Marine Stewardship Council (MSC) Reduced Re-Assessment Public Comment Draft Report

Scottish Fisheries Sustainable Accreditation Group (SFSAG) North Sea haddock

On behalf of SFSAG

Prepared by ME Certification Ltd

FEBRUARY 2016

Authors: **Dr Joanna Gascoigne**
Dr Sophie des Clers
Mr Robert O'Boyle

ME Certification Ltd
56 High Street, Lymington
Hampshire, SO41 9AH
United Kingdom
Tel: 01590 613007
Fax: 01590 671573
E-mail: info@me-cert.com
Website: www.me-cert.com

Contents

Glossary

Term / acronym	Definition
ACOM	ICES Advisory Committee
CCQS	Cod Catch Quota Scheme
CFP	Common Fisheries Policy
CR 1.3	Certification Requirements v1.3 (MSC Scheme Document)
CRP	Cod Recovery Plan
CV	Coefficient of Variation
DCF	Data Collection Framework
DEFRA	Department for Environment, Food & Rural Affairs
DFPO	Danish Fisheries Producer Organisation
EMFF	European Maritime and Fisheries Fund
ETP	Endangered, Threatened and Protected (species)
F	Fishing mortality
FAM	Fishery Assessment Methodology
FCR	Fishery Certification Requirements (MSC Scheme Document)
FISA	Fishing Industry Science Alliance
FMAC	Fisheries Management and Conservation Group
FU	Functional Unit (*Nephrops*)
GES	Good Environmental Status
HCR	Harvest Control Rule(s)
IBTS	International Beam Trawl Survey
ICES	The International Council for the Exploration of the Sea
LTMP	Long-Term Management Plan
MCS	Monitoring Control and Surveillance
MCZ	Marine Conservation Zones
MEC	ME Certification Ltd
MLS	Minimum Landing Size
MS	Member State(s) (EU)
MSE	Management Strategy Evaluation
MSFD	Marine Strategy Framework Directive
MSS	Marine Scotland Science
MSY	Maximum Sustainable Yield
NCMPAs	Nature Conservation Marine Protected Areas
NSAC	North Sea Advisory Council
NWWAC	North Western Waters Advisory Council
OSPAR	Oslo-Paris Convention
PA	Precautionary approach
PETS	Protected, Endangered and Threatened (species)
PCDR	Public Comment Draft Report
PCR	Public Certification Report
PI	Performance Indicator
RBF	Risk Based Framework
RFMO	Regional fisheries management organisation

RP	Reference point
SAC	Special Area of Conservation
SCCS	Scottish Conservation Credits Scheme
SFF	Scottish Fishermen's Federation
SFPA	Scottish Fisheries Protection Agency
SFSAG	Scottish Fisheries Sustainable Accreditation Group
SI	Scoring Issue
SIDI	Scottish Industry Discard Initiative
SPA	Special Protected Area
SSB	Spawning Stock Biomass
SSIs	Scottish Statutory Instruments
STEFC	Scientific, Technical and Economic Committee for Fisheries
TAC	Total Allowable Catch
TSA	Time Series Analysis
UNCLOS	UN Convention on the Law of the Sea
UNFSA	UN Fish Stock Agreement
UoA	Unit of Assessment
VMS	Vessel Monitoring System
WGNSSK	ICES Working Group on the Assessment of Demersal Stocks in the North Sea and Skagerrak
WSSD	World Summit for Sustainable Development
XSA	eXtended Survivor Analysis

1. Authorship and Peer Reviewers

The assessment team for this reduced reassessment were:

Robert O'Boyle: Robert O'Boyle received his B.Sc. and M.Sc. from McGill and Guelph Universities in 1972 and 1975 respectively. He was with Canada's Department of Fisheries and Oceans (DFO) at the Bedford Institute of Oceanography (BIO) in Dartmouth, Nova Scotia during 1977 - 2007. During this time, he conducted assessments of the Maritime and Gulf region's fish resources (e.g. herring, capelin, cod, haddock, pollock, flatfishes, sharks). He headed the Marine Fish Division, with responsibility for the finfish research programmes and assessment-related activities of over 80 scientific and support staff. He also coordinated the peer review of scientific advice on fisheries resources and ocean uses and was Associate Director of Science, as such being extensively involved in science programme management at the regional and national level. He has been involved in a number of national and international reviews, ranging from science programme design to resource assessment. He is currently president of Beta Scientific Consulting Inc. (betasci.ca) which provides a variety of services on ocean resource management including technical review and coordination, analyses and assessment. As such, he is proficient in the latest tools of fishery stock assessment and analysis (e.g. R, J, TMB, ADMB and Winbugs). Projects have included analyses and assessments of forage species (Gulf of Mexico and Atlantic Coast Menhaden), deepwater species (Scotian Shelf Cusk) and endangered species (Atlantic Leatherback Turtles). He has been or is currently the principle one or two expert of a number of MSC certifications (e.g. BC Dogfish, Chilean Hake, Nova Scotia, US and Australian Swordfish, Barents Sea Cod, Haddock, and Saithe, North Sea Haddock, Danish Plaice, Deepwater Black Scabbardfish, Blue Ling, and Roundnose Grenadier, Russian Pollack and US West Coast groundfish) and has been peer reviewer on a number of MSC assessments. He has been the chair and / or reviewer of DFO, NMFS and ASMFC stock assessments (e.g. GARM III, SEDAR 18, SARC 50, SARC 54, SARC 55, River Herring/Eel), and has prepared special reports on ocean management issues for government, industry and NGO groups. He has been a member of the Scientific and Statistical Committee of the New England Fisheries Management Council since 2008. He pursues research projects related to resource and ocean management and assessment. Recent projects include the impact of climate change on New England groundfish assessments, the trophic dynamics of the Eastern Scotian Shelf ecosystem, the impact of fish migrations of assessed fishery selectivity patterns, risk analysis in data poor assessments and the interaction of cod and grey seals in the Northwest Atlantic. During this full assessment, he had responsibility for Principle 1.

Dr Jo Gascoigne (Team Leader): Dr Gascoigne is a former research lecturer in marine biology at Bangor University, Wales. She is a fully qualified MSC Team Leader with expertise in the assessment of all MSC Principles. She has been involved as expert and lead auditor in all of MEC's previous MSC assessments and numerous pre-assessments. For this assessment, Dr. Gascoigne was responsible for Principle 2.

Dr Sophie des Clers: Dr des Clers is an independent consultant, specialising in economic and social aspects of fisheries management. She has collaborated to numerous MSC assessments since 2008. Sophie is an expert in fisheries public policy, management systems and legislation at international, regional and national levels, with particular focus on the EU. During this full assessment she was in charge of Principle 3.

The Peer Reviewer for this assessment was:

Dr Massimilano Cardinale: Dr Massimiliano Cardinale has a Biological Science degree from 'La Sapienza' University in Rome and completed his Doctoral thesis at Göteborg University in Sweden in 2001. He has over 20 years' experience working in the fisheries sector, including participation as a scientist on a number of trawl surveys relating to the recruitment and discarding of cod and researcher on stock assessment and modelling of fisheries data. To date, Max has been involved in almost 10 MSC assessments as an assessor and peer reviewer and these include the Astrid Fiske North Sea herring fishery and Polish Eastern Baltic cod fishery. Max now has a permanent position as a researcher at the Swedish University where his work includes stock assessment, statistical analysis and modelling of fisheries data. Since 2000, Max has undertaken a number of job roles involving stock assessment. These have included a researcher for the Institute of Marine Research For the Swedish National Board of Fisheries, the responsibility of stock assessment and resources management in the Java Sea under the Swedish Internal Development Cooperation Agency (SIDA) and the responsibility of a collaboration programme, funded by SIDA, for 'Stock assessment to be implemented into management of artisanal fishery'. In addition to this, he has also attended an ICES Advanced Course in stock assessment at ICES for stock assessment coordinators.

The Risk Based Framework (RBF) was not used for this reduced reassessment.

2. Changes since Initial Assessment

2.1 Overview

2.1.1 Scope and Unit of Assessment

This fishery remains in conformity with the MSC scope requirements (FCR 7.4):

- The fishery does not target amphibians, birds, reptiles or mammals;
- The fishery does not use poisons or explosives;
- The fishery does not operate under a controversial unilateral exemption to an international agreement;
- SFSAG does not include an entity that has been successfully prosecuted for a forced labour violation in the last 2 years;
- The fishery management framework includes a mechanism for resolving disputes and the fishery is not overwhelmed by disputes.

The fishery is not an enhanced fishery as per the MSC FCR 7.4.3

The fishery is not an Introduced Species Based Fishery as per the MSC FCR 7.4.4.

There have been no changes to the Unit of Assessment (UoA) (Table 1), which remains as originally announced in 2008.

An updated vessel list is given in Appendix 6 of this report.

Table 1. Unit of Assessment for the fishery under re-assessment

Species and stock	Haddock (*Melanogrammus aeglefinus*) in ICES Subarea IV and Divisions IIIa West and VIa (North Sea, Skagerrak, and West of Scotland)
Geographical range	North Sea (ICES Divisions IVa & IVb)
Method of capture	Single *Nephrops* (TR2) trawl Twin *Nephrops* (TR2) trawl Demersal TR1 trawl Twin demersal TR1 trawl Danish seine (TR1) Pair seine–trawl (TR1)
Management System/s	**Legal:** EC Common Fisheries Policy; EU-Norway Agreement; National legislation **Enforcement:** Scottish Fisheries Protection Agency; Royal Navy; Norwegian Authorities **Science:** Marine Scotland Science/ ICES
Client group	Scottish Fisheries Sustainable Accreditation Group (SFSAG) Ltd member

	vessels targeting North Sea, Skagerrak, and West of Scotland haddock (*Melanogrammus aeglefinus)* in ICES Divisions IVa and IVb with single *Nephrops* trawl, twin *Nephrops* trawl, demersal trawl, twin demersal trawl, Danish seine and pair seine–trawl

2.1.2 Criteria for reduced re-assessment

According to the Certification Requirements (version 2.0, paragraph 7.24.6), a fishery is eligible for reduced re-assessment if:

- The fishery was covered under the previous certification or scope extension;
- The fishery had no conditions remaining after the 3rd surveillance audit, and;
- The CAB confirms that all standard-related stakeholder comments have been addressed by the 3rd surveillance audit.

The fishery was covered under the previous assessment in its entirety, since there have been no changes to the UoA (see https://www.msc.org/track-a-fishery/fisheries-in-the-program/certified/north-east-atlantic/SFSAG-north-sea-haddock-fishery/assessment-downloads).

The fishery was certified with three conditions, which were closed at the first or second surveillance audits (Table 2).

Table 2. Conditions on the first assessment of this fishery, and their outcomes.

Condition	PI	Requirement	Year closed
1	2.1.2	Mitigation measures to reduce bycatch	Year 2 audit
2	2.1.3	Recording total catch of retained species	Year 1 audit
3	2.2.2	Mitigation measures to reduce discarding	Year 2 audit

As a result of harmonisation, the fishery received a new condition in Year 4, with an action plan that carries over into the new certification period (assuming re-assessment is successful). MEC requested a variation to continue with a reduced re-assessment, and this was accepted by MSC[1].

One written stakeholder comment on the Public Comment Draft Report (PCDR) was received. MSC Technical Oversights were also received. These are both dealt with in the Public Certification Report (PCR). The score for PI1.1.2 was reduced as a result of these comments.

No comments were received on audit reports for Years 1-3. For Year 4, a written comment was received from Marine Scotland, comprising a compliance report for the fishery. One issue was raised but it was not standard-related; it was reviewed with the client by the audit

[1] See https://www.msc.org/track-a-fishery/fisheries-in-the-program/certified/north-east-atlantic/SFSAG-north-sea-haddock-fishery/re-assessment-downloads/20150408_VAR_RES_HAD539.pdf

team and is dealt with in the report. In other words, the re-assessment team is confident that there are no standard-related stakeholder comments outstanding, nor have there been since the fishery was first certified.

2.1.3 Harmonisation

Two previous MSC assessments have been conducted on North Sea haddock (Table 3). A comparison of the Principle 1 scores of the North Sea haddock assessments with the current assessment is given in Table 4. Note that these scores are as of the most recent surveillance audit, the date of which is indicated. Scores noted as, say `90 to 75`, indicates that the initial score of 90 in the PCR was subsequently changed during surveillance audits to 75. As a consequence of the DFPO 2nd surveillance audit (July 2014), the score of PI 1.2.2 was reduced from 80 to 75. Therefore, during its 4th surveillance audit (December 2014), the SFSAG fishery's score on this PI was also reduced from 90 to 75. Comment on the difference in the scores of the current assessment is provided below.

Table 3. Previous assessments of North Sea Haddock

Fishery	Certification body	PCR release date	MSC standard	Reference
SFSAG North Sea Haddock Trawl & Danish Seine	Intertek (IFC)	25th October 2010	FAM 2.0	IFC (2010)
DFPO North Sea & Skaggerak Haddock	Food Certification International (FCI)	7th August 2012	CR 1.3	FCI (2012)

Table 4. Comparison of Principle 1 scores of previous MSC assessments of North Sea Haddock with those of current assessment

Fishery	Date of scores	1.1.1	1.1.2	1.1.3	1.2.1	1.2.2	1.2.3	1.2.4	Overall score
SFSAG North Sea Haddock Trawl & Danish Seine	01-Dec-14	95	85	N/A	95	90 to 75	95	100	90.6
DFPO North Sea & Skaggerak Haddock	1 October 2015	90	80	N/A	85	80 to 75	90	95	85.6
SFSAG North Sea Haddock Trawl & Danish Seine (Re-Assess)	TBA	70	80	80	95	75	90	95	82.7

2.1.3.1 PI 1.1.1. Stock Status

In their scoring of the second scoring issue (SIb) of PI 1.1.1, FCI (2012) and IFC (2010) appeared to have interpreted stock biomass above $B_{TRIGGER}$ and B_{PA} as being consistent with

biomass associated with fishing at F_{MP} (F_{MSY} at that time). However, these reference points are associated with the limit reference, being estimated as $1.4*B_{LIM}$ rather than being the lower limit of fluctuation of B_{MSY}. Notwithstanding this, both assessments determined that extant SSB was in the order of 222 kt - 235 kt and well above $B_{TRIGGER}$. Recent analyses indicate that B_{MSY} is 329 kt, ranging 235 kt – 454 kt. Biomass associated with fishing at the target fishing mortality (0.3) is about 392 kt. Thus, it could be argued that when the previous assessments scored this PI, SSB was at the lower range of B_{MSY}, allowing SIb to score 80. However, since 2008, SSB has dramatically fluctuated, averaging 181 kt during this period. Biomass in 2015 was estimated to be 146 kt, below both B_{MP} and B_{MSY}. Thus, status appears to have changed, justifying the score of 70 in the current assessment.

Notwithstanding the reduced score of this PI compared to those of the previous assessments, in combination with the scoring PI 1.1.3, the overall outcome of the current assessment is the same as the previous ones – overall pass for principle one.

2.1.3.2 PI 1.1.2. Reference Points

The score of 80 is consistent with the DFPO assessment but below that of the SFSAG assessment. However, the latter had employed an old MSC standard which had the possibility to score SIa at SG100 which is no longer the case. All three scores are thus consistent.

2.1.3.3 PI 1.1.3. Stock Rebuilding

Neither the SFSAG nor DFPO assessments scored this PI as they had scored PI 1.1.1 above 80. See harmonization discussion under PI 1.1.1.

2.1.3.4 PI 1.2.1 Harvest Strategy

The score of 95 is consistent with that of the SFSAG assessment but above that (85) of the DFPO assessment. The latter did not score SIa and SIb at SG100. Since 2012, further testing and evaluation of the harvest strategies has occurred which allows scoring of SIa at SG100.

2.1.3.5 PI 1.2.2 Harvest Control Rules

Based upon surveillance audits conducted in 2014, the SFSAG and DFPO assessments reduced their scores down to 75, raising a condition. This was due to not scoring SIc at SG80, based on the change in the stock definition. With the addition of the West of Scotland to the assessment unit, it is now not clear that the HCR will be effective in achieving the target long-term SSB and fishing mortality. This rationale is considered valid and is adopted in this assessment, scoring SIc at 75.

2.1.3.6 PI 1.2.3. Information and Monitoring

The score of 90 is consistent with both of the previous assessments, with minor differences in the scoring rationales. The 95 score of the SFSAG assessment is due to a partial score on one of the SIs which is no longer allowed in CR 1.3.

2.1.3.7 PI.1.2.4. Stock Assessment

The score of 95 is consistent with the DFPO assessment but lower than that of the SFSAG fishery. The latter considered that the assessment evaluated stock status relative to reference points in a probabilistic manner. While the TSA model can provide this estimation, this does not appear to be an on-going feature of the assessment, justifying the lower score.

The MEC team will undertake harmonization discussion on PI 1.1.1 with the DFPO team at the first available opportunity (i.e. next surveillance audit).

2.1.3.8 PI 3.1 Governance and Policy

Harmonisation is also relevant for the first component of Principle 3 because the DFPO Haddock North Sea fishery shares the same European governance and policy frameworks. There were no scores below 80 and therefore the initial scores stand (see Table 5). Both the initial assessment for SFSAG Haddock conducted in 2010 and the DFPO assessment of 2012 were done prior to the latest Common Fisheries Policy reform, and are not directly comparable. Currently there are scoring differences for PIs 3.1.1, 3.1.2 and 3.1.4.

Table 5. Comparison of Component 3.1 scores of previous MSC assessments of North Sea Haddock with those of current assessment

Fishery	Date of scores	3.1.1	3.1.2	3.1.3	3.1.4
SFSAG North Sea Haddock Trawl & Danish Seine	01-Sept-10	100	100	90	100
DFPO North Sea & Skagerrak Haddock	01-Jul-12	80	80	100	90
SFSAG North Sea Haddock Trawl & Danish Seine (Re-Assess)	TBA	85	100	100	100

The MEC team will use the opportunity of PI 1.1.1 harmonization discussion with the DFPO team to harmonize these scores as required.

2.1.4 Catch data for the fishery

The TACs and catch data for the fishery are provided in Table 5 below.

Table 6. TAC and catch data. Data from ICES (2015 – haddock advice) and Marine Scotland (http://www.gov.scot/Topics/marine/Sea-Fisheries/management/17681/WhitefishQuotaUptake)

TAC	Year	2014	Amount	38,284 t
UoA share of TAC*	Year	2014	Amount	27,002 t
UoC share of total TAC	Year	2014	Amount	27,002 t
Total green weight catch by UoC	Year (most recent)	2014	Amount	29,294 t
	Year (second most recent)	2013	Amount	32,167 t

* This is computed using the UK quota, but note that only 1% of UK haddock landings are outside Scotland. Note that the quota figures given are before swaps, so landings appear to exceed quota – in fact, quota update was ~99% according to Marine Scotland.

2.2 Specific Changes since Initial Assessment

2.2.1 Overall

Legal / administrative status: At European level, the Common Fisheries Policy (CFP) was reformed with effect from 1st January 2014[2], bringing in new management requirements. Some transitional technical measures were introduced in 2013[3] ahead of the new CFP technical conservation measures framework, in particular, the prohibition of fishing activities with trawls, demersal seines or similar gears with nets with a minimum mesh size of 120 millimetres for vessels > 15 metres and of 110 millimetres for all other vessels, and fishing gear incorporates a square mesh panel (in case of vessels <15m, if catch is < 90 % saithe) in the waters west of Scotland (ICES division VIa) to protect cod, haddock and whiting stocks, and an area closure to protect juvenile haddock in ICES division VIb (NWWAC, 2015).

The requirements of the EU Marine Strategy Framework Directive (MSFD) were transposed into UK legislation into through the Marine Strategy Regulations 2010 (covering England, Scotland, Wales and Northern Ireland). They require all EU Member States to take measures to achieve Good Environmental Status (GES) in their seas by 2020. For commercially exploited fish and shellfish (Descriptor 3, Defra 2014) the objective coincides with MSY and is therefore aligned with the reformed CFP objectives, on the basis of fishing mortality and biomass indicators and the Data Collection Framework (DCF) monitoring obligation.

The fleet catches some haddock in Norwegian waters in the Northern North Sea where they conform to the rules and regulations of the Norwegian fishery management and conservation regime, including specific e-logbook format (by individual trawl), discard ban and different minimum catching size.

At national level, the Marine (Scotland) Act[4] is the primary legislation for the Scottish fisheries management system and all matters within Scottish territorial waters since 2010, at about the time this fishery was certified. Although the PCR makes no specific mention of the act, it was sufficiently up-to-date to reflect its key provisions (notably the creation of Marine Scotland).

Management: including management of target stocks to MSY-based targets and the landing obligation[5] (from 1st January 2016 for this fishery). Details are given under Principles 1 and 3

[2] REGULATION (EU) No 1380/2013 OF THE EUROPEAN PARLIAMENT AND OF THE COUNCIL of 11 December 2013 on the Common Fisheries Policy, amending Council Regulations (EC) No 1954/2003 and (EC) No 1224/2009 and repealing Council Regulations (EC) No 2371/2002 and (EC) No 639/2004 and Council Decision 2004/585/EC

[3] REGULATION (EU) No 227/2013 OF THE EUROPEAN PARLIAMENT AND OF THE COUNCIL of 13 March 2013 amending Council Regulation (EC) No 850/98 for the conservation of fishery resources through technical measures for the protection of juveniles of marine organisms and Council Regulation (EC) No 1434/98 specifying conditions under which herring may be landed for industrial purposes other than direct human consumption

[4] See http://www.legislation.gov.uk/asp/2010/5/notes/contents

[5] REGULATION (EU) 2015/812 OF THE EUROPEAN PARLIAMENT AND OF THE COUNCIL of 20 May 2015 amending Council Regulations (EC) No 850/98, (EC) No 2187/2005, (EC) No 1967/2006, (EC) No 1098/2007,

below. The EU-Norway management plan is currently undergoing review and revision (see Principle 1). The haddock stock straddles the Norwegian fishing zone in the Northern North Sea (IVa) and the Skagerrak (IIIa) and is included in a joint EU-Norwegian management plan.

The co-management Fisheries Management and Conservation Group (FMAC) replaced the Scottish Fisheries Council and the Conservation Credits Steering Group in 2011. Chaired by Marine Scotland FMAC includes representatives from the industry, POs, environmental organisations and Marine Scotland Policy and Science, with other UK administrations invited to attend as observers. FMAC makes proposals to the Scottish Executive for secondary (subordinate) legislation in the form of Scottish Statutory Instruments (SSIs).

Also in 2011, the Fishing Industry Science Alliance (FISA) replaced the Scottish Industry Science Partnership, with a secured annual funding of funding of £150,000 per annum from 2012. FISA was created to support collaborative research and is overseen by FMAC (Marine Scotland, 2015a).

Species: The fishery remains a mixed demersal fishery for whitefish and *Nephrops*. In this assessment, the analysis of landings was split by gear type for the purpose of identifying all 'main' retained species in a precautionary manner, even though the fishery is not divided into different UoAs by gear. This resulted in some small changes to the identification of 'main' species – set out below.

Fishing practices: No significant change. It is reported that average trip length has got shorter, because catch rates are higher. All vessels >10m now use electronic (instead of paper) logbooks, and all vessels >12m must have VMS. This covers the entire UoA.

Fishing areas: The client reports that fishing areas have changed significantly since the fishery was last certified, and that Figure 2 of the original Public Certification Report (PCR) (IFC, 2010) is now out of date. Haddock landings by area (2009-2013) are given in Figure 1 below.

Involvement of other entities: The extension of the haddock stock definition now spans two regional seas, the North Sea (IV) and the West of Scotland (VI). Two Advisory Councils (renamed from Regional Advisory Council) are therefore involved, for the North Sea (NSAC) and for the North Western Waters (NWWAC).

Harmonisation: The DFPO (Danish) haddock fishery was certified MSC in 2012, and the scoring for this fishery was harmonised with it at the fourth surveillance audit (December 2015). A condition was added which had to carry over into this re-assessment due to the timeframe. This issue is considered in detail under Principle 1 (PI 1.2.2) in Section 1.1.1.

(EC) No 254/2002, (EC) No 2347/2002 and (EC) No 1224/2009, and Regulations (EU) No 1379/2013 and (EU) No 1380/2013 of the European Parliament and of the Council, as regards the landing obligation, and repealing Council Regulation (EC) No 1434/98

Note that the DFPO TR2 fleet was initially included, but failed certification and was therefore removed. See also Section 2.1.4.

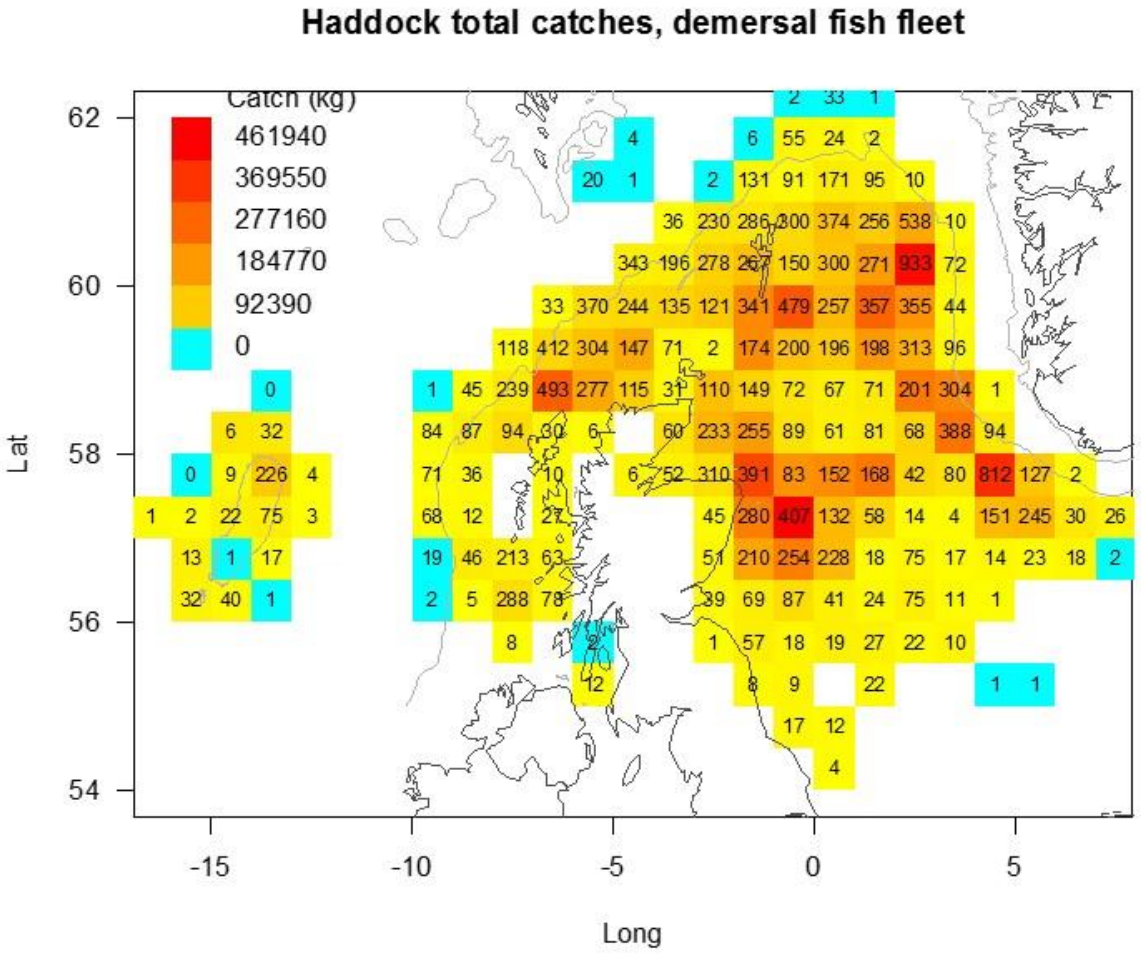
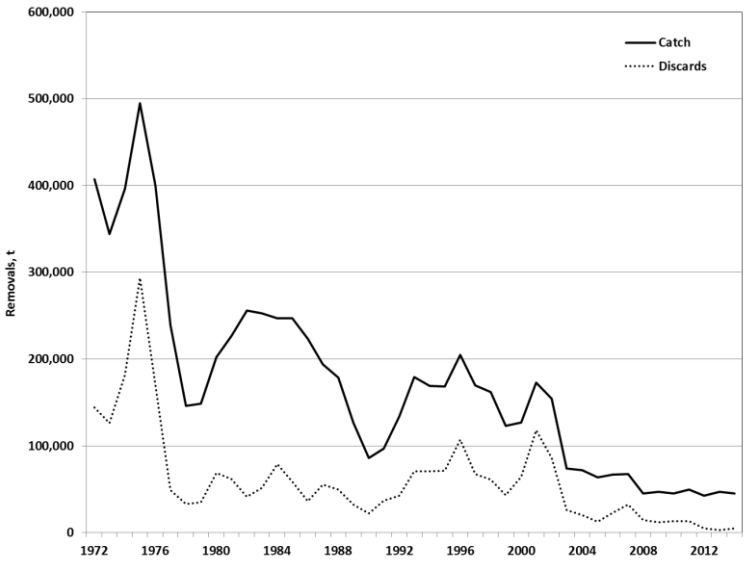


Figure 1. Scottish haddock landings by ICES rectangle of catch, 2009-2013. Figure provided by Marine Scotland Science, by linking VMS and e-logbook data and landings declarations.

2.2.2 Principle 1

2.2.2.1 Stock Status

Since 1972, removals (landings + discards) have continually decreased, from a high of almost 500,000 t in 1975 to an average of over 55,000 t during 2003 – 2014 (Figure 2). Discards were a large fraction of the removals in the 1970s and again more recently in the 1990s. Since 2003, discards have averaged about 25.9 % of removals but have declined to about 14% during 2011-2014. Monitoring of these removals is described in Section 2.2.2.7.



P

Figure 2. Trends in catch and discards during 1972 – 2014; data from ICES (2015a).

Fishing mortality on ages 2 – 4 fluctuated about 0.8 until the early 2000s, at which time it declined and has been below F_{MP} and F_{MSY} since 2008, being at the lower range of F_{MSY} and below F_{MP} for about one haddock generation (Figure 3). F_{2014} = 0.24 or 65% of F_{MSY} and 80% of F_{MP}.

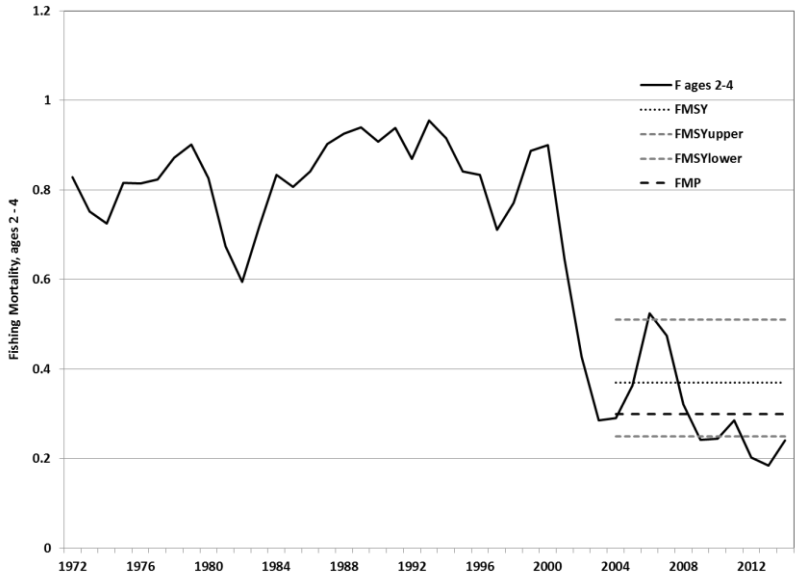


Figure 3. Trend in age 2 – 4 fishing mortality during 1972 – 2014 along with estimates of F_{MP} and F_{MSY} along its upper and lower range; note that reference points only apply to last 10 years; data from ICES (2015a).

Recruitment is characterized by occasional large year classes, the last of which was the strong 1999 year class. More recent relatively strong year-classes are those of 2005, 2009 and 2014. ICES (2015b) indicated that the 2014 recruitment index was higher than recent poor recruitment years, but is still below the long-term average and is thus classified as moderate. Over the long-term, there has been a gradual decline in the average size of Northern Shelf haddock year-classes (Figure 4). The relationship between spawning stock biomass (SSB) and recruitment is weak (see Section 2.2.2.2), implying a strong environmental influence. Causes (i.e. current flows in the North Sea and West of Scotland) of this sporadic recruitment were discussed in the 2011 benchmark assessment of the North Sea stock (ICES, 2011) although nothing definitive appears to have been concluded.

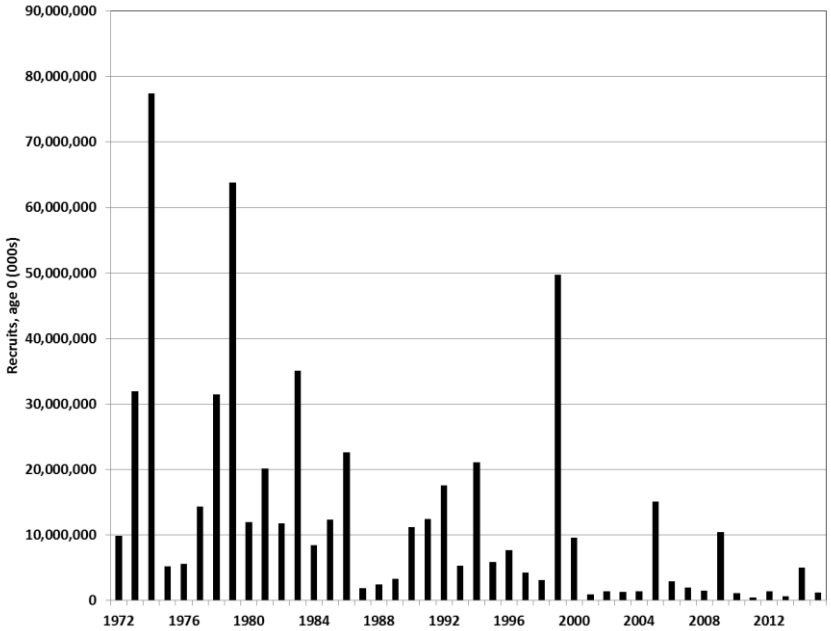


Figure 4. Trend in age 0 recruit abundance during 1972 – 2014; data from ICES (2015a)

Since 1972, SSB has been above B_{LIM} and B_{PA} for much of the time series (Figure 5). It has been increasing since a time series low in 2001 and was 145,650 t in 2015. During 2003 – 2015, Coefficients of Variation (CVs) around the estimates of SSB averaged 7.9% (ICES, 2015b). Based on this, there is a high degree of certainty (Pr>0.95%) that SSB_{2015} was above B_{LIM}. On the other hand, in 2015, SSB was 37.2% and 44.3% of B_{MP} and B_{MSY} respectively and below the lower range of the latter (234,900 t). While there is evidence that rebuilding to MSY conditions can occur in a generation time (see Section 2.2.2.3), this depends on the strength of the in-coming year-classes, many of which recently have been below average.

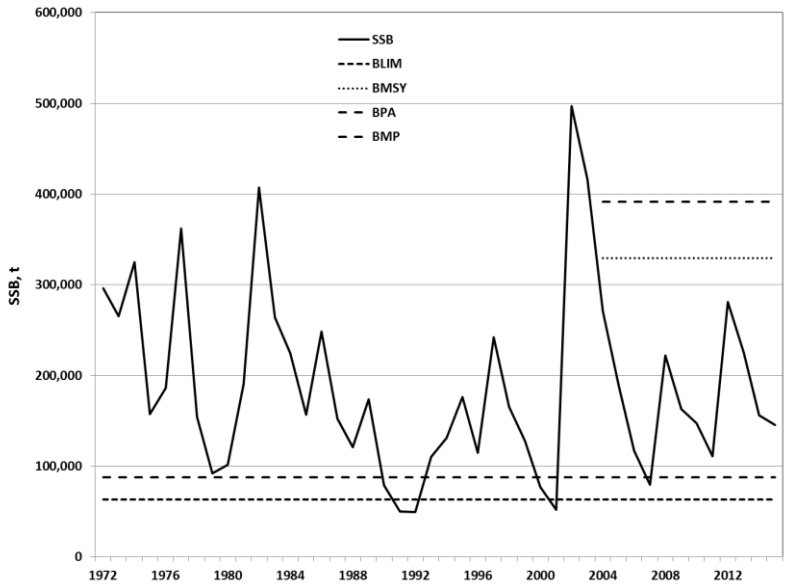


Figure 5. Trend in SSB during 1972 – 2015, along with estimates of B_{LIM}, B_{PA}, B_{MP} and B_{MSY} ; note that reference points only apply to last 10 years; data from ICES (2015a)

During the site visit, based on discussions at the 2015 ICES Working Group on the Assessment of Demersal Stocks in the North Sea and Skagerrak (WGNSSK) meeting, it was indicated that SSB during 2015 – 2017 would first decline and then increase to above the current level by 2017, this in response to recruitment of the 2014 year-class. The latter, based upon a new maturity schedule discussed at the meeting, becomes sexually mature at age 3.

2.2.2.2 Reference Points

Background

ICES uses two complementary sets of fishing mortality (F) and spawning stock biomass (SSB) reference points to inform its Harvest Control Rule (HCR). The first set of RPs is associated with the precautionary approach (PA) and is intended to ensure that F does not reduce SSB to a critically low level (B_{LIM}), interpreted here as the point at which there is an appreciable risk of impairing reproductive capacity. In the HCR, below a specified biomass (B_{PA}), fishing mortality is reduced such that SSB has a high probability (95%) of remaining above B_{LIM}. Similarly, if F is above F_{LIM}, it is reduced to F_{PA} to ensure that F is below F_{LIM} with high probability (95%) and that harvesting is sustainable (ICES, 2003). B_{LIM} and sometimes F_{LIM} are used by ICES in the evaluation of the harvest strategies (see Section 2.2.2.3) to judge whether or not the latter are precautionary. B_{PA} is derived from B_{LIM} based on the precision of the assessment, often taken as a standard value such that is in many cases $B_{PA} = B_{LIM} \times 1.4$ (ICES, 2014j).

The PA reference points have been in use since the late 1990s and more recently, reference points associated with MSY have been added to the HCR, the evolution of which is described by Lassen et al. (2014). In the MSY set of RPs, the overarching objective is to ensure that F does not reduce SSB below that expected to produce Maximum Sustainable Yield (MSY). F_{MSY} is considered the target F. While B_{MSY} is not explicitly used, it is a notional value around which SSB fluctuates when $F = F_{MSY}$. In the ICES HCR, when SSB drops below $B_{TRIGGER}$, which is considered the lower bound of fluctuations around B_{MSY}, fishing mortality is reduced such that SSB can increase to its notional target. Thus, whereas the PA reference points are used to ensure that the stock does not approach critically low SSB, the MSY reference points are used to ensure that stock does not vary significantly from the SSB expected at F_{MSY}. ICES had been moving towards full adoption of the MSY approach by 2015, although this has been delayed to 2020. Initially, it can be expected that F_{PA} will be set equal to F_{MSY} while B_{PA} will be set equal to $B_{TRIGGER}$. In the longer term, it can be expected that F_{MSY} will be lower than F_{PA} while $B_{TRIGGER}$ will be higher than B_{PA} (ICES, 2014j). It is important to understand that the current estimates of B_{PA} are likely more related to B_{LIM} than they are to B_{MSY}. These concepts are illustrated in Figure 6.

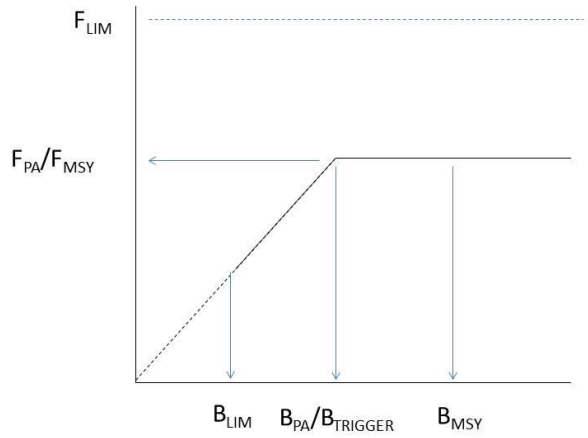


Figure 6. Relationship amongst the PA and MSY-related reference points of ICES; based on ICES (2014j).

The North Sea + Skagerrak haddock long-term management plan (see Section 2.2.2.3), established in 1999, outlines the reference points (F_{MP} and B_{MP}) used in the on-going management of the fishery on that component of the stock (ICES, 2014a). A similar management plan had not been agreed to by the EU for the West of Scotland stock although a proposal had been developed which also outlines a comparable set of reference points (ICES, 2014a). A new long-term plan for the Northern Shelf stock (combined North Sea, Skagerrak and West of Scotland) has not yet been developed and thus the reference points in these planning documents are no longer considered valid (ICES, 2014a).

Northern Shelf Haddock

Until 2014, for the North Sea + Skagerrak stock component, biomass limit (B_{LIM}) and precautionary (B_{PA}) reference points were 100,000 t and 140,000 t respectively. These were developed at the ICES Study Group on the Precautionary Approach in 2001 based upon stock-recruitment estimates from the WGNSSK in 2000. ICES (2011) indicates that the B_{LIM} of 100,000t was based upon the third lowest estimate of SSB in the time series (rounded to the nearest 5,000t) while B_{PA} of 140,000 t was based upon B_{LIM} * 1.4, consistent with the concept of the precautionary reference point being above the limit RP with 95% probability. Different estimates of B_{LIM} and B_{PA} for the North Sea + Skagerrak stock component have been proposed over time. During the 2011 benchmark review (ICES, 2011), using the most recent stock assessment information, biomass limit and precautionary reference points of 185,000 t and 260,000 t respectively were estimated. During the 2014 benchmark review (ICES, 2014e), biomass limit and precautionary reference points of 51,051 t and 70,000 t respectively were estimated, again using the lowest estimated SSB and default derivation of B_{PA} based on this. However, up until and including 2013, ICES continued to provide advice for the North Sea-Skagerrak stock component based upon the initial SSB limit and precautionary reference points of 100,000t and 140,000 t respectively.

For the West of Scotland, since 1998, B_{LIM} has been based upon the lowest observed biomass and B_{PA} = 1.4 * B_{LIM}, these being 22,000 t and 30,000 t respectively.

During the 2014 WGNSSK assessment meeting (ICES, 2014b), biomass limit and precautionary reference points were estimated for the new Northern Shelf (North Sea, Skagerrak and West of Scotland) stock. B_{LIM} was based upon a segmented regression model (Figure 7) fit to the stock – recruitment data. This indicated a likely change point of 63,000 t, which is interpreted as the point below which there is an appreciable risk of reproductive impairment. Application of the previous approach to estimate B_{PA} provided an estimate of B_{LIM}*1.4 = 88,000 t. By default, $B_{TRIGGER}$ was set equal to B_{PA}. These estimates were used to inform 2015 and 2016 advice on this stock.

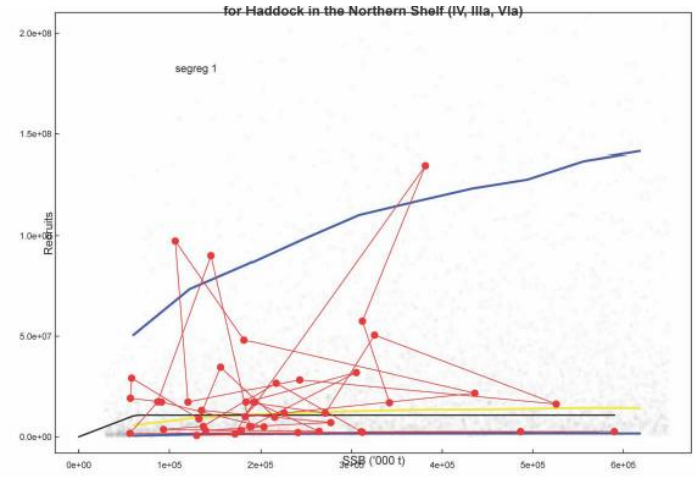


Figure 7. Stock-recruitment relationship of Northern Shelf haddock, indicating segmented regression model (blue line); 95% confidence intervals around model also indicated; from ICES (2014e).

Until the present, the target fishing mortality of the North Sea + Skagerrak haddock management plan (F_{MP}) has been set at 0.3, based upon simulations (ICES, 2006) which indicated that this level of exploitation maintained SSB above B_{LIM} with 95% probability, assuming a 15% limit of inter-annual variation of TACs. ICES (2010b) reports nine estimates of F_{MSY}, based upon differences in the assumed stock-recruitment relationships and the growth and maturity age patterns and their temporal variability. These analyses indicated F_{MSY} ranging 0.25 – 0.48, and thus the F_{MP} was deemed consistent with long-term achievement of MSY conditions. F_{MSY} = 0.3 was also accepted as a proxy F_{MSY} and F_{MP} for the West of Scotland haddock stock component (ICES, 2013c).

Extensive work on estimation of F_{MSY} for the combined Northern Shelf haddock stock is reported in ICES (2014b). These indicated that F_{MSY} was 0.35 which is above the previous estimate which is not surprising given the changes in the stock definition and its assessment. More recent estimates of F_{MSY} for the combined stock were provided as part of an evaluation of this and related RPs for all ICES stocks (ICES, 2014f), prompted by a request from the EU for advice on potential intervals above and below F_{MSY} (ICES, 2015c). The range of fishing mortalities compatible with an MSY approach to fishing were defined as the range of fishing mortalities leading to no less than 95% of MSY and which were precautionary in the sense that the probability of SSB falling below B_{LIM} with fixed F (no HCR) was ≤ 5%. The ranges were produced by first estimating the range of fishing mortalities leading to no less

than 95% of MSY ($F_{MSYlower}$ and $F_{MSYupper}$). This range was then compared with the estimated $F_{P.05}$ (value of F corresponding to 5% probability of SSB<B_{LIM}). Where the estimated $F_{MSYupper}$ exceeded the estimated $F_{P.05}$, $F_{MSYupper}$ was specified as $F_{P.05}$. This was the case for the Northern Shelf haddock stock. Ranges of F were given both based on fixed fishing mortalities and based on F estimated by implementing the ICES MSY HCR (where F decreases linearly to zero with SSB from MSY $B_{TRIGGER}$ to zero). If such an HCR is in use, the estimated $F_{P.05}$ is higher, which may allow a slightly higher average yield in cases where F_{MSY}>$F_{P.05}$ (ICES, 2014f).

For the Northern Shelf haddock stock, the EqSIM software package (described in ICES, 2014f) was used to explore the MSY associated reference points. Two stock-recruitment relationships (Ricker and Segmented Regression) were explored in the estimation of F_{MSY} using data from 1972-2014. The estimate of F_{MSY} proved sensitive to the range of years assumed for the selectivity and biological (growth, maturity) parameters used in the simulations. Five-year blocks (from 2000/2004 to 2009/2013) were explored which indicated a trend of increasing F_{MSY} in recent years (Figure 8). To smooth this temporal variability, a 10-year window of data (2004/2013) was ultimately used to estimate F_{MSY}. The simulations were conducted with and without the biomass RPs within the ICES HCR to evaluate what F_{MSY} would be appropriate to ensure that SSB remains above B_{LIM} with 95% probability.

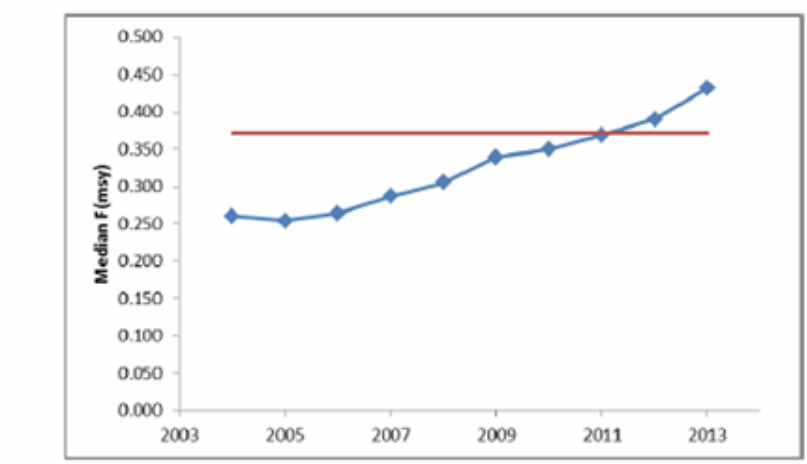


Figure 8. Trend in F_{MSY} using five-year windows to average simulation inputs; points on blue line indicate end year of window; red line is final estimate of F_{MSY}; from ICES (2014f).

The fishing mortality at F_{MSY} was estimated to be 0.37 without the constraint of $B_{TRIGGER}$, ranging 0.25 – 0.51 above and below this (Table 7). Comparable F_{MSY} estimates with the constraint of $B_{TRIGGER}$ included were estimated. The 2015 WGNSSK meeting (ICES, 2015a) re-estimated F_{MSY} as 0.375, confirming the larger estimate than used historically. These F_{MSY} estimates indicate that the management plan's FMP (0.3) is still consistent with the long-term achievement of MSY conditions and indeed is more conservative.

Median SSB associated with F_{MSY} was 329,127 t, ranging 234,900 t – 454,416 t for $F_{MSYupper}$ (0.51) and $F_{MSYlower}$ (0.25) respectively. Thus, SSB in this range would be expected to be consistent with fishing at F_{MSY}. ICES (2014f) does not report the SSB associated with fishing

at F_{MP} but this can be deduced from their analysis. Given that F_{MP} is about midway between the lower (0.25) and median (0.37) fishing mortality associated with F_{MSY}, the SSB midway between these exploitation levels is in the order of 391,500 t (average of 329,127 and 454,416 t). Updated estimates of B_{LIM} and B_{PA} are not provided. Note that these reference points apply to recent conditions (i.e. last 10 years) as stock productivity (i.e. growth and natural mortality) appears to have changed over the long-term (see Section 2.2.2.7).

Table 7. F_{MSY} and associated SSB resulting from simulations of Northern Shelf haddock stock; from ICES, 2014f)

Reference point	Value
F_{MSY} without $B_{trigger}$	0.372
F_{MSY} lower without $B_{trigger}$	0.248
F_{MSY} upper without $B_{trigger}$	0.523
New FP.05 (5% risk to B_{lim} without $B_{trigger}$)	0.512
F_{MSY} upper precautionary without trigger	0.512
F_{MSY} with $B_{trigger}$	0.380
F_{MSY} lower with $B_{trigger}$	0.248
F_{MSY} upper with $B_{trigger}$	0.560
FP.05 (5% risk to B_{lim} with $B_{trigger}$)	0.546
F_{MSY} upper precautionary with $_{trigger}$	0.546
MSY	114 190 t
Median SSB at F_{MSY}	329 127 t
Median SSB lower precautionary (median at F_{MSY} upper precautionary)	234 900 t
Median SSB upper (median at F_{MSY} lower)	454 416 t

The reference points used to inform 2015 and 2016 advice are provided in Table 8.

Table 8. Reference points associated with Northern Shelf haddock stock status and management; from ICES (2015b)

Framework	Reference point	Value	Technical basis	Source
MSY approach	MSY $B_{trigger}$	88000 t	B_{pa}	ICES (2014b)
	F_{MSY}	0.37	Estimated by application of EqSIM evaluation.	ICES (2014b)
Precautionary approach	B_{lim}	63000 t	Segmented regression changepoint estimate.	ICES (2014c)
	B_{pa}	88000 t	$B_{pa} \sim 1.4 \times B_{lim}$.	ICES (2014c)
	F_{lim}	Not defined.		
	F_{pa}	Not defined.		
Previous IV and IIIaW management strategy	F_{MGT}	0.3	Management strategy evaluation.	EU–Norway management strategy
	SSB_{MGT}	100000 t, 140000 t	Trigger values B_{lim} and B_{pa}.	EU–Norway management strategy

2.2.2.3 Harvest Strategy

Strategy Review

The North Sea + Skagerrak haddock stock has been exploited by European Union (EU) member states and Norway under shared management since 1999. In that year, the EU and Norway agreed to a long-term management plan (LTMP) of this resource, which was implemented in January 2005. Since its inception, the target fishing mortality has been F_{MP} = 0.3 with the stipulation that SSB should be kept above B_{PA} = 140,000t and if it were to fall below this level, additional measures would be taken. Since then, ICES has conducted a

number of reviews of the plan, these in response to requests from the EU to address issues as they arise (Table 9). These reviews have been conducted using a Management Strategy Evaluation (MSE) approach which is outlined in ICES (2005). It is similar to approaches used elsewhere (e.g. McAllister et al., 1999) and considers that the harvest strategy of the plan is composed of two broad categories: the operating model and the management procedure. The operating model is composed of biological and fishery models which define the stock and fleet dynamics being controlled by the strategy. The management procedure consists of the observation activities (e.g. surveys and fishery monitoring) which are used in the stock assessment to provide the indicators used in the Harvest Control Rule (HCR). Implementation error (e.g. catch misreporting) is considered here in relation to the observations. A large number (e.g. 1000) of long-term simulations are undertaken in which the stock and fishery dynamics are projected under a range of uncertainties to evaluate the performance of the management procedure.

The first review was requested by the EU and Norway in 2006 (ICES, 2006; Needle, 2006), the results of which formed the basis of ICES advice to the EU and Norway presented at their annual bilateral negotiations in November 2006 (Needle, 2008a; 2011). This MSE-style review resulted in the addition of a sliding F harvest control rule (HCR) to the plan (see Section 2.2.2.4) which was implemented in 2007. ICES considered that the agreed reference points in the LTMP were consistent with the precautionary approach, provided they are used as lower boundaries on SSB, and not as targets. It concluded that the target F_{MP} = 0.3 with the TAC constraint ±15% led on average to a <5% risk of B < B_{LIM} within the next 20 years. Although the management plan had not been fully tested (e.g. at lower fishing mortalities), ICES concluded that the LTMP could provisionally be accepted as precautionary and be used as the basis for advice (ICES, 2007).

Following a meeting in 2008 of the EU-Norway Working Group on Inter-Annual Quota Flexibility, at which EU member states requested that that they be allowed to manage their quotas allowing for inter-annual quota flexibility, ICES undertook an analysis (Needle, 2008b) which indicated that it was very unlikely that any permitted sequence of banking-and-borrowing would have any deleterious effect on the sustainability of the North Sea haddock stock. Thus, inter-annual quota flexibility, with a maximum of 10% transfer of quota between years, was added to the plan.

ICES evaluated the plan again in 2010, this time to ensure that the precautionary reference points were still appropriate. Again, an MSE of the HCR was conducted using simulations of a projected stock from 2010 to 2031 under a range of harvest options and assumptions about stock biology, discard practices, exploitation pattern and assessment performance. It was concluded that the HCR with the extant PA reference points was consistent with the precautionary approach (ICES, 2010a).

The most recent review of the North Sea haddock plan was conducted in 2014 (ICES, 2014g; 2014i) which again indicated that the plan was providing a sustainable fishery with stable yields in conformity with the precautionary approach. Thus far, an evaluation of the precautionary nature of the HCR on the combined Northern Shelf haddock stock has not been undertaken although given the direction of change in the reference points compared to

those used in the LTMP (up for fishing mortality and down for SSB), it would likely be considered precautionary.

Regarding the West of Scotland haddock stock, a 2009 EU management plan proposal recommended that TACs be set according to the same HCR as that for North Sea haddock, the details of which are provided in ICES (2014a). While the plan was never fully agreed to, an evaluation conducted by ICES in 2010 (Needle, 2010a; 2010b) under a range of target Fs and TAC constraints indicated that the proposed plan was likely sustainable. No further reviews were conducted before this stock was combined with that of the North Sea.

Table 9. Overview of ICES reviews of the harvest strategies used in the existing and proposed North Sea and West of Scotland haddock management plans (see text for references).

	North Sea	West of Scotland
2006	Addition of sliding F; HCR Precautionary if SSB RPs PAs & not targets	
2007		
2008	Addition of interannual quota flexibility; No long-term deleterious effects	
2009		
2010	PA reference points appropriate; HCR precautionary	Proposed EU plan likely sustainable
2011		
2012		
2013		
2014		

These MSEs used a range of assumptions about the stock and fishery processes and uncertainties, a synopsis of which is provided in Table 10 (details in Needle, 2011). In undertaking such evaluations, the assessment process can also be simulated (i.e. assessment conducted each year on the simulated stock to inform the HCR). In the North Sea evaluations, the assessment process was emulated but such was not the case in the West of Scotland evaluations. Rather, assessment error was applied to the simulated stock to estimate the perceived stock. Catch is then estimated by calculating the catch at age from the perceived stock using the fishing mortality derived from the HCR. Implementation error is included through the addition of error to the estimated catch at age and thus landings at age for comparison to the TAC.

Table 10. Main assumptions used in the North Sea and West of Scotland haddock harvest strategy evaluations

			North Sea	West of Scotland
Operating Model	Biological Model	Recruitment	Occasional large year-classes interspersed with years of low-to-moderate recruitment	ARMA model
		Growth	Time series average weight at age	Time series average weight at age
		Maturity	Time series average maturity at age	Time series average maturity at age
		Natural Mortality	From SMS model	Fixed at 0.2
	Fishery Model	Selectivity	Fixed througout simulation period	Fixed througout simulation period
Management Procedure	Observations	Survey	Index power function of stock N; CV = 0.2	Index linear function of stock N
		Fishery	Proportions of landings & discards fisxed throughout simulation period; Catch CV = 0.1	Proportions of landings & discards fisxed throughout simulation period
	Stock Assessment		XSA under range of observation & process error dependent on age	True N with random error added

The existing EU–Norway management plan refers to Subarea IV and Division IIIa only, and is therefore no longer suitable as the basis for advice. A new joint EU–Norway management plan will be required in the near future. In the interim, the North Sea plan is being applied to the combined stock. This is appropriate as the North Sea + Skagerrak component comprises roughly 90% of the combined Northern Shelf stock. During the site visit, it was indicated that discussion on a new plan is underway but has not as yet been finalized. It was also mentioned that the EU has been discussing a change to the HCR (now to be called the Advice Rule or AR) with different options (e.g. advice based on a target fishing mortality along with time scales) being considered. Again, nothing has been firmly established and thus the current HCR remains in place. These discussions are related to those on the development of a mixed-fisheries management plan for demersal fisheries in the North Sea, which would take into account the EU landing obligations (see below) to be introduced during 2016 – 2019.

2.2.2.4 Harvest Control Rules

As indicated above, the ICES approach to fisheries management has been evolving since 1977 (Lassen et al., 2014). It includes three elements: precautionary approach, MSY approach and ecosystem approach, which are consistent with international policy while also responding to the specific needs of management (ICES, 2012a). A precautionary approach has been recognised as an important basis for fisheries management in all the jurisdictions advised by ICES since at least the 1990s. The MSY approach on the other hand is a more recent evolution. Annex 2 of the UN Fish Stocks Agreement states that “The fishing mortality rate which generates maximum sustainable yield should be regarded as a minimum standard for limit reference points. For stocks which are not overfished, fishery management strategies shall ensure that fishing mortality does not exceed that which corresponds to

maximum sustainable yield, and that the biomass does not fall below a predefined threshold." Similar statements were made at the 2002 World Summit for Sustainable Development (WSSD). Competent management authorities advised by ICES have therefore based their implementation on the WSSD and the interpretation that fishing mortality should be reduced to FMSY where possible (EU, 2006). In 2010, ICES introduced the MSY framework for fisheries advice, including options for a transition process, initially to attain full implementation of an MSY approach by 2015 (ICES, 2012a) for those fisheries which have generally been managed with MSY as an objective. Transition to the MSY approach has now been delayed to 2020.

The ICES MSY harvest control rule (Figure 6) is designed to promote recovery of the stock to the normal range of stock sizes associated with MSY when the stock is below this range (i.e. when it is below the MSY $B_{TRIGGER}$). For most fisheries, recovery should occur at a fishing mortality (F) of F_{MSY}. The likelihood and speed of recovery is increased by reducing F whenever the stock is below the stock size range associated with fishing at F_{MSY}. When the stock size is so low that recruitment failure is a concern (e.g. at or below B_{LIM} as estimated for a precautionary approach), additional conservation measures may be recommended to prevent a further decline. The special consideration given at low stock sizes is depicted by a broken line in Figure 6.

During 2009-2014, annual TACs for the North Sea – Skagerrak haddock stock were based upon the Harvest Control Rule outlined in the LTMP. During 2012-2014, annual TACs for the West of Scotland stock were based upon the ICES MSY HCR. The 2015 TAC for the combined Northern Shelf haddock stock was based upon the North Sea haddock ICES HCR which will be the case for 2016. The difference in the previous and current HCRs is in the value of the reference points (see Section 2.2.2.2).

The North Sea HCR outlined in the LTMP stipulates (ICES, 2014a):

1. Every effort shall be made to maintain a minimum level of Spawning Stock Biomass greater than 100,000 tonnes (B_{LIM});

2. For 2009 and subsequent years, the Parties agreed to restrict their fishing on the basis of a TAC consistent with a fishing mortality rate of no more than 0.3 for appropriate age-groups, when the SSB in the end of the year in which the TAC is applied is estimated above 140,000 tonnes (B_{PA});

3. Where the rule in paragraph 2 would lead to a TAC, which deviates by more than 15 % from the TAC of the preceding year, the Parties shall establish a TAC that is no more than 15 % greater or 15 % less than the TAC of the preceding year;

4. Where the SSB referred to in paragraph 2 is estimated to be below B_{PA} but above B_{LIM}, the TAC shall not exceed a level which will result in a fishing mortality rate equal to $0.3-0.2*(B_{PA}-SSB)/(B_{PA}-B_{LIM})$. This consideration overrides paragraph 3;

5. Where the SSB referred to in paragraph 2 is estimated to be below B_{LIM}, the TAC shall be set at a level corresponding to a total fishing mortality rate of no more than 0.1. This consideration overrides paragraph 3;

6. In the event that ICES advises that changes are required to the precautionary reference points B_{PA} (140,000t) or B_{LIM}, (100,000t) the Parties shall meet to review paragraphs 1-5;

7. In order to reduce discarding and to increase the spawning stock biomass and the yield of haddock, the Parties agreed that the exploitation pattern shall, while recalling that other demersal species are harvested in these fisheries, be improved in the light of new scientific advice from inter alia ICES;

8. No later than 31 December 2013, the parties shall review the arrangements in paragraphs 1 to 7 in order to ensure that they are consistent with the objective of the plan. This review shall be conducted after obtaining inter alia advice from ICES concerning the performance of the plan in relation to its objective;

9. This arrangement enters into force on 1 January 2009.

In this HCR, data are collected up until the end of year Y-1, assessed in year Y to provide TAC advice for year Y+1, using SSB at the end of Y+1 in the test against the biomass reference points. When undertaking the short-term stock projections, average weights and fishery conditions over the previous three years are used for year Y+1. Partial fishing mortality estimates are obtained for each catch component (human consumption, discards and bycatch) by using the relative contribution (in the 2014 assessment averaged over 2011-2013) of each component to the total catch. This is important to the estimation of the TAC which only applies to the landings and excludes discards (see Section 2.2.2.5).

ICES (2014a) notes that following the ICES MSY approach implies that the target fishing mortality will be increased from 0.3 to 0.37, B_{LIM} reduced from 100,000 t to 63,000 t and $B_{TRIGGER}/B_{PA}$ reduced from 140,000 t to 88,000 t. However, as indicated above, during the site visit, it was mentioned that the European Commission has indicated that in the future, HCRs may not form part of the basis for management plans being discussed with the European Parliament; as such, the MSY intervals would need to be precautionary in the absence of the ICES MSY HCR (ICES, 2014f). These discussions are on-going and it is unclear whether or not and what changes to HCRs will be made.

There is not a specific rebuilding plan in place for Northern Shelf haddock. Rather, rebuilding to achieve MSY conditions is achieved through the HCR by maintaining fishing mortality at or below F_{MSY}, implying rebuilding SSB to B_{MSY}. Rebuilding time frames have been explored during the MSEs undertaken on the harvest strategy. A complication recognized in these and thus in rebuilding SSB is the sporadic nature of recruitment, with a large year-class observed about once every 10 years. In the 2008 explorations of the North Sea HCR (Needle, 2011), using F_{MP} = 0.3, recovery from SSB below that observed in 2014 to above median B_{MSY} occurred in five years, or about one generation (Figure 9). The variation in this recovery was high due to the sporadic recruitment. Since then, F_{MSY} has been re-estimated

as 0.37, higher than the F_{MP} in the management plan. Exploitation of this harvest rate would take longer for SSB to rebuild to B_{MSY}. Notwithstanding this, there is evidence of SSB rebuilding to MSY conditions in the latest assessment (Figure 5).

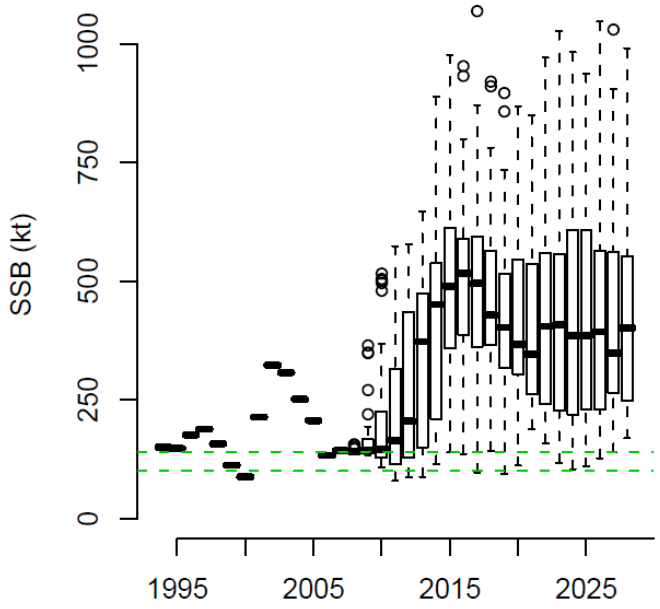


Figure 9. Summary plots of 50 simulation iterations conducted during the North Sea MSE using F_{MP} = 0.3; short horizontal lines indicate medians, and the boxes the quartiles (25%ile and 75%ile); lower whisker gives value of 25%ile and the upper gives 75%ile; outliers beyond this range are shown by open circles; dashed green lines show B_{PA} (upper) and B_{LIM} (lower) used at that time; historical estimates (pre-2007) shown as short horizontal lines only; from Needle (2011)

2.2.2.5 Tools

The primary control on fishing mortality is the total allowable catch (TAC), which is applied to the landings rather than the catch. As indicated above, landings are estimated based upon partial fishing mortalities applied to the target fishing mortality, these based upon the percentage of landings of the catch during the most recent three years of the assessment. As indicated by ICES (2015a), the TAC advice is contingent upon landings rates being the same as during this three-year period. In fact, landings rates (% landings of total catch) have been increasing since 2000 and averaged 85% during 2011- 2015 (Figure 10). It is expected that with the introduction of landings obligations (see below) during 2016 – 2019, landings and catch will ultimately be the same.

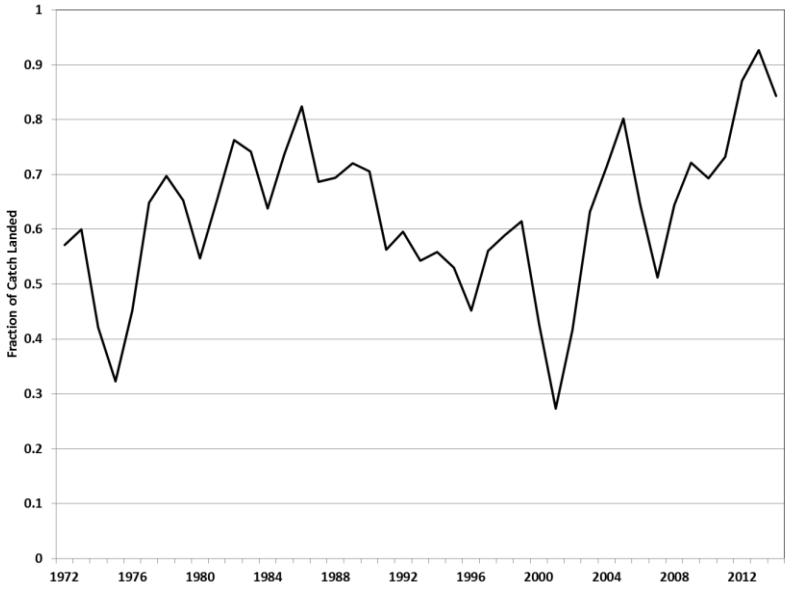


Figure 10. Trends in % landings of total catch of Northern Shelf haddock since 1972; data from ICES (2015b)

In the provision of its advice for 2015 and 2016, ICES indicated that management should take into account the protection of the three stock components to avoid local depletion. To advise on a possible TAC split, ICES would need policy guidelines on the basis for the split, coupled with further analysis of stock distribution (ICES, 2014a). The WGNSSK had discussed a possible means to split the TAC based upon a time-smoothed ITBS QTR1 - based estimate of the proportion of the fishable stock in each area (North Sea, Skagerrak and West of Scotland) in each year (ICES, 2014b). The ICES Advisory Committee (ACOM) subsequently raised concerns with the survey catchability differences in each area, which would bias these calculations. Therefore, the 2015 and 2016 TAC was ultimately split amongst the three stock areas based upon the historical average catch shares outlined in the EU-Norway negotiations (ICES, 2015b). This has added uncertainty to the management of fishing mortality in each area and thus to the overall effectiveness of the HCR. The TAC should be allocated amongst areas based upon the relative fishable biomass in each area, taking into account some estimate of the minimum acceptable biomass in each area. The current allocation process based upon catch opens the possibility of a suboptimal distribution of fishing mortality amongst areas such that the overall stock FMP is not achieved. This effect is likely subtle, given the relative size of the stock components (West of Scotland about 10% of the total) and could be evaluated through simulation. Notwithstanding this, it is noted that the current allocation process is likely an interim measure, further exploration of which should be undertaken in support of a new Northern Shelf haddock management plan.

In addition to TACs, effort restrictions in the EU were introduced in 2003 for the protection of the North Sea cod stock. A long-term plan for the recovery of cod stocks was adopted in 2008. In 2009, effort management switched from a days-at-sea to a kW-day system, in which different amounts of kW-days are allocated within each area by Member Country to different groups of vessels, depending on gear and mesh size. Effort ceilings are updated annually.

Mesh size regulations for TR1 vessels consist of >100mm (>120 mm when targeting) diamond mesh in the codend except in non-EU (Norwegian) waters in which this applies to the whole net and for TR2, mainly twin-rigged vessels, 70-99 mm codend mesh. Following the introduction of days-at-sea regulations in 2003, there was a substantial switch from the larger mesh (>100 mm, TR1) gear to the smaller mesh (70–99 mm, TR2) gear.

In February 2008, Scotland implemented a national scheme known as the 'Conservation Credits Scheme'. The principle of this scheme involves additional time at sea in return for the adoption of measures (real-time closures and technical measures) aimed at reducing mortality of cod and leading to a reduction in discard numbers. Real-time closures are of 21 day duration based upon at-sea reports of cod in the area. In 2010, there were 165 real-time closures; from July 2010, the area of each closure increased (from 50 square nautical miles to 225 square nautical miles). During 2011, there were 185 of these larger closures, while there were 173 in 2012 and 166 in 2013. The Scottish industry has also proposed (yet to be implemented) a move-on rule in which vessels leave an area based upon the percent of undersized fish caught in an area.

2.2.2.6 Linkage between Components of Harvest Strategy

It is important to evaluate whether or not the components of the harvest strategy are working together. The objective is to maintain exploitation at a level commensurate with MSY by controlling landings through a Total Allowable Catch (TAC). ICES provides a range of harvest options for the EC to consider including, for the North Sea + Skagerrak stock, an option based on the agreed LTMP and for the West of Scotland stock, an option based upon the proposed management plan. These are reviewed by STECF before the TAC is set by the Commission. In the case of the North Sea + Skagerrak stock, the TAC is split between the two sub-stock areas based upon an agreed spatial allocation. During 2008 – 2014, a comparison was made between the ICES and STECF advice, the EC set TAC and landings (human consumption) as estimated by ICES (Table 11).

For the North Sea + Skagerrak stock, the EU Scientific, Technical and Economic Committee for Fisheries (STECF) has agreed with the ICES advice, with TACs generally set according to this advice. Landings in the stock's two subareas were generally below the TACs (due to restrictions imposed by the cod recovery plan) except in the Skagerrak in 2012 where the TAC was marginally exceeded - 2.6 compared to 2.1 kt.

For the West of Scotland stock, again STECF has agreed with the ICES advice. In this case, TACs during 2008 – 2012 were set higher than the scientific advice. However, during 2009 – 2011, the advice was for catch to be as low as possible to promote recovery of the stock. TACs were set to allow fishing in a mixed species fishery while controlling haddock bycatch. In 2012, the TAC (6.0 kt) exceeded the advice (5.6 kt) but since then, TACs have been set consistent with the advice. Except for 2013, landings have been below the TACs and consistent with the advice. Overall, there is evidence for good linkage amongst the components of the harvest strategy.

Table 11. Comparison of ICES (based on management plans) and STECF advice, EU TACs and ICES estimated landings during 2008 – 2014, all in kt; red indicates situations where TAC and / or landings were higher than advice; data from ICES (2015a), cross-checked against STECF reports

	ICES Advice (MP)		STECF Review		TAC				Landings		
	North Sea + Skagerrak	W of S	North Sea + Skagerrak	W of S	North+ Skag	North Sea	Skagerrak	W of S	North Sea	Skagerrak	W of S
2008	49.3	4.2	49.3	4.2	48.9	46.0	2.9	6.1	29.0	1.4	2.8
2009	44.7	0.0	44.7	0.0	44.6	42.0	2.6	3.5	31.0	1.5	2.9
2010	38.0	0.0	38.0	0.0	38.2	36.0	2.2	2.7	28.0	1.3	3.0
2011	36.0	0.0	36.0	0.0	36.1	34.0	2.1	2.0	34.0	1.9	1.7
2012	41.6	5.6	41.6	5.6	41.1	39.0	2.1	6.0	30.0	2.6	5.1
2013	47.8	4.5	47.8	4.5	47.8	45.0	2.8	4.2	39.0		4.6
2014	40.7	4.0	40.7	4.0	40.7	38.3	2.4	4.0	35.0	2.3	4.0

2.2.2.7 Information and Monitoring

Stock Structure

ICES (2014e) provides comprehensive background on both the previous basis of the separate North Sea-Skagerrak and West of Scotland stock units and the now combined Northern Shelf stock unit. Haddock support a substantial mixed fishery in the North Sea (ICES IV) and west of Scotland (ICES VIa) and for management purposes; these two regions had been assessed separately. However, it has been suggested in the literature that these two managed areas may be linked by dispersal and the only reported genetic evidence of structuring is between the inshore and offshore North Sea spawning aggregations.

Existing analyses on genetic and non-genetic markers of differentiation (including otolith micro-chemistry) were reviewed at the 2014 benchmark review (ICES, 2014e), along with survey and landings distribution maps, extant assessment results for both areas, hydrodynamic models of likely larval and juvenile transport, the location of spawning and juvenile areas, and survey-derived length distributions. Some of the main observations were:

- Information from egg and larval surveys in 2004 and 2009 on genetically identified stage I egg suggest that there are centres of spawning close to the Scottish coast and further offshore between Shetland and Norway; there is an almost continuous extent of later stage haddock eggs between the two managed regions and aggregations of spawning adults were found close to the 4° line, separating the two ICES stock regions;

- The main barrier to egg and larval dispersal between the European shelf and Iceland is the shelf edge current; this current may be important in transporting eggs and larvae along the shelf edge leading to a high connectivity off the west of the British Isles into the North Sea;

- A hydrodynamic model simulating the transport of haddock eggs and larvae suggests that larvae spawned north of the Fair Isle and Dooley Currents are likely to be transported eastwards as well as southwards providing one mechanism for isolation between the northern and southern North Sea; many of the progeny of Scottish west coast haddock may end up in the North Sea;

- The otolith signatures of the 0-group component of adult otoliths sampled in both the northwest North Sea and Minch suggested that more than 30% of adults originated from the Scottish east coast nursery areas; further, adult concentrations off Shetland also appeared to originate from major nursery areas off the Scottish east coast; the dispersal of juvenile haddock from the Scottish east coast northwards indicated from otolith microchemistry was consistent with changes in the incidence and intensity of infestation of the plerocerci parasite *Grillotia erinaceus* with haddock age;

- Analyses of historical tag-recapture experiments undertaken during 1958 -1983, using Scottish fishery effort data to correct recapture rates, supports a degree of spatial isolation in haddock; two groups showing high fidelity to their local area were identified within ICES Division VIa, one associated with the north of the region and the other with a resident spawning group in the Firth of Clyde; in the North Sea, both inshore and offshore spawning groups were evident and there was very little ex-change of adult haddock between the North Sea and Via;

- There was a strong concordance between the SSB estimates from the two assessments supporting the hypothesis of a single stock; further, relative survey abundance distribution maps for ages 1 to 7+ during 2005-2013 show that haddock are found in a relatively unbroken stretch from the west of the Hebrides to the central North Sea.

Based on these and additional observations of catch and effort distributions, it was concluded that there is biological justification for combining the North Sea, Skagerrak and West of Scotland areas into a single assessment unit (Northern Shelf) because the split at 4°W does not seem biologically relevant. There would appear to be enough connectivity at the early life stages to consider these areas as part of an interrelated unit that should be combined in the stock assessment. However, the relatively low exchange of mature adult haddock between the regions could lead to locally different rates of fishing mortality and hence supports spatial allocation of harvest across the areas.

2.2.2.8 Stock Productivity

Methods to estimate stock and catch weights at age were considered at the 2014 benchmark meeting (ICES, 2014e). The meeting concluded that simple cohort-based linear models were the most appropriate for characterising haddock growth. Based on these analyses, the weights-at-age for the separate catch components (stock weight at age is assumed to be the same as catch weights art age) indicate that there has been a declining trend in weights-at–age for older ages, as well as some evidence for reduced growth rates for large year classes (Figure 11).

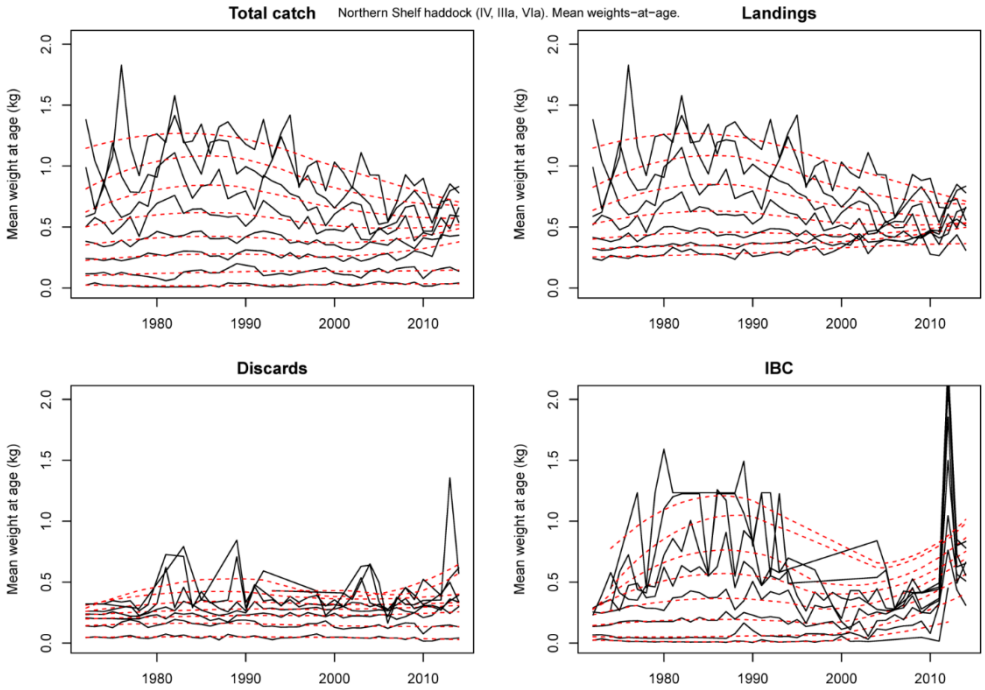


Figure 11. Northern Shelf haddock mean weights-at-age (kg) by catch component (IBC = Industrial bycatch); catch mean weights are also used as stock weights; red dotted lines give loess smoothers through each time-series of mean weights-at-age; from ICES (2015b).

A fixed maturity-at-age key had been used in assessments where the proportion mature at age 2 was 0.32 and 0.57 for the North Sea and West of Scotland components respectively. However, a substantial decline in the maturity size and age relationship has been seen in the North Sea haddock since the 1970s. Analyses were conducted during the 2014 benchmark meeting (ICES, 2014e) that attempted to describe these maturity changes. However, concerns on the how the maturity and age-length samples had been combined in the analyses and on the reproductive potential of age two individual led to the conclusion that maturity should be assumed to be knife-edged at age 3 (i.e. zero for ages 0 - 2 and one for ages 3+). This is an interim measure until a more appropriate model of reproductive potential can be determined.

Long-term trends in Northern Shelf recruitment have been dominated by sporadic appearances of very large year-classes (Figure 4), complicating analyses of the relationship between SSB and recruitment. While Ricker and Segmented Regression relationships have been estimated (Figure 7), the difference between these is marginal. There has been discussion and analyses on the potential link between recruitment and secondary production but these have not been extensive (ICES, 2014e).

Estimates of natural mortality by age used in the stock assessment are produced by the North Sea SMS (Stochastic Multispecies Model) which models the stock dynamics and predator-prey interactions amongst most major species in the ecosystem including cod, whiting, haddock, herring, sprat, northern and southern sandeel, Norway pout, saithe, sole and plaice, and 'external predators' such as eight seabird species, starry ray, grey gurnard, western mackerel, North Sea mackerel, North Sea horse-mackerel, western horse mackerel,

hake, grey seals, harbour porpoise and hake (ICES, 2014h). Natural mortality varies 1.4 – 0.26 for ages 0 – 7 with a very slight declining trend over time (Figure 12).

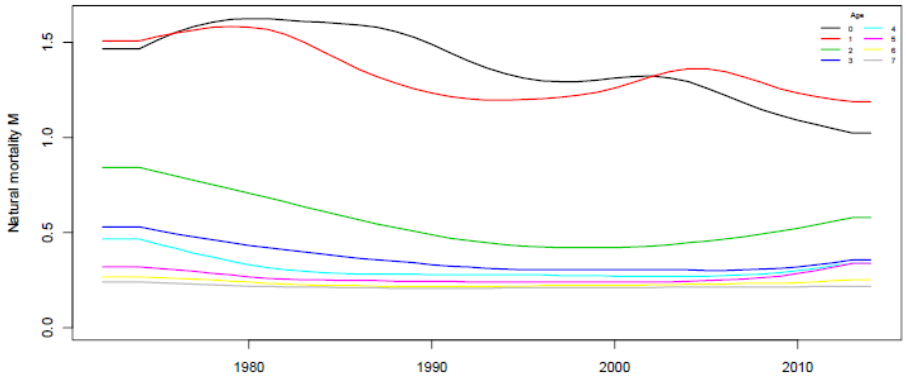


Figure 12. Time series of natural mortality at age estimated by the North Sea SMS model; from ICES (2015b).

Assuming an average of 50% maturity of 2.5 and an M of 0.5 (which applies for most of the fished age groups), generation time (T_{GEN}) is 2.5 + 1/0.5 = 4.5 or almost five years.

Fleet Composition

During the site visit, it was indicated that comprehensive information on the fleet composition (vessel sizes, numbers, configuration, etc) of the fleets involved in the fishery are available in the Scottish Ministry of Fisheries databases. Similar information is available in the national databases of all fleets exploiting the stock.

2.2.2.9 Fishery Removals

At sea, logbooks are completed which record catch by set and provide the information necessary to allocate landings by area. For vessels less than 8m length, logbooks are not mandatory while all vessels 8 – 12 m length carry paper logbooks and all vessels greater than 10 m length carry electronic logs which transmit information to fishing authorities on an on-going basis. All fishing vessels over 12 m in length must carry an operational satellite-linked vessel monitoring system (VMS) whilst at sea. This enables the relevant authorities to monitor the distribution of the UK-registered fleet and locality of individual vessels. Nevertheless, surveillance aircraft are also used to monitor the distribution of all fishing activity (not just Scottish or UK registered fishing vessels). Also, at-sea enforcement boardings are conducted which cross-check catch in the logbooks with that in the hold. All Scottish-based vessels are inspected at sea at least once per year; other at-sea inspections are made on a targeted, risk-based assessment of need, i.e. Inspection effort is focused on areas, activities or vessels that appear to offer greatest justification for an inspection. There is always at least one vessel on patrol within Scottish North Sea waters.

Observer programmes are conducted by national scientific agencies to provide independent estimates of discards. The Scottish discard sampling programme by Marine Scotland Science (MSS) began in 1978 although consistent data are available from 1975 onwards.

Discard sampling of the Danish and Norwegian industrial fleets did not begin until 1972 and 1974 respectively. Overall, there are no reliable observations of discards prior to 1978, and of industrial bycatch prior to 1972 (ICES, 2014e). A parallel observer sampling programme organized by the Scottish Fishermen's Federation (SFF) has been in place since 1999. Until 2008, this programme was primarily used to observe discard practices in specific segments of the Scottish fleet for which such information could be used to support applications for derogations, for example. Since 2008, the SFF programme has attempted to estimate discards of all plaice, sole and cod, and since 2012, this has been expanded to all species. These data have not been included in stock assessments due to methodological issues. During the site visit, the client indicated that in 2014, the SFF programme deployed six observers working for 14 days a month, coordinated in a preliminary manner with the nine observers deployed in the MSS programme. In 2015, it is planned to have full coordination of the two observer programmes with the result being the inclusion of these data in future assessments.

A third observation programme is based on CCTV camera systems installed on 20-25 vessels which are participating in the Scottish Cod Catch Quota Scheme (CCQS). When correctly calibrated, counts and length distributions of the main commercial species in this fishery (including haddock) can be produced, converted to weights using length-weight relationships, and compared with landings to obtain trip-based discard rates by weight (ICES, 2014a). This has been done in the Northern Shelf area for the fourth quarter of 2012 and for most of 2013, and has generated trip-based estimates which are comparable (or lower) to the raised fleet-based estimates from the MSS and SFF programmes. Ways to use these data in future stock assessments are under consideration.

Throughout the EU, a discard ban is being introduced during 2016-2019 (EU, 2013a). For the North Sea and North Western waters, this ban will commence in 2016 for directed fisheries and in 2019 for all other species. There will be a need for national mechanisms to ensure that catch is appropriately monitored during implementation of these landings obligations. The above observer programmes could play an important role in the implementation of this ban.

Marine Scotland Compliance staff based at ports around the coast receive the logbooks and landing declaration forms when initially submitted and may undertake an initial review of their content before forwarding to the Marine Scotland Compliance head office in Edinburgh. A significant part of their time is spent ensuring that box weights equate with declared weights, ensuring that declared landing compositions match what is being put on the market. They also take the opportunity to inspect a vessel's fishing gear whenever it is laid out on the quay rather than bound onto a vessel's net drum. If there are specific concerns with respect to a vessel's gear, inspectors can instruct the skipper to lay the gear out on the quay for inspection.

Logbooks, landing declaration forms and sales notes are forwarded to the Marine Scotland Compliance head office in Edinburgh where the details are transferred to the Marine Scotland fishery database. Aggregate figures are forwarded to the Department for Environment, Food & Rural Affairs (DEFRA), where the UK database is maintained and UK aggregate landings forwarded to the EC Fisheries Directorate. Marine Scotland Compliance

staff are engaged in detailed analysis of cross comparisons of VMS records, at-sea inspection records, log-sheet returns, landing declarations, sales notes, and Marine Scotland Compliance market monitoring records to identify any apparent anomalies in fishing activity, reported and actual landings, and sizes of fish landed by different vessels fishing in the same area. Anomalies that come to light are used to target the appropriate inspection activity at sea, on land or both, to minimise the risk of infractions of regulations. Such inspections might result in frequent visits to a particular boat whenever it is at sea or an unannounced visit to a selling agent‘s offices to audit the books. Marine Scotland Compliance enforcement activities are intelligence-led to minimise risk rather than random, as was the case about 20 years ago.

The age/size composition of removals is based upon sampling conducted by national scientific agencies, again with detailed differences amongst countries. For instance, Germany uses only observers at sea to collect samples while Denmark uses a combination of port and at-sea observers. In general, these programmes provide good data to characterize landings.

The uncertainties in the removals are considered when these data are analysed in the assessment meetings. The landings data are based on a census while the discard estimates are based upon decisions on the adequacy of coverage of sampling strata (e.g. country, month, area, fleet). The same applies to the application of the age composition data to the landings and discards. These decisions do not appear to be based on a formal statistical analysis (e.g. kept / discard estimates and CVs for observed fleets applied to landings observations for full fleet) although the methodology is consistent with practice elsewhere. Further, the uncertainty in the landings and discards are formally considered in the assessment model (see Section 2.2.2.11).

2.2.2.10 Stock Abundance

The surveys available for the Northern Shelf haddock assessment are listed in Table 12. During the 2014-benchmark review (ICES, 2014e), the utility of each of these survey series in the combined assessment for Northern Shelf haddock was considered and the following recommendations made:

- The separate Scottish (ScoGFS Aberdeen Q3, ScoGFS Q3 GOV) and English (EngGFS Q3 GRT, EngGFS Q3 GOV) groundfish survey series have previously been used for the North Sea haddock assessment; the reason for this is historical; the IBTS Q3 survey should be used in place of the separate Scottish and English Q3 surveys;
- New ScoGFS-WIBTS Q4 survey index should be removed from consideration until more years of data are available;
- The IGFS-WIBTS-Q1 survey (old and new) should not be used due to lack of year-class consistency, suggesting that the survey is not a reliable one for haddock;
- Due to concerns about using indices derived from surveys at the edge of the distribution of a widespread stock, further work into the development of a combined Northern Shelf IBTS index for haddock is required.

Table 12. Surveys available for Northern Shelf Haddock Assessment; from ICES (2014b)

Area	Country	Quarter	Code	Year range	Age range
Subarea IV	Scotland	Q3	ScoGFS Aberdeen Q3	1982-1997	0-8
Subarea IV	Scotland	Q3	ScoGFS Q3 GOV	1998-present	0-8
Subarea IV	England	Q3	EngGFS Q3 GRT	1977-1991	0-9
Subarea IV	England	Q3	EngGFS Q3 GOV	1992-present	0-9
Subarea IV and Division IIIa	International	Q1	IBTS Q1	1983-present	1-5
Subarea IV and Division IIIa	International	Q3	IBTS Q3	1991-present	0-5
Subarea VIa	Scotland	Q1	ScoGFS-WIBTS Q1	1985-2010	1-8
Subarea VIa	Scotland	Q1	New ScoGFS-WIBTS Q1	2011-present	1-8
Subarea VIa	Scotland	Q4	ScoGFS-WIBTS Q4	1996-2009	0-7
Subarea VIa	Scotland	Q4	New ScoGFS-WIBTS Q4	2011-present	0-7
Subarea VIa	Ireland	Q4	IGFS-WIBTS-Q4	1993-2002	0-8
Subarea VIa	Ireland	Q4	New IGFS-WIBTS-Q4	2003-present	0-8

In summary, the benchmark meeting (ICES, 2014e) recommended that the final assessment be based on the North Sea IBTS Q1 and Q3 surveys only. The West of Scotland surveys conducted by Scotland and Ireland covered too small a proportion of the overall stock area to be considered reliable indicators of overall stock dynamics, and the separate English and Scottish North Sea indices were only used previously because of the historical timing of the working group -WGNSSK met in October when the IBTS Q3 index was not yet available (ICES, 2014b). A description of the sampling plan and protocols of the International Bottom Trawl Survey (ITBS) are given in ICES (2012b).

The above implies that the North Sea survey index applies to the whole stock area. ICES (2015b) considered the abundance distributions by age and year for the Scottish component of the North Sea IBTS Q1 survey along with the ScoGFS Q1 West of Scotland survey), the North Sea IBTS Q1 and North Sea IBTS Q3 surveys. These showed the concentration of North Sea haddock towards the north and west, and the relatively unbroken distribution across the north of Scotland. The moderately strong 2009 year-class was evident, as was the weakness of succeeding year-classes. The abundance trends in these survey indices indicated reasonably good consistency, supporting the notion that the North Sea ITBS index was representative of Northern Shelf haddock trends. Notwithstanding this, the 2014 benchmark meeting recommended that the IBTS working group consider whether the North Sea IBTS Q1 and West of Scotland ScoGFS Q1 indices could be combined. This is for future consideration.

The uncertainties in the ITBS surveys are well understood. In the North Sea, a pseudo-random design (first sets within strata in time series chosen randomly and subsequent sets

fixed at these locations) is employed while in the West of Scotland, the survey switched from fixed to stratified-random in 2010 (C. Needle, pers. comm.). The statistical properties of indices based on these surveys follow from standard sampling theory. Uncertainties in the survey indices are considered in the assessment model (see Section 2.2.2.11).

Other Data

The Northern Shelf area is one of the most studied within the ICES mandate. Physical and biological oceanographic data are routinely collected on surveys. Food habit studies are undertaken which support the development of ecosystem models, such as the Stochastic Multispecies Model discussed above and others (e.g. North Sea EwE). Benchmark meetings, WGNSSK and other working and study group reports routinely describe the research and findings associated with these data.

2.2.2.11 Stock Assessment

The 2014 benchmark assessment (ICES, 2014e) undertook a complete review of the new stock's identification (see Section 2.2.2.7), data and model. This model, described below, is now the analytical basis of the Northern Shelf haddock stock.

Data

There have been issues with the sampling of discards in the historical datasets. The North Sea – Skagerrak and West of Scotland haddock assessments in 2013 included catch (landings separate from discards) data back to 1963 and 1965 respectively. The benchmark review (ICES, 2014e) considered the provenance of the historical catch (landings and discards) in some detail. It was concluded that there were no reliable observations of discards prior to 1978, and of industrial bycatch prior to 1972. The 2013 North Sea haddock assessment had extended the time series back to 1963 based on data averaging. It was shown that current estimates of the pre-1978 haddock stock in the North Sea, and in particular the very large 1967 and 1974 year-classes, were determined in large part by discard and industrial bycatch data which are largely inferred from later observations. It was concluded that the Northern Shelf assessment start in 1972 to avoid issues with the discard data.

The issue of the first age to use in the assessment was discussed at length during the benchmark meeting. The previous North Sea haddock assessment was unusual among ICES stocks for using age-0 catch and survey data, and indeed the haddock assessment for the west of Scotland started at age-1. There are no landings of age-0 in the North Sea, and all catch data for that age arise from discards and industrial bycatch. The relationship between age-0 catch and subsequent year-class strength is weak. On the other hand, the ITBS QTR3 survey data show strong correlations between age-0 and subsequent year-class strength at age-1. In the interests of retaining useful and representative data where possible, it was recommended that the assessment start at age-0. The meeting did not discuss the choice of plus group for the assessment, and for consistency, it was recommended that the plus group be that used in the previous North Sea stock (ages 8+).

As noted in Section 2.2.2.7, the 2014 benchmark meeting concluded that only the North Sea IBTS QTR1 and QTR3 survey indices should be used to tune the Northern Shelf assessment. The West of Scotland surveys conducted by Scotland and Ireland covered too small a proportion of the overall stock area to be considered reliable indicators of overall stock dynamics, and the separate English and Scottish North Sea indices were only used previously because of the historical timing of the working group. The ITBS QTR 1 survey provided indices for ages 1 – 5 during 1983 – present while the ITBS QTR 3 survey provided indices for ages 0 – 5 during 1991 – present.

Model

TSA (Time Series Analysis) is the analytical basis of the current assessment model of the Northern Self haddock stock. TSA is not a time series model in the statistical sense but rather is a state-space or random effects model in which the underlying states or processes are considered random unobserved variables. The observations are derived from the underlying processes and are subject to measurement error. Thus, contrary to VPA and SCAA models in which only observation error is considered, in state space models, both process and observation errors are considered. The model parameters are estimated in the marginal distribution of the observations, and then the unobserved random variables are predicted through their conditional distribution given the observations. State-space models were introduced in fisheries by Gudmundsson (1987; 1994) and Fryer (2001) who both used the Kalman filter to compute the likelihood function. The Kalman filter provides a closed form iterative algorithm for determining the likelihood for linear normal state-space models. The SAM model is another state-space formulation currently used in a number of ICES stocks; it does not use the Kalman filter but rather uses a combination of automatic differentiation and a Laplace approximation to solve high dimensional non-linear models (Fournier et al., 2012; Millar, 2011; Nielsen and Berg, 2014). During an ICES workshop on stock assessment methods (ICES, 2013a), SAM models compared favourably if not better to both VPA/XSA and SCAA models in retrieving stock trends from simulated data. The SAM model was considered during the benchmark review (ICES, 2014e) and gave similar results to the TSA model although there were some differences i.e. the confidence intervals around the SSB and recruitment estimates were wider in the SAM compared to the TSA model and the recruitment estimates of large year classes differed. It was speculated that these discrepancies might be due to the use of ad-hoc adjustments in the TSA which down weight catch and survey outliers, measurement error and recruitment variability multipliers. This would have the effect of reducing the estimates of error in the TSA. While both models provide similar estimates of stock parameters, it was decided to use the TSA model as 1) it is able to model landings and discards + bycatch separately, which the SAM software is currently not able to do, 2) SAM models recruitment as a lognormal process while TSA allows the variance of large year-classes to be inflated, albeit in an ad-hoc manner and 3) the model developer (R. Fryer) and assessment scientist (C. Needle) are both based in Aberdeen, facilitating model enhancements as required.

TSA employs the Baranov catch equation to describe the relationship between year and age-specific catch, stock abundance, and total mortality, the latter composed of fishing and natural mortality. Age 0 stock numbers (recruits) are not constrained by a parameterised stock-recruitment relationship but rather recruitment is modelled as a random walk subject to

error assuming a time-invariant CV. This is more reasonable than imposition of a stock-recruitment relationship as haddock year-class strength is highly variable and not strongly linked to SSB. Fishing mortality is separated into an age and year component, both of which evolve over time following a random walk. The four sources of error associated with this process are assumed to be normally distributed with zero mean and constant variance, the latter estimated in the likelihood function. Two of these error terms induce transitory changes in fishing mortality around an age and year separable model and through the year component of this separable model while the other two error terms induce persistent changes in fishing mortality through the random walk applied to both the age and year components of the separable model.

Observation error is associated with the landings and discard (including industrial bycatch) at age data, these derived from the catch at age estimated through the Baranov equation. The proportions of the catch discarded at age and year evolve following a random walk with the transitory and persistent changes controlled by variance estimated in the likelihood function. Landings are catch minus discards. While the variance associated with landings and discards are assumed constant over time, an additional age-specific term ($B_{DISCARDS}$ and $B_{LANDINGS}$) is input which allows this variance to change with age.

Observation error is associated with the two survey time series, the latter estimated from the age and year-specific stock numbers based upon age-specific survey catchability estimated in the likelihood function assuming constant (over year) variance. As with landings and discards, an additional age-specific parameter, B_{SURVEY}, is input that allows survey variance to vary with age.

ICES (2014e) provides a comprehensive summary of the TSA model's standardized prediction errors for the landings and discards over time which do not indicate any severe model fit issues. These are the principal diagnostic tools for time-series Kalman filter models like TSA, and indicate the discrepancy between the model prediction and observation as the model steps through the data from the start to the end. They are a useful guide to suggest observations which might need to be down-weighted, but as TSA also includes a backwards smoothing step, they cannot be considered to be residuals in the usual sense. Trends in model observed and fit total catch and the two survey indices again indicate no major issues. The estimate of total catch at age-0 prior to 1991 is based on noisy discard + bycatch data when available, or on model inference when (1973-1977) they are not). Thus, for the earlier period, model fits are not necessarily close to the observations (Figure 13). Similar patterns in the diagnostics were observed in the most recent assessment (ICES, 2015b).

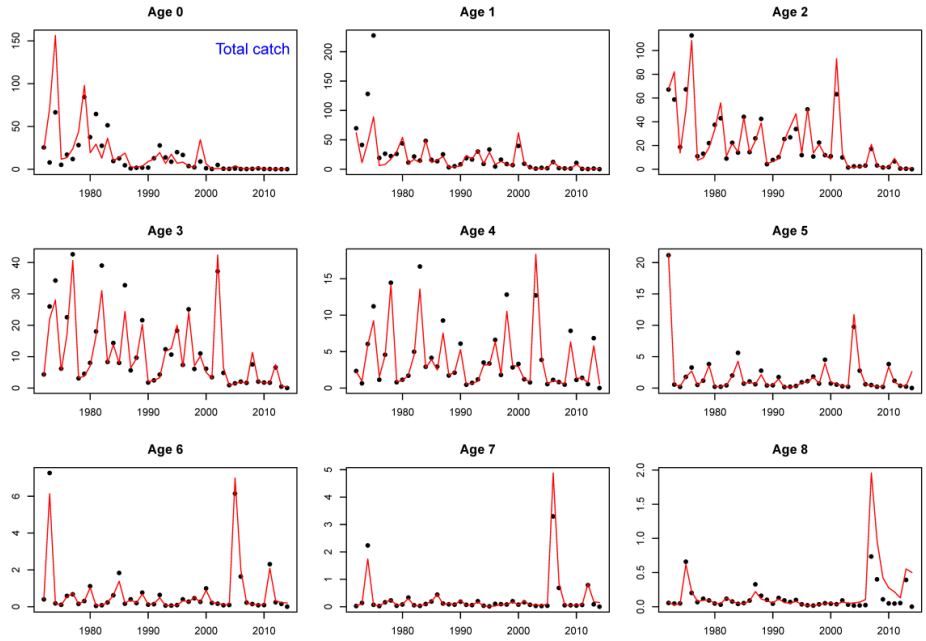


Figure 13. Trends in observed (points) and fitted (lines) values for Northern Shelf haddock total catch by age; from ICES (2014e)

Another notable feature is that total catch tends to be underestimated for larger year-class, whereas survey indices tend to be overestimated for these year-classes: the TSA model fit is a compromise between the two. In relation to the survey fits, a key difference between the 2014 benchmark model and the subsequent WGNSSK assessment was the additional year of ITBT QTR 1 data used in the latter. There is an apparent year-effect in the QTR 1 survey with the indices for four of the five year-classes increasing between 2013 and 2014, rather than decreasing as expected. This was taken as evidence that the strength of the 2013 year-class at age-0 is very low. The ITBS QTR 3 index for the 2013 year-class at age-0 was not particularly low, but it is not very high either; taken together, the conclusion was made that the 2013 year-class must have been very poor.

In common with FLXSA, SAM and SURBAR retrospective analyses from previous WGs for North Sea haddock, there is almost no retrospective pattern in the TSA: at no time does the retrospective pattern fall outside the approximate 95% confidence intervals of the full time-series assessment (Figure 14; only SSB retrospective pattern shown; similar patterns for fishing mortality and recruitment). The retrospective analysis conducted during the most recent assessment confirms these observations (ICES, 2015b).

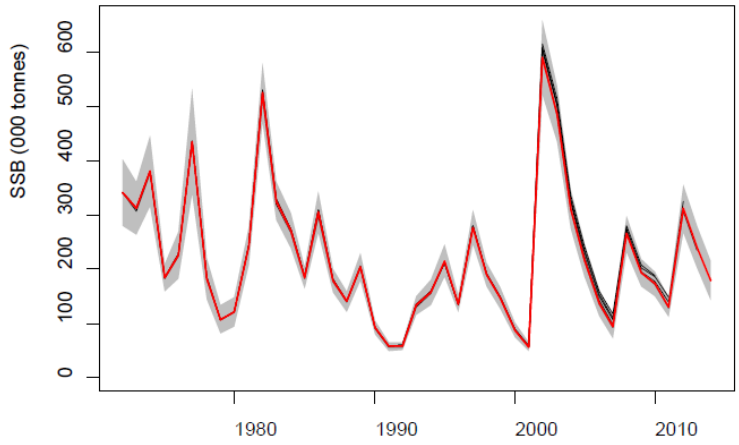


Figure 14. Five-year retrospective peels for Northern Shelf haddock SSB in the final TSA assessment; red line provides full time-series estimates with grey band indicating approximate 95% confidence interval; black lines indicate median estimates from retrospective peels; from ICES (2014e)

The TSA model produces estimates of stock abundance and fishing mortality at age, along with their confidence intervals, in the most recent year which are used as inputs to the HCR (see Section 2.2.2.3) to determine the TAC to be used to manage the fishery over the next three years. Thus, by inference from the requirements of the HCR, current median stock status (50% probability) is stated in relation to the SSB and fishing mortality reference points. The full probability range of the indicator/reference point ratio is not explored, although this is well within the capacity of the TSA model.

Since 2005, a number of models have been used on the North Sea – Skagerrak and West of Scotland stocks (Table 13). For the North Sea-Skagerrak stock, during 2005 – 2013, the primary model was XSA whereas the primary model for the West of Scotland stock was TSA. The eXtended Survivor Analysis (XSA) is a variant of Virtual Population Analysis (Shepherd, 1999). The primary difference between XSA and TSA models is how uncertainty in the observations and processes is treated. VPA models and their variants (e.g. XSA) make the assumption that there is negligible error in the catch at age. Further, the only error included in the model is that associated with the observations.

A range of other models have also been explored, including SVPA, VPA (Laurec-Shepherd), ADAPT, SAM and SURBA. These alternative models have generally confirmed the stock trends produced by the primary models. Also, the previous North Sea and Skagerrak assessment showed strong consistency across the years. Further, while previous West of Scotland assessment had used landings data that had been corrected for misreporting between Division VIa and Subarea IV, this source of uncertainty is now removed as the areas are assessed together.

Table 13. Alternative models used in Northern Shelf haddock stock assessments; first model indicated in each year is the model used for advice; bold italics indicates benchmarks

	North Sea - Skagerrak	West of Scotland
2005	XSA, SVPA, VPA, ADAPT, SURBA	SURBA, XSA, TSA
2006	XSA, SURBA	TSA, SURBA
2007	XSA	TSA, SURBA
2008	XSA, SURBA	TSA
2009	XSA, SVPA, SURBA	TSA
2010	XSA, SVPA, SURBA	TSA
2011	**XSA, SVPA, SURBA, SAM**	TSA
2012	XSA, SURBA, SAM	TSA
2013	XSA, SURBA	TSA
2014	**TSA, SAM, XSA, SURBA**	
2015	TSA, SAM, SURBA	

ICES undertakes in-depth reviews, termed 'benchmarks', of the data and assessments models based upon requirements. The format of these benchmarks is outlined in ICES (2008a) and includes external experts as well as experts from the ICES scientific community. For North Sea haddock, since the start of the benchmark process, benchmarks have been conducted in 2011 and 2014 (ICES, 2011; 2014e). For the West of Scotland, a formal benchmark was not conducted until 2014. Indications are that a benchmark is planned to be held every three years.

During and after each assessment working group meeting, audits are conducted by designated members of the working group which involve, based on ICES guidelines, ensuring that the data and methods used are well described, were those used, were consistent with the benchmark review, and that the methods had been implemented reasonably – technically correct with checks that the methodology may no longer be fit for purpose. These audits are documented in an annex of the WGNSSK working group report.

Following the WGNSSK meeting, the report is considered by ACOM who is ultimately responsible for the ICES advice. Before the advice is implemented in the form of TACs, the EC asks its own advisory group, STECF, to review the ACOM report.

2.2.3 Principle 2

2.2.3.1 Retained species

The main retained species for the previous assessment were identified as cod, saithe, whiting and plaice. For this assessment, it was decided to separate the analysis of 'main' retained species by gear type, which was not previously done (see Section 2.2.1 for an explanation).

Data were obtained from Marine Scotland, who use landings declarations cross-checked against VMS data (for evaluating landings by area). The full data set broken down by gear type is too large to present here; Table 14 gives data for all gear types combined. For each year/gear type combination, the landings of each species were calculated as an overall percentage of the total landings for that year. Species were considered 'main' retained species for that gear type if either i) they represented >5% of the total landings for that gear type for all years or any three out of the four years; or ii) if they represented 2-5% of total landings for that gear type for all years or any three out of the four years and there is a reason to consider them particularly vulnerable to fishing pressure. (Note: vulnerable but protected species are considered under 'ETP' below.) The results of these two analysis are given in Table 15 and Table 16. The analysis of vulnerability (as given in Table 16) is detailed in Table 17.

Table 14. Landings by species in trips where haddock was landed, for all gear types combined, 2011-2014, in live weight (tonnes). Data provided by Marine Scotland.

Species	Live weight tonnes				
	2011	2012	2013	2014	Total
Haddock	20983	25653	30307	26003	102946
Cod	9945	10259	10275	10123	40602
Whiting	7394	8501	9587	8492	33974
Saithe	7509	6194	7584	5614	26900
Nephrops	8816	6215	3978	5568	24577
Monkfish	4687	3475	3309	4212	15683
Plaice	2079	2263	3155	2654	10151
Hake	2291	2704	2367	2108	9470
Ling	1956	1870	1888	1845	7559
Megrim	1389	1350	1632	1402	5772
Lemon Sole	602	522	735	667	2527
Witch	452	443	545	580	2019
Pollack	312	386	340	258	1296
Squid	339	177	212	311	1038
Catfish	182	245	223	226	876
Cuckoo Ray	136	111	118	147	512
Gurnards - Red	82.2	95.0	129	111	417

Species	Live weight tonnes				
	2011	2012	2013	2014	Total
Dabs	101	57.2	89.2	82.2	330
Gurnards - Grey	18.5	64.4	114	123	321
Spotted Ray	69.5	59.5	85.2	78.7	293
Skates and Rays	85.9	76.5	59.6	53.4	275
Redfishes	72.5	58.1	70.8	50.9	252
Torsk (Tusk)	71.8	56.8	60.9	49.7	239
Turbot	62.8	56.5	53.6	49.0	222
Gurnard	38.7	93.4	56.1	18.1	206
Halibut - Atlantic	82.9	56.0	37.1	25.0	201
Halibut - Greenland	12.3	35.5	55.8	38.7	142
Mackerel	30.9	31.8	38.8	29.2	131
Thornback Ray	14.0	16.8	28.1	52.4	111
Roes	48.9	39.3	2.77	0.23	91.1
Other or mixed	32.8	26.9	12.5	3.59	75.8
Conger Eels	25.7	15.9	12.1	21.4	75.1
Unidentified Dogfish	5.13	5.96	14.3	40.5	65.8
John Dory	11.4	10.0	8.92	7.97	38.3
Brill	9.52	12.1	10.2	6.16	37.9
Blue Ling	0.81	2.18	12.2	19.9	35.1
White Skate	18.8	3.21	5.96	2.05	30.1
Horse Mackerel	2.40	13.8	6.30	2.33	24.9
Other Flatfish	8.11	9.75	0.26	0.01	18.1
Crabs	2.21	2.97	3.15	4.62	13.0
Herring	2.36	2.14	6.13	1.17	11.8
Sole	2.96	1.84	3.13	3.63	11.6
Unidentified Sharks	4.73	3.83	0.81	1.69	11.1
Octopus	2.89	1.64	1.70	3.04	9.27
Greater Forked Beard	2.21	1.36	1.84	3.66	9.07
Sandy Ray		0.13	0.12	8.07	8.31
Long-nosed Skate	3.98	0.15			4.13
Red Mullet	2.26	1.24	0.55	0.02	4.07
Blonde Ray	1.13	0.80	0.81	0.23	2.97
Rabbit Fish (Rattail)		2.80			2.80
Stone Crab	0.42	1.06			1.48
Eels		0.22	0.24	0.72	1.17
Common Skate(Blue/Grey)	0.11	0.43	0.60	0.01	1.15

Species	Live weight tonnes				
	2011	2012	2013	2014	Total
Arctic Skate			1.09	0.05	1.14
Lobsters	0.40	0.09	0.23	0.24	0.95
Livers		0.62	0.13		0.75
Spider Crabs	0.34		0.16	0.11	0.61
Bluemouth		0.57			0.57
Flounder or Flukes		0.12	0.39	0.00	0.52
Shagreen Ray		0.42		0.03	0.44
Whelks	0.33				0.33
Greater Silver Smelt		0.31			0.31
Shrimps - Pink			0.17	0.10	0.27
Spurdog	0.10	0.15			0.25
Long Rough Dabs		0.25			0.25
Albacore		0.20	0.00		0.20
Mullet - Other	0.09	0.10	0.00		0.19
Roundnose Grenadier	0.15		0.02		0.17
Wrasses			0.16		0.16
Bass	0.08	0.01	0.06	0.01	0.15
Black Scabbard Fish	0.08	0.07			0.15
Lumpfish			0.14		0.14
Shad	0.02	0.08	0.01	0.02	0.13
Mixed Crabs	0.12				0.12
Roughead Grenadier		0.07		0.01	0.07
Common Prawns			0.03		0.03
Pouting (Bib)		0.03			0.03
Scallops		0.02	0.00		0.02
Other Shellfish			0.02		0.02
Tope	0.01	0.01			0.02
Mixed Squid / Octopus		0.02			0.02
Sea Breams	0.01	0.00			0.01
Cuttlefish	0.00		0.00	0.01	0.01
Porbeagle		0.01			0.01
Common Mora	0.01				0.01
Greater Weever				0.01	0.01
Dogfish	0.01				0.01
Grand Total	70006	71287	77239	71102	289634

Table 15. Species making up >5% of landings in each year for each gear type. Species are designated 'main' retained species if they make up >5% of landings in 3 or 4 of the years. Note: gear type 'TR2 pair trawl' is present in 2014 data only, so the main retained species from this year only have been used.

Mesh size	Gear type	2011	2012	2013	2014	Main retained species
TR1	Danish seine	Cod, whiting	Cod, whiting	Cod, whiting	Cod, whiting, hake	Cod, whiting
	Pair trawl	Cod, whiting, *Nephrops*, hake	Cod, whiting, saithe, monkfish	Cod, whiting, saithe, hake	Cod, whiting, saithe, hake	Cod, whiting, saithe, hake
	Scottish seine	Cod, whiting	Cod, whiting	Cod, whiting	Cod, whiting	Cod, whiting
	Single trawl	Cod, saithe, whiting, monkfish	Cod, saithe, whiting, monkfish	Cod, saithe, whiting, monkfish, plaice	Cod, saithe, whiting, monkfish, *Nephrops*	Cod, saithe, whiting, monkfish
	Twin Trawl	Cod, saithe, whiting, monkfish, plaice, ling, megrim	Cod, saithe, whiting, monkfish, plaice, ling, megrim	Cod, saithe, whiting, monkfish, plaice, ling	Cod, saithe, whiting, monkfish, plaice, ling, *Nephrops*	Cod, saithe, whiting, monkfish, plaice, ling
TR2	Single Trawl	*Nephrops*, whiting, monkfish	*Nephrops*, whiting, monkfish	*Nephrops*, whiting, monkfish	*Nephrops*, whiting, monkfish	*Nephrops*, whiting, monkfish
	Twin Trawl	*Nephrops*, whiting, monkfish	*Nephrops*, whiting, monkfish	*Nephrops*, whiting, monkfish	*Nephrops*, whiting, monkfish	*Nephrops*, whiting, monkfish
	Pair Trawl				*Nephrops*, whiting	*Nephrops*, whiting

Table 16. Species making up 2-5% of landings in each year for each gear type. Species are 'main' retained species if they make up >2% of landings in 3 or 4 of the years AND are considered vulnerable.

Mesh size	Gear type	2011	2012	2013	2014	vulnerable? (See Table 17)	Additional main retained species
TR1	Danish seine	Monkfish, hake	None	Saithe	Saithe, monkfish, ling, megrim	N/A	None
	Pair trawl	None	None	None	None	N/A	None

Mesh size	Gear type	2011	2012	2013	2014	vulnerable? (See Table 17)	Additional main retained species
	Scottish seine	Saithe, hake, megrim	None	Saithe	Saithe, hake	Saithe: no	None
	Single trawl	Plaice, ling	Hake, plaice, ling, megrim	Ling, megrim	Hake, plaice, ling, megrim	Plaice: no; ling: no; megrim: no	None
	Twin Trawl	*Nephrops*	*Nephrops*, hake	*Nephrops*, megrim	Megrim	*Nephrops*: no	None
TR2	Single Trawl	None	None	Saithe, witch	Saithe, witch	N/A	None
	Twin Trawl	Witch	Witch	Witch	Witch	Witch: no	None
	Pair Trawl	-	-	-	Cod, monkfish	Cod: no; monkfish: no	None

Table 17. Analysis of vulnerability for species which are 2-5% of landings for a given gear in 3 or 4 of the years 2011-2014 (as per Table 16 above).

Species	FishBase vulnerability (out of 100)	Stock status	Management in place?	Conclusion: particularly vulnerable to fishing pressure?
Saithe	59	At target	Yes	No
Plaice	71	Above target	Yes	No
Ling	77	Increasing trend	Yes (data deficient)	No
Megrim	54	Above target	Yes	No
Nephrops	N/A – qualitatively not very	Depends on FU	Yes	No
Witch	68	Increasing trend	Yes (data deficient)	No
Cod	67	Depleted	Yes – strict controls	No
Monkfish	72	Increasing trend	Yes (data deficient)	No

The stock status and management situation for each of the 'main' retained species is given in

Table 18. Relevant *Nephrops* Functional Units (FUs) were selected by review of the overlap of the functional units (Figure 15) with the fishing area (Figure 1); however, the Norwegian Deep functional unit was not included because UK landings are reported to be zero by ICES (2015b).

Table 18. Revised list of main retained species – stock status and management.

Species	Stock	Status	Management	Applies to	Ref
Cod	North Sea	F>FMSY; Blim<B<Btrigger	EU-Norway recovery/management plan	All TR1	ICES (2015d)
Saithe	North Sea / W. Scotland	F~=FMSY; B~=Btrigger	EU-Norway management plan	TR1 trawls	ICES (2015e)
Whiting	North Sea	F>Fmgt; B>Blim (no target defined)	EU-Norway management strategy (Fmgt=0.15)	All	ICES (2015f)
Hake	Northern stock	F>FMSY; B>>MSYBtrigger	Management plan exists but ICES consider precautionary ref. points 'no longer appropriate' given recent massive increase in biomass; advice given following MSY approach	TR1 pair trawl	ICES (2015g)
Monkfish	North Sea / W. Scotland NB: two species conflated	Survey stock size indicator increasing since 2011	Framework for category 3 data deficient stocks	TR1 and TR2 single and twin trawls	ICES (2015h)
Plaice	North Sea and Skaggerak	F=~FMSY, B>>MSYBtrigger	EU management plan (Regulation 676/2007)	TR1 twin trawl	ICES (2015i)
Ling	'Other areas' (IIIa, IV, VI-IX, XII, XIV)	Reference fleet (Norway longline) CPUE indicator increasing since 2003	Framework for category 3 data deficient stocks	TR1 twin trawl	ICES (2015j)
Nephrops	Fladen Ground	F<FMSY, B>Btrigger	MSY approach	TR2	ICES (2015b)
	Devil's Hole	Stock size declining – no quantitative assessment available	Approach for data-limited stocks	TR2	ICES (2015b)
	Moray Firth	F>FMSY; B>Btrigger	MSY approach	TR2	ICES (2015b)
	Firth of Forth	F>FMSY; B>Btrigger	MSY approach	TR2	ICES (2015b)

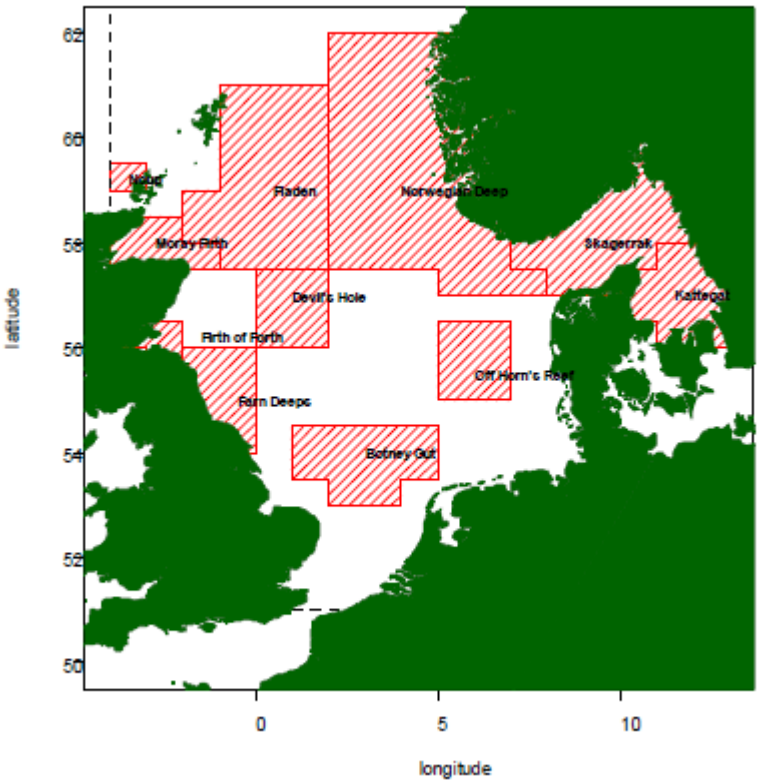


Figure 15. *Nephrops* functional units as defined by ICES

2.2.3.2 Discards

The reformed CFP includes a 'landings obligation' for quota species. This is due to take effect for demersal whitefish and *Nephrops* fisheries from January 2016, but it has been agreed that it will be phased in over the period 2016-2019 (although as of August 2015, final agreement from the European Commission on this point was still pending). Marine Scotland proposes that it will work in the North Sea as follows: From 1 January 2016, TR1 vessels will be required to land all haddock, plaice and northern prawn, and TR2 vessels will be required to land all *Nephrops*, common sole and northern prawn. Further species will be added in 2017 and 2018, and from 2019, the landings obligation will be fully phased in – i.e. all vessels will have to land all catches of quota species unless an exemption applies. Some exemptions (*de minimis* or high survival) have been applied for, but none that affect this fishery significantly[6]. Note that cod has not been included in the landings obligation for 2016, because it is incompatible with the Cod Recovery Plan (CRP) as it currently exists; EU Member States have agreed that cod will be added once the CRP has been removed or revised.

It is clear that the landings obligation is also incompatible with the regulations on Minimum Landing Size (MLS). It is proposed that MLS are changed to 'minimum conservation reference sizes' but it is unclear what, if any, role they will play in regulation.

[6] See http://www.gov.scot/Topics/marine/Sea-Fisheries/discards/demersal

Discards are evaluated by Marine Scotland via two observer programmes, one run by MSS and one run by SFF. Formerly these were separate but now they are integrated, and all the data goes to MSS. Discards are mainly of the main commercial species – cod, haddock, saithe and whiting – mainly because of size but also at times because of quota limitations – this will presumably be phased out from next year, starting with haddock (assuming the Commission accept Marine Scotland's proposals). MSS analyse the data and contribute them to ICES stock assessments.

2.2.3.3 ETP species

As part of the observer programme, any bycatch of vulnerable species is reported on a 'PETS (protected, endangered and threatened species) bycatch recording sheet'. This includes the species in Table 19. The total PETS data set for the North Sea for 2014, covering 47 trips, and for 2015 up to September, covering 63 trips, is given in

Table 20.

The interactions with ETP are overwhelmingly with elasmobranchs. These species have been classified ETP where they are forbidden from being retained (rather than 0 TAC) by EU fisheries regulations (Regulation 2015/104), either in the North Sea (e.g. starry ray) or in general. For those which are not covered by MSC's definition of 'ETP', they may be designated as 'main' bycatch species on the basis of vulnerability, even if they represent <2% of the total catch, if the assessment team can make a 'plausible argument' that they are vulnerable to this fishery. This evaluation by the team is summarised in Table 21**.**

The one non-elasmobranch ETP species is the grey seal (*Halichoerus grypus*), which is protected under the Marine (Scotland) Act 2010 (they may not be killed except by licence or to relieve suffering).

ETP species interacting with this fishery have been determined to be i) species in the common skate complex (*Dipturus batis*, *D. flossada* and *D. intermedia*); ii) starry ray (*Amblyraja radiata*), iii) porbeagle (*Lamna nasus*) and iv) grey seal (*Halichoerus grypus*).

Table 19. Species included in the PETS recording scheme

Bony fish	Elasmo-branchs	Turtles	Marine mammals	Birds
Sea lamprey (*Petromyzon marinus*) River lamprey (*Lampetra fluviatilis*) Sturgeon (Acipenseridae) Twaite shad (*Alosa fallax*) Allis shad (*Alosa alosa*) Moonfish/opah (*Lampris guttatus*) Sunfish (*Mola mola*) Tuna (*Thunnus* spp) Swordfish (*Xiphias gladius*) Sailfish (*Istiophorus platypterus*) Oarfish (*Regalecus glesne***)** Dealfish (*Trachipterus arcticus*)	All species	All species	All species	Divers (Gavidae) Grebes (Podicipedidae) Cormorants (Phalacrocorocidae) Ducks, geese and swans (Anatidae) Auks (Alcidae)

Salmon (*Salmo salar*)				

Table 20. All species recorded by observers on the PETS bycatch recording sheets for 2014, covering 47 North Sea trips, TR1 and TR2, and for 2015 to September, covering 63 trips. Species ordered by total number dead.

Species		2014		2015		Categori-sation	Main?
Common name	Scientific name	Alive	Dead	Alive	Dead		
Starry ray	*Amblyraja radiata*	1	67			ETP	
Cuckoo ray	*Leucoraja naevus*	3	45	16	1	Bycatch	No
Spurdog	*Squalus acanthias*	19	38	8		Bycatch	
Lesser-spotted dogfish	*Scyliorhinus canicula*	12	32		4	Bycatch	No
Flapper skate*	*Dipturus intermedia*	1	15	10	15	ETP	
Starry smoothhound	*Mustelus asterias*	7	5	2	10	Bycatch	No
Common skate*	*Dipturus batis*	4	1	3	2	ETP	
Blue skate*	*Dipturus flossada*		1	1	1	ETP	
Thornback ray	*Raja clavata*				2	Bycatch	No
Grey seal	*Halichoerus grypus*		1	1		ETP	
Shagreen ray	*Raja fullonica*			1	1	Bycatch	No
Rabbit ratfish	*Chimaera monstrosa*		1			Bycatch	No
Blonde ray	*Raja brachyura*				1	Bycatch	No
Six-gilled shark	*Hexanchus griseus*				1	Bycatch	No
Porbeagle	*Lamna nasus*	1				ETP	
Skates nei	Rajidae	1				-	-

* Part of the common skate species complex; all previous classified as *D. batis*

Table 21. For the bycatch (non-ETP species) in Table 20, the team's conclusion as to whether they should be designated 'main' on the basis of their vulnerability to this fishery.

Bycatch species	Main?	Reason	Ref
Cuckoo ray	No	North Sea stock size above long-term average	ICES (2015k)
Spurdog	No	Depleted but evidence of recovery in biomass and recruitment; $F<F_{MSY}$	ICES (2014l)
Lesser-spotted dogfish	No	Survey abundance index increasing since mid-1990s	ICES (2015l)
Starry smoothhound	No	Survey abundance index increasing since mid-1990s	ICES (2015m)
Thornback ray	No	Interaction rate very low	N/A
Shagreen ray	No	Interaction rate very low	N/A

Bycatch species	Main?	Reason	Ref
Ratfish	No	Interaction rate very low	N/A
Blonde ray	No	Interaction rate very low	N/A
Six-gilled shark	No	Interaction rate very low	N/A

2.2.3.4 Changes in P2 management

Gear changes

There have been no changes to the regulations on mesh sizes, square-mesh panels etc. The mesh-size requirements are still defined by EU Regulation 850/1998. The client noted, however, that most TR1 vessels now use a mesh-size slightly above 120mm, to eliminate any compliance risk. Some TR2 vessels have moved up to mesh-size >100mm, to give better selectivity. Nearly all the TR2 vessels are twin-rig, with the exception of some small inshore vessels.

Area closures

Three sets of measures are in place which result in temporary area closures, as follows:

- Real-time closures in areas with high cod catches (Scottish measure, applies to Scottish and English vessels although other nationalities often respect them; allows effort to be re-allocated to Scotland by the Commission under the CRP and the 'conservation credits' scheme);
- Seasonal closures to protect cod spawning aggregations (Scottish measure);
- Juvenile closures in areas of high catches of cod, haddock, saithe or whiting <MLS (EU/Norwegian measure).

Real-time closures are 15x15 nautical miles, last 21 days and can be designated in several ways:

- If a vessel is boarded and shown to have caught a large quantity of cod;
- Via skipper notification of a cod high-density area;
- For each closure period, the top 10 areas recording landings of cod (from e-logbooks) are closed.

Catch quota scheme

The catch quota scheme still exists but now applies only to cod – it had to be abandoned for other species because catches were too high.

Observer programmes

The SFF observer programme, which was just starting at the time of the initial assessment, has now been operational for nearly seven years. From 2008-2012, the programme focused on cod, plaice and sole and on a subset of vessels, because it's main objective was to provide information in support of the Conservation Credits scheme, which in turn focused on the EU recovery plans (in particular, the cod recovery plan). Since 2012, however, the

programme has considered all species, and has followed the same protocol as the Marine Science observer programme, based on stratified random sampling of the whole fleet. This allows the SFF data to be added to the Marine Scotland database. The Scottish Industry Discards Initiative (SIDI) is investigating self-reporting observations and also contributes to fund additional observer trips organised by Marine Scotland Science.

Protected areas

The situation in relation to protected areas has moved on significantly since this fishery was first certified in 2010. The programme of designating sites under the EU Natura 2000 scheme (SACs, SPAs; designated under the Habitats or Birds Directive) has continued, with three new candidate sites added. (One minor change is that candidate SACs/SPAs are now initially designated as 'Sites of Community Importance' – SCIs, before being finally designated as SACs/SPAs.) A new, UK programme of designating marine protected areas has also been put in place, aimed at protected threatened habitats and species listed under OSPAR. In Scottish waters these are called Nature Conservation Marine Protected Areas (NCMPAs), and in English waters they are called Marine Conservation Zones (MCZs). The management measures to be put in place in these MPAs are still under discussion with stakeholders. The NCMPAs in Scottish waters are shown in Figure 16; all relevant protected areas (NCMPAs, MCZs, SCIs) are listed in Table 22. No final decisions on management of the offshore MPAs have been taken; JNCC, in consultation with Marine Scotland, have prepared a 'management options paper' for each site, which is intended to serve as a basis for stakeholder consultation, which is ongoing. The conclusions of this paper for each site, in relation to demersal fishing, are summarised in Table 23.

Table 22. All protected areas relevant to this fishery and their features and status. Relevant areas identified by cross-reference with Figure 1. Information on NCMPAs available at http://jncc.defra.gov.uk/page-5269 (follow links for each site).

Protected area	Type	Features	Status
Central Fladen (CFL)	NCMPA	Burrowed mud (habitat) Quaternary sub-glacial tunnel valley (geomorphological)	Designated by Central Fladen MPA Order 2014(b); in force from 7 Aug. 2014
East of Gannet and Montrose Fields (EGM)	NCMPA	Ocean quahog (*Arctica islandica*) aggregations (species) Offshore subtidal sand and gravel (quahog habitat) Offshore deep-sea muds (habitat)	Designated by East of Gannet and Montrose Fields Marine Protected Area Order 2014(b); in force from 7 Aug. 2014
Firth of Forth Banks complex (FOF)	NCMPA	Ocean quahog (*Arctica islandica*) aggregations (species) Offshore subtidal sand and gravel (habitat) Shelf banks and mounds (large-scale feature) Quaternary moraines (geomorphological)	Designated by Firth of Forth Banks Complex Marine Protected Area Order 2014(b); in force from 7th August 2014
Norwegian	NCMPA	Ocean quahog (*Arctica islandica*)	Designated by Norwegian

Boundary Sediment Plains (NSP)		aggregations (species) Offshore subtidal sand and gravel (quahog habitat)	Boundary Sediment Plains Marine Protected Area Order 2014(b); in force from 7th August 2014
North-West Orkney (NWO)	NCMPA	Sandeels (species) Sand bank, sand wave fields, sediment Wave fields (geomorphological)	Designated by North-West Orkney Marine Protected Area Order 2014(b); in force from 7th August 2014
Turbot Bank (TBB)	NCMPA	Sandeels (species)	Designated by Turbot Bank Marine Protected Area Order 2014(b); in force from 7th August 2014
Braemar Pockmarks	cSAC/SCI	Submarine structures made by leaking gas (methane seeps / carbonate deposits)	SCI since December 2009; not yet designated SAC
Scanner Pockmark	cSAC/SCI	Submarine structures made by leaking gas (methane seeps / carbonate deposits)	SCI since December 2009; not yet designated SAC
Pobie Bank Reef	cSCI	Reef (bedrock / stony outcrops); also harbour porpoise; grey and common seal	Proposed as SCI in Oct. 2012
NE of Farnes Deep	MCZ	Subtidal coarse sediment (habitat) subtidal sand (habitat)	North East of Farnes Deep Marine Conservation Zone Designation Order 2013; in force from 12 Dec. 2013
Swallow Sand	MCZ	Subtidal coarse sediment (habitat) subtidal sand (habitat) glacial tunnel valley (geomorphological)	Swallow Sand Marine Conservation Zone Designation Order 2013; in force from 12 Dec. 2013

There are various protected areas in Norwegian waters to protect cold-water coral reefs, but none which are in the area relevant to this fishery according to Figure 1 and http://www.imr.no/english/__data/page/6335/Marine_protected_areas_in_Norway.pdf.

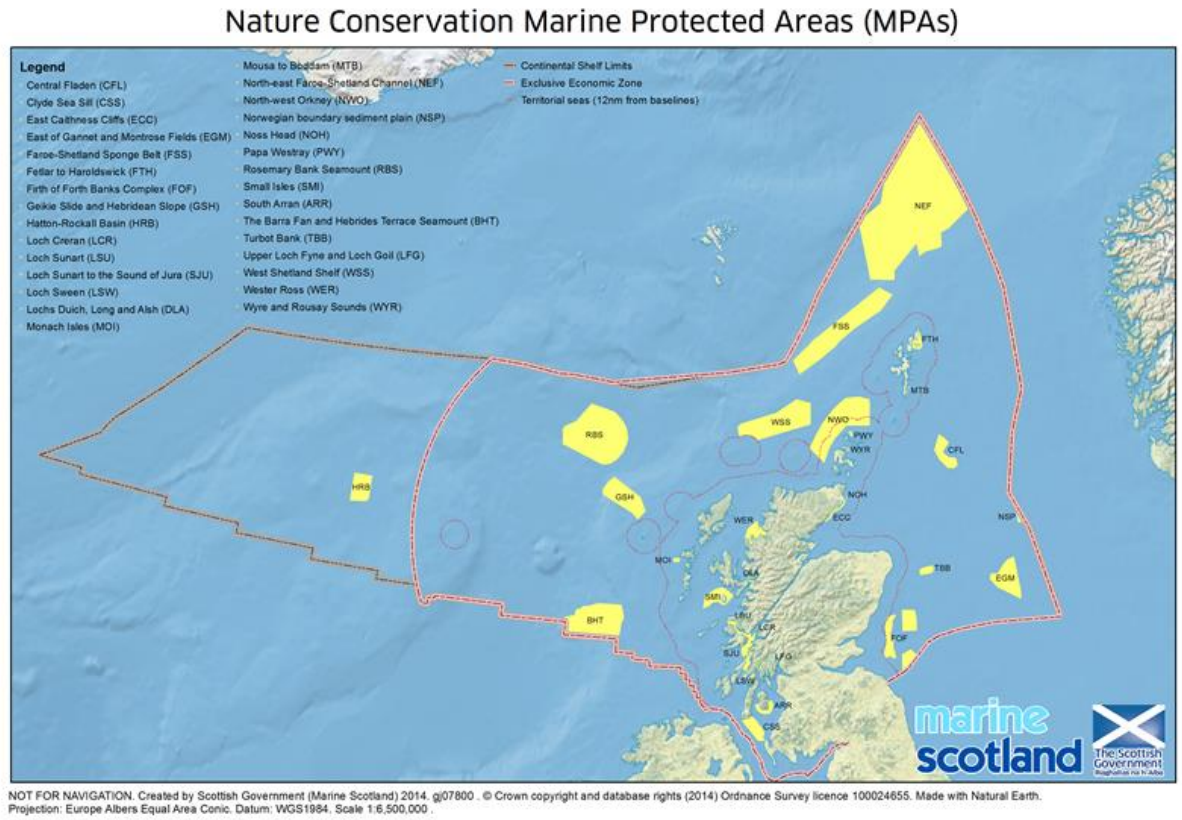


Figure 16. NCMPAs in Scottish waters.

Table 23. Summary of JNCC / Marine Scotland management options for fisheries for each NCMPA – intended as a basis for discussion with stakeholders. Available at http://jncc.defra.gov.uk/page-5269 (follow links for each site).

Protected area	Option for demersal towed gears		
	Do nothing	Reduce or limit	Eliminate
Central Fladen (CFL)	Significant risk of not meeting conservation objectives for burrowed mud	Suggest closure and/or reduction in effort for parts of the site	High probability of meeting conservation objectives
East of Gannet and Montrose Fields (EGM)	Risk of not meeting conservation objectives for ocean quahog and burrowed mud	For quahog suggest reducing/eliminating hydraulic and scallop dredging, for mud suggest closing parts of the site on a temporary or permanent basis	High probability of meeting conservation objectives
Firth of Forth Banks complex (FOF)	Risk of not meeting conservation objectives for ocean quahog and subtidal sand and gravel	For quahog as above; for sand/gravel suggest zoning as for burrowed mud above	High probability of meeting conservation objectives if trawling and dredging are restricted
Norwegian	Risk of not meeting	Restrict dredging as above	High probability of

Boundary Sediment Plains (NSP)	conservation objectives for ocean quahog		meeting conservation objectives if trawling and dredging are restricted
North-West Orkney (NWO)	Fishing not considered an issue of concern		
Turbot Bank (TBB)	In relation to fishing, only sand eel fishery considered an issue of concern		

National Marine Plan

In 2015, Marine Scotland published Scotland's National Marine Plan (see http://www.gov.scot/Resource/0047/00475466.pdf), which includes the development of an ecosystem approach to marine planning and management and a series of objectives around 'good environmental status', as well as a section on fisheries management in this ecosystem context.

2.2.4 Principle 3: Management System Background

The jurisdictional category for this fishery is 'shared stock'. The haddock stock covers ICES Subareas IV and VI, and Divisions IIIa and (the very south of) IIa. Management is shared between the EU and Norway, on the basis of an agreed common management plan.

2.2.4.1 Governance and Policy

EU management framework:

The European Common Fisheries Policy (CFP), which provides the overarching legal framework for the management of this fishery, has been reformed since first certification. The CFP Regulation[7] has direct effect in EU member states (MS) legal systems, but MS may introduce additional fisheries and marine ecosystems management measures at national and local levels. The CFP has 4 policy areas, Conservation, Trade, International (access agreements) and Funding (European Maritime and Fisheries Fund EMFF).

On behalf of its MS, and as part of the CFP international policy area, the EU promotes better international governance and participates to the bodies established under the UN Convention on the Law of the Sea (UNCLOS) and the UN Fish Stock Agreement (UNFSA), the UN Conference on Sustainable Development (Rio+20), notably COFI the FAO Committee on Fisheries (Food and Agriculture Organisation) and regional fisheries management organisations (RFMOs).

The CFP commits the European Union the provision of international conventions and agreements. The most relevant for this fishery are:

- To base the sustainable exploitation of marine biological resources on the precautionary approach, which derives from the precautionary principle referred to in the first subparagraph of Article 191(2) of the (European) Treaty, taking into account available scientific data;
- Exploitation of marine biological resources that restores and maintains populations of harvested stocks above levels that can produce the MSY by 2015 or no later than 2020;
- Coherence with the fisheries targets laid down in the Decision by the Conference of the Parties to the Convention on Biological Diversity on the Strategic Plan for Biodiversity 2011 – 2020, and with the biodiversity targets adopted by the European Council of 25 and 26 March 2010;
- To contribute to the protection of the marine environment and in particular to the achievement of good environmental status by 2020, as set out in Article 1 of Directive 2008/56/EC of the European Parliament and of the Council (the MSFD); and
- To implement an ecosystem-based approach to fisheries management, limit environmental impacts of fishing activities, avoid and reduce unwanted catches as far as possible.

7 Regulation (EU) No 1380/2013 of the European Parliament and the Council of 11 December 2013 on the Common Fisheries Policy

Alongside the CFP, the 'Birds' Directive 2009/147/EC of the European Parliament and of the Council[8], the 'Habitat' Council Directive 92/43/EEC[9] and the 'MSFD' impose certain obligations on MS as regards special protection areas, special areas of conservation and marine protected areas, respectively. The EU and UK are parties to the OSPAR Convention for the Protection and conservation of the North-East Atlantic and its resources; the UK (and several other MS but not the EU) is party to the Agreement on the Conservation of Small Cetaceans in the Baltic, North East Atlantic, Irish and North Seas (ASCOBANS) since 1993.

The following new CFP requirements are introduced progressively:

- To manage stocks to MSY-based target reference points
- The phased introduction of a landings obligation (also known as a discard ban),
- To manage by multi-annual and multi-species management plans,
- To devolve management to the most appropriate level (e.g. national, regional) and
- To manage by output (e.g. total catch, exploitation rate) rather than technical measures.

In practice, ICES has been transitioning to an MSY reference point framework for several years, and management of this fishery is based on an F_{MSY} target. Technical measures remain in place (EU Regulations 850/1998 and 227/2013) and for the moment there are reportedly no plans to remove them.

The landings obligation implies significant changes to the management framework for this fishery, since it is incompatible or semi-incompatible with several existing fundamental management measures, including minimum landings sizes (which will become 'minimum conservation reference sizes' although it is not clear what they will actually be for), the cod recovery plan, management by zero TACs (such as for spurdog) and fixed annual quotas. The landings obligation is due to be introduced in this fishery on 1 January 2016, and for North Sea demersal fisheries the 'Scheveningen Group' of the Member States made its final joint recommendation in June 2015 (NSAC, 2015). The NWWAC also issued a joint recommendation by the member states concerned by certain demersal fisheries including haddock, shortly to be published as European Commission Delegated Regulation (EC, 2015).

In Scotland, the Scottish Industry Discard Initiative (SIDI; representing the industry and POs), formed to lead the industry response to the implementation of the landings obligation, and commissioned a large number of additional observer trips in 2015 coordinated by Marine Scotland.

8 Directive 2009/147/EC of the European Parliament and of the Council of 30 November 2009 on the conservation of wild birds (OJ L 20, 26.1.2010, p. 7).

9 Council Directive 92/43/EEC of 21 May 1992 on the conservation of natural habitats and of wild fauna and flora (OJ L 206, 22.7.1992, p. 7).

Scottish management framework:

At the time of certification, the Marine (Scotland) Act (2010) had just come into force. This Act created Marine Scotland out of the existing separate management, enforcement and science bodies, and gave it wide-ranging powers not only over fisheries but also other issues relating to the marine environment, including marine spatial planning, renewables etc. For our purposes, Marine Scotland (an Executive Agency of the Scottish Government) is concerned with policy and administrative matters, and its sub-organisations Marine Scotland Compliance (formerly the Scottish Fisheries Protection Agency, SFPA) is responsible for control and surveillance, and Marine Scotland Science (formerly FRS Aberdeen Marine Labs) in charge of data collection and stock assessment.

EU-Norway framework:

This stock is shared between the EU and Norway and managed on the basis of a joint management plan. ICES evaluated the original plan for the North Sea (IVa) and West Skagerrak (IIIa) in 2007 and the revised plan in 2008 (which allowed for inter-annual catch variation, or "banking and borrowing" of quota), and concluded that the plan could be accepted as precautionary and used as the basis for advice. In 2014 (see Section 2.2.2.6), ICES revised the stock definition merging haddock in Division VIa (West of Scotland) with haddock in subarea IV (North Sea) and Division IIIa West. A condition was therefore imposed on this fishery at the 4th annual surveillance audit to update the management plan such that it can be shown to be precautionary at the level of the whole stock. In the meantime, EU and Norway delegations met in December 2014 in Clonakilty (Ireland) and agreed the overall 2015 TAC and a split 9.5% (VIa) - 90.5% (IV-IIIa) between the two previously separate components (EU-Norway, 2014). A new version of the joint management plan is due for review to take the stock extension to West of Scotland (VIa) into account.

2.2.4.2 Consultation, roles and responsibilities

The Scottish Fisheries Council no longer exists. Consultation between the industry and the Scottish government is through the FMAC framework (Fisheries Management and Conservation – the co-management body that underpins the Conservation Credits scheme), which meets four times per year. At the EU level, the RAC (now NSAC) operates as before.

2.2.4.3 Objectives

Long-term objectives for P1 and P2 are provided by the (reformed) CFP and the MSFD. Fishery-specific objectives are being carried over from the EU-Norway management plan.

2.2.4.4 Incentives for sustainable fishing

In 2013, Marine Scotland launched an Action Plan to support the fleet's adaptation (TR2 in particular) to discard free operations with a £6 million Fund, including a £3 million hardship fund. The purpose of the hardship fund was to offer financial assistance to fishing vessels facing exceptional stresses on their viability as a direct or indirect result of the very large reductions in prawn catches experienced during 2013. All assistance financial schemes, and

individual projects within them, are closely scrutinized at UK and EU level for their compliance with state aid rules, and against potential environmental impacts in particular through national report to the European Commission regarding fleet size and fishing capacity[10].

2.2.4.5 Fishery-specific management system

The Scottish management system is based on a co-management and shared decision-making, between government (Marine Scotland) including policy makers, administrators, scientists and MCS teams, industry (catching and processing sectors) through their representatives and environmental and other NGOs sitting on the FMAC. FMAC meets quarterly, with specific additional task groups meetings as required. The EU CFP management institutions delegates some powers to member states, in this case the UK. Defra is the government department responsible. In turn, for Scotland the UK has devolved most fisheries management powers to the Scottish Government. Marine Scotland is the directorate responsible for marine and fisheries issues in Scotland. Although FMAC is an advisory body, decisions are taken by consensus when possible, and when not possible, alternative recommendations are made to the Cabinet Secretary for Rural Affairs and the Environment for a political arbitration.

Marine Scotland manages Scotland's shares of the EU-determined TACs through landing and effort (days at sea) quota to maximise profitability and contribute to the Scottish Government's purpose of sustainability. Quota management is done in conjunction with all Scottish Fish Producer Organisations (POs) concerned.

Marine Scotland (Compliance) is responsible for all monitoring, control and surveillance (MCS) of Scottish vessels and within Scottish waters. A high degree of enforcement and control was introduced with the SCCS (Marine Scotland, 2015c) including increased inspection of landings, regular inspections at sea, and the monitoring of fleet activity by aerial surveillance and satellite VMS (Vessel Monitoring System). These activities contribute to the CFP Monitoring Control and Surveillance (MCS) system coordinated through the EU Fisheries Control Agency based now based in Vigo, Spain. Performance against national and CFP targets, including details of infringements and prosecutions, is reported on an annual basis. The shared management generally decreases compliance problems. In particular Marine Scotland Compliance contacted during the site visit note that:

- Across the majority of areas of haddock abundance in area IV, they continue to have a high degree of confidence that the TR1 fleet meets or exceeds the statutory fishing gear rules required, as well as operating within days at sea limits, both which help to limit haddock discards;

- For the TR2 fleet, the introduction of highly selective gear (HSG) has had a positive impact on reducing fish discards, including haddock, when targeting *Nephrops*. MSC continues to contribute to the development and testing of gear options that may deliver even greater selectivity across this TR2 fleet.

[10] http://ec.europa.eu/fisheries/cfp/fishing_rules/fishing_effort/index_en.htm

Marine Scotland (Compliance) also flagged two compliance concerns with the haddock fishery:

1. Misreporting of the area of capture, typically between areas IVa and VIa and/or from Rockall to area Iva;
2. The 'Aberdeen Bank' haddock fishery presents one area of concern. Our experience to date gives Marine Scotland Compliance the impression that this fishery tends to be a bulk fishery, with or without the illegal use of blinders which we believe some operators have used from time to time, creating significant haddock discards (due to 'high' or 'low' grading and/or lack of hold capacity). Generally, high grading, in which crews retain the marketable sizes of haddock, which they believe will attract the highest sale price. This is most starkly illustrated in the North Sea (Fladen) *Nephrops* fishery where the 'prawn' fleet typically catches more haddock than it holds quota for, and/or which the catch composition rules (min. 30% prawns) allow vessels to land.

Marine Scotland (Compliance) regards the second issue as a high priority, and they are currently exploring new initiatives to better evaluate the extent of it, deter and detect it. Joint industry/government discussions are on-going with regard to the possible introduction of a 'move on' scheme in the Aberdeen Bank discreet fishery (FMAC, 2015).

Marine Scotland (Science) collaborates to ICES data collection and scientific advice for the haddock stocks (Principle 1) with a strong collaboration with the vessels active in the fishery. The Scottish Industry Science Partnership is now called the Fishing Industry Science Alliance (FISA, Marine Scotland 2015a). It operates in the same way, through the funding of research projects undertaken by/with individual fishing vessels, currently focusing on Principle 2 issues in particular in order to prepare for the landing obligation coming into force on 1st January 2016. Some research is also done on Principle 3 aspects (Marine Scotland 2013b, Seafish 2015).

2.3 Previous assessments

2.3.1 Summary of previous assessment

The SFSAG Haddock fishery initially entered assessment on the 17th January 2008. The fishery was certified on the 25th October 2010 by Intertek Fisheries Certification (IFC) with three conditions raised (see details in Table 24). The overall principle scores were as follows:

MSC Principle	Fishery Performance
Principle 1: Sustainability of Exploited Stock	Overall: 93
Principle 2: Maintenance of Ecosystem	Overall: 83
Principle 3: Effective Management	Overall: 95

The Intertek assessment team identified the following key strengths and weaknesses of the fishery management as follows;

Principle 1: The North Sea haddock fishery seems to be well managed by means of the joint EU-Norway Management Plan. The plan appears to be working well and will be reviewed at the end of 2009. The main difficulty with haddock is the large and unpredictable variation in year class strength and recruitment which means that at any one time the fishery can be largely dependent on a single year class. Strict management controls are therefore needed to ensure that good year classes, when they occur, are harvested sustainably.

Principle 2: two (cod and whiting) of the five main retained by catch species are currently outside biological limits but there are currently effective management strategies to assist their recovery. These two species, as well as the more abundant saithe, grey gurnard and the spotted dogfish may also be discarded. There is no significant interaction with ETP species. Whilst it is recognised bottom trawling is likely to affect benthic habitats, this fishery is unlikely to cause further reduction in the habitat structure and function to a point where there would be serious or irreversible harm.

Principle 3: The SFSAG North Sea haddock fishery is a well-run, tightly managed fishery with a well-established and understood management regime that is clearly understood by all the key players engaged in the fishery, which is itself subject to close surveillance and monitoring ensuring a high level of compliance. There are good lines of two-way communication between the management and catching sectors and the catching sector is fully engaged in the relevant research programmes. All aspects of the fishery, its management and corresponding research are subject to regular and comprehensive review. Following the initial assessment, the following surveillance audits were also completed.

After the initial certification, the following audits were completed on the fishery;

Year 1 Surveillance Audit: Completed on the 21st October 2011, the first annual surveillance audit found that the conditions raised against 2.1.2 and 2.2.2 had made good

progress (were 'on target'). The condition raised against 2.1.3 was closed. Certification was maintained.

Year 2 Surveillance Audit: Completed on the 22nd October 2012, the second annual surveillance audit found that the conditions raised against 2.1.2 and 2.2.2 could now be closed. Certification was maintained.

Year 3 Surveillance Audit: Completed on the 22nd October 2013, the third annual surveillance audit recommended that certification be maintained (All existing conditions had now been closed out).

Year 4 Surveillance Audit: Completed on the 10th November 2014, the fourth annual surveillance audit concluded that a new condition should be raised against PI 1.2.2. (This discussed in more detail in Section 2.3.2). Certification was maintained.

A summary of all the conditions raised and closed are provided in Table 24 (including the justification and Year of closure for each).

Table 24. Summary of Previous Assessment Conditions

Condition	PI	Year closed	Justification
The client shall ensure that there is a partial strategy in place that is expected to maintain both retained species at levels which are highly likely to be within biologically-based limits, or to ensure the fishery does not hinder their recovery and rebuilding. To achieve this outcome, it is recommended that the SFSAG fleet should continue to collaborate proactively with research and development organisations engaged in seeking gear improvements aimed at reducing unwanted by-catch (both commercial and non-commercial) and other adverse environmental effects. On the basis of this joint research, the client fleet should, in consultation with both statutory and non-statutory organisations, adopt suitably selective gear to reduce discard levels of both whiting and cod. Evidence should be provided by the first annual surveillance there is a partial strategy in place that is expected to maintain the main retained species at levels which are highly likely to be within biologically based limits, or to ensure the fishery does not hinder their recovery and rebuilding. This will include verifiable information on selectivity and gear performance measured against current benchmark levels, which will be formally assessed at the third surveillance audit.	2.1.2	2012 (Year 2 Surveillance Audit)	The client has met the condition at this second surveillance point. The partial strategy is in place and improved selectivity measures have been, and continue to be, adopted. Evidence on improvements in selectivity and gear performance as measured against current benchmark levels will be reported at the third surveillance audit. The requirements of this condition have been met. The score for cod, as indicated in the original assessment is 100, for other scoring components (saithe, monkfish and notably whiting) the score is increased to 80. This PI is now rescored at 85 and the condition is closed.
By the first surveillance audit, evidence must be presented that shows that measures have been developed to provide some accurate quantitative information on total catch (i.e. retained plus discarded catch) of all retained species.	2.1.3	2011 (Year 1 Surveillance Audit)	Information on total catch collated via bespoke paper system, now superseded by on-going collection by e-logbook. Condition closed
Members of the client group will continue to participate extensively in the development and trial of further selective gears to reduce discards through their participation in initiatives such as the Conservation Credits scheme, a Scottish response to regional	2.2.2	2012 (Year 2 Surveillance Audit)	There is a partial strategy in place that would reduce by catch of all species through increased selectivity. By catch of spurdog has been reduced as it is now prohibited to retain or land the species, the fishery

management that promotes sustainable fishing practices, and the Scottish Industry Science Partnership (SISP), which helps fishers develop new, environmentally friendly, fishing gears. Furthermore, the group will seek to influence the on-going use and development of innovative net design and configuration of whitefish gear, Seasonal Closures (SC's), and Real Time Closures (RTC's) which together provide substantial protection for juveniles and vulnerable stocks such as cod and whiting The group will use current levels of selectivity and gear design as a benchmark from which to assess the need for further improvements; the group will deliver any necessary changes through their participation, and influence within the various stakeholder groups. It is expected that a formal partial strategy for the adoption of suitably selective gear will be in place within a year of initial certification and that there is evidence that this strategy is being implemented successfully within three years of certification.			operates to avoid known spurdog aggregations and spurdog signals on echo sounders etc... and selectivity of gear has increased. This PI is therefore rescored at 80 and the condition closed.

2.3.2 Outstanding condition

At the time of commencing the re-assessment one outstanding condition was in place for the fishery against PI 1.2.2. This condition was raised at the fourth surveillance audit by the preceding CAB, Intertek Fisheries Certification (IFC). A Variation Request was subsequently granted to allow this fishery to be assessed under the reduced reassessment criteria. The details of the outstanding condition are provided in the table below.

Condition 4	This condition was opened at the fourth surveillance audit
PI 1.2.2	Harvest control rules and tools: There are well defined and effective harvest control rules in place.
Score	75
Rationale	SIa • SG60: 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. • SG80: 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. SIb • SG80: The selection of the harvest control rules takes into account the main uncertainties. • SG100: The design of the harvest control rules takes into account a wide range of uncertainties. SIc • SG60: There is some evidence that tools used to implement harvest control rules are appropriate and effective in controlling exploitation. • SG80: Available evidence indicates that the tools in use are appropriate and effective in achieving the exploitation levels required under the harvest control rules. • SG100: Evidence clearly shows that the tools in use are effective in achieving the exploitation levels required under the harvest control rules. The 2nd annual surveillance report on the DFPO North Sea and Skagerrak haddock fishery (FCI 2014) noted the following with respect to the recent combining of the West of Scotland and North Sea and Skagerrak stocks for the purpose of the stock assessment: "With the change in stock area designation, ICES has stated that “Management plans (or management plan proposals) for Subarea IV, Division IIIaN, and Division VIa are not relevant for the newly defined stock.” (ICES 2014). However, the current harvest control rule is precautionary if applied, and will limit catches across the whole area to sustainable levels. It is unclear however, how this rule would be implemented or whether some other rule will replace it immediately. It is now no longer clear that the current harvest control rule can achieve the desired exploitation rates. Therefore, the tools in use are longer appropriate and may not be effective. It is recognised that stock delineation is complex and may need adjustment from time to time, but evidence is required that not only the scientists, but management is responding appropriately and that the harvest control rule part of the harvest strategy

	remains consistent with MSC Principles." The SFSAG North Sea haddock fishery is required to harmonise with the DFPO North Sea and Skagerrak haddock fishery, and so a condition is now also opened on the SFSAG fishery at this year 4 audit.
Condition	Harmonising a condition on the SFSAG fishery with the DFPO fishery is complicated by the fact that the DFPO fishery has just completed its year 2 annual surveillance audit, while this is the year 4 annual surveillance audit for the SFSAG fishery. Any condition and associated milestones or actions that extend beyond the SFSAG's existing 5 year certification period would need to be carried-over into a new certification, if the fishery proceeded successfully through reassessment during the time allowed for the condition (MSC CR v1.3, 27.24.2.4). New Condition 4 is set as follows: At or within 3 years of setting the condition (approximately October 2017), demonstrate that the fishery meets all the SG80 requirements of this PI. Specifically, this will be through meeting the requirements of PI 1.2.2, SG80, SIc, which requires that: "Available evidence indicates that the tools in use are appropriate and effective in achieving the exploitation levels required under the harvest control rules."
Milestones	As this is the year 4 annual surveillance audit for the SFSAG North Sea haddock fishery, it is noted that there is no standard mechanism to audit any milestones set for year 1 of this condition (i.e. at the point in 2015 at which the existing certificate ends and a new certificate would commence). As such, milestones are set only from year 2. In the event that the client demonstrates that the SG80 requirements are met in full ahead of this schedule (i.e., during reassessment (year 1) or at the year 2 audit), the fishery may be rescored and the condition closed out. Year 1 (October 2015 if concurrent certification achieved): • No milestone (end of existing fishery certificate, beginning of new certificate if reassessment successful). Year 2 (October 2016 if concurrent certification achieved): • Client to report on the management response to the change in stock designation. (Resulting score: 75). Year 3 (October 2017 if concurrent certification achieved): • Client to demonstrate that the fishery meets the PI 1.2.2 SG80 scoring issues in full (Resulting score: 80).
Client Action Plan	Under the EU Norway Agreement, parties concluded that they would begin a review of a range of species-based Long Term Management Plans, including haddock, in 2015. The SFSAG Chairman (Mike Park) as well as members of the SFSAG Group are involved in both the North Sea and NW Waters Regional Advisory Councils and will be involved in the progression of this review. SFSAG will work closely with Marine Scotland in relation to input to this review and subsequent plan taking account of ICES advice and their recent review of the existing Long Term Management Plan. It should be noted the SFSAG are not in the position to bring about their own management rule for this species. However, through close working with the relevant bodies they will input and review development of the Long Term Management Plan. The SFSAG has committed to the following Client Action Plan: Year 1 (October 2015 if concurrent certification achieved): • No milestone (end of existing fishery certificate, beginning of new certificate if reassessment successful). Year 2 (October 2016 if concurrent certification achieved): • SFSAG will provide an update of progress towards agreeing a new management Long Term management Plan. Year 3 (October 2017 if concurrent certification

	achieved): • SFSAG will show how the fishery meets the SG80 requirements of PI 1.2.2.

The team have confirmed that the scoring of PI 1.2.2 remains below the 80 level and that this condition shall remain in place under the existing Client Action Plan and Milestones. For clarity, these have been stated again under Section 5.3 of this report.

2.4 Changes to the Reporting Template that require an update

Version 1.3 of the CR

Principle One: Target Species Background (Full Assessment Reporting Template (FA Template) v.1.3, Section 3.1)

The target species (haddock) is not a key LTL species.

Principle Three: Management System Background (FA Template v.1.3, Section 3.5)

The jurisdictional category for this fishery is 'shared stock'. The haddock stock covers ICES Subareas IV and VI, and Divisions IIIa and (the very south of) IIa. Management is shared between the EU and Norway, on the basis of an agreed common management plan.

3. Evaluation Procedure

3.1 Assessment Methodologies

The fishery was assessed using FCR version 1.3 and reporting template 1.0. The default assessment tree was used with no adjustments. The RBF was not used.

3.2 Evaluation Processes & Techniques

3.2.1 Site Visits

The site visit for the fishery was held on 11-12th May 2015 in Aberdeen. The P1 and P2 experts attended the site visit, while the P3 expert was consulted remotely (although the same expert undertook the surveillance audit of the closely-related SFSAG saithe fishery for the same client on 28th September 2015). No requests for meetings by stakeholders were received – all meetings were initiated by the team. The team visited the offices of SFF and Marine Scotland Science and spoke to the following individuals during the site visit:

- Mike Parks (SFSAG, SWFPA)
- Jennifer Mouat (SFSAG)
- James-Forbes Birnie (SFF)
- Coby Needle (Marine Scotland Science)

3.2.2 Consultations

As well as the individuals met during the site visit, the following individuals were contacted by email and responded to the team:

- Valerie West (Marine Scotland Science, regarding landings data)
- Simon Dryden (Marine Scotland Compliance, regarding compliance)
- Igor Busturia-Cerezo (Marine Scotland Science, regarding observer data)

The information received has been summarised in the above review of changes to the fishery (Principle 2 and Principle 3).

3.2.3 Evaluation Techniques

a) Media announcements: MEC announced the fishery on the MSC website, through a MSC press release, which targeted a wide range of stakeholders within the sustainable seafood industry. Under version 2.0 of the MSC Certification Requirements, there is not a requirement to publish the fishery announcement elsewhere.

b) Methodology for information gathering: Review of data and documentation, interview of stakeholders. NB: Sub-sampling was not used in as much as all logbook data and all observer reports were reviewed.

c) Scoring process: Scoring was partly completed during the site visit and partly completed afterwards.

The scores were decided as follows:

How many scoring issues met?	SG60	SG80	SG100
All	60	80	100
Half	FAIL	70	90
Less than half	FAIL	65	85
More than half	FAIL	75	95

Note that where there is only one scoring issue in the SG, the issue can be partially scored – In this case the team used their judgement to determine what proportion of it was met, e.g. at the 100 level, a small part met = 85, about half met = 90, nearly all met = 95.

d) Decision rule for reaching the final recommendation:

A UoA cannot be certified if:

- the weighted average score for all PIs under each Principle is less than 80 for any of the three Principles
- any individual scoring issue is not met at the SG60 level, contributing to a score of less than 60 on any PI.

The aggregate score for each Principle is calculated by taking the average score for each Component (e.g. 1.1 – Principle 1 Outcome), followed by the average of all the Component scores (see Section 5.2).

e) Scoring elements:

For Principle 1, only one scoring element was considered, i.e. the North Sea, Skagerrak, and West of Scotland haddock stock. The set of scoring elements that were considered in the outcome PIs under retained, discarded and ETP species in Principle 2 is listed in Table 25.

Table 25. Scoring elements

Component	Gear type	Scoring elements	Main/not main	Data-deficient or not
Principle 1	All	North Sea haddock	N/A	No
Retained species	TR1 Danish seine	Cod, whiting	Main	No
	TR1 pair Trawl	Cod, whiting, saithe, hake	Main	No
	TR1 Scottish seine	Cod, whiting	Main	No
	TR1 single trawl	Cod, whiting, saithe, monkfish	Main	No

Component	Gear type	Scoring elements	Main/not main	Data-deficient or not
	TR1 twin trawl	Cod, whiting, saithe, monkfish, plaice, ling	Main	No
	TR2 single trawl	*Nephrops*, whiting, monkfish	Main	No
	TR2 twin trawl	*Nephrops*, whiting, monkfish	Main	No
	TR2 pair trawl	*Nephrops*, whiting	Main	No
	Minor species	See Table 14	Not main	-
Bycatch species	All	None	Main	-
ETP species	All	Starry ray, common skate complex, grey seal, porbeagle	n/a	No

4. Traceability

4.1 Eligibility Date

The fishery products are currently covered by the current fishery certificate, which is due to expire on the 1st May 2016. This reassessment should be completed before the expiration date so there is not a lapse in certification.

4.2 Traceability within the Fishery

This fishery is governed by the requirements of the European Union and the UK government and as a result, presents a robust traceability system.

All fishing vessels involved in this fishery are required to complete an electronic logbook of all catches that they complete during fishing activities. The vessels are also directly tracked through the use of a Vessel Monitoring System (VMS). The fishery is also enforced through the relevant jurisdictions fishery Monitoring Control and Surveillance systems and authorities. This system and the management relating to the fishery are considered to be robust and well maintained. The risk of Illegal, Unregulated and Unreported (IUU) fishing within this fishery is considered relatively low.

Upon gear hauling, fish are brought onboard and graded per length and in accordance to what is required for the destination marketplace. Fish are then placed in open containers in their graded sizes. The catch is then covered with ice to maintain the temperature of the fish. There is no processing or freezing onboard and fish are landed fresh. The boxes are labelled onboard with species, weight and date of capture. The date of capture can be linked to the e-logbooks, which gives a high degree of certainty where the vessels have been and caught fish (for example, whether they have fished outside the UoC).

Upon landing, the labelled boxes remain separated by fishing area and are either purchased through a direct sales agreement between the fishing company and a processor (e.g. is transferred direct from the vessel to the purchaser's vehicles at the point of landing) as well as sales through the auction at the port of landing (sales from fishing company to first buyer). Therefore traceability to the point of first sale is maintained by the vessel skipper. This is the intended change of ownership and subsequent Chain of Custody certification is required after this transaction. Fish may be landed at ports in the UK or northern Denmark.

The combination of EC ‗Buyers and Sellers of First Sale Fish' regulations, EC logbook and custom and practice provide a series of independent and verifiable mass-balance measures that would enable transgressions to be detected.

The European Commissions 'Buyers and Sellers' Act requires that all transactions at the first point of sale are fully recorded, allowing immediate traceability between the fishery and the first point of the chain of custody whilst the logbook provides a record of the time, location and nature (species and volumes) of the catch. Each vessel in the client group is required to sign terms of membership that stipulate that produce from the Unit of Certification must be

both segregated and traceable via logbooks and other mechanisms (e.g. GPS-linked weighing records). Adherence to these terms and conditions would form part of the annual surveillance audit requirements.

Table 26. Traceability Factors within the Fishery:

Traceability Factor	Description of risk factor if present. Where applicable, a description of relevant mitigation measures or traceability systems (this can include the role of existing regulatory or fishery management controls)
Potential for non-certified gear/s to be used within the fishery	The Unit of Assessment (UoA) for this fishery has specifically included all gears used by the vessels under assessment. The risk of a non-certified gear being used is therefore extremely low.
Potential for vessels from the UoC to fish outside the UoC or in different geographical areas (on the same trips or different trips)	There is a possibility of the vessels from the UoC fishing outside the UoC on the same trip. As fish come onboard, they are graded and placed into open labelled boxes. The boxes are labelled onboard with species, weight and date of capture. The date and position of catch would link with the e-log to show where a vessel was fishing; this gives a high degree of security where vessels may fish different management zones in the same fishing trip. The separate labeled boxes provides physical separation of catch on their way to port.
Potential for vessels outside of the UoC or client group fishing the same stock	Vessels from outside the UoC are likely to fish for the same stock but will not be covered by this assessment. To avoid the risk of vessels landing haddock from outside the UoC as MSC (i.e. vessels not associated with this assessment) an up to date list of vessels is maintained by the SFSAG on their website (http://scottishfsag.org/images/banners/vessel%20list%20061015f.pdf). This list can then be used by companies with MSC CoC to ensure product is originating from a vessel covered by this assessment.
Risks of mixing between certified and non-certified catch during storage, transport, or handling activities (including transport at sea and on land, points of landing, and sales at auction)	One risk of mixing is between haddock and other similar species (such as cod). All vessels maintain catch separately by species (meaning physical identification of species on land is still possible as product has not been filleted (for example). The risk of mixing on-board the vessels during storage or handling is seen as low.
Risks of mixing between certified and non-certified catch during processing activities (at-sea and/or before subsequent Chain of	As described above, only basic processing (gutting) is completed on board the vessel and all fish is landed 'whole'. The risk of mixing between certified and non-certified product during processing is seen to be low.

Custody)	
Risks of mixing between certified and non-certified catch during transhipment	No transhipment occurs within this fishery and so the risk is seen as minimal.
Any other risks of substitution between fish from the UoC (certified catch) and fish from outside this unit (non-certified catch) before subsequent Chain of Custody is required	No other risks have been identified. Product is landed directly and chain of custody will be required from the first change of ownership (either directly on landing or through the auction system). When product is sold in the auction it is sold by vessel and by species (and is backed up by logbook data). Risk of mixing of certified and non-certified product here is therefore minimal.

4.3 Eligibility to Enter Further Chains of Custody

The assessment team have considered the risks of traceability in the fishery and have determined that product landed by vessels covered by the SFSAG vessel list (found at the following link, http://scottishfsag.org/images/banners/vessel%20list%20061015f.pdf) and originating from within the Unit of Assessment covered by this assessment shall be eligible to enter in further chains of custody. Product landed from vessels not included on the SFSAG list (as described above) will not be eligible to enter into further chains of custody.

Product is eligible for landing at the following landing ports:

- Peterhead
- Scalloway
- Mallaig
- Kinlochbervie
- Scrabster
- Fraserburgh
- Lerwick
- Hanstholm

Further chain of custody will be required for certified product at the first point of sale (either directly at the point of landing or through the auction). Any additional storage of product by the fishing vessel (i.e. storage not on-board the vessel) other than storage organised by an auction, will require separate assessment to determine if chain of custody is required.

Please Note: Transportation does not require separate Chain of Custody assessment.

4.4 Eligibility of Inseparable or Practicably Inseparable (IPI) stock(s) to Enter Further Chains of Custody

Not applicable for this fishery.

5. Evaluation Results

5.1 Principle Level Scores

The final principal scores are provided in the table below.

Table 27. Final Principle Scores

Final Principle Scores	
Principle	Score
Principle 1 – Target Species	82.7
Principle 2 – Ecosystem	82.7
Principle 3 – Management System	93.6

5.2 Summary of Scores

Principle	Component	Weighting	PI number	Performance Indicator	Score
1	Outcome	0.5	1.1.1	Stock status	70
			1.1.2	Reference points	80
			1.1.3	Stock rebuilding	80
	Management	0.5	1.2.1	Harvest Strategy	95
			1.2.2	Harvest control rules and tools	75
			1.2.3	Information and monitoring	90
			1.2.4	Assessment of stock status	95
2	Retained species	0.2	2.1.1	Outcome	85
			2.1.2	Management	85
			2.1.3	Information	80
	Bycatch species	0.2	2.2.1	Outcome	80
			2.2.2	Management	80
			2.2.3	Information	80
	ETP species	0.2	2.3.1	Outcome	75
			2.3.2	Management	75
			2.3.3	Information	75

	Habitats	0.2	2.4.1	Outcome	80
			2.4.2	Management	85
			2.4.3	Information	80
	Ecosystem	0.2	2.5.1	Outcome	90
			2.5.2	Management	90
			2.5.3	Information	100
3	Governance and Policy	0.5	3.1.1	Legal and customary framework	85
			3.1.2	Consultation, roles and responsibilities	100
			3.1.3	Long term objectives	100
			3.1.4	Incentives for sustainability	100
	Fishery-specific management system	0.5	3.2.1	Fishery specific objectives	90
			3.2.2	Decision making processes	100
			3.2.3	Compliance and enforcement	95
			3.2.4	Research plan	90
			3.2.5	Management performance evaluation	80

5.3 Summary of Conditions

Three new conditions have been raised during the reassessment. In addition, one existing condition has been carried over from the previous assessment relating to PI 1.2.2. This condition was raised during the Year 4 Surveillance audit and has set milestones which must be completed during the cycle of this assessment process. This condition remains in line with the required milestones and so does not limit the reassessment of the fishery (CR 7.24.2.2). The conditions are summarised in Table 28. For further details please see Appendix 1.2.

Table 28. Summary of Conditions

Condition number	Condition	Performance Indicator	Related to previously raised condition? (Y/N/ NA)
1	At or within 3 years of setting the condition (approximately October 2017), demonstrate that the fishery meets all the SG80 requirements of this PI. Specifically, this will be through meeting the requirements of PI 1.2.2, SG80, SIc, which requires that: "Available evidence indicates that the tools in use are appropriate and effective in achieving the exploitation levels required under the harvest control rules."	PI 1.2.2	Y. This condition was raised under the Year 4 Surveillance Audit and will be carried in to the new 5 year cycle under this assessment.

Condition number	Condition	Performance Indicator	Related to previously raised condition? (Y/N/ NA)
2	The bycatch from the fishery should be restrained within a level which can be considered to be 'highly unlikely' to create unacceptable impacts on starry ray and common skate, and is not hindering the recovery of these stocks. This could be achieved with further analysis of the PET data, with actions targeted to reduce bycatch of these species to a minimum or by other appropriate methods.	PI 2.3.1	No
3	There needs to be an objective basis for confidence that the strategy for reducing bycatch of starry ray and common skate from the fishery will work to reduce the bycatch to a level which can be considered to be 'highly unlikely' to create unacceptable impacts. This could be on the basis of an assessment of the stock trajectory (by ICES or other) or on the basis of an evaluation of trends in bycatch across the fleet, or by some other suitable method.	PI 2.3.2	No
4	There needs to be sufficient information available such that the impact of this fishery on common skate can be quantitatively estimated, and hence it can be determined whether the fishery may be a threat to the recovery of the common skate complex. This requires, as a minimum, a fleet-wide estimate of bycatch of common skate, as well as some basis by which population-level trends can be evaluated (noting that ICES considers that existing data are insufficient for this purpose).	PI 2.3.3	No

5.4 Recommendations

The Assessment Team does not have any recommendations for the fishery.

5.5 Determination, Formal Conclusion and Agreement

(REQUIRED FOR FR AND PCR)

1. The report shall include a formal statement as to the certification determination recommendation reached by the assessment team about whether or not the fishery should be certified.

(Reference: FCR 7.16)

(REQUIRED FOR PCR)

2. The report shall include a formal statement as to the certification action taken by the CAB's official decision-makers in response to the Determination recommendation.

6. References

Baum, J.K., R.A. Myers, D.G. Kehler, B. Worm, S.J. Harley, and P.A. Doherty. 2003. Collapse and conservation of shark populations in the Northwest Atlantic. *Science* 299: 389-392.

Cook, R. M., and M. R. Heath. 2005. "The implications of warming climate for the management of North Sea demersal fisheries." *ICES Journal of Marine Science: Journal du Conseil* 62.7 (2005): 1322-1326. Defra, 2014. Marine Strategy Part Two: UK Marine Monitoring Programmes, July 2014, 86p.

DEFRA, 2014. Marine Strategy Part Two: UK Marine Monitoring Programmes, July 2014, 86p.

EC, 2015. Commission Delegated Regulation (EU) Establishing a discard plan for certain demersal fisheries in North-Western waters, 9p. and Annex 1, 5p. Brussels 12.10.2015 C(2015) 6833 final.

EU, 1998. REGULATION (EU) No 850/98 of 30th March 1998 for the conservation of fishery resources through technical measures for the protection of juveniles of marine organisms.

EU, 2006. Implementing sustainability in EU fisheries through maximum sustainable yield. Communication from the Commission to the Council and the European Parliament. COM (2006) 360 (final).

EU, 2007. REGULATION (EU) No 676/2007 of 11 June 2007 establishing a multiannual plan for fisheries exploiting socks of plaice and sole in the North Sea.

EU, 2013a. REGULATION (EU) No 1380/2013 OF THE EUROPEAN PARLIAMENT AND OF THE COUNCIL of 11 December 2013 on the Common Fisheries Policy, amending Council Regulations (EC) No 1954/2003 and (EC) No 1224/2009 and repealing Council Regulations (EC) No 2371/2002 and (EC) No 639/2004 and Council Decision 2004/585/EC

EU, 2013b. REGULATION (EU) No 605/2013 OF THE EUROPEAN PARLIAMENT AND OF THE COUNCIL of 12 June 2013, amending Council Regulation (EC) No 1185/2003 on the removal of fins of sharks on board vessels

EU, 2013c. Regulation (EU) 1379/2013 on the Common Organisation of the Markets of Fishery and Aquaculture Products (CMO) or "CMO regulation" and Commission implementing regulation (EU) No 1418/2013) – mandatory since 1 January 2014, see http://ec.europa.eu/fisheries/cfp/market/faq/index_en.htm

EU, 2015. REGULATIONS (EU) No 2015/104 OF THE EUROPEAN PARLIAMENT AND OF THE COUNCIL of 19 January 2015 fixing for 2015 the fishing opportunities for certain fish stocks and groups of fish stocks, applicable in Union waters and, for Union vessels, in certain non-Union waters, amending Regulation (EU) No 43/2014 and repealing Regulation (EU) No 779/2014

EU-Norway, 2014. Agreed record of Fisheries Consultations between the European Union and Norway for 2015, Clonakilty, 4 December 2014. https://www.regjeringen.no/contentassets/7904340b736a4390a16641b9d40c4b4d/1412_04_eu_no_north_sea_part_1.pdf

FCI. 2012. MSC Sustainable Fisheries Certification of the DFPO Danish North Sea and Skagerrak Haddock Fishery. 372 pp.

FMAC, 2015. Misreporting area of capture in demersal fisheries; Powerpoint presentation from Marine Scotland Compliance, 9 slides.

Fryer, R. 2001. TSA: is it the way? Appendix D of Report of the Working Group on methods on fish stock assessments. ICES headquarters, 3 – 7 December 2001, ICES CM 2002/D:01.

Fournier, D.A., H. J. Skaug, J. Ancheta, J. Ianelli, A. Magnusson, M. N. Maunder, A. Nielsen and J. Sibert. 2012. AD Model Builder: using automatic differentiation for statistical inference of highly parameterized complex nonlinear models, Optimization Methods and Software, 27: 233-249.

Gudmundsson, G. 1987. Time series models of fishing mortality rates. ICES CM 1987/D:6.

Gudmundsson, G. 1994. Time series analysis of catch-at-age observations. Appl. Statist. 43:117-126.

Greenstreet, S., Fraser, H., Cotter, J. and Pinnegar. J. 2009. Assessment of the environmental impact of fishing. Supplementary Report 1: Analysis of the ICES International Bottom Trawl (IBTS) data set covering the North Sea (OSPAR Region II) to examine trends in the "health" of the demersal fish community. Available online at http://www.ospar.org/html_documents/ospar/html/p465_supplementary_report_1.pdf (last accessed 11 April 2012).

Hinz, H, Hiddink, JG, Forde, J and Kaiser, MJ. 2008. Large scale responses of nematode communities to chronic otter-trawl disturbance, *Canadian Journal of Fisheries and Aquatic Science* 65, 723-732

ICES, 2003. Report of the Study Group on Precautionary Reference Points for Advice on Fishery Management. ICES CM 2003/ACFM:15

ICES, 2005. Report of the Study Group on Management Strategies. 31 January – 4 February 2005, ICES Headquarter. ICES CM 2005/ACFM:09.

ICES, 2006. Harvest control rules for North Sea haddock (Subarea IV and Division IIIa). Special Requests. Book 6. Section 6.3.3.3.

ICES, 2007. Report of the ICES Advisory Committee. North Sea. Haddock in Subarea IV and Divisions IIIa North (North Sea and Skagerrak). Book 6. Section 6.4.3.

ICES, 2008. Report of the Benchmark Workshop Planning Group: Report of the Chair (PGBWK), by correspondence, ICES CM 2008/ACOM:62. 22 pp.

ICES, 2010a. Joint EU–Norway request on the evaluation of the long-term management plan for haddock in Subarea IV (North Sea) and Division IIIa West (Skagerrak). In Report of the ICES Advisory Committee, 2010. ICES Advice 2010, Book 6, Section 6.3.3.2.

ICES, 2010b. Report of the ICES Advisory Committee. North Sea. Haddock in Subarea IV and Divisions IIIa North (North Sea and Skagerrak). Book 6.

ICES, 2011. Report of the Benchmark Workshop on Roundfish and Pelagic Stocks (WKROUND), 24-31 January 2011. Lisbon, Portugal. ICES CM 2011/ACOM: 38. 423pp.

ICES, 2012a. Report of the ICES Advisory Committee. ICES advice 2012. Book 1. 140 pp.

ICES, 2012b. Manual for the International Bottom Trawl Surveys. Series of ICES Survey Protocols. SISP 1-IBTS VIII. 68 pp.

ICES, 2012c. ICES Implementation of Advice for Data-limited Stocks in. ICES CM 2012/ACOM 68. 42 pp.

ICES, 2013a. World Conference on Stock Assessment Methods (WCSAM), 15-19 July 2013, Boston, USA. ICES CM 2013/ ACOM/SCICOM:02. 87 pp.

ICES, 2013b. Haddock in Subarea IV (North Sea) and Division IIIa West (Skagerrak). In Report of the ICES Advisory Committee, 2013. ICES Advice 2013, Book 6, Section 6.4.7.

ICES, 2013c. Report of the Working Group for the Celtic Seas Ecoregion (WGCSE), 8–17 May 2013, Copenhagen, Denmark. ICES CM 2013/ACOM:12.

ICES, 2013d. Joint EU–Norway request to evaluate the long-term management plan for whiting in the North Sea. Special Request, Advice (October 2013)

ICES, 2014a. Report of the ICES Benchmark Meeting on Northern Haddock Stocks (WKHAD). ICES CM 2014/ACOM:41.

ICES, 2014b. Haddock in Subarea IV and Divisions IIIa West and VIa (North Sea, Skagerrak, and West of Scotland). In Report of the ICES Advisory Committee, 2014. ICES Advice 2014, Book 6, Section 6.3.7.

ICES, 2014c. Report of the ICES Advisory Committee. North Sea. Haddock in Subarea IV and Divisions IIIa West and VIa (North Sea, Skagerrak and West of Scotland) (updated). Advice June 2014. Book 6.

ICES, 2014d. Report of the Working Group on the Assessment of Demersal Stocks in the North Sea and Skagerrak (WGNSSK), 30 April–7 May 2014. ICES CM 2014/ACOM:13.

ICES, 2014e. Report of the ICES Benchmark Workshop for Northern Haddock Stocks (WKHAD), February–March 2014, Aberdeen and Copenhagen. ICES CM 2014/ACOM:41.

ICES, 2014f. Report of the Joint ICES-MYFISH Workshop to consider the basis of FMSY ranges for all stocks (WKMSYREF3), 17-21 November 2014, Copenhagen, Denmark. ICES CM 2014/ACOM:46. 164 pp.

ICES, 2014g. Joint EU–Norway request on the evaluation of the long-term management plan for North Sea haddock. In Report of the ICES Advisory Committee, 2014. ICES Advice 2014, Book 6, Section 6.2.3.5.

ICES, 2014h. Interim report of the working group on multispecies assessment methods (WGSAM). 20-24 October 2014, London, UK. ICES CM 2014/SSGSUE: 11.

ICES, 2014i. EU–Norway request to evaluate the performance of the long-term management plan for North Sea haddock. In Report of the ICES Advisory Committee, 2010. ICES Advice 2014, Book 6, Section 6.2.3.5.

ICES, 2014j Advice basis. In Report of the ICES Advisory Committee, 2014. ICES Advice 2014, Book 1, Section 1.2.

ICES, 2014k. Report of the Working Group for the Celtic Seas Ecoregion (WGCSE), 13-22 May 2014, Copenhagen, Denmark. ICES CM 2014/ACOM:12. Draft

ICES, 2014l. ICES Advice on Widely distributed and migratory stocks. 9.3.26. Spurdog (*Squalus acanthias*) in the Northeast Atlantic. In Report of the ICES Advisory Committee, 2014. ICES Advice 2015, Book 9.

ICES, 2015a. Report of the ICES Advisory Committee. Section 6.3.10. Greater North Sea and Celtic Seas Ecosystem. Haddock in Subarea IV and Divisions IIIa West and VIa (North Sea, West of Scotland and Skagerrak). Advice June 2015. Book 6.

ICES, 2015b. 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. 1031 pp.

ICES, 2015c. ICES Special Request Advice. In Report of the ICES Advisory Committee, 2015. ICES Advice 2015, Book 6.

ICES, 2015d. ICES Advice on fishing opportunities, catch, and effort Greater North Sea and Celtic Seas Ecoregions. 6.3.4 Cod (*Gadus morhua*) in Subarea IV and Divisions VIId and IIIa West (North Sea, Eastern English Channel, Skagerrak). In Report of the ICES Advisory Committee, 2015. ICES Advice 2015, Book 6.

ICES, 2015e. ICES Advice on fishing opportunities, catch, and effort Greater North Sea and Celtic Seas Ecoregions. 6.3.35 Saithe (*Pollachius virens*) in Subareas IV and VI and Division IIIa (North Sea, Rockall and West of Scotland, Skagerrak and Kattegat). In Report of the ICES Advisory Committee, 2015. ICES Advice 2015, Book 6.

ICES, 2015f. ICES Advice on fishing opportunities, catch, and effort Greater North Sea and Celtic Seas Ecoregions. 6.3.56 (update) Whiting (*Merlangius merlangus*) in Subarea IV and Division VIId (North Sea and Eastern English Channel). In Report of the ICES Advisory Committee, 2015. ICES Advice 2015, Book 6.

ICES, 2015g. ICES Advice on fishing opportunities, catch, and effort Greater North Sea, Celtic Seas, Bay of Biscay and Iberian coast Ecoregions. 9.3.14 Hake (*Merluccius merluccius*) in Subareas IV, VI, and VII and Divisions IIIa, VIIIa,b,d (Northern stock) (Greater North Sea, Celtic Seas, Northern Bay of Biscay). In Report of the ICES Advisory Committee, 2015. ICES Advice 2015, Book 9.

ICES, 2015h. ICES Advice on fishing opportunities, catch, and effort Celtic Seas and Greater North Sea Ecoregions. 5.3.1 Anglerfish (*Lophius piscatorius* and *L. budegassa*) in Subareas IV and VI and Division IIIa (North Sea, Rockall and West of Scotland, Skagerrak and Kattegat). In Report of the ICES Advisory Committee, 2015. ICES Advice 2015, Book 5.

ICES, 2015i. ICES Advice on fishing opportunities, catch, and effort Greater North Sea Ecoregion. 6.3.31 Plaice (*Pleuronectes platessa*) in Subarea IV (North Sea) and Division IIIa (Skagerrak). In Report of the ICES Advisory Committee, 2015. ICES Advice 2015, Book 6.

ICES, 2015j. ICES Advice on fishing opportunities, catch, and effort Northeast Atlantic. 9.3.24 Ling (*Molva molva*) in Subareas VI-IX, XII, and XIV, and in Divisions IIIa and IVa (other areas). In Report of the ICES Advisory Committee, 2015. ICES Advice 2015, Book 9.

ICES, 2015k. ICES Advice on fishing opportunities, catch, and effort Greater North Sea Ecoregion. 6.3.6 Cuckoo ray (*Leucoraja naevus*) in Subarea IV and Division IIIa (North Sea, Skagerrak, and Kattegat). In Report of the ICES Advisory Committee, 2015. ICES Advice 2015, Book 6.

ICES, 2015l. ICES Advice on fishing opportunities, catch, and effort Greater North Sea Ecoregion. 6.3.15 Lesser-spotted dogfish (*Scyliorhinus canicula*) in Subarea IV and Divisions IIIa and VIId (North Sea, Skagerrak and Kattegat, and eastern English Channel). In Report of the ICES Advisory Committee, 2015. ICES Advice 2015, Book 6.

ICES, 2015m. ICES Advice on fishing opportunities, catch, and effort Oceanic Northeast Atlantic Ecoregion. 9.3.41 Smooth-hound (*Mustelus* spp.) in the Northeast Atlantic. In Report of the ICES Advisory Committee, 2015. ICES Advice 2015, Book 9.

ICES, 2015n. ICES Advice on fishing opportunities, catch, and effort Greater North Sea Ecoregion. 6.3.50 Starry ray (*Amblyraja radiata*) in Subareas II and IV and Division IIIa (Norwegian Sea, North Sea, Skagerrak, and Kattegat). In Report of the ICES Advisory Committee, 2015. ICES Advice 2015, Book 6.

ICES, 2015p. ICES Advice on fishing opportunities, catch, and effort Greater North Sea Ecoregion. 6.3.5 Common skate (*Dipturus batis*-complex) in Subarea IV and Division IIIa (North Sea, Skagerrak, and Kattegat). In Report of the ICES Advisory Committee, 2015. ICES Advice 2015, Book 6.

ICES, 2015q. ICES Advice on fishing opportunities, catch, and effort Northeast Atlantic Ecoregion. 9.3.27 Porbeagle (*Lamna nasus*) in the Northeast Atlantic. In Report of the ICES Advisory Committee, 2015. ICES Advice 2015, Book 9.

ICES 2015r. ICES Advice on fishing opportunities, catch, and effort Greater North Sea Ecoregion. 6.2.2.2. Mixed fisheries advice for Subarea IV (North Sea), Divisions IIIa North (Skaggerak) and VIId (eastern Channel). In Report of the ICES Advisory Committee, 2015. ICES Advice 2015, Book 6.

IFC. 2010. Public Certification Report (v5) for the SFSAG North Sea Haddock Trawl and Danish Seine Fishery. 158 pp.

Kaiser, M.J., Collie, J.S., Hall, S.J., Jennings, S. and Poiner I.R. 2001. Impacts of fishing gear on marine benthic habitats. Reykjavik Conference on Responsible Fisheries in the Marine Ecosystem. 19pp. ftp://ftp.fao.org/fi/document/reykjavik/pdf/12kaiser.PDF

Lassen, H.L., C. Kelly and M. Sissenwine. 2014. ICES advisory framework 1977 – 2012: from FMAX to precautionary approach and beyond. ICES J. Mar. Science. 71: 166 – 172.

Mackinson, S. and Daskalov, G. 2007. An ecosystem model of the North Sea to support an ecosystem approach to fisheries management description and parameterisaton

Science Series Technical Report No. 142
http://www.cefas.defra.gov.uk/publications/techrep/tech142.pdf

Marine Scotland, 2010. Marine (Scotland) Act 2010.
http://www.legislation.gov.uk/asp/2010/5/pdfs/asp_20100005_en.pdf

Marine Scotland, 2012. Fisheries Management and Conservation (FMAC) Group. Remit, FMAC/11/02 1p.

Marine Scotland, 2013a. Aid to Adapt: A five-point action plan for Scottish whitefish and prawn fishing, July 2013, 3p. http://www.gov.scot/Resource/0042/00428414.pdf

Marine Scotland, 2013b. Economic Assessment of Scottish North Sea TR2 Vessels. An evaluation of declining North Sea *Nephrops* to the TR2 fleet, July 2013, 35p.
http://www.gov.scot/Resource/0042/00428417.pdf

Marine Scotland, 2013c. Guidance note on EU points system for serious infringements, 25p.

Marine Scotland, 2014. Scottish government action plan on whitefish and prawn fishing. Hardship Fund, FMAC/14/03 2p.

Marine Scotland, 2015a. Fishing Industry Science Alliance presentation leaflet, 2p.
http://www.gov.scot/Topics/marine/Publications/TopicSheets/tslist/FISA

Marine Scotland, 2015b. Collection of bycatch data for spurdog *(Squalus acanthias)*
http://www.gov.scot/Resource/0047/00479590.pdf

Marine Scotland, 2015c. Scottish Government Conservation Credits Scheme, Scheme Rules, Version 6.0 (January 2015), 30p.

Marine Scotland, 2015d. Scotland's National Marine Plan – A single framework for managing our seas, 144p. http://www.gov.scot/Resource/0047/00475466.pdf

McAllister, M.K., P.J. Starr, V.R. Restrepo and G.P. Kirkwood. 1999. Formulating quantitative methods to evaluate fishery-management systems: what fishery processes should be modelled and what trade-offs should be made? ICES J. Marine Science. 56: 900 – 916.

Millar, R.B. 2011. Maximum likelihood estimation and inference. Wiley Press. 357 pp.

Needle, C.L. 2006. Revised FLR-based evaluation of candidate harvest control rules for North Sea haddock. Fisheries Research Series. Marine Laboratory, Aberdeen. 35 pp.

Needle, C.L. 2008a. Management strategy evaluation for North Sea haddock, Fisheries Research 94(2): 141–150.

Needle, C.L. 2008b. Evaluation of inter-annual quota flexibility for North Sea haddock: final report. FRS Marine Laboratory, Aberdeen. 23 pp.

Needle, C.L., 2010. Revised management strategy for North Sea haddock. Working paper to ICES ACOM, July 2010.

Needle, C.L. 2010a. An evaluation of a proposed management plan for haddock in Division VIa (2nd edition). Working paper to ACOM.

Needle, C.L. 2010b. Management strategy evaluation of Via haddock: an additional TAC constraint option. Working paper to ACOM/STECF.

Needle, C.L., 2010c. Revised management strategy for North Sea haddock. Working paper to ICES ACOM, July 2010.

Needle, C.L. 2011. Fleet dynamics in fisheries management strategy evaluations. PhD thesis. University of Strathclyde. 352 pp.

Needle, C. 2014. Response to Joint EU–Norway request to ICES to evaluate the performance of the long-term management plan for North Sea haddock. Working paper to ACOM, October 2014.

Nielsen, A. and C.W. Berg. 2014. Estimation of time-varying selectivity in stock assessments using state-space models. Fisheries Research. 158: 96 – 101.

NSAC, 2015. Scheveningen Group Joint Recommendation, Discard Plan for Demersal Fisheries in the North Sea and annexes http://www.nsrac.org/category/keydocs/approved-plans/

NWWAC, 2015. North Western Waters Atlas, Marine Institute and NWWAC, 3rd edition, http://www.nwwac.org/_fileupload/MI_NWWAC_North_Western_Waters_Atlas_3rd-Edition_low%20res.pdf

Seafish, 2015. Quay Issues, 2013 Economics of the UK Fishing Fleet, Key Features. L. Cowie and S. Lawrence, Seafish Report No SR680, 36p.

Shepherd, J.G. 1999. Extended survivors analysis: an improved method for the analysis of catch-at-age data and abundance indices. ICES J. Mar. Science. 56: 584 – 591.

SCOS 2010. Scientific advice on matters relating to the management of seal population, 2010. Special Committee on Seals. See http://www.smru.st-andrews.ac.uk/documents/389.pdf

SCOS 2014. Scientific advice on matters relating to the management of seal population, 2014. Special Committee on Seals. See http://www.smru.st-andrews.ac.uk/documents/2589.pdf

Scottish Courts - http://www.scotcourts.gov.uk/search-judgments/judgment-search?indexCatalogue=high%2Dcourt%2Djudgments&searchQuery=fish&wordsMode=0 (searched December 2015)

Scottish MPA Project. (2014) Central Fladen Nature Conservation Marine Protected Area. Management Options Paper. Version 4. http://jncc.defra.gov.uk/pdf/Central_Fladen_Management_Options_Paper_v4_0.pdf

UK, 2009. Marine and Coastal Access Act 2009. from http://www.legislation.gov.uk/ukpga/2009/23/contents

Appendices

Appendix 1 Scoring and Rationales

Appendix 1.1 Performance Indicator Scores and Rationale

Evaluation table 1 - PI 1.1.1

PI 1.1.1		**The stock is at a level which maintains high productivity and has a low probability of recruitment overfishing**		
SI		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	Y	Y
	Justification	Spawning stock biomass (SSB) in 2015 (145.7 kt) was above B_{LIM} (63 kt) with a high degree of certainty, based on an average CV of 7.9% during 2003-2015 about SSB estimates from the stock assessment. ICES classifies the stock as having full reproductive capacity and being harvested sustainably. Further, fishing mortality has been below F_{MP} and F_{MSY} since 2008. Therefore, there is a high degree of certainty that at the current level of the SSB, recruitment is not being impaired. SIa meets SG100.		

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
	Justification	As per CB2.3.2.3, the biomass implied through fishing at the target fishing mortalities (F_{MP} and F_{MSY}) was used in the scoring. SSB in 2015 (145.7 kt) was 37.2% and 44.3% of the implied B_{MP} and median B_{MSY} respectively and below the lower range of the latter (234.9 kt). Since 2000, SSB has fluctuated above the lower range of B_{MSY} twice. While SSB has been increasing since a time series low in 2001 and has been above B_{PA} and $B_{TRIGGER}$ (88 kt) since that time, fishing mortality has been consistently below F_{MP} and F_{MSY} since 2008, or about one generation time (5 years). Fishing mortality was very high during 1972 – 2002 and there has been a long-term decline in average recruitment. Further SSB growth is required to ensure that biomass are consistent with F_{MP} and F_{MSY}. Sib does not meet SG80.			
References	ICES (2015a; 2015b; 2014f)			

Stock Status relative to Reference Points

	Type of reference point	Value of reference point	Current stock status relative to reference point
Target reference point	$B_{PA}/B_{TRIGGER}$	88.0 kt	1.66
	F_{MSY}	0.37	0.65
	B_{MSY} (implicit)	329.1 kt	0.44
	F_{MP}	0.30	0.80
	B_{MP} (implicit)	391.5 kt	0.37
Limit reference point	B_{LIM}	63.0 kt	2.31
OVERALL PERFORMANCE INDICATOR SCORE		**70**	
CONDITION NUMBER		**None**	

Evaluation table 2 - PI 1.1.2

PI 1.1.2		Limit and target reference points are appropriate for the stock		
SI		SG 60	SG 80	SG 100
a	**Guide post**	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	Based upon simulations, a number of SSB and fishing mortality reference points have been estimated for both the North Sea component and the combined Northern Shelf haddock stock. These have employed guidelines developed by ICES on the appropriate estimation of reference points and consider many aspects of the stock's biology and fishery. SIa meets SG80.		
b	**Guide post**		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	New biomass limit and precautionary reference points have been estimated for the Northern Shelf (North Sea, Skagerrak and West of Scotland) stock. B_{LIM} was based upon a segmented regression model fit to the stock – recruitment data. This indicated a likely change point of 63,000 t, which is interpreted here as the point below which there is an appreciable risk of reproductive impairment. SIb meets SG80. B_{LIM} is close to the lowest SSB observed since 1972. The relationship between stock and recruitment is very weak with the sporadic occurrence of strong year-classes a dominant feature. B_{LIM} (63 kt) is 19% of the implied B_{MSY} (329 kt) which is low compared to the MSC default of 50% B_{MSY}. While evidence indicates that B_{LIM} is above the point of recruitment impairment, it does not appear that consideration has been given as to its precautionary nature. SIb does not meet SG 100.		
c	**Guide post**		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 fishing mortality used in the management plan (F_{MP} is 0.3). This is below recent estimates of F_{MSY} (0.37, ranging 0.25 – 0.51) for the Northern Shelf stock, implying that the current plan is precautionary. The latter was based upon information on selectivity, growth and natural mortality at age since 2000 as well as two stock-recruitment (Ricker and Segmented Regression) relationships. Exploitation at any level below F_{MP}, which is below F_{MSY}, is expected to achieve stock conditions consistent if not surpassing those at B_{MSY}. Sic meets SG80. The estimation of F_{MSY} took into account whether or not it could sustain SSB above B_{LIM} with 95% probability. The methodology took recruitment variability into account by sampling from the predicted distribution conditional on the chosen model. The stock is subject to occasional high recruitment, the causal basis of which is likely environmental although this has not been fully explored. The ecological consequences of these large sporadic year-classes and the role of haddock in the Northern Shelf ecosystem were not considered in the formulation of F_{MSY}. Specifically, the estimation of F_{MSY} and F_{MP} does not include modelling to account for wider ecosystem effects. Sic does not meet SG100.		

d	**Guide post**		For key low trophic level stocks, the target reference point takes into account the ecological role of the stock.	
	Met?		NA	
	Justification	N/A		
References		ICES (2003; 2011; 2013c; 2014a; 2014b; 2014e; 2014f; 2014j; 2015), Lassen et al. (2014)		
OVERALL PERFORMANCE INDICATOR SCORE			**80**	
CONDITION NUMBER			None	

Evaluation table 3 for PI 1.1.3

PI 1.1.3		Where the stock is depleted, there is evidence of stock rebuilding within a specified timeframe		
SI		SG 60	SG 80	SG 100
a	**Guide post**	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	A rebuilding strategy is in place, in the form of the agreed LTMP's HCR, to achieve biomass consistent with the F_{MP} = 0.3 target fishing mortality, which is below the current estimate of F_{MSY} = 0.37. Through the management process, actions have been taken to ensure that the target fishing mortality is achieved. SIa meets SG60. Given the high variability in year-class strength, it is not possible to state that there is as yet strong evidence that rebuilding to biomass consistent with F_{MP} will take place within the expected five years generation time. SIa does not meet SG100.		
b	**Guide post**	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	There is evidence that the stock is being rebuilt - the latest assessment indicates that SSB has increased from a low in 2000 to the lower range of fluctuation in B_{MSY} by 2014-2015. This is the period during which the LTMP has been in place. Simulations undertaken during the MSEs to evaluate the harvest strategy indicate that rebuilding from current SSB to median SSB_{MSY} should take five years or one generation. SIb meets SG80. Although it is in place, the rebuilding strategy does not explicitly aim to recover SSB to levels consistent with MSY conditions in the shortest practical time period. SIb does not score 100.		
C	**Guide post**	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	Y	
	Justification	The annual assessments of the WGNSSK provide the monitoring necessary to ensure that the stock is rebuilding to conditions consistent with MSY. SIc meets SG60. The latest assessment provides evidence that SSB has rebuilt from a low level in 2000 to below the lower range of B_{MSY}. Further, simulation modeling conducted in 2011 indicates that rebuilding from current SSB to biomass consistent with F_{MP} should occur within five years or one generation. SIc meets SG80.		
References		ICES (2006; 2014g; 2014i, 2015b), Needle (2006; 2008b; 2011)		

OVERALL PERFORMANCE INDICATOR SCORE	80
CONDITION NUMBER	None

Evaluation table 4 - PI 1.2.1

PI 1.2.1		There is a robust and precautionary harvest strategy in place		
SI		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	Y
	Justification	The elements for a good responsive harvest strategy (objectives associated with reference points, monitoring through stock assessment, management decisions based upon a HCR and implementation of measures to control fishing mortality) are present. SIa meets SG60 Since 2005, there is good evidence that TACs set by the EC are based on the scientific advice from ICES and that landings are controlled so that TACs are not generally over-run. SIa meets SG80. The harvest strategy was initially designed to achieve MSY conditions as well as to avoid SSB falling below the point of recruitment impairment. While a new plan for the combined stock is being developed, the current one is being used to manage the Northern Shelf stock in the interim. This is appropriate as the North Sea + Skagerrak component comprises roughly 90% of the combined Northern Shelf stock. SIa meets SG100.		

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	The harvest strategy is designed similar to those used elsewhere and is likely to work based upon prior experience both in the stock area and elsewhere. Sib meets SG60. Since 2006, a number of evaluations of the harvest strategy have been undertaken which indicate that it can achieve its objectives as well as being consistent with the precautionary approach. Sib meets SG80. The MSEs that have been conducted have been thorough and indicate that the strategy should achieve its objectives. However, while fishing mortality is now at or below both F_{MP} and F_{MSY}, SSB is still below biomass expected at these reference points. Thus, more evidence is required to clearly indicate that the strategy is able to maintain SSB at conditions consistent with F_{MP}. SIb does not score 100.		
c	**Guidepost**	Monitoring is in place that is expected to determine whether the harvest strategy is working.		
	Met?	Y		
	Justification	The annual assessments of the WGNSSK and subsequent peer review process provide the monitoring required to ensure that the strategy is working. SIc meets SG60.		
d	**Guidepost**			The harvest strategy is periodically reviewed and improved as necessary.
	Met?			Y
	Justification	Since 2006, the North Sea haddock strategy has undergone three reviews while that of the West of Scotland has undergone one review. These were undertaken in response to issues raised by the EU and Norway and responded to by ICES using an MSE framework specifically designed to address such requests. In each case, the harvest strategy was improved based upon the review. SId meets 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?	NA	NA	NA
	Justification	Sharks are not targeted by this fishery.		
References		ICES (2005; 2006; 2007; 2010a; 2014g; 2014i), McAllister et al. (1999), Needle (2006; 2008a; 2010a; 2010b; 2011)		
OVERALL PERFORMANCE INDICATOR SCORE		**95**		
CONDITION NUMBER		None		

Evaluation table 5 - PI 1.2.2

PI 1.2.2		There are well defined and effective harvest control rules in place		
SI		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	Well defined harvest control rules are in place within the EU-Norway LTMP for North Sea Haddock. The HCR aims to maintain SSB above a limit reference point (B_{LIM} = 63 kt) to avoid recruitment impairment and has a target F_{MP} (0.3) to achieve biomass consistent with MSY. Further, it has a sliding F component which reduces fishing mortality below a precautionary SSB reference point (B_{PA} = 88 kt), thus reducing exploitation as the limit reference point is approached. Although the current HCR was developed for only part of the stock (North Sea + Skagerrak), it is being applied to the combined Northern Shelf stock, which also includes the West of Scotland component, until a new HCR has been designed. This is appropriate as the North Sea + Skagerrak component comprises roughly 90% of the combined Northern Shelf stock. SIa 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	Since 2006, a number of quantitative management strategy evaluations (MSE) have been undertaken on both components of the stock, both of the overall plan and of proposed modifications (e.g. flexibility in inter-annual quota allocation). These MSEs were based on stochastic simulations of the complete fishery system including a biological operating model, a knowledge model including simulated stock assessments, and an implementation model. These analyses accounted for the sporadic high recruitment of the haddock stock by including two recruitment scenarios in the analysis (i.e. occasional large year classes and low recruitment during the full simulated period. Simulations were conducted for a range of options for target fishing mortalities that cover the range of potential F_{MSY} estimates and proxies. The results indicate that achievement of plan targets are robust to the uncertainties considered. Although the current HCR was developed for only a component of the combined stock (North Sea+ Skagerrak), the reference points used in the LTMP's HCR (F_{MP}, B_{LIM} and $B_{TRIGGER}$) are more precautionary than the most recent reference points estimated for the combined Northern Shelf stock. SIb meets SG 80. The HCR does not take into account for a wide range of uncertainties. For example, simulations were carried out assuming that natural mortality, weight at age and proportion mature at age were time invariant and without error. These and additional sources of uncertainty were noted in the 2014 benchmark assessment. Sib does not meet SG100.		
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	N	N

	Justification	TACs on landings are the primary tool used to control exploitation rates and there is good evidence from the stock assessment that these have controlled exploitation rates. Fishing mortality has decreased since the introduction of the management plan and has been below F_{MP} and F_{MSY} since 2008. Landings have been consistent with the agreed TAC under the management plan. SIc meets SG60. TACs are split among stock subareas to avoid potential local depletion. This has been done for the North Sea + Skagerrat component since implementation of the LTMP. The addition of the West of Scotland component to the management unit requires that a portion of the TAC be allocated to this subarea as well. For 2015 and 2016, TACs were split amongst the three stock areas based upon the historical average catch shares outlined in the EU-Norway negotiations (ICES, 2015b). This has added uncertainty to the management of fishing mortality in each area and thus to the overall effectiveness of the HCR. The TAC should be allocated amongst areas based upon the relative fishable biomass in each area, taking into account some estimate of the minimum acceptable biomass in each area. The current allocation process based upon catch opens the possibility of a suboptimal distribution of fishing mortality amongst areas such that the overall stock F_{MP} is not achieved. This effect is likely subtle, given the relative size of the stock components (West of Scotland about 10% of the total) and current exploitation rates. Further exploration of the appropriate areal split of the TAC in support of a new Northern Shelf haddock management plan is required, which may include estimation of area-specific fishing mortality and biomass. This is to ensure both that the achievement of the plan's overall objectives is not adversely affected by the areal TAC allocation process and that local depletion does not occur. Therefore, until further evidence through these explorations is available, it is not possible to state that the current tools are clearly effective in controlling exploitation levels to achieve objectives. SIc does not meet SG80. Note that this issue was raised in the 2nd surveillance audit by FCI of the DFPO Danish North Sea & Skagerrak Haddock Fishery and the 4th surveillance audit by Intertek of the SFSAG North Sea Haddock Fishery. This resulted in a condition being put in place by the DFPO assessment team which was also adopted by the SFSAG assessment team. It is determined that this condition is appropriate and the current team agrees that it will continue under its current form through the new cycle of the certificate.
References		EU (2006), ICES (2012a; 2014a; 2014b; 2014f; 2015a; 2015b), Lassen et al. (2014), Needle (2011)
OVERALL PERFORMANCE INDICATOR SCORE		**75**
CONDITION NUMBER		1

Evaluation table 6 - PI 1.2.3

PI 1.2.3		Relevant information is collected to support the harvest strategy		
SI		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	There is a comprehensive range of data available on the species biology and the fishery for the assessment of the stock. Growth rates, age at maturity and natural mortality estimates are well understood, the latter based upon a stochastic multispecies model. Fisheries removals are well monitored with three possible sources of discard information. A number of survey indices exist which the WGNSSK has evaluated for their applicability as a Northern Shelf haddock stock indicator. Fleet composition of each country participating in the fishery is well comprehensively well understood. A range of other data is available to inform the assessment and haddock's role in the ecosystem. SIa meets 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	N
	Justification	A comprehensive suite of monitoring activities provide a census of the reported landings and it is considered that these provide reliable estimates for the assessment. Discards are monitored through three at-sea programmes, the primary one being conducted by MSS. An industry run initiative is now collaborating with this programme which will further enhance the estimation of discards. A suite of survey indices are available to inform the assessment but the WGNSSK has deemed that two (ITBS Qtr1 and Qtr3) are most appropriate as indices of abundance. SIb meets SG80. While there are issues with some of the assessment input data (e.g. sampling data from non-UoC catch), the assessment takes these into account in its formulation. A larger concern is that the ITBS indices are for the North Sea component and assumed to apply the whole Northern Shelf stock. Evidence to date indicates that this is the case. However, the WGNSSK has recognized the need for a Northern Shelf index, recommending research on the development of such an index. Until this index has been developed and evaluated, there is some uncertainty on the utility of the current indices as representative of the Northern Shelf stock. SIb does not meet SG100.		
c	**Guidepost**		There is good information on all other fishery removals from the stock.	
	Met?		Y	
	Justification	During 2006 – 2014, the UoC fishery represented about 84% of the total landings. The remaining 16% was reported primarily by Denmark, Germany, Norway and Ireland. These nations employ fishery removal monitoring systems similar to those to monitor the UoC fishery. Sic meets SG80.		
References		EU (2013a); ICES (2012b; 2014a; 2014b; 2014e; 2014h; 2015b)		
OVERALL PERFORMANCE INDICATOR SCORE		**90**		
CONDITION NUMBER		None		

Evaluation table 7 - PI 1.2.4

PI 1.2.4		There is an adequate assessment of the stock status		
SI		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 TSA model is a state-space formulation that describes the age-specific stock and fishery dynamics by year. Similar models (i.e. SAM) have performed well when compared to observation error models. It has been subjected to a benchmark review and was deemed the most appropriate model to use given that it allows separate treatment of landings and discards data, the latter an important consideration in this stock. Current SSB and fishing mortality are estimated which are used in the HCR to provide short-term harvest advice. SIa meets SG80. A key change in the TSA model from the previous two models (North Sea and West of Scotland) is the combination of the data from the two areas based upon a comprehensive review of stock structure information. The TSA model incorporates age-based natural mortality based upon the results of a stochastic multi-species assessment. It estimates recruitment based upon a random walk which is more appropriate than the estimates being constrained by a stock-recruitment relationship. Landings and discards by age are separately estimated, the latter based on age-specific proportions at age which can change over time based upon a random walk. SIa meets SG100.		
b	Guidepost	The assessment estimates stock status relative to reference points.		
	Met?	Y		
	Justification	Current SSB and fishing mortality are estimated on an annual basis relative to SSB and fishing mortality reference points. SIb meets 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	N
	Justification	The observation uncertainties included in the assessment are associated with stock structure, the landings and discard data and the two ITBS indices. The process uncertainties are associated with fishery mortality and how this changes over time, highly variable recruitment with the sporadic appearance of strong year-classes, age-specific natural mortality, and trends in stock and fishery weights at age. The impact of these uncertainties has been evaluated and their implications examined and reported as part of the management advice. Model fits and retrospective analyses do not indicate significant structural issues. SIc is met at SG80. While the TSA model is well capable to evaluate SSB and fishing mortality relative to the biological reference points in a probabilistic manner, this is not a routine part of the annual assessment. SIc does not meet 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	State-space models such as TSA have been challenged with simulated data and shown to be robust to a wide range of uncertainties and indeed there is evidence through self-testing (model applied to data consistent with error assumptions) and cross-testing (model applied to data with different error assumptions) that it performs favourably if not better than observation-error models. Further, residual and retrospective analyses indicate no major issues in model fits. Alternative formulations (e.g. XSA, VPA, SURBA, SAM) are regularly used and indicate consistency in assessment outputs. SId meets 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

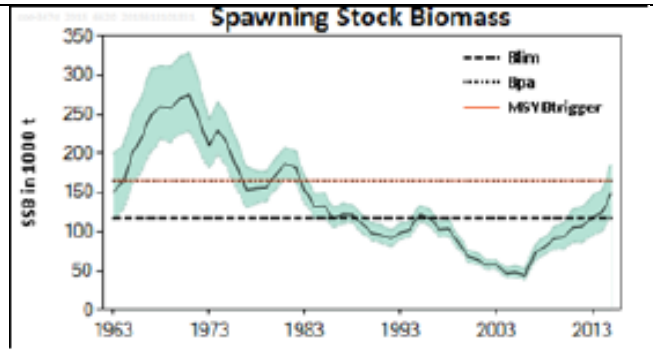
	Justification	The WGNSSK reports are subjected to an internal audit process which forms the first level of review. These reports are then reviewed by ACOM who are ultimately responsible for the official ICES advice. This forms the second level of review. Before the advice is implemented in the form of TACs, the EC may ask its own advisory group, STECF to review the ACOM report, which represents the third level of review. Periodically, ICES will organise a benchmark review to consider improvements to the assessment data and model, the latest of which occurred in 2014. SIe meets SG100.
References		ICES (2008; 2011; 2013a; 2014e), Fournier et al. (2012), Fryer (2001), Gudmundsson (1987; 1994), Millar (2011), Nielsen and Berg (2014), Shepherd (1999)
OVERALL PERFORMANCE INDICATOR SCORE		**95**
CONDITION NUMBER		None

Evaluation table 8 - PI 2.1.1

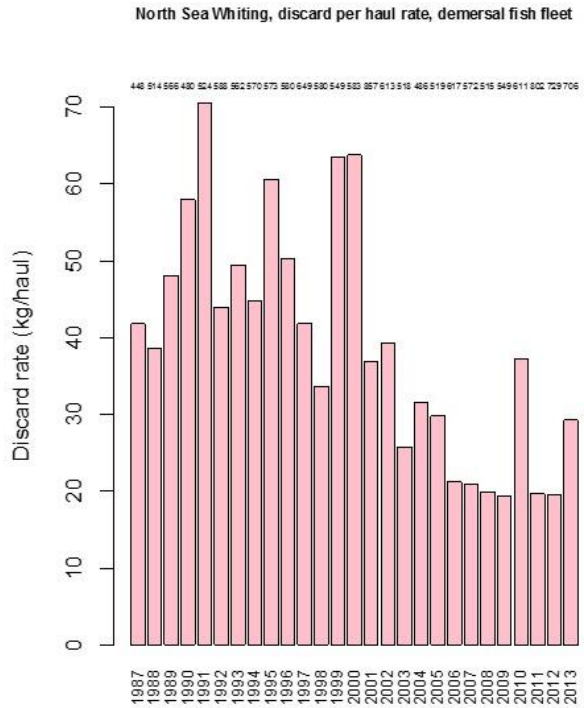
PI 2.1.1		**The fishery does not pose a risk of serious or irreversible harm to the retained species and does not hinder recovery of depleted retained species**		
Scoring Issue		SG 60	SG 80	SG 100
a	**Guidepost**	Main retained species are likely to be within biologically based limits (if not, go to scoring issue c below).	Main retained species are highly likely to be within biologically based limits (if not, go to scoring issue c below).	There is a high degree of certainty that retained species are within biologically based limits and fluctuating around their target reference points.
	Met?	Y – cod, whiting, saithe, *Nephrops* FU7, 8, 9, hake, plaice, ling, monkfish Go to scoring issue c – *Nephrops* FU34 N/a – minor species	Y – cod, saithe, *Nephrops* FU7, 8, 9, hake, plaice, ling Go to scoring issue c – *Nephrops* FU34, whiting, monkfish N/a – minor species	Y – saithe, hake, plaice N – whiting, *Nephrops* FU7, 8, 9, 34, ling, monkfish, cod N – minor species
	Justification	Main retained species are identified as follows: TR1: Danish seine – cod, whiting pair trawl – cod, whiting, saithe, hake Scottish seine – cod, whiting single trawl – cod, whiting, saithe, monkfish twin trawl – cod, whiting, saithe, monkfish, plaice, ling TR2: single trawl – *Nephrops*, whiting, monkfish twin trawl – *Nephrops*, whiting, monkfish		

		pair trawl – *Nephrops*, whiting Cod: North Sea cod biomass is estimated to be above Blim with ~95% probability (see Figure below) but is below MSYBtrigger. SG80 is met but SG100 is not met for cod Whiting: Although ICES estimates that for North Sea whiting B>Blim, it does not provide an evaluation of the probability associated with this estimate, and overall still considers biomass to be low across the North Sea as a whole (ICES, 2015f). The team considered on this basis that the stock was best evaluated as 'likely' but not 'highly likely' to be within biologically-based limits (i.e. above Blim). Whiting is evaluated further under scoring issue c below. Saithe: Saithe biomass (North Sea / W. Scotland) is estimated to be at ~MSYBtrigger. MSYBtrigger is set equal to Bpa, which has been set to give a ~95% probability that B is above Blim (ICES, 2015e). SG80 and SG100 are met for saithe. Hake: Hake biomass (northern stock) is estimated to be >>MSYBtrigger, which is set to give a ~95% probability that the stock is above Blim (ICES, 2015g). SG80 and SG100 are met for hake. Monkfish: ICES advice includes two species of monkfish (*Lophius piscatorius* and *L. budegassa*), but in practice the North Sea is outside the range of *L. budegassa*, and even though ICES advice also covers the West of Scotland and Rockall, it appears that that issue of confusion of the two species is not a serious one – a greater problem in terms of developing a quantitative stock assessment is that individuals are very difficult to age (ICES, 2015h). No reference points have been defined for the North Sea/ West of Scotland stock. Since the survey stock size indicator has been increasing since 2011 (ICES, 2015h), it is reasonable to suppose that the stocks are above the point of impaired recruitment, so SG60 is met. It is not clear if SG80 is met so monkfish is evaluated further under scoring issue c below. Plaice: Plaice SSB (North Sea and Skaggerak) for 2015 is estimated to be 901,694 tonnes which is set to give a ~95% probability that the stock is above Blim (ICES, 2015i). SG80 and SG100 are met for plaice. Ling: No reference points have been defined for the North Sea/ West of Scotland 'stock' (stock structure is unclear). Since the stock size indicator (standardised Norwegian longline CPUE) has been increasing year on year for the last 12 years, the team concluded that it was 'highly likely' (in a qualitative sense) that the stock is within biologically based limits (ICES 2015j). SG80 is met for ling. In the absence of reference points, however, this could not be stated with a high degree of certainty – SG100 is not met.

		Nephrops: Evaluating overlap of *Nephrops* FUs with the footprint of the fishery (Figure 1 and Figure 15), five FUs are relevant: Fladen Ground (FU 7), Devil's Hole (34), Moray Firth (9) and Firth of Forth (8). See ICES (2015a). Fladen Ground (7): Stock abundance is estimated to be ~at MSYBtrigger, and 'above possible reference points' for Bpa and Blim. SG80 is met. Devil's Hole (34): ICES states that stock status is 'unknown'; survey indicates that biomass is declining (survey data only available to 2012), but LPUE trends are increasing / stable. Evaluated under scoring issues c and d below. Moray Firth (9): Stock abundance is estimated to be ~at MSYBtrigger, and 'above possible reference points' for Bpa and Blim. SG80 is met. Firth of Forth (8): Stock abundance is estimated to be above MSYBtrigger and 'above possible reference points' for Bpa and Blim. SG80 is met. (Note: the overlap of this fishery with the haddock fishery is likely very small.) Stock status is not explicitly evaluated in relation to reference points in a probabilistic way; evaluations are based on empirical data (surveys of burrows). The team concluded that SG100 is not met for the *Nephrops* FUs. In relation to SG100, the full list of retained species is given in Table 14 of the main report; there are a very large number, most of which do not have defined target reference points or quantitative stock assessments. SG100 is not met overall for these species.

		 Estimated North Sea cod biomass in relation to reference points, with 95% confidence intervals (ICES, 2015d)		
b	**Guidepost**			Target reference points are defined for retained species.
	Met?			Y – cod, whiting, saithe, hake, plaice, *Nephrops* FU7, 8, 9 N – ling, *Nephrops* FU34, monkfish, minor species
	Justification	Target reference points are only defined for cod, whiting, saithe, hake, plaice and *Nephrops* (except Devil's Hole). As such SG100 is only met for those scoring elements.		
c	**Guidepost**	If main retained species are outside the limits there are measures in place that are expected to ensure that the fishery does not hinder recovery and rebuilding of the depleted species.	If main retained species are outside the limits there is a partial strategy of demonstrably effective management measures in place such that the fishery does not hinder recovery and rebuilding.	
	Met?	Y	Y	

	Justification	Whiting, monkfish and Devil's Hole *Nephrops* (FU34) are considered here (see scoring issue a) Whiting: There is an agreed EU-Norway management strategy for North Sea whiting, as follows (ICES, 2015f): *The Parties agreed to implement a long-term management plan for the whiting stock in the North Sea, which is consistent with a precautionary approach and designed to provide for sustainable fisheries and high yields.* *The plan shall consist of the following elements:* *1. The Parties shall establish a TAC that is consistent with a fishing mortality rate of no more than 0.15 for appropriate age-groups.* *2. Where the rule in paragraph 1 would lead to a TAC, which deviates by more than 15% from the TAC of the preceding year, the Parties shall establish a TAC that is no more than 15% greater or 15% less than the TAC of the preceding year.* *3. A review of this arrangement shall take place no later than 31 December 2017.* 4. This arrangement entered into force on 1 January 2014. The limits on effort put in place for the Cod Recovery Plan have also had a big impact on reducing effort on whiting. ICES evaluated the EU-Norway strategy in 2013 (ICES, 2013d) and concluded that it is precautionary under assumptions of low-moderate recruitment. On this basis, SG60 is met. SG80 requires management measures to be 'demonstrably effective'. On the one hand, F was estimated for 2014 to be above the agreed management level; however, F has declined overall by a factor of 3 since 1990, while biomass has recovered since the lowest observed level in 2007. It is also relevant to look at the Scottish level since the majority of North Sea whiting is taken by the Scottish fishery. Scotland has had measures in place (conservation credits scheme) to try and reduce discards (which, for whiting, make up a significant proportion of the catch). Discard rates (kg/haul) for the Scottish fleet have declined significantly over the last 25 years (see figure below). On this basis, the team considered that overall, the set of measures in place for North Sea whiting, at both EU/Norway and Scottish level, have been 'demonstrably effective' in improving the status of the stock; hence SG80 is met.



Discard rate (kg/haul) for North Sea whiting (data provided by Marine Scotland).

Monkfish: ICES provide advice for this stock using the management framework for data-deficient stocks (ICES 2012a), which the team considered to be a 'strategy'. The stock is 'category 3', which means that a stock biomass indicator is available (in this case from the Scottish trawl survey) but reference points cannot be set (because of problems with species identification and aging). The advice is based on a comparison of the two latest index values with the three preceding values, multiplied by the recent advised catch – i.e. if the indicator increases over a sustained period, as currently, the TAC can increase. ICES also apply precautionary limits to the amount of increase, depending on the situation – in this case, the index has increased by >50% over the defined period, but the TAC increase is limited to 20%.

		Although there is no target reference point, the strategy appears to be demonstrably effective in this particular case, in that catches are stable at around the TAC level and the biomass is apparently increasing. The team were concerned as to whether the proportions of the two species in the catch has remained consistent, but it appears that *L. budegassa* does not occur in the area of this fishery. On this basis, the team were satisfied that SG80 is met.		
		Devil's Hole *Nephrops*: ICES recommend a maximum total catch based recent average catches, as long as the implied harvest rate does not exceed the lower bound of the harvest rate used as an MSY proxy for other *Nephrops* FUs (8-16% - harvest rate implied by advice 5.3% which ICES considers to be precautionary). A TAC is set on the basis of ICES advice, but for the whole North Sea, so in theory, the recommended maximum catch for a given FU can be exceeded. For this FU, ICES recommends a total catch for 2015 and 2016 of 410 t (landings of 383 t). Landings up to 2012 were considerably higher than this, but landings for 2013 were estimated at 121 t and in 2014 at 320 t, with effort in the area having declined significantly. 2013 was the first year ICES provided quantitative advice for this FU, so the actions of the fishery relative to ICES advice prior to 2013 cannot be evaluated; the total catch in 2014 was lower than ICES' advised maximum level. On the basis that ICES advice is precautionary and that catches in 2013 and 2014 were significantly lower than this advice, the team considered that the fishery is highly unlikely to be hindering recovery, hence SG80 is met for Devil's Hole *Nephrops*.		
d	**Guidepost**	If the status is poorly known there are measures or practices in place that are expected to result in the fishery not causing the retained species to be outside biologically based limits or hindering recovery.		
	Met?	Y		
	Justification	This applies to Devil's Hole *Nephrops*. ICES' provides advice on a precautionary maximum catch / landings. A TAC is set on the basis of this advice, although covering all North Sea FUs, and landings have been lower than the advised level since quantitative advice was provided for this FU. On this basis, the team considered that this is met.		
References		ICES (2012a, 2013d, 2015d, e, f, g, h, I, j)		

Score cod	**90**
Score whiting	**85**
Score saithe	**100**
Score *Nephrops* FU7	**80**
Score *Nephrops* FU8	**80**
Score *Nephrops* FU9	**80**
Score *Nephrops* FU34	**80**
Score hake	**100**
Score plaice	**100**
Score ling	**80**
Score monkfish	**80**
Score minor species	**80**
OVERALL PERFORMANCE INDICATOR SCORE:	**85**
CONDITION NUMBER (if relevant):	**None**

Evaluation table 9 - PI 2.1.2

PI 2.1.2		There is a strategy in place for managing retained species that is designed to ensure the fishery does not pose a risk of serious or irreversible harm to retained species		
Scoring Issue		SG 60	SG 80	SG 100
a	**Guide post**	There are measures in place, if necessary, that are expected to maintain the main retained species at levels which are highly likely to be within biologically based limits, or to ensure the fishery does not hinder their recovery and rebuilding.	There is a partial strategy in place, if necessary, that is expected to maintain the main retained species at levels which are highly likely to be within biologically based limits, or to ensure the fishery does not hinder their recovery and rebuilding.	There is a strategy in place for managing retained species.
	Met?	Y	Y	Y – cod, whiting, saithe, hake, plaice N – monkfish, ling, *Nephrops*, minor species
	Justification	A full list of the main retained species for each gear type is given in the rationale for 2.1.1. Cod: There is a strategy in place for managing cod stocks, in the shape of the cod recovery plan, which has been demonstrably successful at rebuilding the North Sea cod stock. SG80 and SG100 are met. Whiting: There is a joint EU-Norway management strategy for North Sea whiting, as well as measures to reduce discarding (conservation credits in Scotland, EU juvenile closed areas). The team considered that these comprise a 'partial strategy' as required by SG80. This strategy has successfully reduced catches, discards and fishing mortality on North Sea whiting over the last two decades. Stock biomass has improved since the low point in the time series (2007). However, the most recent estimate of F was above the agreed management level (0.23 vs. 0.15). Blim is set at Bloss (a precautionary level – 184,000 t). As part of their evaluation of the management plan, ICES evaluated the short-term (2014-18) and long-term (2014-2033) risks of biomass dropping below various thresholds under various levels of F, on the basis of low-moderate recruitment, as has been observed in recent years. They estimated based on projections that at F=0.2 there was a short-term risk of 6% (long-term 10%) of biomass dropping below 180,000 t; 10% and 14% for 190,000 t. MSC define 'highly likely' in the P2 context as a 70% probability, so on this basis, the team concluded that even if F cannot be reduced below current levels, the biomass is 'highly likely' to remain above Blim at this level of exploitation. Therefore, SG80 and SG100 are met. Saithe: There is a joint EU-Norway management strategy for North Sea / W. Scotland saithe; biomass and fishing mortality are at the target levels. SG80 and SG100 are met. Hake: An EU recovery plan for the northern stock was put in place in 2004, but is no longer relevant since the stock has recovered and		

		indeed expanded way beyond estimated biomass reference points (most likely due to warming). ICES have therefore set the plan aside and provide advice based on the MSY approach. Since biomass is ~5 times higher than MSYBtrigger, the team considered that SG80 and SG100 are met. Monkfish: Monkfish is managed following the EU 'data-deficient' framework, with the TAC based on relative trends in a survey index with a precautionary cap on the rate of increase, as described above. This constitutes a 'partial strategy' which has stabilised catches and allowed the stock to grow in recent years. SG80 is met. Plaice: North Sea and Skaggerak plaice is managed (along with sole) via an EU multispecies management plan, which included a rebuilding stage and an MSY stage – the stock is now rebuilt to >>MSYBtrigger and fishing mortality has reduced to ~FMSY, hence the TAC is set following the MSY approach. SG80 and SG100 are met for plaice. Ling: Ling is managed following the EU 'data-deficient' framework, with the TAC based on relative trends in an index of standardised CPUE from the Norwegian longline fishery, with a precautionary cap on the rate of increase, as described above. This constitutes a 'partial strategy' which has stabilised catches and allowed the stock to grow year on year since 2003. SG80 is met.
		Nephrops: For *Nephrops*, ICES' monitor the stock abundance in the FUs directly using UWTV, as well as via fisheries data, and provide advice on the basis of reference points based on exploitation rates (except for Devil's Hole where appropriate exploitation rates are extrapolated from other FUs on a precautionary basis). This then gives an estimate of maximum catch compatible with this exploitation rate, which is turned into a recommendation on landings via estimates of discards. Sex ratio in the landings is also monitored. A TAC is set on the basis of the ICES' advice, which covers all of the North Sea FUs; effort is also limited via the cod recovery plan. The team considered that this constitutes a 'partial strategy' as required by SG80. The main issue with this strategy is that because the TAC is set at a larger spatial scale than the 'stocks' (FUs), individual FUs can still be overfished in a given year. This issue is evaluated in the figure below. Aside from the Firth of Forth, which has been consistently overfished relative to ICES' advice by a small amount, there has not been a pattern of overshooting ICES advice in any of the relevant FUs in recent years. In 2014, however, landings from the Firth of Forth and the Moray Firth increased sharply as a result of low biomass and catch rates in the main fishing area (the Fladen Ground). For the moment, however, the stock abundance of these FUs remains above the target level. In relation to the Firth of Forth, ICES notes that the stock appears to be resilient to exploitation rates consistently (if slightly) above the reference point level, and speculates that this stock is particularly productive.

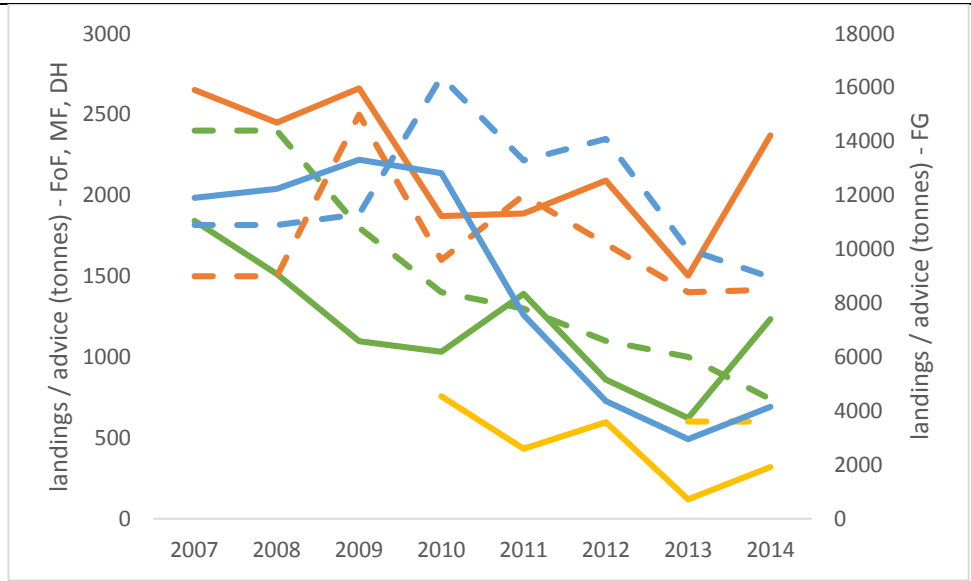


Figure: ICES advice (dotted) vs. landings (solid) for the relevant *Nephrops* functional units: Fladen Ground = blue (NB: on a separate axis); Firth of Forth = orange; Moray Firth = green; Devil's Hole = yellow.

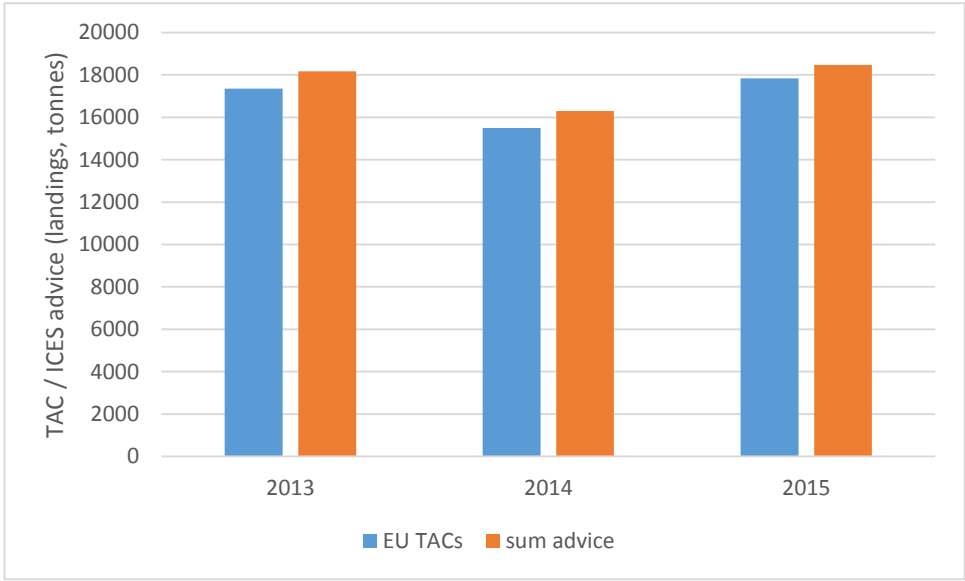
Overall, the team considered that despite some shortcomings, the partial strategy appeared to be working in practice quite well to maintain good stock status of the relevant FUs, and is flexible enough to allow the fishery to adapt to natural fluctuations (e.g. it is speculated that the recovery of cod has increased predation rates on *Nephrops* in some areas; weather conditions will also sometimes result in the fleet moving from offshore to inshore FUs). The team concluded that SG80 is met. If, however, the overshoot of the ICES advice in the inshore areas continues, and has an impact on stock status, the CAB will need to review this issue.

In relation to SG100 there is not a strategy in place in all cases (e.g. some minor retained species are not subject to a TAC or other management measures, although catches are limited by general factors such as days at sea limits), so SG100 is not met in full.

b	**Guide post**	The measures are considered likely to work, based on plausible argument (e.g., general experience, theory or comparison with similar fisheries/species).	There is some objective basis for confidence that the partial strategy will work, based on some information directly about the fishery and/or species involved.	Testing supports high confidence that the strategy will work, based on information directly about the fishery and/or species involved.

	Met?	Y	Y	Y – cod, whiting, saithe, hake, plaice N – monkfish, ling, *Nephrops*, minor species
	Justification	Cod: The cod recovery plan has worked, according to stock assessments (see 2.1.1). SG100 is met. Whiting: Details on ICES' simulations of various management scenarios for whiting are given in the rationale for scoring issue a) above. On this basis, the team considered that SG80 is met for whiting. The simulation testing suggests a ~10% long-term probability of the stock biomass dropping below the limit reference points (Bloss). On this basis, there is high confidence that the strategy will work. SG100 is also met. Saithe: The EU-Norway plan has been in place since 2012 and was evaluated by ICES to be precautionary (2012). The plan has been respected (TAC set according to advice, landings not exceeding TAC). The stock biomass has fluctuated around the target reference point since the management plan was introduced. SG100 is met. Hake: The biomass of hake in the North Sea has exploded in recent years (most likely due to warming), rendering the EU 'recovery plan' irrelevant. Since the biomass is at ~5 times MSYBtrigger, there are no concerns for the sustainability of the fishery for hake. SG100 is met. Monkfish: There is no analytical assessment for monkfish and no quantitative reference points can be set, due to problems with aging. However, there is a basis for considering that the management strategy is working based on various indicators: i) catches have been stabilised at a level below the peak of the late 1990s (after which the stock biomass as measured by the survey indicator declined somewhat); ii) the biomass index has increased significant in recent years (the ratio used to evaluate the increase in the TAC has increased by >50%) and iii) there is a precautionary cap such that the TAC cannot track the biomass indicator upwards at a rate >20% per year. On this basis, the team considered that there is an objective basis for confidence that the strategy is working, based on the information analysed by ICES. SG80 is met, but SG100 is not met. Plaice: The biomass of North Sea plaice has increased to ~4 times MSYBtrigger; on this basis (as for hake), SG100 is met. Ling: Ling is managed on the same basis as monkfish. The biomass index has increased year on year since 2003, providing an objective basis that the fishery is not threatening the stock. SG80 is met. *Nephrops*: For *Nephrops*, although the strategy is employed at a wider spatial scale than the FUs, it appears to have been effective, , based on the biomass and exploitation rate trends of the relevant stocks. There is some concern that in 2014, effort moved from the offshore to the inshore FUs, leading to concern about overexploitation of the Firth of Forth and Moray Firth FUs in the medium term, but as long as these high catches do not continue over several years, the current evidence suggests that the strategy has been successful. SG80 is met, but SG 100 is not met. Minor species: Since there is not an overarching strategy for all retained species (although limits on days at sea is a partial strategy covering all species) then SG100 is not met in full.		

c	**Guide post**		There is some evidence that the partial strategy is being implemented successfully.	There is clear evidence that the strategy is being implemented successfully.
	Met?		Y	Y – cod, saithe N – whiting, hake, plaice, ling, *Nephrops* , monkfish
	Justification	Cod: The cod recovery plan has been implemented, as evidenced by a 5-fold reduction in catch between 1987 and 2014. Whiting: For whiting, the TAC has been set according to the management plan since it was introduced (2012). Landings have not exceeded the TAC, although catches have been higher due to discards. According to data from Marine Scotland, however, discards of the Scottish fleet (the main fleet exploiting the North Sea stock) have also declined significantly since the mid-2000s, both in terms of discards per haul and discards per unit landings. On this basis, the team considered that the partial strategy for whiting is being implemented but that SG100 is not met because of remaining concerns about discards. Saithe: As noved above, the TAC has been set according to the requirements of the management plan, and landings have not exceeded the TAC. The management plan is therefore being implemented. Hake: Landings have exceeded the TAC in every year since 2009, and ICES estimate that discards have also increased. These two issues arise as a result of the failure of the TACs to keep pace with the explosion in biomass which means that it is difficult for fishers to avoid catching hake over their quotas. Nevertheless, F has decreased sharply since 2006, and was estimated by ICES at slightly above FMSY in 2014 (0.33 vs. 0.27), having declined from a peak of ~1.1 (late 1990s). Overall, given that biomass is at ~5X MSYBtrigger, it makes no sense to conclude that the partial strategy should be implemented differently. SG80 is met but SG100 is not met. Monkfish: It is not possible to compare the ICES advice and the TAC for North Sea monkfish, because they cover different areas (ICES: IIIa, IV and VI; TAC: IV, VI, XII, XIV, EU waters of IIb and Vb), although they are in the same ballpark. Based on the evidence that the stock is growing and catches are stable, the team concluded that the partial strategy as implemented is successful. SG80 is met but SG100 is not met (since there is no strategy). Plaice: The TAC has followed ICES advice every year since 2009, except for 2011 when ICES presented a series of scenarios. Landings have respected the TAC every year since 2002, but there have been significant discards (since the smaller sole is the main target species of the plaice fishery in the southern North Sea). Discards are, however, included in the assessment. In 2015, ICES started to provide advice based on 'wanted catch' plus 'unwanted catch', to reflect the forthcoming implementation of the discard ban. The strategy is being implemented successfully and SG80 is met, but like whiting, SG100 is not met because of remaining concerns about discards. Ling: As for monkfish, it is problematic to compare ICES advice with TACs directly since they cover different and overlapping areas. Landings in 2014 were ~17,000 tonnes, compared to ICES advice for the same areas of 10,800 tonnes (discards were considered to be negligible). Notwithstanding this, there is evidence that the partial strategy is being effectively implemented as since 2003, both the		

		biomass index and ICES' advice have increased.. SG80 is met but since there is no strategy, SG100 is not met. *Nephrops*: A TAC (or actually TACs for EU and Norway waters – the latter <10% of the former) is set on the basis of ICES advice but for the whole of the North Sea. ICES (2015b) includes data back to 2012, and in this period, landings have always been much less than the total TAC (2012: EU TAC 21929 t, Norway TAC 1200 t, landings 13632 t; 2013: EU TAC 17350 t, Norway TAC 1000 t, landings 10829 t). Since 2013 (the year in which ICES began providing quantitative advice for all areas, including outside the FUs), the EU TAC has always been set slightly lower than the sum of the ICES advice for all areas; presumably to allow for a small TAC in Norwegian waters without exceeding ICES advice. On this basis, the team concluded that the partial strategy is being implemented successfully. Minor species: Have no strategy so SG100 is not met.		
				
d	**Guide post**			There is some evidence that the strategy is achieving its overall objective.
	Met?			Y – cod, saithe N - others

	Justification	Cod, whiting, saithe, hake and plaice are considered to have a strategy (see scoring issue a). For the other species, including minor species, this cannot be met. Cod: Stock above Blim in 2013 for the first time since ~1995. Met. Whiting: Biomass has increased but F remains above the target level. Not met. Saithe: F at or below target level since 2010. Met. Hake: Biomass has exceeded the target level to such an extent that the strategy has become irrelevant. Not met. Plaice: Like hake, the strategy has been overtaken by events (large increase in biomass) and is not longer relevant. Not met.		
e	**Guide post**	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?	Y	Y	Y
	Justification	A very small quantity of sharks are landed by the fishery (Table 14), but shark finning is forbidden in EU fisheries (Regulation 605/2013) and there is absolutely no evidence that there is any shark finning in this fishery.		
References		EU 2007, 2013b ICES (2012a, 2013d, 2015d, e, f, g, h, I, j)		

Score cod	**100**
Score whiting	**90**
Score saithe	**100**
Score *Nephrops* FU7	**80**
Score *Nephrops* FU8	**80**
Score *Nephrops* FU9	**80**
Score *Nephrops* FU34	**80**
Score hake	**90**
Score plaice	**90**

Score ling	**80**
Score monkfish	**80**
Score minor species	**80**
OVERALL PERFORMANCE INDICATOR SCORE:	**85**
CONDITION NUMBER (if relevant):	**None**

Evaluation table 10 - PI 2.1.3

PI 2.1.3		**Information on the nature and extent of retained species is adequate to determine the risk posed by the fishery and the effectiveness of the strategy to manage retained species**		
Scoring Issue		SG 60	SG 80	SG 100
a	**Guide post**	Qualitative information is available on the amount of main retained species taken by the fishery.	Qualitative information and some quantitative information are available on the amount of main retained species taken by the fishery.	Accurate and verifiable information is available on the catch of all retained species and the consequences for the status of affected populations.
	Met?	Y	Y	N
	Justification	Data on landings of all species is available (see Table 14 of the main report), and is cross-checked by Marine Scotland against logbook and VMS data, with discrepancies being followed up (Valerie West, Marine Scotland, pers. comm.). Information is also available on discards via the two observer programmes (MSS and SFF – now integrated). These data are analysed for the main commercial species (also the main species subject to discards – i.e. cod, haddock, saithe and whiting) but it is not completely clear to what extent they are analysed for all species. SG80 is met, but SG100 is not met.		
b	**Guide post**	Information is adequate to qualitatively assess outcome status with respect to biologically based limits.	Information is sufficient to estimate outcome status with respect to biologically based limits.	Information is sufficient to quantitatively estimate outcome status with a high degree of certainty.
	Met?	Y	Y	N
	Justification	The stock status is assessed quantitatively relative to biologically-based limits for all the main retained species except for monkfish, ling and Devil's Hole *Nephrops*. For these three stocks, there is no quantitative stock assessment, but survey data (monkfish, *Nephrops*) or standardised commercial CPUE (ling) allow an analysis of trends, sufficient for ICES to provide quantitative advice for these stocks. SG80 is met, but SG100 is not met because there is no 'high degree of certainty' for these stocks, nor for many of the minor retained species.		
c	**Guide post**	Information is adequate to support measures to manage main retained species.	Information is adequate to support a partial strategy to manage main retained species.	Information is adequate to support a strategy to manage retained species, and evaluate with a high degree of certainty whether the strategy is achieving its objective.
	Met?	Y	Y	N

	Justification	All the 'main' retained species are evaluated as having a strategy or a partial strategy for management of the stocks/FUs, which is supported by ICES assessments in all cases. Therefore SG80 is met. There can be argued to be an overarching strategy for the management of stocks in European waters (the MSY and data-limited stocks approach) but since it is not possible in the case of monkfish, ling or Devil's Hole *Nephrops*, or many of the minor species, to evaluate with a high degree of certainty whether the required stock status is being achieved, hence SG100 is not met.		
d	**Guide post**		Sufficient data continue to be collected to detect any increase in risk level (e.g. due to changes in the outcome indicator score or the operation of the fishery or the effectiveness of the strategy)	Monitoring of retained species is conducted in sufficient detail to assess ongoing mortalities to all retained species.
	Met?		Y	N
	Justification	Landings data are available for all the retained species. Discards data are collected by observers, and discard rates are estimated quantitatively (or by extrapolation from other stocks in the case of Devil's Hole *Nephrops*) for all the 'main' retained species, but not necessarily for all the minor retained species. For *Nephrops* FUs, surveys are conducted annually or biennially. Fisheries-independent surveys are also available for the finfish 'main' and minor retained species (see details in PI1.2.4). On this basis, SG80 is met. However, because assessing mortalities (rather than risk levels) requires information on stock abundance, and this is not available for all the retained species, SG100 is not met.		
References		ICES (2012a, 2013d, 2015d, e, f, g, h, I, j)		
OVERALL PERFORMANCE INDICATOR SCORE:				**80**
CONDITION NUMBER (if relevant):				**None**

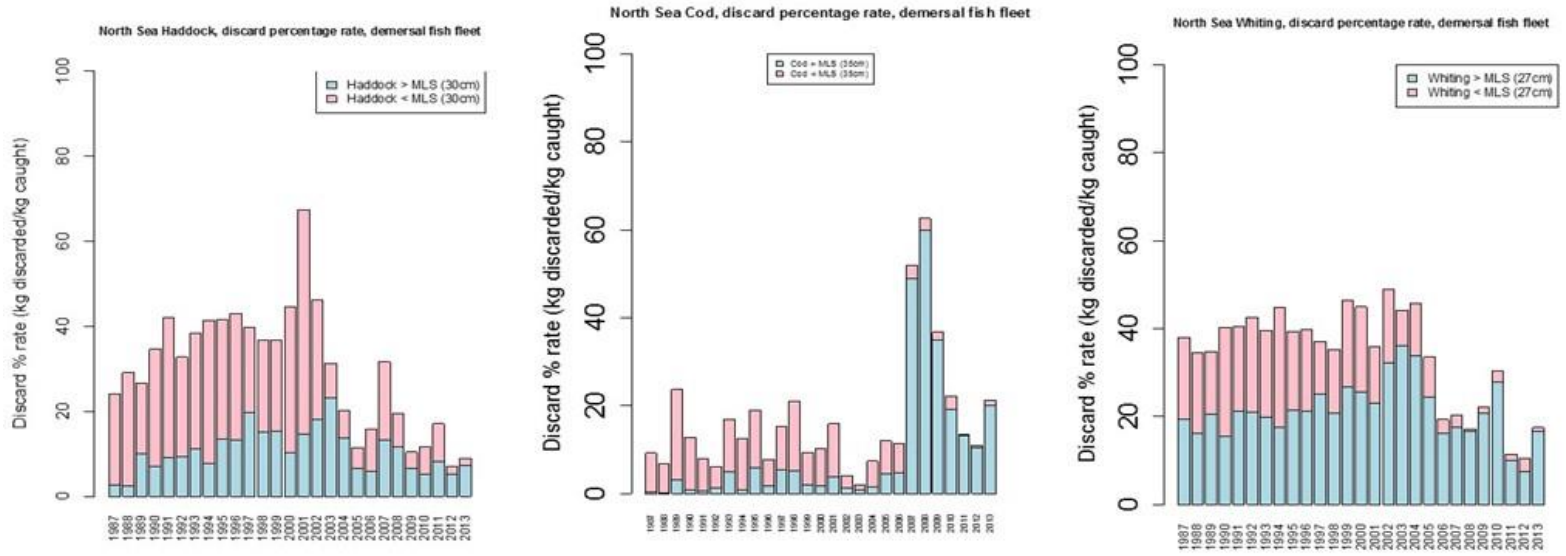
Evaluation table 11 - PI 2.2.1

PI 2.2.1		The fishery does not pose a risk of serious or irreversible harm to the bycatch species or species groups and does not hinder recovery of depleted bycatch species or species groups		
Scoring Issue		SG 60	SG 80	SG 100
a	**Guide post**	Main bycatch species are likely to be within biologically based limits (if not, go to scoring issue b below).	Main bycatch species are highly likely to be within biologically based limits (if not, go to scoring issue b below).	There is a high degree of certainty that bycatch species are within biologically based limits.
	Met?	Y	Y	N
	Justification	No 'main' bycatch species have been identified – there is discarding in this fishery, but it is mainly of species which are considered under 'retained' above, which are discarded for reasons of size or quota. Even species which are reported in the previous assessment to be discarded are now apparently sometimes retained (e.g. grey gurnard). Discards of vulnerable species (evaluated via the PETS bycatch recording programme by observers) were reviewed and none of the bycatch (non-ETP) species were considered to be 'main' (see Table 21). SG80 is met by default. SG100 is not met, because some minor bycatch species (e.g. spurdog) are not within biologically-based limits (although there are signs of recovery); for others the stock status is not known.		
b	**Guide post**	If main bycatch species are outside biologically based limits there are mitigation measures in place that are expected to ensure that the fishery does not hinder recovery and rebuilding.	If main bycatch species are outside biologically based limits there is a partial strategy of demonstrably effective mitigation measures in place such that the fishery does not hinder recovery and rebuilding.	
	Met?	Y	Y	
	Justification	There are no 'main' bycatch species so this is met by default.		

c	**Guide post**	If the status is poorly known there are measures or practices in place that are expected to result in the fishery not causing the bycatch species to be outside biologically based limits or hindering recovery.		
	Met?	Y		
	Justification	There are no 'main' bycatch species so this is met by default.		
References		PETS bycatch recording data provided by Marine Scotland Science Report on discards of the main commercial species, provided by Marine Scotland Science Marine Scotland, 2015b ICES 2012a		
OVERALL PERFORMANCE INDICATOR SCORE:				**80**
CONDITION NUMBER (if relevant):				**None**

Evaluation table 12 - PI 2.2.2

PI 2.2.2		There is a strategy in place for managing bycatch that is designed to ensure the fishery does not pose a risk of serious or irreversible harm to bycatch populations		
Scoring Issue		SG 60	SG 80	SG 100
a	**Guide post**	There are measures in place, if necessary, that are expected to maintain the main bycatch species at levels which are highly likely to be within biologically based limits, or to ensure the fishery does not hinder their recovery and rebuilding.	There is a partial strategy in place, if necessary, that is expected to maintain the main bycatch species at levels which are highly likely to be within biologically based limits, or to ensure the fishery does not hinder their recovery and rebuilding.	There is a strategy in place for managing and minimizing bycatch.
	Met?	Y	Y	N
	Justification	Since there are no 'main' bycatch species, SG80 is met by default. In relation to SG100, there are currently various measures in place for reducing bycatch: this includes mesh-size regulations (EU Regulation 850/1998), the requirement for TR2 vessels to include a square-mesh panel and the system of real-time closed areas to avoid aggregations of cod or of juveniles. Starting in 2016, the landings obligation will start to be phased in in this fishery, with a complete ban on discarding of quota species foreseen to be in place by 2019. The team considered that the landings obligation certainly constitutes a 'strategy' as required by SG100. The team debated i) whether the current measures, which are fairly comprehensive, by themselves constitute a 'strategy' but noted that this would leave 'nowhere to go' in scoring when the landings obligation, which is a big step change in policy on discarding, is implemented. Therefore, the team concluded that SG100 is not (yet) met.		
b	**Guide post**	The measures are considered likely to work, based on plausible argument (e.g. general experience, theory or comparison with similar fisheries/species).	There is some objective basis for confidence that the partial strategy will work, based on some information directly about the fishery and/or species involved.	Testing supports high confidence that the strategy will work, based on information directly about the fishery and/or species involved.
	Met?	Y	Y	N

	Justification	Since there are no 'main' bycatch species, SG80 is met by default. Nevertheless, it is important to note that there is a clear basis for confidence that the partial strategy is working, as shown in the figure below. The discard rate per quantity caught has decreased significantly for haddock, cod and whiting, and most of the discards are now due to the MLS rather than quota issues.  Figure – kg discards per kg catch for the North Sea: haddock (left), cod (middle) and whiting (right), 1987-2013; <MLS in blue, >MLS in pink. Data provided by Marine Scotland Science. The team considered that SG100 is not met because it is not yet clear how the landings obligation will work for this fishery – Marine Scotland has put forward a strategy to the European Commission, but at time of writing it was not approved; furthermore, various details (e.g. in relation to quota flexibility, landings of undersized fish etc.) remain to be worked out.		
c	**Guide post**		There is some evidence that the partial strategy is being implemented successfully.	There is clear evidence that the strategy is being implemented successfully.
	Met?		Y	N

	Justification	SG80 is met by default. However, the team noted that there is evidence that the partial strategy up till now has been implemented successfully. Gear restrictions are enforced by Marine Scotland Compliance, who do not report any issues with illegal gear in this fishery. Real-time closed areas are in place (see Marine Scotland website). It is clear that over the last few years, these measures have worked to reduce discards significantly in this fishery (see rationale for scoring issue b). As noted above, SG100 will be met as and when the landings obligation is fully implemented.		
d	**Guide post**			There is some evidence that the strategy is achieving its overall objective.
	Met?			N
	Justification	Because the team concluded that there is not yet a full 'strategy' in this fishery (although the partial strategy is very strong), this is not fully met. The team noted, however, that evidence of a reduction in discards is given in scoring issue b. There is also evidence that many of the key stocks are recovering or increasing: for example, North Sea cod, whiting, spurdog, dogfish, smoothhound.		
References		Information on real-time closures available here: http://www.gov.scot/Topics/marine/Sea-Fisheries/management/restrictions/closed ICES (2014l) ICES (2015d, f, l, m) EU, 1998 Bycatch data provided by Marine Scotland Science		
OVERALL PERFORMANCE INDICATOR SCORE:				**80**
CONDITION NUMBER (if relevant):				**None**

Evaluation table 13 - PI 2.2.3

PI 2.2.3		Information on the nature and the amount of bycatch is adequate to determine the risk posed by the fishery and the effectiveness of the strategy to manage bycatch		
Scoring Issue		SG 60	SG 80	SG 100
a	**Guide post**	Qualitative information is available on the amount of main bycatch species taken by the fishery.	Qualitative information and some quantitative information are available on the amount of main bycatch species taken by the fishery.	Accurate and verifiable information is available on the catch of all bycatch species and the consequences for the status of affected populations.
	Met?	Y	Y	N
	Justification	Quantitative information is available on bycatch via the two observer schemes (now integrated) and the PETS recording scheme (part of the observer protocol). This allows a full quantitative analysis of discards for the main commercial species (also the main species discarded), which is integrated into the ICES stock assessments. For the species encountered more rarely, however, Marine Scotland Science is not apparently completely confident to scale up these data to provide estimates for the whole fishery. On this basis (and because no 'main' bycatch species were identified), SG80 is met but SG100 is not met.		
b	**Guide post**	Information is adequate to broadly understand outcome status with respect to biologically based limits	Information is sufficient to estimate outcome status with respect to biologically based limits.	Information is sufficient to quantitatively estimate outcome status with respect to biologically based limits with a high degree of certainty.
	Met?	Y	Y	N
	Justification	No 'main' bycatch species were identified, so SG60 and 80 are met by default. For several of the vulnerable bycatch species, outcome status is estimated with respect to biologically-based limits (see Table 21) but not with a 'high degree of certainty' so SG100 is not met.		
c	**Guide post**	Information is adequate to support measures to manage bycatch.	Information is adequate to support a partial strategy to manage main bycatch species.	Information is adequate to support a strategy to manage retained species, and evaluate with a high degree of certainty whether the strategy is achieving its objective.
	Met?	Y	Y	N

	Justification	As noted in the rationale for PI 2.2.2, a partial strategy for reducing / eliminating discards is in place, and this partial strategy is being successfully implemented; hence SG80 is met. It is clear, overall, that this strategy is working, but because discard data is not routinely scaled up to provide whole fleet estimates for all the species which are discarded (most of which are partially retained and partially discarded), it is not clear that discard impacts can be evaluated with a high degree of certainty for all the species that interact with this fishery – hence SG100 is not met in full.		
d	**Guide post**		Sufficient data continue to be collected to detect any increase in risk to main bycatch species (e.g., due to changes in the outcome indicator scores or the operation of the fishery or the effectively of the strategy).	Monitoring of bycatch data is conducted in sufficient detail to assess ongoing mortalities to all bycatch species.
	Met?		Y	N
	Justification	No 'main' bycatch species were identified, so SG80 is met by default. In any case, the observer programmes provide sufficient data for risk-based monitoring of discards. In relation to SG100, it is not clear that 'ongoing mortalities' can be assessed for all species, since this requires quantitative population data as well as fisheries data – for the vulnerable species, assessments are generally quantitative (based on survey index trends). Hence SG100 is not met.		
References		ICES (2014l) ICES (2015l, m, k) PETS recording data provided by Marine Scotland Science (see Table 20)		
OVERALL PERFORMANCE INDICATOR SCORE:				**80**
CONDITION NUMBER (if relevant):				**None**

Evaluation table 14 - PI 2.3.1

PI 2.3.1		**The fishery meets national and international requirements for the protection of ETP species** **The fishery does not pose a risk of serious or irreversible harm to ETP species and does not hinder recovery of ETP species**		
Scoring Issue		SG 60	SG 80	SG 100
a	**Guidepost**	Known effects of the fishery are likely to be within limits of national and international requirements for protection of ETP species.	The effects of the fishery are known and are highly likely to be within limits of national and international requirements for protection of ETP species.	There is a high degree of certainty that the effects of the fishery are within limits of national and international requirements for protection of ETP species.
	Met?	Y	Y	Y – porbeagle, grey seal N – starry ray, common skate complex
	Justification	ETP species have been identified as follows: based on EU fisheries regulations – Regulation 2015/104 – porbeagle, starry ray and common skate species complex; based on the Marine Scotland Act 2010 – grey seal. The key data source for the evaluation of ETP species impacts for this fishery is the PETS bycatch recording scheme data provided by Marine Scotland Science, covering 110 trips in 2014 and 2015. There is no particular reason to think that the fishery would have impacts on these species which would not be covered by this recording scheme, so on that basis, the team considered that the 'effects of the fishery are known'. In terms of national / international requirements for the protection of all these species, the requirements under the EU fisheries regulations are as follows: it is forbidden to hold on board, transship or land these species; when caught they should not be injured and should be put back in the water quickly (EU Regulation 2015/104, Article 12). Porbeagle ICES considers that porbeagle stock status is unknown. The advice is the fishing mortality should be minimised and no targeted fisheries permitted. Recent landings are negligible, so discard mortality is the main fishery-related impact. The PETS data records only one interaction with a porbeagle, released alive. On this basis, the team considered that there is a 'high degree of certainty' that the fishery is within international requirements for the protection of this species – SG100 is met for this species. Starry ray ICES notes that although the species is widespread in the central and northern North Sea, the survey abundance index has been decreasing continuously since the 1990s. ICES advise no targeted fishery and measures to reduce bycatch. The species is almost entirely discarded, and neither total discards nor discard survival can be quantified. Total interactions with this species recorded in		

		the PETS data was 68 individuals (67 dead) in 110 trips. In terms of the regulatory requirements, the species is always discarded (according to ICES, recorded landings in total for the whole area of IIa, IIIa and IV are ~300 kg), but according to the PETS data, individuals are usually dead on arrival on board, or in some cases injured (these have been classified as 'dead' in Table 20), so it is not clear that the requirement to discard promptly has much effect for this species. Nevertheless, the team considered that international requirements (not to target, not to retain, to discard promptly when alive) were highly likely to be being met for this fishery, and hence SG80 is met. Common skate ICES evaluates the whole species complex together, although they note that most/all of these in the North Sea are *D. intermedia*. ICES considers that the species (complex) is depleted, although stock abundance and trends are unknown (survey catch rates are too low to allow an abundance index). ICES advice is the same as for starry ray. The PETS data record the three species separately, and likewise estimate that most of the interactions are with *D. intermedia*. From the 110 trips observed in 2014 and 2015, interactions were as follows: *D. intermedia*: 11 alive, 30 dead *D. batis*: 7 alive, 3 dead *D. flossada*: 1 alive, 2 dead The team considered that the scoring outcome is the same for this species as for starry ray. Grey seal Grey seals are protected under the Marine (Scotland) Act 2010, and may not be killed, except with a licence or to alleviate suffering. The PET data set includes interactions with two grey seals, one alive and one dead (which was most likely killed by interaction with the fishing gear, according to the notes made by the observer). Scientific advice on seal populations in the UK is provided by the Special Committee on Seals, which is hosted by the Sea Mammal Research Unit at St. Andrews University. The 2014 advice estimated the total UK population of grey seals at 111,600 animals in 2013, about the same as 2012, and an increase from 2009 (estimated ~99,000). The population has increased around the North Sea in recent years, and is stable elsewhere. On this basis, the team considered that although total mortality for the whole fleet cannot be estimated from the data available, there is a high degree of confidence that it will have no impact on the grey seal population.		
b	**Guidepost**	Known direct effects are unlikely to create unacceptable impacts to ETP species.	Direct effects are highly unlikely to create unacceptable impacts to ETP species.	There is a high degree of confidence that there are no significant detrimental direct effects of the fishery on ETP species.
	Met?	Y	Y – porbeagle, grey seal	Y – porbeagle, grey seal

			N – starry ray, common skate complex	N – starry ray, common skate complex
	Justification	Direct impacts were considered to be bycatch and discard mortality. For porbeagle and grey seal, the team had a high degree of confidence, based on very low interaction rates, that this fishery is not having a significant detrimental effect – SG100 is met. For starry ray, the team noted that while the average interaction rate was ~2 individuals every 3 trips, in practice interactions are patchy (e.g. 40 of the 67 dead individuals came from one tow; there have been none recorded so far in 2015). The team concluded that since regulatory requirements are being met following ICES advice, direct impacts could be evaluated (qualitatively) as 'unlikely' to create unacceptable impacts (SG60 met). It is at least possible, however, that the fishery could do more, perhaps by evaluating the areas or conditions under which large quantities of the species are caught together, and/or the circumstances in which the individuals are brought on board in good or bad condition – i.e. it was possible to do more to avoid fishing or killing these individuals. On this basis, the team considered that SG80 was not fully met. For common skate likewise, their catch can likewise be patchy (e.g. 15 of the *intermedia* taken in one haul), and that although the regulatory requirements are being met (SG60 met) the fishery could do better to avoid some of these impacts with more targeted requirements, hence SG80 is likewise not met. Note that this outcome is harmonised with the SFSAG saithe fishery for common skate. The saithe fishery has no condition for starry ray, since the data at the time of assessment did not suggest that the species was in decline.		
c	**Guidepost**		Indirect effects have been considered and are thought to be unlikely to create unacceptable impacts.	There is a high degree of confidence that there are no significant detrimental indirect effects of the fishery on ETP species.
	Met?		Y	N
	Justification	The team considered that indirect effects are unlikely and so considered that SG80 was met. SG100 is not met because there is not a 'high degree of confidence' about indirect effects.		
References		EU Regulation 2015/104 Marine (Scotland) Act 2010 PETS data provided by Marine Scotland Science (see Table 20) ICES (2015n, p, q) SCOS 2014. Scientific advice on matters relating to the management of seal population, 2014. Special Committee on Seals. See		

	http://www.smru.st-andrews.ac.uk/documents/2589.pdf SCOS 2010. Scientific advice on matters relating to the management of seal population, 2010. Special Committee on Seals. See http://www.smru.st-andrews.ac.uk/documents/389.pdf	
Score porbeagle		**95**
Score grey seal		**95**
Score starry ray		**75**
Score common skate complex		**75**
OVERALL PERFORMANCE INDICATOR SCORE:		**75**
CONDITION NUMBER (if relevant):		**1**

Evaluation table 15 - PI 2.3.2

PI 2.3.2		**The fishery has in place precautionary management strategies designed to:** • **Meet national and international requirements;** • **Ensure the fishery does not pose a risk of serious harm to ETP species;** • **Ensure the fishery does not hinder recovery of ETP species; and** • **Minimise mortality of ETP species.**		
Scoring Issue		SG 60	SG 80	SG 100
a	**Guidepost**	There are measures in place that minimise mortality of ETP species, and are expected to be highly likely to achieve national and international requirements for the protection of ETP species.	There is a strategy in place for managing the fishery's impact on ETP species, including measures to minimise mortality, which is designed to be highly likely to achieve national and international requirements for the protection of ETP species.	There is a comprehensive strategy in place for managing the fishery's impact on ETP species, including measures to minimise mortality, which is designed to achieve above national and international requirements for the protection of ETP species.
	Met?	Y	Y	Y – porbeagle, grey seal N – starry ray, common skate complex
	Justification	ICES provide advice on all three elasmobranch species (summarised in 2.3.1 above), which is in summary to avoid catching where possible. This advice is reflected in the EU Regulations (also quoted above). On this basis, the team considered that this constitutes a strategy for managing the impact of fisheries (in general, including this one) on these stocks. They include measures to minimise mortality (no targeting, avoid bycatch, carefully handling if taken alive), and are designed to reduce the fishery impact to the lowest practicable level. Hence SG80 is met. In relation to SG100, the team did not consider that these measures constitute a 'comprehensive strategy' because, as discussed above, it seems at least plausible to us that additional measures are possible, at least for the rays. In relation to grey seal, the Marine (Scotland) Act 2010 bans the killing of grey seals without a licence, as well as the disturbance of seals at haul-out sites. Seal populations are surveyed annually by the Sea Mammal Research Unit of St. Andrews University, and are known to be increasing. Interactions with grey seals in the fishery are reported to be rare and it is clear that the fishery is not having a detrimental impact on the population. The team considered that on this basis, that the Scottish / UK strategy for protecting grey seals was the most appropriate level at which to have a strategy (rather than in the fishery directly), hence SG80 is met. Since there are no formal measures in the fishery directly, however, SG100 is not met.		

b	**Guidepost**	The measures are considered likely to work, based on plausible argument (e.g., general experience, theory or comparison with similar fisheries/species).	There is an objective basis for confidence that the strategy will work, based on information directly about the fishery and/or the species involved.	The strategy is mainly based on information directly about the fishery and/or species involved, and a quantitative analysis supports high confidence that the strategy will work.
	Met?	Y	Y – porbeagle, grey seal N – starry ray, common skate complex	Y – porbeagle, grey seal N - starry ray, common skate complex
	Justification	For porbeagle and grey seal, quantitative data (the PET data) gives a high degree of confidence that interactions with this fishery are very low, while scientific advice (ICES, SMRU) confirm that the population trend is increasing. SG100 is met. For the ray species, since the measures are aligned with ICES advice, they can be considered 'likely to work'. The team did not consider, however, that there is currently an objective basis for confidence that they will work. This is problematic, in as much as a reduction in bycatch rates could be attributed either to the measures working, or to a reduction in the population. For starry ray, however, the survey index suggests that the overall situation with the population remains of concern, and ICES state that the common skate species are depleted (although they do not provide data). On this basis, SG80 is not met.		
c	**Guidepost**		There is evidence that the strategy is being implemented successfully.	There is clear evidence that the strategy is being implemented successfully.
	Met?		Y	N
	Justification	For the elasmobranchs, the regulatory requirements are being implemented in this fishery (no targeting, no landings, good handling practices when alive). SFF have reportedly provided ray identification charts and training in handling. SG80 is therefore met. For grey seal, the 'strategy' in relation to this fishery is the fishing method, which results in interactions being rare – the PET data provide evidence of this, so SG80 is met. SG100 is not met for any of the species because there is only direct information about discard rates and mortality from a subset of trips (those with observers).		
d	**Guidepost**			There is evidence that the strategy is achieving its objective.
	Met?			Y – porbeagle, grey seal N - starry ray, common skate complex
	Justification	For porbeagle and grey seal, low interaction rates provide evidence. For the rays, interaction rates are higher and there is no good evidence that the stocks are recovering so this is not met. Note this scoring has also been harmonised with the SFSAG saithe fishery.		

References	EU Regulation 2015/104 Marine (Scotland) Act 2010 PETS data provided by Marine Scotland Science (see Table 20) ICES (2015n, p, q) SCOS 2014. Scientific advice on matters relating to the management of seal population, 2014. Special Committee on Seals. See http://www.smru.st-andrews.ac.uk/documents/2589.pdf SCOS 2010. Scientific advice on matters relating to the management of seal population, 2010. Special Committee on Seals. See http://www.smru.st-andrews.ac.uk/documents/389.pdf

Score porbeagle	**95**
Score grey seal	**95**
Score starry ray	**75**
Score common skate complex	**75**
OVERALL PERFORMANCE INDICATOR SCORE:	**75**
CONDITION NUMBER (if relevant):	**2**

Evaluation table 16 - PI 2.3.3

PI 2.3.3		**Relevant information is collected to support the management of fishery impacts on ETP species, including:** • **Information for the development of the management strategy;** • **Information to assess the effectiveness of the management strategy; and** • **Information to determine the outcome status of ETP species.**		
Scoring Issue		SG 60	SG 80	SG 100
a	**Guide post**	Information is sufficient to qualitatively estimate the fishery related mortality of ETP species.	Sufficient information is available to allow fishery related mortality and the impact of fishing to be quantitatively estimated for ETP species.	Information is sufficient to quantitatively estimate outcome status of ETP species with a high degree of certainty.
	Met?	Y	Y – porbeagle, starry ray, grey seal N – common skate species	N
	Justification	Information about interactions with this fishery come from the PET scheme, which covered 47 trips in 2014, and 63 trips in 2015 to September. It is not clear that it is possible to scale these data up to provide estimates for the entire fleet, so estimates of mortality of PET species remain qualitative rather than quantitative. In terms of evaluating stock status for these species, porbeagle has a quantitative stock assessment, grey seal an annual survey, starry ray a survey abundance index and the common skate species nothing. Overall, SG60 is met (qualitative estimate of fishery-related mortality from PET data). SG80 is met for porbeagle, grey seal and starry ray since the overall status or trend in stock status can be evaluated quantitatively, but not for the common skate species. SG100 is not met for any species, because the PET data cannot be scaled up to the whole fleet.		
b	**Guide post**	Information is adequate to broadly understand the impact of the fishery on ETP species.	Information is sufficient to determine whether the fishery may be a threat to protection and recovery of the ETP species.	Accurate and verifiable information is available on the magnitude of all impacts, mortalities and injuries and the consequences for the status of ETP species.
	Met?	Y	Y – porbeagle, starry ray, grey seal N – common skate species	N

	Justification	Although the PET data cannot be quantitatively scaled up to the fleet level, it gives an understanding in broad (semi-quantitative) terms of the impact of the fishery on these species, so SG60 is met. For porbeagle, grey seal and starry ray, the population size is tracked directly either via surveys or via a stock assessment, so the status and recovery of these species can be directly evaluated. Therefore SG80 is met for these species. For common skate, however, population trends cannot be measured, and hence it is difficult to evaluate the consequences for the population of the fishery impact. SG80 is not met for the common skate species. As above, SG100 is not met for any species.		
c	**Guide post**	Information is adequate to support measures to manage the impacts on ETP species.	Information is sufficient to measure trends and support a full strategy to manage impacts on ETP species.	Information is adequate to support a comprehensive strategy to manage impacts, minimize mortality and injury of ETP species, and evaluate with a high degree of certainty whether a strategy is achieving its objectives.
	Met?	Y	Y	N
	Justification	As argued in 2.3.2 scoring issue a) there is a strategy in place for all the ETP species. The strategy does not particularly rely on gathering information – rather on minimising any fisheries impacts (or in the case of grey seal, impacts from direct killing and disturbance which are more of a concern than fisheries interactions). On this basis, SG80 is met. In relation to SG100, since there has not been argued to be a 'comprehensive strategy' for any of the species (see 2.3.2a) then it cannot be met.		
References		PETS data provided by Marine Scotland Science (see Table 20) ICES (2015n, p, q) SCOS 2014. Scientific advice on matters relating to the management of seal population, 2014. Special Committee on Seals. See http://www.smru.st-andrews.ac.uk/documents/2589.pdf SCOS 2010. Scientific advice on matters relating to the management of seal population, 2010. Special Committee on Seals. See http://www.smru.st-andrews.ac.uk/documents/389.pdf		
Score porbeagle				**80**
Score grey seal				**80**
Score starry ray				**80**

Score common skate complex	**65**
OVERALL PERFORMANCE INDICATOR SCORE:	**75**
CONDITION NUMBER (if relevant):	**3**

Evaluation table 17 - PI 2.4.1

PI 2.4.1		**The fishery does not cause serious or irreversible harm to habitat structure, considered on a regional or bioregional basis, and function**		
Scoring Issue		SG 60	SG 80	SG 100
a	**Guide post**	The fishery is unlikely to reduce habitat structure and function to a point where there would be serious or irreversible harm.	The fishery is highly unlikely to reduce habitat structure and function to a point where there would be serious or irreversible harm.	There is evidence that the fishery is highly unlikely to reduce habitat structure and function to a point where there would be serious or irreversible harm.
	Met?	Y	Y	N
	Justification	This fishery takes place in an area which has been trawled consistently for many years, and habitat protection has to be seen in that context. In Scottish waters, there is starting to be an extensive framework for the protection of marine habitats in the area of the fishery, as set out in the main report. The Natura 2000 framework (SACs and SPAs) is continuing to be extended in marine areas (three new candidate areas) but more extensive is the process of designating NCMPAs (MCZs in England) to establish a network which meets the requirements for protection of OSPAR vulnerable and threatened habitats. According to SNH, these areas cover >10% of Scottish waters. Although these areas have been formally designated, however, there is as yet no final decision on management, although options have been set out and consultation is ongoing. The fishery also takes place to a more limited extent in English and Norwegian waters. In England, the same process is underway as in Scotland, and a couple of MCZs have been designated in the central North Sea which will have some overlap with the fishery. As in Scotland, these areas are formally designated, but there is as yet no management in place. Norway has relatively extensive closed areas for cold-water corals, but not in the area of this fishery (further north); it is not clear that there is a management structure for habitat protection more widely in this area of Norway. It is clear that past trawling has changed North Sea demersal habitats considerably. Nevertheless, some apparently sensitive species and habitats have survived (e.g. sea pens in the Fladen Ground, *Arctica islandica*) and a structure is now being put in place in the core area of this fishery to protect these species; burrowed mud (seapen habitat) and *Arctica* aggregations are two of the designation features for the NCMPAs. It is also worth noting, as does the previous assessment that trawl effort in the North Sea has declined by more than a quarter in the last 20 years. On this basis, the team concluded that the fishery is highly unlikely to have further significant impacts on existing habitats – i.e. SG80 is met. In relation to SG100, the team considered that 'evidence' would only be available when management is in place for the protected areas and their impact can be evaluated.		

References	Nature Conservation Marine Protected Areas: http://www.snh.gov.uk/protecting-scotlands-nature/protected-areas/national-designations/mpas/ Scottish MPA Project. (2014) SFSAG Haddock, Initial Assessment PCR (25th October 2010) https://www.msc.org/track-a-fishery/fisheries-in-the-program/certified/north-east-atlantic/SFSAG-north-sea-haddock-fishery/assessment-downloads-1/SFSAG-Haddock-PCRv5.pdf
OVERALL PERFORMANCE INDICATOR SCORE:	**80**
CONDITION NUMBER (if relevant):	**None**

Evaluation table 18 - PI 2.4.2

PI 2.4.2		There is a strategy in place that is designed to ensure the fishery does not pose a risk of serious or irreversible harm to habitat types		
Scoring Issue		SG 60	SG 80	SG 100
a	**Guide post**	There are measures in place, if necessary, that are expected to achieve the Habitat Outcome 80 level of performance.	There is a partial strategy in place, if necessary, that is expected to achieve the Habitat Outcome 80 level of performance or above.	There is a strategy in place for managing the impact of the fishery on habitat types.
	Met?	Y	Y	N
	Justification	The team considered that the process of designated sites as NCMPAs, based on habitat mapping and on the OSPAR designations of vulnerable habitats as well as the Natura 2000 list of habitats constituted a strategy for managing the impact of the fishery on habitats which applies to the core area of the fishery (i.e. Scottish waters). It is not clear, however, that there is a similar strategy in place (or underway) in Norway. On this basis, the strategy is designated a 'partial' strategy, hence SG80 is met but SG100 is not met.		
b	**Guide post**	The measures are considered likely to work, based on plausible argument (e.g. general experience, theory or comparison with similar fisheries/habitats).	There is some objective basis for confidence that the partial strategy will work, based on information directly about the fishery and/or habitats involved.	Testing supports high confidence that the strategy will work, based on information directly about the fishery and/or habitats involved.
	Met?	Y	Y	N
	Justification	Habitats are known and mapped, areas have been designated on an objective basis and management options and their consequences have been evaluated. There is therefore an objective basis for confidence that this strategy will work to protect habitats, once management has been put in place. Further, there is an objectives basis for considering that management will be put in place, since this has already been done for the inshore MPAs (all on the west coast so not directly relevant to this fishery, except as an example of the process). SG80 is met. The team considered, however, that 'high confidence' was only possible once it is clear how each area will be managed, so SG100 is not met.		
c	**Guide post**		There is some evidence that the partial strategy is being implemented successfully.	There is clear evidence that the strategy is being implemented successfully.
	Met?		Y	Y

	Justification	It is clear that the strategy is being implemented: areas have been evaluated and designated and there is now a clear process ongoing for evaluating management options and their costs (a business impact evaluation), consulting with stakeholders and in due course arriving at a decision about management for each area, as has already been done for the inshore areas. On this basis, the team considered that there is clear evidence that the strategy is being implemented (SG100 is met).		
d	**Guide post**			There is some evidence that the strategy is achieving its objective.
	Met?			N
	Justification	Since there is as yet no management in place, and no subsequent evaluation of the results, then the strategy is not yet achieving its objective.		
References		http://www.gov.scot/Topics/marine/marine-environment/mpanetwork http://jncc.defra.gov.uk/page-5269 - Select each site and scroll to the bottom for links to the site description, designation order, management options paper and business impact assessment.		
OVERALL PERFORMANCE INDICATOR SCORE:				**85**
CONDITION NUMBER (if relevant):				**None**

Evaluation table 19 - PI 2.4.3

PI 2.4.3		Information is adequate to determine the risk posed to habitat types by the fishery and the effectiveness of the strategy to manage impacts on habitat types		
Scoring Issue		SG 60	SG 80	SG 100
a	**Guide post**	There is basic understanding of the types and distribution of main habitats in the area of the fishery.	The nature, distribution and vulnerability of all main habitat types in the fishery are known at a level of detail relevant to the scale and intensity of the fishery.	The distribution of habitat types is known over their range, with particular attention to the occurrence of vulnerable habitat types.
	Met?	Y	Y	N
	Justification	As a basis for the designation of MPAs, and more generally as a basis for Scotland's National Marine Plan, Marine Scotland published a marine habitat atlas, and OSPAR which includes maps of intertidal, inshore, offshore and deep-sea habitats, as well as the distributions of fish stocks and vulnerable species. In Norway, the MAREANO programme provides good information on marine habitats in some areas, but it does not (as yet) cover the whole coast. On this basis, SG80 is met but SG100 is not met in full.		
b	**Guide post**	Information is adequate to broadly understand the nature of the main impacts of gear use on the main habitats, including spatial overlap of habitat with fishing gear.	Sufficient data are available to allow the nature of the impacts of the fishery on habitat types to be identified and there is reliable information on the spatial extent of interaction, and the timing and location of use of the fishing gear.	The physical impacts of the gear on the habitat types have been quantified fully.
	Met?	Y	Y	N
	Justification	The habitats are mainly mapped, as set out for scoring issue a. In relation to fishing gear, all vessels >12m are required to have VMS, which provides Marine Scotland (and the Norwegian Directorate of Fisheries where relevant) with detailed information about the fishery footprint, and is used by Marine Scotland to allocate catches by area (see Figure 1 of the main report). SG80 is met. In relation to SG100, while the physical impacts of various types of fishing gear have been studied (see for example review in Kaiser et al., 2001), this is not the case for all gear/habitat combinations in this fishery, so SG100 is not met.		
c	**Guide post**		Sufficient data continue to be collected to detect any increase in risk to habitat (e.g. due to changes in the outcome indicator scores or the operation of the fishery or the effectiveness of the measures).	Changes in habitat distributions over time are measured.

	Met?		Y	N (for protected areas will be, but not in place)
	Justification	The footprint of the fishery is continually monitored. Protected areas are required to be monitored, in order to establish that conservation objectives are being met – hence the risks to key areas of vulnerable habitats will be evaluated on an ongoing basis. SG80 is met. It is not clear, however, what are the plans, if any, to update the Marine Habitat Atlas in the future, so SG100 is not met in full.		
References		Scotttish Marine Habitat Atlas: http://www.gov.scot/resource/doc/345830/0115129.pdf Scotland's National Marine Plan: http://www.gov.scot/Resource/0047/00475466.pdf MAREANO: http://www.mareano.no/kart/mareano_en.html?language=en Kaiser et al. (2001)		
OVERALL PERFORMANCE INDICATOR SCORE:				**80**
CONDITION NUMBER (if relevant):				**None**

Evaluation table 20 - PI 2.5.1

PI 2.5.1		**The fishery does not cause serious or irreversible harm to the key elements of ecosystem structure and function**		
Scoring Issue		SG 60	SG 80	SG 100
a	**Guide post**	The fishery is unlikely to disrupt the key elements underlying ecosystem structure and function to a point where there would be a serious or irreversible harm.	The fishery is highly unlikely to disrupt the key elements underlying ecosystem structure and function to a point where there would be a serious or irreversible harm.	There is evidence that the fishery is highly unlikely to disrupt the key elements underlying ecosystem structure and function to a point where there would be a serious or irreversible harm.
	Met?	Y	Y	P

	Justification	In general, fishing has altered the ecosystem in Scottish waters – as shown, for example, by the 'large fish indicator' (Greenstreet et al., 2009). However, this trend now appears to be reversing, probably due to reductions in effort, at least in nearshore waters (See SFSAG Saithe PCR). On this basis, the team took the view that this change does not constitute 'serious or irreversible harm'. In scoring this issue, the team took into account the stock status of main target, retained, bycatch and ETP species and potential risks to benthic habitat from this fishery. The stock status of the target species is good, as is that of the main retained species, so the team assumed that these species are able to play their role in the marine ecosystem. It is clear that sharks and rays have suffered a general decline in Scottish marine ecosystems, as they have globally. The ecosystem consequences of this are not clear, although the team did not think it likely that elasmobranchs are (or were ever, at least within historical memory) keystone species in Scottish marine ecosystems. Again, actions are being taken to reduce exploitation rates on these species, although given their relatively low reproductive rate, they will take a long time to show any effects. Discarding is another aspect of this fishery that can cause ecosystem change, for example by causing a change in the behaviour of seabirds and by increasing populations of scavengers such as decapod crustaceans. Again, the team noted that efforts are being made to reduce and in the next few years largely eliminate discarding, and that these changes were not irreversible – in fact, the food supplement to some seabirds populations may have acted to counterbalance reductions in food supply due to other causes. The fishery also has some potential to damage vulnerable habitats, but as noted in the scoring for 2.3, an extensive management framework is being put in place to protect marine habitats in the area of the fishery. On this basis, the team considered that serious or irreversible harm to marine ecosystems from this fishery is highly unlikely - SG80 is met. SG100 requires 'evidence'. A report on changes in marine ecosystems since 1980 concludes that there has been some change (although spatially very variable), but this can be regarded for the most part as positive (e.g. increased species-richness in the northern North Sea – assumed to be climate-related). For some types of impact, the evidence is more circumstantial – for example, there is evidence from some areas of impacts of trawling on benthic ecosystems even down to nemotodes and nutrient cycling – however, actual changes occurring on the fishing grounds in a given area are usually impossible to assess. (The team noted that the size of the fleet has reduced a lot over the last 30 years, which is likely to have reduced benthic impacts.) On this basis, the team concluded that SG100 is partly but not fully met.

References	Greenstreet et al. (2009).; Baum et al. (2003); Hinz et al. (2008)
OVERALL PERFORMANCE INDICATOR SCORE:	**90**
CONDITION NUMBER (if relevant):	**None**

Evaluation table 21 - PI 2.5.2

PI 2.5.2		**There are measures in place to ensure the fishery does not pose a risk of serious or irreversible harm to ecosystem structure and function**		
Scoring Issue		SG 60	SG 80	SG 100
a	**Guide post**	There are measures in place, if necessary.	There is a partial strategy in place, if necessary.	There is a strategy that consists of a plan, in place.
	Met?	Y	Y	Y
	Justification	Scotland's National Marine Plan is a strategy that consists of a plan … It includes in its general framework the following issues: • visions and objectives, including a set of specific ecosystem objectives • a framework for integrated marine planning including conflict resolution • a requirement to develop regional plans for inshore areas • an MPA framework (MPAs, Natura 2000, sites of special scientific interest and the possibility of local designations) • species protection • possibility for designation of 'priority marine features' • geodiversity • marine heritage • use of best scientific evidence, cumulative impacts and adaptive management • climate change (mitigation, adaptation) • objectives and a framework for marine fisheries specifically, including socio-economic and conservation objectives The National Marine Plan itself sits within the framework of the EU strategy for marine ecosystem conservation / management, set out in the Marine Strategy Framework Directive (MSFD; Directive 2008/56/EC on establishing a framework for community action in the field of marine environmental policy). This outlines the legislative framework for an ecosystem-based approach to the management of human activities which supports the sustainable use of marine goods and services. The overarching goal of the Directive is to achieve 'Good Environmental Status' by 2020 across Europe's marine environment. To do so, a series of detailed criteria and indicators have been produced by the Commission (see 2010/477/EU) which are used by member states as a blueprint for the implementation of the		

		MSFD. The MSFD requires member states to: • Provide an assessment of the current state of their seas by July 2012 • Provide a set of detailed characteristics of what good environmental status means for their waters, and associated targets and indicators, by July 2012 • Establish a monitoring programme to measure progress by July 2014 • Establish a programme of measures for achieving good environmental status by 2016 The team considered that the MSFD and within it Scotland's National Marine Plan together constitute an overarching 'strategy which consists of a plan'. On this basis, SG100 is met.		
b	**Guide post**	The measures take into account potential impacts of the fishery on key elements of the ecosystem.	The partial strategy takes into account available information and is expected to restrain impacts of the fishery on the ecosystem so as to achieve the Ecosystem Outcome 80 level of performance.	The strategy, which consists of a plan, contains measures to address all main impacts of the fishery on the ecosystem, and at least some of these measures are in place. The plan and measures are based on well-understood functional relationships between the fishery and the Components and elements of the ecosystem. This plan provides for development of a full strategy that restrains impacts on the ecosystem to ensure the fishery does not cause serious or irreversible harm.
	Met?	Y	Y	N
	Justification	The National Marine Plan includes specific policy objectives for fisheries, including: • an ecosystem approach, protection of vulnerable species and stocks, protection of the seabed • management of conflicts between fisheries and other activities, including in relation to sustainability of stocks • delivery of international commitments, including the discard ban Measures to deliver these policy objectives include: • Implement the reformed CFP – MSY by 2020 and the discard ban • Moving towards monitoring total removals rather than landings		

		• Stabilising fishing effort at a sustainable level • Spatial management for inshore areas • Monitoring and adaptation to climate change The plan is based on a strong evidence base, including fisheries data (stock assessments, spatial distribution of fishing effort and landings), as well as other inputs such as the Habitat Atlas. On this basis, the team considered that SG80 is met. In relation to the specific effects of this fishery on the ecosystem, although none have been noted particularly (see 2.5.1), the plan is probably a bit general to address possible impacts such as, for example, the depletion of elasmobranch stocks (although it is addressed in a general way by the MSY objective). Overall, however, the team considered that the plan was too unspecific for SG100 to be met. The MSFD includes more detailed descriptors around 'good environmental status' but these remain to be specifically defined in many cases. The overall score is therefore 80.		
c	**Guide post**	The measures are considered likely to work, based on plausible argument (e.g., general experience, theory or comparison with similar fisheries/ecosystems).	The partial strategy is considered likely to work, based on plausible argument (e.g., general experience, theory or comparison with similar fisheries/ecosystems).	The measures are considered likely to work based on prior experience, plausible argument or information directly from the fishery/ecosystems involved.
	Met?	Y	Y	Y
	Justification	The measures being put in place are the usual measures for marine and fisheries conservation – i.e. reduce effort and set TACs such that exploitation of stocks is kept at a sustainable level; limit/eliminate discards; protection measures for endangered species; spatial protection for habitats – all based on analysis of the available scientific data. It is hard to think of a different way of doing it. The team also noted that other, more general ecosystem issues, such as conflicts between different uses of the marine environment and climate change, are taken into account. The plan is evaluated via a Strategic Environmental Assessment, providing a further basis for confidence that the measures proposed are appropriate. On this basis, SG80 is met. In relation to SG100, there have been various ecosystem studies of the impacts of fisheries on the North Sea (e.g. Heath 2005, Mackinson and Daskalov, 2007) which show that fisheries have had a measureable impact on various aspects of the ecosystem, quantitatively but not qualitatively (i.e. relative proportions of secondary production and consumption by different consumer groups have changed, but the overall ecosystem structure and function remains intact). On this basis, it appears that the measures are working, based on information directly about the ecosystem. SG100 is met.		

d	**Guide post**		There is some evidence that the measures comprising the partial strategy are being implemented successfully.	There is evidence that the measures are being implemented successfully.
	Met?		Y	N
	Justification	Many of the measures which protect the ecosystem are already in place or underway – e.g. TACs, quotas, effort limitations and other restrictions on fishing pressure, the designation of MPAs, the protection of ETP species etc. – the implementation of these measures is discussion in the other P2 PIs above. On this basis, SG80 is met. In relation to SG100, since both the National Marine Plan and the MSFD are relatively new, not all the measures required under these plans are yet in place, hence SG100 is not met in full.		
References		Mackinson and Daskalov, 2007 Cook and Heath, 2005 Scotland's National Marine Plan: http://www.gov.scot/Resource/0047/00475466.pdf Directive 2008/56/EC on establishing a framework for community action in the field of marine environmental policy 2010/477/EU: Commission Decision of 1 September 2010 on criteria and methodological standards on good environmental status of marine waters (notified under document C (2010) 5956) Text with EEA relevance		
OVERALL PERFORMANCE INDICATOR SCORE:				**90**
CONDITION NUMBER (if relevant):				**None**

Evaluation table 22 - PI 2.5.3

PI 2.5.3		There is adequate knowledge of the impacts of the fishery on the ecosystem		
Scoring Issue		SG 60	SG 80	SG 100
a	**Guide post**	Information is adequate to identify the key elements of the ecosystem (e.g., trophic structure and function, community composition, productivity pattern and biodiversity).	Information is adequate to broadly understand the key elements of the ecosystem.	
	Met?	Y	Y	
	Justification	Information on key elements of the ecosystem continues to be collected under the Marine Strategy Framework Directive, the VECTORS project, the EC Habitats (e.g. EUNIS) and Birds Directives as well as through independent research (e.g. Cook and Heath, 2005, Mackinson and Daskalov, 2007). Information is thus adequate to broadly understand the key elements of the ecosystem. SG80 is met.		
b	**Guide post**	Main impacts of the fishery on these key ecosystem elements can be inferred from existing information, and have not been investigated in detail.	Main impacts of the fishery on these key ecosystem elements can be inferred from existing information and some have been investigated in detail.	Main interactions between the fishery and these ecosystem elements can be inferred from existing information, and have been investigated.
	Met?	Y	Y	Y
	Justification	The main impact of the fishery on the ecosystem is considered to be the removal of demersal fish biomass. Catches and assessments are presented on a yearly basis by ICES as mixed-species advice for the North Sea fisheries. These consider the effect of the fishery on the key relevant stocks (haddock, cod, saithe, whiting, plaice, sole and *Nephrops*) in the North Sea (ICES, 2015r). The advice investigates the main impacts in detail, for example landings of species by gear type, fishing patterns and estimates by stock and by scenario. These then provide catch options for the following year, which bolster the single stock advice. On this basis SG80 is met. Further to this, there has also been investigation into the main interactions between the fishery and ecosystem elements, for example between trawl fisheries in the North Sea and benthic habitats. ETP species interactions have also been investigated. Ecosystem models (e.g. Cook and Heath, 2005, Mackinson and Daskalov, 2007) examined the effects of different fishing activities/methods on commercial species, and estimated the effects of those changes to the populations of their prey species and on their predators. SG100 is therefore met.		

c	**Guide post**		The main functions of the Components (i.e., target, Bycatch, Retained and ETP species and Habitats) in the ecosystem are known.	The impacts of the fishery on target, Bycatch, Retained and ETP species are identified and the main functions of these Components in the ecosystem are understood.
	Met?		Y	Y
	Justification	As discussed in scoring issue a, and in more detail in earlier PIs, the impacts of the fishery on target, bycatch, retained and ETP species and habitats are identified. The functions of each of these components in the North Sea ecosystem is extremely well known, and has been the subject of ecosystem modelling to further elucidate the importance of each component and interactions between these. SG100 is met.		
d	**Guide post**		Sufficient information is available on the impacts of the fishery on these Components to allow some of the main consequences for the ecosystem to be inferred.	Sufficient information is available on the impacts of the fishery on the Components and elements to allow the main consequences for the ecosystem to be inferred.
	Met?		Y	Y
	Justification	As per scoring issue c, sufficient information is available on the impacts of the fishery on target, retained species, bycatch and ETP species and habitats to allow the main consequences for the ecosystem components to be inferred. As outlined above, the significance of, and interactions between, the ecosystem components are well described and subject to ecosystem modelling. The impacts of the fishery and the main consequences for the ecosystem may therefore be (at least) inferred; SG100 is met.		
e	**Guide post**		Sufficient data continue to be collected to detect any increase in risk level (e.g., due to changes in the outcome indicator scores or the operation of the fishery or the effectiveness of the measures).	Information is sufficient to support the development of strategies to manage ecosystem impacts.
	Met?		Y	Y

	Justification	Information on key elements of the ecosystem continues to be collected under the Marine Strategy Framework Directive; the VECTORS project, the EC Habitats (e.g. EUNIS) and Birds Directives as well as well as through independent research. Sufficient data are therefore collected for any increase in risk level to be detected. SG80 is met. Under the Marine Strategy Framework Directive (MSFD) each member state should achieve 'Good Environmental Status' (GES) by 2020 and establish an action plan on how this will be achieved. The fishery in assessment resides within the North-east Atlantic Ocean zone. A regional overview of information collected and available was therefore deemed more relevant by the team. As the competent regional authority, OSPAR has a role in co-ordinating the MSFD implementation process within the region for the 11 'descriptors' by which GES of the marine ecosystem is monitored and evaluated. It has also provided a framework for the development of coordinated environmental targets and indicators. Facilitating a high degree of information sharing and joint assessment of the North-East Atlantic, including the North Sea. The OSPAR Quality Status Report 2010 (QSR, 2010), together with its underlying assessment reports, provided the primary basis for coordination of national initial assessments across the North-East Atlantic OSPAR Contracting Parties that are also EU Member States. The QSR provided an overarching summary of environmental state across the Region and the five sub-regions. The 2012 report "finding common ground" summarises progress against the environmental status descriptors, including "regional coherence of GES expression", advice guidance documents for specific descriptors, and routes towards progression with objectives. The available information is therefore deemed sufficient to support the development of strategies to manage ecosystem impacts. SG100 is therefore met.
References		ICES, 2015r Mackinson and Daskalov, 2007 Cook, R. M., and M. R. Heath, 2005
OVERALL PERFORMANCE INDICATOR SCORE:		**100**
CONDITION NUMBER (if relevant):		**None**

Evaluation table 23 - PI 3.1.1

PI 3.1.1		The management system exists within an appropriate legal and/or customary framework which ensures that it: Is capable of delivering sustainable fisheries in accordance with MSC Principles 1 and 2; and Observes the legal rights created explicitly or established by custom of people dependent on fishing for food or livelihood; and Incorporates an appropriate dispute resolution framework.		
Scoring Issue		SG 60	SG 80	SG 100
a	**Guide post**	There is an effective national legal system and a framework for cooperation with other parties, where necessary, to deliver management outcomes consistent with MSC Principles 1 and 2	There is an effective national legal system and organised and effective cooperation with other parties, where necessary, to deliver management outcomes consistent with MSC Principles 1 and 2.	There is an effective national legal system and binding procedures governing cooperation with other parties which delivers management outcomes consistent with MSC Principles 1 and 2.
	Met?	Y	Y	N
	Justification	The European policy and management measures of the recently reformed CFP prevail for the haddock shared stock. The CFP systems of data collection, collaborative research, monitoring, control and surveillance and market organisation are overarching and transposed into the UK and Scottish legal systems. The North Sea and North Western Waters Advisory Councils provide organised and effective cooperation platforms between member states and with the European Commission, as demonstrated by their recent submissions of joint recommendations for implementation of the landing obligations in demersal fisheries (NSAC, 2015; NWWAC 2015). The EU Environmental policy measures to deliver management some outcomes consistent with MSC Principle 2 have been integrated in the UK (Marine Act 2009) and Marine (Scotland) Act (2010), and are being implemented through the Scottish Marine Plan (2015) notably the programme of measures identified for the EU the Marine Framework Strategy Directive (MSFD) regarding commercial fisheries impacts on habitats and non-target species. The haddock stock is also shared with Norway, and has been managed through a joint management plan since 2008. Fishing activities in Norwegian North Sea waters are governed by the Norway fisheries management system, which has strong and effective management and legal systems in place consistent with MSC Principles 1 and 2. The procedures of cooperation between the EU and Norway have worked effectively for this stock since 2008, however they are not binding; only SG80 is met.		

b	**Guide post**	The management system incorporates or is subject by law to a mechanism for the resolution of legal disputes arising within the system.	The management system incorporates or is subject by law to a transparent mechanism for the resolution of legal disputes which is considered to be effective in dealing with most issues and that is appropriate to the context of the fishery.	The management system incorporates or subject by law to a transparent mechanism for the resolution of legal disputes that is appropriate to the context of the fishery and has been tested and proven to be effective.
	Met?	Y	Y	N
	Justification	Administrative decisions regarding licences or penalties may be disputed through well-documented and transparent channels via administrative proceedings and/or through the Scottish courts. For disputes that are not resolved, an appeal may be lodged with the administration concerned, with the procurator fiscal (for penalties), or a judicial review process against the administration may be initiated. The use of review panels (for example for the Hardship Fund) and transparent procedures and the FMAC co-management arrangements prevalent in Scotland reduce the number of disputes. But the system has been thoroughly tested in the past, regarding MCS infringements for example (see Scottish Court cases, reference below). However, currently there is no system that could resolve a dispute between Norway and the EU, SG100 is not met.		
d	**Guide post**	The management system has a mechanism to generally respect the legal rights created explicitly or established by custom of people dependent on fishing for food or livelihood in a manner consistent with the objectives of MSC Principles 1 and 2.	The management system has a mechanism to observe the legal rights created explicitly or established by custom of people dependent on fishing for food or livelihood in a manner consistent with the objectives of MSC Principles 1 and 2.	The management system has a mechanism to formally commit to the legal rights created explicitly or established by custom of people dependent on fishing for food and livelihood in a manner consistent with the objectives of MSC Principles 1 and 2.
	Met?	Y	Y	Y
	Justification	For EU-managed quota species, the CFP commits to historical fishing rights through the use of 'track records' to apportion shares of the Total Allowable Catch (TAC) by member states and each member state through the Producer Organisations (PO). Individual fishing rights may be temporarily suspended by the POs in case of quota overshoot, and temporarily or permanently withdrawn by Marine Scotland in case of serious offences. SG100 is met		
References		EU, 2013a. CFP Regulation; UK, 2009. Marine and Coastal Access Act UK; Marine Scotland, 2010. Marine (Scotland) Act; Marine Scotland, 2015d Scottish Marine Plan; EU-Norway (2014) Clonakilty; NSAC (2015), NWWAC, 2015) Scottish Courts - http://www.scotcourts.gov.uk/search-judgments/judgment-search?indexCatalogue=high%2Dcourt%2Djudgments&searchQuery=fish&wordsMode=0 (searched December 2015)		

	Marine Scotland, 2013c. Guidance note on EU points system for serious infringements, 25p.
OVERALL PERFORMANCE INDICATOR SCORE:	85
CONDITION NUMBER (if relevant):	None

Evaluation table 24 - PI 3.1.2

PI 3.1.2		**The management system has effective consultation processes that are open to interested and affected parties.** **The roles and responsibilities of organisations and individuals who are involved in the management process are clear and understood by all relevant parties**		
Scoring Issue		SG 60	SG 80	SG 100
a	**Guide post**	Organisations and individuals involved in the management process have been identified. Functions, roles and responsibilities are generally understood.	Organisations and individuals involved in the management process have been identified. Functions, roles and responsibilities are explicitly defined and well understood for key areas of responsibility and interaction.	Organisations and individuals involved in the management process have been identified. Functions, roles and responsibilities are explicitly defined and well understood for all areas of responsibility and interaction.
	Met?	Y	Y	Y
	Justification	The European and Scottish systems of fisheries management have clearly identified organisations and individuals involved with opportunities to reject, adapt of accept management measures from the design stages. The Scottish system of co-management brings decision makers together with skippers, scientists and environmental NGO representatives in the Fisheries Management and Conservation Group (FMAC), which meets quarterly and examine EU and Scottish management measures at each stage of the process. The advisory councils (North Sea and North Western Waters) provide the structure for cooperation between member states and are the stakeholder advisory forum to the European Commission. Scientists are involved at each stage, with close collaboration through the Fishing Industry Science Alliance (FISA) and the Scottish Industry Discards Initiative (SIDI) project. ICES scientists take industry and information into account, and collaborate with Norwegian scientists. At each level the roles are explicitly defined and well understood and anyone with an interest can engage in the management process and contribute. The same applies to cooperation on control and surveillance through the European Fisheries Control Agency (EFCA) and to market and quota management through the Producer Organisations in the UK (SFSAG members) and other European member states. SG100 is met		
b	**Guide post**	The management system includes consultation processes that obtain relevant information from the main affected parties, including local knowledge, to inform the management system.	The management system includes consultation processes that regularly seek and accept relevant information, including local knowledge. The management system demonstrates consideration of the information obtained.	The management system includes consultation processes that regularly seek and accept relevant information, including local knowledge. The management system demonstrates consideration of the information and explains how it is used or not used.

	Met?	Y	Y	Y
	Justification	Regular consultations take place through the Scottish co-management body FMAC, which seeks and facilitates the inclusion of local knowledge in the fisheries management decision-making. The Marine Strategy (Marine Scotland 2015d) implementation process also proceeds in a fully inclusive manner, such as through Marine Planning and MPA consultations where the information used, available and needed is explained. For the EU process, the European Advisory Councils (NS and NWW AC, 2015) provide a very effective and transparent co-operative consultation process for this fishery. Finally, the Scottish fishing industry is fully consulted and informed of the UK negotiations with Norway. SG100 is met.		
c	**Guide post**		The consultation process provides opportunity for all interested and affected parties to be involved.	The consultation process provides opportunity and encouragement for all interested and affected parties to be involved, and facilitates their effective engagement.
	Met?		Y	Y
	Justification	Participation to FMAC and the ACs is open to all interested parties as observers. The Marine Planning and Marine Strategy process consults all members of the public (Marine Scotland, 2015d)		
References		NSAC, 2015. Scheveningen Group Joint Recommendation, Discard Plan for Demersal Fisheries in the North Sea and annexes http://www.nsrac.org/category/keydocs/approved-plans/ NWWAC, 2015a. North Western Waters Atlas, Marine Institute and NWWAC, 3rd edition, http://www.nwwac.org/_fileupload/MI_NWWAC_North_Western_Waters_Atlas_3rd-Edition_low%20res.pdf Marine Scotland, 2015c. Scottish Government Conservation Credits Scheme, Scheme Rules, Version 6.0 Marine Scotland, 2015d. Scotland's National Marine Plan – A single framework for managing our seas, 144p. http://www.gov.scot/Resource/0047/00475466.pdf		
OVERALL PERFORMANCE INDICATOR SCORE:				**100**
CONDITION NUMBER (if relevant):				**None**

Evaluation table 25 - PI 3.1.3

PI 3.1.3		**The management policy has clear long-term objectives to guide decision-making that are consistent with MSC Principles and Criteria, and incorporates the precautionary approach**		
Scoring Issue		SG 60	SG 80	SG 100
a	**Guide post**	Long-term objectives to guide decision-making, consistent with the MSC Principles and Criteria and the precautionary approach, are implicit within management policy	Clear long-term objectives that guide decision-making, consistent with MSC Principles and Criteria and the precautionary approach are explicit within management policy.	Clear long-term objectives that guide decision-making, consistent with MSC Principles and Criteria and the precautionary approach, are explicit within and required by management policy.
	Met?	Y	Y	Y
	Justification	Fisheries shared in EU waters are governed by the long-term management objectives of the reformed CFP (and the EU Treaty regarding the precautionary approach), which requires a commitment to an ecosystem approach to fishery management. The agreement between the EU and Norway renewed each year includes plan for the long-term management of the North Sea haddock stock. The plan was evaluated by ICES in 2007 which considers that it "plan is consistent with the precautionary approach (…) and conforms with the goal of achieving long-term maximum sustainable yield from the stock and ensuring low risk to SSB". Fisheries-specific management objective are examined but this is to illustrate that precautionary approach is internationalised. The plan's focus has been extended to the (smaller – 9.5% of the total) West of Scotland component of the stock in response of the extended stock definition in 2014. SG100 is met		
References		EU, 2013a. REGULATION (EU) No 1380/2013 OF THE EUROPEAN PARLIAMENT AND OF THE COUNCIL of 11 December 2013 on the Common Fisheries Policy ICES, 2008. Report of the Benchmark Workshop Planning Group: Report of the Chair (PGBWK), by correspondence, ICES CM 2008/ACOM: 62. 22 pp		
OVERALL PERFORMANCE INDICATOR SCORE:				**100**
CONDITION NUMBER (if relevant):				**None**

Evaluation table 26 - PI 3.1.4

PI 3.1.4		**The management system provides economic and social incentives for sustainable fishing and does not operate with subsidies that contribute to unsustainable fishing**		
Scoring Issue		SG 60	SG 80	SG 100
a	**Guide post**	The management system provides for incentives that are consistent with achieving the outcomes expressed by MSC Principles 1 and 2.	The management system provides for incentives that are consistent with achieving the outcomes expressed by MSC Principles 1 and 2, and seeks to ensure that perverse incentives do not arise.	The management system provides for incentives that are consistent with achieving the outcomes expressed by MSC Principles 1 and 2, and explicitly considers incentives in a regular review of management policy or procedures to ensure they do not contribute to unsustainable fishing practices.
	Met?	Y	Y	Y
	Justification	The management system provides positive economic and social incentives through a transparent allocation of resources (quota) at a level compatible with sustainable fishery management. Active participation in management provides fishing firms with an improved understanding and sense of fairness, improved legitimacy of management measures. The fishing industry's active involvement in the CFP reform and in the Operational Programming (OP) of the new European Fisheries Fund (EFF 2007-2013 and EMFF 2014-2020) has helped identify support to help fishing vessels comply with the new landing obligations (on-board cameras, e-logbooks, gear selectivity etc.). Following very low *Nephrops* catches in 2013, Marine Scotland introduced an Action Plan to support the fleet's adaptation (TR2 in particular) to discard free operations with a £6 million Fund, including a £3 million immediately accessible hardship fund. In Scotland, the use of public money is submitted to the same checks as for the European Funds. It is too early for an evaluation of the Hardship Fund to be available yet but the allocation procedures were fully transparent on the basis of socio-economic information. Incentives provided by EFF / EMFF and associated Scottish public support to the fishing industry are considered explicitly in the annual reviews and formally evaluated (ex-ante, mid-term and ex-post). SG100 is met.		
References		Fisheries Management and Conservation Group (FMAC) Action Plan, http://www.gov.scot/Resource/0042/00428414.pdf EMFF website: http://ec.europa.eu/fisheries/cfp/emff/index_en.htm		
OVERALL PERFORMANCE INDICATOR SCORE:				**100**
CONDITION NUMBER (if relevant):				**None**

Evaluation table 27 - PI 3.2.1

PI 3.2.1		**The fishery has clear, specific objectives designed to achieve the outcomes expressed by MSC's Principles 1 and 2**		
Scoring Issue		SG 60	SG 80	SG 100
a	**Guide post**	Objectives, which are broadly consistent with achieving the outcomes expressed by MSC's Principles 1 and 2, are implicit within the fishery's management system	Short and long-term objectives, which are consistent with achieving the outcomes expressed by MSC's Principles 1 and 2, are explicit within the fishery's management system.	Well defined and measurable short and long-term objectives, which are demonstrably consistent with achieving the outcomes expressed by MSC's Principles 1 and 2, are explicit within the fishery's management system.
	Met?	Y	Y	P
	Justification	The fishery is managed within the terms of a long-term EU–Norway stock management agreement and objectives, which ICES (2008 and 2015) found to meet precautionary criteria. Both the EU and Norway have short and long-term objectives explicit in their management systems that are aligned with the outcomes expressed by MSC Principles 1 & 2. ICES annual scientific advice (2015) and in response to Joint EU–Norway request to ICES (Needle, 2014) provides well-defined and measurable short-term objectives. Other policy instruments set more specific P2-related objectives, such as the EU MSFD for commercial fishing activities and the protection of marine habitats and biodiversity. Until the MSFD programmes of measures are adopted for the two marine regions (North Sea and West of Scotland), not all are P2-related objectives have been quantified. SG100 is only partially met.		
References		ICES 2015a Needle, C. 2014. MSFD Scotland see http://blogs.scotland.gov.uk/coastal-monitoring/2014/08/12/update-on-the-marine-strategy-framework-directive-msfd-consultation/		
OVERALL PERFORMANCE INDICATOR SCORE:				**90**
CONDITION NUMBER (if relevant):				**None**

Evaluation table 28 - PI 3.2.2

PI 3.2.2		The fishery-specific management system includes effective decision-making processes that result in measures and strategies to achieve the objectives, and has an appropriate approach to actual disputes in the fishery under assessment.		
Scoring Issue		SG 60	SG 80	SG 100
a	**Guidepost**	There are some decision-making processes in place that result in measures and strategies to achieve the fishery-specific objectives.	There are established decision-making processes that result in measures and strategies to achieve the fishery-specific objectives.	
	Met?	Y	Y	
	Justification	Decision-making processes for the management of North Sea - West of Scotland haddock are well established through the CFP (2013) and European institutions, and the EU–Norway agreement. They are based on a strong cooperation between member states for the collection (DCF - Data Collection Framework) and analysis of data and the provision of ICES scientific advice. Decision-making processes at European level are well established although the introduction of co-decision by the EU parliament is new it comes in complement to existing systems. At Scottish level, the SSCS Steering group introduced important advisory power for industry and environmental NGOs, which are carried on by the new Fisheries Management Advisory Committee FMAC. SG80 is met.		
b	**Guidepost**	Decision-making processes respond to serious issues identified in relevant research, monitoring, evaluation and consultation, in a transparent, timely and adaptive manner and take some account of the wider implications of decisions.	Decision-making processes respond to serious and other important issues identified in relevant research, monitoring, evaluation and consultation, in a transparent, timely and adaptive manner and take account of the wider implications of decisions.	Decision-making processes respond to all issues identified in relevant research, monitoring, evaluation and consultation, in a transparent, timely and adaptive manner and take account of the wider implications of decisions.
	Met?	Y	Y	Y

	Justification	The decision-making procedures established at European level identify serious and other important issues regarding the resource and ecosystem through annual research surveys and scientific working group meetings. Meetings are prepared with stakeholders at the North Sea and NWW Advisory Councils, where results are presented as they become available. The management system also responds to issues raised by the ACs. The process is seen as open, transparent and timely. ICES advice is based on data from catches, stock status, wider ecosystem indicators and cooperative research activities, which estimates, monitors and evaluates the effect of management decisions, such as for the EU regulation on landing obligation, effective from January 2016 in the fishery. Marine Scotland has consulted and set up a number of Committees to respond to all relevant issues in a transparent and adaptive manner, including socio-economic aspects, regulation, economic profitability or Marine Spatial Planning, and other possibly conflicting developments at sea, including marine conservation and the designation of SACs and other types of protected area. In addition, SNH (responsible for marine conservation) and Marine Scotland have a clear and transparent consultation processes that involve the fishing industry, recently used for Marine Planning (Marine Scotland, 2015). SG100 is met		
c	**Guidepost**		Decision-making processes use the precautionary approach and are based on best available information.	
	Met?		Y	
	Justification	Scientific advice at EU (ICES and STECF), Norwegian and Scottish level all refer to the precautionary approach, which is embedded in policy. The Scottish quarterly (or more) FMAC meetings, and other meetings involving the demersal fisheries (monthly meetings of the SCCS for the cod recovery plan) and working groups to set out the landing obligation make it possible to discuss all whitefish fisheries including haddock. SG80 is met		
d	**Guidepost**	Some information on fishery performance and management action is generally available on request to stakeholders.	Information on fishery performance and management action is available on request, and explanations are provided for any actions or lack of action associated with findings and relevant recommendations emerging from research, monitoring, evaluation and review activity.	Formal reporting to all interested stakeholders provides comprehensive information on fishery performance and management actions and describes how the management system responded to findings and relevant recommendations emerging from research, monitoring, evaluation and review activity.
	Met?	Y	Y	Y
	Justification	ICES analyses the fishery's performance and EU-Norway management plan process annually (ICES 2015). Management is discussed at the Advisory Councils (ACs: NSAC and NWWAC) annually ahead of the TAC and quota negotiations. The European Fisheries Control Agency reports annually and national control agencies provide information on fishing activities and compliance; information on landings from the fishery is available to stakeholders through their POs almost in real time. Management authorities provide		

		explanations in feedback to the ACs. FMAC agenda and minutes are publicly available. SG100 is met.		
e	**Guidepost**	Although the management authority or fishery may be subject to continuing court challenges, it is not indicating a disrespect or defiance of the law by repeatedly violating the same law or regulation necessary for the sustainability for the fishery.	The management system or fishery is attempting to comply in a timely fashion with judicial decisions arising from any legal challenges.	The management system or fishery acts proactively to avoid legal disputes or rapidly implements judicial decisions arising from legal challenges.
	Met?	Y	Y	Y
	Justification	The Scottish management authority is not subject to continuing court challenges. There is ample evidence at national, European and the EU-Norway level that management authorities work proactively to avoid legal disputes through strengthened consultations with stakeholders. A recent example is provided by extended (to 18 January 2016) consultations by Marine Scotland aiming to reach agreement on adjusted management measures for some MPAs. SG100 is met.		
References		ICES, 2015a STECF remit see: http://ec.europa.eu/fisheries/partners/stecf/index_en.htm FMAC minutes from http://www.scotland.gov.uk/Topics/marine/Sea- Fisheries/FMAC Fisheries Council agreement: http://ec.europa.eu/newsroom/mare/itemlongdetail.cfm?item_id=27996&lang=en Scottish West Coast MPA extended consultation on West Coast MPAs, see: http://www.gov.scot/Topics/marine/marine-environment/mpanetwork/MPAMGT/protectedareasmgt Marine Scotland, 2015. Scotland's National Marine Plan – A single framework for managing our seas, 144p. http://www.gov.scot/Resource/0047/00475466.pdf		
OVERALL PERFORMANCE INDICATOR SCORE:				**100**
CONDITION NUMBER (if relevant):				**None**

Evaluation table 29 - PI 3.2.3

PI 3.2.3		**Monitoring, control and surveillance mechanisms ensure the fishery's management measures are enforced and complied with**		
Scoring Issue		SG 60	SG 80	SG 100
a	**Guide post**	Monitoring, control and surveillance mechanisms exist, are implemented in the fishery under assessment and there is a reasonable expectation that they are effective.	A monitoring, control and surveillance system has been implemented in the fishery under assessment and has demonstrated an ability to enforce relevant management measures, strategies and/or rules.	A comprehensive monitoring, control and surveillance system has been implemented in the fishery under assessment and has demonstrated a consistent ability to enforce relevant management measures, strategies and/or rules.
	Met?	Y	Y	Y
	Justification	Marine Scotland Compliance uses a risk-based framework that aims to optimize compliance and the use of MCS assets. The haddock fishery takes place in European and Norwegian waters, where MCS systems are highly developed. Introduction of the Landing Obligation under the reformed CFP from January 2016 (EU, 2013b) will require vessel operators to find ways to avoid or minimize by-catch of species for which they have no quota. The SIDI has ran trials over the past year and Marine Scotland has set up an Action Plan to provide support for vessels to adapt in order to limit enforcement problems (Marine Scotland, 2014). On the basis of a long-term risk analysis undertaken by all member states agencies concerned, the European Fisheries Control Agency (EFCA) coordinates Joint Deployment Plans (JDP) that cover all potential risk factors, from vessels to land transport. Fishing zones and port entries are monitored (Scotland, 2015), as are landings and first sales operations for all EU vessels. Electronic logbooks are in place on all vessels involved in the fishery. Allocation of fixed quota shares gives incentives for sustainable fishing operations, as vessel quota can be temporary or permanently lost in the case of serious infringements. Since 2014, the POs have to submit plans for quota use (EU, 2013c) and are also increasingly involved in policing quota uptake. SG100 is met.		
b	**Guide post**	Sanctions to deal with non-compliance exist and there is some evidence that they are applied.	Sanctions to deal with non-compliance exist, are consistently applied and thought to provide effective deterrence.	Sanctions to deal with non-compliance exist, are consistently applied and demonstrably provide effective deterrence.
	Met?	Y	Y	Y
	Justifi	EU members states all have effective judicial systems that impose sanctions for non-compliance with fisheries management measures,		

	cation	arrangements to exchange information and recognize sanctions imposed on vessels found to be non-compliant by another member state patrol. (Marine Scotland, 2013c) In particular, vessels can taken away from the fishing grounds and be detained for inspections and possible sentencing in Coastal States (including Norway) courts, measures that have high potential economic costs. Any quota-related infringement (catch kept or discarded) are passed on to the POs and taken out of national and EU quotas. In response, POs have their own sanction systems, including temporary or permanent quota reduction. The comprehensive enforcement system combined with the reported level of compliance makes it reasonable to assume that the systems in place provide effective deterrence, SG100 is met.		
c	**Guide post**	Fishers are generally thought to comply with the management system for the fishery under assessment, including, when required, providing information of importance to the effective management of the fishery.	Some evidence exists to demonstrate fishers comply with the management system under assessment, including, when required, providing information of importance to the effective management of the fishery.	There is a high degree of confidence that fishers comply with the management system under assessment, including, providing information of importance to the effective management of the fishery.
	Met?	Y	Y	N
	Justification	Inspection statistics indicate that all major risk factors are covered and there is a high degree of confidence that compliance is high across the various fleet and vessels. On the basis of the comprehensive EFCA JDP results, it is reasonable to conclude that the system provides for effective deterrence. The close implication of stakeholders in the design of management and conservation measures through the ACs and the Producer Organisations (POs) give high legitimacy to the management system, which also contributes to increased levels of compliance in the fishery, including the provision of information necessary for effective management of the fishery. However, Marine Scotland Compliance notes some degree of are misreporting between the NS (IVa) and West of Scotland (VIa) grounds (FMAC 2015), which are being addressed, nevertheless, only SG 80 is met		
d	**Guide post**		There is no evidence of systematic non-compliance.	
	Met?		Y	
	Justification	There is no evidence of systematic non-compliance; the compliance issues identified by Marine Scotland (Compliance) are addressed in collaboration with the vessels concerned and also through the risk-based MCS system. SG 80 is met.		
References		EU, 2013a. Regulation (EU) 1379/2013 on the Common Organisation of the Markets of Fishery and Aquaculture Products (CMO) http://ec.europa.eu/fisheries/cfp/market/index_en.htm EU, 2013b. Commission Implementing Regulation (EU) No 1418/2013 of 17 December 2013 concerning production and marketing plans pursuant to Regulation (EU) No 1379/2013 of the European Parliament and of the Council on the common organisation of the		

	markets in fishery and aquaculture products. Marine Scotland, 2013c. Guidance note on EU points system for serious infringements, 25p Marine Scotland, 2014. Strategy on implementing the landing obligation, Sept. 2014 http://www.gov.scot/Topics/marine/Sea-Fisheries/19213/discards/ScottishDiscardSteeringGroup/SDSGMeetings/SDSGMeeting3September2014 FMAC, 2015. Misreporting area of capture in demersal fisheries; PowerPoint presentation from Marine Scotland Compliance, 9 slides and Marine Scotland Compliance pers. comm. Scotland, 2015: List of UK designated landing port http://www.gov.scot/Topics/marine/Compliance/DLP consulted Dec. 2015
OVERALL PERFORMANCE INDICATOR SCORE:	**95**
CONDITION NUMBER (if relevant):	**None**

Evaluation table 30 - PI 3.2.4

PI 3.2.4		The fishery has a research plan that addresses the information needs of management		
Scoring Issue		SG 60	SG 80	SG 100
a	**Guide post**	Research is undertaken, as required, to achieve the objectives consistent with MSC's Principles 1 and 2.	A research plan provides the management system with a strategic approach to research and reliable and timely information sufficient to achieve the objectives consistent with MSC's Principles 1 and 2.	A comprehensive research plan provides the management system with a coherent and strategic approach to research across P1, P2 and P3, and reliable and timely information sufficient to achieve the objectives consistent with MSC's Principles 1 and 2.
	Met?	Y	Y	N
	Justification	The ICES stock assessment process shows that a comprehensive research plan exists with a strategic approach to P1 aspects. ICES explore ecosystem aspects such as changes to migration patterns (WGNSSK, WGRED, REGNS and others, see main text). Further research on P2 and P3 does exist at member state level also to address research needs identified by the Advisory Council identifies. Through ICES, the ACs and FMAC P1 & P2 aspects are addressed in a strategic manner in what equates to a research plan. That plan does provide the management system with timely information in order to achieve P1 & 2 objectives. There is research on P3 issues in Scotland (Marine Scotland 2013b, Seafish 2015), which is produced to inform decision in a timely manner, although these are not included in a comprehensive plan, SG 100 is not met.		
b	**Guide post**	Research results are available to interested parties.	Research results are disseminated to all interested parties in a timely fashion.	Research plan and results are disseminated to all interested parties in a timely fashion and are widely and publicly available.
	Met?	Y	Y	Y
	Justification	Research plans and results are presented regularly to the Advisory Councils (NSAC and NWWAC) and are publicly available from the ICES website, as conference presentations and in scientific journals. The SIDI project has partnered with Marine Scotland Science to support industry-funded observer and self-sampling programmes to ensure that scientific information and fishermen's expert knowledge are fully compatible. Marine Scotland actively disseminates research plans and results all interested parties, primarily through emailing lists. A large number of research results are also presented for the wider public and freely available from the Scottish government website. SG100 is met		

References	ICES Working Groups: WGNSSK on the Assessment of Demersal Stocks in the North Sea and Skagerrak; WGRED for Regional Ecosystem Description; REGNS - Regional Ecosystem Study Group for the North Sea Scotland's Marine Atlas, National Marine Plans, SIDI project Marine Scotland, 2013b. Economic Assessment of Scottish North Sea TR2 Vessels. An evaluation of declining North Sea *Nephrops* to the TR2 fleet, July 2013, 35p. http://www.gov.scot/Resource/0042/00428417.pdf Seafish, 2015. Quay Issues, 2013 Economics of the UK Fishing Fleet, Key Features. L. Cowie and S. Lawrence, Seafish Report No SR680, 36p.
OVERALL PERFORMANCE INDICATOR SCORE:	**90**
CONDITION NUMBER (if relevant):	**None**

Evaluation table 31 - PI 3.2.5

PI 3.2.5		**There is a system of monitoring and evaluating the performance of the fishery-specific management system against its objectives. There is effective and timely review of the fishery-specific management system**		
Scoring Issue		SG 60	SG 80	SG 100
a	**Guide post**	The fishery has in place mechanisms to evaluate some parts of the management system.	The fishery has in place mechanisms to evaluate key parts of the management system	The fishery has in place mechanisms to evaluate all parts of the management system.
	Met?	Y	Y	N
	Justification	The CFP went through a substantial review (EU, 2013), EU-Norway fishery's management plan is reviewed by ICES and by STECF (2014). The Scottish management system is reviewed by the European Commission through annual reports from UK on fishing capacity, and compliance issues that may have been identified by the EFCA. ICES advice, the Common Fisheries Policy and national management systems are subject to regular evaluation through benchmarking. All key aspects of the management system are evaluated, but it is difficult to assume that mechanisms are in place to review all parts of the management system, only SG80 is met.		
b	**Guide post**	The fishery-specific management system is subject to occasional internal review.	The fishery-specific management system is subject to regular internal and occasional external review.	The fishery-specific management system is subject to regular internal and external review.
	Met?	Y	Y	N
	Justification	Overall, the EU system also has multiple sources of both internal and external review and to a lesser extent the Scottish system (through Audit Scotland and parliamentary oversight), which is external to the Fishery-specific management system but only ad-hoc and occasional. For European shared fisheries, the performance of Marine Scotland regarding the fishery is imbedded within the CFP institutional scrutiny (Advisory Councils, EU Parliament, EU Commission and Agencies), which covers all the significant aspects of the haddock fishery management system – however, external reviews are not 'regular'. SG100 is not met		
References		EU. 2013a. REGULATION (EU) No 1380/2013 OF THE EUROPEAN PARLIAMENT AND OF THE COUNCIL of 11 December 2013 on the Common Fisheries Policy STECF, 2014. Review of Scientific advice for 2015 - Consolidated Advice on Fish Stocks of Interest to the European Union (EWG 14-08 - EWG 14-16), 2014-12_STECF 14-24 - Consolidated Review of advice for 2015_JRC93360.pdf		
OVERALL PERFORMANCE INDICATOR SCORE:				**80**
CONDITION NUMBER (if relevant):				**None**

Appendix 1.2 Conditions

Three new conditions have been raised during the reassessment. In addition, one existing condition has been carried over from the previous assessment relating to PI 1.2.2. This condition was raised during the Year 4 Surveillance audit and has set milestones which must be completed during the cycle of this assessment process. This condition remains in line with the required milestones and so does not limit the reassessment of the fishery (CR 7.24.2.2). The details of this open condition and the existing Client Action Plan (CAP) is provided in the table below. The client action plan is detailed in full in Appendix 7.

Condition 1 (carried over from previous certification period)

Performance Indicator	PI 1.2.2 Harvest control rules and tools: There are well defined and effective harvest control rules in place
Score	75
Rationale	SIc (80): Available evidence indicates that the tools in use are appropriate and effective in achieving the exploitation levels required under the harvest control rules. The 2nd annual surveillance report on the DFPO North Sea and Skagerrak haddock fishery (FCI 2014) noted the following with respect to the recent combining of the West of Scotland and North Sea and Skagerrak stocks for the purpose of the stock assessment: "With the change in stock area designation, ICES has stated that “Management plans (or management plan proposals) for Subarea IV, Division IIIaN, and Division VIa are not relevant for the newly defined stock.” (ICES 2014). However, the current harvest control rule is precautionary if applied, and will limit catches across the whole area to sustainable levels. It is unclear however, how this rule would be implemented or whether some other rule will replace it immediately. It is now no longer clear that the current harvest control rule can achieve the desired exploitation rates. Therefore, the tools in use are longer appropriate and may not be effective. It is recognised that stock delineation is complex and may need adjustment from time to time, but evidence is required that not only the scientists, but management is responding appropriately and that the harvest control rule part of the harvest strategy remains consistent with MSC Principles." The SFSAG North Sea haddock fishery is required to harmonise with the DFPO North Sea and Skagerrak haddock fishery, and so a condition is now also opened on the SFSAG fishery at this year 4 audit.
Condition	Harmonising a condition on the SFSAG fishery with the DFPO fishery is complicated by the fact that the DFPO fishery has just completed its year 2 annual surveillance audit, while this is the year 4 annual surveillance audit for the SFSAG fishery. Any condition and associated milestones or actions that extend beyond the SFSAG's existing 5 year certification period would need to be carried-over into a new certification, if the fishery proceeded successfully through reassessment during the time allowed for the condition (MSC CR v1.3, 27.24.2.4). New Condition 4 is set as follows: At or within 3 years of setting the condition (approximately October 2017), demonstrate that the fishery meets all the SG80 requirements of this PI. Specifically, this will be through meeting the requirements

	of PI 1.2.2, SG80, SIc, which requires that: "Available evidence indicates that the tools in use are appropriate and effective in achieving the exploitation levels required under the harvest control rules."
Milestones	As this is the year 4 annual surveillance audit for the SFSAG North Sea haddock fishery, it is noted that there is no standard mechanism to audit any milestones set for year 1 of this condition (i.e. at the point in 2015 at which the existing certificate ends and a new certificate would commence). As such, milestones are set only from year 2. In the event that the client demonstrates that the SG80 requirements are met in full ahead of this schedule (i.e., during reassessment (year 1) or at the year 2 audit), the fishery may be rescored and the condition closed out. Year 1 (October 2015 if concurrent certification achieved): • No milestone (end of existing fishery certificate, beginning of new certificate if reassessment successful). Year 2 (October 2016 if concurrent certification achieved): • Client to report on the management response to the change in stock designation. (Resulting score: 75). Year 3 (October 2017 if concurrent certification achieved): • Client to demonstrate that the fishery meets the PI 1.2.2 SG80 scoring issues in full (Resulting score: 80).
Client action plan	Under the EU Norway Agreement, parties concluded that they would begin a review of a range of species-based Long Term Management Plans, including haddock, in 2015. The SFSAG Chairman (Mike Park) as well as members of the SFSAG Group are involved in both the North Sea and NW Waters Regional Advisory Councils and will be involved in the progression of this review. SFSAG will work closely with Marine Scotland in relation to input to this review and subsequent plan taking account of ICES advice and their recent review of the existing Long Term Management Plan. It should be noted the SFSAG are not in the position to bring about their own management rule for this species. However, through close working with the relevant bodies they will input and review development of the Long Term Management Plan. The SFSAG has committed to the following Client Action Plan: Year 1 (October 2015 if concurrent certification achieved): • No milestone (end of existing fishery certificate, beginning of new certificate if reassessment successful). Year 2 (October 2016 if concurrent certification achieved): • SFSAG will provide an update of progress towards agreeing a new management Long Term management Plan. Year 3 (October 2017 if concurrent certification achieved): • SFSAG will show how the fishery meets the SG80 requirements of PI 1.2.2
Consultation on condition	Marine Scotland, North Sea and NW Waters Regional Advisory Councils

Condition 2

Performance Indicator	PI 2.3.1 The fishery meets national and international requirements for the protection of ETP species
Score	75
Rationale	SIa (80): Direct effects are highly unlikely to create unacceptable impacts to ETP species Direct impacts were considered to be bycatch and discard mortality. For starry ray, the team noted that while the average interaction rate was ~2 individuals every 3 trips, in practice interactions are patchy (e.g. 40 of the 67 dead individuals came from one tow; there have been none recorded so far in 2015). The team concluded that since regulatory requirements are being met following ICES advice, direct impacts could be evaluated (qualitatively) as 'unlikely' to create unacceptable impacts (SG60 met). It is at least possible, however, that the fishery could do more, perhaps by evaluating the areas or conditions under which large quantities of the species are caught together, and/or the circumstances in which the individuals are brought on board in good or bad condition – i.e. it was possible to do more to avoid fishing or killing these individuals. On this basis, the team considered that SG80 was not fully met. For common skate likewise, their catch can likewise be patchy (e.g. 15 of the intermedia taken in one haul), and that although the regulatory requirements are being met (SG60 met) the fishery could do better to avoid some of these impacts with more targeted requirements, hence SG80 is likewise not met. Note that this outcome is harmonised with the SFSAG saithe fishery for common skate, as far as is compatible with their different positions in the assessment cycle (SFSAG saithe having at time of writing just completed the Year 2 audit). The saithe fishery has no condition for starry ray, since the data at the time of assessment did not suggest that the species was in decline.
Condition	The bycatch from the fishery should be restrained within a level which can be considered to be 'highly unlikely' to create unacceptable impacts on starry ray and common skate, and is not hindering the recovery of these stocks. This could be achieved with further analysis of the PET data, with actions targeted to reduce bycatch of these species to a minimum or by other appropriate methods.
Milestones	Note: The milestones are not harmonised with the SFSAG saithe fishery because the fisheries are at different points in the assessment cycle. Years 3, 4 and 5: Evaluate species bycatch data in relation to management targets to ensure that there is an objective basis that the strategy will work and adjust strategy as appropriate. (Resulting Score Year 5: 80)
Client action plan	Action plan for conditions 2, 3 and 4: Ensure data collection requirements are met under current PET observer programme. Also continue distribution of skate and ray identification cards, to member vessels and request interactions with starry ray and common skate to be logged so that the rate of interactions can be adequately assessed. On the basis of the recorded data, the fishery impact on those species

	will be assessed and appropriate management actions will be reviewed and implemented as required. Year 1: continue distribution of skate and ray identification cards and reporting instructions. Review data collection requirements to assess fishery impacts on common skate and starry ray and put in place additional data collection measures as required. Year 2: Data collection and provisional review of fishery impact Year 3: Data collection and assessment of fishery impact. Review of management options to reduce fishery impact on starry ray and common skate as required. Determine which management options can provide objective basis for confidence that the strategy – if required - will work. Year 4: Data collection and implementation of management strategy. Year 5: Data collection and final review of impacts and effectiveness management strategy.
Consultation on condition	SFSAG has primary responsibility for implementing this action plan but will provide opportunity for stakeholder input from third parties such as research institutions (e.g. Marine Scotland Science)

Condition 3

Performance Indicator	**PI 2.3.2 The fishery has in place precautionary management strategies designed to:** • **Meet national and international requirements;** • **Ensure the fishery does not pose a risk of serious harm to ETP species;** • **Ensure the fishery does not hinder recovery of ETP species; and** • **Minimise mortality of ETP species.–**
Score	75
Rationale	Sib (80): There is an objective basis for confidence that the strategy will work, based on information directly about the fishery and/or the species involved. For the ray species, since the measures are aligned with ICES advice, they can be considered 'likely to work'. The team did not consider, however, that there is currently an objective basis for confidence that they will work. This is problematic, in as much as a reduction in bycatch rates could be attributed either to the measures working, or to a reduction in the population. For starry ray, however, the survey index suggests that the overall situation with the population remains of concern, and ICES state that the common skate species are depleted (although they do not provide data). On this basis, SG80 is not met.
Condition	There needs to be an objective basis for confidence that the strategy for reducing bycatch of starry ray and common skate from the fishery will work to reduce the bycatch to a level which can be considered to be 'highly unlikely' to create unacceptable impacts. This could be on the basis of an assessment of the stock

	trajectory (by ICES or other) or on the basis of an evaluation of trends in bycatch across the fleet, or by some other suitable method.
Milestones	Note: The milestones are not harmonised with the SFSAG saithe fishery because the fisheries are at different points in the assessment cycle. Year 1: Ensure that data collection plan (condition 4) is sufficient to provide an objective basis for evaluating whether bycatch in this fishery leads to 'unacceptable' impacts (Score: 75) Year 2: Data collection (Score: 75) Year 3: Review options for management strategy for starry ray and common skate bycatch reduction (noting that it should provide an objective basis for confidence that it will work). (Score: 75) Year 4: Implement management strategy (Score: 75) Years 5: Demonstrate that there is an objective basis for confidence that the strategy for reducing bycatch of starry ray and common skate from the fishery will work to reduce the bycatch to a level which can be considered to be 'highly unlikely' to create unacceptable impacts. (Score: 80)
Client action plan	Action plan for conditions 2, 3 and 4: Ensure data collection requirements are met under current PET observer programme. Also continue distribution of skate and ray identification cards, to member vessels and request interactions with starry ray and common skate to be logged so that the rate of interactions can be adequately assessed. On the basis of the recorded data, the fishery impact on those species will be assessed and appropriate management actions will be reviewed and implemented as required. Year 1: continue distribution of skate and ray identification cards and reporting instructions. Review data collection requirements to assess fishery impacts on common skate and starry ray and put in place additional data collection measures as required. Year 2: Data collection and provisional review of fishery impact Year 3: Data collection and assessment of fishery impact. Review of management options to reduce fishery impact on starry ray and common skate as required. Determine which management options can provide objective basis for confidence that the strategy – if required - will work. Year 4: Data collection and implementation of management strategy. Year 5: Data collection and final review of impacts and effectiveness management strategy.
Consultation on condition	SFSAG has primary responsibility for implementing this action plan but will provide opportunity for stakeholder input from third parties such as research institutions (e.g. Marine Scotland Science)

Condition 4

Performance Indicator	**PI 2.3.3 Relevant information is collected to support the management of fishery impacts on ETP species, including:** • **Information for the development of the management strategy;** • **Information to assess the effectiveness of the management strategy; and** • **Information to determine the outcome status of ETP species.–**
Score	75
Rationale	SIa(80): Sufficient information is available to allow fishery-related mortality and the impact of fishing to be quantitatively estimated for ETP species. Information about interactions with this fishery come from the PET scheme, which covered 47 trips in 2014, and 63 trips in 2015 to September. It is not clear that it is possible to scale these data up to provide estimates for the entire fleet, so estimates of mortality of PET species remain qualitative rather than quantitative. In terms of evaluating stock status for these species, porbeagle has a quantitative stock assessment, grey seal an annual survey, starry ray a survey abundance index and the common skate species nothing. Overall, SG60 is met (qualitative estimate of fishery-related mortality from PET data). SG80 is met for porbeagle, grey seal and starry ray since the overall status or trend in stock status can be evaluated quantitatively, but not for the common skate species. SG100 is not met for any species, because the PET data cannot be scaled up to the whole fleet. Sib (80): Information is sufficient to determine whether the fishery may be a threat to protection and recovery of the ETP species. Although the PET data cannot be quantitatively scaled up to the fleet level, it gives an understanding in broad (semi-quantitative) terms of the impact of the fishery on these species, so SG60 is met. For porbeagle, grey seal and starry ray, the population size is tracked directly either via surveys or via a stock assessment, so the status and recovery of these species can be directly evaluated. Therefore SG80 is met for these species. For common skate, however, population trends cannot be measured, and hence it is difficult to evaluate the consequences for the population of the fishery impact. SG80 is not met for the common skate species.
Condition	There needs to be sufficient information available such that the impact of this fishery on common skate can be quantitatively estimated, and hence it can be determined whether the fishery may be a threat to the recovery of the common skate complex. This requires, as a minimum, a fleet-wide estimate of bycatch of common skate, as well as some basis by which population-level trends can be evaluated (noting that ICES considers that existing data are insufficient for this purpose).
Milestones	Note: The milestones are not harmonised with the SFSAG saithe fishery because the fisheries are at different points in the assessment cycle.

	Year 1 and 2: data collection (Score: 75) Year 3: Analysis of bycatch data demonstrates that the fishery does not pose a threat to the recovery of the common skate complex (Score: 80)
Client action plan	Action plan for conditions 2, 3 and 4: Ensure data collection requirements are met under current PET observer programme. Also continue distribution of skate and ray identification cards, to member vessels and request interactions with starry ray and common skate to be logged so that the rate of interactions can be adequately assessed. On the basis of the recorded data, the fishery impact on those species will be assessed and appropriate management actions will be reviewed and implemented as required. Year 1: continue distribution of skate and ray identification cards and reporting instructions. Review data collection requirements to assess fishery impacts on common skate and starry ray and put in place additional data collection measures as required. Year 2: Data collection and provisional review of fishery impact Year 3: Data collection and assessment of fishery impact. Review of management options to reduce fishery impact on starry ray and common skate as required. Determine which management options can provide objective basis for confidence that the strategy – if required - will work. Year 4: Data collection and implementation of management strategy. Year 5: Data collection and final review of impacts and effectiveness management strategy.
Consultation on condition	SFSAG has primary responsibility for implementing this action plan but will provide opportunity for stakeholder input from third parties such as research institutions (e.g. Marine Scotland Science)

Appendix 2. Peer Review Reports

Appendix 2.1 Peer Review 1

Summary of Peer Reviewer Opinion

Has the assessment team arrived at an appropriate conclusion based on the evidence presented in the assessment report?	**Yes/No** **No**	**CAB Response**
Justification: The assessment team has arrived at an appropriate conclusion based on the evidence presented in the assessment report for P2 and P3 but not for P1 (see specific comments below).		*See response to detailed comments below*

Do you think the condition(s) raised are appropriately written to achieve the SG80 outcome within the specified timeframe? [Reference: FCR 7.11.1 and sub-clauses]	**Yes/No** **No**	**CAB Response**
Justification: I consider that condition 1 is at least dubious or not very well substantiated (at least not from the references included in the report). It is important to notice that within ICES, a result of a working group or a workshop cannot be considered valid for advice unless is approved by ACOM. In this context, ICES has clearly indicated that, although BMSY might technically estimable, BMSY is not considered as a valid reference point for producing advice on the management of the exploited fish stock in the North East Atlantic. As a matter of fact, BSMY is reported neither in the summary sheet, nor as part of the MP and thus cannot be used.		It is agreed that ICES does not use B_{MSY} as a reference point but MSC does. In the scoring of the Principle one PIs, biomass expected through fishing at F_{MSY} and F_{MP}, which is available in ICES reports, was used consistent with the CR and its guidance. The text has been clarified to ensure that use of an implicit biomass associated with F_{MSY} and F_{MP} is being used in the scoring.

If included:

Do you think the client action plan is sufficient to close the conditions raised? [Reference FCR 7.11.2-7.11.3 and sub-clauses]	**Yes/No** **Yes**	**CAB Response**
Justification: The condition 1 should have not been raised (see review below).		This condition was raised by two previous assessments teams (FCI and Intertek), the concern being that while the overall F_{MP} might be met, the catch allocation process could lead to over-exploitation in sub-areas of the stock. A recommendation to explore different assessment models to estimate SSB and F by sub-area is good but would not have the same force as a condition to induce the changes in management necessary to meet the requirements of the PI. During its 3rd surveillance audit

	(Oct 2015), the Acoura (past FCI) team of the DFPO fishery determined that progress against this condition was on target with discussion on TAC allocation on-going.

Performance Indicator	Has all available relevant information been used to score this Indicator? (Yes/No)	Does the information and/or rationale used to score this Indicator support the given score? (Yes/No)	Will the condition(s) raised improve the fishery's performance to the SG80 level? (Yes/No/NA)	Justification Please support your answers by referring to specific scoring issues and any relevant documentation where possible. Please attach additional pages if necessary. Note: Justification to support your answers is only required where answers given are 'No'.	CAB Response
1.1.1	No	No	NA	According to ICES, BMSY is not defined as a biomass reference point for North Sea haddock. In fact, BMSY is not even reported by ICES in the summary sheet and thus cannot be used as a reference point here. The biomass reference points defined and used by ICES to provide advice are Blim, Bpa, Btrigger and BMP and the stock is with high degree of certainty, as shown by the confidence interval of the assessment, above all of them. Moreover, the statement that further SSB growth is required to ensure that stock conditions are consistent with FMP and FMSY (which is used in combination with the inappropriate use of BMSY to generate a condition here) is also wrong. You can have a low SSB at low level of F simply because, for example, R is low for a number of years. Current level of F is lower than FMSY with a high degree of certainty in recent years and thus at least SG 80 should be awarded to	It is understood that BMSY and BMP are not explicitly defined as management reference points (RP); these are FMSY and FMP. CR1.3 CB2.3.2.3 stipulates that in the absence of an explicit biomass target used to manage a stock, it can be implied from the target fishing mortality reference points, which is the case here. Text has been added to the BMSY and BMP estimates in the RP table indicating that these are implicit RPs associated with the explicit FMSY and FMP reference points used in management. The source of these RPs is described at length in the Reference Point section of the report. They are based upon simulations conducted in 2014 (Table 7) to define updated RPs for

				guidepost b, and a condition should have not been raised (see also comment above). In the Stock Status relative to Reference Points BMSY should be left blank and BMP are wrong (i.e. Blim and Btrigger are 100000 and 140000 t, respectively).	the new Northern Shelf haddock stock. Updated values of BLIM (63 kt) and BPA/BTRIGGER (88 kt) were developed and used to inform 2015 and 2016 ICES advice. BLIM and BPA/BTRIGGER of 100 kt and 140 kt respectively apply to the former North Sea stock. The new estimates are provided in the scoring rationale table. It is agreed that current biomass (145.7 kt) is above BLIM and BPA/BTRIGGER with a high degree of certainty. However, as per CR 1.3 guidance GCB2.3.2.4, it is necessary to determine the nature of these RPs in relation to BMSY and BMP, as biomass consistent with the target fishing mortality is used to score this PI (GCB2.2). BPA/BTRIGGER is set at 1.4 * BLIM and is intended to ensure that management maintains the stock above the point of recruitment impairment (PRI) with a high degree of certainty (section 2.2.2.2). Thus these RPs are not associated with biomass expected at FMSY and FMP but rather with the PRI. Even during the period of

					high exploitation in the 1970s – 1990s, biomass was above BPA/BTRIGGER for most of the period (Figure 5). It is acknowledged that estimates of biomass associated with the target fishing mortality RPs are highly variable. This is reflected in the simulation reported in section 2.2.2.4 (Figure 9). Biomass expected through long-term exploitation at FMSY is 329 kt with upper and lower median values of 454 kt and 235 kt respectively. Thus, further growth in biomass is required to achieve the lower median value. Scoring 70 on this PI does not raise a condition but rather requires scoring of PI 1.1.3. Scoring of this PI remains at 70.
1.1.2	No	No	NA	I do not necessarily disagree with the scoring here but I consider that the assessors should define which they mean with the ecological consequences of these sporadic large year classes and the role of haddock in the ecosystem. It is very difficult to justify the scoring without pointing out which are the really issues here.	SIc (TRP) was not scored at 100 as the estimation of F_{MP} and F_{MSY} does not include modeling to account for wider ecosystem effects. A dominant feature of the stock is sporatic year-classes which could have broader ecosystem consequences which would need to be explored through ecosystem modeling. A sentence has been

					added to the scoring rationale to clarify this. SIc remains at SG80.
1.1.3	No	No	NA	B_{MSY} is not part of the management plan neither is defined or/and approved by ICES. Thus, the rationale for not scoring 100 is not correct. Moreover, I am confused when it cames to the evaluation of the MP in guidepost c. In the most recent evaluation of the MP, there is no mention of B_{MSY}, neither B_{MSY} has never been used by ICES as a reference point in MSE for any haddock stock. I consider that this statement is factually wrong as well as the scoring.	B_{MSY} and B_{MP} are the implied biomass associated with the explicity defined F_{MSY} and F_{MP}. As indicated in the response to the comment on PI 1.1.1, MSC requires scoring of Principle 1 outcome PIs in relation to biomass expected at target fishing mortality. To avoid confusion, the references to B_{MSY} and B_{MP} in the scoring rationale have been changed to 'biomass consistent with F_{MP}'. PI score remains at 80.
1.2.1	No	No	NA	As explained above, B_{MSY} is not defined by ICES and SSB is currently above B_{MP}. Thus, the rationale used here is wrong as well as the scoring.	B_{MSY} is the biomass associated with the explicity defined F_{MSY}. As indicated in the comment in PI 1.1.1, MSC requires scoring of Principle 1 outcome PIs in relation to biomass expected at the target fishing mortality, which is above $B_{PA}/B_{TRIGGER}$, these being associated with B_{LIM}. To avoid confusion, the references to B_{MSY} and B_{MP} in the scoring rationale have been changed to 'biomass consistent with the F_{MP}'. PI score remains at 95.
1.2.2	No	No	NA	In guidepost c: I have sympathy for local depletion but I am not convinced that the rationale used here to not award a score of 80 is correct. As recent F have been well below F_{MP} and F_{MSY}, it is difficult to say that current tools are not effective to control	As noted in the scoring rationale, this score and consequent condition was raised by two previous assessments teams (FCI and Intertek) on this stock. The concern is that while the overall F_{MP} might

				exploitation. I think that SG 80 is met and that therefore a condition should not be raised. Instead, the assessing team should have recommended (not raised a condition) that different assessment models should be explored, which are able to estimate F and biomass by sub-areas and thus avoid local depletion. Nevertheless, even if the current allocation process based upon catch opens the possibility of a suboptimal distribution of fishing mortality among areas, the overall stock F_{MP} (and F_{MSY}) is achieved as shown by the assessment.	be met, the catch allocation process could lead to over-exploitation in sub-areas of the stock. A recommendation to explore different assessment models to estimate SSB and F by sub-area is good but would not have the same force as a condition to induce the changes in management necessary to meet the requirements of the PI. During its 3rd surveillance audit (Oct 2015), the Acoura (past FCI) team of the DFPO fishery determined that progress against this condition was on target with discussion on TAC allocation on-going. The PI score remains at 75.
1.2.3	Yes	Yes	NA		No comment required
1.2.4	Yes	Yes	NA		No comment required
2.1.1				For cod, the scoring is incorrect. The stock is below $B_{trigger}$ and therefore it is not fluctuating around its target reference points. Thus, the score for cod should be 80 and not 100. For ling, the recent observed increase in biomass was used to justify a score of 80. However, an increase in biomass does not imply necessarily that the stock is within biologically based limits, thus I think the scoring is incorrect and a 60 should be awarded instead.	Cod: True – the mistake has been corrected. It made no difference to the overall score. Ling: Not so. The MSC definition of 'biologically-based limits' is: There is a benchmark against which status of a component can be evaluated, and the benchmark is chosen to provide a low risk of serious or irreversible harm to the ecosystem feature. The benchmark should be derived from biological information that is relevant to the

					ecosystem feature and fishery, although the information does not necessarily have to come from the specific area In other words, 'biologically-based limits' is not the same as a target reference point; but is rather more like a limit reference point, or the 'point of recruitment impairment' from version 2.0. The team concluded that despite the fact that there are no reference points for ling, it is clear that the stock is above this point, since it has been increasing every year for the last 12 years – it is thus above the point at which there is any significant risk of serious or irreversible harm to the stock. Hence SG80 is met.
2.1.2	Yes	Yes	NA		No comment required
2.1.3	Yes	Yes	NA		No comment required
2.2.1	Yes	Yes	NA		No comment required
2.2.2	No	No	NA	Given the clear increasing trend in the key stocks, I consider that there is at least some evidence that the strategy is achieving its overall objectives to allow the stock to recover and stays within biological limits. Thus SG 100 should be awarded in guidepost d.	We agree, however, according to the scoring rules as we understand them, if SG100a is not met – i.e. the team concludes that there is not a 'strategy' - then SG100d cannot be met either, even if there is evidence (which there is).

2.2.3	Yes	Yes	NA		No comment required
2.3.1	Yes	Yes	NA		No comment required
2.3.2	Yes	Yes	NA		No comment required
2.3.3	Yes	Yes	NA		No comment required
2.4.1	Yes	Yes	NA		No comment required
2.4.2	Yes	Yes	NA		No comment required
2.4.3	Yes	Yes	NA		No comment required
2.5.1	Yes	Yes	NA		No comment required
2.5.2	Yes	Yes	NA		No comment required
2.5.3	Yes	Yes	NA		No comment required
3.1.1	Yes	Yes	NA		No comment required
3.1.2	Yes	Yes	NA		No comment required
3.1.3	Yes	Yes	NA		No comment required
3.2.1	Yes	Yes	NA		No comment required
3.2.2	Yes	Yes	NA		No comment required
3.2.3	Yes	Yes	NA		No comment required
3.2.4	Yes	Yes	NA		No comment required
3.2.5	No	No	NA	I do not necessarily disagree with the scoring	The text has been edited

				but I consider that the authors are very vague when it comes to the rationale used for not scoring 100 for guidepost a and b. I cannot see which parts of the management system is not regularly evaluated and not subject to internal and external review. The assessment team should at least indicate which are these parts, otherwise it is difficult to evaluate the scoring here.	

Appendix 3. Stakeholder submissions

1. The report shall include:

a. All written submissions made by stakeholders during consultation opportunities listed in FCR 7.15.4.1.
b. All written and a detailed summary of verbal submissions received during site visits regarding issues of concern material to the outcome of the assessment *(Reference FCR 7.15.4.2)*
c. Explicit responses from the team to stakeholder submissions included in line with above requirements *(Reference: FCR 7.15.4.3)*

(REQUIRED FOR FR AND PCR)

2. The report shall include all written submissions made by stakeholders about the public comment draft report in full, together with the explicit responses of the team to points raised in comments on the public comment draft report that identify:

a. Specifically what (if any) changes to scoring, rationales, or conditions have been made.
b. A substantiated justification for not making changes where stakeholders suggest changes but the team makes no change.

(Reference: FCR 7.15.5-7.15.6)

Appendix 4. Surveillance Frequency

1. The report shall include a rationale for any reduction from the default surveillance level following FCR 7.23.4 in Table 4.1.
2. The report shall include a rationale for any deviations from carrying out the surveillance audit before or after the anniversary date of certification in Table 4.2
3. The report shall include a completed fishery surveillance program in Table 4.3.

Table 4.1: Surveillance level rationale

Year	Surveillance activity	Number of auditors	Rationale
e.g.3	*e.g.On-site audit*	*e.g. 1 auditor on-site with remote support from 1 auditor*	*e.g. From client action plan it can be deduced that information needed to verify progress towards conditions 1.2.1, 2.2.3 and 3.2.3 can be provided remotely in year 3. Considering that milestones indicate that most conditions will be closed out in year 3, the CAB proposes to have an on-site audit with 1 auditor on-site with remote support – this to ensure that all information is collected and because the information can be provide remotely.*

Table 4.2: Timing of surveillance audit

Year	Anniversary date of certificate	Proposed date of surveillance audit	Rationale
e.g. 1	*e.g. May 2014*	*e.g. July 2014*	*e.g. Scientific advice to be released in June 2014, proposal to postpone audit to include findings of scientific advice*

Table 4.3: Fishery Surveillance Programme

Surveillance Level	Year 1	Year 2	Year 3	Year 4
e.g. Level 5	*e.g. On-site surveillance audit*	*e.g. On-site surveillance audit*	*e.g. On-site surveillance audit*	*e.g. On-site surveillance audit & re-certification site visit*

Appendix 5. Objections Process

(REQUIRED FOR THE PCR IN ASSESSMENTS WHERE AN OBJECTION WAS RAISED AND ACCEPTED BY AN INDEPENDENT ADJUDICATOR)

The report shall include all written decisions arising from an objection.

(Reference: FCR 7.19.1)

Appendix 6. Vessel List

A vessel list for this fishery is available at the following link:

http://scottishfsag.org/images/banners/vessel%20list%20061015f.pdf

Appendix 7. Client Action Plan

Condition		PI	Related to previously raised condition? (Y/N/ NA)	Client Action	Timescale and Owner
1	**At or within 3 years of setting the condition (approximately October 2017), demonstrate that the fishery meets all the SG80 requirements of this PI. Specifically, this will be through meeting the requirements of PI 1.2.2, SG80, SIc, which requires that: "Available evidence indicates that the tools in use are appropriate and effective in achieving the exploitation levels required under the harvest control rules."**	PI 1.2.2	Y. This condition was raised under the Year 4 Surveillance Audit and will be carried in to the new 5 year cycle under this assessment.	This relates to the overall management of the fishery under the present system. The comments under the fourth surveillance audit have been updated as below. Haddock will be considered along with other key stocks in the development of a Mixed Fishery Plan for the North Sea. The overall purpose of a mixed fishery plan is to achieve a new management framework. Previous management plans, notably the cod management plan, have been too rigid. They have been developed and approved through legislative procedures that have rendered them incapable of being revised, even when changes are urgently required to safeguard fish stocks and fisheries. Plans should be adaptive, whilst providing a stable long-term framework. Simplicity is therefore desirable,	The SFSAG has committed to the following Client Action Plan: Year 1 (October 2016 if concurrent certification achieved): No milestone (end of existing fishery certificate, beginning of new certificate if reassessment successful). Year 2 (October 2017): SFSAG will provide an update of progress towards agreeing a new management plan. Year 3 (October 2018): SFSAG will show how the fishery meets the SG80 requirements of PI 1.2.2.

Condition		PI	Related to previously raised condition? (Y/N/ NA)	Client Action	Timescale and Owner
				although the content of multiannual plans must include measures to achieve the objectives of the CFP in line with the CFP Basic Regulation. Article 10 requires a multiannual plan to provide for its own revision after an initial ex-post evaluation, in particular to take account of scientific advice. It should be noted the SFSAG are not in the position to bring about their own management rule for this species. However, through close working with the relevant bodies they will input and review development of the Mixed Fishery Plan.	
2	The bycatch from the fishery should be restrained within a level which can be considered to be 'highly unlikely' to create unacceptable impacts on starry ray and common skate, and is not hindering the recovery of these stocks. This could be achieved with further analysis of the PET data, with actions targeted to reduce bycatch of these species to a minimum or by other appropriate methods. Note: The milestones are not	PI 2.3.1	No	Action plan for conditions 2, 3 and 4: Ensure data collection requirements are met under current PET observer programme. Also continue distribution of skate and ray identification cards, to member vessels and request interactions with starry ray and common skate to be logged so that the rate of interactions can be adequately assessed. On the	Year 1: continue distribution of skate and ray identification cards and reporting instructions. Review data collection requirements to assess fishery impacts on common skate and starry ray and put in place additional data collection measures as required. Year 2: Data collection and provisional review of fishery impact

Condition		PI	Related to previously raised condition? (Y/N/ NA)	Client Action	Timescale and Owner
	harmonised with the SFSAG saithe fishery because the fisheries are at different points in the assessment cycle. Years 3, 4 and 5: Evaluate species bycatch data in relation to management targets to ensure that there is an objective basis that the strategy will work and adjust strategy as appropriate. (Resulting Score: 80)			basis of the recorded data, the fishery impact on those species will be assessed and appropriate management actions will be reviewed and implemented as required.	Year 3: Data collection and assessment of fishery impact. Review of management options to reduce fishery impact on starry ray and common skate as required. Determine which management options can provide objective basis for confidence that the strategy – if required - will work. Year 4: Data collection and implementation of management strategy. Year 5: Data collection and final review of impacts and effectiveness management strategy.
3	There needs to be an objective basis for confidence that the strategy for reducing bycatch of starry ray and common skate from the fishery will work to reduce the bycatch to a level which can be considered to be 'highly unlikely' to create unacceptable impacts. This could be on the basis of an assessment of the stock trajectory	PI 2.3.2	No	As above	As above

Condition		PI	Related to previously raised condition? (Y/N/ NA)	Client Action	Timescale and Owner
	(by ICES or other) or on the basis of an evaluation of trends in bycatch across the fleet, or by some other suitable method. Note: The milestones are not harmonised with the SFSAG saithe fishery because the fisheries are at different points in the assessment cycle. Year 1: Ensure that data collection plan (condition 4) is sufficient to provide an objective basis for evaluating whether bycatch in this fishery leads to 'unacceptable' impacts (Score: 75) Year 2: Data collection (Score: 75) Year 3: Review options for management strategy for starry ray and common skate bycatch reduction (noting that it should provide an objective basis for confidence that it will work. (Score: 75) Year 4: Implement management strategy (Score: 75)				

Condition		PI	Related to previously raised condition? (Y/N/ NA)	Client Action	Timescale and Owner
	Years 5: Demonstrate that there is an objective basis for confidence that the strategy for reducing bycatch of starry ray and common skate from the fishery will work to reduce the bycatch to a level which can be considered to be 'highly unlikely' to create unacceptable impacts. (Score: 80)				
4	There needs to be sufficient information available such that the impact of this fishery on common skate can be quantitatively estimated, and hence it can be determined whether the fishery may be a threat to the recovery of the common skate complex. This requires, as a minimum, a fleet-wide estimate of bycatch of common skate, as well as some basis by which population-level trends can be evaluated (noting that ICES considers that existing data are insufficient for this purpose). Year 1 and 2: data collection (Score: 75) Year 3: Analysis of bycatch data demonstrates that the fishery does not pose a threat to the recovery of the	PI 2.3.3	No	As above	As above

Condition		PI	Related to previously raised condition? (Y/N/ NA)	Client Action	Timescale and Owner
	common skate complex (Score: 80)				