



Background Document for Atlantic cod
Gadus morhua



OSPAR Convention

The Convention for the Protection of the Marine Environment of the North-East Atlantic (the “OSPAR Convention”) was opened for signature at the Ministerial Meeting of the former Oslo and Paris Commissions in Paris on 22 September 1992. The Convention entered into force on 25 March 1998. The Contracting Parties are Belgium, Denmark, the European Union, Finland, France, Germany, Iceland, Ireland, Luxembourg, the Netherlands, Norway, Portugal, Spain, Sweden, Switzerland and the United Kingdom.

Convention OSPAR

La Convention pour la protection du milieu marin de l'Atlantique du Nord-Est, dite Convention OSPAR, a été ouverte à la signature à la réunion ministérielle des anciennes Commissions d'Oslo et de Paris, à Paris le 22 septembre 1992. La Convention est entrée en vigueur le 25 mars 1998. Les Parties contractantes sont l'Allemagne, la Belgique, le Danemark, l'Espagne, la Finlande, la France, l'Irlande, l'Islande, le Luxembourg, la Norvège, les Pays-Bas, le Portugal, le Royaume-Uni de Grande Bretagne et d'Irlande du Nord, la Suède, la Suisse et l'Union européenne.

Acknowledgement

The first version of the Background Document (published 2010) was prepared by Germany as lead country with contributions from the European Union, Iceland and Norway. This update was initially prepared by France and Germany and finalised by a task group led by Norway and comprising the European Union, France, Germany, Iceland and the UK.

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OSPAR Background Document on Atlantic cod *Gadus morhua*

Executive Summary

This background document on Atlantic cod *Gadus morhua* has been developed by OSPAR following the inclusion of this species on the OSPAR List of threatened and/or declining species and habitats (OSPAR Agreement 2008-6). The document provides a compilation of the reviews and assessments that have been prepared concerning this species since the agreement to include it in the OSPAR List in 2003. The original evaluation used to justify the inclusion of *G.morhua* in the OSPAR List is followed by an assessment of the most recent information on its status (distribution, population, condition) and key threats prepared during 2009-2014. Chapter 7 provides proposals for the actions and measures that could be taken to improve the conservation status of the species. In agreeing to the publication of this document, Contracting Parties have indicated the need to further review these proposals. Publication of this background document does not, therefore, imply any formal endorsement of these proposals by the OSPAR Commission. On the basis of the further review of these proposals, OSPAR will continue its work to ensure the protection of *G.morhua*, where necessary in cooperation with other competent organisations. Updates will be made to this background document to reflect further developments or further information on the status of the species as this becomes available.

Récapitulatif

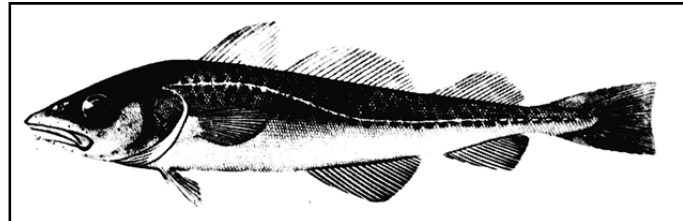
Le présent document de fond sur le cabillaud a été élaboré par OSPAR à la suite de l'inclusion de cette espèce dans la liste OSPAR des espèces et habitats menacés et/ou en déclin (Accord OSPAR 2008-6). Ce document comporte une compilation des revues et des évaluations concernant cette espèce qui ont été préparées depuis qu'il a été convenu de l'inclure dans la Liste OSPAR en 2003. L'évaluation d'origine permettant de justifier l'inclusion du cabillaud dans la Liste OSPAR est suivie d'une évaluation des informations les plus récentes sur son statut (distribution, population, condition) et des menaces clés, préparée en 2009-2014. Le chapitre 7 fournit des propositions d'actions et de mesures qui pourraient être prises afin d'améliorer l'état de conservation de l'espèce. En se mettant d'accord sur la publication de ce document, les Parties contractantes ont indiqué la nécessité de réviser de nouveau ces propositions. La publication de ce document ne signifie pas, par conséquent que la Commission OSPAR entérine ces propositions de manière formelle. A partir de la nouvelle révision de ces propositions, OSPAR poursuivra ses travaux afin de s'assurer de la protection du cabillaud, le cas échéant avec la coopération d'autres organisations compétentes. Ce document de fond pourra être actualisé pour tenir compte de nouvelles avancées ou de nouvelles informations qui deviendront disponibles sur l'état de l'espèce.

1. Background Information

Name of species

Atlantic cod (*Gadus morhua*) Linnaeus 1758

Figure 1
Atlantic cod (*Gadus morhua*)
Source: Whitehead *et al.* 1986



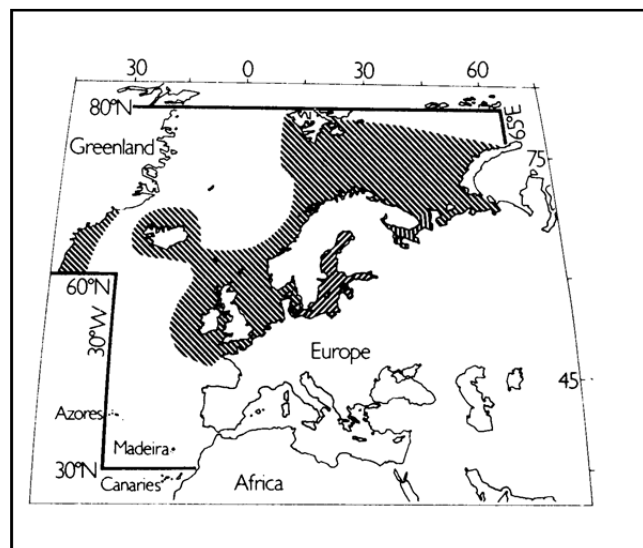
2. Original evaluation against the Texel-Faial selection criteria

List of OSPAR Regions where the feature occurs

OSPAR Regions: I, II, III, IV, V

Dinter Biogeographic Zones: Warm-temperate waters, Cold-temperate waters, Cold-Arctic waters, Warm-temperate pelagic waters, Azores shelf, Lusitanian (Cold/Warm), Lusitanian-boreal, Cold-temperate pelagic waters, Boreal-lusitanian, Seamounts and plateaus, Boreal, Norwegian Coast (Finnmark), Norwegian Coast (Westnorwegian), Norwegian Coast (Skagerrak), South Iceland - Faroe Shelf, Southeast Greenland, North Iceland Shelf, Northeast Greenland Shelf (incl. NEWP), High Arctic Maritime, Barents Sea.

Figure 2
Distribution of Atlantic cod (*Gadus morhua*) in the North-East Atlantic including the OSPAR Maritime Area
Source: Whitehead *et al.* 1986



List of OSPAR Regions and Dinter biogeographic zones where the feature is under threat and/or in decline

OSPAR Regions: The OSPAR List identifies *G.morhua* as under threat and/or in decline in Regions II and III , specifying the following populations/stocks as referred to in ICES advice: *the North Sea, Eastern Channel and Skagerrak cod stock, Kattegat cod stock, Cod west of Scotland, Cod in the Irish Sea, Cod in the Celtic Sea*¹ .

Dinter Biogeographic Zones: Cold-temperate waters, Cold-Arctic waters, Cold-temperate pelagic waters, Boreal, Norwegian Coast (Finnmark), Norwegian Coast (Westnorwegian) , Norwegian Coast (Skagerrak), South Iceland - Faroe Shelf, Southeast Greenland, North Iceland Shelf, Northeast Greenland Shelf (incl. NEWP), High Arctic Maritime, Barents Sea.

Original evaluation against the Texel-Faial criteria for which the feature was included on the OSPAR List of threatened and/or declining species and habitats

Criterion	Comments	Evaluation
Global importance	Distributed in North Atlantic including Baltic Sea.	Does not qualify
Regional importance	Distributed over all Regions within the OSPAR Maritime Area.	Does not qualify
Rarity	Not rare.	Does not qualify
Sensitivity	Sensitive to fisheries and slow to recover from depletion in some cases.	Qualifies
Keystone species	Top-predator historically shaping and stabilising its respective ecosystems.	Qualifies
Decline. The Texel Faial criteria ask for “significant decline in numbers, extent or quality” and therefore a quantitative assessment of the decline should be included.	Several stocks severely declined to about 5% or less of the unfished population and are currently outside safe biological limits e.g. below Blim (to various extents)	Qualifies

¹ However, it should be noted that ICES advice for 2013 considers that the cod stock in the Celtic Sea (VIIe-k) is within safe biological limits, with fishing mortality not exceeding F_{msy}

3. Current status of the species

Distribution in OSPAR Maritime Area

G. morhua is a benthopelagic species, distributed in a variety of habitats, from the shoreline down to the continental shelf and beyond to depths of 600 m. The species forms large schools during the day, and performs seasonal (spawning and wintering) migrations. Several spawning grounds of different stocks have been identified. In the OSPAR Maritime Area, the species is found from Greenland and Iceland to the Barents Sea, and south to the English Channel and the Celtic Sea (Fricke 1987, 2007a, Cohen *et al.* 1990, Anonymous 1998, Campana *et al.* 1999, Vandeperre & Methven 2007, Fox *et al.* 2008, OSPAR 2008, Eschmeyer & Fricke 2009, Froese & Pauly 2009). It also occurs in the Western North Atlantic and the Baltic Sea; the Baltic Sea cod may be a separate taxonomic entity (Pogson *et al.* 1995, 2001, Nielsen *et al.* 2003).

In the North-East Atlantic, the North-east arctic cod stock in the Barents Sea, the Icelandic stock and the much smaller North Sea stock range widely. There are also local, stationary races which always remain close inshore (Knutsen *et al.* 2003, Svedäng 2003, OSPAR 2008).

Population (current/trends/future prospects)

G. morhua stocks are genetically isolated from each other. In North-western Atlantic stocks, a considerable genetic heterogeneity was found (Beacham *et al.* 2002). In the western Baltic Sea, hybrid zones between stocks were observed (Nielsen *et al.* 2003). North-eastern Atlantic stocks are supposed to be likewise heterogenic, and should be treated as separate entities.

The Atlantic cod is a species with a high fluctuation in abundance. It is a typical pattern for this species that increasing stocks are followed by depletions. In the so-called 'gadoid outburst' in the 1970s, cod and other gadoid species had a relatively high abundance, possibly due to exceptional circumstances. However, considering the long-term population development over 100-150 years, clearly a severe overall depletion has occurred in almost all cod populations/stocks.

Today, most of the cod stocks in the North-East Atlantic are fully exploited or depleted as a result of unsustainable removal in target fisheries. Several stocks are fully exploited at levels consistent with the precautionary approach or that achieve the long-term objective of maximum sustainable yield (MSY). In general, the rebuilding of depleted stocks has been slow, and in many cases promising increases in recruitment in the 1980s or 1990s have not resulted in lasting improvements in stock status.

Two exceptions are, however, the North-East Arctic, and Icelandic cod stocks which the latest ICES advice classifies as having full reproductive capacity and being harvested sustainably. According to the latest ICES advice, the Celtic Sea cod stock is considered to have full reproductive capacity and the fishing mortality is close to F_{MSY} (precautionary reference points for F are not defined). The latest ICES advice considers the North-east Arctic cod stock to be at a record high in the time series since 1946 and the Icelandic cod stock spawning stock biomass is at present at a record high since 1965 (ICES 2013 g).

Example 1: Recent historical trends of Cod in the North Sea

From the beginning of the previous century until the 1960s, landings of cod fluctuated between 50 000 tonnes and 100 000 tonnes in the North Sea. In the 1960s, catches (including discards) increased and reached a peak of 361.9 thousand tonnes in 1972, followed by a decrease and another peak at 362.9 thousand tonnes in 1981. They then declined steadily from 1981 to 1991 (120 thousand tonnes), since when they have shown a small increase to 185 thousand tonnes in 1995. Then catches decreased again from 1995 to 2006 (41.6 thousand tonnes); since 2006, catches have been increasing slightly (66.9 thousand tonnes in 2011).

The cod stock in the North Sea reached a maximum in the beginning of the 1970s (spawning stock biomass 276 thousand tonnes in 1971) a period known as “gadoid outburst” and characterized by favourable environmental conditions. Subsequently, the North Sea cod stock declined continuously until 2006 since when it has shown a small increase. Since the mid 1980s the cod stock is outside safe biological limits (SSB below $B_{\text{precautionary approach (pa)}}$) and since the mid-1990s even below the spawning stock biomass reference level ($B_{\text{limit (lim)}}$). Recruitment since 2000 has been poor. ICES in 2001 advised of the high risk of stock collapse (ICES, 2001). The very poor state of the North Sea cod stock in the beginning of the 2000s was caused primarily by continuous fisheries mortality, which was too high, and additional unfavourable environmental conditions (ICES 2013 m).

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 is now in the vicinity of B_{lim} (ICES, 2013a) Recruitment since 2000 has been poor. The proportion of discards is still high in relation to the historical period (ICES 2013a). Recruitment of 1 year old cod has varied considerably since the 1960s, but since 1998, average recruitment has been lower than any other time. The 2005 and 2009 year class were stronger but still well below the long-term average.

Recent recruitments have been low, possibly influenced by changes in the availability of food resources for cod larvae and increasing predation pressure. 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 contribute to continued low recruitment (ICES 2013a).

The overall reporting of catch data provided to ICES has improved since 2006, more recently through fully documented fisheries starting in 2011. Unaccounted removals are no longer estimated for 2006 onwards. The main sources of uncertainty are aspects of the input data (historical landings and discards, discrepancies between stock trends implied by fishery-dependent and independent sources) and the assumption of fishing mortality in 2013 in the advice forecast (ICES 2013a).

The study of Hutchinson *et al.* 2001 “indicates that several of the current North Sea management units, which are assumed to be single stocks for the purposes of assessment, are in fact composed of several genetically distinct stocks. Thus the present amalgamation of data from different biological stocks may hide a disproportionate decline of the more vulnerable, which may require separate monitoring and management policies to remain sustainable. However, incorporating this information into an effective and realistic management policy would be difficult, without resorting to the large-scale closure of fisheries”. There are indications that some subpopulations of cod in the North Sea and Skagerrak might already have disappeared due to disproportionately high rates of fishing mortality (Holmes *et al.* 2008, Svedäng 2003, Bartolino *et al.* 2012, ICES 2010). If that is the case, the recovery of the North Sea /Skagerrak/English Channel stock will be slower and possibly severely hampered (Heath *et al.* 2008).

Condition (current/trends/future prospects)

The Food and Agriculture Organisation of the United Nations (FAO) classified the status of Eastern North Atlantic (Fishing area 27) cod stocks ranging from fully exploited to depleted (FAO 2008).

ICES (2013) has reported the current status of the different stocks of cod previously identified by OSPAR as being under threat and/or in decline as follows:

Kattegat cod (Division IIIa East Kattegat)

Advice for 2014: ICES advice 2013b: New data available for this stock do not change the perception of the stock. Therefore, the advice for this fishery in 2014 is the same as the advice for 2013 (see ICES, 2012): *“ICES advises on the basis of precautionary considerations that there should be no directed fisheries and bycatch and discards should be minimised”*.

SSB of cod in the Kattegat steadily declined from around 35 000 tonnes in the late 1970s to a level of 5000-6000 tonnes at the end of the 1990s. Since about 2000, the SSB is estimated at the historically lowest level, SSB was for 2011 estimated in the range of 950-1700 tonnes, i.e. below B_{lim} at 6000 tonnes. Current level of fishing mortality is unknown. Recruitment in recent years has been the lowest in the time series.

Cod in the North Sea, Eastern Channel and Skagerrak (IV, VIId, and IIIa)

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, and is now in the vicinity of B_{lim} (ICES 2013a). Fishing mortality declined from 2000 and is now estimated to be around 0.4, between F_{pa} (F_{pa} = Precautionary reference point for fishing mortality (mean over defined age range)) and the FMSY proxy. Recruitment since 2000 has been poor, potentially caused by high exploitation rate, which may result in truncated age structure of the stock. The low average age may reduce the reproductive capacity of the stock as first-time spawners reproduce less successfully than older fish (ICES 2013a,m).

ICES estimates total catch (2012) at around 43.6 kt, with 33.2 kt estimated landings (58% demersal trawls and seines >100 mm, 11% gillnets, 9% *Nephrops* trawls 70–99 mm, 6% beam trawls, and 16% other gears) and 10.4 kt estimated discards.

Advice for 2014: ICES advice 2013 a: *“ICES advises on the basis of the EU – Norway management plan that landings in 2014 should be no more than 28 809 tonnes (9% less than the 2013 total allowable catch”*.

The EU – Norway annual negotiations agreed to set a Total Allowable Catch (TAC) for 2014 at 27 799 tonnes.

Cod west of Scotland (VIa)

Based on the most recent estimates of SSB (2013) and fishing mortality (2012) ICES classifies this stock as being harvested unsustainably and at reduced reproductive capacity. Fishing mortality is high. The spawning-stock biomass has been below B_{lim} since 1997 and has remained very low, well below B_{lim} since 2006. Recruitment has been estimated to be low over the last decade and is considered impaired. (ICES 2013c).

Advice for 2014: ICES advice 2013 d: *“ICES advises that there should be no directed fishery for cod in the west of Scotland in 2014, to ensure a long-term optimal use of this resource”*.

Cod in the Irish Sea (VIIa)

Based on the most recent estimates of SSB (2012) and fishing mortality (2011) ICES classifies this stock as being harvested unsustainably and at reduced reproductive capacity. The SSB has declined ten-fold since the late 1980s and has had reduced reproductive capacity since the mid-1990s. The SSB increased from 2010 but remains well below B_{lim} . The fishing mortality in recent years is declining and uncertain, but total mortality remains very high. Recruitment has been low for the last ten years.

Advice for 2014: ICES 2013 d: *“ICES advises that there should be no directed fishery for Irish Sea cod in 2014, to ensure a long-term optimal use of this resource”*.

Cod in the Celtic Sea (VIIe–k)

Based on the most recent estimates of SSB (2012) and fishing mortality (2011) ICES classifies this stock as being harvested sustainably and at full reproductive capacity. SSB has increased from below B_{lim} to well above $MSY B_{trigger}$ since 2010. Fishing mortality increased from around 0.5 in 1971 to 0.8 in 1981 and varied without trend around this level until 2005, when it sharply declined to around FMSY in 2011. Recruitment has been highly variable over time with occasional very high recruitment (1987, 2010).

Advice for 2014: ICES 2013 d: *“ICES advises that landings in 2014 should be no more than 6 848 tonnes to ensure a long-term optimal use of this resource (33% less than the 2013 total allowable catch)”*.

ICES (2013) has reported the current status of the different stocks of cod currently not identified by OSPAR as being under threat and/or in decline as follows:

Cod in Norwegian coastal waters (Subareas I and II)

Estimated catches in the recreational fishery represented about 35% of the total catch in 2009. However, these estimates are not monitored on an annual basis and are considered to be uncertain. Absolute stock estimates from catch at age analysis are, therefore, also considered to be uncertain. The time trend in the catch at age analysis is similar to the trend observed in the annual coastal cod survey, showing a significant stock decline in the late 1990s and a rather stable stock since 2003, close to its lowest observed value. The survey, serving as a basis for ICES advice, indicates that the SSB is stable and close to its lowest value while F appears variable without a clear trend since 2000. Estimated catches in the recreational fishery represented about 35% of the total catch in 2009. However, these estimates are not monitored on an annual basis and are considered to be uncertain.

The 2012 commercial landings were estimated to be 31 900 t, i.e. above the expected catch (21 000 t) set at the quota agreement. The regulations have not reduced catches, and current catches are considered to be too high. (ICES 2013f)

Advice for 2014: ICES 2013 f: *ICES advises to follow the Norwegian rebuilding plan which is considered by ICES to be provisionally consistent with the precautionary approach.*

Icelandic cod (Va)

Based on the most recent estimates of SSB (2013) and fishing mortality (2012) ICES classifies this stock as being harvested sustainably and at full reproductive capacity. The spawning stock of Icelandic cod is increasing and is higher than has been observed over the last four decades. Fishing mortality has declined significantly in the last decade and is presently at a historical low and below likely candidates for F_{pa} and F_{lim} . Year classes since the mid-1980s are estimated to be relatively stable but with the mean around the lower values observed in the period 1955 to 1985 (ICES 2013g).

Advice for 2014: ICES 2013 g: *“ICES advises on the basis of the Icelandic 2009 management plan that the TAC in the fishing year 2013/2014 should be set at 215 000 t”*.

Faroe Plateau cod (Vb1)

SSB has remained around B_{lim} since 2005. Fishing mortality has decreased since 2010 and is now below F_{lim} , but still above F_{pa} and FMSY. The 2009–2011 year classes are estimated to be below average (ICES 2013h).

Advice for 2014: ICES 2013 h: *“ICES advises on the basis of the MSY approach that effort should be reduced such that fishing mortality in 2014 will be no more than $F = 0.16$, corresponding to a 69% reduction in the present fishing mortality.*

Faroe Bank cod (Vb2)

Advice for 2014: ICES 2013 i: *“New data on landings and indices from the two annual Faroese surveys (2012 summer, 2013 spring) do not change the perception of the stock since 2008 and do not give reason to change the advice from 2011. The advice for the fishery in 2014 is therefore the same as the advice given since 2008: “Because of the very low stock size ICES advises that the fishery should be closed. Reopening the fishery should not be considered until both survey indices indicate a biomass at or above the average of the period 1996–2002” “*

North-east Arctic cod (I and II)

The SSB has been above MSY $B_{trigger}$ since 2002 and is now the highest observed. The total stock biomass is close to the highest observed. Fishing mortality was reduced from well above F_{lim} in 1997 to below FMSY in 2007 and is now close to its lowest value in the time-series. Surveys indicate that year classes 2010–2012 are slightly above average.

Based on the most recent estimate of SSB (in 2013) and fishing mortality (in 2012), ICES classifies the stock as being harvested sustainably and at full reproductive capacity. The SSB has been above MSY $B_{trigger}$ since 2002 and is now at a record high. The total stock biomass is close to the highest observed. Fishing mortality was reduced from well above F_{lim} in 1997 to below FMSY in 2007 and is now close to its lowest value. Surveys indicate that year classes 2009–2011 are above average (ICES 2013k).

Advice for 2014: ICES 2013 k: *“ICES advises on the basis of the Joint Russian – Norwegian Fisheries Commission management plan that TAC in 2014 should be set at 993 000 t”.*

The Joint Russian – Norwegian Fisheries Commission agreed to set the TAC for 2014 at 993 000 tonnes.

Synopsis

The ICES evaluation in 2013 (above) states that most stocks are still outside Safe Biological Limits (SBL) but it should also be observed that the situation has improved in recent years. It is reasonable to consider that stocks need to be at least above SBL not to qualify as being threatened or declining, and that they are not being harvested outside such limits.

Consequently, all cod stocks in OSPAR Regions II and III that have been identified by OSPAR to be under threat and/or in decline in the original evaluation (2008), – with the exception of the Celtic Sea are still under threat (see also Section 6).

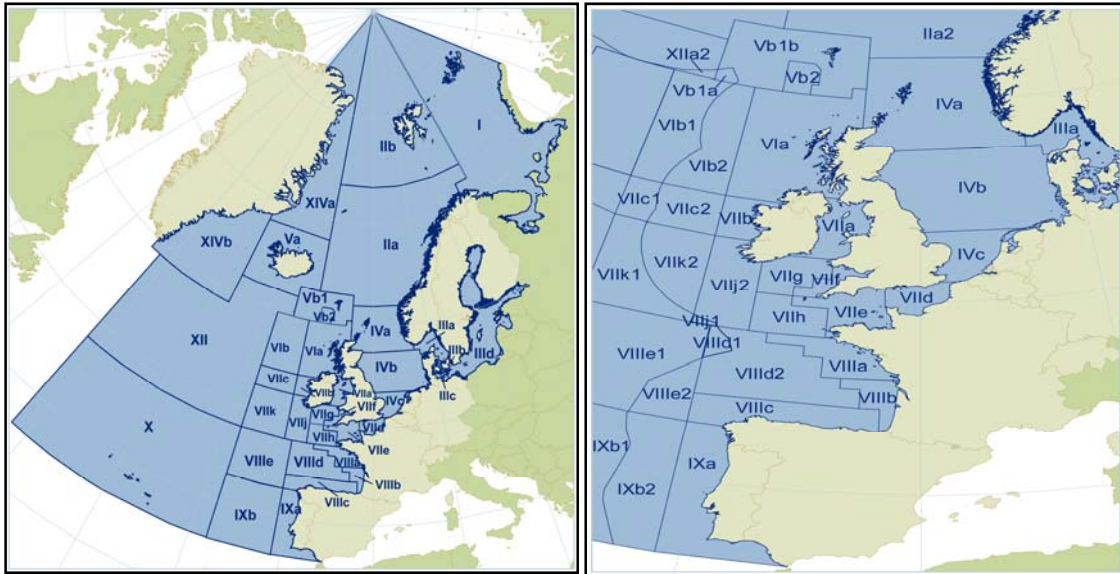


Figure 3 ICES Fishing Areas

Limitations in knowledge

There is a substantial amount of information on the status of the different cod stocks in the OSPAR Maritime Area from surveys and landings data. These go back for many decades and have been used by ICES to assess the status of the different stocks.

Since the information on landings and effort is considerably unreliable, commercial indices were not used in the assessment. Instead, the assessment uses only survey data for calibration. Despite their obligation under EU data collection regulations, some countries with substantial cod landings have not supplied discarding estimates, although the situation has improved in recent years (ICES 2013c). This is a source of added uncertainty in the assessments, together with the lack of estimates of removals by recreational fisheries in some cases (ICES 2013c).

In the west of Scotland, the contribution of seal predation (among other species) to total cod mortality is likely to be significant. However, data on predation by seals and other species are insufficient for reliable estimation of predation mortality. (ICES 2013c).

Natural variability is likely to have contributed to the changing status of cod. The evidence that depletion of food supplies and global warming have played an important role in declines of cod stocks is nevertheless incomplete and sometimes speculative (Castonguay *et al.* 1999, Björnsson *et al.* 2001, Fischer 2003, Ruzicka 2004, Drinkwater 2005, Brander 2006, Nielsen *et al.* 2007). No evidence for effects of climate change on cod stocks in the southern part of the range in the North-western Atlantic was found by Nielsen *et al.* 2007. Although cod stocks are clearly affected by ocean conditions and food supply, evidence that these factors would have caused major declines in cod stocks, without overfishing, is weak (ICES 2002). There is a paucity of knowledge concerning cod population structure. Such information is vital for management and to estimate recovery potential (Smedbol & Wroblewski 2002).

4. Evaluation of threats and impacts

By far the largest threat to cod stocks comes from fisheries (Rose *et al.* 2000, Froese & Pauly 2003, Handegard *et al.* 2003, Harvey *et al.* 2003, Sellers 2003, Cardinale & Svedäng 2004, Suuronen *et al.* 2007, Urbach & Cotton 2008). This is caused by too high fishing pressure in directed fisheries (ICES 2013) as well as bycatch in mixed fisheries and in fisheries targeting other species with smaller mesh sizes, where juvenile cod in particular may be caught. Some of the captured cod are then discarded.

Norway and Iceland have a discard ban . The EU will implement a landing obligation and discard restrictions.

Depletion of food sources and global warming has also been suggested as contributory factors in the decline but any effects are likely to be minor compared to that from fishing (Neat & Righton 2007). Higher sea surface temperatures may, however, affect local recovery of cod stocks (O'Brien *et al.* 2000).

Type of impact	Cause of threat	Comment
Fisheries	Target and bycatch fisheries.	Major impact, see above.
Climate change	Human induced global warming	Moderate to minor impact, possible shifting in certain areas of distribution range due to rising sea temperatures.
Habitat damage	Mobile fishing gears, pollution	Minor impact compared with mortality in fisheries.

Impact of fishery on species, habitats and marine ecosystem

Overfishing and collapse of cod stocks, which is an important predator of the higher trophic level, can have significant negative impacts on the food web and trophic structure in the marine ecosystem. Commercial fisheries has impacts on the target species, but also on non-target species and habitats. According to Baum and Worm (2009), trawl surveys showed significant increases in small fish (< 40 cm) abundance across much of the North Sea over the past 30 years, coinciding with declines in larger predators. Hiddink *et al.* 2006 showed 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. By assembling published data from studies in exploited North Atlantic ecosystems, Frank *et al.*(2007) demonstrate how (fisheries driven) collapse of the benthic fish community (cod, haddock, hake, pollack), which occurred during the mid-1980s and early 1990s, has resulted in the virtual elimination of the ecosystem-structuring role of the large bodied predators that had dominated for centuries. These changes in top-predator abundance have had a cascading effect on lower trophic levels: the abundance of small pelagic fishes and benthic macro invertebrates increased markedly following the benthic fish collapse.

Cod in OSPAR regions II and III is mainly caught with active bottom-contacting fishing gear e.g. trawls and Danish seine. The intensity of the impact on the benthic habitat, varies between gear types and their riggings, the weight of the gear and the trawling speed, (Bergman & Hup 1992; Kaiser *et al.* 1998; Kaiser *et al.* 2006). Beam trawls have the highest negative impact on benthic communities due to their heavy weight. Nevertheless other mobile bottom contacting fishing gear, like otter trawls, Danish and Scottish seines are also negatively impacting benthic communities on sandbanks (Hall *et al.* 2008).

Fisheries with passive gear especially gillnets can result in high bycatch mortality of marine mammals and diving seabirds.

5. Existing management measures

The information on the management of cod stocks provided in this section is not considered to be all-encompassing. Rather, this section aims to highlight some of the most important regulatory measures that have been adopted by the respective authorities competent for fisheries management for the cod stocks as defined by the International Council for the Exploration of the Sea (ICES). Emphasis is given to management of those cod stocks that have been identified in the OSPAR List of threatened and/or declining species and habitats namely the North Sea, Eastern Channel and Skagerrak cod stock, Kattegat cod stock, cod west of Scotland, Cod in the Irish Sea, Cod in the Celtic Sea.

Further and comprehensive information can be obtained at

- The European Commission (http://ec.europa.eu/fisheries/cfp/index_en.htm)
- Norwegian Ministry of Fisheries and Coastal Affairs (<http://www.regjeringen.no/en/dep/fkd.html?id=257>)

General cod fisheries management

Long-term management plan

In general, the management of cod stocks in (a) the Kattegat, (b) the North Sea, Skagerrak, and eastern Channel, (c) west of Scotland, and (d) the Irish Sea is regulated by Council Regulation (EC) No 1342/2008 of 18 December 2008 establishing a long-term plan for cod stocks and the fisheries exploiting those stocks and repealing Regulation (EC) No 423/2004. The plan shall ensure the sustainable exploitation of these cod stocks on the basis of maximum sustainable yield. The North Sea cod stock is shared with Norway and is jointly managed. The measures provided for in this Regulation should therefore take due account of consultations with Norway pursuant to the Agreement on fisheries between the European Economic Community and the Kingdom of Norway.

The long-term management plan for these cod stocks replaced biomass-based objectives with a target fishing mortality of 0.4, and aimed at subsequently managing the stocks based on maximum sustainable yield (Anonymous 2009b). The plan includes a regime of effort for EU fishing vessels (except pelagic) operating in these areas. Biomass targets (B_{lim} and B_{pa}) are used as a trigger to define the reduction of fishing mortality.

This will allow genuine conservation measures to be taken where they are most needed, while helping the industry benefit from recovery once it has taken root. TACs cannot be reduced or increased by more than 20%. When the EC Scientific, Technical and Economic Committee for Fisheries (STECF) do not have adequate data to advise a TAC according to the rules established in the long-term management plan, TACs should be reduced by at least 25% if a reduction of catches is considered necessary. As the North Sea cod is a jointly managed stock, the TAC is formally set in negotiations between the EU and Norway.

The long-term management plan was evaluated by ICES in 2009 and found, assuming adequate implementation and enforcement, to be in accordance with the precautionary approach. The evaluation is most sensitive to implementation error, i.e. TAC and effort overshoots and subsequent increases in discarding, and to continued low recruitment. Under these scenarios, the effectiveness of the plan could be undermined and recovery delayed until after 2015 (Anonymous 2009b, ICES 2009b). Kraak *et al.* (2013) give a useful overview of EU cod management plans and lessons learnt from them. (see p.16, below).

Discards

Official landings consistently comply with the set TACs, but discards have accounted in some years for approximately equal fishing mortality to that due to landings. There is still substantial discard especially in mixed fisheries targeting whiting and haddock. Bycatch of juvenile cod in most fisheries is high and has a negative impact on the recovery of cod stocks. Discards are banned in Norway and Iceland, but still legal in EU waters. A newly reformed Common Fisheries Policy (CFP) came into force at the start of 2014 (Regulation EU 1380/2013 of the European Parliament and of the Council). Among other measures, this introduces a landing obligation which will be implemented gradually based on a specified timetable. This means, e.g. that most valuable demersal species will be subject to a discard ban from 2016 onwards.

There are also strong indications of unaccounted removals due to other sources, presumed to be fishing-related (Anonymous 2009b, ICES 2009b). However, discarding currently has declined for certain stocks (such as in the North Sea), showing a slight improvement compared to recent years. There have been considerable efforts to reduce discards by some countries, and the impact of these reductions are starting to be felt (e.g. reduced discarding leading to improved survival of the stronger 2009 year class; ICES 2012b).

Assessment estimates and reports from some fisheries indicate that, historically, quota restrictions have not been effective in controlling the catch of cod. Since 1992, TACs were set by managers to substantially reduce F and were accompanied by an increasing number of technical measures and effort limitations (since 2003) imposed on the fisheries targeting cod.

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 (undersized cod, high-grading and over-quota catches) that do not count against quota, and mis-reporting 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 catches. There is a need to reduce fishing induced mortality on North Sea cod further, particularly for younger ages, in order to allow more fish to reach maturity and increase the probability of good recruitment. The availability of discard rate estimates and age compositions has improved in 2011.

Recent measures to improve survival of young cod, such as the Scottish Credit Conservation Scheme, and increased uptake of more selective gear such as the now widespread use of sorting grids in the Skagerrak, should be encouraged (ICES 2013 m).

Table 3: <i>Total Allowable Catches (TAC) of Cod (Gadus morhua) for North Atlantic stocks 2012-2013</i> Source: ICES Advice 2013					
TAC Unit (ICES fishing zone)	TAC in 2012 tonnes	TAC in 2013 tonnes	% TAC change 2012-2013	TAC in 2014 tonnes	% TAC change 2013-2014
Vla, Vb	0	0	0%	0	0%
IV	26 500	26 500	0%	27 799	+5%
VIIId	1 500	1 500	0%	1 620	-28%
I, II	751 000	1 000 000	33%	993 000	-1%
Norwegian coastal waters	21 000	21 000	0%	21 000	0%
Skagerrak	3 800	3 800	0%	3 972	-33%
Vlb (Rockall subunit)	780	740	-20%	74	-90%
Kattegat (IIIa)	1330	1000	-25%	100	-90%
VIIa	3800	2850	-25%	228	-92%
VIIb,c,e-k, VIII,IX,X,CECAF 34.1.1. (EC)	10 059 000	10 200 000	+1%	6 848	-33%
Va	177 000	196 000	+11%	214 400	+9%

Minimum mesh size

In 2001, cod in the whole of North-East Atlantic Fisheries Commission (NEAFC) Region 2 was a legitimate target species for towed gears with a minimum cod-end 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 from 2002 was 120 mm, although in a transitional arrangement until 31 December 2002, vessels were allowed to exploit cod with 110 mm cod-ends provided that the trawl was fitted with a 90 mm square mesh panel and the catch composition of cod retained on board was not greater than 30% by weight of the total catch. From 1 January 2003, the basic minimum mesh size for towed gears targeting cod was 120 mm. The minimum mesh size for vessels targeting cod in Norwegian waters south of 62°N is also 120 mm. North of 64°N the minimum mesh size is 130 mm.

The expected benefits from the increase in mesh size to 120 mm are not apparent from the available data as a changed pattern of mesh size use in demersal trawls has emerged, with increases in the use of larger mesh sizes and more pronounced effort in vessels using smaller meshes (Anonymous 2009b, ICES 2009b).

Management of cod in the North Sea (ICES 2013 m)

A Cod Recovery Plan which detailed the process of setting TACs for the North Sea cod was in place until 2008. Details of it are given in Council Regulation EC 423/2004 establishing measures for the recovery of cod stocks and previous ICES working group reports. ICES considered this recovery plan

as not consistent with the precautionary approach because it did not result in a closure of the fisheries for cod at a time of very low stock abundance and until an initial recovery of the cod SSB had been proven.

In April 2008 the European Commission adopted a proposal to amend the cod recovery plan. The new system is intended to be simpler, more flexible and more efficient than the previous one, allowing effort reductions to be proportionate to targeted reductions in fishing mortality for the segments that contribute the most to cod mortality, while for other segments effort will be frozen at the average level for 2005-2007.

In December 2008 the European Commission and Norway agreed on a new cod management plan implementing the new system of effort management and a target fishing mortality of 0.4. 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 (i.e. discarding in excess of the assumptions under the management plan will affect the effectiveness of the plan).

The management plan foresees a further reduction of the fishing mortality and will result in further reductions of the TACS by 20% in 2013, leading to a 36% increase in the spawning stock in 2014. The success of the management plan will be dependent on a further efficient reduction of the fishing mortality. Avoiding/limiting unwanted catch which are discarded will contribute to that reduction in fishing mortality.

Over many years the TAC for cod in the North Sea was set by the EU Council significantly higher than the scientific advice by ICES (see figure 4). For eight of the last 12 years fishery scientists advised a closure of the cod fishery (zero TAC) in the North Sea according to the precautionary approach. The responsible managers (EU Council) did not follow this advice (see Figure 4). Since 2010 the TAC follows the scientific advice according to the long term management plan. Since 2012 the TAC is consistent with the scientific advice (ICES 2013m, Kraak *et al.* 2013) but still does not control discards. Fishing mortality has been decreasing by 61% since 2000 but is still too high (nearly twice FMSY). There is a need to reduce fishing induced mortality on North Sea cod further, particularly for younger ages, in order to allow more fish to reach maturity and increase the probability of good recruitment (ICES 2013m)

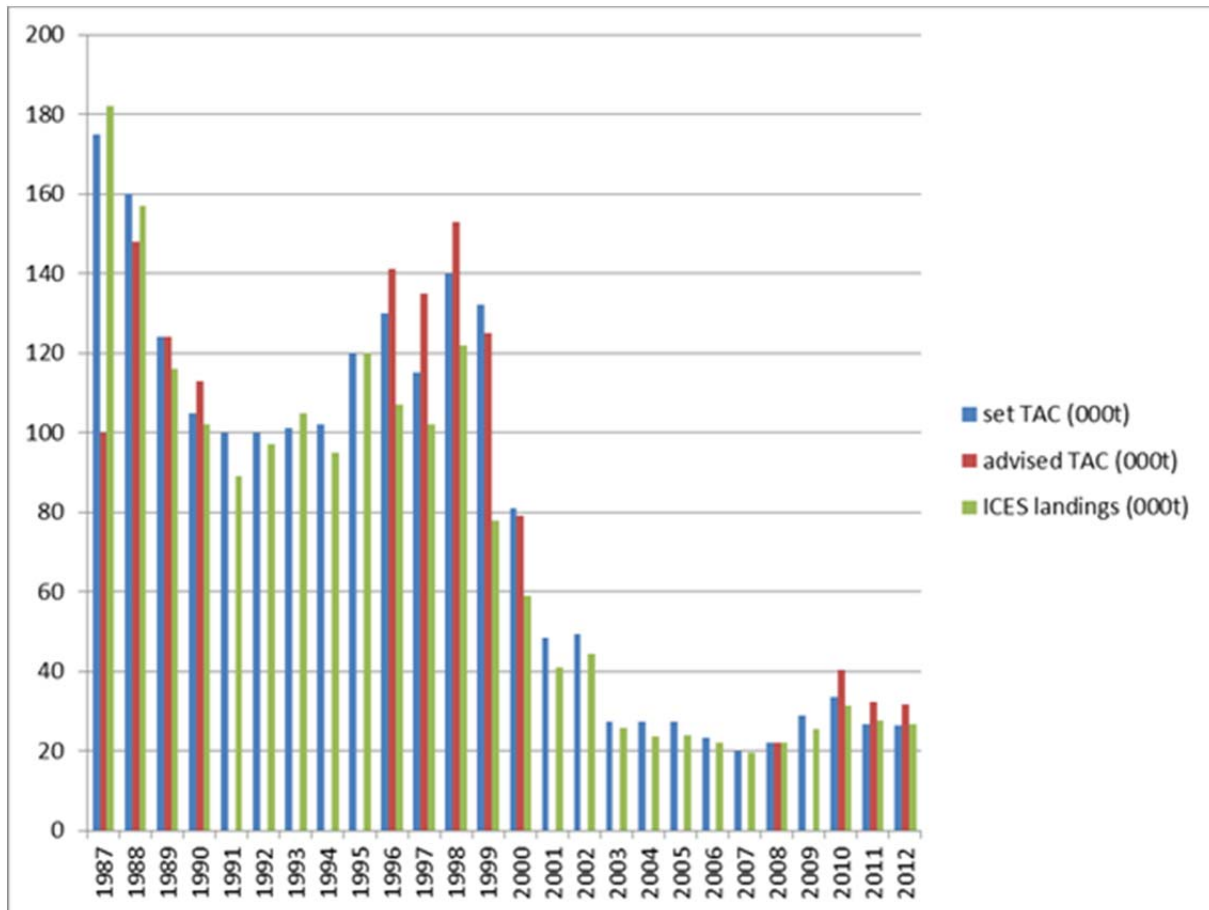


Figure 4.: North Sea cod, Set TAC, advised TAC, Landings estimate by ICES, Scientific advice from 1991-1995 was defined in terms of effort. For 2001-2007 and 2009 a zero catch was advised. Source: ICES 2013b

Closed areas

Marine Protected Areas (MPAs) can be useful management tools in rebuilding and conserving portions of depleted fish species such as the Atlantic cod (Moland *et al.* 2013). Seen from a fisheries management point of view every area with restrictions related to fishing of cod will have a positive effect that depends on the size of the area and the reduction of the fishing pressure in that area. This applies even if the regulation in question might not be regarded as an MPA in accordance with the International Union for Conservation of Nature (IUCN) criteria.

In the North Sea, a cod protection area was implemented in 2004 (Council Regulation EC 2287/2003, amended by Council Regulation EC 867/2004) which defined the conditions under which certain stocks, including haddock, could be caught in Community waters. A maximum of 35% of the haddock TAC in 2004 could be taken from within the cod protection area. For the UK, a special permit was required to fish for haddock in the cod protection area. Although this management scheme was proposed to permit additional haddock to be caught in 2004, the requests for special permits were relatively few. This cod protection area was only in force in 2004 and the desired effects were not achieved (ICES 2009b).

Real time closures are regularly put in place since 2008, for example set by Scotland and England in the North Sea and France in the Eastern Channel. Fishing areas, where abundance of mature or juveniles of cod are detected, are closed for a period of 21 days.

Spatial and temporal fishing area closures were implemented in the Kattegat in January 2009 in order to reduce fishing mortality on cod. The relative fishing impact (proxy for fishing mortality) has been estimated to have been considerably reduced since 2008 due to spatial restrictions on fisheries, effort limitations and introduction of more selective fishing gears.

Along the Norwegian coast trawling for cod is generally forbidden within 12 nautical miles. A few exceptions exist. In the internal waters of Norway most of the fjords north of 65 degrees north are closed for fishing with larger vessels using purse seines, to protect the coastal cod. Some areas where coastal cod aggregates in the spawning season outside the fjords are also closed. A number of large areas along the coast beyond 12 nautical miles are also closed for demersal trawling. In the capelin fisheries areas where bycatches of cod beyond 35 kilogramme per ton capelin occur may be closed on a real time basis. A system of real time closures to protect juvenile fish has been operated in the Barents sea since the mid-1980s. This system applies both to trawling for demersal fish and shrimp. Areas in the fjords of Northern Norway is closed for shrimp trawling on a real time basis if bycatches beyond a fixed level of juvenile cod occurs. A system for real time closures, RTC, was established in the North Sea and Skagerrak in 2009 after negotiations between the EU and Norway.

Management of cod in the Celtic Sea

Since 2005, ICES rectangles 30E4, 31E4, and 32E3 have been closed during the first quarter (Council Regulations 27/2005, 51/2006, and 41/2007, 40/2008, and 43/2009) with the intention of reducing the fishing mortality of cod. STECF (2007) concluded that the closure is a potentially effective measure for displacing fishing activities away from spawning aggregations off North Cornwall and hence making vessels less efficient at catching cod. The major impact of the closure appears to have been on French trawlers that historically have taken a large proportion of the cod landings in Divisions VIIe–k. The effectiveness of the closed rectangle off the Irish coast is less evident, due to its lesser importance as a fishing ground for the EU whitefish fleets and the poorer knowledge of the distribution of cod spawning activity off the south-east coast of Ireland. The quantitative impact of this closure was evaluated by ICES in 2007 in response to a special request from the EC and it could not be quantitatively disentangled from other factors.

Technical measures applied to this stock are a minimum mesh size for beam and otter trawlers in Subarea VII and a minimum landing size (MLS) of 35 cm. Minimum landing sizes do not prevent cod from being discarded, but might prevent the targeting of juvenile cod. Highgrading appears and becomes the most prominent discard practice when quotas are restrictive. In 2011, the initial low TAC with regard to the abundance of the 2009 year class has led to exceptionally high levels of highgrading for all fleets during the first part of the year. In response, the 2011 TAC has been significantly increased since cod catches are part of mixed fisheries, any measures would have not avoided a high level of catch of marketable fish and a too low TAC would have resulted in highgrading.

Management of cod stocks by Norway

For protecting and rebuilding the Norwegian coastal waters cod stock (north of 62°N) several new technical regulations were introduced in coastal waters in 2005. The main elements were restrictions on vessel size and gear type, and closing of some spawning areas in the spawning season as mentioned above (pp.17-18 (Closed areas)). Since the fleet has a combined quota for North-East Arctic cod and coastal cod, the regulations were partly aimed at moving fishing pressure from coastal cod to North-East Arctic cod. In addition to this, gear regulations applying to recreational fisheries along the whole Norwegian coast were changed, reducing the length of gillnets allowed and increasing the mesh size.

A rebuilding plan as agreed by the Norwegian authorities (ICES 2013 f) was evaluated by ICES in 2010. ICES considers the proposed plan to be provisionally consistent with the precautionary approach. (ICES 2013f). This plan specifies that in every year when the survey index of spawning stock declines, the regulations in the following year should aim at a reduced fishing mortality (fixed steps equal to 15% of estimated F for the year 2009). With no decline in the survey index, the regulation can remain unchanged. The rebuilding target is a survey index equal to the average of the 1995-1998 surveys. So far, no significant increase is observed in spawning stock or recruitment.

In 2004 the Joint Norwegian Russian Fisheries Commission agreed on a long term management plan for the North-East Arctic cod. An amendment to the plan was made in 2009 (ICES 2013k). Several technical regulations are in operation for protecting young fish in the Barents Sea such as mandatory use of sorting grids in trawl fisheries (since 1997), combined with temporal closing of areas with high abundance of young fish as mentioned above (pp. 17-18 (Closed areas)). Port state agreements on control and reporting of landings have been important for eliminating illegal, unreported and unregulated (IUU) fishing in the Barents Sea.

Management of cod stocks by Iceland

Regarding the Icelandic cod stock, the Icelandic Government adopted a new management plan for the Icelandic cod stock for five fishing years, starting with the 2009/2010 fishing season. The main objective of the management plan is to ensure that the spawning stock biomass (SSB) will with high probability (> 95%) be above the size estimated in 2009, 220 000 tons by the year 2015. The management plan applies a harvest control rule to calculate the TAC. ICES has advised that this management plan has a high probability of increasing the size of the spawning stock and that the plan is consistent with the precautionary approach. In addition the fishing mortality is consistent with international commitments to achieve maximum sustainable yield.²

Management of cod stocks by the Faroe Islands

No information was supplied on the management of the cod stocks by the Faroe Islands.

6. Conclusion on overall status

Of the ten cod stocks within the OSPAR Maritime area considered here, seven are classified as over-exploited or depleted by fisheries. Fisheries management has often not been in line with advice provided by ICES, but improvement can be noted in some stocks in recent years.

As a result of specific recovery and management programmes for cod stocks, fishing pressure is now falling, in several OSPAR Regions. Despite this improved management, seven out of the ten stocks continue to be outside SBL, and current management measures are probably not sufficient for cod stock recovery in all cases.

In the OSPAR List of threatened and/or declining species and habitats, only Regions II and III were originally identified as where the feature is under threat and/or in decline, with a footnote specifying this listing as applying to the populations/stocks referred to in ICES advice as the North Sea, Eastern Channel and Skagerrak cod, Kattegat cod, Cod west of Scotland, Cod in the Irish Sea, Cod in the Celtic Sea.

² Further information on the Icelandic management system and measures can be obtained at www.fisheries.is, Icelandic Ministry of Industries and Innovation (www.anr.is) and The Marine Research Institute http://www.hafro.is/undir_eng.php?ID=26&REF=4. while further information on the Icelandic cod stock is available at www.hafro.is

However, following the precautionary approach and considering the recent ICES evaluation of the cod stocks in the North-East Atlantic (ICES 2013 i, h, f) there are reasons to also specify Region I as an area where the species is threatened and/or declining in the following stocks referred to in the ICES advice: “Norwegian coastal waters cod”, “Faroe Plateau cod”, “Faroe Bank cod”.

Erosion of the cod population structure, i.e., eradication of entire subpopulation/ population units, as has happened along the Swedish west coast (Svedäng 2003, Svedäng & Bardon 2003), may impede a full recovery to former stock sizes in the short-/ medium-term.

For several stocks, recent recruitment is estimated to be low and considered impaired, possibly due to a combination of low spawning stock biomass, caused by past overfishing, and poor environmental conditions (ICES, 2012b).

However, it should be noted that the status of certain stocks within the OSPAR Maritime Area has improved in recent years: indeed, in its latest advice ICES considers 3 stocks (North-East Arctic, Celtic and Icelandic cod stocks) as having full reproductive capacity and being harvested sustainably (ICES, 2013 e,g, k).

7. Action to be taken by OSPAR

The conservation objectives for this species should be set by relevant management authorities on the basis of ICES advice and according to the long-term management plan for cod stocks, if applicable, in order to enable in the first place the threatened and/or declining stocks to recover.

All cod stocks, apart from the cod in the Celtic Sea, are already subject to management plans and several, including North Sea cod and Irish Sea cod, have recovery plans in place that focus on reducing fishing mortality.

Action/measures that OSPAR could take, subject to OSPAR agreement

As set out in Article 4 of Annex V of the Convention, OSPAR has agreed that no programme or measure concerning a question relating to the management of fisheries shall be adopted under this Annex. However where the Commission considers that action is desirable in relation to such a question, it shall draw that question to the attention of the authority or international body competent for that question. Where action within the competence of the Commission is desirable to complement or support action by those authorities or bodies, the Commission shall endeavour to cooperate with them.

Scientific advice on the management of this species is available from ICES. “The scientific advice is implemented fully for only some of the stocks”.

It is therefore proposed that OSPAR should encourage relevant Contracting Parties (Range States and those whose flag vessels are engaged in fisheries that capture *Gadus morhua*) to adopt, or support management consistent with ICES advice for the stocks which are on the OSPAR List, to rebuild the cod stocks in the OSPAR Maritime Area to be within safe biological limits and reach reference levels $F \leq F_{MSY}$ and $B > B_{MSY}$ according to the targets of the World Summit on Sustainable Development (WSSD, Johannesburg, 2000), the Marine Strategy Framework Directive and the EU Common Fisheries Policy. Furthermore, OSPAR may, in particular, consider supporting fisheries management measures through the protection of critical habitats for this species and through the promotion of relevant research.

Table 4: Summary of the key priority actions and measures which could be taken for Atlantic cod (<i>Gadus morhua</i>). Where relevant, the OSPAR Commission should draw the need for action in relation to questions of fisheries management to the attention of the competent authorities. Where action within the competence of the Commission is desirable to complement or support action by those authorities or bodies, the Commission shall endeavour to cooperate with them. ³		
Key threats	Too high fisheries mortality (target and bycatch)	
Other responsible authorities	EC and Council of Fisheries Ministers (Common Fisheries Policy, Regulations, TACs) Norway, Iceland, Faroe Islands, Russia NEAFC Contracting Parties OSPAR Contracting Parties ICES	
Relevant measures already taken by contracting parties	Council Regulation (EC) No 1342/2008 of 18 December 2008 establishing a long-term plan for cod stocks and the fisheries exploiting those stocks and repealing Regulation (EC) No 423/2004	Long-term management plan for the recovery of the cod stocks in the (a) Kattegat, (b) North Sea, Skagerrak, eastern Channel, (c) west of Scotland; and (d) Irish Sea, jointly agreed by the EU and Norway and in force since 1 January 2009.
	The Russian – Norwegian Fisheries Commission / Norwegian Government	Agreed harvest control rules for the North-east Arctic cod Rebuilding plan for the Norwegian coastal cod
	Total Allowable Catches and bycatch quotas	TACs have been reduced in several regions and set in line with the provisions of the long-term management plan.
	Fishing effort limitations	Effort is limited for all vessels fishing in the area of the long-term management plan and reduced as fishing mortality for the group of vessels which have the most impact on cod. (EU vessels)
	Catch composition rules and mesh size	EU regulation 850/98 defined mesh size and catch composition in particular for cod. The Norwegian regulation relating to sea-water fisheries of 22 December 2004 with later amendments defined mesh sizes and catch composition rules applicable for all vessels fishing for cod in the Norwegian EEZ. Current mesh size for trawls in the North Sea is 120 mm.
	High-grading ban	A high-grading ban on cod has been introduced in 2009

³ Table 4 on priority actions and measures for Atlantic cod is only referring to the cod stocks identified in the OSPAR List of threatened and/or declining species and habitats; i.e. North Sea, Eastern Channel and Skagerrak cod stock, Kattegat cod stock, Cod west of Scotland, Cod in the Irish Sea, Cod in the Celtic Sea.

		<p>in the North Sea and Eastern Channel and in 2010 in all areas</p> <p>The Norwegian discard ban effectively prohibits high-grading.</p>
	Minimum landing size	<p>EC Regulation 850/98 defined the minimum landing size for cod at 35 cm (30 cm in Kattegat and Skagerrak). In the Norwegian part of the North Sea the minimum size for cod is 40 cm (minimum catching size, an opposite approach compared to the EU minimum landing size which means legal to catch, illegal to land. The minimum size in the Barents Sea is 44 cm.</p>
	Trimestriel management of cod TAC in North Sea and Skagerrak	<p>EC Regulations 23/2010 and 43/2009 introduce obligation of a trimestriel management of cod in the North Sea and Skagerrak. Selective gears have to be used if the targets are surpassed.</p>
	Real time closures (RTC)	<p>RTC are implemented in the North Sea by Norway and the EU, and also in West Scotland by Scottish vessels and others on a voluntary basis.</p> <p>RTCs in the Barents Sea, based on monitoring of the intermixture of juvenile cod, haddock and saithe.</p>
	Marine Protected Areas	<p>Several Contracting Parties have established MPAs; however, these have not been set up specifically for protecting cod against impacts from fisheries but may have positive effects on certain cod stocks.</p> <p>Since 2009, there is a cod protection area within the Kattegat with the purpose to protect and rebuild the depleted Kattegat cod stock.</p> <p>Inside the Norwegian EEZ there are, however, regulatory measures in a number of geographically defined boxes along the coastline prohibiting the use of certain gears during specific time periods of the year, and thus protecting cod and the spawning areas.</p>
Recommended Actions and Measures	OSPAR Commission	<ul style="list-style-type: none"> ▪ Monitor information regarding status of Atlantic cod stocks and corresponding advice from ICES and bring this to the attention of Contracting Parties.
	Contracting Parties	<ul style="list-style-type: none"> ▪ Adopt ICES advice; ▪ Support ICES advice in the Council of Ministers and their national government (for non-EU members) ▪ Identify and, when needed, protect critical habitats (in particular nursery grounds and spawning aggregations) against adverse impacts from fisheries; ▪ Strictly enforce fishery regulations; and

		<ul style="list-style-type: none"> ▪ Support research on: Life history and trend data, discard data and bycatch survival studies; natural mortality rates, trophic interactions, growth parameters and other biological data; spawning grounds; modelling impact of maximum landing sizes upon stock recovery; evaluate impact of real time closures (RTC) on cod recovery and reduction of fishing mortality; and modelling impact of zero catch zones (e.g. MPAs) on stock recovery
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Brief summary of proposed monitoring system (see annex 2)

Fishery-independent surveys are already monitoring this species and landings are recorded, primarily at species level. More information is required on discards.

Annex 1: Overview of data and information provided by Contracting Parties

Contracting Party	Feature occurs in CP's Maritime Area	Contribution made to the assessment (e.g. data or information provided)	National reports References or weblinks
Belgium	Y		
Denmark	Y		
France	Y	Revision of the background document 2013	
Germany	Y	Compilation of Background Document	Eschmeyer, W.N. & Fricke, R. (eds.) 2009; Fricke, R. 1987; Fricke, R. 2007; Fricke, R. (ed.) 2007b; Froese, R. & Pauly, D. 2003; Froese R. & Pauly, D. (eds) 2009
Iceland	Y		
Ireland	Y		
Netherlands	Y	Review of Draft Background Document (by IMARES)	
Norway	Y	Revision of the background document in the written procedure following BDC 2014	
Portugal	N		
Spain	N		
Sweden	Y	Review of Draft Background Document	Knutsen <i>et al.</i> 2003; Svedäng 2003
UK	Y	Review of Draft Background Document (by CEFAS)	

Annex 2: Description of the proposed monitoring and assessment strategy

Rationale for the proposed monitoring

Continued monitoring is essential to provide management advice and to evaluate future trends, including bycatch and stock recovery following cessation of target fisheries.

Use of existing monitoring programmes

Regular fishery independent surveys are undertaken by research vessels and chartered vessels in the OSPAR Maritime Area and landings data are collected at species level.

Synergies with monitoring of other species or habitats

Monitoring of other demersal fish species on the OSPAR List require the same strategy.

Assessment criteria

It is not considered necessary to develop assessment criteria or triggers for additional monitoring of this species at the present time.

Techniques/approaches

As already underway, with the addition of improved discard reporting, discard survival studies in collaboration with industry, and collection of additional biological data.

Selection of monitoring locations

Should include critical areas (e.g. spawning and nursery grounds).

Timing and Frequency of monitoring.

As already underway.

Data collection and reporting

As already undertaken with improvements as required.

Quality assurance

n/a

Annex 3: References

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