MSC SUSTAINABLE FISHERIES CERTIFICATION

Off-Site Expedited Audit - DFPO Denmark North Sea & Skagerrak cod & saithe Fishery

(Cod Component)

December 2018

Certificate Code:	F-ACO-0110
Prepared For:	Danish Fishermen Producer Organisation (DFPO)
Prepared By:	**Acoura Marine**
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Assessment Data Sheet

Fishery name	Cod (*Gadus morhua*); Danish: Torsk	
Species and Stock	North Sea, Skagerrak and Eastern English Channel	
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Contents

1 Introduction

This Expedited P1 Audit of North Sea cod was triggered by the release of ICES Advice on NS cod in June 2018[1] (and as updated in Nov 2018).

1.1 Scope of Expedited Audit

This report outlines the findings of the expedited audit of the P1 cod component of the DFPO Denmark North Sea & Skagerrak cod & saithe fishery. The primary focus of this expedited audit is to assess the latest ICES stock advice for the 3 UoAs, as published by ICES (Nov 2018). The Units of Certification are set out below:

UoC 1

Species:	Cod (*Gadus morhua*); Danish: Torsk
Stock:	North Sea, Skagerrak and Eastern English Channel
Geographical area:	ICES Subarea IV (North Sea) and Division IIIa West (Skagerrak).
Harvest method:	Demersal Trawl[2]
Client Group:	DFPO member vessels fishing for North Sea cod[3]. A register of eligible vessels will be maintained at http://danishmscfisheries.fiskeriforening.dk/danish-msc-eligible-vessels/
Other Eligible Fishers[4]:	Danish and Swedish registered vessels fishing for cod which are not currently members of the DFPO.

UoC 2

Species:	Cod (*Gadus morhua*); Danish: Torsk
Stock:	North Sea, Skagerrak and Eastern English Channel
Geographical area:	ICES Subarea IV (North Sea) and Division IIIa West (Skagerrak)
Harvest method:	Set nets (Trammel net & Gill net)
Client Group:	DFPO member vessels fishing for North Sea cod. A register of eligible vessels will be maintained at http://danishmscfisheries.fiskeriforening.dk/danish-msc-eligible-vessels/
Other Eligible Fishers:	Danish and Swedish registered vessels fishing for cod which are not currently members of the DFPO.

[1]ttps://fisheries.msc.org/en/fisheries/dfpo-denmark-north-sea-skagerrak-cod-saithe/@@assessments

[2] Demersal trawl includes both otter trawl and fly shooting fishing methods (see Saithe report Section 2.3.1 for full description on gear type).

[3] This is to be interpreted in strict accordance with operational practices defined in this report, in particular the DFPO Code of Conduct defined in section 2.2 of the Saithe report. This applies to all UoCs.

[4] Under strict conditions defined within the Certificate Sharing Mechanism for this fishery (Appendix 5 in Saithe report). This applies to all UoCs.

UoC 3

Species:	Cod (*Gadus morhua*); Danish: Torsk
Stock:	North Sea, Skagerrak and Eastern English Channel
Geographical area:	ICES Subarea IV (North Sea) and Division IIIa West (Skagerrak)
Harvest method:	Danish Seine
Client Group:	DFPO member vessels fishing for North Sea cod. A register of eligible vessels will be maintained at http://danishmscfisheries.fiskeriforening.dk/danish-msc-eligible-vessels/
Other Eligible Fishers:	Danish and Swedish registered vessels fishing for cod which are not currently members of the DFPO.

2 Aims of the Surveillance

This expedited audit was called in response to ICES advice for NS cod published in June 2018 and updated thereafter (Nov 2018), and only applies to the Principle 1 cod component of the fishery.

The purpose of this expedited audit is:

- to establish and report on whether or not there have been any material changes to the circumstances and practices affecting the original complying assessment of the fishery following new ICES advice on the UoA cod stock.

Please note: For a complete picture, this report should be read in conjunction with the Public Certification Report for this fishery assessment published in 2016, as well as the annual surveillance audits of 2017 and 2018. These reports can be found here:

https://fisheries.msc.org/en/fisheries/dfpo-denmark-north-sea-skagerrak-cod-saithe/@@assessments

2.1 Certificate Holder Details

Certificate holder: DFPO

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3 Expedited Audit Process

3.1 Findings of the original assessment

As a result of the assessment, a number of conditions of certification were raised by the assessment team, and maintenance of the MSC certificate is contingent on the DFPO Denmark North Sea & Skagerrak cod & saithe fishery moving to comply with these conditions within the time-scales set at the time the certificate was issued. In addition, several recommendations were made which, whilst not obligatory, the client is encouraged to act upon within the spirit of the certification. These conditions have been closed out during the surveillance audit process, apart from:

Cod: Condition 1 PI 1.1.1, stock status of cod (raised at Expedited Assessment 2016)

Table 1 Allocation of weighted Scores at Principle level for Cod

MSC Principle	Fishery Performance		
	Bottom Trawl	Danish Seine	Set Nets
Principle 1: Sustainability of Exploited Stock	81.5 - PASS		
Principle 2: Maintenance of Ecosystem	80.0 - PASS	81.6 - PASS	81 - PASS
Principle 3: Effective Management System	86 - PASS		

Source: Acoura Marine assessment team for P1 (2016), Expedited Assessment for Cod

Principle 1 – Stock Status / Harvest Control Rules			All gear types
1.1.1	Outcome (status)	Stock status	60
1.1.2		Reference Points	80
1.1.3		Stock Rebuilding	75
1.2.1	Management	Harvest Strategy	75
1.2.2		Harvest control rules & tools	90
1.2.3		Information & monitoring	100
1.2.4		Assessment of stock status	100

Principle 2 – Wider Ecosystem Impacts			Trawl	Danish Seine	Set Net
2.1.1	Retained Species	Outcome (status)	80	80	80
2.1.2		Management	90	90	90
2.1.3		Information	90	90	90
2.2.1	Bycatch	Outcome (status)	80	80	80
2.2.2		Management	90	90	90
2.2.3		Information	85	85	85
2.3.1	ETP Species	Outcome (status)	75	75	75
2.3.2		Management	60	60	60

2.3.3		Information	**80**	**80**	**60**
2.4.1	**Habitats**	Outcome (status)	**60**	**80**	**90**
2.4.2		Management	**75**	**80**	**80**
2.4.3		Information	**80**	**80**	**80**
2.5.1	**Ecosystem**	Outcome (status)	**85**	**85**	**85**
2.5.2		Management	**80**	**80**	**80**
2.5.3		Information	**90**	**90**	**90**
Principle 3 – Management / Governance			**All gear types**		
3.1.1	**Governance & Policy**	Legal & customary framework	**95**		
3.1.2		Consultation, roles & responsibilities	**85**		
3.1.3		Long term objectives	**100**		
3.1.4		Incentives for sustainable fishing	**80**		
3.2.1	**Fishery-specific Management System**	Fishery specific objectives	**80**		
3.2.2		Decision making processes	**80**		
3.2.3		Compliance & enforcement	**85**		
3.2.4		Research plan	**80**		
3.2.5		Management performance	**85**		

Source: Acoura Marine assessment team for P1 (2016), Expedited Assessment for Cod

Table 2 Summary of progress on conditions after Surveillance 2017 - Cod

Condition number	Condition	Performance Indicator	Exp Assessment All gears 2016	SA 2017	SA 2018
1	Reduce fishing mortality on cod to achieve Bpa target	PI 1.1.1	60	On target	Closed (Revised score 70 & PI 1.1.3 triggered)
2	Ensure stock rebuilding strategy is effective	PI 1.1.3	75	On target	Closed (revised score 90)
3	Ensure a robust and precautionary harvest strategy	PI 1.2.1	75	On target	Closed (Revised score 85)

3.2 Surveillance Activity

3.2.1 Surveillance team details

Gudrun Gaudian was the team leader and Robin Cook was the Principal 1 assessor.

3.2.2 Date & Location of surveillance audit

This off-site expedited audit was carried out the week commencing 28th September 2018 and concluded after the latest ICES advice was released on November 16th 2018.

3.2.3 Stakeholder consultation & meetings

Stakeholders were informed of the scheduled site visit, its time and location and the proposed audit team on 27th August 2018 via posting on the MSC website and email notification. The site visit was remote and took place on the 1st October 2018. Persons present by phone were Sofie Smedegaard Mathiesen and Robin Cook.

3.2.4 What was inspected

The following was inspected during the audit:

- The ICES advice released on 29th June and 8th August 2018 was discussed with the client;
- and concluded after reviewing the revised version finalized on the 14th November 2018 http://ices.dk/sites/pub/Publication%20Reports/Advice/2018/2018/cod.27.47d20.pdf

3.2.5 Stakeholder Consultation

A total of 40 stakeholder organisations and individuals having relevant interest in the assessment were identified and consulted during this surveillance audit. The interest of others not appearing on this list was solicited through the postings on the MSC website.

https://fisheries.msc.org/en/fisheries/dfpo-denmark-north-sea-skagerrak-cod-saithe/@@assessments

Documents referred to:

See **Appendix 4**.

3.3 Surveillance Standards

3.3.1 MSC Standards, Requirements and Guidance used

This expedited audit was carried out according to the MSC Fisheries Certification Requirements v2.0. The evaluation of this fishery continues under MSC CR v1.3, as per original assessment in 2016.

3.3.2 Confirmation that destructive fishing practices or controversial unilateral exemptions have not been introduced

No destructive fishing practices or controversial unilateral exemptions introduced.

3.3.3 Harmonisation

There are three other overlapping cod fisheries in the MSC programme, Scottish Fisheries Sustainable Accreditation Group (SFSAG) North Sea cod, Norway North Sea demersal and Joint demersal fisheries in the North Sea and adjacent waters. The expedited audit was triggered for the former 3 fisheries noting that the Joint demersal fishery is currently in assessment. Scottish Fisheries Sustainable Accreditation Group (SFSAG) North Sea cod is assessed against V2.0 whilst this fishery is assessed against V1.3. Therefore the outcomes of the expedited audit report was harmonised with DNV-GL in relation to the Norway North Sea demersal fishery.

4 Updated Fishery Background

The only change being examined in this expedited audit is the change to the relevant ICES advice for the UoA stock.

4.1 Changes in the management system

N/A

4.2 Changes in relevant regulations

N/A

4.3 Changes to personnel involved in science, management or industry

N/A

4.4 Changes to scientific base of information including stock assessments

4.4.1 Stock update

Current ICES assessments show stock trends from 1963 onwards although data from the 1960s are available and show very large year classes in 1962 and 1967, a period often referred to as the "gadoid outburst" (Hislop, 1996). Discards have been a significant fraction of the total catch especially when a large year class enters the fishery. For many years fishing mortality was very high but reduced substantially from about 2001 onwards and has been reducing towards F_{MSY} and below F_{lim} since 2010 (Figure 1

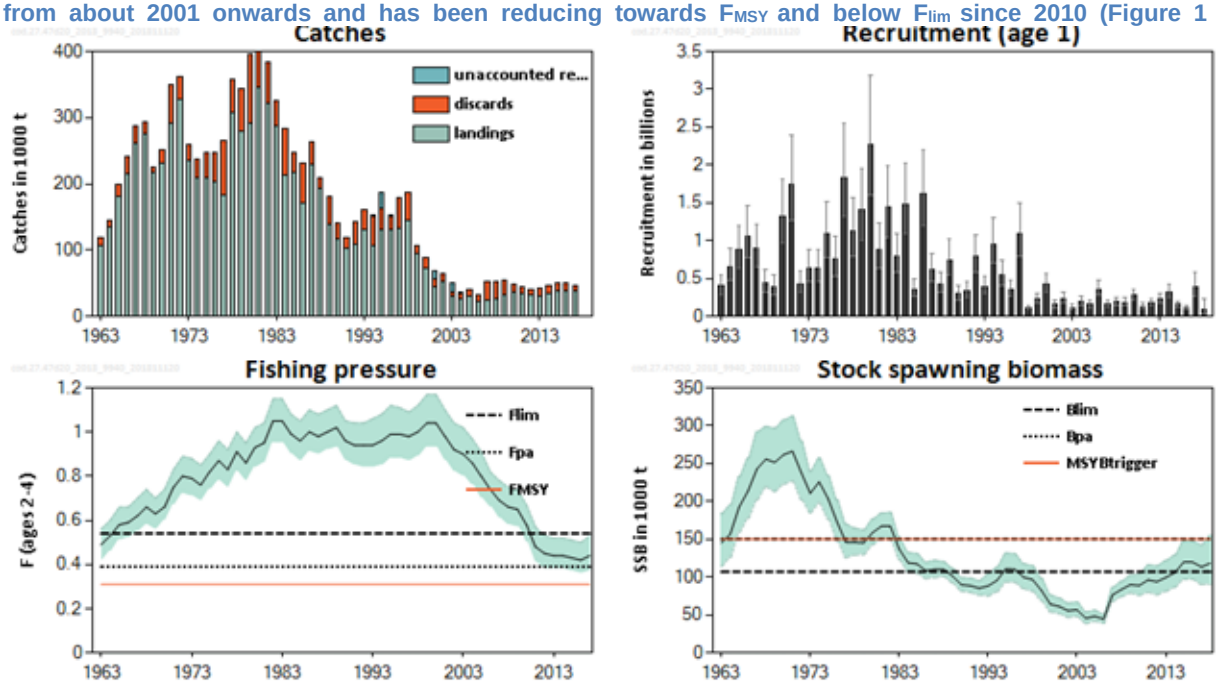

Figure 1). Spawning stock biomass shows recovery from 2005, surpassing B_{lim} in 2013, but appears to have now levelled off below $MSYB_{trigger}$ (Figure 1

Figure 1) (ICES, 2018). Recruitment shows low levels since 1997 but the best recruitment since then was in 2017 (Figure 1).

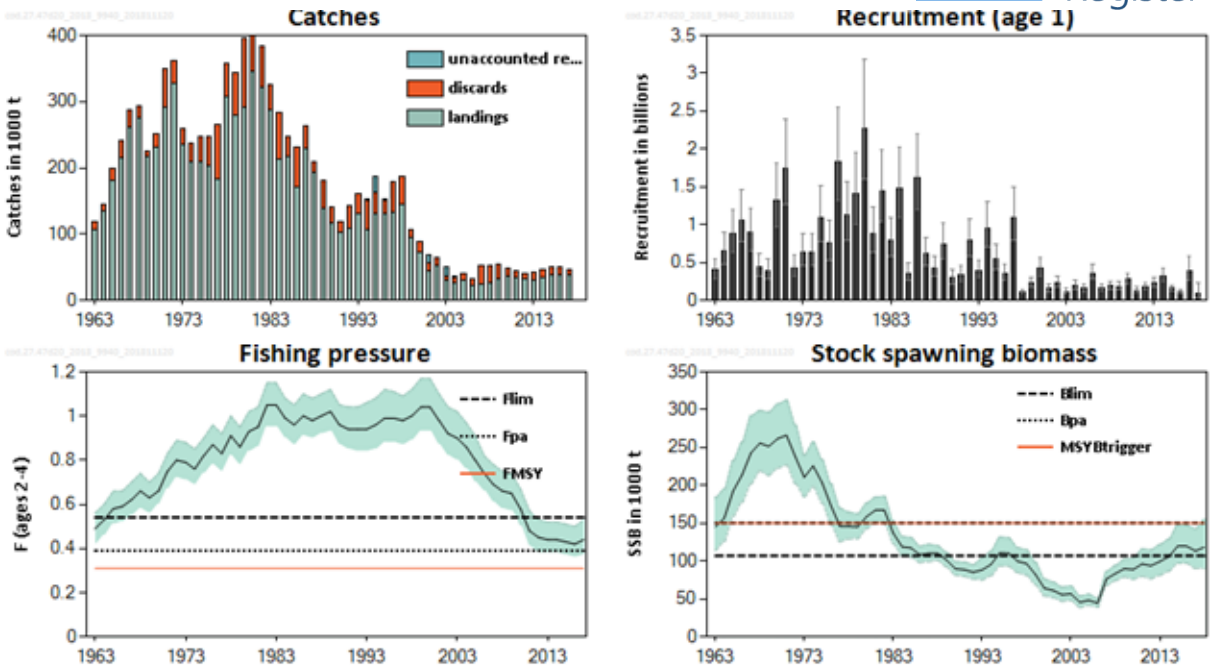

Figure 1. Cod in Subarea 4, Division 7.d, and Subdivision 20 (ICES, 2018).

	Fishing pressure					Stock size				
		2015	2016	2017			2016	2017	2018	
Maximum sustainable yield	F_{MSY}	✗	✗	✗	Above	MSY $B_{trigger}$	✗	✗	✗	Below trigger
Precautionary approach	F_{pa},F_{lim}	o	o	o	Increased risk	B_{pa},B_{lim}	o	o	o	Increased risk
Management plan	F_{MGT}	–	–	–	Not applicable	B_{MGT}	–	–	–	Not applicable

Figure 2. State of the stock and fishery relative to reference points (ICES, 2018).

The historical assessments in the ICES Nov 2018 Advice shows retrospective bias for SSB Fig 3 below)

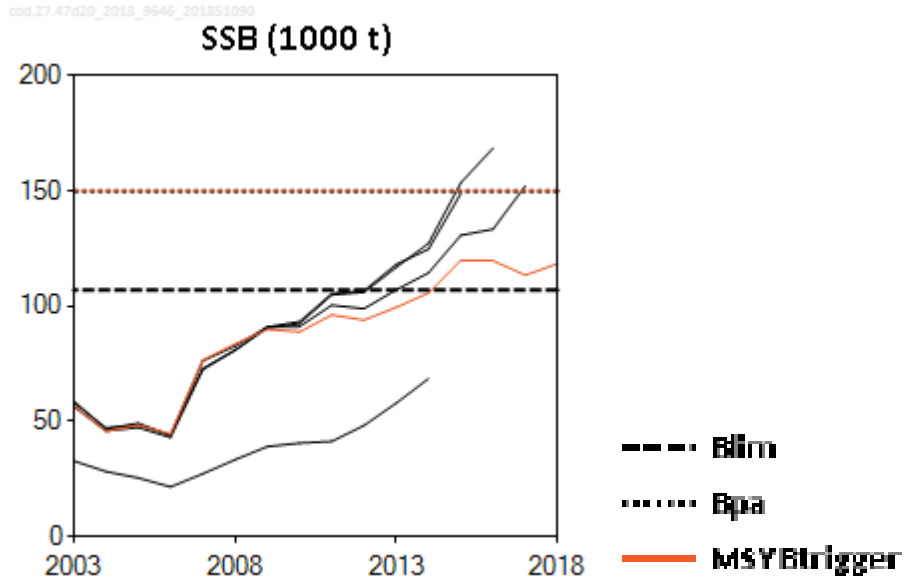

Figure 3. Historical assessment for SSB, final year recruitment included (Source: ICES Advice Nov 2018)

The big upward adjustment in 2014 was due to the switch to the more appropriate SAM software/model. However, subsequently, based on the same model, the state of the stock has retrospectively shown to

be over-optimistic. Thus the actual SSB (red graph line) is closer to Blim than was thought in earlier advice which the assessment team used to make decisions.

Regarding Fishing pressure, the historical assessments in the ICES Nov 2018 Advice also shows retrospective bias, and F is higher than initially shown (Fig.4). The days-at-sea regulation was discontinued in 2017 for regulated gears apart from larger meshed beam trawls (BT2 and BT1), which resulted in an increase of the total effort in fisheries catching cod in 2017.

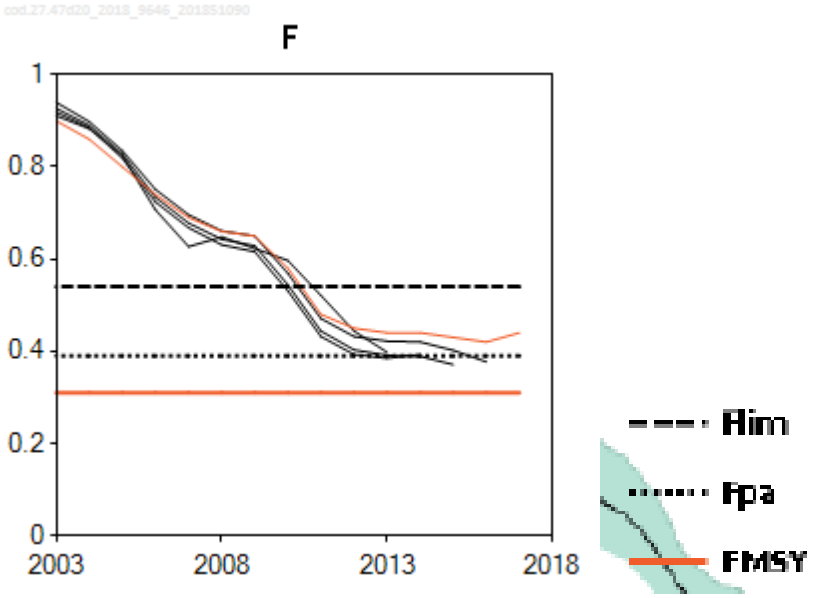

Figure 4. Historical assessment for F, final year recruitment included (Source: ICES Advice Nov 2018)

4.4.2 Reference points

Improved catch data have been provided to ICES since 2012 through sampling programmes such as Fully Documented Fisheries. (FDF), and increased coverage by the Scottish industry/science observer sampling scheme. The benchmark in 2015 introduced annually varying maturity estimates to the assessment. Maturity-at-age was re-estimated in 2017 to produce a time-series of maturity estimates that are consistently calculated over time and corrected for errors. The re-estimated maturities caused a re-scaling of the SSB, to an extent that necessitated the recalculation of reference points. ICES re-evaluated reference points for this stock in 2017 (ICES, 2017b) (Table 3).

Framework	Reference point	Value	Technical basis	Source
MSY approach	MSY $B_{trigger}$	150 000	B_{pa}	
	F_{MSY}	0.31	EQsim analysis based on the recruitment period 1988–2016	ICES (2017)
Precautionary approach	B_{lim}	107 000	SSB associated with the last above-average recruitment (1996 year class)	ICES (2017)
	B_{pa}	150 000	$B_{lim} \times \exp(1.645 \times 0.2) \approx 1.4 \times B_{lim}$	ICES (2017)
	F_{lim}	0.54	EQsim analysis based on the recruitment period 1998–2016	ICES (2017)
	F_{pa}	0.39	$F_{lim} \times \exp(-1.645 \times 0.2) \approx F_{lim} / 1.4$	ICES (2017)
EU–Norway Management Strategy	$SSB_{MS\text{-}lower}$	70 000	Former B_{lim}	EU (2008)
	$SSB_{MS\text{-}upper}$	150 000	Former B_{pa}	
	$F_{MS\text{-}lower}$	0.20	Fishing mortality when SSB < $SSB_{MS\text{-}lower}$	
	$F_{MS\text{-}upper}$	0.40	Fishing mortality when SSB > $SSB_{MS\text{-}upper}$	
Management Plan*	MAP MSY $B_{trigger}$	150 000	MSY $B_{trigger}$	
	MAP B_{lim}	107 000	B_{lim}	
	MAP F_{MSY}	0.31	F_{MSY}	
	MAP range F_{lower}	0.198	Consistent with ranges provided by ICES (2017), resulting in no more than 5% reduction in long-term yield compared with MSY	
	MAP range F_{upper}	0.46	Consistent with ranges provided by ICES (2017), resulting in no more than 5% reduction in long-term yield compared with MSY	

*Proposed EU multiannual plan (MAP) for the North Sea (EU, 2016)

Table 3. ICES reference points for North Sea Cod. (ICES, 2018) **citing** (EU, 2008, 2016; ICES, 2017b).

The most recent ICES assessment for Cod (*Gadus morhua*) in Subarea 4, Division 7.d, and Subdivision 3.a.20 (North Sea, eastern English Channel, Skagerrak) (ICES Advice 14th November 2018) shows a change compared with previous assessments. Fishing mortality (F) has declined since year 2000, but is estimated to be above F_{MSY}. Spawning–stock biomass (SSB) has increased from the historical low in 2006 but is below $MSYB_{trigger}$. There is sustained low recruitment since 1998 (**Error! Reference source not found.**). The main change to the assessment is the result of revisions to the 2013 and 2016 year classes which are estimated to be lower than previously thought based on the 2018 spring survey. As a result, the estimated SSB in 2017 has been revised downward, although the long term upward trend is still evident. Contrary to the 2017 assessment, therefore, the SSB has not yet recovered to the target biomass of 150000t.

Table 4. ICES stock status summary relative to MSY reference points.

	Fishing pressure					Stock size				
		2015	2016	2017			2016	2017	2018	
Maximum sustainable yield	F_{MSY}	⊗	⊗	⊗	Above	MSY $B_{trigger}$	⊗	⊗	⊗	Below trigger
Precautionary approach	F_{pa},F_{lim}	o	o	o	Increased risk	B_{pa},B_{lim}	o	o	o	Increased risk
Management plan	F_{MGT}	–	–	–	Not applicable	B_{MGT}	–	–	–	Not applicable

From 2018, cod has been fully under the EU landing obligation in Subarea 4 and Subdivision 20. The EU landing obligation does not apply to cod in Division 7.d in 2018. BMS (Below Minimum Size) landings of cod reported to ICES are currently much lower than the estimates of catches below MCRS (minimum conservation reference size) estimated by observer programmes.

4.4.3 Conclusion based on ICES Advice Nov 2018

The latest ICES advice on cod, (Nov 2018), clearly shows that F has been greater than Fmsy (an absolute minimum for rebuilding) since 2015, and the stock is still well below the target reference point and has not been rebuilding since 2015. There are a number of factors to consider, which, result in the re-introduction of a condition under stock rebuilding (PI 1.1.3)).

Importantly, management decisions on TACs have been in line with scientific advice, so decisions have been made in good faith, assuming the past estimates were accurate. Indeed, the TACs appear to have been set at lower levels than those corresponding to advice: 68-83% of the maximum catch recommended from the stock assessments 2016-18 (see Table 7 in ICES Advice 2018). Therefore the management system has been working as intended, but the scientific advice has over-estimated the rate of recovery.

Based on the information outlined above, the fishery has been set a time-limited condition, to respond to the new scientific advice, and continue rebuilding the stock within a specified time frame. Given that rebuilding has stalled (i.e. SSB is flat) rather than reversed, it is suggested that a condition on the Rebuilding PI (1.1.3) is closed within 5 years, thus is based strictly on outcome. At the 5 year point, the rebuilding can only be proved by the SSB actually rising to above the trigger point, while FMSY or below is, retrospectively, maintained over a number of years. This outcome is important and if the outcome is not achieved within 5 years, the fishery should be suspended until such time as the stock is determined as above Btrigger.

4.5 Changes and updates on Ecosystem issues

N/A

4.6 Summary of Assessment Conditions

Table 4.6-1 Summary of Assessment Conditions following this Audit

Condition number	Performance indicator (PI)	Status	PI original score (2016)	PI revised score (2018)
1	1.1.1	New at this expedited audit (2018)	70 (1.1.3 triggered)	60
2	1.1.3	New at this expedited audit (2018)	75	70

5 Results

5.1 Condition 1 – New at this expedited audit

Performance Indicator(s) & Score(s)	Insert relevant PI number(s)	Insert relevant scoring issue/ scoring guidepost text	Score
	PI 1.1.1 – Stock status	**a) It is highly likely that the stock is above the point where recruitment would be impaired.**	**60**
Condition	Reduce fishing mortality on cod to achieve Bpa target		
Rationale	Scoring issue a (SG80): It is highly likely that the stock is above the PRI. The 95 % confidence interval for the SSB in 2018 is estimated to be 90,333 – 155,154 tonnes (ICES 2108). Assuming a lognormal distribution, the probability that the current SSB (118,387) exceeds B_{lim} of 107,000 is 0.77 (77 %) which meets SG60. Inspection of the stock-recruitment data for the years ICES uses for MSY calculations (1988 onwards) suggests the lower bound of the current SSB estimate (90,333t) is above biomass values when recruitment is lowest (Figure 3). For this stock B_{lim} is defined on the most recent biomass that produced above average recruitment (in 1996) rather than the point of impaired recruitment. Recent recruitment in this stock has typically been lower than historical values and it is possible that the productivity of the stock has declined in response to environmental change. There is evidence, for example, that recruitment in cod declines with increasing temperature (Cook and Heath, 2005, Beaugrand et al 2003, O'Brien et al 2000). Hence there is some doubt about the current definition of the PRI. Notwithstanding this, the assessment team took the precautionary approach and treated B_{lim} to be a proxy for PRI. On this precautionary basis it cannot be considered that the stock is highly likely to be above B_{lim} (as proxy for PRI) (> 80 % probability) and SG80 is not met. Note: scoring issue b also scored less than 80; however for this scoring issue, PI 1.1.3 was triggered.		
Milestones	Year 1: Evidence that the client is working with ICES, the relevant national authorities, and the EU on identifying measures required to rebuild the stock to a level that is highly likely to be above the PRI. Score: 60 Year 2: Evidence that the measures are being developed. Score 60. Year 3: Evidence that the measures have been implemented and that the stock is rebuilding to a level that is highly likely to be above the PRI. Score 60. Year 4: Evidence that the stock has rebuilt to a level that is highly likely to be above the PRI. Score: 80. NOTE: Year 1 for this condition is 2019.		
Client action plan	Year 2: The client will continue to work with scientists, ICES and the EU and provide evidence that ICES continues to provide precautionary advice within the MSY framework, and that the TAC for 2019 has been agreed in line with the EU/Norway LTMS such that the stock is being rebuilt to a level that is highly likely to be above the PRI. Year 3: The client will provide evidence that the TACs are being set within the EU/Norway framework to the latest advice and show that the stock has started to recover towards MSY Btrigger.		

	Year 4: The client will provide evidence that the stock is rebuilding to a level that is highly likely to be above the PRI. Year 1 of reassessment: The clients will provide evidence that the stock has rebuilt to a level that is highly likely to be above the PRI. Score SG80
Progress on Condition [New]	New at this expedited assessment.
Status of condition	New at this expedited assessment.

5.2 Condition 2 – New- Stock rebuilding

	Insert relevant PI number(s)	Insert relevant scoring issue/ scoring guidepost text	Score
Performance Indicator(s) & Score(s)	**PI 1.1.3 – Stock rebuilding**	a) Where stocks are depleted, strategies are demonstrated to be rebuilding stocks continuously and there is strong evidence that rebuilding will be complete within the specified timeframe. c) There is evidence that they are rebuilding stocks, or it is highly likely based on simulation modelling or previous performance that they will be able to rebuild the stock within a specified timeframe	**60**
Condition	By year [5] of the certificate, SSB has risen above Bpa, while F has remained at or below Fmsy for at least [3] years.		
Rationale	Although fishing mortality has declined in recent years, it remains above FMSY and has not yet reached a level consistent with MSY. Under the EU cod recovery plan, a rebuilding strategy is in place, The management strategy was considered by ICES to switch from the recovery phase to the long-term phase in 2013. Changes to the stock assessment and reference points in 2015 and 2017 imply a need to re-evaluate the management strategy to ascertain if it can still be considered precautionary under the new stock perception.		
Milestones	**By year 5 (2023)** of the certificate SSB has risen to above the trigger point, while FMSY or below is, retrospectively, maintained over a number of years. **Year 1 (2019)**: Evidence that the client is working with relevant parties with the need to re-evaluate the management strategy to ascertain if it can still be considered precautionary under the new stock perception. Score 70 **Year 2 & 3 (2020 - 2021)**: Evidence that rebuilding strategies as an outcome of re-evaluated management strategy are in place. Evidence that management action reduces the fishing mortality towards FMSY. Score 70 **Year 4 (2022):** Evidence that rebuilding strategies are delivering as required by this PI. Score 80 NOTE: Year 1 for this condition is the 4th annual surveillance audit		
Client action plan	Actions set out to meet condition 1 are also applicable to condition 2 and will be evaluated to ensure progress against this condition.		
Progress on Condition [New]	New at this expedited assessment.		
Status of condition	New at this expedited assessment.		

5.3 Recommendations

Recommendation 1:

A recommendation was raised in the prior surveillance audit (March 2018) to analyse the available ETP data, including the data collected in previous years. The ETP data should also be analysed per gear, as for example done for the 2015 surveillance audit, where data was analysed by ETP species per gear as well as ETP species per area.

The progress of this recommendation was not considered at this expedited audit.

6 Conclusion

6.1 Summary of findings

New conditions were raised for PI 1.1.1, and PI 1.1.3; the fishery remains certified. Revised P1 scores and Principal level score for P1 are below:

Prin-ciple	Component	PI No.	Performance Indicator (PI)	Score
One	Outcome	1.1.1	Stock status	60
		1.1.2	Reference points	80
		1.1.3	Stock rebuilding	70
	Management	1.2.1	Harvest strategy	85
		1.2.2	Harvest control rules & tools	80
		1.2.3	Information & monitoring	100
		1.2.4	Assessment of stock status	100

Principle 1 - Target species	80.6

7 References

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Cook, R.M., Heath, M.R., 2005. The implications of warming climate for the management of North Sea demersal fisheries. ICES Journal of Marine Science 62, 1322–1326.

O'Brien, C.M., Fox, C.J., Planque, B., Casey, J., 2000. Climate variability and North Sea cod. Nature 6774, 142

ICES Advice Nov 2018 Cod (*Gadus morhua*) in Subarea 4, Division 7.d, and Subdivision 20 (North Sea, eastern English Channel, Skagerrak

ICES, 2017. Report of the Working Group on the Assessment of Demersal Stocks in the North Sea and Skagerrak (WGNSSK). ICES, 26 April-5 May 2017, Copenhagen, Denmark. ICES CM 2017/ACOM:21

ICES 2015. Report of the Working Group on the Assessment of Demersal Stocks in the North Sea and Skagerrak (WGNSSK), 28 April-7 May, ICES HQ, Copenhagen, Denmark. ICES CM 2015/ACOM:13. 1182 pp.

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ICES 2015. Report of the Benchmark Workshop on North Sea Stocks (WKNSEA), 2–6 February 2015, Copenhagen, Denmark. ICES CM 2015/ACOM:32. 253 pp

ICES 2015. Stock Annex for North Sea cod. http://ices.dk/sites/pub/Publication%20Reports/Expert%20Group%20Report/acom/2015/WGNSSK/cod-347d_SA.pdf.

ICES 2011. WKROUNDMP Report of the Joint ICES-STECF Workshop on management plan evaluations for roundfish stocks (WKROUNDMP/EWG 11-01), 28 February - 4 March 2011, ICES Headquarters, Copenhagen. 67 pp.

ICES 2009. Report of the ICES-STECF Workshop on Fishery Management Plan Development and Evaluation (WKOMSE) ICES CM 2009/ACOM:27

EU 2008. EU COUNCIL REGULATION (EC) No 1342/2008. Establishing a long-term plan for cod stocks and the fisheries exploiting those stocks and repealing Regulation (EC) No 423/2004.

EU 2013. REGULATION (EU) No 1380/2013 OF THE EUROPEAN PARLIAMENT AND OF THE COUNCIL

8 Appendix

Appendix 1 – Re-scoring evaluation tables (if necessary)

PI 1.1.1 Stock Status Evaluation table

PI 1.1.1		**The stock is at a level which maintains high productivity and has a low probability of recruitment overfishing**		
Scoring Issue		SG 60	SG 80	SG 100
a	**Guidepost**	It is likely that the stock is above the point where recruitment would be impaired.	It is highly likely that the stock is above the point where recruitment would be impaired.	There is a high degree of certainty that the stock is above the point where recruitment would be impaired.
	Met?	Y	N	N
	Justification	The 95 % confidence interval for the SSB in 2018 is estimated to be 90,333 – 155,154 tonnes (ICES 2108). Assuming a lognormal distribution, the probability that the current SSB (118,387) exceeds B_{lim} of 107,000 is 0.77 (77 %) which meets SG60. Inspection of the stock-recruitment data for the years ICES uses for MSY calculations (1988 onwards) suggests the lower bound of the current SSB estimate (90,333t) is above biomass values when recruitment is lowest (Figure 3). For this stock B_{lim} is defined on the most recent biomass that produced above average recruitment (in 1996) rather than the point of impaired recruitment. Recent recruitment in this stock has typically been lower than historical values and it is possible that the productivity of the stock has declined in response to environmental change. There is evidence, for example, that recruitment in cod declines with increasing temperature (Cook and Heath, 2005, Beaugrand et al 2003, O'Brien et al 2000). Hence there is some doubt about the current definition of the PRI. Notwithstanding this, the assessment team took the precautionary approach and treated B_{lim} to be a proxy for PRI. On this precautionary basis it cannot be considered that the stock is highly likely to be above B_{Lim} (as proxy for PRI) (> 80 % probability) and SG80 is not met.		

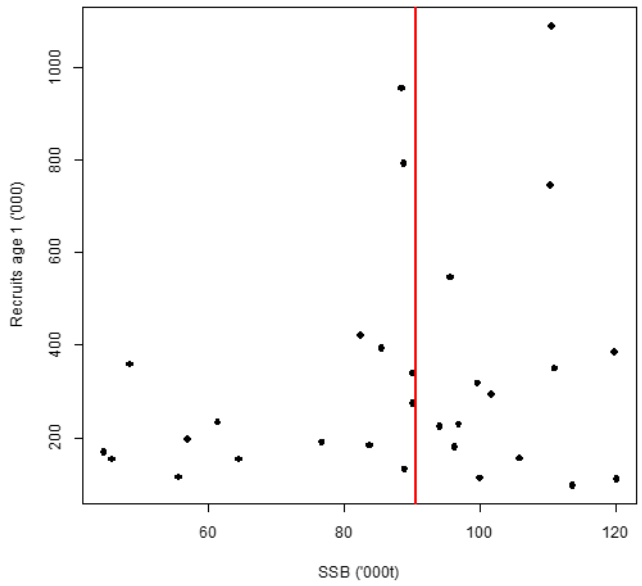

Figure 3. Stock recruitment plot for the period ICES uses for MSY calculations. Red line show the lower 2.5%ile of the 2018 SSB estimate and occurs in a region when high recruitment has occurred.

b	**Guidepost**		The stock is at or fluctuating around its target reference point.	There is a high degree of certainty that the stock has been fluctuating around its target reference point, or has been above its target reference point, over recent years.
	Met?		N	N
	Justificaion	At present the stock is increasing from an historical low value. From the ICES 2018 assessment, the estimate for SSB in 2018 is 118,387 tonnes which is below MSY $B_{trigger}$ (150,000 tonnes). There is only a 4 % chance of the stock being above $MSYB_{trigger}$. The estimate of F in 2018 is 0.44, above the F_{MSY} value (0.31) but within the F_{MSY} range stated by ICES where the upper bound is 0.48 (ICES 2017). Hence the current stock biomass is not at a level consistent with high productivity. As the stock has been below MSY $B_{trigger}$ in the preceding decade, the SG80 level is not satisfied.		
References		Cook, R.M., Heath, M.R., 2005. The implications of warming climate for the management of North Sea demersal fisheries. ICES Journal of Marine Science 62, 1322–1326. Beaugrand, G., Brander, K.M., Lindley, J.A., Souissi, S., Reid, P.C., 2003. Plankton effect on cod recruitment in the North Sea. Nature 426, 661–664 O'Brien, C.M., Fox, C.J., Planque, B., Casey, J., 2000. Climate variability and North Sea cod. Nature 6774, 142 ICES, 2017. Report of the Working Group on the Assessment of Demersal Stocks in the North Sea and Skagerrak (WGNSSK). ICES, 26 April-5 May 2017, Copenhagen, Denmark. ICES CM 2017/ACOM:21. ICES (2018) ICES advice		

Stock Status relative to Reference Points			
	Type of reference point	**Value of reference point**	**Current stock status relative to reference point**

Target reference point	MSY $B_{trigger}$ F_{MSY}	SSB = 150,000 tonnes F_{MSY} = 0.31, F = 0.44	118,387/MSY$B_{trigger}$= 0.79 0.44/F_{MSY} = 1.42
Limit reference point	B_{lim}	B_{lim} = 107,000 tonnes SSB = 118,387	118,387/B_{lim} = 1.11
OVERALL PERFORMANCE INDICATOR SCORE:			**60**
CONDITION NUMBER: PI 1.1.3, stock rebuilding, was triggered			**1**

As neither scoring issue (a) nor scoring issue (b) meet 80, a condition should be applied to scoring issue 1.1.1a, while also triggering PI 1.1.3 for the rebuilding (See interpretation).

PI 1.1.2 Limit and Target reference Points Evaluation Table

PI 1.1.2		Limit and target reference points are appropriate for the stock		
Scoring Issue		SG 60	SG 80	SG 100
a	**Guidepost**	Generic limit and target reference points are based on justifiable and reasonable practice appropriate for the species category.	Reference points are appropriate for the stock and can be estimated.	
	Met?	Y	Y	
	Justification	ICES is committed to working within a precautionary framework and providing advice that is also consistent with MSY. The reference points for cod in IV, IIIaN (Skagerrak) and VIId were reviewed at ICES 2015 (WGNSSK). B_{lim}, B_{PA}, F_{MSY} and MSY $B_{trigger}$ were revised as reported in the previous section [note that F_{lim} and F_{PA} were not reviewed at ICES 2015 (WKNSEA)]. The reference points are therefore appropriate and can be estimated. This satisfies the first scoring element under SG80.		
b	**Guidepost**		The limit reference point is set above the level at which there is an appreciable risk of impairing reproductive capacity.	The limit reference point is set above the level at which there is an appreciable risk of impairing reproductive capacity following consideration of precautionary issues.
	Met?		Y	N
	Justification	The biomass limit reference point B_{lim} is set at B_{lim} = 107,000 t which is the SSB associated with the 1996 year class. The choice for B_{lim} was to take the last SSB to have produced above average recruitment (the 1996 year class). Therefore, it can be argued that SSB values above the 1996 level have the potential to produce high recruitment under sufficiently good environmental conditions (see figure in P1.1.1a). This meets SG80. Recent recruitment has been low despite higher SSB suggesting that environmental effects impair recruitment and amy require a more precautionary approach and hence SG100.		
c	**Guidepost**		The target reference point is such that the stock is maintained at a level consistent with B_{MSY} or some measure or surrogate with similar intent or outcome.	The target reference point is such that the stock is maintained at a level consistent with B_{MSY} or some measure or surrogate with similar intent or outcome, or a higher level, and takes into account relevant precautionary issues such as the ecological role of the stock with a high degree of certainty.
	Met?		Y	N
	Justification	The target reference point (B_{pa}) is a minimum threshold to ensure the stock approaches B_{MSY} and hence SG80 is met. However, to ensure the stock is close to MSY it would need to be shown that the biomass is above this level with high confidence and hence SG100 is not met		

PI 1.1.2		**Limit and target reference points are appropriate for the stock**		
d	**Guidepost**		For key low trophic level stocks, the target reference point takes into account the ecological role of the stock.	
	Met?		Not relevant	
	Justification			
References		ICES 2015. Stock Annex for North Sea cod. http://ices.dk/sites/pub/Publication%20Reports/Expert%20Group%20Report/acom/2015/WGNSSK/cod-347d_SA.pdf. ICES 2015. Report of the Working Group on the Assessment of Demersal Stocks in the North Sea and Skagerrak (WGNSSK), 28 April-7 May, ICES HQ, Copenhagen, Denmark. ICES CM 2015/ACOM:13. 1182 pp. ICES 2015. 6.3.4 Cod (*Gadus morhua*) in Subarea IV and Divisions VIId and IIIa West (North Sea, Eastern English Channel, Skagerrak). http://www.ices.dk/sites/pub/Publication%20Reports/Advice/2015/2015/cod-347d.pdf. ICES 2015. Report of the Benchmark Workshop on North Sea Stocks (WKNSEA), 2–6 February 2015, Copenhagen, Denmark. ICES CM 2015/ACOM:32. 253 pp.	

OVERALL PERFORMANCE INDICATOR SCORE:	**80**
CONDITION NUMBER (if relevant):	

PI 1.1.3 Stock rebuilding Evaluation table (Using MSC CR v1.3) – Triggered as PI 1.1.1b is less than 80

PI 1.1.3		Where the stock is depleted, there is evidence of stock rebuilding within a specified timeframe		
Scoring Issue		SG 60	SG 80	SG 100
a	**Guidepost**	Where stocks are depleted rebuilding strategies, which have a reasonable expectation of success, are in place.		Where stocks are depleted, strategies are demonstrated to be rebuilding stocks continuously and there is strong evidence that rebuilding will be complete within the specified timeframe.
	Met?	Y		N
	Justification	The stock was subject to a recovery plan set out in EU 2008. This aimed to reduce F to 0.4 and achieve a minimum SSB of 150,000 tonnes. The 2017 ICES assessment indicated that rebuilding targets had been achieved with point estimates of SSB = 167,711 tonnes and F = 0.35. As a consequence some of the controls in the recovery plan were abandoned, notably effort controls. However, the 2018 assessment revised the SSB to 118,387 t and F upward to 0.44. The assessment still shows the stock recovering but at a lower rate. SG 100 is not met as there is no strong evidence that the stock will rebuild within the specified timeframe.		
b	**Guidepost**	A rebuilding timeframe is specified for the depleted stock that is the shorter of 30 years or 3 times its generation time. For cases where 3 generations is less than 5 years, the rebuilding timeframe is up to 5 years.	A rebuilding timeframe is specified for the depleted stock that is the shorter of 20 years or 2 times its generation time. For cases where 2 generations is less than 5 years, the rebuilding timeframe is up to 5 years.	The shortest practicable rebuilding timeframe is specified which does not exceed one generation time for the depleted stock.
	Met?	Y	Y	N
	Justification	Short term projections indicate that the stock will continue to recover even at the present level of F. Projections assuming status quo F (0.44) using the 2018 ICES assessment and average recent recruitment estimate the SSB will reach 150,000 t within 7 years which is within the estimated generation time of 8 years (1/0.2+3). As the shortest practicable rebuilding timeframe is not specified, SG 100 is not met.		
c	**Guidepost**	Monitoring is in place to determine whether the rebuilding strategies are effective in rebuilding the stock within a specified timeframe.	There is evidence that they are rebuilding stocks, or it is highly likely based on simulation modelling or previous performance that they will be able to rebuild the stock within a specified timeframe.	
	Met?	Y	N	

PI 1.1.3		**Where the stock is depleted, there is evidence of stock rebuilding within a specified timeframe**
	Justification	Monitoring is in place through regular ICES assessments to determine whether the rebuilding strategies are effective in rebuilding the stock within a specified timeframe – SG60 is met. The most recent ICES assessment indicates that the stock has rebuilt by a factor of 2.7 from the lowest value in 2006. The current stock trajectory however has flattened out and under the current TAC SSB will not reach SSBMSY in 2020 which is above Bpa.
References		EU 2008. EU COUNCIL REGULATION (EC) No 1342/2008. Establishing a long-term plan for cod stocks and the fisheries exploiting those stocks and repealing Regulation (EC) No 423/2004. ICES 2017. ICES Advice 2017.
OVERALL PERFORMANCE INDICATOR SCORE:		**70**
CONDITION NUMBER (if relevant):		**2**

PI 1.2.1 Harvest strategy Evaluation table

PI 1.2.1		There is a robust and precautionary harvest strategy in place		
Scoring Issue		SG 60	SG 80	SG 100
a	**Guidepost**	The harvest strategy is expected to achieve stock management objectives reflected in the target and limit reference points.	The harvest strategy is responsive to the state of the stock and the elements of the harvest strategy work together towards achieving management objectives reflected in the target and limit reference points.	The harvest strategy is responsive to the state of the stock and is designed to achieve stock management objectives reflected in the target and limit reference points.
	Met?	Y	Y	N
	Justification	Until recently the harvest strategy was intended to recover the stock above Bpa. Currently, the strategy is to harvest the stock in a manner consistent with MSY. This is achieved through a variety of management tools that include TACs, minimum mesh size regulations, restrictions on discarding and measures to limit fleet capacity through licensing systems. The EU–Norway management strategy was updated in December 2008. The EU has adopted a long-term plan with the same aims (EU management plan 2008). ICES evaluated the EU–Norway management strategy in 2009 and concluded that it was in accordance with the precautionary approach if implemented and enforced adequately. The strategy responds to stock status by reducing fishing mortality in proportion to the size of the SSB when it falls below Bpa. The management strategy was considered by ICES to switch from the recovery phase to the long-term phase in 2013. Changes to the stock assessment and reference points in 2015 and 2017 imply a need to re-evaluate the management strategy to ascertain if it can still be considered precautionary under the new stock perception. An EU multiannual management plan (MAP) has been proposed for this stock (EC 2016). This plan is not adopted by Norway, thus, not used as the basis of the advice for this shared stock. ICES was requested by the EC to provide advice based on the MSY approach and to include the MAP as a catch option. As there is no agreed management plan between the EU and Norway and the stock is below Bpa, SG100 is not met.		
b	**Guidepost**	The harvest strategy is likely to work based on prior experience or plausible argument.	The harvest strategy may not have been fully tested but evidence exists that it is achieving its objectives.	The performance of the harvest strategy has been fully evaluated and evidence exists to show that it is achieving its objectives including being clearly able to maintain stocks at target levels.
	Met?	Y	Y	N
	Justification	All recent ICES assessments show a long term decline in F and increase SSB since 2006 which suggest the perceived improvement is robust to analytical error and that management measures are effective. The most recent assessment indicates that management targets articulated in the 2008 recovery plan have yet to be reached but that recovery is continuing. This satisfies SG80. The harvest strategy has not been fully evaluated in the light of changes to reference points which means SG100 is not met.		

PI 1.2.1		There is a robust and precautionary harvest strategy in place		
c	Guidepost	Monitoring is in place that is expected to determine whether the harvest strategy is working.		
	Met?	Y		
	Justification	Article 25(2) of the revised Common Fisheries Policy sets out data collection requirements for fishery management purposes. All coastal states submit landings data and the relevant national scientific institutes submit age composition data for landings and discards. ICES also co-ordinates two annual international trawl surveys that cover the whole stock area. Using these data ICES conducts annual stock assessments that provide a basis for assessing the performance of the harvest strategy. ICES considers the data to be reliable. The annual assessment conducted by ICES, the ICES WGNSSK provides the monitoring necessary to determine whether or not the harvest strategy is achieving its objectives. This meets the guideline for SG 60.		
d	Guidepost			The harvest strategy is periodically reviewed and improved as necessary.
	Met?			Y
	Justification	The harvest strategy was fully evaluated by ICES in 2007 and re-evaluated in 2011 jointly by ICES and STECF. The strategy is provisionally accepted as precautionary for cod. This meets the third guideline for SG100.		
e	Guidepost	It is likely that shark finning is not taking place.	It is highly likely that shark finning is not taking place.	There is a high degree of certainty that shark finning is not taking place.
	Met?	Not relevant	Not relevant	Not relevant
	Justification			
References		EU 2013. REGULATION (EU) No 1380/2013 OF THE EUROPEAN PARLIAMENT AND OF THE COUNCIL ICES 2009. Report of the ICES-STECF Workshop on Fishery Management Plan Development and Evaluation (WKOMSE) ICES CM 2009/ACOM:27		

PI 1.2.1	There is a robust and precautionary harvest strategy in place	
	ICES 2011. Report of the Joint ICES-STECF Workshop on management plan evaluations for roundfish stocks (WKROUNDMP/EWG 11-01), 28 February - 4 March 2011, ICES Headquarters, Copenhagen. 67 pp. ICES 2015. Report of the Working Group on the Assessment of Demersal Stocks in the North Sea and Skagerrak (WGNSSK). ICES CM 2015/ACOM:13 ICES 2107. ICES Advice 2017	
OVERALL PERFORMANCE INDICATOR SCORE:		**85**
CONDITION NUMBER (if relevant):		

PI 1.2.2 HCR – rules and tools Evaluation table

PI 1.2.2		There are well defined and effective harvest control rules in place		
Scoring Issue		SG 60	SG 80	SG 100
a	**Guidepost**	Generally understood harvest rules are in place that are consistent with the harvest strategy and which act to reduce the exploitation rate as limit reference points are approached.	Well defined harvest control rules are in place that are consistent with the harvest strategy and ensure that the exploitation rate is reduced as limit reference points are approached.	
	Met?	Y	Y	
	Justification	The current HCR used by ICES for advice is well-defined. When the biomass falls below B_{pa} the fishing mortality is reduced in proportion to the biomass. The HCR has been evaluated by ICES and is considered to be consistent with the precautionary approach. Recent ICES assessments show recovery toward the desired minimum biomass when applying the rule. This meets SG80.		
b	**Guidepost**		The selection of the harvest control rules takes into account the main uncertainties.	The design of the harvest control rules takes into account a wide range of uncertainties.
	Met?		Y	N
	Justification	HCRs have been evaluated considering uncertainties in the observations, stock assessments and implementation error and are likely to be robust hence SG80 is met. Wider uncertainties such as environmental changes and the ecological role of the stock are not considered in these evaluations and hence SG100 is not met.		
c	**Guidepost**	There is some evidence that tools used to implement harvest control rules are appropriate and effective in controlling exploitation.	Available evidence indicates that the tools in use are appropriate and effective in achieving the exploitation levels required under the harvest control rules.	Evidence clearly shows that the tools in use are effective in achieving the exploitation levels required under the harvest control rules.
	Met?	Y	Y	N

PI 1.2.2		There are well defined and effective harvest control rules in place
	Justification	The two main tools for implementing the HCR are Total Allowable Catches (TACs) and effort control measures. These are set according to ICES advice based on annual assessments. Fishing mortality as estimated from ICES assessments, e.g. ICES (2017), shows continuous decline to the target fishing mortality which suggests these measures contribute to controlling exploitation. In many countries decommissioning schemes have also reduced fleet size and are likely to be an important factor in reducing exploitation rates. F has not fallen as sharply or as decisively as might have been expected from the level of effort reduction, however. In the absence of a stronger recovery, this is considered to meet SG80 but not at SG100.
References		ICES, 2017. Report of the Working Group on the Assessment of Demersal Stocks in the North Sea and Skagerrak (WGNSSK). ICES, 26 April-5 May 2017, Copenhagen, Denmark. ICES CM 2017/ACOM:21.
OVERALL PERFORMANCE INDICATOR SCORE:		**80**
CONDITION NUMBER (if relevant):		

PI 1.2.3 Information to support harvest strategy Evaluation table

PI 1.2.3		Relevant information is collected to support the harvest strategy		
Scoring Issue		SG 60	SG 80	SG 100
a	**Guidepost**	Some relevant information related to stock structure, stock productivity and fleet composition is available to support the harvest strategy.	Sufficient relevant information related to stock structure, stock productivity, fleet composition and other data is available to support the harvest strategy.	A comprehensive range of information (on stock structure, stock productivity, fleet composition, stock abundance, fishery removals and other information such as environmental information), including some that may not be directly related to the current harvest strategy, is available.
	Met?	Y	Y	Y
	Justification	The stock structure of North Sea cod has been well established over a long period of time. Based upon a comprehensive review (ICES, 2015 - WKNSEA) a good understanding of the interaction of North Sea and Skagerrak cod has been developed. The information on stock structure is considered comprehensive. Stock abundance is monitored through two surveys in the North Sea. These standardized surveys have been sampling the populations since the mid-1980s, presenting over two cod generations. There is comprehensive information on fleet composition (e.g. vessel and gear characteristics) available from national fishery authorities. There is good information on fishery removals including landings, and sampling of landings. In the past, there have been issues with discard monitoring and analysis but these appear to have been resolved with information on discards is considered good. This information is considered sufficient to support the harvest strategy. Regarding other data, the region is well described oceanographically being the focus of a number of ecosystem level studies. Information is overall sufficient to support the harvest strategy, and is considered comprehensive. This meets the first guideline at SG100		
b	**Guidepost**	Stock abundance and fishery removals are monitored and at least one indicator is available and monitored with sufficient frequency to support the harvest control rule.	Stock abundance and fishery removals are regularly monitored at a level of accuracy and coverage consistent with the harvest control rule, and one or more indicators are available and monitored with sufficient frequency to support the harvest control rule.	All information required by the harvest control rule is monitored with high frequency and a high degree of certainty, and there is a good understanding of inherent uncertainties in the information [data] and the robustness of assessment and management to this uncertainty.
	Met?	Y	Y	Y
	Justification	Long time series of biological data have been collected on a quarterly basis enabling trends in catch and stock weights to be assessed. Estimate of stock abundance are regularly monitored by research vessel surveys. The surveys cover the main area of distribution. Uncertainties in the data have been investigated through Benchmark assessments, including most recently in 2015 when all input data to the assessment is reviewed and tested together with a range of alternative assessment models. This meets the second requirement at SG100.		

PI 1.2.3		**Relevant information is collected to support the harvest strategy**		
c	**Guidepost**		There is good information on all other fishery removals from the stock.	
	Met?		Y	
	Justification	All information required to support the assessment and the harvest control rules are monitored frequently and with a high degree of certainty. There is an extensive programme of market sampling of the landings which provides estimates of age composition by sex and quarter. Information on catch and discarding is collected from observer trips and self-sampling from commercial vessel. The overall reporting of catch data provided to ICES has improved during 2012–2014 through such aspects as the fully documented fisheries (FDF) programme and increased coverage by the Scottish industry/science observer sampling scheme. Unaccounted removals are no longer estimated for 2006 onwards.		
References		ICES 2011. WKROUNDMP Report of the Joint ICES-STECF Workshop on management plan evaluations for roundfish stocks (WKROUNDMP/EWG 11-01), 28 February - 4 March 2011, ICES Headquarters, Copenhagen. 67 pp. ICES 2015. Stock Annex for North Sea cod. http://ices.dk/sites/pub/Publication%20Reports/Expert%20Group%20Report/acom/2015/WGNSSK/cod-347d_SA.pdf. ICES 2015. Report of the Working Group on the Assessment of Demersal Stocks in the North Sea and Skagerrak (WGNSSK), 28 April-7 May, ICES HQ, Copenhagen, Denmark. ICES CM 2015/ACOM:13. 1182 pp. ICES 2015. 6.3.4 Cod (*Gadus morhua*) in Subarea IV and Divisions VIId and IIIa West (North Sea, Eastern English Channel, Skagerrak). http://www.ices.dk/sites/pub/Publication%20Reports/Advice/2015/2015/cod-347d.pdf. ICES 2015. Report of the Benchmark Workshop on North Sea Stocks (WKNSEA), 2–6 February 2015, Copenhagen, Denmark. ICES CM 2015/ACOM:32. 253 pp.		
OVERALL PERFORMANCE INDICATOR SCORE:				**100**
CONDITION NUMBER (if relevant):				

PI 1.2.4 Assessment of stock status Evaluation table

PI 1.2.4		There is an adequate assessment of the stock status		
Scoring Issue		SG 60	SG 80	SG 100
a	**Guidepost**		The assessment is appropriate for the stock and for the harvest control rule.	The assessment is appropriate for the stock and for the harvest control rule and takes into account the major features relevant to the biology of the species and the nature of the fishery.
	Met?		Y	Y
	Justification	The assessment model used for this stock is based on state–space model SAM (Nielsen and Berg, 2014), using catch at age matrix calibrated with two fisheries independent survey indices. SAM offers a flexible way of describing the entire system, with relative few model parameters. It allows for objective estimation of important variance parameters, leaving out the need for subjective ad hoc adjustment numbers, which is desirable when managing natural resources.. The assessment has been thoroughly tested over the years and in 2015, a benchmark assessment was carried out (ICES 2015 - WKNSEA). This provides the WG with an opportunity to review and test the input data and models used. In addition to the standard model used in the assessment a number of alternative models which allow for uncertainties in the input data were tested (a4a). The results from all the models were generally similar. This meets the requirements of the first guideline at SG100.		
b	**Guidepost**	The assessment estimates stock status relative to reference points.		
	Met?	Y		
	Justification	Biological reference points have been calculated on the basis of the SAM final assessment presented ICES 2015 - WGNSSK. The assessment estimates spawning stock biomass and fishing mortality on an annual basis and these estimates are directly comparable against the reference points. This meets the requirements of the first guideline at SG60.		
c	**Guidepost**	The assessment identifies major sources of uncertainty.	The assessment takes uncertainty into account.	The assessment takes into account uncertainty and is evaluating stock status relative to reference points in a probabilistic way.
	Met?	Y	Y	Y

PI 1.2.4		There is an adequate assessment of the stock status		
	Justification	SAM is considered more appropriate than VPA approaches such as B-Adapt, because the additional variability/uncertainty considered in various components of SAM seems realistic and gives rise to results that are less reactive to noise in the catch or survey data or to potential changes in survey catchability. The fact that SAM considers random variability of the annual survival process along cohorts produces smoother estimated F paths over time. Because the current management regime for the North Sea cod stock is strongly focused on F estimates in the final assessment year, it is important that these estimates do not change too suddenly in response to some data values which may represent noise. Additionally, SAM utilizes the age structure of the observed catch even in years when the overall catch value is considered biased. SAM was considered by recent benchmarks of North Sea cod (ICES 2011; ICES 2015- WKNSEA) to be the most appropriate modelling approach for the stock assessment. This meets the requirements of the first guideline at SG100.		
d	Guidepost			The assessment has been tested and shown to be robust. Alternative hypotheses and assessment approaches have been rigorously explored.
	Met?			Y
	Justification	The assessment is tested through a benchmark procedure where all input data and relevant assumptions are reviewed and some alternative assessment approaches such as the a4a model. Comparisons between a4a and the SAM model have been carried out during ICES 2015 - WGSSK. This meets the requirements of the first guideline at SG100.		
e	Guidepost		The assessment of stock status is subject to peer review.	The assessment has been internally and externally peer reviewed.
	Met?		Y	Y
	Justification	The assessment is internally peer reviewed by an internal audit within the WGNSSK group itself and by the ICES Advisory Committee (ACOM). It is also peer reviewed for the EU by the Scientific, Technical and Economic Committee (STECF). This meets the SG 80. Regular benchmark assessments are carried out in which key assumptions, input data and models used in the assessment are tested and reviewed by working group members and external peer reviewers.		
References		ICES 2015. Stock Annex for North Sea cod. http://ices.dk/sites/pub/Publication%20Reports/Expert%20Group%20Report/acom/2015/WGNSSK/cod-347d_SA.pdf. ICES 2015. Report of the Working Group on the Assessment of Demersal Stocks in the North Sea and Skagerrak (WGNSSK), 28 April-7 May, ICES HQ, Copenhagen, Denmark. ICES CM 2015/ACOM:13. 1182 pp. ICES 2015. 6.3.4 Cod (*Gadus morhua*) in Subarea IV and Divisions VIId and IIIa West (North Sea, Eastern English Channel, Skagerrak). http://www.ices.dk/sites/pub/Publication%20Reports/Advice/2015/2015/cod-347d.pdf.		

PI 1.2.4	**There is an adequate assessment of the stock status**
	ICES 2015. Report of the Benchmark Workshop on North Sea Stocks (WKNSEA), 2–6 February 2015, Copenhagen, Denmark. ICES CM 2015/ACOM:32. 253 pp.
OVERALL PERFORMANCE INDICATOR SCORE:	**100**
CONDITION NUMBER (if relevant):	

Appendix 2 - Stakeholder submissions (if any)

None received.

Appendix 3 - Surveillance audit information (if necessary)

N/A

Appendix 4 - Additional detail on conditions/ actions/ results (if necessary)

N/A

Appendix 5 - Revised Surveillance Program (if necessary)

Table 5.1 : Surveillance level rationale

Year	Surveillance activity	Number of auditors	Rationale
4	*Off site*	*P1 Auditor to assess milestones and stock info*	*From client action plan it can be deduced that information needed to verify progress towards conditions 1.1.1, an 1.1.3 can be provided remotely in year 4. This will be yr 1 for both conditions –as the conditions are new in yr3. (2018)*

Table 5.2: Timing of surveillance audit

Year	Anniversary date of certificate	Proposed date of surveillance audit	Rationale
4, 2019	*Feb 2019*	*June 2019*	*Scientific advice to be released in June 2019, proposal to postpone audit to include findings of scientific advice.*

Table 5.3: Fishery Surveillance Program Revised

Surveillance Level	Year 1	Year 2	Year 3	Year 4
Level 1	*Review of Information*	*Off site*	*Review of information*	*On-site surveillance audit & re-certification site visit.*