ECOREGION North Sea
STOCK Cod in Subarea IV (North Sea) and Divisions VIId (Eastern Channel) and IIIa West (Skagerrak)

Advice for 2012

ICES advises on the basis of the EU–Norway management plan that landings in 2012 should be no more than 31 800 t.

Stock status

F (Fishing Mortality)	2008	2009	2010	
MSY (F_{MSY})	✗	✗	✗	Above target
Precautionary approach (F_{pa},F_{lim})	o	o	o	Increased risk
Management plan (F_{MP})	✗	✗	✗	Above target

SSB (Spawning-Stock Biomass)	2009	2010	2011	
MSY ($B_{trigger}$)	✗	✗	✗	Below trigger
Precautionary approach (B_{pa},B_{lim})	✗	✗	✗	Reduced reproductive capacity
Management plan (SSB_{MP})	✗	✗	✗	Below trigger

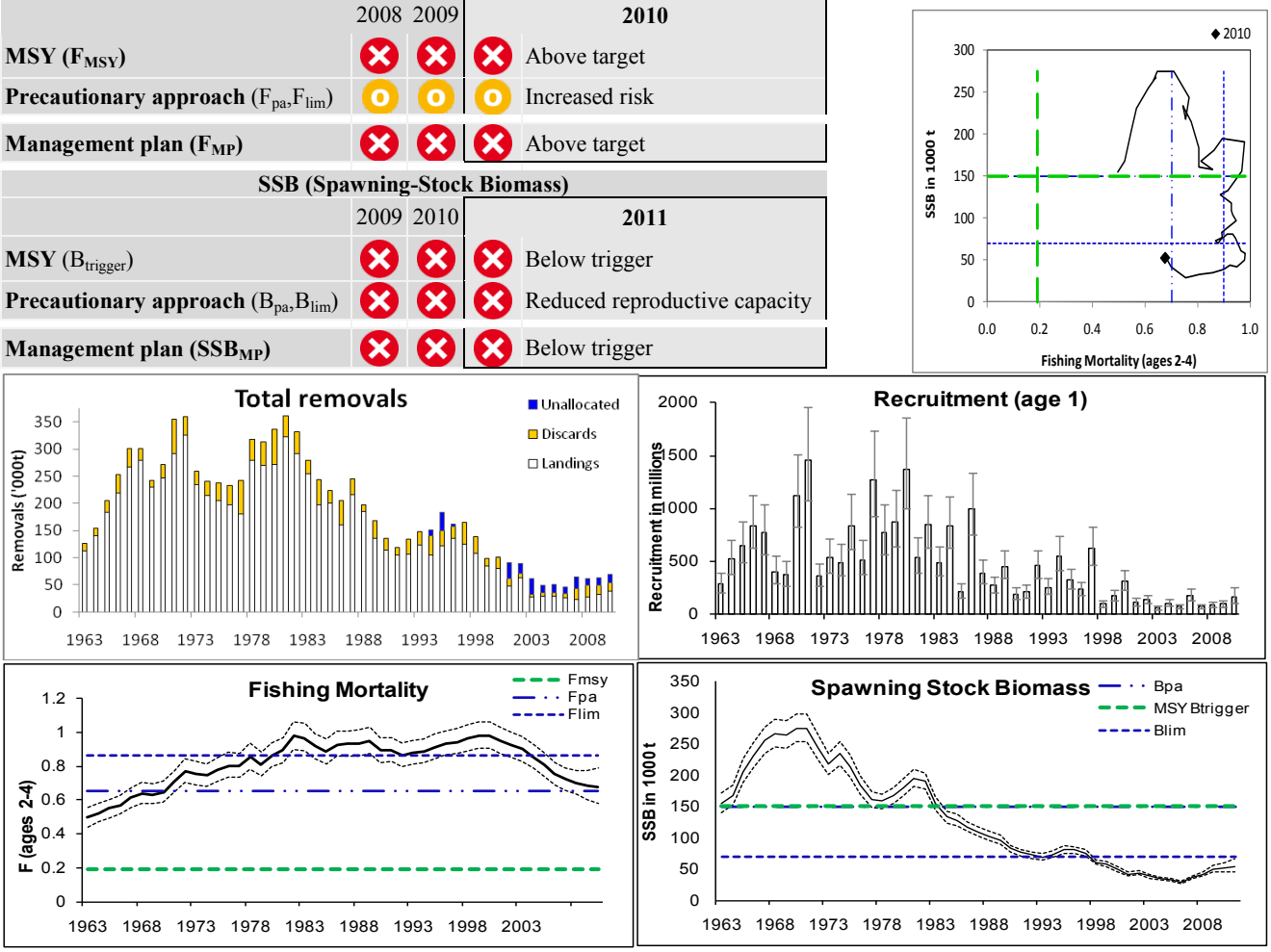

Figure 6.4.2.1 Cod in Subarea IV (North Sea) and Divisions VIId (Eastern Channel) and IIIa West (Skagerrak). Summary of stock assessment with point-wise 95% confidence intervals, catch estimated, and adjusted for unallocated removals (from 1993). Weights in tonnes.

There has been a gradual improvement in the status of the stock over the last few years. SSB has increased from the historical low in 2006, but remains below B_{lim}. Fishing mortality declined from 2000, but is estimated to be well above F_{MSY}, and is just above F_{pa}. Recruitment since 2000 has been poor. Although discards are still high, there has been a decreasing trend since 2008.

Management plans

The EU–Norway agreement management plan was updated in December 2008 (Annex 6.4.2). The EU has adopted a long-term plan for this stock with the same aims (Council Regulation (EC) 1342/2008). ICES evaluated both plans in 2009 and concluded they are in accordance with the precautionary approach if implemented and enforced adequately.

A joint ICES–STECF group is currently conducting a historical evaluation of the effectiveness of these plans (ICES, 2011b).

Biology

Cod are widely distributed throughout the North Sea, but there are indications of sub-stocks. Genetic studies have indicated two subpopulations with long-term differences in recruitment trends, and largely inhabiting different regions of the North Sea, with cod from the deep-water subpopulation not expected to re-colonize areas depleted in the southern North Sea (ICES, 2011c).

Environmental influence on the stock

Recent recruitments have been low, with possible influence of changes in the availability of food resources for cod larvae to increasing predation pressure. There is evidence of cannibalism and seal predation. Multispecies model runs estimate a decrease in cannibalism rates for age 1 and age 2 cod at current low stock levels, while seal predation on ages 3 to 6 has increased over the years due to an increase in seal abundance.

The fisheries

Cod are taken by towed gears in mixed demersal fisheries. Cod are targeted by some fleets, but are also caught as part of mixed fisheries catching haddock, whiting, *Nephrops*, plaice, and sole. Cod discards have declined from 45% in 2008 to 20% in 2010 as a proportion of the total cod catches by weight.

Catch by fleet	ICES estimates total removals (2010) at around 69 kt, with 39.0 kt estimated landings (64% demersal trawls and seines >100 mm, 12% *Nephrops* trawls 70–99 mm, 12% gillnets, and 8% beam trawls) and 14.4 kt estimated discards. Unaccounted removals are estimated at around 30% (between 6% and 59%) of the catch in 2010.

Effects of the fisheries on the ecosystem

Gillnet fishery for cod takes bycatches of harbour porpoise. Since 2001, effort reductions in this fishery have likely led to decreased bycatches. Hiddink *et al.* (2006) estimates that in areas of bottom trawl activity in the North Sea,benthic biomass and production is reduced by 56% and 21%, respectively, compared with an unfished situation.

Quality considerations

The main source of uncertainty for the advice forecast is the assumption of fishing mortality in 2011. Rather than assuming a *status quo* F in 2011, which would imply a TAC overshoot of 50%, the projections assume that the effort reductions in the management plan have resulted in a 15% decrease in F between 2010 and 2011.

A new stochastic assessment model was used in 2011 which shows less interannual variation in fishing mortality. Discards are estimated from relatively few samples. Discard information in the correct form or of sufficient quality was not available for Dutch, French, and Belgian fleets, respectively accounting for 7%, 6%, and 2% of cod landings in 2010. These are sources of added uncertainty in the assessment.

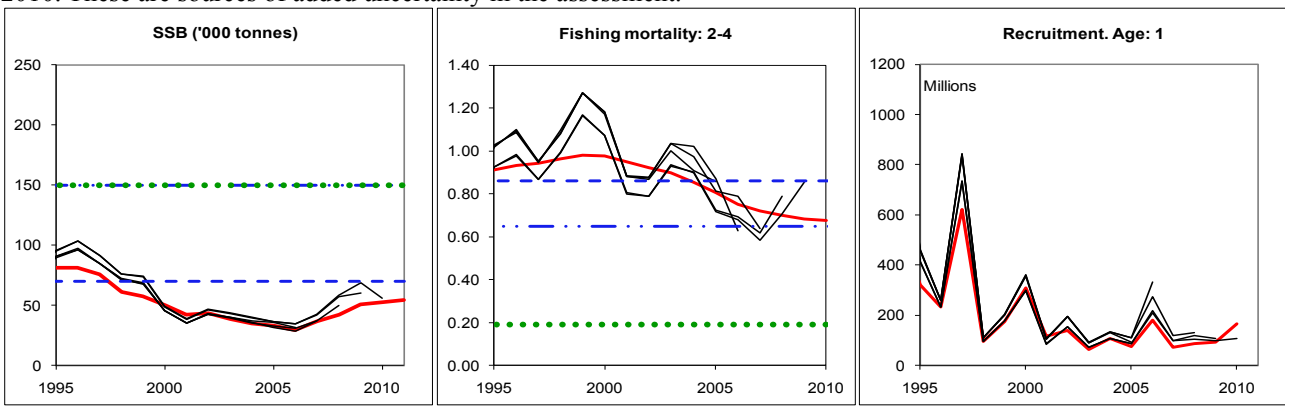

Figure 6.4.2.2 Cod in Subarea IV (North Sea) and Divisions VIId (Eastern Channel) and IIIa West (Skagerrak). Historical assessment results (final year recruitment estimates included).

Scientific basis

Assessment type	A state–space age-structured assessment model with estimates of unaccounted removals (SAM), and a stochastic age-based model with estimates of unaccounted removals (B-ADAPT) used as comparison.
Input data	One survey index (from IBTS Q1 survey).
Discards and bycatch	Included in the assessment (since 2004).
Indicators	None.
Other information	Latest full benchmark was performed in 2009 with an inter benchmark meeting in 2011.
Working group report	WGNSSK

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Reference points

	Type	*Value*	*Technical basis*
Management Plan	SSB_{MP}	150 000 t	= $\mathbf{B_{pa}}$
	F_{MP}	0.4	Mortality rate when SSB > SSB_{MP}.
MSY Approach	MSY $B_{trigger}$	150 000 t	The default option of B_{pa}
	F_{MSY}	0.19	F_{max} 2010, within the range of fishing mortalities consistent with F_{MSY} (0.16–0.42).
Precautionary approach	B_{lim}	70 000 t	B_{loss} (~1995)
	B_{pa}	150 000 t	B_{pa} = Previous MBAL and signs of impaired recruitment below 150 000 t.
	F_{lim}	0.86	F_{lim} = F_{loss} (~1995).
	F_{pa}	0.65	F_{pa} = Approx. 5th percentile of F_{loss}, implying an equilibrium biomass > B_{pa}.

(unchanged since: 2011)

Outlook for 2012

Basis: Management plan assumption mean F (2011) = mean F(2010)×0.85 = 0.58; Recruitment (2011) re-sampled 1998–2010 = 107 million; SSB (2012) = 66.9; HC landings (2011) = 41.8; Discards (2011) = 14.8; Unallocated removals = 15.8.

Rationale	**Landings[1] (2012)**	**Basis**	**F_{total} (2012)**	**F_{land} (2012)**	**F_{disc} (2012)**	**F_{unal}[2] (2012)**	**Disc (2012)**	**Unal[2] (2012)**	**SSB (2013)**	**%SSB[3] Change**	**%TAC[4] Change**
Management Plan	31.8	F_{08}*0.45 with TAC constraint	0.32	0.18	0.07	0.07	8.0	11.1	107.4	+ 60 %	- 1 %
MSY framework	9.5	F_{MSY}* $SSB_{2012}/B_{trigger}$	0.08	0.05	0.02	0.02	2.3	3.3	134.6	+ 101 %	- 71 %
MSY transition	42.0	Transition rule	0.44	0.25	0.09	0.10	10.6	14.6	95.1	+ 42 %	+ 30 %
Zero Catch	0.0	F=0	0.00	0.00	0.00	0.00	0.0	0.0	146.2	+ 119 %	- 100 %
Status quo	20.3	F_{MSY}	0.19	0.11	0.04	0.04	5.0	7.0	121.3	+ 81 %	- 37 %
	26.0	TAC_{2011}−20%	0.25	0.14	0.05	0.05	6.4	9.0	114.4	+ 71 %	- 20 %
	38.6	TAC_{2011}+20%	0.40	0.23	0.09	0.09	9.7	13.5	99.1	+ 48 %	+ 20 %
	51.8	F_{2011}	0.58	0.33	0.13	0.13	13.2	18.1	83.2	+ 24 %	+ 61 %

Units: ‘000 tonnes.
[1] Landings do not include unallocated mortality.
[2] Unallocated removals (calculated by dividing total by average catch multiplier in last three years).
[3] SSB 2013 relative to SSB 2012.
[4] Landings 2012 (not including unallocated removals) relative to TAC 2011.

Management plan

The EU–Norway agreement management plan as updated in December 2008 aims to be consistent with the precautionary approach and is intended to provide for sustainable fisheries and high yield leading to a target fishing mortality of 0.4 (for details see Annex 6.4.2).

The EU has adopted a long-term plan for this stock with the same aims (Council Regulation (EC) 1342/2008). In addition to the EU–Norway agreement the EU plan also includes effort restrictions, reducing kW-days available to community vessels in the main metiers catching cod in direct proportion to reductions in fishing mortality until the target F of 0.4 has been reached. This implies a 15.4% reduction in effort in 2011.

In both plans fishing mortality should be reduced to levels corresponding to 75% of F_{2008} in 2009 and 65% of F_{2008} in 2010. Until the long-term phase of the management plans has been reached, further annual reductions of 10% must be applied which lead to an F in 2012 equal to 45% of F_{2008}. This would lead to a TAC reduction within the limits of the 20% TAC constraint. According to these rules, landings should be 31 800 t in total for Subarea IV and Divisions IIIa West and VIId in 2012.

MSY approach

Following the ICES MSY framework implies fishing mortality to be reduced to 0.08 (lower than F_{MSY} because SSB 2012 < MSY $B_{trigger}$), resulting in landings of less than 9500 t in 2012. This is expected to lead to an SSB of 134 600 t in 2013.

To follow the transition scheme towards the ICES MSY framework the fishing mortality must be reduced to (0.6*0.68) + (0.4*(0.19*0.40)) = 0.44, which is lower than F_{pa}. This results in landings of less than 42 000 t in 2012, which is expected to lead to an SSB of 95 100 t in 2013.

The stock is below B_{lim} and recruitment remains poor. Therefore, a more rapid transition to the MSY framework may be necessary to rectify the situation. ICES highlights catch options for transition periods ranging from one to four years (2012 to 2015, respectively).

PA approach

Even a zero catch in 2012 is not expected to result in SSB reaching B_{pa} in 2013.

Additional considerations

Uncertainty in the assessment

Because of the differing levels of noise associated with the data sets on discards and landings, the current SAM assessment model was adopted by the benchmark workshop for North Sea cod in February 2011 (ICES, 2011c) for an interim period until further refinements can be made that account for discards and landings separately. Two alternative assessment methods (SAM and B-Adapt models) using the same set of input data provide similar perceptions of the stock over time and in the most recent year.

The IBTS Q3 survey is no longer included in the assessment because of the conflicting trends between the IBTS Q1 and Q3 indices used in the assessment, possibly resulting from changes in the catchability/availability of cod in Q3 related to recent changes in fish distribution. Future re-inclusion of the IBTS Q3 survey is envisaged once a detailed investigation is carried out; the February 2011 benchmark has recommended that a working group on improving the use of survey data for assessment and advice be established for this purpose.

Historically high recruitment estimates have been revised downward, which may influence the stock recruitment relationship and may therefore affect the revision of reference points in future.

MSY reference points

The choice of the proxy F_{max} as a candidate for F_{MSY} was based on the clear peak at F = 0.19 in the yield-per-recruit analysis in 2010. Extensive simulations and investigations of the productivity of the stock provide a range of possible candidate values (F_{MSY} = 0.16 to 0.42). The estimate of F_{MSY} is strongly dependent on the choice of stock–recruitment (S–R) model.

Management considerations

The assessment estimates that SSB in 2012 is still below B_{lim} and F is still largely above any management target, indicating that the LTMP objective of reducing fishing mortality by 35% in 2010 compared to 2008 has likely not been achieved (the decrease in F from 2008 to 2010 is estimated to be around 3%, Figure 6.4.2.1).

Fishing mortality rates have been reduced from 2000 and the stock has increased since 2006. The low average age of the spawning stock may reduce its reproductive capacity as first-time spawners may reproduce less successfully than older fish, a factor that could be a contributor to continued low recruitment.

Mixed-fisheries considerations are of primary importance for the management of North Sea cod. Single-stock management is a cause of discarding in mixed fisheries, because individual management objectives may not be

consistent with each other. As such, the TAC of one species may be exhausted before the TAC of another, leading to catches of valuable fish that cannot be landed legally. It was estimated that the single-species management targets for North Sea cod cannot be achieved unless substantial reductions in TACs of all other stocks and corresponding effort reductions are applied (Ulrich *et al.*, 2011). ICES WGMIXFISH provides annual catch option scenarios to evaluate the consistency of the North Sea demersal single-stock exploitation boundaries in a mixed-fisheries and fleet-based perspective.

A joint ICES–STECF WG meeting will be held in the first half of 2011 to evaluate the effectiveness of the plan (ICES, 2011b).

Surveys indicate that the year classes are depleting faster than one would expect from the catches, and point to unaccounted removals. There is no documented information on the source of these unaccounted removals; while it has been previously assumed that these removals originate mostly from fishing activities, changes in natural mortality may also have an influence. Plausible fishery-based contributions to these unaccounted removals are discards (undersized cod, highgrading, and over-quota catches) that do not count against quota, and mis- and under-reporting of catches. The recorded landings from 2005–2010 fluctuated between 35% and 59% of the estimated total removals, indicating that the management system has not been effective in controlling the removals.

In the catch options table separate categories are included for projected landings, discards, and unallocated removals.

Several nations, who make substantial landings of cod, have not supplied ICES with estimates of discards that can be used within the assessment process, despite the requirement of the EU data collection regulations. In order to improve the quality of the assessment, and hence management advice, these nations should be encouraged to do so.

Management plan evaluations

ICES has evaluated the EC management plan (EC 1342/2008 and Annex 6.4.2) and the EU–Norway agreed long-term plan in March 2009 and concluded that this management plan is in accordance with the precautionary approach only if implemented and enforced adequately. A joint ICES–STECF group is currently conducting a historical evaluation of the effectiveness of these plans.

Regulations and their effects

The North Sea cod benchmark (ICES, 2011c) investigated the incidence of underreporting for the main fishing nations. Underreporting by the Scottish fleet fishing for cod has declined significantly since 2003, and is likely to have been low since 2006. Similarly, based on several indicators (including comparisons between the total quantity of cod registered in logbooks and those registered in sales receipts), the Danish Directorate of Fisheries estimates that the placement of illegal fish on the market does not occur on a large scale.

Effort restrictions in the EC were introduced in 2003 (annual annexes to the TAC regulations) for the protection of the North Sea cod stock. In 2009, the management program switched from a days-at-sea to a kW-day system (2009 Council Regulation (EC) N° 43/2009), in which different amounts of kW-days are allocated within each area by member state to different groups of vessels, depending on gear and mesh size. Effort ceilings are updated annually.

The STECF has performed annual monitoring of effort trends since 2004. Overall effort (kW-days) by demersal trawls, seines, beam trawls, and gillnets in the North Sea, Skagerrak, and Eastern Channel had been substantially reduced (−30% between 2003 and 2009; STECF, 2011). Following the introduction of days at sea regulations in 2003, there was a substantial switch from the larger mesh (>100 mm, TR1) gear to the smaller mesh (70–99 mm, TR2) gear. Subsequently, effort by TR1 has been relatively stable, whereas effort in TR2, beam trawl (80–120 mm, BT2), and gillnet has shown a continuous decline (−23%, −38%, and −31%, respectively, between 2003 and 2009).

Fishing mortality in the period 2003–2009 decreased by 23%, and preliminary analyses suggested that correlation between F and effort trends were significant. From 2009 on though, these patterns may change, as increasing proportions of effort fall under derogations of the cod management plan (articles 11 and 13), which reward cod avoidance and discard reduction behaviour with additional effort ceilings.

Scotland implemented in February 2008 a national scheme known as the 'Conservation Credits Scheme'. The principle of this two-part scheme involves additional time at sea in return for the adoption of measures which aim to reduce mortality on cod and lead to a reduction in discard numbers. ICES notes that from the initial year of operation (2008) cod discarding rates in Scotland have decreased from 62% to 36% in 2010. In 2010 there were 165 closures, and from July 2010 the area of each closure increased (from 50 square nautical miles to 225 square nautical miles). Recent work tracking Scottish vessels in 2009 has concluded that vessels did indeed move from areas of higher to lower cod

concentration following real-time closures during the first and third quarters (there was no significant effect during the second and fourth quarters (Needle and Catarino, 2011).

The introduction of the one-net rule is likely to have improved the accuracy of reporting of metier-based landings from 2008 onwards. Scottish legislation implemented in January 2008, which bans the use of multi-rigs (>2 rigs per trawl), could limit the potential of uncontrolled increase in effort.

A rights-based regulation (FKA – Vessel Quota Share) was put in force in Denmark from the 1st of January 2007. Individual vessels have been allocated a yearly share of the Danish quota, which can be taken at any time of the year. There is also a possibility to trade it, exchange it, or pool it with other fishers. This system gives the industry a possibility to plan better and is expected to lead to a more efficient fishery with less discards; however, the consequences of these measures have not yet been evaluated.

Changes in fishing technology and fishing patterns

The expansion of the Closed Circuit TV (CCTV)/ fully documented fisheries programmes in 2010 (and subsequently in 2011) in Scotland, Denmark, and England is expected to have reduced cod mortality; vessels carrying CCTV systems are not permitted to discard cod.

Environmental influence

There has been an apparent northerly shift in the mean latitudinal distribution of the stock in the North Sea. However, this is not thought to be due to cod migrating from the south to the north in response to climate change. More likely, cod in the North Sea are composed of a complex of more or less isolated sub-stocks and the southern units have been subjected to disproportionately high rates of mortality. The contracted range of the North Sea cod stock can be linked to reduced abundance as well as climate factors.

The consumption of cod in the North Sea in 2002 by grey seals has been estimated by Hammond and Grellier (2006). For the North Sea it was estimated that in 1985 grey seals consumed 4150 tonnes of cod (95% confidence intervals; 2484–5760 tonnes), and in 2002 the population tripled in size (21 000–68 000 individuals) and consumed 8344 tonnes (95% confidence intervals; 5028–14 941 tonnes). Grey seals have not been accounted for in multispecies models since 2005, therefore the current level of predation by seals is unknown.

Data and methods

The assessment uses combined landings and discards, calibrated with one survey index (from IBTS quarter 1 survey). For ICES Subarea IV and Division VIId, discards were estimated from the Scottish discards sampling programme up until 2005 and raised to the total international fleet. The coverage of national discard data has subsequently improved.

Information from the fishing industry

Comparison between the fishers' North Sea stock survey (Napier, 2011) and the IBTS survey data has been shown in previous years the time-series are broadly in agreement in recording a stable overall stock abundance until 2003–2005, followed by a more recent increase. Because of the inherent spatial variation the IBTS surveys have more variability, but exhibit similar trends in the same areas as the fishers' survey, showing significant increases in stock abundance in the north and west, and less in the south.

Both the Danish REX and UK northeast coast cod surveys (collaborative research projects with the fishing industry) indicate that catch rates of cod are significantly greater on the hard ground compared to the soft ground. The Danish REX survey also indicates much higher catch rates of cod in the first quarter compared to the third quarter for a trawler and Danish seines, but not for a gillnetter, possibly explained by the high water turbidity caused by the more frequent storm events in the first quarter (the gillnetter is not affected by this to the same extent as the other two vessels). A UK whitefish survey, initiated in 2009, indicates that catches of older cod are more frequent and less noisy in this survey than in the IBTS Q3 survey. This is supported by results from the Danish REX survey, which shows good agreement with the IBTS Q3 survey for younger ages, but not for older ages.

Comparison with previous assessment and advice

The SAM model was considered to be the most appropriate because it considers additional variability/uncertainty in various components, making it less reactive to noise in the catch/survey data, or to potential changes to survey catchability than B-ADAPT. Last year, a *status quo* F was assumed for the current year. This year, the projections assume that the effort reductions in the management plan have resulted in a 15% decrease in F between 2010 and 2011.

Last year's advice was based on different scenarios. This year´s advice is based on the EC management plan.

Sources

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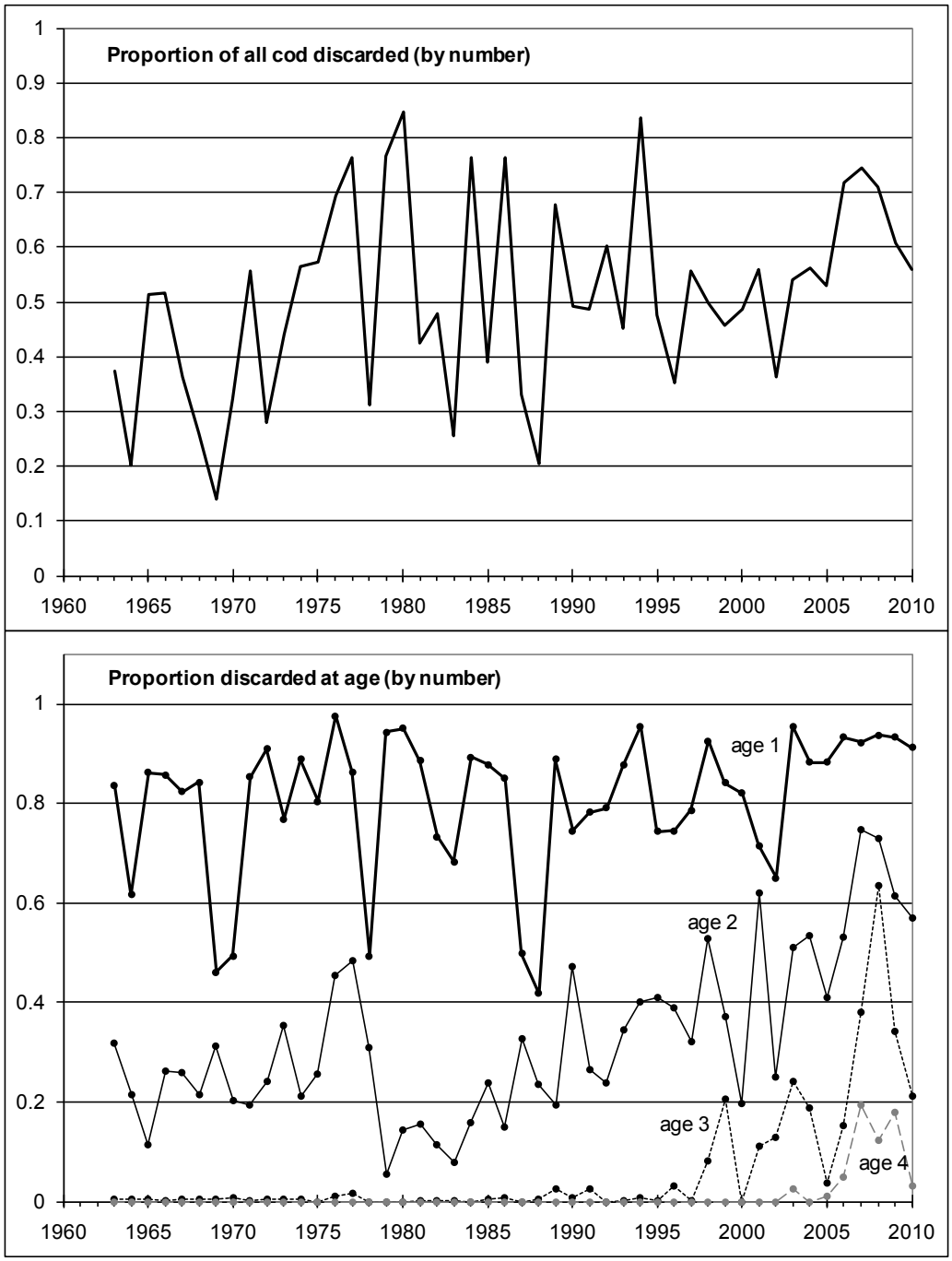

Figure 6.4.2.3 Cod in Subarea IV (North Sea) and Divisions VIId (Eastern Channel) and IIIa West (Skagerrak). Proportion of total numbers caught that are discarded in total and at age. In 2010, 91% of 1-year-old, 57% of 2-year-old, 21% of 3-year-old, and 3% of 4-year-old cod were discarded.

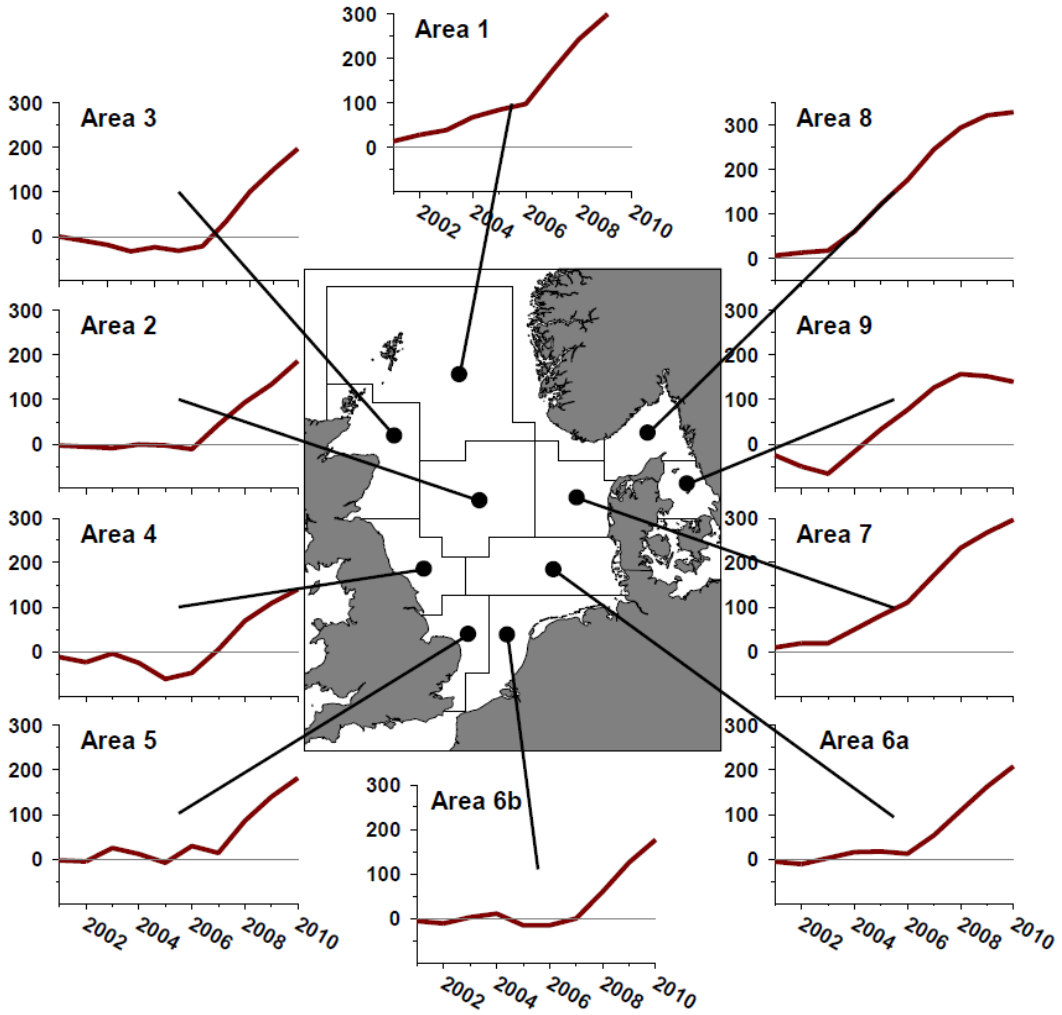

Figure 6.4.2.4 Cod in Subarea IV (North Sea) and Divisions VIId (Eastern Channel),and IIIa (Skagerrak). Results of the North Sea Commission fishers' survey perceptions of abundance by area, 2010.

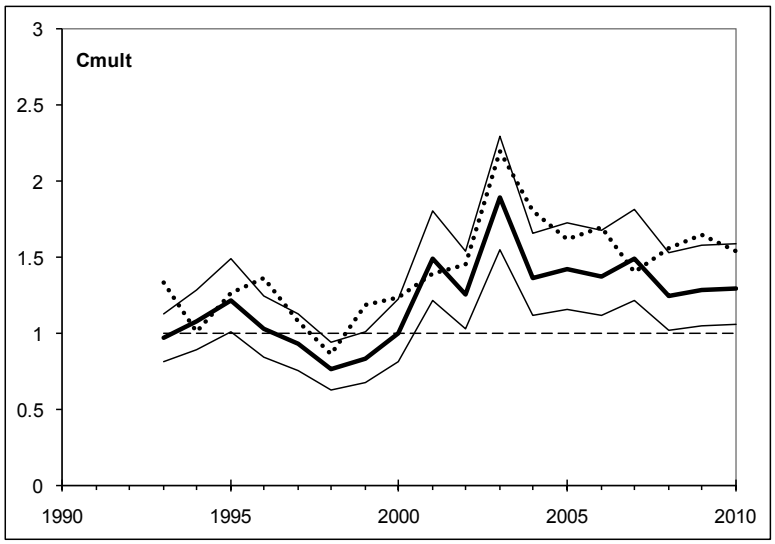

Figure 6.4.2.5 Cod in Subarea IV (North Sea) and Divisions VIId (Eastern Channel) and IIIa (Skagerrak). Estimates of factor for unallocated removals (catch multiplier) from SAM (bold line with 95% confidence limits) and B-Adapt (dotted line).

Table 6.4.2.1 Cod in Subarea IV (North Sea) and Divisions VIId (Eastern Channel) and IIIa (Skagerrak). ICES advice, management, and catch/landings. Landings for each of the three parts of this combined-area assessment and for all areas combined are given in Table 6.4.2.2.

North Sea (Subarea IV)

Year	ICES Advice	Predicted catch corresponding to advice	Agreed TAC	Official landings	ICES landings
1987	SSB recovery; TAC	100–125	175	167	182
1988	70% of F(86); TAC	148	160	142	157
1989	Halt SSB decline; protect juveniles; TAC	124	124	110	116
1990	80% of F (88); TAC	113	105	99	105
1991	70% of effort (89)		100	87	89
1992	70% of effort (89)		100	98	97
1993	70% of effort (89)		101	94	105
1994	Significant effort reduction		102	87	95
1995	Significant effort reduction		120	112	120
1996	80% of F(94) = 0.7	141	130	104	107
1997	80% of F(95) = 0.65	135	115	100	102
1998	F(98) should not exceed F(96)	153	140	114	122
1999	F = 0.60 to rebuild SSB	125	132	80	78
2000	F less than 0.55	< 79	81	62	59
2001	lowest possible catch	0	48.6	42.3	41
2002	lowest possible catch	0	49.3	44.2	44.3
2003	Closure	0	27.3	27.4	NA
2004	Zero catch	0	27.3	23.4	NA
2005	Zero catch	0	27.3	23.9	NA
2006	Zero catch	0	23.2	22.2	NA
2007	Zero catch	0	20.0	19.7	NA
2008	Exploitation boundaries in relation to precautionary limits Total removals < 22 000 t	< 22	22.2	22.2	NA
2009	Zero catch	0	28.8	25.7	NA
2010	Management plan F (65% of F_{2008})	< 40.3 [1)]	33.6	31.4	NA
2011	See scenarios	-	26.8		
2012	Management plan F (45% of F_{2008})	< 31.8 [1)]			

Weights in '000 t.

[1)] For Subarea IV (North Sea) and Divisions VIId (Eastern Channel) and IIIa (Skagerrak).

Table 6.4.2.1 Continued

Skagerrak (Division IIIa)

Year	ICES Advice	Predicted catch corresponding to advice	Agreed TAC[1]	Official landings	ICES landings[1]
1987	$F = F_{max}$	<21	22.5	19.9	20.9
1988	Reduce F		21.5	17.0	16.9
1989	F at F_{med}	<23	20.5	18.7	19.6
1990	F at F_{med}; TAC	21.0	21.0	17.8	18.6
1991	TAC	15.0	15.0	12.1	12.4
1992	70% of F(90)		15.0	14.0	14.8
1993	Precautionary TAC		15.0	14.7	15.3
1994	No long-term gain in increased F + precautionary TAC		15.5	13.3	13.9
1995	If required precautionary TAC; link to North Sea		20.0	12.1	12.1
1996	If required precautionary TAC; link to North Sea		23.0	16.2	16.4
1997	If required precautionary TAC; link to North Sea		16.1	14.9	14.9
1998	If required precautionary TAC; link to North Sea	21.9	20.0	15.3	15.3
1999	F = 0.60 to rebuild SSB	17.9	19.0	11.0	11.0
2000	F less than 0.55	<11.3	11.6	9.3	9.3
2001	lowest possible catch	0	7.0	7.1	7.1
2002	lowest possible catch	0	7.1	7.5	7.5
2003	Closure	0	3.9	3.8	NA
2004	Zero catch	0	3.9	3.8	NA
2005	Zero catch	0	3.9	3.8	NA
2006	Zero catch	0	3.3	3.4	NA
2007	Zero catch	0	2.9	2.9	NA
2008	Exploitation boundaries in relation to precautionary limits Total removals less than 22 000 t	< 22	3.2	3.3	NA
2009	Zero catch	0	4.1	3.9	NA
2010	Management plan F (65% of F2008)	< 40.3[2)]	4.8	4.3	NA
2011	See scenarios	-	3.8		
2012	Management plan F (45% of F_{2008})	< 31.8 [2)]			

Weights in '000 t.
[1)] Norwegian fjords not included.
[2)] For Subarea IV (North Sea) and Divisions VIId (Eastern Channel) and IIIa (Skagerrak).

Table 6.4.2.1 Continued

Eastern Channel (Division VIId)

Year	ICES Advice	Predicted catch corresponding to advice	Agreed TAC [1)]	Official landings	ICES landings
1987	Not assessed	-	-	9.4	14.2
1988	Precautionary TAC	-	-	10.1	10.7
1989	No increase in F; TAC	10.0 [2)]	-	n/a	5.5
1990	No increase in F; TAC	9.0 [2)]	-	n/a	2.8
1991	Precautionary TAC	3.0 [2)]	-	n/a	1.9
1992	If required, precautionary TAC	5.5 [2)]	-	2.7	2.7
1993	If TAC required, consider SSB decline	-	-	2.5	2.4
1994	Reduce F+ precautionary TAC		-	2.9	2.9
1995	Significant effort reduction; link to North Sea		-	4.0	4.0
1996	Reference made to North Sea advice		-	3.5	3.5
1997	No advice		-	7.2	7.0
1998	Link to North Sea	4.9	-	8.7	8.6
1999	F = 0.60 to rebuild SSB	4.0	-	n/a	6.9
2000	F less than 0.55	< 2.5	-	3.6	2.3
2001	lowest possible catch	0	-	2.0	1.6
2002	lowest possible catch	0	-	1.6	3.1
2003	Closure	0	-	1.3	NA
2004	Zero catch	0	-	0.2	NA
2005	Zero catch	0	-	0.7	NA
2006	Zero catch	0	-	1.1	NA
2007	Zero catch	0	-	1.7	NA
2008	Exploitation boundaries in relation to precautionary limits Total removals less than 22 000 t	< 22	-	1.4	NA
2009	Zero catch	0	1.7	1.2	NA
2010	Management plan F (65% of F2008)	< 40.3[3)]	2.0	1.8	NA
2011	See scenarios	-	1.6		
2012	Management plan F (45% of F_{2008})	< 31.8 [3)]			

Weights in '000 t.

[1)] Until 2008 this area was included in the TAC for Subarea VII (except Division VIIa). From 2009 a separate TAC is set.

[2)] Including Division VIIe.

[3)] For Subarea IV (North Sea) and Divisions VIId (Eastern Channel) and IIIa (Skagerrak).

Table 6.4.2.2 Cod in Subarea IV (North Sea) and Divisions VIId (Eastern Channel) and IIIa West (Skagerrak). Nominal landings (in tonnes) as officially reported to ICES, and ICES estimates of catches.

Sub-area IV										
Country	1991	1992	1993	1994	1995	1996	1997	1998	1999	2000
Belgium	2,331	3,356	3,374	2,648	4,827	3,458	4,642	5,799	3,882	3,304
Denmark	18,997	18,479	19,547	19,243	24,067	23,573	21,870	23,002	19,697	14,000
Faroe Islands	23	109	46	80	219	44	40	102	96	.
France	975	2,146	1,868	1,868	3,040	1,934	3,451	2,934	.	1,222
Germany	7,278	8,446	6,800	5,974	9,457	8,344	5,179	8,045	3,386	1,740
Greenland	-	-	-	-	-	-	-	-	-	-
Netherlands	6,831	11,133	10,220	6,512	11,199	9,271	11,807	14,676	9,068	5,995
Norway	6,022	10,476	8,742	7,707	7,111	5,869	5,814	5,823	7,432	6,410
Poland	15	-	-	-	-	18	31	25	19	18
Sweden	784	823	646	630	709	617	832	540	625	640
UK (E/W/NI)	14,249	14,462	14,940	13,941	14,991	15,930	13,413	17,745	10,344	6,543
UK (Scotland)	29,060	28,677	28,197	28,854	35,848	35,349	32,344	35,633	23,017	21,009
Total Nominal Catch	86,565	98,107	94,380	87,457	111,468	104,407	99,423	114,324	77,566	60,881
Unallocated landings	1,968	-758	10,200	7,066	8,555	2,161	2,746	7,779	826	-1,114
WG estimate of total landings	**88,533**	**97,349**	**104,580**	**94,523**	**120,023**	**106,568**	**102,169**	**122,103**	**78,392**	**59,767**
Agreed TAC	**100,000**	**100,000**	**101,000**	**102,000**	**120,000**	**130,000**	**115,000**	**140,000**	**132,400**	**81,000**

Division VIId										
Country	1991	1992	1993	1994	1995	1996	1997	1998	1999	2000
Belgium	182	187	157	228	377	321	310	239	172	110
Denmark	-	1	-	9	-	-	-	-	-	-
France	.	2,079	1,771	2,338	3,261	2,808	6,387	7,788	.	3,084
Netherlands	-	2	-	-	-	-	-	19	3	4
UK (E/W/NI)	341	443	530	312	336	414	478	618	454	385
UK (Scotland)	2	22	2	<0.5	<0.5	4	3	1	-	-
Total Nominal Catch	525	2,734	2,460	2,887	3,974	3,547	7,178	8,665	629	3,583
Unallocated landings	1,361	-65	-28	-37	-10	-44	-135	-85	6,229	-1,258
WG estimate of total landings	**1,886**	**2,669**	**2,432**	**2,850**	**3,964**	**3,503**	**7,043**	**8,580**	**6,858**	**2,325**

Division IIIa (Skagerrak)**										
Country	1991	1992	1993	1994	1995	1996	1997	1998	1999	2000
Denmark	10,294	11,187	11,994	11,921	15,888	14,573	12,159	12,339	8,682	7,656
Germany	3	-	530	399	285	259	81	54	54	54
Norway	924	1,208	1,043	850	1,039	1,046	1,323	1,293	1,146	926
Sweden	3,846	2,523	2,575	1,834	2,483	1,986	2,173	1,900	1,909	1,293
Others	38	102	88	71	134	-	-	-	-	-
Norwegian coast *	854	923	909	760	846	748	911	976	788	624
Danish industrial by-catch *	953	1,360	511	666	749	676	205	97	62	99
Total Nominal Catch	15,105	15,020	16,230	15,075	19,829	17,864	15,736	15,586	11,791	9,929
Unallocated landings	-3,046	-1,018	-1,493	-1,814	-7,720	-1,615	-790	-255	-817	-652
WG estimate of total landings	**12,059**	**14,002**	**14,737**	**13,261**	**12,109**	**16,249**	**14,946**	**15,331**	**10,974**	**9,277**
Agreed TAC	**15,000**	**15,000**	**15,000**	**15,500**	**20,000**	**23,000**	**16,100**	**20,000**	**19,000**	**11,600**

Sub-area IV, Divisions VIId and IIIa (Skagerrak) combined										
	1991	1992	1993	1994	1995	1996	1997	1998	1999	2000
Total Nominal Catch	102,195	115,861	113,070	105,419	135,271	125,818	122,337	138,575	89,986	74,393
Unallocated landings	283	-1,841	8,679	5,215	825	502	1,821	7,439	6,239	-3,024
WG estimate of total landings	**102,478**	**114,020**	**121,749**	**110,634**	**136,096**	**126,320**	**124,158**	**146,014**	**96,225**	**71,369**

** Skaggerak/Kattegat split derived from national statistics

* The Danish industrial by-catch and the Norwegian coast catches are not included in the (WG estimate of) total landings of Division IIIa

. Magnitude not available - Magnitude known to be nil <0.5 Magnitude less than half the unit used in the table n/a Not applicable

Division IIIa (Skagerrak) landings not included in the assessment										
Country	1991	1992	1993	1994	1995	1996	1997	1998	1999	2000
Norwegian coast *	854	923	909	760	846	748	911	976	788	624
Danish industrial by-catch *	953	1,360	511	666	749	676	205	97	62	99
Total	**1,807**	**2,283**	**1,420**	**1,426**	**1,595**	**1,424**	**1,116**	**1,073**	**850**	**723**

Table 6.4.2.2.cont

Sub-area IV

Country	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010
Belgium	2,470	2,616	1,482	1,627	1,722	1,309	1,009	894	946	666
Denmark	8,358	9,022	4,676	5,889	6,291	5,105	3,430	3,831	4,402	5,686
Faroe Islands	9	34	36	37	34	3	-	16	45	32
France	717	1,777	620	294	664	354	659	573	928	775
Germany	1,810	2,018	2,048	2,213	2,648	2,537	1,899	1,736	2,374	2,844
Greenland	-	-	-	-	35	23	17	17	11	.
Netherlands	3,574	4,707	2,305	1,726	1,660	1,585	1,523	1,896	2,649	2,656
Norway	4,369	5,217	4,417	3,223	2,900	2,749	3,057	4,128	4,234	4,483
Poland	18	39	35	-	-	-	1	2	3	.
Sweden	661	463	252	240	319	309	387	439	378	362
UK (E/W/NI)	4,087	3,112	2,213	1,890	1,270	1,491	1,587	1,546	2,384	
UK (Scotland)	15,640	15,416	7,852	6,650	4,936	6,857	6,511	7,185	9,052	
UK (combined)	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	14,112
Others	-	-	-	-	-	786	.	.	.	.
Norwegian indust by-catch *	.	.	.	.	.	48	101	22	4	201
Danish industrial by-catch *	.	.	.	.	.	34	18	46	76	11
Total Nominal Catch	41,713	44,421	25,936	23,789	22,479	23,108	20,080	22,263	27,406	31,616
Unallocated landings	-740	-121	-89	-240	1,391	-1,012	-336	-68	-1,778	-317
WG estimate of total landings	**40,973**	**44,300**	**25,847**	**23,549**	**23,870**	**22,096**	**19,744**	**22,195**	**25,628**	**31,300**
Agreed TAC	**48,600**	**49,300**	**27,300**	**27,300**	**27,300**	**23,205**	**19,957**	**22,152**	**28,798**	**33,552**

Division VIId

Country	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010
Belgium	93	51	54	47	51	80	84	154	73	57
Denmark	-	-	-	-	-	-	.	.	.	.
France	1,677	1,361	1,730	810	986	1,124	1,743	1,326	1,761	1,565
Netherlands	17	6	36	14	9	9	59	30	35	43
UK (E/W/NI)	249	145	121	103	184	267	175	144	134	
UK (Scotland)	-	-	-	-	-	1	12	7	3	
UK (conbined)	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	127
Total Nominal Catch	2,036	1,563	1,941	974	1,230	1,481	2,073	1,661	2,006	1,792
Unallocated landings	-463	1,534	-707	-167	-197	-353	-331	-307	-759	0
WG estimate of total landings	**1,573**	**3,097**	**1,234**	**807**	**1,033**	**1,128**	**1,742**	**1,354**	**1,247**	**1,792**
Agreed TAC									**1,678**	**1,955**

Division IIIa (Skagerrak)**

Country	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010
Denmark	5,870	5,511	3,054	3,009	2,984	2,478	2,228	2,552	3,023	3,289
Germany	32	83	49	99	86	84	67	52	55	56
Norway	762	645	825	856	759	628	681	779	440	434
Sweden	1,035	897	510	495	488	372	370	365	459	458
Others	-	-	27	24	21	373	385	13	2	26
Norwegian coast *	846	.	.	720	759	524	494	498	342	369
Danish industrial by-catch *	687	.	.	10	18	9	.	-	1	0
Total Nominal Catch	7,699	7,136	4,465	4,483	4,338	3,935	3,731	3,761	3,979	4,263
Unallocated landings	-613	332	-674	-696	-533	-569	-784	-463	-101	-175
WG estimate of total landings	**7,086**	**7,468**	**3,791**	**3,787**	**3,805**	**3,366**	**2,947**	**3,298**	**3,878**	**4,089**
Agreed TAC	**7,000**	**7,100**	**3,900**	**3,900**	**3,900**	**3,315**	**2,851**	**3,165**	**4,114**	**4,793**

Sub-area IV, Divisions VIId and IIIa (Skagerrak) combined

	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010
Total Nominal Catch	51,448	53,120	32,342	29,246	28,047	28,524	25,884	27,685	33,391	37,672
Unallocated landings	-1,816	1,745	-1,470	-1,103	661	-1,934	-1,451	-838	-2,638	-492
WG estimate of total landings	**49,632**	**54,865**	**30,872**	**28,143**	**28,708**	**26,590**	**24,433**	**26,847**	**30,753**	**37,180**

** Skaggerak/Kattegat split derived from national statistics

* The Danish and Norwegian industrial by-catch and the Norwegian coast catches are not included in the (WG estimate of) total landings

. Magnitude not available - Magnitude known to be nil <0.5 Magnitude less than half the unit used in the table n/a Not applicable

Division IV and IIIa (Skagerrak) landings not included in the assessment

Country	2001	2002	2002	2004	2003	2006	2007	2008	2009	2010
Norwegian coast *	846	.	.	720	759	524	494	498	342	369
Norwegian indust by-catch *	.	.	.	.	.	48	101	22	4	201
Danish industrial by-catch *	687	.	.	10	18	43	18	46	77	11
Total	**1,533**	**.**	**.**	**730**	**777**	**615**	**613**	**566**	**423**	**582**

Table 6.4.2.3a Cod in Subarea IV (North Sea) and Divisions VIId (Eastern Channel) and IIIa West (Skagerrak). Summary of stock assessment (weights in tonnes). Estimated recruitment (age 1, in thousands), total stock biomass (TSB), spawning-stock biomass (SSB), total removals (including unallocated mortality), and average fishing mortality for ages 2 to 4 (Fbar 2–4). Low = lower limit and High = higher limit of 95% confidence interval.

Year	Recruits age 1 ('000)	Low	High	TSB (tons)	Low	High	SSB (tons)	Low	High	Total removals (tons)	Low	High	Fbar 2-4	Low	High
1963	285501	209274	389493	435391	392320	483190	154817	139522	171789	126754	112862	142355	0.495	0.440	0.557
1964	520216	384985	702949	562418	500122	632472	168215	152762	185232	154662	139522	171446	0.521	0.468	0.579
1965	654090	487332	877911	702219	628396	784714	206489	188528	226160	205664	183964	229924	0.548	0.496	0.606
1966	838190	623697	1126448	852561	762052	953820	230729	211785	251368	252458	226533	281350	0.567	0.514	0.625
1967	771429	572759	1039011	932850	838034	1038394	255250	234729	277565	301040	269328	336487	0.611	0.555	0.673
1968	404740	298009	549696	830680	759118	908989	267533	246389	290492	301342	272949	332688	0.640	0.582	0.704
1969	371016	274301	501832	704328	642490	772119	264607	243725	287278	241591	221448	263566	0.633	0.576	0.695
1970	1122423	832560	1513204	999490	856634	1166168	275130	253004	299192	271848	239300	308824	0.647	0.590	0.710
1971	1452795	1075870	1961775	1113479	967612	1281336	275406	253966	298655	353982	308666	405950	0.708	0.648	0.774
1972	358255	265052	484232	852561	768190	946199	244019	224970	264680	359691	316868	408300	0.768	0.700	0.842
1973	533919	395632	720543	689692	625353	760650	218382	202009	236081	259886	237116	284844	0.755	0.691	0.826
1974	490902	363691	662609	633490	574460	698586	234451	215729	254797	240145	216634	266208	0.744	0.680	0.813
1975	836515	611616	1144113	678744	597284	771315	214701	197981	232832	237281	212029	265540	0.776	0.711	0.848
1976	515555	375998	706911	557936	501077	621247	184241	170416	199188	233748	205610	265737	0.804	0.735	0.880
1977	1266794	926751	1731606	747882	634685	881267	161135	149378	173819	242316	209719	279980	0.803	0.735	0.878
1978	771429	569048	1045787	844922	730593	977143	158419	147343	170328	317109	270146	372236	0.856	0.784	0.935
1979	866312	639716	1173170	807744	717731	909045	167879	156044	180612	312388	276223	353288	0.811	0.743	0.885
1980	1368191	1004158	1864195	896273	779631	1030365	181317	168634	194953	337055	294212	386136	0.863	0.794	0.938
1981	533919	394376	722838	815046	726974	913788	194853	181725	208929	360411	314985	412388	0.893	0.823	0.969
1982	842391	628493	1129087	801307	707968	906953	190613	177942	204186	331705	294549	373547	0.977	0.898	1.063
1983	483110	362885	643167	641138	570891	720028	155593	145249	166673	278730	245553	316390	0.967	0.891	1.049
1984	832343	624346	1109633	625934	550177	712122	133252	124511	142607	243531	215595	275087	0.914	0.844	0.991
1985	218163	162615	292687	480220	433377	532126	128412	119887	137543	223463	196832	253697	0.886	0.815	0.962
1986	999490	748660	1334357	570918	489722	665575	117830	110075	126131	204843	179030	234378	0.927	0.855	1.005
1987	389648	293256	517725	568638	499839	646907	109098	101870	116839	245242	210866	285221	0.929	0.857	1.006
1988	268874	202400	357182	450900	406893	499665	103570	96672	110960	197402	177435	219617	0.933	0.861	1.01
1989	452254	337743	605591	413329	363487	470007	96858	90160	104053	167209	148306	188522	0.946	0.872	1.027
1990	192529	145002	255633	308970	278536	342730	82537	76890	88598	135131	119760	152475	0.892	0.820	0.969
1991	214058	161058	284498	284077	256118	315088	76726	71776	82018	119134	107336	132227	0.893	0.824	0.969
1992	459549	345760	610785	374745	323932	433528	72548	67723	77716	133786	116633	153462	0.866	0.798	0.939
1993	254486	191680	337871	341465	304852	382475	69633	65246	74316	147561	129041	168740	0.877	0.809	0.950
1994	553491	412116	743363	397122	347101	454353	73571	68889	78570	150844	133108	170943	0.886	0.818	0.960
1995	321258	241987	426497	432787	382235	490024	81471	76129	87188	183139	159409	210402	0.912	0.842	0.987
1996	233982	175849	311334	368428	331982	408875	81064	75913	86565	161943	144921	180965	0.933	0.863	1.010
1997	620946	464000	830979	450449	383516	529064	75735	70940	80855	165049	141998	191843	0.944	0.874	1.020
1998	96858	71898	130483	282095	250262	317978	61451	57550	65617	139525	120672	161324	0.965	0.893	1.042
1999	173685	129752	232494	213203	193439	234986	57526	53734	61586	98322	89022	108592	0.981	0.906	1.062
2000	310519	233029	413776	246965	214401	284474	50161	46609	53984	101114	87598	116715	0.979	0.905	1.060
2001	116658	86308	157680	196222	176130	218605	42489	39746	45421	90853	80130	103011	0.949	0.878	1.026
2002	139107	103910	186227	205664	184436	229336	43827	40929	46930	88965	79352	99743	0.922	0.851	0.999
2003	63959	47923	85361	128541	117601	140498	38949	36154	41959	61574	55457	68366	0.898	0.829	0.973
2004	107045	80436	142455	117948	106386	130767	34718	32343	37267	49021	44277	54272	0.856	0.789	0.929
2005	75282	56735	99894	118658	107315	131200	32958	30680	35405	50262	44790	56402	0.807	0.742	0.879
2006	181317	136459	240920	122272	109672	136318	29437	27392	31634	46351	41493	51778	0.753	0.689	0.822
2007	72620	54753	96319	157000	140687	175204	36864	34173	39768	65186	57039	74496	0.720	0.656	0.790
2008	87728	65891	116803	155438	141690	170519	42362	39056	45948	61390	55771	67575	0.699	0.631	0.774
2009	94750	68241	131558	167209	149951	186453	50767	46038	55982	63831	57390	70996	0.684	0.605	0.772
2010	165215	106483	256340	187963	161259	219089	52733	46518	59778	69286	60927	78792	0.676	0.579	0.790
2011							54721	44838	66783						

Table 6.4.2.3b Cod in Subarea IV (North Sea) and Divisions VIId (Eastern Channel) and IIIa (Skagerrak). Summary of the assessment: estimates of landings, discards, and catch from the SAM model (in thousand tonnes). A catch multiplier is included in the model from 1993 onwards. "Total Removals" are obtained by multiplying the "Catch" column with the "Catch multiplier" column.

Year	Landings	Discards	Catch	Catch multiplier
1963	112758	14118	126754	
1964	140787	13837	154662	
1965	183322	22181	205664	
1966	218819	33456	252458	
1967	266199	34648	301040	
1968	279568	21703	301342	
1969	229120	12585	241591	
1970	246965	25034	271848	
1971	291268	63070	353982	
1972	325462	34372	359691	
1973	234920	24810	259886	
1974	214915	25135	240145	
1975	205048	32177	237281	
1976	197205	36425	233748	
1977	179872	62380	242316	
1978	278452	38754	317109	
1979	270493	41940	312388	
1980	270763	66237	337055	
1981	322223	38216	360411	
1982	291851	39895	331705	
1983	253723	25160	278730	
1984	197798	45844	243531	
1985	201189	22248	223463	
1986	160492	44445	204843	
1987	215777	29437	245242	
1988	184795	12640	197402	
1989	134996	32338	167209	
1990	113664	21397	135131	
1991	104715	14464	119134	
1992	106831	27011	133786	
1993	126694	26148	152899	0.97
1994	104349	35721	140154	1.08
1995	122165	27423	149661	1.22
1996	135372	21912	157280	1.03
1997	133517	44090	177546	0.93
1998	139145	41826	180822	0.77
1999	101165	17499	118600	0.83
2000	79549	21070	100622	1.00
2001	47830	13156	60986	1.49
2002	62941	7636	70541	1.26
2003	27313	5221	32537	1.89
2004	28852	7039	35916	1.36
2005	29466	6005	35454	1.42
2006	26001	7718	33721	1.37
2007	22707	20982	43714	1.49
2008	27155	22099	49233	1.25
2009	32653	16798	49498	1.29
2010	38963	14401	53336	1.30

Annex 6.4.2

EU–Norway management plan

In 2008 the EU and Norway renewed their initial agreement from 2004 and *"agreed to implement a long-term management plan for the cod stock, which is consistent with the precautionary approach and is intended to provide for sustainable fisheries and high yield."*

Transitional arrangement:

F will be reduced as follows: 75% of F in 2008 for the TACs in 2009, 65% of F in 2008 for the TACs in 2010, and applying successive decrements of 10% for the following years.

The transitional phase ends as from the first year in which the long-term management arrangement (paragraphs 3–5) leads to a higher TAC than the transitional arrangement.

Long-term management

1. If the size of the stock on 1 January of the year prior to the year of application of the TACs is:

    a. Above the precautionary spawning biomass level, the TACs shall correspond to a fishing mortality rate of 0.4 on appropriate age groups;
    b. Between the minimum spawning biomass level and the precautionary spawning biomass level, the TACs shall not exceed a level corresponding to a fishing mortality rate on appropriate age groups equal to the following formula:

        0.4 - (0.2 * (Precautionary spawning biomass level - spawning biomass) / (Precautionary spawning biomass level - minimum spawning biomass level))

    c. At or below the limit spawning biomass level, the TAC shall not exceed a level corresponding to a fishing mortality rate of 0.2 on appropriate age groups.

2. Notwithstanding paragraphs 2 and 3, the TAC for 2010 and subsequent years shall not be set at a level that is more than 20 % below or above the TACs established in the previous year.
3. Where the stock has been exploited at a fishing mortality rate close to 0.4 during three successive years, the parameters of this plan shall be reviewed on the basis of advice from ICES in order to ensure exploitation at maximum sustainable yield.
4. The TAC shall be calculated by deducting the following quantities from the total removals of cod that are advised by ICES as corresponding to the fishing mortality rates consistent with the management plan:

    a. A quantity of fish equivalent to the expected discards of cod from the stock concerned;
    b. A quantity corresponding to other relevant sources of cod mortality.
5. The Parties agree to adopt values for the minimum spawning biomass level (70,000 tonnes), the precautionary biomass level (150,000 tonnes) and to review these quantities as appropriate in the light of ICES advice.

Procedure for setting TACs in data-poor circumstances

6. If, due to a lack of sufficiently precise and representative information, it is not possible to implement the provisions in paragraphs 3 to 6, the TAC will be set according to the following procedure.

    a. If the scientific advice recommends that the catches of cod should be reduced to the lowest possible level the TAC shall be reduced by 25% with respect to the TAC for the preceding year;
    b. In all other cases the TAC shall be reduced by 15% with respect to the TAC for the previous year, unless the scientific advice recommends otherwise.

This plan shall be subject to triennial review, the first of which will take place before 31 December 2011. It enters into force on 1 January 2009.

The main changes between this and the plan of 2004 is the phasing (transitional and long-term phase) and the inclusion of an F reduction fraction.

EU management plan

In December 2008 the European Council agreed on a new cod management plan implementing the new system of effort management and a target fishing mortality of 0.4 (EC 1342/2008). The HCR for setting TAC for the North Sea cod stock are as follows:

Article 7 1.(a) and 1.(b) are required for interpretation of Article 8.

Article 7: Procedure for setting TACs for cod stocks in the Kattegat the west of Scotland and the Irish Sea

1. *Each year, the Council shall decide on the TAC for the following year for each of the cod stocks in the Kattegat, the west of Scotland and the Irish Sea. The TAC shall be calculated by deducting the following quantities from the total removals of cod that are forecast by STECF as corresponding to the fishing mortality rates referred to in paragraphs 2 and 3:*
   (a) a quantity of fish equivalent to the expected discards of cod from the stock concerned;
   (b) as appropriate a quantity corresponding to other sources of cod mortality caused by fishing to be fixed on the basis of a proposal from the Commission. […]

Article 8: Procedure for setting TACs for the cod stock in the North Sea

1. *Each year, the Council shall decide on the TACs for the cod stock in the North Sea. The TACs shall be calculated by applying the reduction rules set out in Article 7 paragraph 1(a) and (b).*
2. *The TACs shall initially be calculated in accordance with paragraphs 3 and 5. From the year where the TACs resulting from the application of paragraphs 3 and 5 would be lower than the TACs resulting from the application of paragraphs 4 and 5, the TACs shall be calculated according to the paragraphs 4 and 5.*
3. *Initially, the TACs shall not exceed a level corresponding to a fishing mortality which is a fraction of the estimate of fishing mortality on appropriate age groups in 2008 as follows: 75 % for the TACs in 2009, 65 % for the TACs in 2010, and applying successive decrements of 10 % for the following years.*
4. *Subsequently, if the size of the stock on 1 January of the year prior to the year of application of the TACs is:*
   (a) above the precautionary spawning biomass level, the TACs shall correspond to a fishing mortality rate of 0,4 on appropriate age groups;
   *(b) between the minimum spawning biomass level and the precautionary spawning biomass level, the TACs shall not exceed a level corresponding to a fishing mortality rate on appropriate age groups equal to the following formula: 0,4 – (0,2 * (Precautionary spawning biomass level – spawning biomass) / (Precautionary spawning biomass level – minimum spawning biomass level))*
   (c) at or below the limit spawning biomass level, the TACs shall not exceed a level corresponding to a fishing mortality rate of 0,2 on appropriate age groups.
5. *Notwithstanding paragraphs 3 and 4, the Council shall not set the TACs for 2010 and subsequent years at a level that is more than 20 % below or above the TACs established in the previous year.*
6. *Where the cod stock referred to in paragraph 1 has been exploited at a fishing mortality rate close to 0,4 during three successive years, the Commission shall evaluate the application of this Article and, where appropriate, propose relevant measures to amend it in order to ensure exploitation at maximum sustainable yield.*

Article 9: Procedure for setting TACs in poor data conditions

Where, due to lack of sufficiently accurate and representative information, STECF is not able to give advice allowing the Council to set the TACs in accordance with Articles 7 or 8, the Council shall decide as follows:

(a) where STECF advises that the catches of cod should be reduced to the lowest possible level, the TACs shall be set according to a 25 % reduction compared to the TAC in the previous year;
(b) in all other cases the TACs shall be set according to a 15 % reduction compared to the TAC in the previous year, unless STECF advises that this is not appropriate.

Article 10: Adaptation of measures

1. *When the target fishing mortality rate in Article 5(2) has been reached or in the event that STECF advises that this target, or the minimum and precautionary spawning biomass levels in Article 6 or the levels of fishing mortality rates given in Article 7(2) are no longer appropriate in order to maintain a low risk of stock depletion and a maximum sustainable yield, the Council shall decide on new values for these levels.*
2. *In the event that STECF advises that any of the cod stocks is failing to recover properly, the Council shall take a decision which:*
   (a) sets the TAC for the relevant stock at a level lower than that provided for in Articles 7, 8 and 9;
   (b) sets the maximum allowable fishing effort at a level lower than that provided for in Article 12;
   (c) establishes associated conditions as appropriate.