{trigger}$, B_{pa}, and B_{lim}.

Table 1   Cod in subareas 1 and 2 (Northeast Arctic). State of the stock and fishery relative to reference points.

		Fishing pressure				Stock size			
		2016	2017	2018		2017	2018	2019	
Maximum sustainable yield	F_{MSY}	✅	✅	❌ Above	MSY $B_{trigger}$	✅	✅	✅ Above trigger	
Precautionary approach	F_{pa}, F_{lim}	✅	✅	🟡 Increased risk	B_{pa}, B_{lim}	✅	✅	✅ Full reproductive capacity	
Management plan	F_{MGT}	✅	✅	✅ Below	B_{MGT}	✅	✅	✅ Above	

Catch scenarios

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

Variable	Value	Notes
$F_{ages\ 5-10}$ (2019)	0.42	F *status quo* (F_{sq}; 2018); exploitation pattern from average of last three years
SSB (2020)	1 227 387 tonnes	Based on fishing at F_{sq}
$R_{age\ 3}$ (2019)	660000 thousands	Recruitment model estimate
$R_{age\ 3}$ (2020)	524 000 thousands	Recruitment model estimate
$R_{age\ 3}$ (2021)	644 000 thousands	Recruitment model estimate
Total catch (2019)	687 500 tonnes	Fishing at F_{sq}

Table 3   Cod in subareas 1 and 2 (Northeast Arctic). Annual catch scenarios. All weights are in tonnes.

Basis	Total catch (2020)	F_{total} (2020)	SSB (2021)	% SSB change *	% TAC change **	% Advice change ***
ICES advice basis						
Management plan ^	689 672	0.47	1 056 392	−14	−5	2
Other scenarios						
MSY approach: F_{MSY}	603 541	0.40	1 127 500	−8	−17	−11
F = 0	0	0	1 652 231	35	−100	−100
F = F_{2019}	630 101	0.42	1 105 457	−10	−13	−7
F_{pa}	603 541	0.40	1 127 500	−8	−17	−11
F_{lim}	971 521	0.74	831 987	−32	34	44

* SSB 2021 relative to SSB 2020.
** Advice value for 2020 relative to TAC 2019 (725 000 tonnes).
*** Advice value for 2020 relative to the advice value for 2019 (674 678 tonnes).
^ Since SSB in 2020 is between 2 × B_{pa} = 920 000 tonnes and 3 × B_{pa} = 1 380 000 tonnes, F = 0.4 × (1+0.5 × (1227−920)/460) = 0.533 is used in the 3-year prediction, giving catches of 761 080, 674 767, and 633 166 tonnes in 2020, 2021, and 2022, respectively. The average catch over the 3-year period is thus 689 672 tonnes, which corresponds to an F of 0.47 in 2020.

The advice for 2020 is very similar to the advice for 2019.

Basis of the advice

Table 4   Cod in subareas 1 and 2 (Northeast Arctic). The basis of the advice.

| Advice basis	Joint Russian–Norwegian Fisheries Commission management plan
Management plan	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: The TAC is calculated as the average catch predicted for the coming 3 years, using the target level of exploitation (F_{tr}). The target level of exploitation is calculated according to the spawning-stock biomass (SSB) in the first year of the forecast as follows: - if SSB < B_{pa}, then F_{tr} = SSB / B_{pa} × F_{MSY}; - if B_{pa} ≤ SSB ≤ 2×B_{pa}, then F_{tr} = F_{MSY}; - if 2 × B_{pa} < SSB < 3 × B_{pa}, then F_{tr} = F_{MSY} × (1 + 0.5 × (SSB − 2 × B_{pa}) / B_{pa}); - if SSB ≥ 3 × B_{pa}, then F_{tr} = 1.5 × F_{MSY}; where F_{MSY} = 0.40 and B_{pa} = 460 000 tonnes. If the spawning-stock biomass 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 ±20% compared with the previous year's TAC. In this case, F_{tr} should however not be below 0.30. In 2014, JNRFC decided that from 2015 onwards, Norway and Russia can transfer to or borrow from the following year up to 10% of the country's quota. ICES evaluated this harvest control rule in 2016 (ICES, 2016) and concluded that it is precautionary.

Quality of the assessment

There are some conflicting signals from the different surveys and catch-at-age data. This increases the uncertainty of the assessment.

An increasing proportion of older fish in the stock is outside the age range in the survey data used in the assessment; this may require a revision of the model tuning. The estimated selectivity-at-age is dome-shaped with selectivity sharply decreasing above age 12, which is not currently informed by survey data. These issues were investigated in 2019 (ICES, 2019a). However, no adequate solution was found so it will have to be investigated further at the next benchmark.

The Russian bottom trawl survey was not conducted in 2018 and the joint ecosystem survey had a complete lack of coverage in southeastern part of the survey area. This adds uncertainty to the assessment in the final year.

The sampling level from commercial catches was reduced around 2010 and remained at a lower level in the following years, but has improved in 2016–2018.
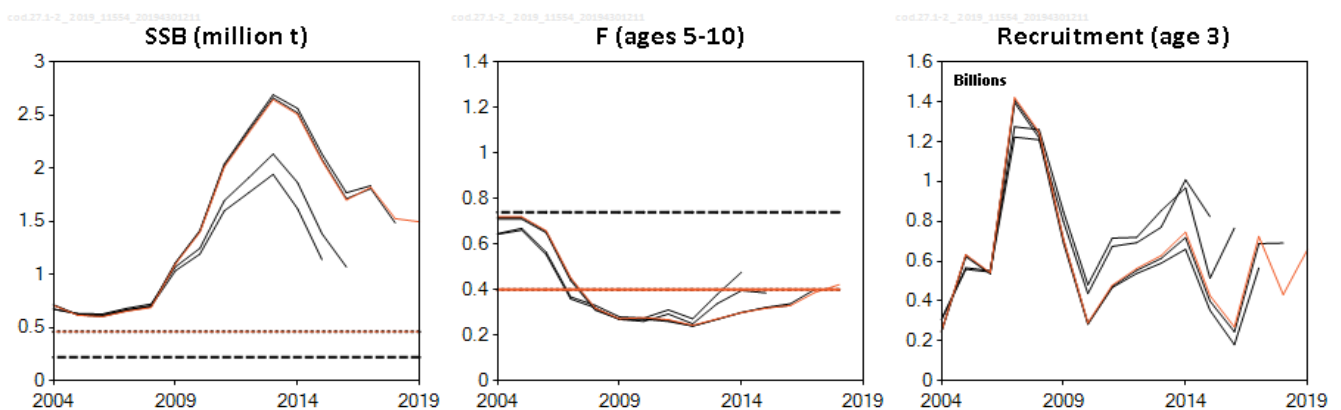
Figure 2   Cod in subareas 1 and 2 (Northeast Arctic). Historical assessment results. The assessments prior to the benchmark in 2017 (first two black lines) are based on a different model. Final year recruitment values in the plot are assumed.

Issues relevant for the advice

Fisheries targeting Northeast Arctic (NEA) cod take a bycatch of golden redfish (*Sebastes norvegicus)*, and the bycatch of the latter species is still above any sustainable catch level. Measures to minimize bycatch 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.

Reference points

Table 5   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 lower trigger point in HCR	ICES (2003)
	F_{MSY}	0.40	Long-term simulations	ICES (2005)
Precautionary approach	B_{lim}	220 000 t	Change point regression	ICES (2003)
	B_{pa}	460 000 t	The lowest SSB estimate having >90% probability of remaining above B_{lim}	ICES (2003)
	F_{lim}	0.74	F corresponding to an equilibrium stock = B_{lim}	ICES (2003)
	F_{pa}	0.40	The highest F estimate having >90% probability of remaining below F_{lim}	ICES (2003)
Management plan	SSB_{mgt}	460 000 t and 920 000 t	Two-step (double hockey-stick) HCR, see Table 4	ICES (2017a)
	F_{mgt}	0.40–0.60	Two-step (double hockey-stick) HCR, see Table 4	ICES (2017a)

Basis of the assessment

Table 6 Cod in subareas 1 and 2 (Northeast Arctic). Basis of the assessment and advice.

ICES stock data category	1 (ICES, 2018).
Assessment type	Age-based analytical assessment (SAM; ICES, 2019a) 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 bottom trawl survey Barents Sea, Feb–Mar (BS-NoRu-Q1 (BTr)); Joint acoustic survey Barents Sea and Lofoten, Feb–Mar (BS-NoRu-Q1 (Aco)); Russian bottom trawl survey, October–December (RU-BTr-Q4)); Joint Ecosystem survey (Eco-NoRu-Q3 (Btr)); annual maturity data from the four surveys; natural mortalities from annual stomach sampling.
Discards and bycatch	Discarding is considered negligible in recent years. Bycatch is included.
Indicators	None.
Other information	Last benchmarked in 2017 (ICES, 2017b).
Working group	Arctic Fisheries Working Group (AFWG).

Information from stakeholders

There is no additional available information.

History of the advice, catch, and management

Table 7 Cod in subareas 1 and 2 (Northeast Arctic). ICES advice, agreed TACs, and the official and ICES catches. All weights are in tonnes.

Year	ICES advice	Catch corresponding to advice	Agreed TAC	Official catches	ICES catches	Unreported landings (included in 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 F_{low}; TAC	172000	160000	210000	212000	25000
1991	F at F_{low}; TAC	215000	215000	294000	319158	50000
1992	Within safe biological limits	250000	356000	421000	513234	130000
1993	Healthy stock	256000	500000	575000	581611	50000
1994	No long-term gains in increased F	649000	700000	795000	771086	25000
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 prob. of SSB >B_{pa} in 2003	263000	395000		426471	
2002	Reduce F to well below 0.25	181000	395000		535045	90000
2003	Reduce F to below F_{pa}	305000	395000		551990	115000
2004	Reduce F to below F_{pa}	398000	486000		606445	117000
2005	Take into account coastal cod and redfish bycatches. Apply catch rule.	485000	485000		641276	166000
2006	Take into account coastal cod and redfish bycatches. Apply amended catch rule.	471000	471000		537642	67100
2007	Take into account coastal cod and redfish bycatches. F_{pa}	309000	424000		486883	41087
2008	Take into account coastal cod and redfish bycatches. Apply catch rule.	409000	430000		464171	15000
2009	Take into account coastal cod and redfish bycatches. Apply catch rule.	473000	525000		523431	0
2010	Take into account coastal cod and redfish bycatches. Apply catch rule.	577500	607000		609983	0
2011	Take into account coastal cod and redfish bycatches. Apply catch rule.	703000	703000		719829	0

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

^ 2017 TAC was set according to the new 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 8   Cod in subareas 1 and 2 (Northeast Arctic). Catch distribution by fleet in 2018 as estimated by ICES.

Catch (2018)	Landings		Discards
778 627 tonnes	71% demersal trawls	29% other gear types	Discarding is considered to be negligible
	778 627 tonnes		

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 all countries
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

Year	Faroe Islands	France	German Dem.Rep.	Fed.Rep.Germany	Greenland	Iceland	Norway	Poland	United Kingdom	Russia**	Spain	Others	Total all countries
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
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

* 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. Weights are in tonnes.

Year	Recruitment (Age 3; thousands)	Recruitment High	Recruitment Low	SSB	SSB High	SSB Low	Total catch	F (ages 5–10)	F High	F Low
1946	1416931	2084275	963258	990849	1150017	853710	706000	0.21	0.27	0.166
1947	619134	890193	430610	1021359	1192407	874848	882017	0.32	0.39	0.25
1948	409903	604760	277831	837151	985302	711276	774295	0.31	0.39	0.25
1949	578971	826568	405542	624676	721421	540905	800122	0.36	0.45	0.30
1950	878251	1246668	618709	561970	642269	491711	731982	0.38	0.46	0.31
1951	2464249	3488962	1740495	511078	590146	442603	827180	0.43	0.52	0.35
1952	2319857	3285337	1638108	499222	582760	427660	876795	0.52	0.63	0.43
1953	2577947	3667153	1812254	396048	460645	340510	695546	0.40	0.48	0.32
1954	849308	1199806	601201	409556	471192	355982	826021	0.42	0.51	0.34
1955	388276	548915	274648	331358	377610	290771	1147841	0.50	0.61	0.42
1956	745369	1052079	528074	284149	324075	249143	1343068	0.61	0.74	0.51
1957	1420132	2002036	1007362	206883	236346	181093	792557	0.53	0.64	0.43
1958	1029039	1450796	729890	204280	235571	177145	769313	0.53	0.64	0.44
1959	1323764	1867907	938136	442991	519124	378024	744607	0.53	0.64	0.44
1960	1478093	2087027	1046828	402990	473634	342882	622042	0.51	0.62	0.42
1961	1526684	2145820	1086189	406033	470922	350085	783221	0.65	0.77	0.54
1962	1250450	1751933	892514	320206	371600	275920	909266	0.76	0.90	0.64
1963	842509	1186962	598016	214441	249388	184392	776337	0.87	1.03	0.74
1964	485216	689826	341295	192096	224154	164623	437695	0.68	0.81	0.56
1965	907526	1281777	642548	106528	123371	91984	444930	0.56	0.67	0.46
1966	1899526	2691000	1340840	121929	141320	105199	483711	0.51	0.61	0.42
1967	1262674	1788385	891500	133538	155570	114626	572605	0.54	0.65	0.45
1968	186334	262396	132320	228937	263141	199179	1074084	0.58	0.70	0.48
1969	111350	157460	78742	151312	175724	130291	1197226	0.76	0.90	0.64
1970	213861	301051	151923	230628	269945	197038	933246	0.70	0.83	0.58
1971	389450	548773	276382	319334	383801	265696	689048	0.59	0.71	0.48
1972	994529	1396112	708459	365182	445026	299663	565254	0.69	0.83	0.58
1973	1862348	2627469	1320031	324238	396393	265218	792685	0.61	0.73	0.51
1974	641060	896711	458294	159552	193454	131591	1102433	0.64	0.76	0.53
1975	598801	837413	428179	130574	149215	114261	829377	0.64	0.76	0.53
1976	609951	854130	435579	167876	193910	145338	867463	0.66	0.79	0.55
1977	373618	518397	269274	352518	424508	292737	905301	0.81	0.96	0.68
1978	627373	869090	452884	234824	290314	189940	698715	0.97	1.14	0.83
1979	209981	288852	152645	165128	202885	134398	440538	0.78	0.93	0.66
1980	129936	176697	95549	102622	122218	86169	380434	0.78	0.92	0.66
1981	159985	215070	119009	151677	177114	129893	399038	0.77	0.91	0.65
1982	174971	231420	132292	310238	370099	260059	363730	0.81	0.96	0.69
1983	156432	206623	118433	281458	333926	237234	289992	0.78	0.92	0.66
1984	413732	540521	316683	227619	264207	196098	277651	0.89	1.04	0.75
1985	558141	728592	427566	187504	217338	161765	307920	0.79	0.94	0.67
1986	1118909	1464141	855080	162209	187009	140699	430113	0.90	1.06	0.77
1987	327381	427421	250756	110255	127519	95329	523071	1.02	1.19	0.88
1988	297828	390308	227260	179367	209808	153343	434939	0.95	1.11	0.82
1989	188918	246191	144969	234248	274180	200132	332481	0.65	0.78	0.54
1990	155641	206305	117419	331888	392447	280673	212000	0.37	0.45	0.30
1991	396154	516859	303639	706539	828671	602407	319158	0.32	0.39	0.26
1992	735643	962564	562217	908683	1053507	783768	513234	0.45	0.55	0.37
1993	927910	1210042	711560	775845	893534	673657	581611	0.58	0.69	0.48
1994	732611	960039	559059	591364	673928	518916	771086	0.80	0.94	0.68
1995	500001	652732	383007	523318	600113	456350	739999	0.78	0.93	0.66
1996	410747	539484	312731	546404	638842	467342	732228	0.77	0.91	0.65
1997	671971	875229	515917	544203	649349	456084	762403	0.95	1.11	0.81

Year	Recruitment (Age 3; thousands)	Recruitment High	Recruitment Low	SSB	SSB High	SSB Low	Total catch	F (ages 5–10)	F High	F Low
1998	956873	1250029	732467	377854	451007	316566	592624	0.96	1.12	0.82
1999	544727	709982	417936	283058	335687	238680	484910	0.96	1.12	0.82
2000	672798	878886	515035	239037	274976	207795	414868	0.82	0.97	0.70
2001	551468	720336	422188	363501	421776	313279	426471	0.71	0.84	0.60
2002	409501	533845	314119	505998	589069	434641	535045	0.66	0.78	0.55
2003	694292	898917	536247	595218	691746	512159	551990	0.58	0.69	0.48
2004	247602	315559	194280	709114	825369	609234	606445	0.72	0.86	0.60
2005	633125	807598	496346	615647	712288	532118	641276	0.72	0.86	0.61
2006	542436	695692	422942	602187	690172	525419	537642	0.66	0.79	0.55
2007	1421853	1819884	1110877	653169	747807	570508	486883	0.45	0.55	0.37
2008	1248669	1606959	970264	688680	787689	602116	464171	0.32	0.39	0.26
2009	710394	924396	545934	1099774	1248066	969102	523430	0.27	0.34	0.22
2010	289761	379050	221504	1398250	1589287	1230176	609983	0.28	0.35	0.22
2011	479622	632983	363418	2012786	2298986	1762214	719830	0.27	0.34	0.21
2012	563238	727415	436115	2334475	2682430	2031655	727663	0.24	0.31	0.192
2013	628109	818157	482207	2645872	3058550	2288874	966209	0.27	0.34	0.22
2014	745585	988206	562531	2507946	2923560	2151415	986449	0.30	0.37	0.24
2015	426911	565443	322320	2071319	2442416	1756606	864384	0.32	0.40	0.26
2016	269656	373249	194814	1700333	2040400	1416943	849422	0.33	0.41	0.26
2017	724455	1043468	502972	1821497	2203648	1505618	868276	0.39	0.50	0.30
2018	431988	714064	261341	1525907	1944219	1197598	778627	0.42	0.59	0.30
2019	660000			1495633						

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