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Advice on fishing opportunities for Barents Sea capelin in 2025

ICES subareas 1 and 2 excluding Division 2.a west of 5°W

Institute of Marine Research – IMR

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Stock Name: Barents Sea capelin (ICES subareas 1 and 2 excluding Division 2.a west of 5°W)

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Advice on fishing opportunities

The Joint Russian-Norwegian Working Group on Arctic Fisheries (JRN-AFWG) advises that when the Joint Norwegian–Russian Fisheries Commission management plan is applied, there should be zero catches of Barents Sea capelin in 2025.

Stock development over time

There is less than 95% probability that the spawning stock size will be above $B_{escapement}$ (200 000 tonnes) in 2025. No reference points for fishing pressure have been defined for this stock.

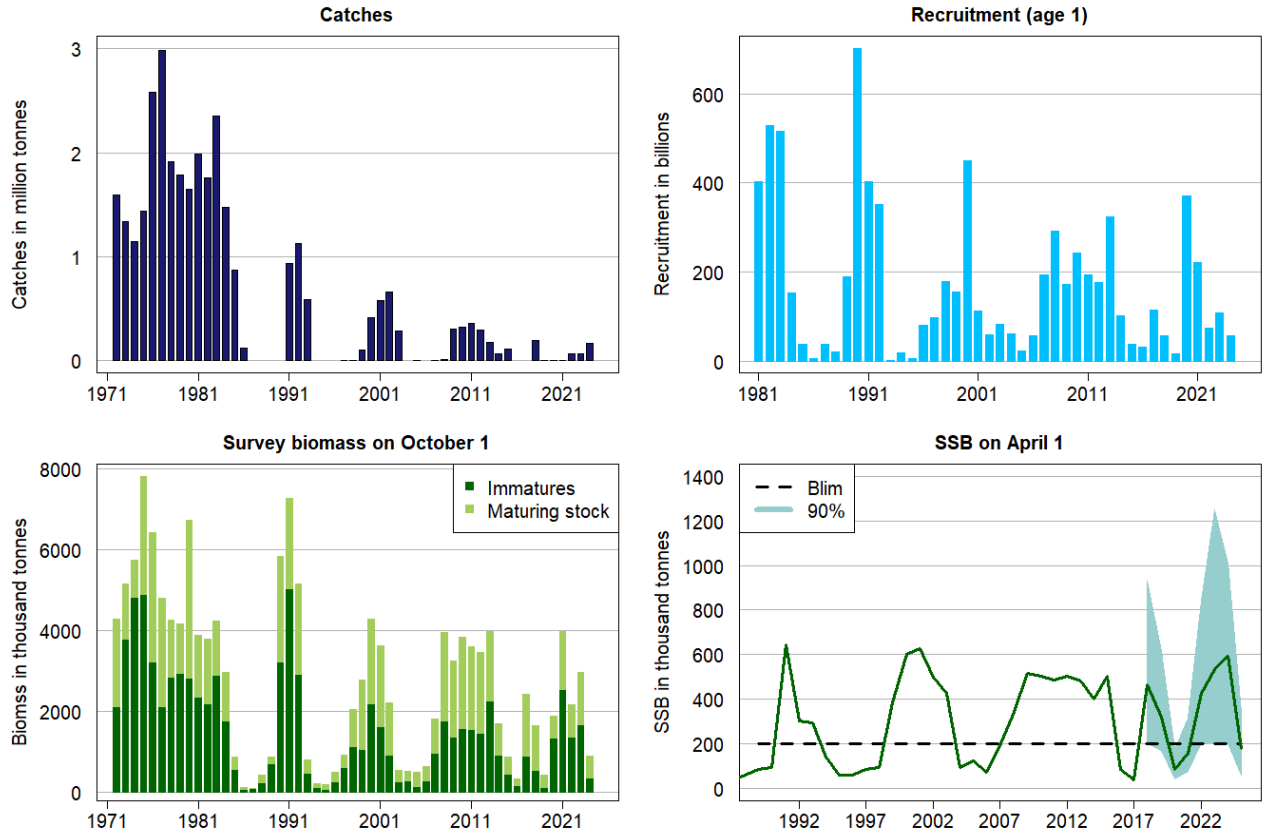

Figure 1. Barents Sea capelin (ICES subareas 1 and 2, excluding Division 2.a west of 5°W). Catch, recruitment, survey biomass (age 1+, maturing (≥14cm) and immature (<14 cm) stock biomass), and SSB (1 April) with 5 and 95 % confidence limits. The biomass reference points relate to SSB. Survey biomass and recruitment values are estimates from the acoustic survey completed by the beginning of October. The recruitment plot is shown only from 1981 onwards since earlier estimates of age 1 capelin are based on incomplete survey coverage. SSB estimates are shown only from 1989 onwards because a different model was used previously, and uncertainty estimates are only available from 2018 onwards. The 2022 estimate of recruitment, maturing and immature stock biomass is not corrected for incomplete survey coverage. Incomplete survey coverage in 2018 also might have led to recruitment underestimation.

Catch scenarios

Calculations of catch scenarios are based on a forward projection from the autumn acoustic survey. It involves that SSB for April 2025 is calculated by taking into account predation by immature cod and other sources of natural mortality.

Table 1. Barents Sea capelin (ICES subareas 1 and 2, excluding Division 2.a west of 5°W). Assumptions made for the interim year and in the forecast. All biomasses are in tonnes.

Variable	Value	Notes
Maturing stock biomass 2024	534 000	Mean biomass of fish at or above the length-at-maturity (14 cm), estimated based on the autumn acoustic survey 1 October 2024. These fish are the basis for the spawning stock in April 2025.

Variable	Value	Notes
Predation by immature cod January–March 2025; from the predation model	250 000	Based on the prediction of cod abundance in 2025 from the 2024 cod stock assessment (JRN-AFWG 2024a).

Table 2. Barents Sea capelin (ICES subareas 1 and 2, excluding Division 2.a west of 5°W). Annual catch scenarios. P = probability. All weights are in tonnes.

Basis	Total catch (2025)	Median SSB (2025)	P(SSB 2025 > $B_{escapement}$) in %	% TAC change*	% advice change**
MP harvest control rule, P (SSB > $B_{escapement}$ =200 000 t) = 95%	0	177 000	40	-100	-100
Harvest control rule with P (SSB > $B_{escapement}$ =150 000 t) = 95%	0	177 000	63	-100	-100
Harvest control rule with P (SSB > $B_{escapement}$ =400 000 t) = 95%	0	177 000	1	-100	-100

*TAC (2025) vs. TAC (2024).

**Advice (2025) vs. Advice (2024).

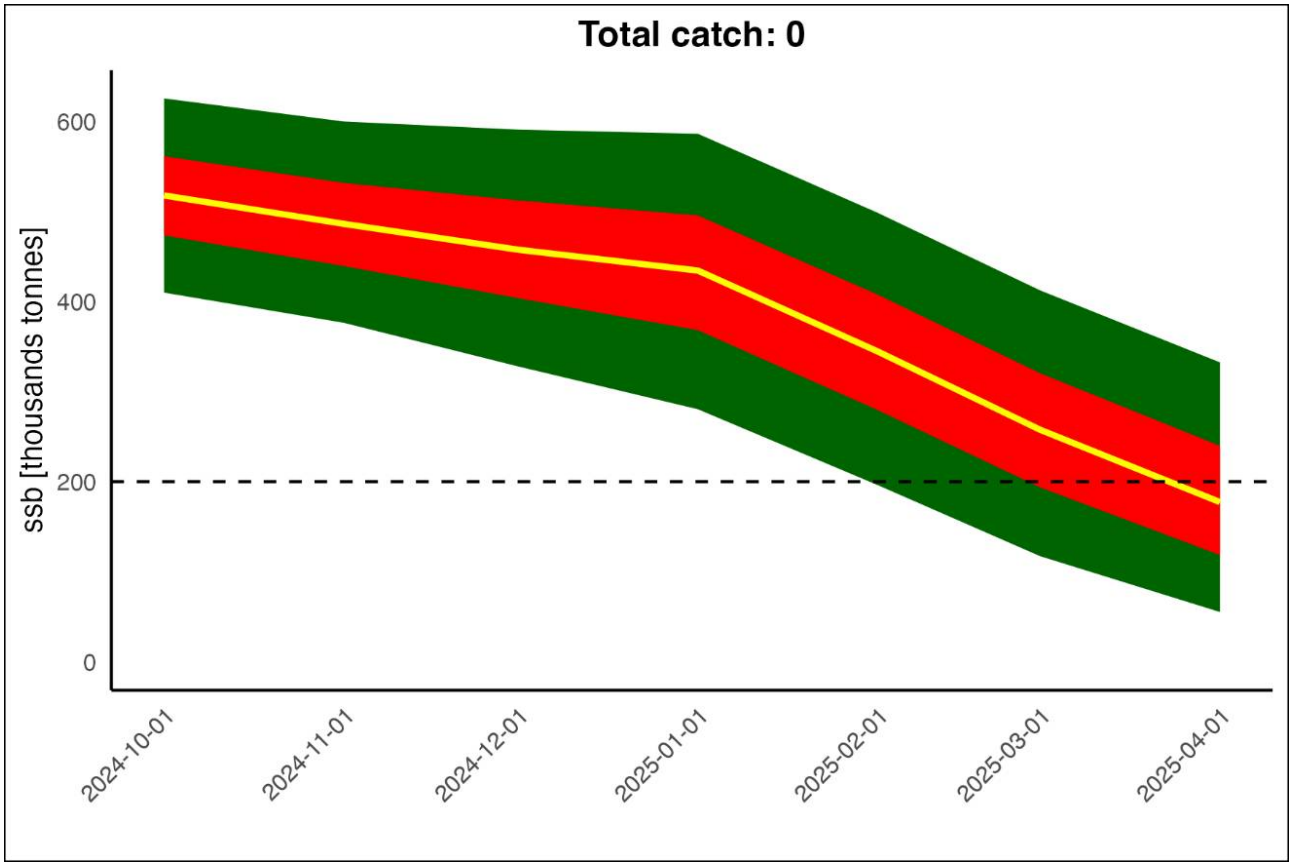

Figure 2. Barents Sea capelin (ICES subareas 1 and 2, excluding Division 2.a west of 5°W). Probabilistic prognosis of SSB for the maturing stock from 1 October 2024 to 1 April 2025, based on the acoustic survey estimate from autumn 2024 assuming zero catch. The yellow line marks the median while red band marks the 25th-75th percentiles and green band 5th-95th percentiles of the distribution. Dotted black line marks the Bescapement. The values are based on 5000 simulation replicates.

Basis of the advice

Table 3. Barents Sea capelin (ICES subareas 1 and 2, excluding Division 2.a west of 5°W). The basis of the advice.

Advice basis	Management plan
Management plan	In 2002, the Joint Norwegian–Russian Fisheries Commission (JNRFC) adopted the following harvest control rule (HCR) for Barents Sea capelin: '*The TAC for the following year should be set so that, with 95% probability, at least 200 000 tonnes of capelin (B_{lim}) will be allowed to spawn*'. ICES evaluated this HCR as well as alternative HCRs suggested by JNRFC in 2016 (ICES, 2016), and only the existing HCR was found to be precautionary. Following ICES evaluation, the JNRFC decided to maintain the existing HCR (JNRFC, 2016). It should be noted that the harvest control rule explicitly refers to $B_{escapement}$ in the latest benchmark report (ICES, 2023), and $B_{escapement}$ is set to 200 000 tonnes (Table 4).

Quality of the assessment

The geographical survey coverage of the Barents Sea capelin stock during the BESS in 2024 was close to complete (Figure 3). In the main distribution area the degree of coverage was very good. The areas west of Svalbard and west of Frans Josef Land were not covered, but in previous years only minor concentrations have been found there.

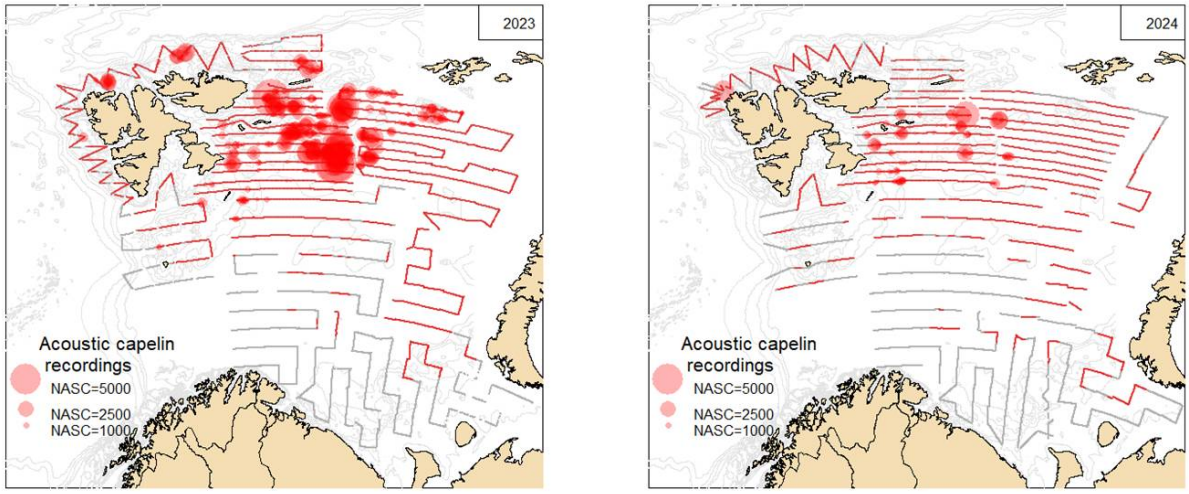

Figure 3. Survey coverage (transects included in estimation) and geographical distribution of acoustic recordings of capelin in autumn 2023 and 2024. The size of the circles corresponds to nautical acoustic scattering coefficient (NASC; m^2/nm^2) per 1 nautical mile. Grey lines mark transect sections with no acoustic recordings of capelin. The south western strata were also covered in both years, but there were no capelin recordings there so it was excluded from the estimate and the map.

Issues relevant for the advice

Due to the temporary suspension of Russian scientists from ICES, this assessment was conducted by a Joint Russian-Norwegian working group on Arctic Fisheries (JRN-AFWG) consisting of scientists from VNIRO (Russia) and IMR (Norway) (JRN-AFWG 2024b). This advice has been conducted outside ICES and should not be considered as ICES advice. However, this assessment and advice has been produced following the new methodology agreed and described in detail at the recent ICES benchmark in 2022 (ICES, 2023).

On request from managers (Joint Norwegian-Russian Fisheries Commission), Trochta et al. (2024) assessed harvest control rules for capelin in the Barents Sea using a management strategy evaluation (MSE), a modelling framework that simulates population and fishery responses to management actions. The form of the current escapement rule is retained and is defined by $B_{escapement}$, the biomass that should be allowed to escape to spawn after fishing is accounted for. The MSE specifically tested four different $B_{escapement}$ values (100 000, 150 000, 200 000 and 400 000 tonnes) with and without three alternative fixed minimum quotas (25 000, 50 000 or 75 000 tonnes).

All four $B_{escapement}$ values without fixed minimum quotas maintained a low risk (<5%) of spawning biomass falling below B_{lim}, the SSB below which recruitment is reduced, assuming historical capelin productivity, accurate survey estimates and that survey precision is correctly estimated. However, a $B_{escapement}$ equal to 100 000 tonnes showed notably higher risk (of SSB<B_{lim}) if the survey estimate is either biased high or survey precision is lower than assumed in the assessment. High probabilities of fishery closures resulted from $B_{escapement}$ = 400 000 tonnes. All of the alternative rules using fixed minimum quotas showed very high risk of SSB falling below B_{lim} and the model framework projected reduced future recruitment to the extent of stock

collapse over the long term. In Table 2 we have thus provided catch options for the tested $B_{escapement}$ values which were found to be precautionary, i.e. 150 000, 200 000 (i.e. current HCR) and 400 000 tonnes.

Reference points

Table 4. Barents Sea capelin (ICES subareas 1 and 2, excluding Division 2.a west of 5°W). Reference points, values, and their technical basis. Values in tonnes.

Framework	Reference point	Value	Technical basis	Source
MSY approach	MSY $B_{trigger}$			
	F_{MSY}			
Precautionary approach	B_{lim}	68 000	SSB_{1990}, which was the lowest SSB after the herring collapse that has produced a good year class. SSB estimated on April 1.	ICES (2023a)
	B_{pa}			
	F_{lim}			
	F_{pa}			
Management plan	$B_{escapement}$	200 000	The $B_{escapement}$ used in the HCR corresponds to 95% probability of the SSB being above $B_{escapement}$	JNRFC (2016)
	F_{mgt}			

Basis of the assessment

Table 5. Barents Sea capelin (ICES subareas 1 and 2, excluding Division 2.a west of 5°W). Basis of assessment and advice

ICES stock data category	1 (ICES, 2023b).
Assessment type	Model based on acoustic survey and prediction six months ahead to calculate spawning biomass. Target escapement strategy used.
Input data	Norwegian–Russian acoustic survey in autumn. Model estimates of maturation based on survey data. Natural mortalities from multispecies model (predation by immature cod on prespawning capelin based on information on cod distribution, abundance and stomach content data).
Discards and bycatch	All catches are assumed to be landed. The amount of bycaught capelin in other fisheries is very low.
Indicators	None.
Other information	Latest benchmark was in 2022 (ICES, 2023a).
Working group	Joint Russian-Norwegian working group on Arctic Fisheries (JRN-AFWG).

History of the advice, catch, and management

Table 6. Barents Sea capelin (ICES subareas 1 and 2, excluding Division 2.a west of 5°W). Advice, agreed TAC, and catch. All weights are in tonnes.

Year	ICES /JRN-AFWG advice	Catch corresponding to advice	Agreed TAC	ICES catch
1988	No catch	0	0	0
1989	No catch	0	0	0
1990	No catch	0	0	0
1991	TAC	1000000	900000	933000
1992	SSB > 400 000–500000 t	834000	1100000	1123000
1993	A cautious approach, SSB > 400 000–500 000 t	600000	630000	586000
1994	No fishing	0	0	0
1995	No fishing	0	0	0
1996	No fishing	0	0	0
1997	No fishing	0	0	1000
1998	No fishing	0	0	3000
1999	SSB > 500 000 t	79000	80000	101000
2000	5% probability of SSB < 200 000 t	435000	435000	414000
2001	5% probability of SSB < 200 000 t	630000	630000	568000
2002	5% probability of SSB < 200 000 t	650000	650000	651000
2003	5% probability of SSB < 200 000 t	310000	310000	282000
2004	No fishing	0	0	0
2005	No fishing	0	0	1000*
2006	No fishing	0	0	0
2007	No fishing	0	0	4000*
2008	No fishing	0	0	12000*
2009	5% probability of SSB < 200 000 t	390000	390000	307000
2010	5% probability of SSB < 200 000 t	360000	360000	323000
2011	5% probability of SSB < 200 000 t	380000	380000	360000
2012	5% probability of SSB < 200 000 t	320000	320000	296000
2013	5% probability of SSB < 200 000 t	200000	200000	177000
2014	5% probability of SSB < 200 000 t	65000	65000	66000
2015	5% probability of SSB < 200 000 t	6000	120000	115000
2016	Zero catch	0	0	0
2017	Zero catch	0	0	0
2018	5% probability of SSB < 200 000 t	205000	205000	194520
2019	Zero catch	0	0 **	53*
2020	Management plan	0	0**	31*

Year	ICES /JRN-AFWG advice	Catch corresponding to advice	Agreed TAC	ICES catch
2021	Management plan	0	0**	10*
2022	Management plan	≤ 70000	70000	65246***
2023	Management plan***	≤ 62000***	62000	60692***
2024	Management plan***	≤ 196000***	196000	168680***
2025	Management plan***	0***		

*Research catch and bycatches in other fisheries.

**Up to 500 tonnes was allowed for research survey catches.

***In 2022-2024 assessment and advice was carried out by the Joint Russian-Norwegian working group on Arctic Fisheries (JRN-AFWG) which compiled catches and gave advice.

History of catch and landings

Table 7. Barents Sea capelin (ICES subareas 1 and 2, excluding Division 2.a west of 5°W). The history of official catches is presented for each country participating in the fishery. All weights are in tonnes.

Year	Winter				Summer–Autumn			Year total
	Norway	Russia	Others	Total	Norway	Russia	Total	
1965	217000	7000	0	224000	0	0	0	224000
1966	380000	9000	0	389000	0	0	0	389000
1967	403000	6000	0	409000	0	0	0	409000
1968	460000	15000	0	475000	62000	0	62000	537000
1969	436000	1000	0	437000	243000	0	243000	680000
1970	955000	8000	0	963000	346000	5000	351000	1314000
1971	1300000	14000	0	1314000	71000	7000	78000	1392000
1972	1208000	24000	0	1232000	347000	13000	360000	1591000
1973	1078000	34000	0	1112000	213000	12000	225000	1337000
1974	749000	63000	0	812000	237000	99000	336000	1148000
1975	559000	301000	43000	903000	407000	131000	538000	1441000
1976	1252000	228000	0	1480000	739000	368000	1107000	2587000
1977	1441000	317000	2000	1760000	722000	504000	1226000	2986000
1978	784000	429000	25000	1238000	360000	318000	678000	1916000
1979	539000	342000	5000	886000	570000	326000	896000	1782000
1980	539000	253000	9000	801000	459000	388000	847000	1648000
1981	784000	429000	28000	1241000	454000	292000	746000	1986000
1982	568000	260000	5000	833000	591000	336000	927000	1760000
1983	751000	373000	36000	1160000	758000	439000	1197000	2357000
1984	330000	257000	42000	629000	481000	368000	849000	1477000
1985	340000	234000	17000	591000	113000	164000	277000	868000
1986	72000	51000	0	123000	0	0	0	123000
1987	0	0	0	0	0	0	0	0
1988	0	0	0	0	0	0	0	0
1989	0	0	0	0	0	0	0	0
1990	0	0	0	0	0	0	0	0
1991	528000	159000	20000	707000	31000	195000	226000	933000
1992	620000	247000	24000	891000	73000	159000	232000	1123000
1993	402000	170000	14000	586000	0	0	0	586000
1994	0	0	0	0	0	0	0	0
1995	0	0	0	0	0	0	0	0
1996	0	0	0	0	0	0	0	0

Year	Winter				Summer–Autumn			Year total
	Norway	Russia	Others	Total	Norway	Russia	Total	
1997	0	0	0	0	0	1000	1000	1000
1998	0	2000	0	2000	0	1000	1000	3000
1999	50000	33000	0	83000	0	22000	22000	105000
2000	279000	94000	8000	381000	0	29000	29000	410000
2001	376000	180000	8000	564000	0	14000	14000	578000
2002	398000	228000	17000	643000	0	16000	16000	659000
2003	180000	93000	9000	282000	0	0	0	282000
2004	0	0	0	0	0	0	0	0
2005	1000	0	0	1000	0	0	0	1000
2006	0	0	0	0	0	0	0	0
2007	2000	2000	0	4000	0	0	0	4000
2008	5000	5000	0	10000	0	2000	2000	12000
2009	233000	73000	0	306000	0	1000	1000	307000
2010	246000	77000	0	323000	0	0	0	323000
2011	273000	87000	0	360000	0	0	0	360000
2012	228000	68000	0	296000	0	0	0	296000
2013	116000	60000	0	177000	0	0	0	177000
2014	40000	26000	0	66000	0	0	0	66000
2015	71000	44000	0	115000	0	0	0	115000
2016	0	0	0	0	0	0	0	0
2017	0	0	0	0	0	0	0	0
2018	128520	66000	0	194520	0	0	0	194520
2019	5	0	0	0	0	0	0	53
2020	9	0	0	9	0	21	0	31
2021	2	0	0	2	0	8	0	10
2022	42597	22646	0	65243	0	3	3	65246
2023	37652	23040	0	60692	0	0	0	60692
2024	117555	51125	0	168680				

Summary of the assessment

Table 8. Barents Sea capelin (ICES subareas 1 and 2, excluding Division 2.a west of 5°W). Assessment summary. Predicted SSB is the modelled stochastic spawning-stock biomass (after the winter fishery). Maturing biomass refers to fish at or above the length-at-maturity (14 cm). Weights are in tonnes, recruitment numbers in millions.

Year	Predicted SSB assuming catch = advised catch, 1 April			Recruitment from autumn acoustic survey, 1 October	Stock biomass from autumn acoustic survey, 1 October		Catch
	Median	5th percentile	95th percentile		Immature	Maturing biomass	
	tonnes			Age 1, millions	tonnes		
1973					3796000	1350000	1337000
1974					4831000	907000	1148000
1975					4900000	2916000	1441000
1976					3220000	3200000	2587000
1977					2127000	2676000	2986000
1978					2845000	1402000	1916000
1979					2934000	1227000	1782000
1980					2810000	3913000	1648000
1981				402560	2341000	1551000	1986000
1982				528310	2187000	1591000	1760000
1983				514880	2897000	1329000	2357000
1984				154750	1756000	1208000	1477000
1985				38690	572000	285000	868000
1986				6029	55000	65000	123000
1987				37578	83000	17000	0
1988				20987	227000	200000	0
1989	84000			189200	695000	174000	0
1990	92000			700370	3221000	2617000	0
1991	643000			402090	5034000	2248000	933000
1992	302000			351290	2927000	2228000	1123000
1993	293000			2237	467000	330000	586000
1994	139000			19761	105000	94000	0
1995	60000			7130	75000	118000	0
1996	60000			81907	254000	248000	0
1997	85000			98876	598000	312000	1000
1998	94000			179026	1123000	932000	3000
1999	382000			155921	1056000	1718000	105000
2000	599000			449166	2177000	2097000	410000
2001	626000			113587	1610000	2019000	578000
2002	496000			59703	919000	1290000	659000

Year	Predicted SSB assuming catch = advised catch, 1 April			Recruitment from autumn acoustic survey, 1 October	Stock biomass from autumn acoustic survey, 1 October		Catch
	Median	5th percentile	95th percentile		Immature	Maturing biomass	
	tonnes			Age 1, millions	tonnes		
2003	427000			82444	254000	280000	282000
2004	94000			62056	289000	225000	0
2005	122000			22661	143000	355000	1000
2006	72000			57294	289000	348000	0
2007	189000			195125	970000	846000	4000
2008	330000			292392	1766000	2186000	12000
2009	517000			172754	1355000	1892000	307000
2010	504000			243649	1576000	2248000	323000
2011	487000			194255	1544000	2059000	360000
2012	504000			176130	1460000	1996000	296000
2013	479000			323845	2248000	1725000	177000
2014	399000			103136	904000	785000	66000
2015	504000			37832	444000	434000	115000
2016	82000			32575	163000	153000	0
2017	37000			115370	882000	1547000	0
2018	462000	200000	930000	58812	541000	1100000	194520
2019	317000	168282	613733	18029	111000	302000	53
2020	85110	38830	171850	370016	1348000	542000	31
2021	156376	75197	314559	222667	2528000	1459000	10
2022	423751	201897	838670	75460*	1356000*	817000*	65246
2023	534000	201000	1250000	108509	1666000	1286000	60692
2024	590000	201000	1011000	58560	353000	534000	168680
2025	177000	56000	332000				

*Not adjusted for incomplete survey coverage.

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