

6.4.2 Cod in Subarea IV (North Sea), Division VIIId (Eastern Channel), and IIIa West (Skagerrak)

State of the stock

Spawning biomass in relation to precautionary limits	Fishing mortality in relation to precautionary limits	Fishing mortality in relation to high long-term yield	Fishing mortality in relation to agreed target	Comment
Reduced reproductive capacity	Increased risk	Overfished	Above target	

Based on the most recent estimate of SSB (in 2009) and fishing mortality (in 2008), ICES classifies the stock as suffering reduced reproductive capacity and as being at risk of being harvested unsustainably. SSB has increased since its historical low in 2006, but remains below B_{lim} . Fishing mortality declined after 2000, but in 2008 increased, predominantly as a consequence of increased discarding and is currently estimated to be between F_{lim} and F_{pa} . The 2005 year class is estimated to be one of the most abundant amongst the recent below-average year classes. The 2008 year class is estimated to be one of the lowest in the series.

Management objectives

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 to 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).

ICES has evaluated the management plan in 2009 and considers it to be in accordance with the precautionary approach if it is implemented and enforced adequately. Discarding in excess of the assumptions under the management plan will affect the effectiveness of the plan. The evaluation is most sensitive to assumptions about implementation error (i.e. TAC and effort overshoot and the consequent increase in discards).

Reference points

	Type	Value	Technical basis
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} .
Targets	F_{mgt}	0.4	EU/Norway agreement and EU management plan 1342/08

(Unchanged since 1998, management plan target added in 2008)

Yield and spawning biomass per Recruit F-reference points (2009):

	Fishing Mortality		Yield/R	SSB/R
	Ages 2-4			
Average last 3 years	0.79			
F_{max}	0.25	0.69	2.1	
$F_{0.1}$	0.16	0.69	3.2	
F_{med}	0.81	0.51	0.3	

Estimated by ICES in 2009, assuming constant maturity, with M and stock weights averaged over the period 2000-2007. Selectivity is averaged over 2005-2007.

In 2005, ICES advised that, on the basis of evaluations of harvest control rules for North Sea cod, target fishing mortalities (covering all catches) below 0.4 (ages 2–4) would result in a low risk of SSB falling below the conservation limit Blim and would achieve high long-term yields

Single-stock exploitation boundaries

Considering the options below, ICES advises on the basis of the management plan on an F in 2010 that is 65% of the F in 2008 ($F_{2010}=0.51$), catches should be less 66 400 t. Assuming discards rates as observed in 2008, this implies landings of less than 40 300 t in 2010. This presumes that the objectives of the management plan are realised which assumes reduction in F and control of catches in 2009 and 2010.

Exploitation boundaries in relation to existing management plans

The plan stipulates that, based on the assumption that the 25% reduction in F in 2009 has been effective in reducing F_{2009} to 25% below F_{2008} , the following criteria be met, in order of increasing priority:

- (a) TAC_{2009} should not exceed a level that results in F_{2010} being above 65% of F_{2008} ;
- (b) There should be no more than a 20% change from TAC_{2009} to TAC_{2010} ;

These criteria imply catches should be less 66 400 t. Assuming discards rates as observed in 2008, this implies landings of less than 40 300 t in 2010. This is less than the 20% increase constraint ($1.2 \times TAC_{2009} = 41\,500\text{t}$) for Area IV and Subdivisions VIIId and IIIa (Skagerrak).

Exploitation boundaries in relation to high long-term yield, low risk of depletion of production potential and considering ecosystem effects

F_{2008} is above the levels that would lead to high long-term yield and low risk of depletion of production potential, taking ecosystem effects into account.

Exploitation boundaries in relation to precautionary limits

Given the low stock size and recent poor recruitment, the stock cannot be rebuilt to B_{pa} at the start of 2011 even with a zero catch. Simulations indicate that with the recent poor recruitment, a zero catch in 2010 and 2011 is likely to achieve the rebuilding of the stock to B_{pa} by 2012.

Short-term implications

Outlook for 2010

Management plan assumptions

Basis; $F_{09} = [\text{management plan}] = 0.75F_{08} = 0.59$ (land=0.29, disc=0.30); R_{08-10} = (re-sampled from 1997-2007 YC, median of 1998-2008 YC) ~110 million; SSB(2010) = 66.0; Landings (2009) = 41.9; Discards (2009) = 24.8.

Rationale	Catches (2010)	Landings (2010)	Basis	F total (2010)	F land (2010)	F disc (2010)	Discards (2010)	SSB (2011)	%SSB change ¹⁾	%TAC change ²⁾
Management Plan	66.4	40.3	$F_{10} = 0.65 * F_{08}$	0.51	0.25	0.26	26.1	79.6	21%	17%

This option is considered precautionary in the context of the long term management plan.

ICES assumptions

Basis: $F_{sq} = F_{06-08}$ scaled to $F_{08} = 0.79$; R_{08-10} = (re-sampled from 1997-2007 YC, median of 1998-2008 YC) ~110 million; SSB(2010) = 54.2; Landings (2009) = 51.5; Discards (2009) = 30.8.

Rationale	Catches (2010)	Landings (2010)	Basis	F total (2010)	F land (2010)	F disc (2010)	Discards (2010)	SSB (2011)	%SSB change ¹⁾	%TAC change ²⁾
Zero Catch	0	0.0	F=0	0.00	0.00	0.00	0.0	113.5	110%	-100%
Status quo options	46.8	27.9	$0.50 * F_{sq}$	0.40	0.19	0.20	18.9	75.9	40%	-19%
	50.5	30.1	$0.55 * F_{sq}$	0.44	0.21	0.22	20.4	72.9	35%	-13%
	54.3	32.3	$0.60 * F_{sq}$	0.48	0.23	0.24	22.0	70.1	29%	-7%
	57.8	34.3	$0.65 * F_{sq}$	0.51	0.25	0.26	23.4	67.2	24%	-1%
	61.1	36.2	$0.70 * F_{sq}$	0.55	0.27	0.28	24.8	64.6	19%	5%
	64.2	38.1	$0.75 * F_{sq}$	0.59	0.29	0.30	26.1	62.0	14%	10%
	67.3	39.9	$0.80 * F_{sq}$	0.63	0.31	0.32	27.4	59.6	10%	15%
	70.5	41.8	$0.85 * F_{sq}$	0.67	0.33	0.34	28.7	57.3	6%	21%
	73.5	43.5	$0.90 * F_{sq}$	0.71	0.35	0.36	30.0	55.1	2%	26%
	79.1	46.7	F_{sq}	0.79	0.39	0.40	32.4	50.8	-6%	35%

Weights in '000 t.

Shaded areas are not considered consistent with the precautionary approach in the short term.

¹⁾ SSB 2011 relative to SSB 2010.

²⁾ Landings 2010 relative to TAC 2009 (Total = 34 590 t for the Skagerrak; VIId and IV; EC waters of IIa; that part of IIIa not covered by the Skagerrak and Kattegat)

Management considerations

The 2008 advice from ICES for this stock was a zero catch in 2009 because it did not consider the former recovery plan precautionary. The ICES advice for 2010 indicates that catches of cod can be allowed under the new management agreement. This change in advice is because the new management agreement is considered to be consistent with the precautionary approach. It should be emphasised that the new agreement is only consistent with the precautionary approach if it is implemented and enforced adequately.

ICES has observed that there have been considerable problems with the effectiveness of the former recovery plan. Despite the objective of the plan to reduce fishing mortality and to increase the SSB by combined TAC control and effort management, estimated catches have been much higher than intended in the management plan. Although fishing mortality has been reduced after 2000, it has remained well above the targets implied by the plan and has increased again in 2008. Also discarding increased in 2007 and 2008 and contributed about half of the total fishing mortality in these years. Under the present implementation and enforcement approach, reduction in F and the recovery of the stock is unlikely under either management plan. It is therefore urgent to make significant improvements in implementation and enforcement to achieve reduction in F by effective control of cod catches.

In recent years 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 is 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 that do not count against quota, and the mis- and under-reporting of catches (although the latter are considered to have reduced in recent years following changes to national reporting procedures). The recorded landings from 2005-2008 have fluctuated between 30% and 55% of the total removals. This indicates that the management system has not been effective in controlling the catches.

Although the absolute levels of current SSB and fishing mortality are considered uncertain (Figure 6.4.2.1), fishing mortality rates have been reduced after 2000 and, due to the 2005 year class, the stock has increased since 2006. However, all recent year classes have been poor. The low average age of the spawning stock reduces its reproductive capacity, as first-time spawners reproduce less successfully than older fish which is considered to be a factor that has contributed to the continued low recruitment.

In 2008, 94% of 1 year old, 73% of 2 year old, 64% of 3 year old (the abundant 2005 year class) and 12% of 4 year old cod (in numbers) were discarded. This resulted in discard mortality which exceeded landings mortality (Figure 6.4.2.2 and Figure 6.4.2.3). The recruitment of the relatively more numerous 2005 year-class to the fishery will have no beneficial effect on the current spawning biomass if it continues to be caught and heavily discarded. ICES notes that there have been considerable efforts to reduce discards by some countries, but it is too premature to evaluate the impact these have had in reducing discard mortality. It is important that the effectiveness of the existing measures is monitored and if discarding is still considered to be too high, then additional technical, temporal or spatial measures should be promptly introduced that are effective in reducing discards.

The 2006 year class is locally abundant in the southern North Sea and Eastern Channel. This is causing high rates of discards and high-grading in 2008 and 2009 in the Eastern Channel. The 2006 year class is estimated as high as the 1996 year class in the Eastern Channel by the French ground fish survey but was found to be poor in the North Sea, based on the IBTS Q1 and Q3 surveys.

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 to do so according to 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.

Cod are taken by towed gears in mixed demersal fisheries, which include haddock, whiting, Nephrops, plaice, and sole. They are also taken in directed fisheries using fixed gears. For management to be effective, both species-specific assessments and the latest developments in mixed fisheries approaches need to be considered. A reduction in direct effort on one stock may lead to a reduction or an increase in effort on another and, hence, the implications of any changes need to be identified and carefully evaluated.

Cod catch in Division VIIId was managed by a TAC for Divisions VIIb-k, VIII, IX, X, and CECAF 34.1.1, (i.e. the TAC covers a small proportion of the North Sea cod stock together with cod in Divisions VIIe-k). Division VIIId was allocated a separate TAC for 2009 which was adjusted in line with the revision to the North Sea TAC.

ICES has developed a generic approach to evaluate whether new survey information that becomes available in September forms a basis to update the advice. If this is the case, ICES will publish new advice in November 2009.

Management plan evaluations

In December 2008 the European Commission and Norway agreed on a new cod management plan implementing a new system of linked effort management with a target fishing mortality of 0.4 (EC 1342/2008 and Annex 6.4.2).

ICES has evaluated the EC management plan in March 2009 and concluded that this management plan is in accordance with the precautionary approach only if implemented and enforced adequately.

During the evaluation, ICES assumed that the annual effort reduction is fully achieved and the target F is achieved. Recovery is sensitive to assumptions about implementation error (i.e. scenarios of TAC and effort overshoot and increase in discards) and a continuation of the current low recruitment. Under these scenarios recovery to a precautionary status is delayed until after the required target date of 2015.

The application of the 20% TAC constraint results in reductions in fishing mortality to values that are so low (e.g. $F = 0.1$ by ~ 2012) that it is impractical for effort to be reduced to the levels required, possibly even for by-catch fisheries. At such low levels of fishing, the behaviour of the mixed fishery is considered highly uncertain and the management plan evaluation assumptions will break down, especially with respect to discard practices. Removing the TAC constraint might reduce the level of discards and lead to more appropriate management and fishing practices but would also delay the recovery.

Impacts of fisheries on the ecosystems

Cod is targeted by a gillnet fishery, primarily conducted by Denmark and the UK, with a substantial bycatch of harbour porpoise. In 2001 the total bycatch in the cod fishery was around 2000 porpoises. Since 2001, effort reductions in this fishery have likely led to decreased bycatches of porpoises.

The effect on the benthic invertebrate community in the northern North Sea from all otter trawling is estimated to represent an annual mortality of approximately 25% of the standing-crop biomass. The MAFCONS and STECF data set suggest that otter trawl effort directed at fish has declined since 1999 (Greenstreet *et al.*, 2007).

Factors affecting the fisheries and the stock

Regulations and their effects

Spatial management has been attempted for cod, both in the form of a closure of a large area of the North Sea in 2001 (Council Regulation (EC) 259/2001) and through implementation of a cod protection area in 2004 (EC 2287/2003). None of these measures appeared to have had the desired effect and both were abandoned shortly after implementation.

In 2001, cod in the whole of NEAFC region 2 was a legitimate target species for towed gears with a minimum codend mesh size of 100 mm. As part of the cod recovery measures, the EU and Norway introduced additional technical measures from 1 January 2002 (EC 2056/2001). The basic minimum mesh size for towed gears for cod, apart from some transitional arrangements, has been 120 mm from 2002. This resulted in a shift in effort towards smaller meshed fisheries.

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. In 2008, STECF indicated that overall effort (kW/days) by demersal trawls, seines and beam trawls had been substantially reduced since 2002. Fishing mortality declined between 2003 and 2007 concomitant with this effort reduction, but F increased again in 2008 despite a further nominal reduction in effort. Marked changes have also occurred in the use of the different mesh size categories by demersal trawlers. A sharp reduction has occurred in the use of mesh sizes between 100mm and 119mm, while a pronounced increase is apparent in the use of mesh sizes of 120mm and greater. As well, a general increase in effort has been observed in vessels using mesh sizes of 70-89mm and 90-99mm.

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 aims to reduce mortality on cod and lead to a reduction in discard numbers. ICES has not yet been able to evaluate the consequences of these measures. Despite their introduction, ICES notes that during the initial year of operation (2008) cod discarding rates increased substantially.

A new rights-based regulation (FKA – Vessel Quota Share) was put in force in Denmark from the 1st January 2007. With the new system, individual vessels are 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. The old regulation had a system with 14-day quotas, which continuously adjusted to the amount of national quota left. The new system gives the industry a possibility to plan better and is expected to lead to a more efficient fishery with less discards. ICES has not yet been able to evaluate the consequences of these measures.

Changes in fishing technology and fishing patterns

WGFTFB (ICES, 2009) note that the decline in fuel costs from 2008 to 2009 have influenced the operational dynamics of some fleets that traditionally target mixed demersal species in the North Sea by lowering the costs associated with fishing in more distant areas. This has been further enhanced by the introduction of a more restrictive effort regime in IV, VIIId and VIa and the absence of effort restrictions in other areas. These factors are thought to have contributed to a shift in effort away from IV towards fisheries in Rockall, the Celtic Sea and the Porcupine. The extent of the effort transfer can not currently be quantified, but is likely to be significant and fishing patterns in 2009 may be very different to those observed in 2008..

The expected benefits from the increase in mesh size to 120 mm are not apparent from the available data. The effect of this increase is confounded by the transfer of effort from the fleets fishing with mesh sizes >120 mm to fleets fishing with mesh sizes between 70 and 99 mm, i.e. fishing for *Nephrops*. The regulation differentiated between the number of fishing days allowed when fishing for *Nephrops* or when fishing for other demersal species (>120 mm). Fishing for *Nephrops* with the smaller mesh allowed more days at sea than fishing with larger meshes.

The introduction of the one-net rule as part of the Scottish Conservation Credit Scheme is likely to improve the accuracy of reporting of metier-based landings. Scottish legislation implemented in January 2008, banning the use of multi-rigs (>2 rigs per trawl), could limit the potential of uncontrolled increase in effort. There has also been a move in Scottish vessels from using 100–110 mm for whitefish on west coast ground (Subarea VI) to the North Sea using 80 mm prawn codends, which could imply increased discarding.

A move from the Farn Deeps *Nephrops* fishery into other fisheries for whitefish because of poor *Nephrops* catch rates, implies increased effort in whitefish fisheries.

Impacts of the environment on the fish stock

The North Sea has seen a northerly shift in the mean latitudinal distribution of the stock. However, the evidence for this in the form of a migratory response is slight or non-existent. 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 fishing 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 recently been estimated (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). Inclusion of the new grey seal diet data and seal population abundance are expected to reduce slightly the historic estimates of cod consumption in the North Sea by seals, generated from a multispecies model previously used. This suggests that the new estimates of seal predation will not alter the current perception of North Sea cod stock dynamics.

Scientific basis

Data and methods

The age-based assessment model (B-ADAPT) used landings and discards, calibrated with two survey indices (from IBTS quarter 1 and quarter 3 surveys). For ICES Subarea IV and Division VIIId, discards were estimated from the Scottish discards sampling programme up until 2005 and raised to the total international fleet. For 2006 Denmark provided its own discard estimates. For 2007 and 2008 Scottish, Danish, German, and England & Wales discard estimates were combined and used to raise landings-at-age for remaining nations in Subarea IV. Discards in Division IIIa were based on observer estimates. For 2006 - 2008, Danish and Swedish discard estimates were combined to raise landings-at-age from the remaining nations in Division IIIa.

The assessment and forecast made use of the 2009 Quarter 1 IBTS survey. Because of unreliable information on landings and effort, commercial indices were not used in the assessment. Instead, the assessment uses only survey data for calibration. The natural mortality values used in the assessment have been revised based on new estimates from the

multi-species model. Quantities of additional unallocated removals were estimated by the model on the basis of the total mortality indicated by the survey. In addition to the B-ADAPT model a new model (state space SAM model) was used to validate the estimates of unallocated removals. Both models gave similar estimates of SSB and total F although there were differences in unallocated removals. The unallocated removals estimates could potentially include components associated to increased natural mortality and discarding as well as unreported landings. It is, however, assumed that all of these removals originate from fishing activities.

A series of medium-term projections were used to evaluate management scenarios. The catch options in the forecast table represent median values from the projections. All scenarios assume a 25% reduction in fishing mortality in 2009 to account for a 25% reduction in effort for the main cod gears, as stipulated in EC 1342/2008. Landings and discards in the forecast are estimated by applying the landing- and discard-at-age ratios for 2008 to total fishing mortality-at-age for the projection period. Figures 6.2.2.3a and b illustrate two scenarios, one with constant fishing at the 2009 level (Figures 6.4.2.3a) and the other a closure from 2010 onwards (Figures 6.4.2.3b). The closure option is expected to bring SSB above B_{lim} in 2012 with 95% probability.

Information from the fishing industry

Comparison between the fishers North Sea Stock Survey 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 an increase more recently, especially in the north-western North Sea. The IBTS surveys have more variability, due to the inherent spatial variation, but exhibit similar trends in the same areas as the fishers survey, with significant increases in the north and west.

In May 2008, French fishers targeting cuttlefish in the eastern Channel reported discards of several tonnes per haul of undersized cod in ICES rectangle 28F0, forcing them to leave their usual cuttlefish fishing area. They reported that this also occurred in 2007. Data collected in the Channel by French fishers and submitted to the ICES WGNSK in 2009 indicate high rates of discards for lengths between 37 and 48cm (ages 2 and 3), confirming the information from previous years and indicate recent improved recruitment and survivorship in the southern North Sea and VIId.

Uncertainties in assessment and forecast

A large part (approximately 50% in 2007 and 2008) of the total catch used in the assessment is discards estimated from relatively low sample numbers compared to landings, and through estimation of unallocated mortality rates. Raised discard information was not available for a major component of the catch in the southern part of the North Sea and in the eastern Channel from French fleets. These are sources of added uncertainty in the assessment.

Comparison with previous assessment and advice:

The fishing mortality for 2007 has been revised downwards by 3% compared to the last assessment (May 2008) while SSB in 2008 was revised upwards by 15%. The F_{2008} estimate, at 0.79 is a 36% increase on the F_{2008} (0.58) used for the previous years' forecast, which was based on the 10% reduction in fishing effort in 2008 imposed in that year. The natural mortality values used in the assessment have been revised based on new estimates from the multi-species model. The basis for the advice has changed from precautionary limits to the management plan since this was evaluated in 2009 and found to be consistent with the precautionary approach when implemented and enforced adequately.

Sources of information

Report of the Working Group on the Assessment of Demersal Stocks in the North Sea and Skagerrak, 6-12 May 2009 (ICES CM 2009/ACOM:10).

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Table 6.4.2.1 Cod in Subarea IV (North Sea), Division VIIId (Eastern Channel), and Division IIIa (Skagerrak). Single-stock exploitation boundaries (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	Single-stock exploitation boundaries	Predicted catch corresponding to advice	Predicted catch corresp. to single-stock exploitation boundaries	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	Zero catch	0	0	27.3	23.4	NA
2005	Zero catch	Zero catch	0	0	27.3	23.9	NA
2006	Zero catch	Zero catch	0	0	23.2	22.2	NA
2007	Zero catch	Zero catch	0	0	20.0	19.7	NA
2008	Exploitation boundaries in relation to precautionary limits	Total removals < 22 000 t	< 22	< 22	22.2	22.2	NA
2009	Zero catch	Zero catch	0	0	28.8		
2010	Management plan F (65% of F2008)		< 40.3 ¹⁾				

Weights in '000 t.

¹⁾ For Subarea IV (North Sea), Division VIIId (Eastern Channel), and Division IIIa (Skagerrak)

Skagerrak (Division IIIa)

Year	ICES Advice	Single-stock exploitation boundaries	Predicted catch corresponding to advice	Predicted catch corresp. to single-stock exploitation boundaries	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	Zero catch	0	0	3.9	3.8	NA
2005	Zero catch	Zero catch	0	0	3.9	3.8	NA
2006	Zero catch	Zero catch	0	0	3.3	3.4	NA
2007	Zero catch	Zero catch	0	0	2.9	2.9	NA
2008	Exploitation boundaries in relation to precautionary limits	Total removals less than 22 000 t	< 22	< 22	3.2	3.3	NA
2009	Zero catch	Zero catch	0	0	4.1		
2010	Management plan F (65% of F2008)		< 40.3 ²⁾				

Weights in '000 t.

¹⁾ Norwegian fjords not included.

²⁾ For Subarea IV (North Sea), Division VIIId (Eastern Channel), and Division IIIa (Skagerrak)

Eastern Channel (Division VIIId)

Year	ICES Advice	Single-stock exploitation boundaries	Predicted catch corresponding to advice	Predicted catch corresp. to single-stock exploitation boundaries	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	Zero catch	0	0	-	0.2	NA
2005	Zero catch	Zero catch	0	0	-	0.7	NA
2006	Zero catch	Zero catch	0	0	-	1.1	NA
2007	Zero catch	Zero catch	0	0	-	1.7	NA
2008	Exploitation boundaries in relation to precautionary limits	Total removals less than 22 000 t	< 22	< 22	-	1.4	NA
2009	Zero catch	Zero catch	0	0	1.7		
2010	Management plan F (65% of F2008)		< 40.3 ³⁾				

Weights in '000 t.

¹⁾ Until 2008 this area was included in TAC for Subarea VII (except Division VIIa), from 2009 a separate TAC is set.²⁾ Including Division VIIe.³⁾ For Subarea IV (North Sea), Division VIIId (Eastern Channel), and Division IIIa (Skagerrak)

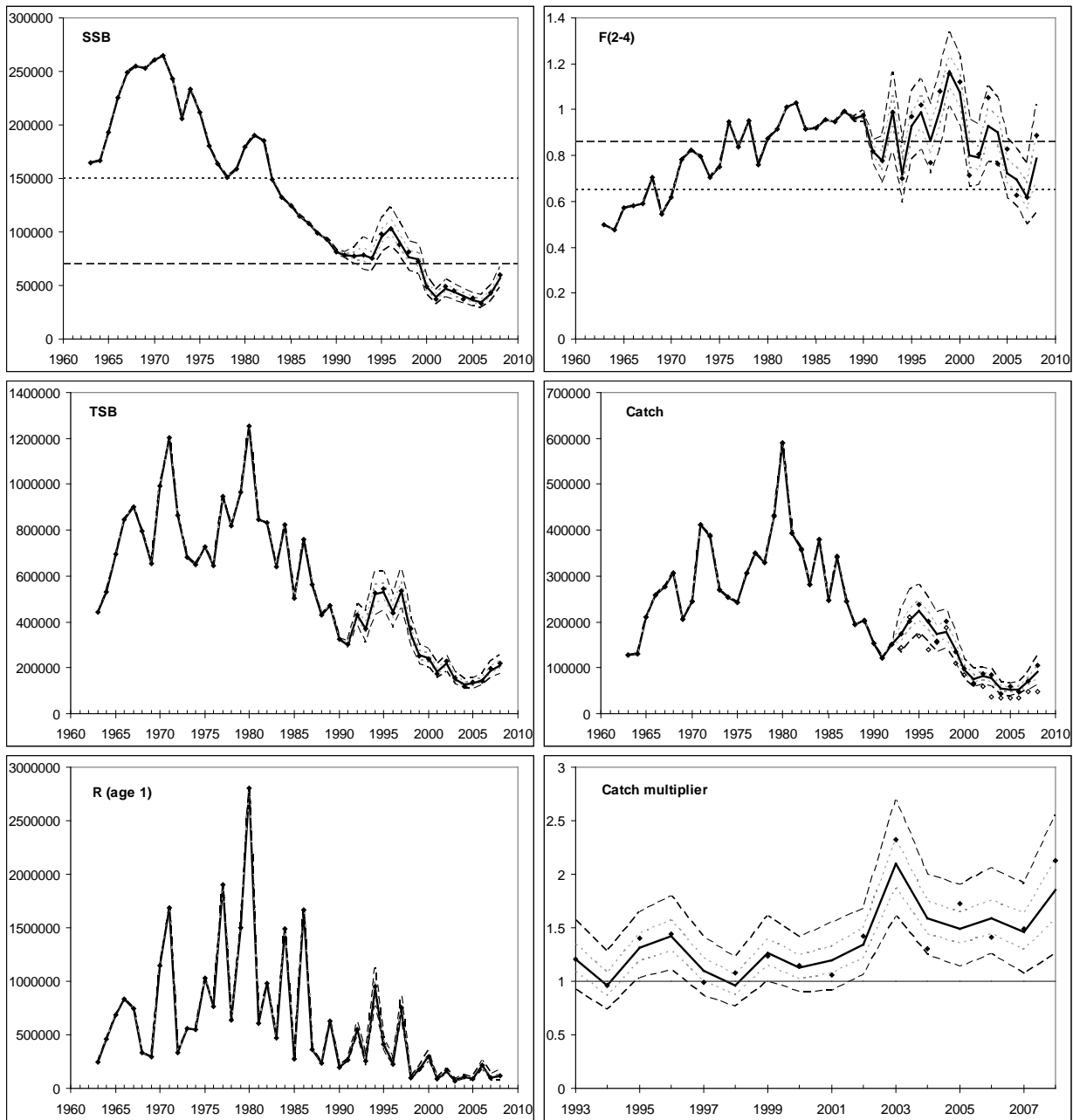


Figure 6.4.2.1 Cod in Subarea IV (North Sea), Division VIId (Eastern Channel), and Division IIIa (Skagerrak). Clockwise from top left: percentiles (5,25,50,75,95) of the estimated spawning-stock biomass (SSB), total stock biomass (TSB), recruitment (R(age 1)), and the catch multiplier, catch, and mean fishing mortality for ages 2–4 (F(2–4)) from the B-ADAPT base run. The heavy lines represent the bootstrap median, the light broken lines the 25th and 75th percentiles, and the heavy broken lines the 5th and 95th percentiles. The solid diamonds represent point estimates, and the open diamonds given in the catch plot the recorded total catch. The horizontal broken lines in the SSB plot indicate $B_{lim} = 70\,000\text{ t}$ and $B_{pa} = 150\,000\text{ t}$, and those in the F(2–4) plot $F_{pa} = 0.65$ and $F_{lim} = 0.86$. The horizontal solid line in the catch multiplier plot indicates a multiplier of 1. Catch, SSB, and TSB are in tonnes, R is in thousands.

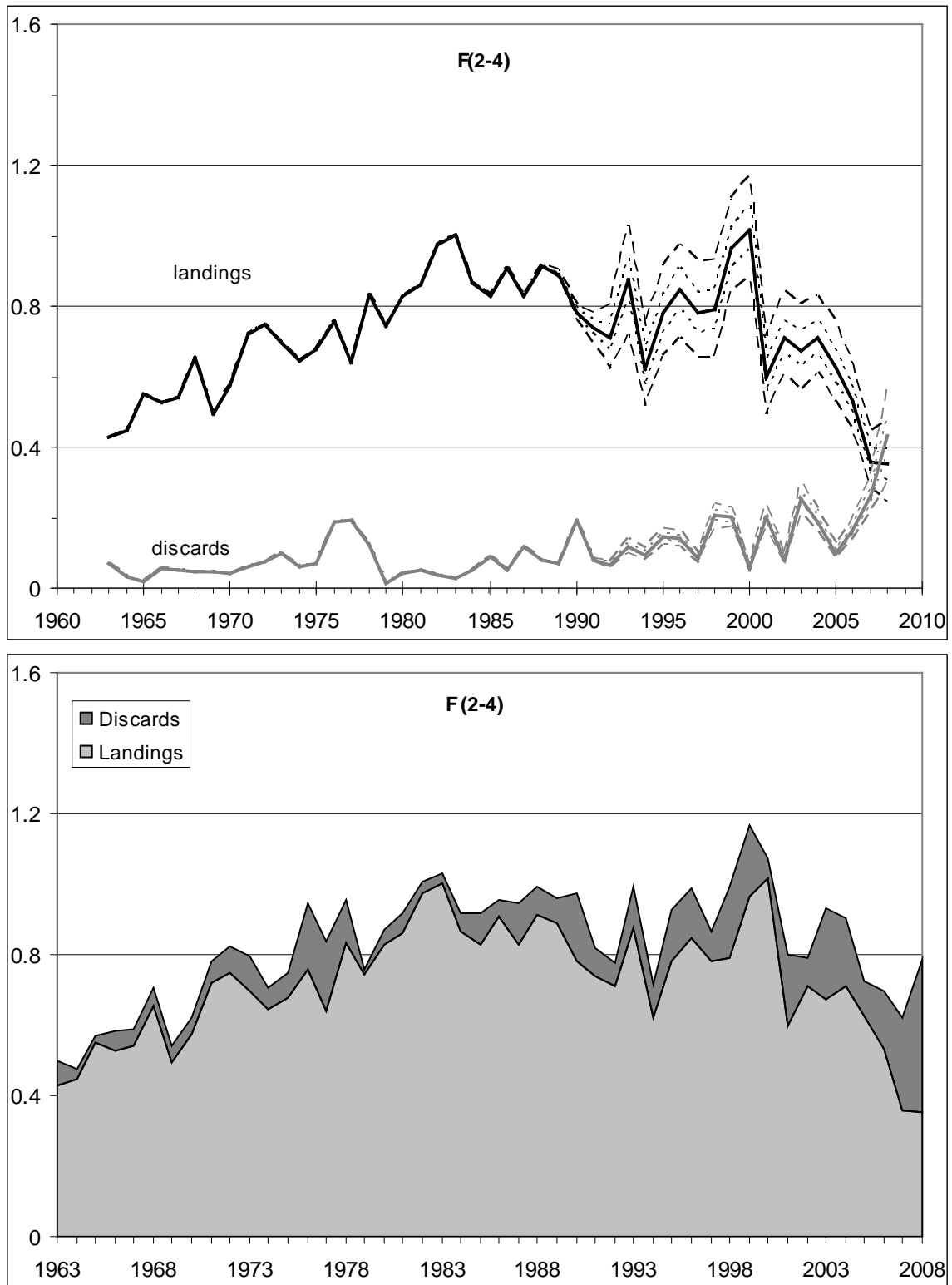


Figure 6.4.2.2 Cod in Subarea IV, Divisions IIIa (Skagerrak) and VIId. The mean fishing mortality for ages 2-4 separated into landings and discards components by using ratios calculated from the landings and discards numbers at age from the reported catch data. The top panel shows bootstrap medians (heavy lines) with 25th and 75th percentiles (light broken lines), and 5th and 95th percentiles (heavy broken lines), while the bottom panel shows a stacked-area plot of the bootstrap medians.

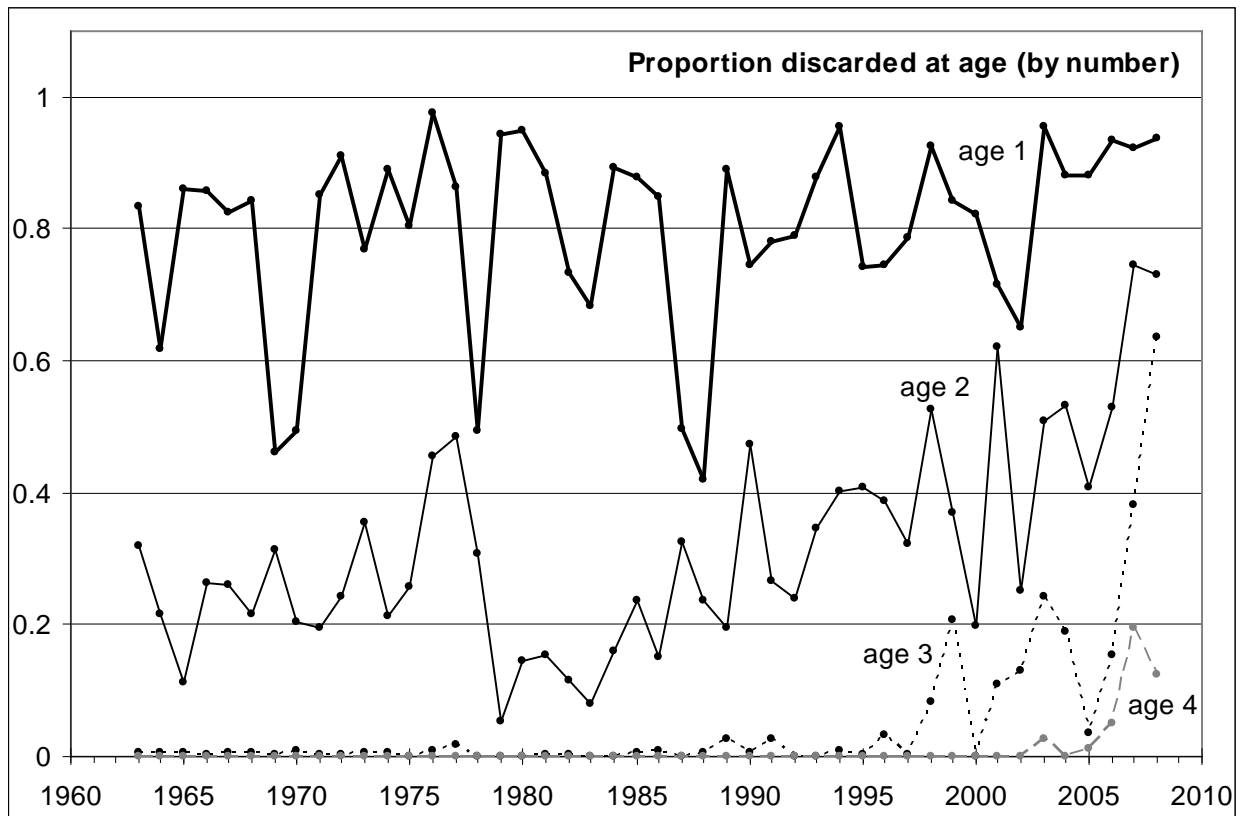


Figure 6.4.2.3 Cod in Subarea IV and Divisions IIIa (Skagerrak) and VIId: Proportion of total numbers caught at age that are discarded. In 2008, 94% of 1 year old, 73% of 2 year old, 64% of 3 year old (the abundant 2005 year class) and 12% of 4 year old cod, were discarded.

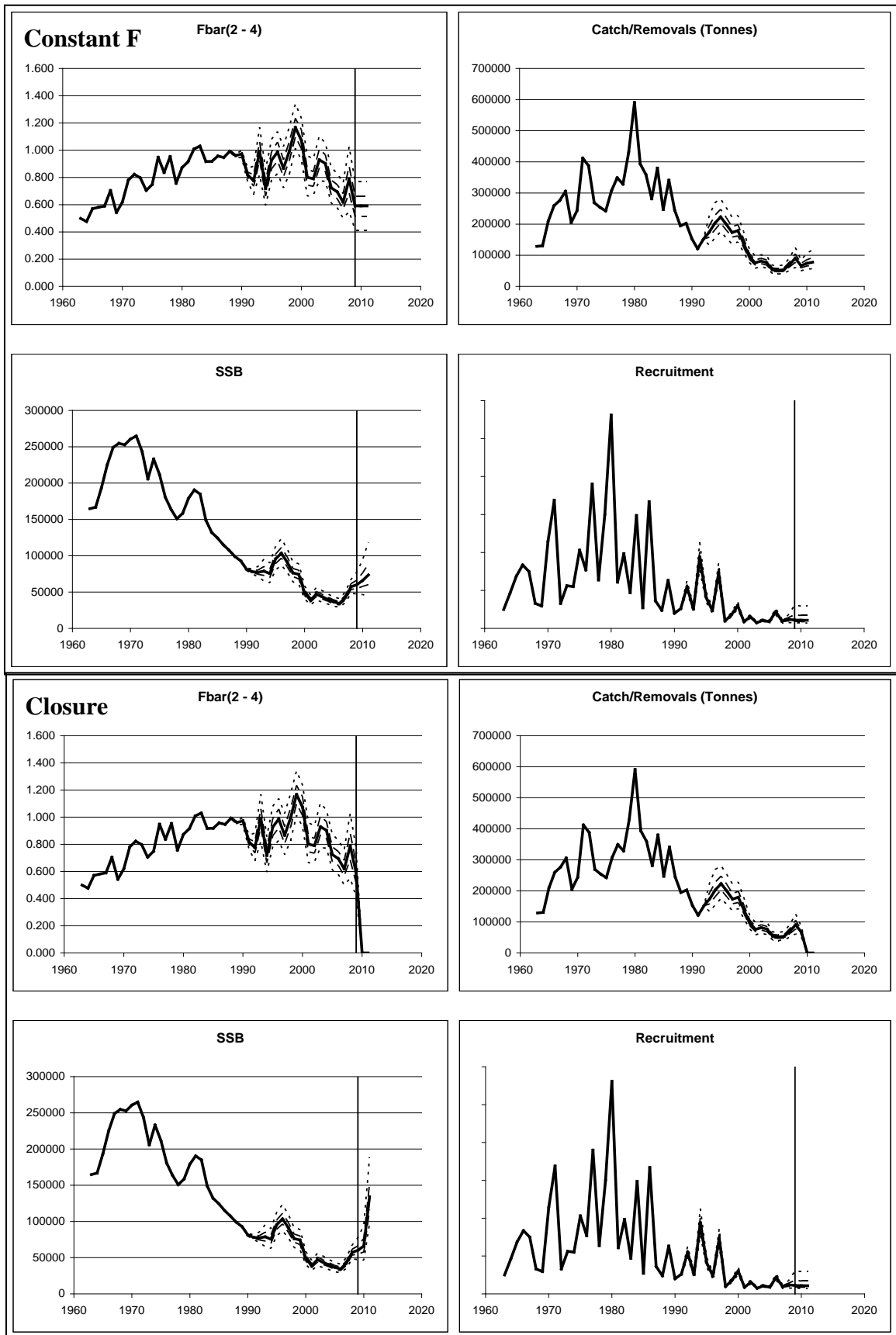


Figure 6.4.2.4a Cod in Subarea IV (North Sea), Division VIIId (Eastern Channel), and Division IIIa (Skagerrak). B-ADAPT forecast for a reduction in fishing mortality by 25% from 2009, followed by Top 4 graphs; constant fishing mortality at the 2009 level for 2010 onwards. Bottom 4 graphs; a closure of the fishery for 2009 onwards. Broken lines represent bootstrap percentiles (5,25,75,95), and the solid trajectory the median.

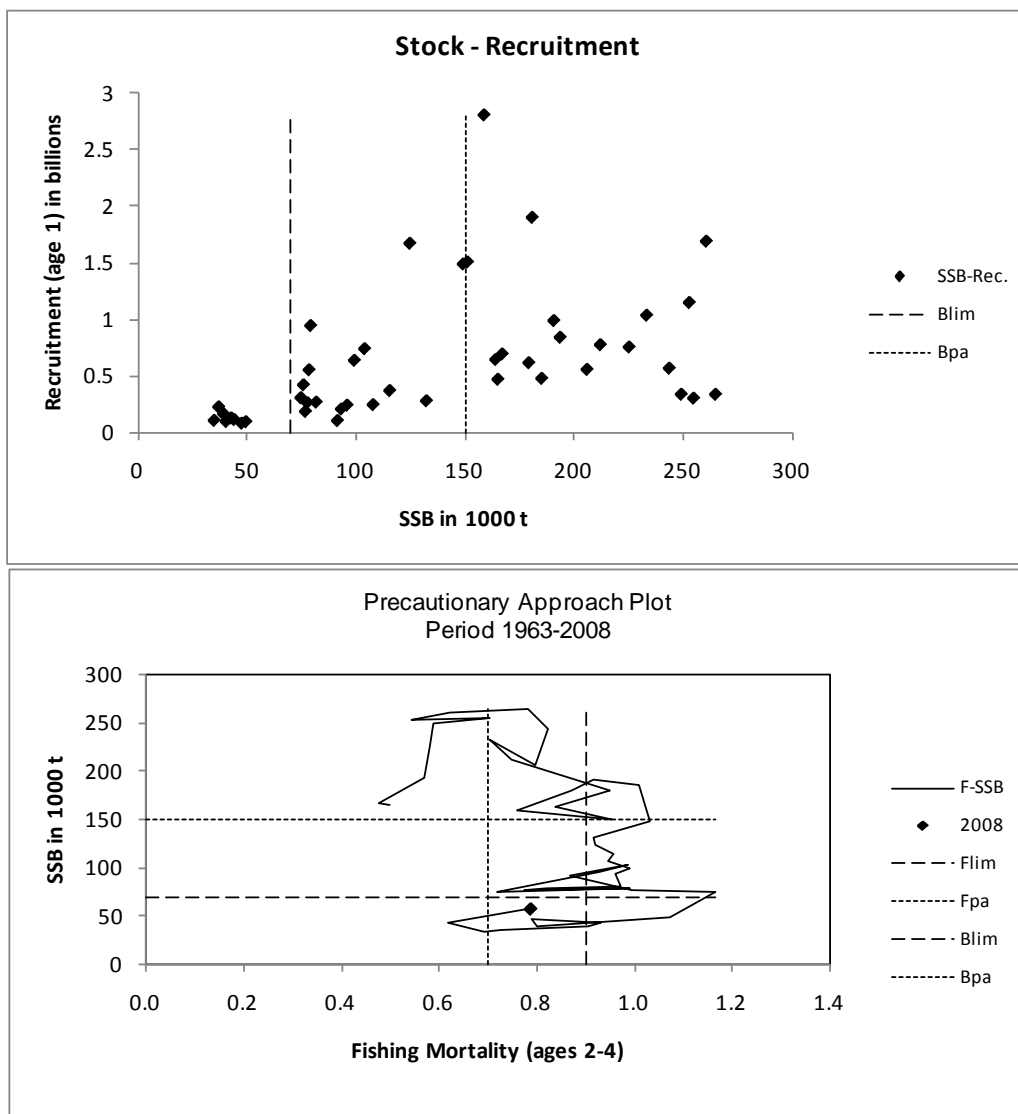


Figure 6.4.2.5 Cod in Subarea IV (North Sea), Division VIId (Eastern Channel), and Division IIIa (Skagerrak). Spawning stock – recruitment and precautionary approach plot.

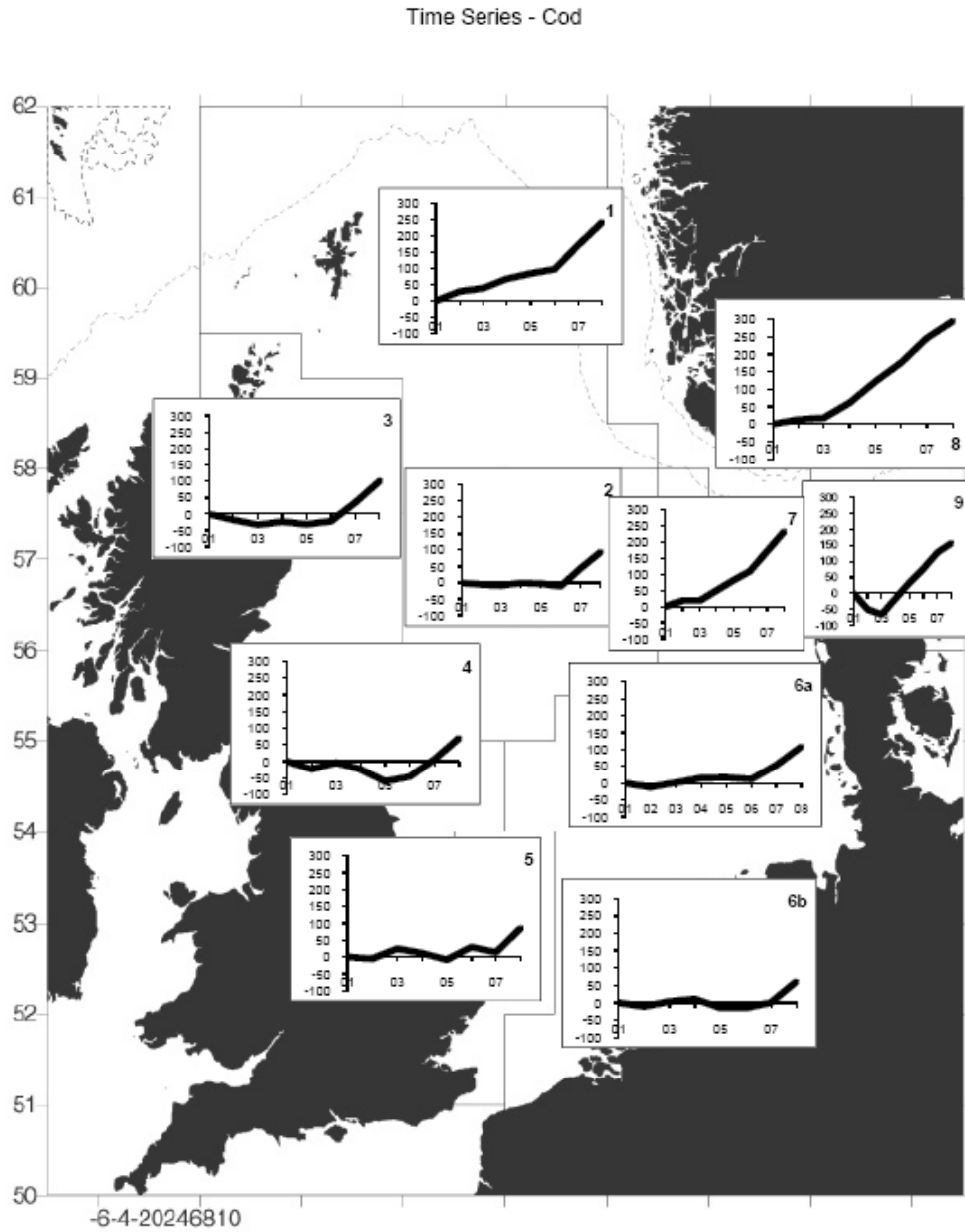


Figure 6.4.2.6 Cod in Subarea IV (North Sea), Division VIId (Eastern Channel), and Division IIIa (Skagerrak). Results of the North Sea Commission fishers' survey 2008.

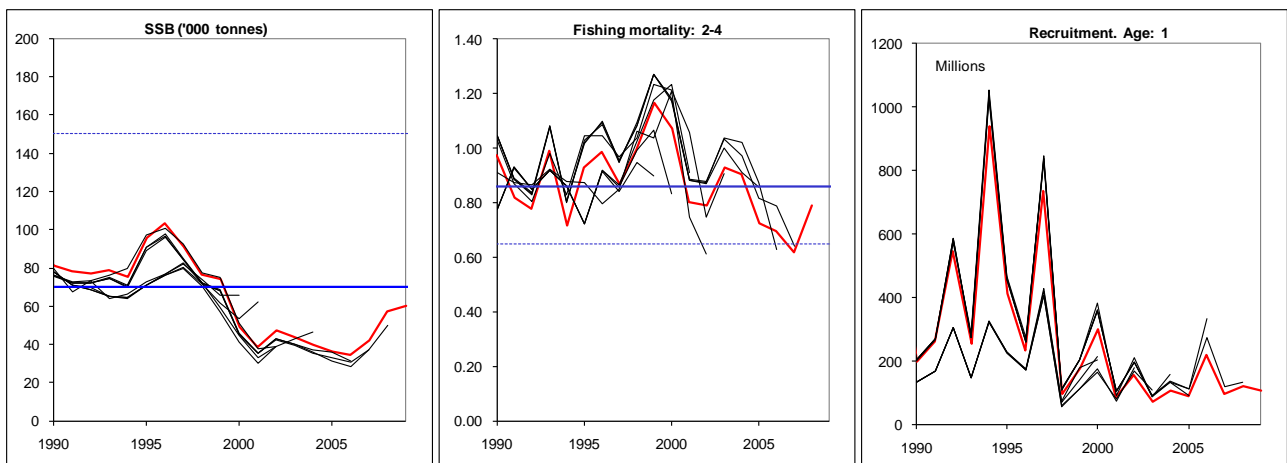


Figure 6.4.2.7 Cod in Subarea IV (North Sea), Division VIId (Eastern Channel), and Division IIIa (Skagerrak). Historical performance of the assessment.

Table 6.4.2.2

Cod in Subarea IV (North Sea), Division VIIId (Eastern Channel), and Division IIIa (Skagerrak). Nominal landings (in tonnes) of COD, 1989–2008, as officially reported to ICES, and as used by the Working Group.

Sub-area IV										
Country	1989	1990	1991	1992	1993	1994	1995	1996	1997	1998
Belgium	3,398	2,934	2,331	3,356	3,374	2,648	4,827	3,458	4,642	5,799
Denmark	25,782	21,601	18,997	18,479	19,547	19,243	24,067	23,573	21,870	23,002
Faroe Islands	35	96	23	109	46	80	219	44	40	102
France	2,578	1,641	975	2,146	1,868	1,868	3,040	1,934	3,451	2,934
Germany	11,430	11,725	7,278	8,446	6,800	5,974	9,457	8,344	5,179	8,045
Greenland	-	-	-	-	-	-	-	-	-	-
Netherlands	12,028	8,441	6,831	11,133	10,220	6,512	11,199	9,271	11,807	14,676
Norway	4,813	5,168	6,022	10,476	8,742	7,707	7,111	5,869	5,814	5,823
Poland	24	53	15	-	-	-	-	18	31	25
Sweden	501	620	784	823	646	630	709	617	832	540
UK (E/W/NI)	18,035	15,593	14,249	14,462	14,940	13,941	14,991	15,930	13,413	17,745
UK (Scotland)	31,828	31,187	29,060	28,677	28,197	28,854	35,848	35,349	32,344	35,633
Total Nominal Catch	110,452	99,059	86,565	98,107	94,380	87,457	111,468	104,407	99,423	114,324
Unallocated landings	5,248	5,692	1,968	-758	10,200	7,066	8,555	2,161	2,746	7,779
WG estimate of total landings	115,700	104,751	88,533	97,349	104,580	94,523	120,023	106,568	102,169	122,103
Agreed TAC	124,000	105,000	100,000	100,000	101,000	102,000	120,000	130,000	115,000	140,000
Division VIIId										
Country	1989	1990	1991	1992	1993	1994	1995	1996	1997	1998
Belgium	173	237	182	187	157	228	377	321	310	239
Denmark	<0.5	-	-	1	-	9	-	-	-	-
France	-	-	-	2,079	1,771	2,338	3,261	2,808	6,387	7,788
Netherlands	1	-	-	2	-	-	-	-	-	19
UK (E/W/NI)	563	422	341	443	530	312	336	414	478	618
UK (Scotland)	-	7	2	22	2	<0.5	<0.5	4	3	1
Total Nominal Catch	737	666	525	2,734	2,460	2,887	3,974	3,547	7,178	8,665
Unallocated landings	4,801	2,097	1,361	-65	-28	-37	-10	-44	-135	-85
WG estimate of total landings	5,538	2,763	1,886	2,669	2,432	2,850	3,964	3,503	7,043	8,580
Division IIIa (Skagerrak)**										
Country	1989	1990	1991	1992	1993	1994	1995	1996	1997	1998
Denmark	16,634	15,819	10,294	11,187	11,994	11,921	15,888	14,573	12,159	12,339
Germany	-	58	3	-	530	399	285	259	81	54
Norway	1,003	1,061	924	1,208	1,043	850	1,039	1,046	1,323	1,293
Sweden	1,805	1,136	3,846	2,523	2,575	1,834	2,483	1,986	2,173	1,900
Others	34	76	38	102	88	71	134	-	-	-
Norwegian coast *	888	846	854	923	909	760	846	748	911	976
Danish industrial by-catch *	428	687	953	1,360	511	666	749	676	205	97
Total Nominal Catch	19,476	18,150	15,105	15,020	16,230	15,075	19,829	17,864	15,736	15,586
Unallocated landings	-779	-350	-3,046	-1,018	-1,493	-1,814	-7,720	-1,615	-790	-255
WG estimate of total landings	18,697	17,800	12,059	14,002	14,737	13,261	12,109	16,249	14,946	15,331
Agreed TAC	20,500	21,000	15,000	15,000	15,000	15,500	20,000	23,000	16,100	20,000
Sub-area IV, Divisions VIIId and IIIa (Skagerrak) combined										
Country	1989	1990	1991	1992	1993	1994	1995	1996	1997	1998
Total Nominal Catch	130,665	117,875	102,195	115,861	113,070	105,419	135,271	125,818	122,337	138,575
Unallocated landings	9,271	7,439	283	-1,841	8,679	5,215	825	502	1,821	7,439
WG estimate of total landings	139,936	125,314	102,478	114,020	121,749	110,634	136,096	126,320	124,158	146,014
** Skagerrak/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	1989	1990	1991	1992	1993	1994	1995	1996	1997	1998
Norwegian coast *	888	846	854	923	909	760	846	748	911	976
Danish industrial by-catch *	428	687	953	1,360	511	666	749	676	205	97
Total	1,316	1,533	1,807	2,283	1,420	1,426	1,595	1,424	1,116	1,073

Table 6.4.2.2.cont Cod in Subarea IV (North Sea), Division VIId (Eastern Channel), and Division IIIa (Skagerrak). Nominal landings (in tonnes) of COD, 1989–2008, as officially reported to ICES, and as used by the Working Group.

Sub-area IV										
Country	1999	2000	2001	2002	2003	2004	2005	2006	2007	2008
Belgium	3,882	3,304	2,470	2,616	1,482	1,627	1,722	1,309	1,009	890
Denmark	19,697	14,000	8,358	9,022	4,676	5,889	6,291	5,105	3,430	3,828
Faroe Islands	96	.	9	34	36	37	34	3	.	.
France	.	1,222	717	1,777	620	294	664	354	659	631
Germany	3,386	1,740	1,810	2,018	2,048	2,213	2,648	2,537	1,899	1,736
Greenland	.	.	.	.	.	.	35	23	.	.
Netherlands	9,068	5,995	3,574	4,707	2,305	1,726	1,660	1,585	1,523	1,896
Norway	7,432	6,410	4,369	5,217	4,417	3,223	2,900	2,749	3,057	4,128
Poland	19	18	18	39	35	.	.	.	1	2
Sweden	625	640	661	463	252	240	319	309	387	435
UK (E/W/NI)	10,344	6,543	4,087	3,112	2,213	1,890	1,270	1,491	1,587	n/a
UK (Scotland)	23,017	21,009	15,640	15,416	7,852	6,650	4,936	6,857	6,511	n/a
UK (combined)	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	8,727
Others	.	.	.	.	.	.	.	786	.	.
Norwegian indust by-catch *	.	.	.	.	.	.	.	48	101	22
Danish industrial by-catch *	.	.	.	.	.	.	.	34	18	46
Total Nominal Catch	77,566	60,881	41,713	44,421	25,936	23,789	22,479	23,108	20,063	22,272
Unallocated landings	826	-1,114	-740	-121	-89	-240	1,391	-915	-380	-78
WG estimate of total landings	78,392	59,767	40,973	44,300	25,847	23,549	23,870	22,193	19,683	22,195
Agreed TAC	132,400	81,000	48,600	49,300	27,300	27,300	27,300	23,205	19,957	22,152
Division VIId										
Country	1999	2000	2001	2002	2003	2004	2005	2006	2007	2008
Belgium	172	110	93	51	54	47	51	80	84	155
Denmark	.	.	.	.	.	.	.	.	.	.
France	.	3,084	1,677	1,361	1,730	810	986	1,124	1,735	760
Netherlands	3	4	17	6	36	14	9	9	59	30
UK (E/W/NI)	454	385	249	145	121	103	184	270	175	n/a
UK (Scotland)	.	.	.	.	.	.	.	2	12	n/a
UK (combined)	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	151
Total Nominal Catch	629	3,583	2,036	1,563	1,941	974	1,230	1,485	2,065	1,096
Unallocated landings	6,229	-1,258	-463	1,534	-707	-167	-197	-358	-325	258
WG estimate of total landings	6,858	2,325	1,573	3,097	1,234	807	1,033	1,127	1,740	1,354
Division IIIa (Skagerrak)**										
Country	1999	2000	2001	2002	2003	2004	2005	2006	2007	2008
Denmark	8,682	7,656	5,870	5,511	3,054	3,009	2,984	2,478	2,228	2,534
Germany	54	54	32	83	49	99	86	84	67	52
Norway	1,146	926	762	645	825	856	759	628	681	779
Sweden	1,909	1,293	1,035	897	510	495	488	372	370	365
Others	.	.	.	.	27	24	21	373	385	13
Norwegian coast *	788	624	846	.	.	720	759	524	494	499
Danish industrial by-catch *	62	99	687	.	.	10	18	9	.	.
Total Nominal Catch	11,791	9,929	7,699	7,136	4,465	4,483	4,338	3,935	3,731	3,743
Unallocated landings	-817	-652	-613	332	-674	-696	-533	-569	-785	-445
WG estimate of total landings	10,974	9,277	7,086	7,468	3,791	3,787	3,805	3,366	2,946	3,298
Agreed TAC	19,000	11,600	7,000	7,100	3,900	3,900	3,900	3,315	2,851	3,165
Sub-area IV, Divisions VIId and IIIa (Skagerrak) combined										
Country	1999	2000	2001	2002	2003	2004	2005	2006	2007	2008
Total Nominal Catch	89,986	74,393	51,448	53,120	32,342	29,246	28,047	28,528	25,859	27,112
Unallocated landings	6,239	-3,024	-1,816	1,745	-1,470	-1,103	661	-1,842	-1,490	-264
WG estimate of total landings	96,225	71,369	49,632	54,865	30,872	28,143	28,708	26,686	24,369	26,847
** Skagerrak/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	1999	2000	2001	2002	2002	2004	2003	2006	2007	2008
Norwegian coast *	788	624	846	.	.	720	759	524	494	499
Norwegian indust by-catch *	.	.	.	.	.	.	.	48	101	22
Danish industrial by-catch *	62	99	687	.	.	10	18	43	18	46
Total	850	723	1,533	.	.	730	777	615	613	567

Table 6.4.2.3 Cod in Subarea IV (North Sea), Division VIIId (Eastern Channel), and Division IIIa (Skagerrak). Landings, discards, and estimated total removals in tonnes.

	Landings	Discards	Catch (L+D)	Total estimated removals
1985	214.6	31.5	246.1	247.0
1986	204.1	139.1	343.1	341.0
1987	216.2	27.8	244.1	244.8
1988	184.2	10.7	195.0	194.8
1989	139.9	62.1	202.1	202.6
1990	125.3	27.0	152.3	153.0
1991	102.5	18.6	121.0	121.2
1992	114.0	36.9	150.9	151.8
1993	121.7	21.9	143.6	174.0
1994	110.6	99.6	210.2	203.2
1995	136.1	32.2	168.3	223.2
1996	126.3	14.3	140.6	199.4
1997	124.2	33.6	157.8	173.4
1998	146.0	40.5	186.5	179.3
1999	96.2	14.2	110.4	138.5
2000	71.4	13.7	85.1	96.2
2001	49.7	13.9	63.6	75.9
2002	54.9	5.7	60.6	81.6
2003	30.9	6.4	37.2	76.7
2004	28.2	5.8	34.0	53.9
2005	28.7	6.3	35.0	51.9
2006	26.6	8.1	34.6	53.3
2007	24.4	23.6	48.1	70.1
2008	26.8	21.8	48.7	90.7

Table 6.4.2.4 Cod in Subarea IV (North Sea), Division VIIId (Eastern Channel), and Division IIIa (Skagerrak).
Summary from stock assessment.

Run title: North Sea/Skagerrak/Eastern Channel Cod
Tuning data. INCLUDES DISCARDS
30/04/2009 10:26

B-ADAPT median values

	RECRUITS	TSB	SSB	CATCH	YIELD/SSB	FBAR 2-4
	Age 1 ('000)	(tons)	(tons)	(tons)		
1963	249718	443856	164821	128686	0.781	0.499
1964	462750	530389	166809	130740	0.784	0.477
1965	687286	695016	193421	210237	1.087	0.570
1966	835166	846628	225100	259416	1.152	0.581
1967	748976	900304	249059	276387	1.110	0.589
1968	329855	797607	254722	305911	1.201	0.704
1969	295479	654250	252744	205510	0.813	0.543
1970	1143743	993899	260553	243867	0.936	0.620
1971	1687701	1201678	264800	412264	1.557	0.781
1972	329293	863226	243532	387737	1.592	0.823
1973	561402	683266	205762	269139	1.308	0.797
1974	550554	650496	233150	253989	1.089	0.705
1975	1030925	728266	211890	242349	1.144	0.749
1976	769399	644409	180579	307102	1.701	0.948
1977	1898803	946599	163815	349038	2.131	0.837
1978	638410	817810	150864	328585	2.178	0.953
1979	1502822	964889	158450	430688	2.718	0.758
1980	2807522	1255362	179034	590678	3.299	0.873
1981	609627	844173	190515	393451	2.065	0.916
1982	983478	834918	184954	359372	1.943	1.009
1983	470856	638926	148887	281696	1.892	1.031
1984	1485856	825394	131990	379974	2.879	0.917
1985	272216	505132	124377	247031	1.986	0.918
1986	1668788	761628	115131	341047	2.962	0.957
1987	363026	563625	107496	244809	2.277	0.947
1988	238092	432243	98890	194798	1.970	0.992
1989	630938	469625	92913	202639	2.181	0.961
1990	199511	323769	81361	153021	1.881	0.973
1991	260092	301415	78090	121204	1.552	0.818
1992	546894	428548	77338	151755	1.962	0.776
1993	254721	372630	78810	173978	2.208	0.992
1994	939238	520934	75503	203158	2.691	0.718
1995	413639	531888	95546	223243	2.336	0.927
1996	233277	443080	103589	199412	1.925	0.986
1997	734266	537068	91120	173408	1.903	0.867
1998	96659	349928	76426	179324	2.346	0.995
1999	177838	256969	74317	138457	1.863	1.167
2000	299673	241222	49052	96179	1.961	1.074
2001	86372	182425	38830	75895	1.955	0.801
2002	155474	217959	47150	81559	1.730	0.790
2003	73605	152148	43644	76695	1.757	0.930
2004	106661	128590	40050	53925	1.346	0.903
2005	88393	132469	36564	51858	1.418	0.725
2006	218422	145291	34475	53268	1.545	0.694
2007	98279	189117	42313	70102	1.657	0.619
2008	120160	212026	57282	90687	1.583	0.788
2009			60139			

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:
$$0.4 - (0.2 * (\text{Precautionary spawning biomass level} - \text{spawning biomass}) / (\text{Precautionary spawning biomass level} - \text{minimum spawning biomass level}))$$
 - 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, the Skagerrak and the eastern Channel

1. Each year, the Council shall decide on the TACs for the cod stock in the North Sea, the Skagerrak and the eastern Channel. 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: $0,4 - (0,2 * (\text{Precautionary spawning biomass level} - \text{spawning biomass}) / (\text{Precautionary spawning biomass level} - \text{minimum spawning biomass level}))$
- (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.