

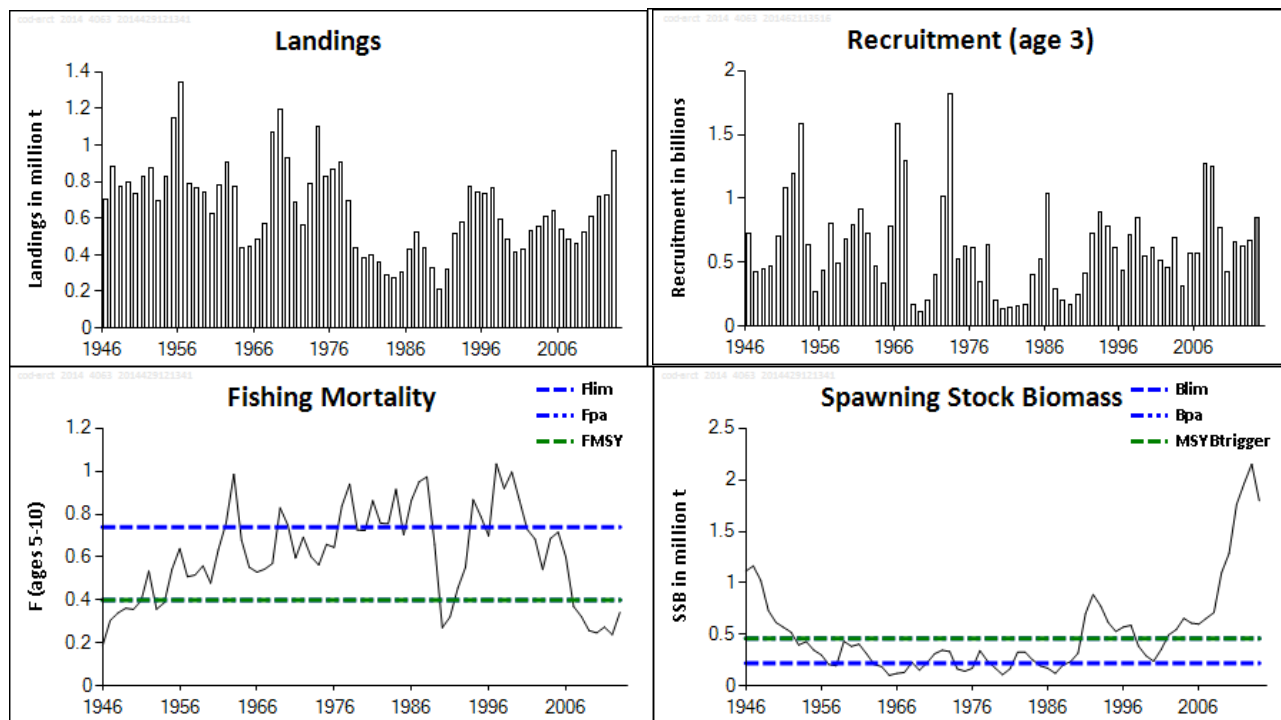
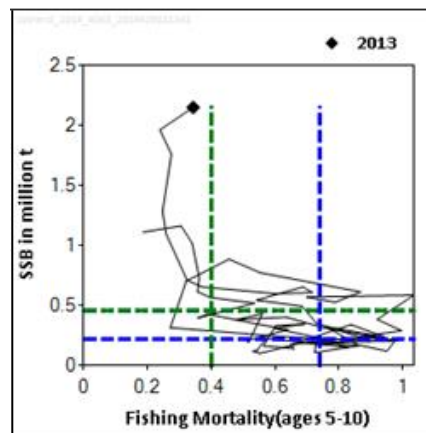
**ECOREGION** Barents Sea and Norwegian Sea  
**STOCK** Cod in Subareas I and II (Northeast Arctic cod)

Advice for 2015

ICES advises on the basis of the Joint Russian–Norwegian Fisheries Commission management plan that TAC in 2015 should be set at 894 000 t. All catches are assumed to be landed. Bycatches of coastal cod and *Sebastes norvegicus*<sup>1</sup> should be kept as low as possible.

Stock status

Fishing pressure			
	2011	2012	2013
MSY ( $F_{MSY}$ )	✓	✓	✓ Appropriate
Precautionary approach ( $F_{pa}, F_{lim}$ )	✓	✓	✓ Harvested sustainably
Management plan ( $F_{MGT}$ )	✓	✓	✓ Below target
Stock size			
	2012	2013	2014
MSY ( $B_{trigger}$ )	✓	✓	✓ Above trigger
Precautionary approach ( $B_{pa}, B_{lim}$ )	✓	✓	✓ Full reproductive capacity
Management plan ( $SSB_{MGT}$ )	✓	✓	✓ Above trigger



**Figure 3.3.2.1** Cod in Subareas I and II. Summary of stock assessment (weights in thousand tonnes). Top right: SSB/F for the time-series used in the assessment ( $B_{pa}$  equal to MSY  $B_{trigger}$ ,  $F_{pa}$  equal to  $F_{MSY}$ ).

<sup>1</sup> This species has up to now been named *Sebastes marinus*. It was decided to adopt the species list by WoRMS (<http://www.marinespecies.org/>). The name used for this species will hence hereafter be *Sebastes norvegicus*.

The SSB has been above  $MSY B_{trigger}$  since 2002. The total stock biomass is close to the highest observed. Fishing mortality was reduced from well above  $F_{lim}$  in 1997 to below  $F_{MSY}$  in 2007 and is close to its lowest value in the time-series. Surveys indicate that year classes 2010–2013 are slightly above average.

### Management plans

A management plan has been in effect since 2004 (Annex 3.3.2), aimed at maintaining high long-term yield, year-to-year stability of catches, and full utilization of all available information on stock dynamics. The plan was evaluated in 2010 and ICES considers it to be in accordance with the precautionary approach and not in contradiction to the MSY approach. At the 2010 meeting of the Joint Russian–Norwegian Fisheries Commission it was agreed that the plan will be in force until 2015.

### Environmental influence on the stock

Among the factors influencing cod growth and recruitment are water temperature, food supply, and cod population abundance. Environmental drivers (capelin biomass, ice coverage, temperature, and oxygen saturation) were used in the estimation of recruitment and temperature in the estimation of cod cannibalism. Changes in growth, maturity, and cod cannibalism are linked to the abundance of capelin. This linkage appears to be less pronounced in the recent period than in the 1980s and 1990s. Capelin abundance is at present intermediate. The distribution area of cod has expanded northwards and eastwards in recent years, and is now the widest ever reported (north to 82°N and east to 80°E, as observed during the ecosystem survey in August–October).

### The fisheries

Cod is a target species caught in a mixed fishery together with haddock and saithe. In coastal areas, Northeast Arctic cod and coastal cod are caught in the same fishery at certain periods of the year. Redfish (both *Sebastes mentella* and *S. norvegicus*) are caught as bycatch in the cod fishery. TAC regulations are in place. Unreported catches were close to zero in 2009–2013. Discarding is illegal in Norway and Russia. Data on discarding are scarce, but attempts to obtain better quantification continue. The fisheries are controlled by inspections at sea through mandatory reporting at catch control points when entering and leaving the EEZs to land fish, and by VMS satellite tracking for some fleets.

<b>Catch distribution</b>	Total catch (2013): 966 kt, where 100% were landings (70% demersal trawls and 30% other gear types). Discards are considered to be negligible.
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### Effects of the fisheries on the ecosystem

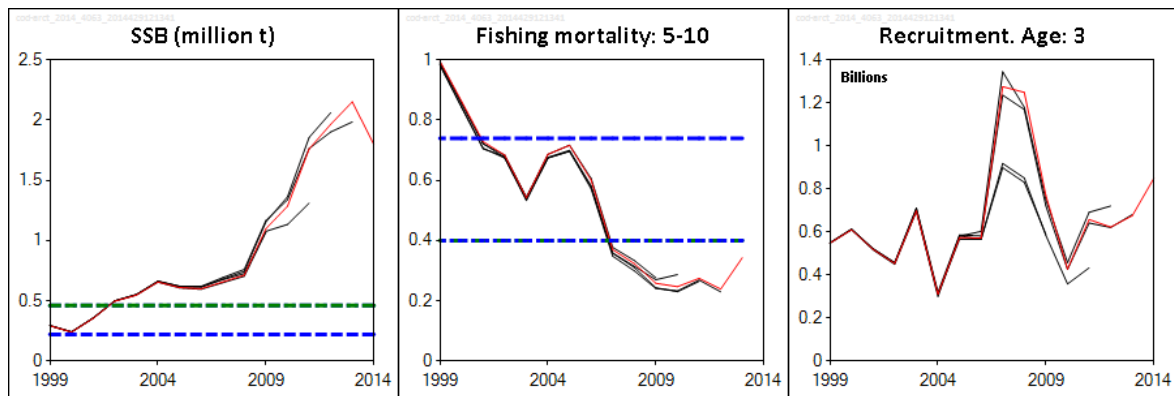
Fisheries of cod in the Barents Sea do not only influence the targeted stock. Because of strong species interactions the removal by fisheries of cod, which is an important predator in the ecosystem, influences the abundance of prey stocks such as capelin, haddock, and redfish.

### Quality considerations

The uncertainties in this assessment relate both to catch and survey data. Unreported catches (illegal, unregulated, and unreported (IUU)) were a problem prior to 2009. With the recent expansion of the cod distribution it is likely that the coverage in the February survey (BS-NoRu-Q1 (BTr) and BS-NoRu-Q1 (Aco)) has been incomplete in recent years, in particular for the younger ages. This assumption was verified by the expansion of the coverage in this survey in 2014.

Norwegian sampling of commercial catches is believed to be less precise because of the termination of a Norwegian port sampling programme in mid-2009. The poor sampling caused problems in estimating Norwegian catches for the oldest ages in 2010 and 2011. The sampling has improved somewhat in 2012–2013, but there is still a lack of samples from certain gear/area/season combinations and ICES continues to recommend an increase in port sampling effort. Sampling from Norwegian trawl catches was also very poor in the second half of 2013.

Russian sampling of commercial catches has decreased in recent years, and the sampling in 2013 was at the same level as in 2012. It is recommended to also increase Russian sampling.



**Figure 3.3.2.2** Cod in Subareas I and II. Historical performance of the assessment (final-year estimates included).

**Scientific basis**

**Stock data category**

1 ([ICES, 2014a](#)).

**Assessment type**

Age-based analytical assessment (XSA) with cannibalism estimated.

**Input data**

Commercial catches (international landings, ages and length frequencies from catch sampling);  
 three 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));  
 one commercial index (commercial cpue index; data from the Russian trawl fisheries);  
 annual maturity data from the three surveys;  
 natural mortalities from annual stomach sampling.

**Discards and bycatch**

Discards are considered negligible.

**Indicators**

None.

**Other information**

Scheduled to be benchmarked in 2015.

**Working group**

Arctic Fisheries Working Group ([AFWG](#)).

**ECOREGION** Barents Sea and Norwegian Sea  
**STOCK** Cod in Subareas I and II (Northeast Arctic cod)

**Reference points**

	<i>Type</i>	<i>Value</i>	<i>Technical basis</i>
Management plan	SSB <sub>MP</sub>	460 000 t.	B <sub>pa</sub> , TAC linearly reduced from F <sub>pa</sub> at SSB = B <sub>pa</sub> to zero at SSB = 0.
	F <sub>MP</sub>	0.40	F <sub>pa</sub> , average TAC for the coming three years based on F <sub>pa</sub> .
MSY approach	MSY	460 000 t.	B <sub>pa</sub> , and trigger point in HCR.
	B <sub>trigger</sub>		
Precautionary approach	F <sub>MSY</sub>	0.40	Long-term simulations.
	B <sub>lim</sub>	220 000 t.	Change point regression.
	B <sub>pa</sub>	460 000 t.	The lowest SSB estimate having >90% probability of remaining above B <sub>lim</sub> .
	F <sub>lim</sub>	0.74	F corresponding to an equilibrium stock = B <sub>lim</sub> .
	F <sub>pa</sub>	0.40	The highest F estimate having >90% probability of remaining below F <sub>lim</sub> .

(Last changed in: 2012)

Yield and spawning biomass per Recruit F-reference points:

	<b>Fish Mort</b>	<b>Yield/R</b>	<b>SSB/R</b>
	<b>Ages 0</b>		
Average last 3 years	0.29	0.90	1.96
F <sub>max</sub>	0.25	0.90	2.29
F <sub>0.1</sub>	0.12	0.82	4.77
F <sub>med</sub>	0.62	0.84	0.66

**Outlook for 2015**

Basis: F<sub>2014</sub> = F<sub>2013</sub> = 0.34; SSB (2015) = 1570; R (2014) = 850 million; catch (2014) = 864.

<b>Rationale</b>	<b>Catches (2015)</b>	<b>Basis</b>	<b>F</b>	<b>SSB</b>	<b>%SSB change</b>	<b>%TAC change</b>
			<b>(2015)</b>	<b>(2016)</b>	<b><sup>1)</sup></b>	<b><sup>2)</sup></b>
Management plan <sup>3)</sup>	894	F <sub>MP</sub>	0.41	1301	-17	-10
MSY approach	878	F <sub>MSY</sub>	0.40	1315	-16	-12
Zero catch	0	0	0	2112	+35	-100
<i>Status quo</i>	774	F <sub>sq</sub>	0.34	1405	-10	-22

Weights in thousand tonnes.

<sup>1)</sup> SSB 2016 relative to SSB 2015.

<sup>2)</sup> Catch 2015 relative to TAC 2014.

<sup>3)</sup> Forecast based on catch corresponding to -10% change compared to TAC 2014.

**Management plan**

In accordance with the adopted management plan the catch in 2015 should be based on a -10% change compared to TAC 2014, corresponding to landings of 894 000 t. This is expected to keep SSB well above B<sub>pa</sub> in 2016.

**MSY approach**

Fishing at F<sub>MSY</sub> (= 0.40) corresponds to catches of no more than 878 kt in 2015. This is expected to keep SSB well above MSY B<sub>trigger</sub> in 2016.

## **Additional considerations**

### *Management considerations*

Unreported landings, as estimated by the Joint Norwegian–Russian analysis group, were reduced considerably compared to the period 2006–2008. For 2009–2013, unreported landings are estimated to be negligible.

### *Management plan*

The plan aims to maintain  $F$  at  $F_{pa} = 0.40$  and to restrict between-year TAC changes to  $\pm 10\%$  unless SSB falls below  $B_{pa}$ , in which case the target  $F$  should be reduced.

The management plan was amended in 2009, adding a new condition: “If the TAC, by following such a rule, corresponds to a fishing mortality ( $F$ ) lower than 0.30 the TAC should be increased to a level corresponding to a fishing mortality of 0.30”, when SSB is above  $B_{pa}$ .

### *Regulations and their effects*

The reduction in fishing mortality in recent years is largely a result of the implementation of the harvest control rule and the absence of IUU fishing. In addition to quotas, fisheries are regulated by mesh size limitations, a minimum catching size, a maximum bycatch of undersized fish, maximum bycatch of non-target species, closure of areas with high densities of juveniles, and other seasonal and area restrictions. Since January 1997, sorting grids have been mandatory for the trawl fisheries in most of the Barents Sea and Svalbard area. From 2011 onwards, the minimum mesh size for bottom trawl fisheries for cod and haddock is 130 mm for the entire Barents Sea (before 2011 the minimum mesh size was 135 mm in the Norwegian EEZ and 125 mm in the Russian EEZ). This change is expected to have a minor impact on the total exploitation pattern for this stock; thus, a recent average exploitation pattern is used in the predictions.

A real-time closure system has been in force along the Norwegian coast and in the Barents Sea since 1984, aimed at protecting juvenile fish. Based on scientific research data and mapping of areas by hired fishing vessels, fishing is prohibited in areas where the proportion by number of undersized cod, haddock, and saithe combined has been observed by inspectors to exceed 15% (the size limits vary by species). The time of notice before a closure of an area comes into force is 2–4 hours for national vessels and 7 days for foreign vessels. Before or parallel to a closure, the Coast Guard requests vessels not to fish in an area where too many small fish have been observed during their inspections. A closed area is not opened until it is documented by trial fishing to contain less than 15% undersized fish. A preliminary evaluation of the effectiveness of the system up to 1998 showed a clear decrease in the discarding of small cod and haddock.

From 1 January 2011, the technical regulations for the demersal fisheries were harmonized so that they are now the same in the Norwegian and Russian EEZs. The minimum size is now 44 cm for cod (previously 47 cm in the Norwegian and 42 cm in the Russian EEZ). The maximum allowable percentage of fish below the minimum size is 15% by number of cod, haddock, and saithe combined in the Norwegian EEZ, and 15% by number of cod and haddock combined in the Russian EEZ. Previously, the maximum percentage was 15% for each species (cod and haddock) in the Russian EEZ. The effect of these changes is expected to be minor as long as the fishing mortality is kept low, as implied by the agreed harvest control rule.

### *Information from the fishing industry*

Port sampling and data from Norwegian fishing vessels provide regular sampling data for length and age. These data are used to estimate catch-at-age for the corresponding fleets. Russian fishing vessels with observers on board provide similar information on catch length distribution, sampling fish to obtain data on length–age matrices.

### *Data and methods*

The analytical assessment is based on catch-at-age data, using one commercial cpue series and three survey series. Estimates of cod cannibalism are included in the natural mortality.

### *Uncertainties in assessment and forecast*

The abundance of the year classes 2004 and 2005 in the last three years (at ages 7–10) is far above any previous observations for these age groups. This means that the model choice for the age range for stock size-dependent catchability has a considerable impact on the assessment. The stock dynamics (growth, maturation, and natural mortality including cannibalism) are also hard to predict at the present high stock sizes, although a decrease in stock abundance is expected because recruitment has decreased.

Adjustments have been made for incomplete spatial coverage in some surveys in 2012. This mainly affects the recruitment estimates (2009–2011 year classes). The *status quo* F assumption for 2014 in the forecast implies a catch in 2014 that is 13% below the agreed TAC. However, the prediction uncertainty associated with this is less than that associated with, e.g. the choice of age range for stock size-dependent catchability.

*Comparison of the basis of previous assessment and advice*

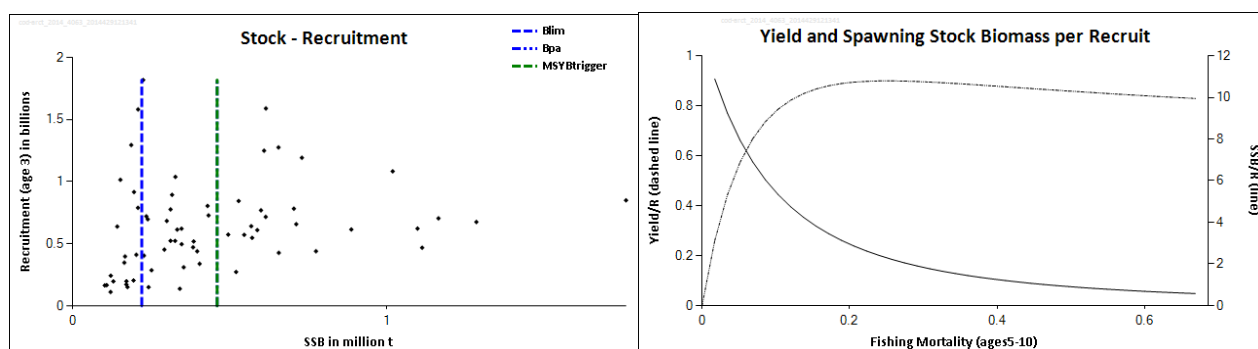
The age range for stock size-dependent survey catchability is increased from 3–8 to 3–9 to improve model diagnostics and avoid overestimation of the abundance of the 2004–2005 year classes.

The basis for the assessment has not changed from last year.

The basis for the advice this year is the same as last year: the management plan.

**Sources**

ICES. 2014a. Advice basis. *In* Report of the ICES Advisory Committee, 2014. ICES Advice 2014, Book 1, Section 1.2.  
 ICES 2014b. Report of the Arctic Fisheries Working Group (AFWG), 23–29 April 2014, Lisbon, Portugal. ICES CM 2014/ACOM:05.



**Figure 3.3.2.3** Cod in Subareas I and II (Northeast Arctic cod). Stock–recruitment plot and yield-per-recruit analysis.

Table 3.3.2.1

Cod in Subareas I and II (Northeast Arctic cod). ICES advice, management, and landings.

Year	ICES Advice	Predicted catch corresp. to advice	Agreed TAC	Official landings	ICES landings	Unreported landings (included in ICES landings)
1987	Gradual reduction in F	595	560	552	523	
1988	F = 0.51; TAC (Advice November 87, revised advice May 88)	530 (320–360)	590 451	459	435	
1989	Large reduction in F	335	300	348	332	
1990	F at $F_{low}$ ; TAC	172	160	210	212	25
1991	F at $F_{low}$ ; TAC	215	215	294	319	50
1992	Within safe biological limits	250	356	421	513	130
1993	Healthy stock	256	500	575	582	50
1994	No long-term gains in increased F	649	700	795	771	25
1995	No long-term gains in increased F	681	700	763	740	
1996	No long-term gains in increased F	746	700	759	732	
1997	Well below $F_{med}$	< 993	850	792	762	
1998	F less than $F_{med}$	514	654	615	593	
1999	Reduce F to below $F_{pa}$	360	480	506	485	
2000	Increase B above $B_{pa}$ in 2001	110	390		415	
2001	High prob. of $SSB > B_{pa}$ in 2003	263	395		426	
2002	Reduce F to well below 0.25	181	395		535	90
2003	Reduce F to below $F_{pa}$	305	395		552	115
2004	Reduce F to below $F_{pa}$	398	486		606	117
2005	Take into account coastal cod and redfish bycatches. Apply catch rule.	485	485		641	166
2006	Take into account coastal cod and redfish bycatches. Apply amended catch rule.	471	471		538	67
2007	Take into account coastal cod and redfish bycatches. $F_{pa}$	309	424		487	41
2008	Take into account coastal cod and redfish bycatches. Apply catch rule.	409	430		464	15
2009	Take into account coastal cod and redfish bycatches. Apply catch rule.	473	525		523	0
2010	Take into account coastal cod and redfish bycatches. Apply catch rule.	577.5	607		610	0
2011	Take into account coastal cod and redfish bycatches. Apply catch rule.	703	703		720	0
2012	Take into account coastal cod and redfish bycatches. Apply catch rule.	751	751		728	0
2013	Take into account coastal cod and <i>S. marinus</i> bycatches. Apply catch rule.	940	1000		966	0
2014	Take into account coastal cod and <i>S. marinus</i> bycatches. Apply catch rule.	993	993			
2015	Take into account coastal cod and <i>S. norvegicus</i> <sup>1</sup> bycatches. Apply catch rule.	894				

Weights in thousand tonnes.

<sup>1</sup>This species has up to now been named *Sebastes marinus*. It was decided to adopt the species list by WoRMS (<http://www.marinespecies.org/>). The name used for this species will hence hereafter be *Sebastes norvegicus*.

Table 3.3.2.2

Cod in Subareas I and II (Northeast Arctic cod). Reported landings (t) by country.

Year	Faroe Islands	France	German Dem.Rep.	Fed.Rep. Germany	Norway	Poland	United Kingdom	Russia <sup>2</sup>	Others	Total all countries
1961	3 934	13 755	3 921	8 129	268 377	-	158 113	325 780	1 212	783 221
1962	3 109	20 482	1 532	6 503	225 615	-	175 020	476 760	245	909 266
1963	-	18 318	129	4 223	205 056	108	129 779	417 964	-	775 577
1964	-	8 634	297	3 202	149 878	-	94 549	180 550	585	437 695
1965	-	526	91	3 670	197 085	-	89 962	152 780	816	444 930
1966	-	2 967	228	4 284	203 792	-	103 012	169 300	121	483 704
1967	-	664	45	3 632	218 910	-	87 008	262 340	6	572 605
1968	-	-	225	1 073	255 611	-	140 387	676 758	-	1 074 084
1969	29 374	-	5 907	5 543	305 241	7 856	231 066	612 215	133	1 197 226
1970	26 265	44 245	12 413	9 451	377 606	5 153	181 481	276 632	-	933 246
1971	5 877	34 772	4 998	9 726	407 044	1 512	80 102	144 802	215	689 048
1972	1 393	8 915	1 300	3 405	394 181	892	58 382	96 653	166	565 287
1973	1 916	17 028	4 684	16 751	285 184	843	78 808	387 196	276	792 686
1974	5 717	46 028	4 860	78 507	287 276	9 898	90 894	540 801	38 453	1 102 434
1975	11 309	28 734	9 981	30 037	277 099	7 435	101 843	343 580	19 368	829 377
1976	11 511	20 941	8 946	24 369	344 502	6 986	89 061	343 057	18 090	867 463
1977	9 167	15 414	3 463	12 763	388 982	1 084	86 781	369 876	17 771	905 301
1978	9 092	9 394	3 029	5 434	363 088	566	35 449	267 138	5 525	698 715
1979	6 320	3 046	547	2 513	294 821	15	17 991	105 846	9 439	440 538
1980	9 981	1 705	233	1 921	232 242	3	10 366	115 194	8 789	380 434
										<b>Spain</b>
1981	12 825	3 106	298	2 228	277 818	14 500	5 262	83 000	-	399 037
1982	11 998	761	302	1 717	287 525	14 515	6 601	40 311	-	363 730
1983	11 106	126	473	1 243	234 000	14 229	5 840	22 975	-	289 992
1984	10 674	11	686	1 010	230 743	8 608	3 663	22 256	-	277 651
1985	13 418	23	1 019	4 395	211 065	7 846	3 335	62 489	4 330	307 920
1986	18 667	591	1 543	10 092	232 096	5 497	7 581	150 541	3 505	430 113
1987	15 036	1	986	7 035	268 004	16 223	10 957	202 314	2 515	523 071
1988	15 329	2 551	605	2 803	223 412	10 905	8 107	169 365	1 862	434 939
1989	15 625	3 231	326	3 291	158 684	7 802	7 056	134 593	1 273	332 481
1990	9 584	592	169	1 437	88 737	7 950	3 412	74 609	510	187 000
1991	8 981	975	<b>Greenland</b>	2 613	126 226	3 677	3 981	119 427 <sup>3</sup>	3 278	269 158
1992	11 663	2	3 337	3 911	168 460	6 217	6 120	182 315	<b>Iceland</b> 1 209	383 234
1993	17 435	3 572	5 389	5 887	221 051	8 800	11 336	244 860	9 374 3 907	531 611
1994	22 826	1 962	6 882	8 283	318 395	14 929	15 579	291 925	36 737 28 568	746 086
1995	22 262	4 912	7 462	7 428	319 987	15 505	16 329	296 158	34 214 15 742	739 999
1996	17 758	5 352	6 529	8 326	319 158	15 871	16 061	305 317	23 005 14 851	732 228
1997	20 076	5 353	6 426	6 680	357 825	17 130	18 066	313 344	4 200 13 303	762 403
1998	14 290	1 197	6 388	3 841	284 647	14 212	14 294	244 115	1 423 8 217	592 624
1999	13 700	2 137	4 093	3 019	223 390	8 994	11 315	210 379	1 985 5 898	484 910
2000	13 350	2 621	5 787	3 513	192 860	8 695	9 165	166 202	7 562 5 115	414 870
2001	12 500	2 681	5 727	4 524	188 431	9 196	8 698	183 572	5 917 5 225	426 471
2002	15 693	2 934	6 419	4 517	202 559	8 414	8 977	184 072	5 975 5 484	445 045
2003	19 427	2 921	7 026	4 732	191 977	7 924	8 711	182 160	5 963 6 149	436 990
2004	19 226	3 621	8 196	6 187	212 117	11 285	14 004	201 525	7 201 6 082	489 445
2005	16 273	3 491	8 135	5 848	207 825	9 349	10 744	200 077	5 874 7 660	475 276
2006	16 327	4 376	8 164	3 837	201 987	9 219	10 594	203 782	5 972 6 271	470 527
2007	14 788	3 190	5951	4619	199 809	9 496	9298	186 229	7316 5 101	445 796
2008	15 812	3 149	5 617	4 955	196 598	9 658	8 287	190 225	7 535 7 336	449 171
2009	16 905	3 908	4 977	8 585	224 298	12 013	8 632	229 291	7 380 7 442	523 431
2010	15 977	4 499	6 584	8 442	264 701	12 657	9 091	267 547	11 299 9 185	609 983
2011	13 429	1 173	7 155	4 621	331 535	13 291	8 210	310 326	12 734 17 354 <sup>4</sup>	719 829
2012 <sup>5</sup>	17523	2841	8520	8 500	315 739	12814	11166	329 943	9536 11 081	727 663
2013 <sup>1</sup>	13833	7858	7885	8 010	438 734	15042	12536	432 314	14734 15 263	966 209

<sup>1</sup> Provisional figures.<sup>2</sup> USSR prior to 1991.<sup>3</sup> Includes Baltic countries.<sup>4</sup> Includes unspecified EU catches.<sup>5</sup> Revised figures.



**Table 3.3.2.3**

Cod in Subareas I and II (Northeast Arctic cod). Summary of the assessment. Landings include unreported landings.

Year	Recruitment	TBiomass	SSB	Landings	F
1946	728153	4168918	1112830	706000	0.1857
1947	425197	3692730	1165041	882017	0.3047
1948	442672	3665785	1019065	774295	0.3398
1949	468394	3065104	729858	800122	0.3619
1950	704902	2830106	615348	731982	0.3566
1951	1083765	3141009	568704	827180	0.3966
1952	1193117	3407677	520597	876795	0.5348
1953	1590386	3557375	396417	695546	0.3572
1954	641573	4039197	429693	826021	0.3879
1955	272785	3488381	346918	1147841	0.5437
1956	439609	3189826	299820	1343068	0.6401
1957	804793	2495893	207838	792557	0.5089
1958	496822	2164144	195377	769313	0.5169
1959	683686	2415820	432488	744607	0.5596
1960	789650	2050801	383478	622042	0.4789
1961	916839	2137145	404227	783221	0.6348
1962	728336	1957003	311676	909266	0.7576
1963	472070	1747578	208207	776337	0.9866
1964	338682	1374528	186570	437695	0.6789
1965	776925	1440686	102315	444930	0.5533
1966	1582567	2198419	120722	483711	0.5302
1967	1295405	2852156	129784	572605	0.5439
1968	164952	3387452	227214	1074084	0.5704
1969	112038	2805588	151870	1197226	0.8292
1970	197103	2057696	224482	933246	0.7493
1971	404768	1610966	311662	689048	0.5956
1972	1015331	1621487	346511	565254	0.6928
1973	1818945	2401954	332913	792685	0.602
1974	523917	2236384	164491	1102433	0.5633
1975	621618	2037430	142028	829377	0.6595
1976	613942	1931394	171238	867463	0.6457
1977	348053	1950747	341385	905301	0.8379
1978	638492	1576565	241536	698715	0.9406
1979	198489	1114380	174698	440538	0.7264
1980	137736	863861	108253	380434	0.7241
1981	150868	983657	166925	399038	0.8632
1982	151830	750870	326132	363730	0.7583
1983	166828	738674	327181	289992	0.756
1984	397833	817596	251086	277651	0.9161
1985	523672	957509	193855	307920	0.7038
1986	1038680	1294397	170728	430113	0.8649
1987	286359	1126256	121242	523071	0.951
1988	204627	915427	202585	434939	0.9743
1989	172775	890310	234704	332481	0.6602

Year	Recruitment	TBiomass	SSB	Landings	F
1990	242734	962599	316389	212000	0.271
1991	411714	1561567	704669	319158	0.321
1992	721126	1912062	887441	513234	0.4551
1993	894454	2359374	775039	581611	0.5529
1994	782755	2148245	614722	771086	0.868
1995	615367	1807663	528577	739999	0.7886
1996	439963	1688778	571459	732228	0.699
1997	716481	1531555	588073	762403	1.0352
1998	844734	1228867	385274	592624	0.9202
1999	548095	1099355	291897	484910	0.9964
2000	610168	1099950	239272	414868	0.8634
2001	519022	1374250	353463	426471	0.7291
2002	453255	1545121	495530	535045	0.684
2003	697546	1620504	546491	551990	0.5419
2004	310410	1590090	655544	606445	0.6867
2005	573868	1588486	609745	641276	0.7166
2006	571758	1552659	599609	537642	0.601
2007	1276193	1918298	656497	486883	0.3698
2008	1249637	2616901	712124	464171	0.3235
2009	769732	3223175	1098141	523430	0.2578
2010	427525	3454311	1285830	609983	0.2467
2011	657899	3559490	1762057	719830	0.2743
2012	622630	3545400	1966081	727663	0.2387
2013	675666	3672119	2152909	966209	0.3429
2014	850000		1797496		

### Annex 3.3.2 Northeast Arctic cod management agreement

At the 38th meeting of the Joint Russian–Norwegian Fisheries Commission (JRNFC) in November 2009, the previously used management plan was amended (marked in bold) and currently states:

*“The Parties agreed that the management strategies for cod and haddock should take into account the following:*

*conditions for high long-term yield from the stocks  
achievement of year-to-year stability in TACs  
full utilization of all available information on stock development*

*On this basis, the Parties determined the following decision rules for setting the annual fishing quota (TAC) for Northeast Arctic cod (NEA cod):*

*estimate the average TAC level for the coming 3 years based on  $F_{pa}$ . TAC for the next year will be set to this level as a starting value for the 3-year period.*

*the year after, the TAC calculation for the next 3 years is repeated based on the updated information about the stock development, however the TAC should not be changed by more than +/- 10% compared with the previous year's TAC. **If the TAC, by following such a rule, corresponds to a fishing mortality (F) lower than 0.30 the TAC should be increased to a level corresponding to a fishing mortality of 0.30.***

*if the spawning stock falls below  $B_{pa}$ , the procedure for establishing TAC should be based on a fishing mortality that is linearly reduced from  $F_{pa}$  at  $B_{pa}$ , to  $F=0$  at SSB equal to zero. At SSB-levels below  $B_{pa}$  in any of the operational years (current year, a year before and 3 years of prediction) there should be no limitations on the year-to-year variations in TAC.”<sup>1</sup>*

At the 39th Session of the Joint Russian–Norwegian Fisheries Commission in October 2010 it was agreed that the current management plan should be used “for five more years” before it is evaluated.

<sup>1</sup> This quotation is taken from Annex 14 in the Protocol of the 38th Session of the Joint Russian–Norwegian Fisheries Commission and translated from Norwegian to English. For an accurate interpretation, please consult the text in the official languages of the Commission (Norwegian and Russian).