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

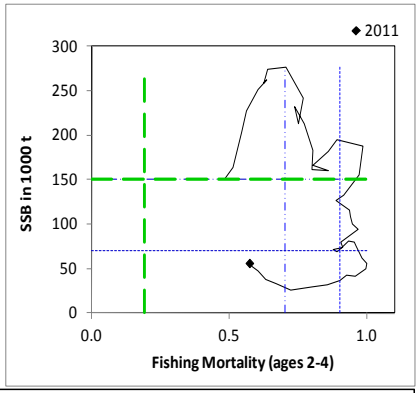
Advice for 2013

ICES advises on the basis of the EU–Norway management plan that landings in 2013 should be no more than 25 441 t.

Stock status

F (Fishing Mortality)	2009	2010	2011	
MSY (F_{MSY})	✗	✗	✗	Above target
Precautionary approach (F_{pa},F_{lim})	✓	✓	✓	Harvested sustainably
Management plan (F_{MP})	✗	✗	✗	Above target

SSB (Spawning-Stock Biomass)	2010	2011	2012	
MSY ($B_{trigger}$)	✗	✗	✗	Below trigger
Precautionary approach (B_{pa},B_{lim})	✗	✗	✗	Reduced reproductive capacity
Management plan (SSB_{MP})	✗	✗	✗	Below trigger



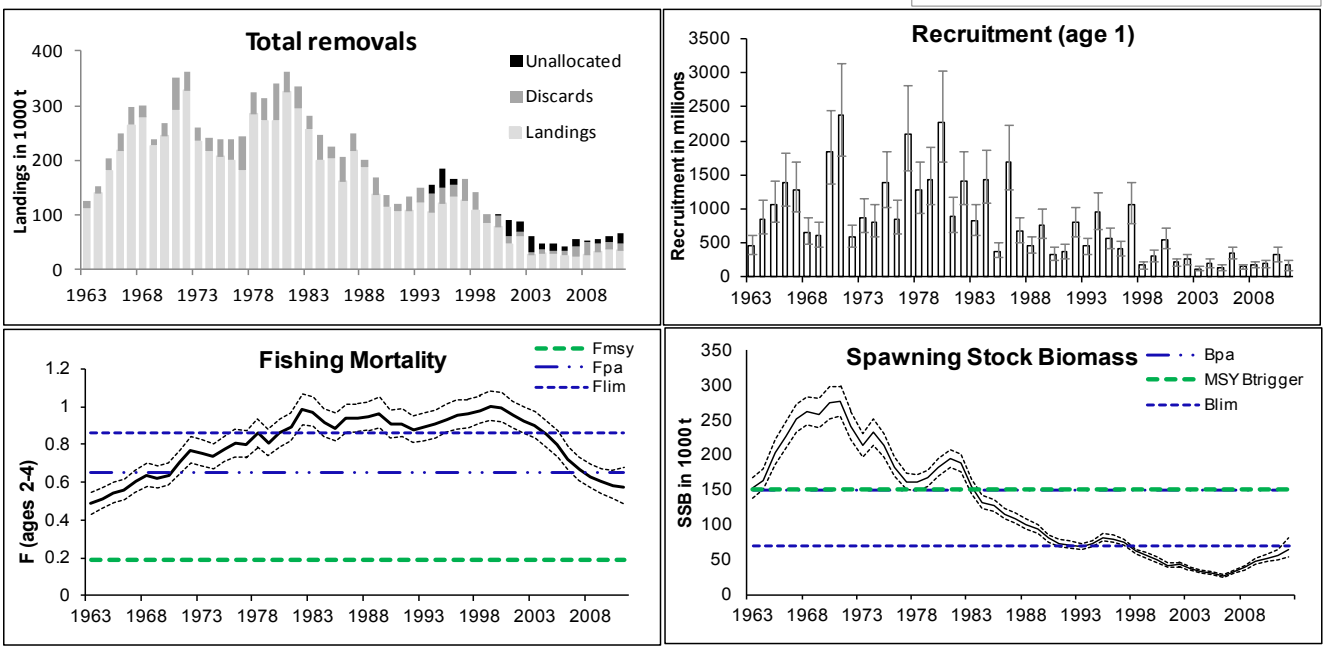


Figure 6.4.2.1 Cod in Subarea IV (North Sea) and Divisions VIId (Eastern Channel) and IIIa West (Skagerrak). Summary of stock assessment with point-wise 95% confidence intervals, catch estimated, and adjusted for unallocated removals (from 1993). Weights in tonnes.

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 just below B_{lim}. Fishing mortality declined from 2000 and is now below F_{pa}, but is estimated to be well above F_{MSY}. Recruitment since 2000 has been poor. The proportion of discards is still high relative to the historical period.

Management plans

The EU–Norway agreement management plan was updated in December 2008 (Annex 6.4.2), and will be re-considered during 2012. The EU has adopted a long-term plan for this stock with the same aims (Council Regulation (EC) 1342/2008). ICES evaluated the plans in 2009 and concluded that they are both in accordance with the precautionary approach if implemented and enforced adequately.

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 depleted areas in the southern North Sea.

Environmental influence on the stock

Recent recruitments have been low, possibly influenced by changes in the availability of food resources for cod larvae and 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. Harbour porpoises also take a substantial amount of cod up to age 3.

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 a mixed fisheries catching haddock, whiting, *Nephrops*, plaice, and sole. Cod discards relative to catch have declined from the highest on record in 2008 to a just above the historical average in 2011 (from 50% to 25%, weight of cod discarded from the total estimated cod catch).

Catch distribution	ICES estimates total removals (2011) at around 67 kt, with 35 kt estimated landings (59% demersal trawls and seines >100 mm, 16% gillnets, 10% *Nephrops* trawls 70–99 mm, and 6% beam trawls) and 11.7 kt estimated discards. Unallocated removals are estimated at around 43% (between 16% and 77%) of the catch in 2011.

Effects of the fisheries on the ecosystem

The 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 overall reporting (in particular through fully documented fisheries) of catch data provided to ICES has improved in 2012. The main sources of uncertainty are the estimation of unallocated removals and the assumption of fishing mortality in 2012 in the advice forecast.

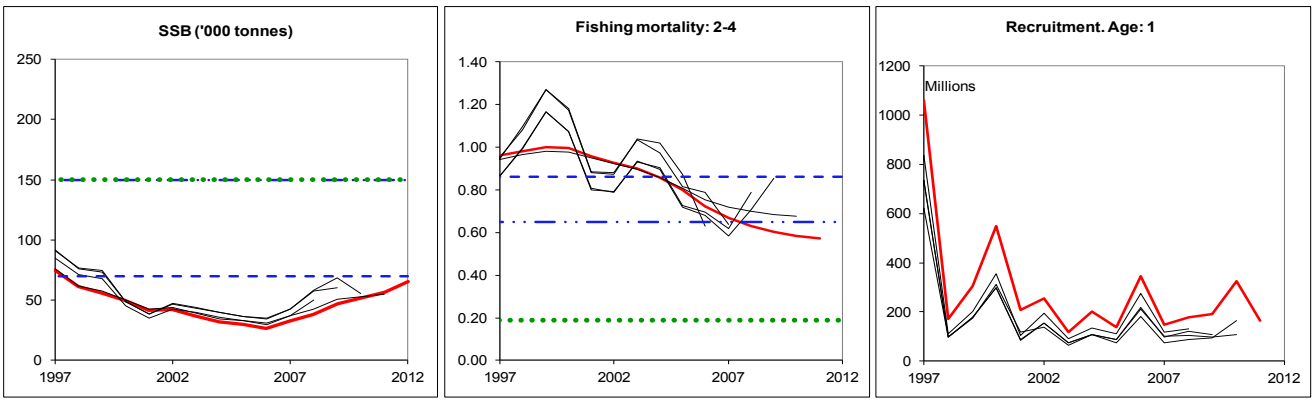


Figure 6.4.2.2 Cod in Subarea IV (North Sea) and Divisions VIId (Eastern Channel) and IIIa West (Skagerrak). Historical assessment results (final-year recruitment estimates included).

Scientific basis

Assessment type	A state–space age-structured assessment model with estimates of unaccounted removals (SAM).
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

ECOREGION North Sea
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Reference points

	Type	*Value*	*Technical basis*
Management Plan	SSB_{MP}	150 000 t	$= B_{pa}$
	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 2013

Two forecast tables are presented: Table A based on the management plan assumptions on reductions in F, and table B on the assumption of F reduced according to the observed trends as assumed by ICES.

Outlook Table A
Basis: Management plan assumption mean F (2012) = mean F (2011) × 0.82 = 0.47; Recruitment (2012) re-sampled 1998–2011 = 200 million; SSB (2013) = 78.3; landings (2012) = 40.3; Discards (2012) = 10.3; Unallocated removals = 13.6.

Rationale	**Landings**[1)] **(2013)**	**Basis**	$\mathbf{F_{total}}$ **(2013)**	$\mathbf{F_{land}}$ **(2013)**	$\mathbf{F_{disc}}$ **(2013)**	$\mathbf{F_{unal}}$[2)] **(2013)**	**Disc (2013)**	**Unal**[2)] **(2013)**	**SSB (2014)**	**%SSB**[3)] **Change**	**%TAC**[4)] **Change**
Management Plan	25.441	TAC constraint	0.26	0.15	0.06	0.05	6.5	8.6	107	+37%	−20%

Outlook Table B

Basis: F trend assumption F (2012) based on trend over 2006–2010 = 0.5; Recruitment (2012) re-sampled 1998–2011 = 200 million; SSB (2013) = 75.7; HC landings (2012) = 42.6; Discards (2012) = 10.9; Unallocated removals = 14.4.

Rationale	**Landings[1] (2013)**	**Basis**	**F_{total} (2013)**	**F_{land} (2013)**	**F_{disc} (2013)**	**F_{unal}[2] (2013)**	**Disc (2013)**	**Unal[2] (2013)**	**SSB (2014)**	**%SSB[3] Change**	**%TAC[4] Change**
Management Plan	25.441	TAC constraint	0.27	0.16	0.06	0.06	6.6	8.6	103	+36%	-20%
MSY framework	10	F_{MSY}* $SSB_{2013}/B_{trigger}$	0.10	0.06	0.02	0.02	2.5	3.4	123	+63%	-69%
MSY transition	28	Transition rule	0.29	0.17	0.06	0.06	7.2	9.4	101	+33%	-13%
Zero catch	0	F=0	0.00	0.00	0.00	0.00	0.0	0.0	136	+80%	-100%
Other options	19	F_{MSY}	0.19	0.11	0.04	0.04	4.9	6.4	112	+47%	-41%
	25.441	TAC_{2012}−20%	0.27	0.16	0.06	0.06	6.6	8.6	103	+36%	-20%
	38.161	TAC_{2012}+20%	0.43	0.25	0.09	0.09	10.2	13.0	87	+15%	+20%
	43	F_{2012}	0.50	0.29	0.10	0.11	11.7	14.8	81	+7%	+36%
	43	Landings 2012	0.49	0.28	0.10	0.10	11.5	14.6	82	+8%	+34%
Mixed fisheries options – minor differences with calculation above can occur due to different methodology used (ICES, 2012b)											
Maximum	49	A	0.77	NA	NA	NA	NA	NA	50	-34 %	+55 %
Minimum	25	B	0.25	NA	NA	NA	NA	NA	114	51 %	-20 %
Cod MP	25	C	0.29	NA	NA	NA	NA	NA	95	+25 %	-20 %
SQ effort	42	D	0.55	NA	NA	NA	NA	NA	68	-10%	+33 %
Effort_Mgt	30	E	0.32	NA	NA	NA	NA	NA	96	+26 %	-6 %

Weights in thousand 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 2014 relative to SSB 2013.

[4] Landings 2013 (not including unallocated removals) relative to TAC 2012.

Mixed fisheries assumptions:

A. Maximum scenario: Fleets stop fishing when last quota exhausted.
B. Minimum scenario: Fleets stop fishing when first quota exhausted.
C. Cod management plan scenario: Fleets stop fishing when cod quota exhausted.
D. *Status quo (*SQ) effort scenario: Effort in 2012 and 2013 as in 2011.
E. Effort management scenario: Effort reductions according to cod and flatfish management plans.

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). This management plan will be re-considered during 2012.

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 long-term phase of the plan is reached, for which the target F is 0.4 if SSB is above B_{pa}. Following the management plan implies a reduction in effort ceilings of 18.2% in 2012 and 22.2% in 2013 compared to the preceding year.

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 to achieve an F in 2013 equal to 35% of F_{2008}. This would lead to a TAC reduction of more than 20%. The management plans limit annual TAC variations to 20%. According to these rules, landings should be no more than 25 441 t in total for Subarea IV and Divisions IIIa West and VIId in 2013 (Outlook Table A).

MSY approach

While ICES considers that a reduction in F took place, the intermediate year F assumption from the management plan is considered to be over-optimistic (Kraak *et al.*, 2012). An alternative assumption for the F in 2012 is made based on the continuation of the F trend from 2006 to 2010 (Outlook Table B). Following the ICES MSY framework requires fishing mortality to be reduced to 0.10 (lower than F_{MSY} because SSB 2013 < MSY $B_{trigger}$), resulting in landings of less than 10 000 t in 2012. This is expected to lead to an SSB of 123 000 t in 2014.

To follow the transition scheme towards the ICES MSY framework the fishing mortality must be reduced to (0.4*0.58) + (0.6*0.10) = 0.29, which is lower than F_{pa}. This results in landings of less than 27 600 t in 2013, which is expected to lead to an SSB of 101 000 t in 2014.

PA approach

Even a zero catch in 2013 is not expected to result in SSB reaching B_{pa} in 2014.

Mixed fisheries

In 2012, ICES offers mixed-fisheries advice for the first time (ICES, 2012c). In contrast to single-species advice there is no single recommendation for mixed fisheries, but rather a range of plausible scenarios, assuming fishing patterns and catchability in 2012 and 2013 are unchanged from those in 2011. Major differences between the outcomes of the various scenarios indicate potential undershoot or overshoot of the TACs corresponding to the single-species advice. As a result, fleet dynamics may change, but cannot be determined.

Cod is the limiting species for the North Sea demersal fisheries in 2013. The 'minimum' and 'cod' scenarios of the mixed-fisheries analyses are both consistent with the single-species advice for cod.

Additional considerations

Data revision

Estimates of natural mortality, derived from multi-species analyses, have been updated to account for improved knowledge of predation on cod by other species (mainly seals, harbour porpoises, and grey gurnards); this update occurred in 2012 with the 2011 key run of the multispecies model (ICES, 2011d).

Uncertainty in the assessment

There is a discrepancy between the information coming from commercial catch and the scientific survey used for tuning the assessment, resulting in the estimation of unallocated mortality and catches.

The IBTS Q3 survey has not been included in the assessment since 2011 because of the conflicting trends between the IBTS Q1 and Q3 indices, possibly resulting from changes in the catchability/availability of cod in Q3 related to recent changes in fish distribution. The IBTS Q3 was considered in the assessment again this year (in addition to the Q1 survey), but was not used because of unresolved issues.

Recruitment estimates have been revised both downwards in 2011 (with the change in assessment model), and now upwards again (with the update of the natural mortality estimates by predation from multi-species work; ICES, 2011d). These revisions may influence the stock–recruitment relationship and may therefore affect the estimates of reference points.

The main source of uncertainty for the advice forecast is the assumption of fishing mortality in 2012. Rather than assuming a *status quo* F in 2012, which would imply a TAC overshoot of 48%, the projections assume that the effort reductions in the management plan have resulted in a 18% decrease in F between 2011 and 2012 (A) or a continuation of the F trend observed over 2006–2010, resulting in a 12% decrease in F between 2011 and 2012 (B).

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 although F is now below F_{pa}, it is still largely above any management target. The objective of the EU management plan to reduce fishing mortality by 45% in 2011 compared to 2008 has not been achieved. The decrease in F from 2008 to 2011 is estimated to be around 9% (Table 6.4.2.3a).

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 species including 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. For mixed-fishery results relevant to cod see 'Mixed fisheries' above.

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 2005–2011 fluctuated between 40% and 62% 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.

The overall quality of catch data provided to ICES has improved in 2012. International landings and discard rate estimates for 2011 were provided and raised according to the Data Collection Framework (DCF) métier categories. In addition the expansion of the catch quota and closed-circuit TV (CCTV) shemes (24% of landings in 2011) has likely improved the quality of catch reporting.

Management plan evaluations

ICES has evaluated the EC management plan (EC 1342/2008) and the EU–Norway agreed long-term plan in March 2009 (Annex 6.4.2) and concluded that these management plans are in accordance with the precautionary approach only if implemented and enforced (ICES, 2011a). A joint ICES–STECF group met during 2011 to conduct a historical evaluation of the effectiveness of these plans (ICES, 2011c; Kraak *et al.*, 2012). The group concluded that although there has been a gradual reduction in F and discards in recent years, the plans for North Sea cod have not controlled F as envisaged, and following the current regime is unlikely to deliver F_{MSY} by 2015.

Regulations and their effects

The North Sea cod benchmark workshop (ICES, 2011b) 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 programme 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.

Overall nominal effort (kW-days) by European demersal trawls, seines, beam trawls, and gillnets in the North Sea, Skagerrak, and Eastern Channel had been substantially reduced (−20% between 2003 and 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 (−12%, −39%, and −35%, respectively, between 2004 and 2011) (ICES, 2012b). Nominal effort reported by Norway has increased in 2011 due to the generalization of electronic logbooks.

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 24% in 2011. In 2010 there were 185 closures, and from July 2010 the area of each closure increased (from 50 square nautical miles to 225 square nautical miles).

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.

Changes in fishing technology and fishing patterns

The expansion of the closed-circuit TV (CCTV) and fully documented fisheries (FDF) programmes in 2010–2012 in Scotland, Denmark, and England is expected to have contributed to the reduction of cod mortality. Under this scheme, UK vessels are not permitted to discard any cod, while Danish vessels are still permitted to discard undersized cod. For both nations, all cod caught are counted against the quota.

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 there do appear to be long-term differences in recruitment trends. The presence of subpopulations largely inhabiting different regions of the North Sea will mean that there is the potential for regional differences in mortality, because cod from the Northern deep-water subpopulations would not be expected to re-colonize areas depleted in the southern North Sea (ICES, 2011b). The contracted range of the North Sea cod stock can be linked to reduced abundance as well as climate factors.

The distribution of 0-group cod (recruits) over the last 10–15 years has shifted towards the eastern part of the North Sea region (i.e. the Skagerrak and Kattegat). This means that the abundance of recruits is stable and shows no trends in the eastern part, whereas in the North Sea, a pronounced decline is clearly discernible. This change in distribution of cod recruits is likely to reflect changes (erosion) of the stock structure in the North Sea, so that the only productive units left in the North Sea are those which tend to use the eastern North Sea region as a nursery area (Knutsen *et al.*, 2004; Svedäng and Svenson, 2006; Svedäng *et al.*, 2007).

Data and methods

The assessment uses combined landings and discards, calibrated with one survey index (the International Bottom Trawl Quarter 1 Survey, IBTS Q1). 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; Figure 6.4.2.6) and the IBTS survey data has shown in previous years that 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, with a leveling off in these southern areas in 2011.

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. This can possibly be 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.

There is potential for combining a number of collaborative scientific–fishing industry surveys covering parts of the North Sea (e.g. the Danish REX, UK northeast coast cod, and UK whitefish surveys) into an index of stock abundance that could contribute to an assessment, and compilation of such data should be encouraged.

Comparison with previous assessment and advice

The basis for the assessment has not changed from last year. The only change from last year's assessment has been an update of the multi-species derived natural mortality estimates; this has not changed the perception of SSB and F trends, but only of overall recruitment levels. Compared to the assessment in 2011, SSB_{2011} is estimated at around the same level and F_{2010} is estimated to be 14% lower.

As last year, the advice is based on the EC management plan.

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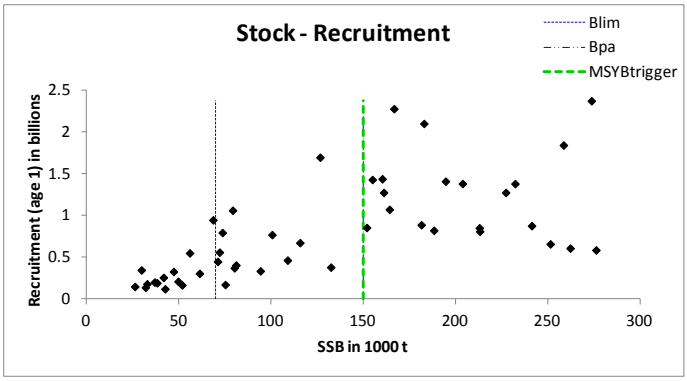

Figure 6.4.2.3 Cod in Subarea IV (North Sea) and Divisions VIId (Eastern Channel) and IIIa West (Skagerrak). Stock–recruitment plot.

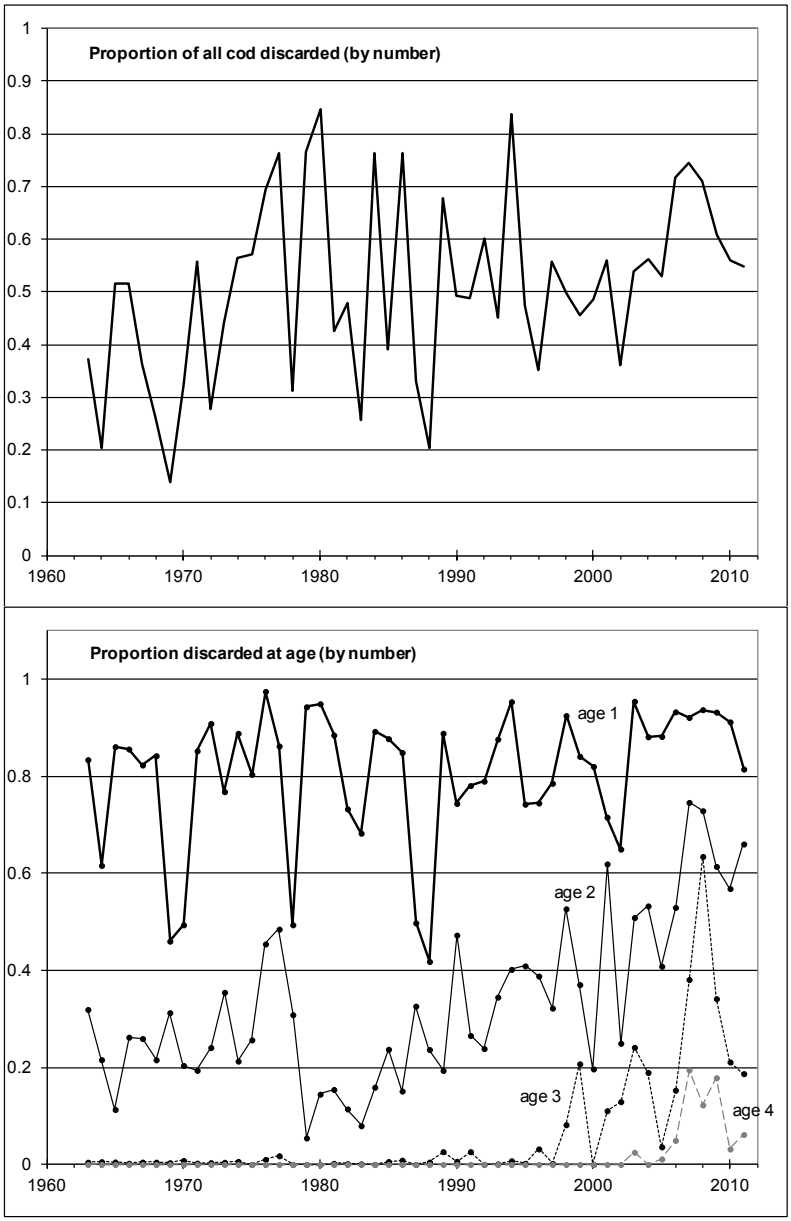

Figure 6.4.2.4 Cod in Subarea IV (North Sea) and Divisions VIId (Eastern Channel) and IIIa West (Skagerrak). Proportion of total numbers caught that are discarded in total and at age. In 2011, 82% of 1-year-old, 66% of 2-year-old, 19% of 3-year-old, and 6% of 4-year-old cod were discarded.

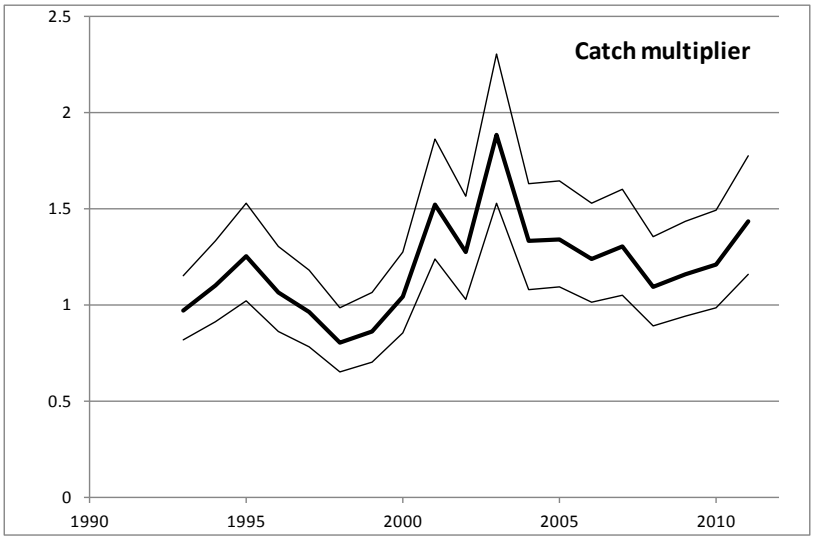

Figure 6.4.2.5 Cod in Subarea IV (North Sea) and Divisions VIId (Eastern Channel) and IIIa (Skagerrak). Estimates of factor for unallocated removals (catch multiplier).

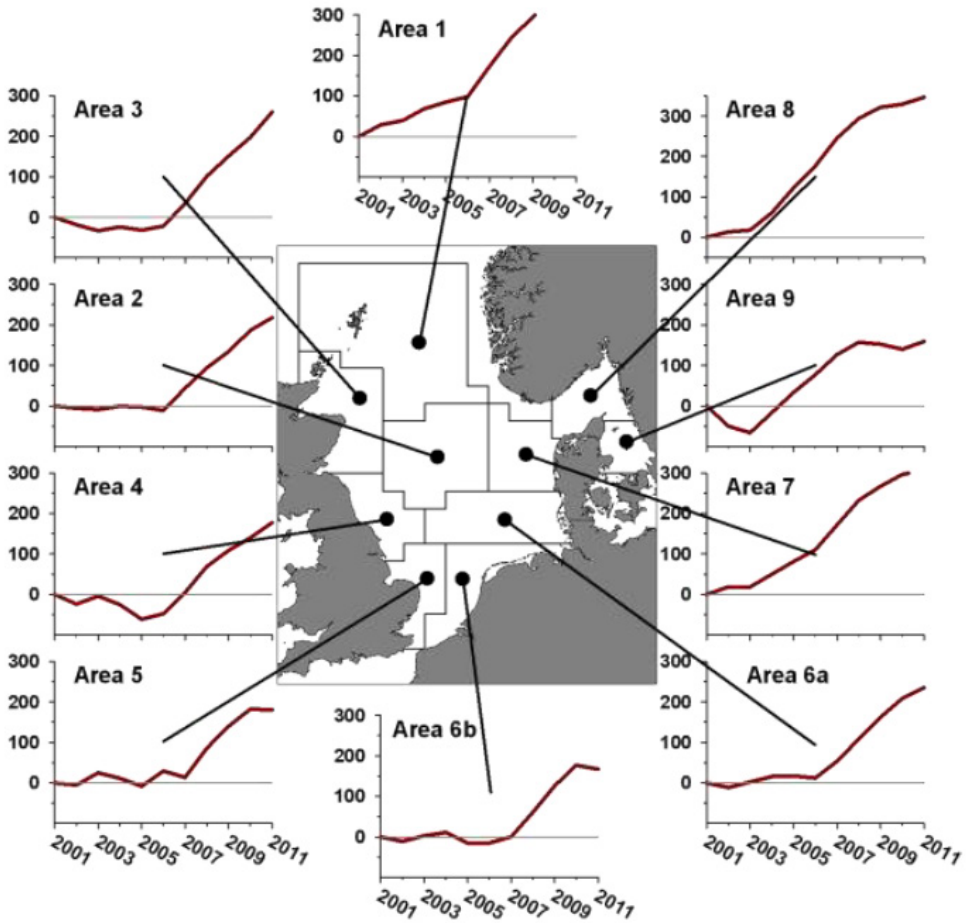

Figure 6.4.2.6 Cod in Subarea IV (North Sea) and Divisions VIId (Eastern Channel),and IIIa (Skagerrak). Results of the North Sea Commission fishers' survey perceptions of abundance by area, 2011.

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	25.9
2004	Zero catch	0	27.3	23.4	23.6
2005	Zero catch	0	27.3	23.9	23.9
2006	Zero catch	0	23.2	22.2	22.1
2007	Zero catch	0	20.0	19.7	19.7
2008	Exploitation boundaries in relation to precautionary limits. Total removals < 22 000 t	< 22	22.2	22.2	22.2
2009	Zero catch	0	28.8	27.4	25.6
2010	Management plan F (65% of F_{2008})	< 40.3 [1)]	33.6	31.7	31.3
2011	See scenarios	-	26.8	19.2	27.7
2012	Management plan F (45% of F_{2008})	< 31.8 [1)]	26.5		
2013	Management plan (TAC – 20%)	< 25.441 [1)]			

Weights in thousand tonnes.
[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	7.1	7.5
2003	Closure	0	3.9	4.5	3.8
2004	Zero catch	0	3.9	4.4	3.8
2005	Zero catch	0	3.9	4.3	3.8
2006	Zero catch	0	3.3	3.9	3.4
2007	Zero catch	0	2.9	3.7	3.0
2008	Exploitation boundaries in relation to precautionary limits. Total removals less than 22 000 t	< 22	3.2	3.8	3.3
2009	Zero catch	0	4.1	4.0	3.9
2010	Management plan F (65% of F2008)	< 40.3[2)]	4.8	4.3	4.1
2011	See scenarios	-	3.8	3.5	3.9
2012	Management plan F (45% of F_{2008})	< 31.8 [2)]	3.8		
2013	Management plan (TAC – 20%)	< 25.441 [1)]			

Weights in thousand tonnes.
[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	-	1.9	1.2
2004	Zero catch	0	-	1.0	0.8
2005	Zero catch	0	-	1.2	1.0
2006	Zero catch	0	-	1.5	1.1
2007	Zero catch	0	-	2.1	1.7
2008	Exploitation boundaries in relation to precautionary limits. Total removals less than 22 000 t	< 22	-	1.7	1.4
2009	Zero catch	0	1.7	2.0	1.2
2010	Management plan F (65% of F2008)	< 40.3[3)]	2.0	1.8	1.8
2011	See scenarios	-	1.6	1.3	1.2
2012	Management plan F (45% of F_{2008})	< 31.8 [3)]	1.5		
2013	Management plan (TAC – 20%)	< 25.441 [1)]			

Weights in thousand tonnes.

[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	1992	1993	1994	1995	1996	1997	1998	1999	2000	2001
Belgium	3,356	3,374	2,648	4,827	3,458	4,642	5,799	3,882	3,304	2,470
Denmark	18,479	19,547	19,243	24,067	23,573	21,870	23,002	19,697	14,000	8,358
Faroe Islands	109	46	80	219	44	40	102	96	-	9
France	2,146	1,868	1,868	3,040	1,934	3,451	2,934	.	1,222	717
Germany	8,446	6,800	5,974	9,457	8,344	5,179	8,045	3,386	1,740	1,810
Greenland	.	.	.	.	.	.	.	.	.	.
Netherlands	11,133	10,220	6,512	11,199	9,271	11,807	14,676	9,068	5,995	3,574
Norway	10,476	8,742	7,707	7,111	5,869	5,814	5,823	7,432	6,410	4,369
Poland	-	-	-	-	18	31	25	19	18	18
Sweden	823	646	630	709	617	832	540	625	640	661
UK (E/W/NI)	14,462	14,940	13,941	14,991	15,930	13,413	17,745	10,344	6,543	4,087
UK (Scotland)	28,677	28,197	28,854	35,848	35,349	32,344	35,633	23,017	21,009	15,640
Total Nominal Catch	98,107	94,380	87,457	111,468	104,407	99,423	114,324	77,566	60,881	41,713
Unallocated landings	-758	10,200	7,066	8,555	2,161	2,746	7,779	826	-1,114	-740
WG estimate of total landings	**97,349**	**104,580**	**94,523**	**120,023**	**106,568**	**102,169**	**122,103**	**78,392**	**59,767**	**40,973**
Agreed TAC	**100,000**	**101,000**	**102,000**	**120,000**	**130,000**	**115,000**	**140,000**	**132,400**	**81,000**	**48,600**

Division VIId										
Country	1992	1993	1994	1995	1996	1997	1998	1999	2000	2001
Belgium	187	157	228	377	321	310	239	172	110	93
Denmark	1	-	9	-	-	-	-	-	-	-
France	2,079	1,771	2,338	3,261	2,808	6,387	7,788	.	3,084	1,677
Netherlands	2	-	-	-	-	-	19	3	4	17
UK (E/W/NI)	443	530	312	336	414	478	618	454	385	249
UK (Scotland)	22	2	<0.5	<0.5	4	3	1	-	-	-
Total Nominal Catch	2,734	2,460	2,887	3,974	3,547	7,178	8,665	629	3,583	2,036
Unallocated landings	-65	-28	-37	-10	-44	-135	-85	6,229	-1,258	-463
WG estimate of total landings	**2,669**	**2,432**	**2,850**	**3,964**	**3,503**	**7,043**	**8,580**	**6,858**	**2,325**	**1,573**

Division IIIa (Skagerrak)**										
Country	1992	1993	1994	1995	1996	1997	1998	1999	2000	2001
Denmark	11,187	11,994	11,921	15,888	14,573	12,159	12,339	8,682	7,656	5,870
Germany	-	530	399	285	259	81	54	54	54	32
Norway	1,208	1,043	850	1,039	1,046	1,323	1,293	1,146	926	762
Sweden	2,523	2,575	1,834	2,483	1,986	2,173	1,900	1,909	1,293	1,035
Others	102	88	71	134	-	-	-	-	-	-
Norwegian coast *	923	909	760	846	748	911	976	788	624	846
Danish industrial by-catch *	1,360	511	666	749	676	205	97	62	99	687
Total Nominal Catch	15,020	16,230	15,075	19,829	17,864	15,736	15,586	11,791	9,929	7,699
Unallocated landings	-1,018	-1,493	-1,814	-7,720	-1,615	-790	-255	-817	-652	-613
WG estimate of total landings	**14,002**	**14,737**	**13,261**	**12,109**	**16,249**	**14,946**	**15,331**	**10,974**	**9,277**	**7,086**
Agreed TAC	**15,000**	**15,000**	**15,500**	**20,000**	**23,000**	**16,100**	**20,000**	**19,000**	**11,600**	**7,000**

Sub-area IV, Divisions VIId and IIIa (Skagerrak) combined										
	1992	1993	1994	1995	1996	1997	1998	1999	2000	2001
Total Nominal Catch	115,861	113,070	105,419	135,271	125,818	122,337	138,575	89,986	74,393	51,448
Unallocated landings	-1,841	8,679	5,215	825	502	1,821	7,439	6,239	-3,024	-1,816
WG estimate of total landings	**114,020**	**121,749**	**110,634**	**136,096**	**126,320**	**124,158**	**146,014**	**96,225**	**71,369**	**49,632**

** 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	1992	1993	1994	1995	1996	1997	1998	1999	2000	2001
Norwegian coast *	923	909	760	846	748	911	976	788	624	846
Danish industrial by-catch *	1,360	511	666	749	676	205	97	62	99	687
Total	**2,283**	**1,420**	**1,426**	**1,595**	**1,424**	**1,116**	**1,073**	**850**	**723**	**1,533**

Table 6.4.2.2.cont

Sub-area IV

Country	2002	2003	2004	2005	2006	2007	2008	2009	2010	2011
Belgium	2,616	1,482	1,627	1,722	1,309	1,009	894	946	666	648
Denmark	9,022	4,676	5,889	6,291	5,105	3,430	3,831	4,402	5,686	4,863
Faroe Islands	34	36	37	34	3	-	16	45	32	0
France	1,777	620	294	664	354	659	573	950	781	510
Germany	2,018	2,048	2,213	2,648	2,537	1,899	1,736	2,374	2,844	2,211
Greenland	.	.	.	35	23	17	17	11	.	.
Netherlands	4,707	2,305	1,726	1,660	1,585	1,523	1,896	2,649	2,657	1,961
Norway	5,217	4,417	3,223	2,900	2,749	3,057	4,128	4,234	4,498	4,870
Poland	39	35	-	-	-	1	2	3	.	.
Sweden	463	252	240	319	309	387	439	378	363	315
UK (E/W/NI)	3,112	2,213	1,890	1,270	1,491	1,587	1,546	2,384	2,553	
UK (Scotland)	15,416	7,852	6,650	4,936	6,857	6,511	7,185	9,052	11,567	
UK (combined)	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	12,026
Others	.	.	.	.	786	.	.	.	.	.
Norwegian indust by-catch *	.	.	.	.	48	101	22	4	201	1
Danish industrial by-catch *	.	.	.	.	34	18	46	76	11	0
Total Nominal Catch	44,421	25,936	23,789	22,479	23,108	20,080	22,263	27,428	31,647	19,172
Unallocated landings	-121	-89	-240	1,391	-1,012	-336	-68	-1,800	-347	8,557
WG estimate of total landings	**44,300**	**25,847**	**23,549**	**23,870**	**22,096**	**19,744**	**22,195**	**25,628**	**31,300**	**27,728**
Agreed TAC	**49,300**	**27,300**	**27,300**	**27,300**	**23,205**	**19,957**	**22,152**	**28,798**	**33,552**	**26,842**

Division VIId

Country	2002	2003	2004	2005	2006	2007	2008	2009	2010	2011
Belgium	51	54	47	51	80	84	154	73	57	55
Denmark	-	-	-	-	-	.	.	.	.	.
France	1,361	1,730	810	986	1,124	1,743	1,326	1,779	1,606	1,111
Netherlands	6	36	14	9	9	59	30	35	45	52
UK (E/W/NI)	145	121	103	184	267	175	144	134	127	
UK (Scotland)	-	-	-	-	1	12	7	3	1	
UK (conbined)	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	119
Total Nominal Catch	1,563	1,941	974	1,230	1,481	2,073	1,661	2,024	1,836	1,336
Unallocated landings	1,534	-707	-167	-197	-353	-331	-307	-777	-44	-119
WG estimate of total landings	**3,097**	**1,234**	**807**	**1,033**	**1,128**	**1,742**	**1,354**	**1,247**	**1,792**	**1,218**
Agreed TAC								**1,678**	**1,955**	**1,564**

Division IIIa (Skagerrak)**

Country	2002	2003	2004	2005	2006	2007	2008	2009	2010	2011
Denmark	5,511	3,054	3,009	2,984	2,478	2,228	2,552	3,023	3,289	3,042
Germany	83	49	99	86	84	67	52	55	56	60
Norway	645	825	856	759	628	681	779	440	433	421
Sweden	897	510	495	488	372	370	365	459	458	.
Others	-	27	24	21	373	385	13	2	26	0
Norwegian coast *	.	.	720	759	524	494	498	342	369	342
Danish industrial by-catch *	.	.	10	18	9	.	-	1	0	0
Total Nominal Catch	7,136	4,465	4,483	4,338	3,935	3,731	3,761	3,979	4,262	3,523
Unallocated landings	332	-674	-696	-533	-569	-784	-463	-101	-174	402
WG estimate of total landings	**7,468**	**3,791**	**3,787**	**3,805**	**3,366**	**2,947**	**3,298**	**3,878**	**4,089**	**3,925**
Agreed TAC	**7,100**	**3,900**	**3,900**	**3,900**	**3,315**	**2,851**	**3,165**	**4,114**	**4,793**	**3,835**

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

	2002	2003	2004	2005	2006	2007	2008	2009	2010	2011
Total Nominal Catch	53,120	32,342	29,246	28,047	28,524	25,884	27,685	33,431	37,745	24,031
Unallocated landings	1,745	-1,470	-1,103	661	-1,934	-1,451	-838	-2,678	-565	8,840
WG estimate of total landings	**54,865**	**30,872**	**28,143**	**28,708**	**26,590**	**24,433**	**26,847**	**30,753**	**37,180**	**32,871**

** 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	2002	2002	2004	2003	2006	2007	2008	2009	2010	2011
Norwegian coast *	.	.	720	759	524	494	498	342	369	342
Norwegian indust by-catch *	.	.	.	.	48	101	22	4	201	1
Danish industrial by-catch *	.	.	10	18	43	18	46	77	11	0
Total	**.**	**.**	**730**	**777**	**615**	**613**	**566**	**423**	**582**	**343**

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	465562	346383	625746	514011	458510	576230	151903	137479	167841	124991	111393	140250	0.485	0.432	0.545
1964	852561	639934	1135837	686938	598517	788423	164226	149789	180055	152818	138062	169150	0.513	0.462	0.570
1965	1069819	807469	1417407	862853	760402	979109	203822	186820	222370	203211	182158	226697	0.543	0.491	0.600
1966	1379180	1040737	1827684	1050734	922752	1196467	227294	209349	246777	249197	224021	277203	0.560	0.508	0.618
1967	1271872	957633	1689224	1135973	1004934	1284099	251450	232062	272459	298045	267223	332422	0.605	0.550	0.666
1968	656711	491089	878192	944112	855552	1041839	262236	242285	283830	299539	271759	330159	0.635	0.577	0.699
1969	606221	454794	808067	804519	723014	895212	258590	238710	280126	239666	219948	261151	0.623	0.567	0.685
1970	1839492	1383075	2446527	1333077	1115146	1593597	273758	252288	297055	268069	236281	304133	0.639	0.582	0.701
1971	2369051	1779851	3153300	1460077	1246602	1710110	276233	255304	298877	351864	307065	403199	0.705	0.644	0.771
1972	584201	438599	778139	976764	875190	1090126	241349	222982	261229	361855	318951	410531	0.768	0.701	0.842
1973	875018	657895	1163799	800507	713004	898748	213203	197688	229936	259627	236994	284421	0.752	0.688	0.823
1974	807744	606852	1075138	755398	675155	845178	232350	214317	251901	240867	217270	267027	0.736	0.673	0.806
1975	1377802	1024751	1852488	859409	739184	999188	212990	196802	230509	238470	213151	266797	0.772	0.706	0.843
1976	849158	629915	1144708	659344	586124	741710	182956	169538	197436	237518	209065	269844	0.803	0.734	0.879
1977	2096962	1560630	2817611	1007518	836246	1213867	161135	149748	173388	244019	211359	281725	0.798	0.730	0.873
1978	1271872	950592	1701737	1122423	957172	1316203	160332	149432	172026	323515	275897	379351	0.858	0.785	0.937
1979	1435466	1075956	1915099	1006511	878527	1153139	166708	155438	178796	314268	277926	355361	0.804	0.737	0.878
1980	2273884	1696673	3047463	1172912	1000826	1374587	181498	169274	194604	339422	296329	388783	0.860	0.791	0.935
1981	885582	663736	1181576	989544	874170	1120146	194658	181971	208230	362943	317563	414807	0.890	0.819	0.966
1982	1407042	1064675	1859503	1018661	880198	1178907	188339	176317	201182	334703	297358	376739	0.983	0.905	1.069
1983	819132	623722	1075762	817495	716778	932363	154972	145018	165610	282377	248504	320868	0.972	0.896	1.054
1984	1426879	1085140	1876239	828192	711878	963510	132455	124089	141385	246225	217735	278442	0.916	0.844	0.993
1985	378511	285758	501370	569777	510510	635924	126627	118499	135312	225709	198651	256451	0.887	0.816	0.963
1986	1692979	1284988	2230508	776848	649623	928989	115728	108388	123565	206489	180214	236594	0.936	0.864	1.015
1987	671319	512102	880038	739700	643468	850323	108989	101957	116506	248202	213131	289045	0.938	0.866	1.016
1988	462314	352561	606233	550730	487913	621635	100609	94190	107467	199586	179255	222223	0.948	0.875	1.027
1989	767582	580636	1014717	538208	462094	626858	94278	88020	100981	169058	149833	190751	0.966	0.890	1.048
1990	333701	254542	437477	378890	336702	426363	80178	74919	85805	136216	120586	153872	0.906	0.834	0.985
1991	370275	282383	485522	350459	309215	397205	73644	69101	78486	120211	108172	133589	0.910	0.839	0.987
1992	792541	604188	1039614	517622	437058	613035	71111	66579	75952	134861	117489	154801	0.877	0.808	0.951
1993	446860	341008	585569	431059	380163	488768	68597	64415	73050	149343	130422	171008	0.891	0.822	0.966
1994	944112	711976	1251934	527023	449225	618294	72114	67745	76765	153430	135498	173736	0.906	0.836	0.982
1995	557936	426053	730643	562980	489906	646955	81064	75916	86562	185907	161754	213666	0.934	0.862	1.013
1996	403528	307737	529136	459089	406639	518305	79221	74414	84339	165545	148161	184970	0.955	0.882	1.033
1997	1059174	802173	1398513	632225	526439	759268	75207	70632	80079	166375	143617	192739	0.961	0.890	1.038
1998	170587	128831	225876	342833	302889	388046	61267	57470	65316	140787	121969	162507	0.980	0.908	1.058
1999	303458	230794	399001	256530	228576	287902	55938	52441	59668	100912	91510	111279	0.999	0.924	1.081
2000	548532	418244	719405	344897	293524	405261	49662	46314	53252	101926	88540	117335	0.995	0.921	1.075
2001	208981	157475	277335	247954	220119	279310	41731	39159	44472	90853	80334	102750	0.956	0.885	1.032
2002	255761	193501	338054	266465	233606	303947	42574	39884	45445	88521	79067	99107	0.926	0.856	1.001
2003	119134	90746	156401	150995	136822	166635	36901	34378	39610	60718	54729	67363	0.901	0.833	0.975
2004	200186	152808	262252	149642	131281	170571	31984	29936	34173	47620	42977	52764	0.857	0.791	0.929
2005	137448	105169	179635	144929	129072	162734	29762	27851	31805	47052	41989	52724	0.800	0.736	0.869
2006	344897	263899	450755	156530	136450	179565	26239	24534	28062	41606	37182	46556	0.723	0.663	0.788
2007	147119	112688	192071	185535	165218	208351	32827	30557	35265	56106	49278	63880	0.669	0.611	0.732
2008	178796	136806	233673	186093	167105	207237	38254	35465	41262	54122	49147	59601	0.630	0.573	0.693
2009	191186	145402	251385	211716	187697	238808	47193	43289	51449	56897	51354	63039	0.602	0.541	0.669
2010	326440	236201	451152	246225	212427	285400	51792	46924	57166	61821	55563	68784	0.583	0.513	0.662
2011	165711	105755	259658	236807	200556	279610	56331	49366	64278	66903	59064	75782	0.572	0.485	0.676
2012				295079	208797	417016	65317	52987	80515						

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	111525	13544	124991	
1964	139525	13249	152818	
1965	181861	21199	203211	
1966	217075	32080	249197	
1967	264342	33490	298045	
1968	278730	20919	299539	
1969	227521	12139	239666	
1970	244019	24029	268069	
1971	290977	61084	351864	
1972	327420	34303	361855	
1973	235155	24588	259627	
1974	215993	24934	240867	
1975	206282	32145	238470	
1976	200186	37309	237518	
1977	180954	62881	244019	
1978	284077	39577	323515	
1979	272393	41856	314268	
1980	272938	66436	339422	
1981	324487	38216	362943	
1982	294490	40215	334703	
1983	256786	25566	282377	
1984	199786	46677	246225	
1985	203008	22788	225709	
1986	161619	44846	206489	
1987	218163	29912	248202	
1988	186652	12942	199586	
1989	136489	32598	169058	
1990	114348	21781	136216	
1991	105556	14747	120211	
1992	107796	27092	134861	
1993	126988	26340	153254	0.97
1994	104849	34971	139842	1.10
1995	121407	26981	148435	1.25
1996	134948	21454	156318	1.06
1997	131834	41785	173564	0.96
1998	136488	40255	176661	0.80
1999	100559	16868	117301	0.86
2000	78174	20082	98193	1.04
2001	47205	12703	59890	1.52
2002	62263	7480	69712	1.27
2003	27136	5152	32325	1.88
2004	28829	7041	35887	1.33
2005	29210	5933	35146	1.34
2006	25730	7798	33538	1.24
2007	22471	20702	43174	1.30
2008	27117	22357	49459	1.09
2009	32327	16506	48907	1.16
2010	37888	13224	51092	1.21
2011	34983	11679	46659	1.43

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 states:

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.