Marine Stewardship Council (MSC)
Public Comment Draft Report

SFSAG North Sea Cod Fishery

On behalf of the Scottish Fisheries Sustainable Accreditation Group

Prepared by ME Certification Ltd

FEBRUARY 2017

Authors: Chrissie Sieben
Robin Cook
Jo Gascoigne
Geir Hønneland

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
AIS	Automatic identification system
CFP	Common Fisheries Policy
CoC	Chain of Custody
CPUE	Catch Per Unit Effort
EEZ	Exclusive Economic Zone
E-log	Electronic logbook
ETP	Endangered Threatened Protected (species)
F	Fishing mortality
FAM	Fishery Assessment Methodology (MSC scheme document)
FCR	Fisheries Certification Requirements (MSC scheme document)
FMAC	Fisheries Management and Conservation Group
FU	Functional Unit (*Nephrops*)
GITAG	Gear Innovation and Technology Advisory Group
HCR	Harvest Control Rule
IBTS	International Bottom Trawl Surveys
ICES	International Council for the Exploration of the Sea
ICJ	International Court of Justice
IFMAC	Inshore Fisheries Management and Conservation Group
IPI	Inseparable or Practicably Inseparable (stocks)
ITLOS	International Tribunal for the Law of the Sea
IUU	Illegal, Unreported, Unregulated
LO	Landing obligation
LRP	Limit Reference Point
LTL	Low Trophic Level (species)
M	Natural mortality
MCS	Monitoring Control and surveillance
MEC	ME Certification Ltd
MEP	MacAlister Elliott and Partners Ltd
MMO	Marine Management Organisation

MPA	Marine Protected Area
MSFD	Marine Strategy Framework Directive
MSS	Marine Scotland Science
MSY	Maximim Sustainable Yield
NCMPA	Nature Conservation Marine Protected Area
NDPB	Non-Departmental Public Body
NEAFC	North East Atlantic Fishery Commission
NGO	Non-Governmental Organisation
Nm	Nautical mile
NSAC	North Sea Advisory Council
PA	Precautionary Approach
PCA	Permanent Court of Arbitration
PCR	Public Certification Report
PI	Performance indicator
PO	Producer Organisation
PRI	Point of recruitment impairment
RBS	Registration of Buyers and Sellers
RFMO	Regional Fisheries Management Organisation
SAC	Special Area of Conservation
SFF	Scottish Fishermen's Federation
SFO	Scottish Fishermen's Organisation
SG	Scoring Guidepost
SSB	Spawning Stock Biomass
SWFPA	Scottish White Fish Producers Association
STECF	Scientific, Technical and Economic Committee for Fisheries
RTC	Real-time closure
TAC	Total Allowable Catch
TRP	Target Reference Point
TSB	Total Stock Biomass
UoA	Unit of Assessment
UoC	Unit of Certification
VME	Vulnerable marine ecosystems
VMS	Vessel Monitoring System

Executive Summary

This report is the Public Comment Draft Report for the SFSAG North Sea cod (*Gadus morhua*) fishery. The assessment team consisted of Chrissie sieben (Team Leader), Dr Robin Cook (Principle 1), Dr Jo Gascoigne (Principle 2) and Dr Geir Hønneland (Principle 3). The site visit for the assessment took place in Aberdeen, Scotland on the 21st and 22nd June 2016.

The fishery is carried out by vessels covered by membership of the Scottish Fisheries Sustainability Assessment Group (SFSAG) which consists of all the Scottish Producer Organisations, as well as a number of fishermen associations. The members represent the majority of the Scottish demersal industry operating in the mixed demersal fisheries of the North Sea and West of Scotland. SFSAG membership includes 227 vessels and represents a mixed fleet, using various gear types to target a mix of demersal species. The SFSAG vessels targeting *Nephrops* also take a significant bycatch of these species, which is retained or discarded according to size and quota. The North Sea cod fishery extends to the east approximately as far as the 200m contour and covers ICES Divisions IVa and b. Any west of Scotland and Rockall catches are therefore not included in the Unit of Assessment.

North Sea cod is fished by all the North Sea coastal states, with the UK accounting for over 45% of the total average landings for 2011-2015. Within the UK, Scotland accounts for the greatest share of the catch. Spawning Stock Biomass (SSB) reached its lowest point in 2006 with an estimated value of little more than 43,000t. Since 2006, however, SSB has increased substantially to a value of 151,000t, close to MSY $B_{trigger}$ and B_{pa} (at 165,000t), while Fishing Mortality (F) continues to decline. The 2015 exploitation rate stands at F=0.385 and is approaching the desired limit of F=0.33.

The fishery is managed at three levels: the international, EU and national levels. Cod is among the six North Sea stocks that are defined as jointly managed by Norway and the EU, based on the framework agreement between the two parties on fisheries cooperation which lays down the procedure for calculating TACs based on the current SSB and exploitation rate in relation to the desired target values. At EU level, the fishery is managed within the context of the Common Fisheries Policy. Under the CFP, the EU Cod Recovery Plan has been in effect since 2009, with the aim of restoring the cod stock and reducing exploitation levels. The plan comprised two elements: a “recovery phase” and a “long-term management phase”. Since its implementation, fishing mortality rates have been reduced and the stock has increased to a level above B_{lim}. The fishery has since exited the ‘recovery phase’ and a long-term management plan is in effect as of 2014. However, due to uncertainties surrounding recruitment, this plan is being revised; until a new plan comes into force ICES management advice follows the MSY approach.

At Scottish level, the main legal bases for fisheries management are the 2013 Aquaculture and Fisheries (Scotland) Act and the 2010 Marine Act. Marine Scotland is the implementing body under the Scottish Government, responsible for all components of fisheries management, from science to management and enforcement. Marine Scotland works closely with the POs, which are delegated responsibility for managing fish quotas on behalf of their members.

The North Sea cod fishery is a mixed fishery. Analysis of landings data for Scottish vessels, as well as discards and landings estimates for Scottish vessels by CCTV and observers indicated 8 main Primary Species (haddock, whiting, saithe, plaice, hake and three *Nephrops* Functional Units) and two main Secondary Species (Monkfish and Devil's Hole *Nephrops*). Elasmobranchs, classed by Council Regulation (EU) 2016/72 of 22 January 2016 as either forbidden to land or zero TAC species, were considered under ETP Species. The fishery was found to interact with starry ray, common skate complex, porbeagle, spurdog, grey seals and allis shad. Vulnerable Marine Ecosystems were identified based on the qualifying features of Scottish Nature Conservation Marine Protected Areas (NCPMAs), in combination with the occurrence of low or limited mobility species. VMEs potentially overlapping with this fishery were identified as burrowed mud and *Arctica islandica* (ocean quahog) aggregations.

The main strength of the client fishery is that it is a well-organised fleet which operates in a well-defined management framework with an effective MCS system, transparent stakeholder consultation processes and clear mechanisms for dispute resolution. The North Sea cod stock has shown strong signs of recovery since its low point in 2006 and an important challenge will be to maintain the trajectory of declining exploitation and rising SSB in the light of recruitment uncertainty. With regards to its wider ecosystem impacts, the fishery will need to address its potential impacts on some ETP species, in particular starry ray and common skate complex. Overall, no single performance indicator scored below 60 and the fishery is therefore being provisionally recommended for certification.

The overall preliminary scores for each Principle are as follows: Principle 1: 90.0, Principle 2: 85.3 and Principle 3: 95.0. Four PIs scored less than 80. One of these was for PI 1.1.1 (target stock status), which automatically triggers scoring of 1.1.2 (rebuilding) and therefore does not require a condition. Three conditions were therefore raised, summarised below. Note that these conditions and their timelines were harmonised with the SFSAG North Sea haddock fishery which was re-certified in May 2016.

Number	Condition	Performance Indicator
1	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 by the end of Year 4.	2.3.1
2	By the end of Year 4 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.	2.3.2
3	By the end of Year 3 there needs to be sufficient information available such that the impact of this fishery on common	2.3.3

	skate and starry ray can be quantitatively estimated, and hence it can be determined whether the fishery may be a threat to the recovery of the starry ray population and the common skate complex. This requires, as a minimum, a fleet-wide estimate of bycatch of starry ray and common skate, as well as some basis by which population-level trends can be evaluated for common skate (noting that ICES considers that existing data are insufficient for this purpose).	

1 Authorship and Peer Reviewers

The assessment team for this full assessment were:

Chrissie Sieben (Team Leader): Chrissie Sieben has a Master's Degree in Marine Environmental Protection which she obtained at the University of Wales, Bangor. She is the MSC Fisheries Scheme Manager at MEC and specialises in marine and fisheries ecology, marine environmental impact assessment and sustainable fisheries. Previous to joining MEC, she worked as a fisheries consultant for MacAlister Elliott and Partners (MEP), where she worked on a number of projects including the application of WWF Common Methodology to wild capture and aquaculture fisheries for the WWF Hong Kong 'Good Fish Guide', Sustainable fisheries in the Trilateral Wadden Sea, acted as Fisheries Liaison for the London Gateway Project and carried out socio-economic characterisations and impact assessments of commercial fisheries for coastal developments. Prior to her work at MEP, she worked inter alia as a marine ecologist on environmental impact assessments (EIAs) and completed an internship with the Global Environment Facility / UNDP International Waters Programme. She is a fully qualified MSC Team Leader with particular expertise in Principle 2 and is involved in MSC full assessments, pre-assessments and fishery surveillance audits. Chrissie was the Team Leader for this assessment.

Dr Robin Cook (Principle 1): Robin Cook studied zoology at Durham University followed by a PhD in population dynamics from Oxford University. He worked for many years at the Marine Laboratory, Aberdeen and was Director there from 2002-2011. He worked mainly in the field of demersal fish stock assessments and assessment methodology. During the 1990s he was chair of the ICES North Sea demersal assessment working group and served on the ICES Advisory Committee on Fishery Management (ACFM) and the EU Scientific, Economic and Technical Committee on Fisheries (STECF). Currently he is a Senior Research Fellow at Strathclyde University, Glasgow, focusing on bio-economic modelling of grey seal predation on demersal fish and the assessment of data-poor stocks. He has published over 80 scientific papers including a number dealing with the status of North Sea cod. Dr Cook had primary responsibility for the assessment of Principle 1.

Dr Gascoigne (Principle 2): 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 Geir Hønneland (Principle 3): Geir Hønneland is Research Director of the Fridtjof Nansen Institute and adjunct professor at the University of Tromsø, Norway. He holds a Ph.D. in political science from the University of Oslo and mainly studies fisheries management and international relations in the European North. Among his books are Making Fishery Agreements Work: Post-Agreement Bargaining in the Barents Sea (Edward Elgar, 2012) and Coercive and Discursive Compliance Mechanisms in the Management of Natural Resources: A Case Study from the Barents Sea (Springer, 2000). He has also published extensively in peer reviewed journals. Before embarking on his academic career, Geir worked for several years as a fishery inspector for the Norwegian Coast Guard. Geir

has gained a broad experience from evaluations and consultancies in the fisheries sector, e.g. for the FAO relating to the FAO Code of Conduct for Responsible Fisheries. He was a member of the team that performed the first MSC assessment of a Russian Barents Sea fishery in 2010, and has subsequently participated in further assessments of cod and haddock fisheries, and herring assessments in the Norwegian and North Seas. His experience includes MSC pre-assessments, surveillance audits and as a MSC peer reviewer. For this full assessment, Geir was responsible for Principle 3.

The peer reviewers for this assessment were as follows:

Dr Lisa Borges

Lisa has been a fishery scientist for the last 18 years and now runs her own consultancy firm. Lisa has a BSc in Marine Biology & Fisheries from the University of the Algarve (Portugal), an MSc in Fisheries from the University of Porto (Portugal), and a PhD on discards from demersal fisheries from the National University of Ireland. She has worked for three national fisheries research institutes, which include IPIMAR (Portugal), the Marine Institute (Ireland), and IMARES (The Netherlands). Lisa has extensive knowledge and experience of assessing the environmental impact of fisheries, with a particular focus on discards and bycatch in particular. She also has knowledge and experience of fisheries management policies, including harvest control rules, management plans and discard policy development. Lisa developed conservation policies for Atlantic fish stocks when she worked for the European Commission in Belgium. Lisa has experience in both pelagic and demersal stock assessments, and is familiar with MSC assessment procedures, having participated as a principle 1 and 2 expert on four different assessments over the last year.

Dr Jan Geert Hiddink

Jan is a marine ecologist with extensive expertise in measuring and modelling the response of benthic communities to disturbance and modelling recovery trajectories for these organisms. His research is focussed on gaining a quantitative understanding of the effect of disturbance (such as exploitation and climate change) on the biodiversity and functioning of marine benthic communities, and on how such effects can be mitigated. This research includes the effects of MPAs on the communities of benthic invertebrates and fish. Most recently Jan has been studying the effect of climate change on the biodiversity of marine organisms using time series. Jan aims to increase understanding of ecosystem functioning and distribution patterns by comparing empirical data with predictions of ecological models.

After completing his PhD in 2002, Jan started a postdoc at Bangor University, where he studied the impact of bottom trawling on the functioning of benthic invertebrate communities. Jan joined the lecturing staff in School of Ocean Sciences in 2006 and was promoted to Reader in 2013.

The Risk-Based Framework was not used in this assessment.

2 Description of the Fishery

2.1 Unit(s) of Assessment (UoA) and Scope of Certification Sought

2.1.1 UoA and Proposed Unit of Certification (UoC)

MEC confirms that the fishery under assessment is within the scope of the MSC Fisheries Standard (7.4 of the MSC Certification Requirements v2.0):

- The target species is not an amphibian, reptile, bird or mammal;
- The fishery does not use poisons or explosives;
- The fishery is not conducted under a controversial unilateral exemption to an international agreement;
- The client or client group does not include an entity that has been successfully prosecuted for a forced labour violation in the last 2 years;
- The fishery has in place a mechanism for resolving disputes, and disputes do not overwhelm the fishery;
- The fishery is not an enhanced fishery as per the MSC FCR 7.4.3; and
- The fishery is not an introduced species-based fishery as per the MSC FCR 7.4.4.

The UoC and UoA are the same in this assessment as there are no other eligible fishers.

UoA:

Species	Cod (*Gadus morhua*)
Geographical range	North Sea (ICES Divisions IVa & IVb)
Method of capture	Single *Nephrops* trawl Twin *Nephrops* trawl Demersal trawl Twin demersal trawl Danish seine Pair seine–trawl Pair trawl
Stock	Cod (*Gadus morhua*) in Subarea IV and Divisions VIId and IIIa West (North Sea, Eastern English Channel, Skagerrak)
Management Systems	**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) member vessels (see up to date vessel list here: http://scottishfsag.org/wp-content/uploads/2017/02/MSC-Saithe-and-haddock-Master-110217.pdf) (note: vessel list is the same as for currently certified haddock and

	saithe fisheries)
Other eligible fishers	None

2.1.2 Final UoC(s)

(PCR ONLY)

The PCR shall describe:

a. The UoC(s) at the time of certification.
b. A rationale for any changes to the proposed UoC(s) in section 3.1(c).
c. Description of final other eligible fishers at the time of certification.

(References: FCR 7.4.8-7.4.10)

2.1.3 Total Allowable Catch (TAC) and Catch Data

The TAC and catch data for the SFSAG North Sea cod fishery are shown in Table 1.

Table 1. TAC and Catch Data

TAC	**2015**	**29,189 t**	**TAC for IIa (EU waters), IIIa (exc. Skagerrak and Kattegat), IV**
UoA share of TAC	**2015**	**~10,232 t**	**~90% of UK quota on above TAC (11,369 t); before swaps**
UoC share of total TAC	**2015**	**As above**	
Total green weight catch by UoC	**2015**	**13,246 t**	**After swaps**
	2014	**10,123 t**	**After swaps**

2.1.4 Scope of Assessment in Relation to Enhanced Fisheries

The fishery under assessment is a wild capture fishery and does not meet the criteria for enhanced fisheries (see FCR v2.0 7.4)

2.1.5 Scope of Assessment in Relation to Introduced Species Based Fisheries (ISBF)

The fishery is not an ISBF (see FCR v2.0 7.4).

2.2 Overview of the fishery

2.2.1 The Client fishery

The SFSAG North Sea cod fishery is carried out by vessels covered by membership of the Scottish Fisheries Sustainability Assessment Group (SFSAG) which consists of all the Scottish POs, as well as a number of fishermen associations. The members represent the majority of the Scottish demersal industry operating in the mixed demersal fisheries of the North Sea and West of Scotland. The collective members of the group are:

- Scottish White Fish Producers Association
- Aberdeen Fish Producers Organisation
- Anglo-Scottish Fish Producers Organisation
- Fife Fish Producers Organisation
- Fishermen's Mutual Association (Pittenweem)
- North East of Scotland Fishermen's Organisation
- Northern Producers Organisation
- The Fish Producers' Organisation
- Orkney Fish Producers Organisation
- Scottish Fishermen's Organisation
- Shetland Fish Producers Organisation
- Eastern England Fish Producers' Organisation
- Lunar FPO Ltd

Vessels in the UoC are all vessels who are members of any of the above organisations, totalling 227 vessels (at the time of writing – see here for an up to date vessel list). Note that this UoC includes some vessels registered in England and Northern Ireland, but administered through the above POs.

The Board of SFSAG is chaired by Mike Park of SWFPA and the Secretariat is provided by Seafood Scotland. Marine Scotland Policy and Science also take an active role in the group by assisting with expertise and funding advice.

2.2.2 History of the fishery and its management

Cod have been exploited for centuries but it was not perhaps until the early 20th century when steam trawlers were introduced that the capacity of fishing fleets became a significant potential threat to the sustainability of the stocks. However, the two world wars curtailed fishing and provided periods of respite during which the stocks recovered. After the Second World War food was in urgent need and fisheries were encouraged. This resulted in expanding fleets especially of motor trawlers that targeted a range of demersal species that include cod, haddock, whiting, plaice and sole. From the 1960's onwards countries including Spain, Portugal and Russia played major roles in the industrialisation of the cod fishery. Historically, the North Sea has not been the most abundant producer of cod; in the 16th through 19th centuries Dutch and French fishermen sailed to Iceland for cod rather than

staying on the North Sea (Brander, 1994 in Bridson, 2011). There was, however, a large increase in cod biomass in the 1960's, a phenomenon seen in many gadoid populations (and referred to as the 'gadoid outburst' – also see Section 2.3.5). For a while afterwards, spawning stock biomass fluctuated, but from 1981 there has been a steady decrease in the population, and biomass dropped to levels known before the 1960's (Brander,1994 in Bridson, 2011). However, since the implementation of the EU Cod Recovery Plan, fishing mortality rates have been reduced and the stock has increased since 2006, in spite of continued low recruitment. Furthermore, there has been an increase in the number of older fish in the population in recent years due to decreased fishing pressure. Recent recruitments have been low, possibly influenced by changes in the availability of food resources for cod larvae and increasing predation pressure (ICES, 2015c).

2.2.3 Gear and operation of the fishery

The SFSAG North Sea cod fleet is a mixed fleet, using various gear types to target a mix of demersal species, including gadoids (cod, haddock, whiting, saithe, hake) but also monkfish and megrim. The SFSAG vessels targeting *Nephrops* also take a significant bycatch of these species which is retained where possible. Under the convention used in the Cod Recovery Plan, gear mesh sizes are described as 'TR1' and 'TR2': TR1 is >100 mm (often 120mm); TR2 is 80-99mm. For squid a mesh size of 70-80 mm is occasionally used by a few vessels.

The fleet can roughly be divided as follows:

- Single-rig trawlers targeting mainly whitefish;
- Twin-rig trawlers targeting mainly whitefish;
- Single-rig trawlers targeting *Nephrops* and whitefish;
- Twin-rig trawlers targeting *Nephrops* and whitefish;
- Pair trawlers targeting whitefish;
- Trawlers targeting squid (occasional);
- Scottish, Danish seines targeting whitefish (single and pair)

The 227 vessels in the UoA are divided as follows:

Gear type	Number
Trawl	196
Pair trawls	18
Scottish and Danish seines	13
TR1	171
TR2	56

2.2.4 Fishing areas and seasons

The fishing area is given in Figure 1 in terms of landings by statistical rectangle (2015 – note this is the entire Scottish fleet) and in Figure 2 in terms of days at sea (2016 – SFSAG only). The fishery extends to the east approximately as far as the 200m contour. (Note that the landings from the west of Scotland and Rockall are not included in the UoA.)

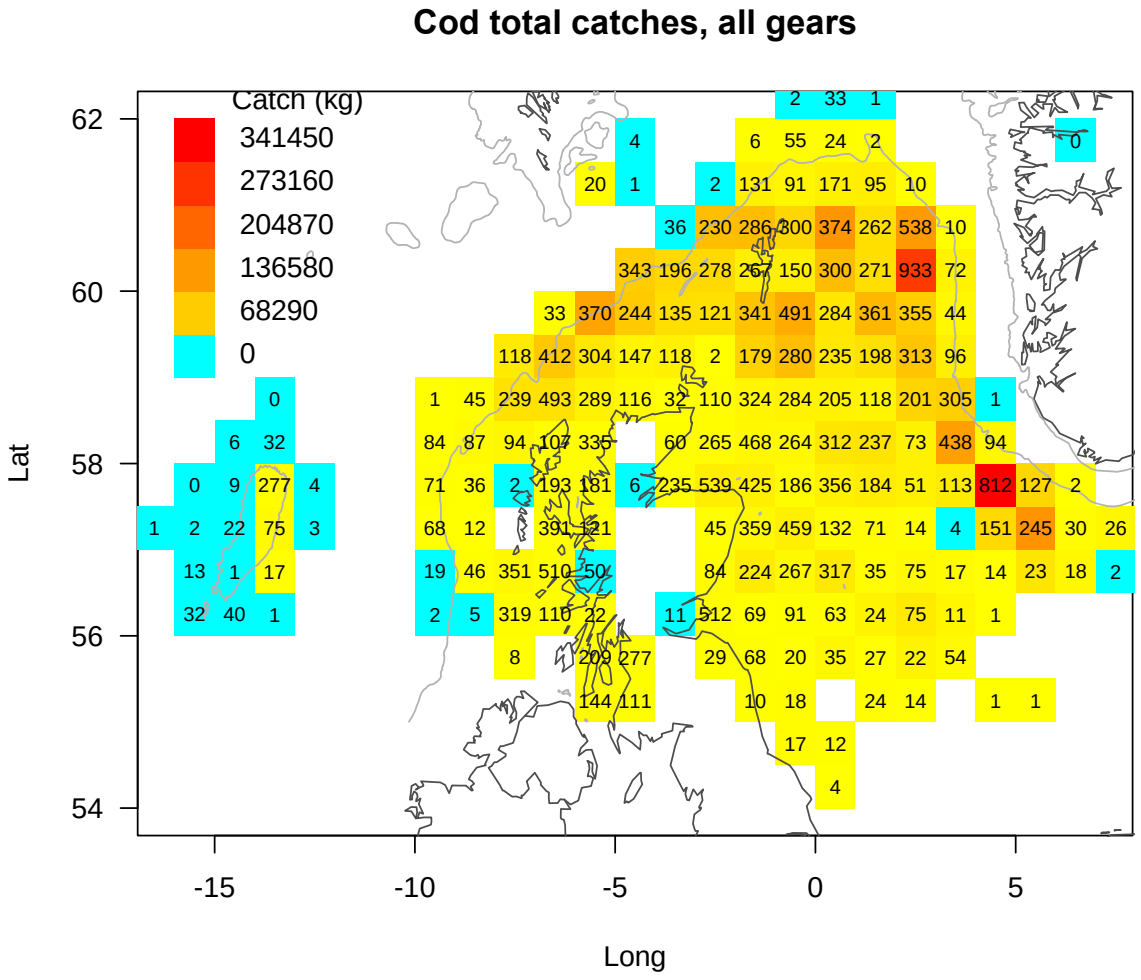


Figure 1. Scottish cod landings (2015) by ICES statistical rectangle. Data provided by Marine Scotland Science.

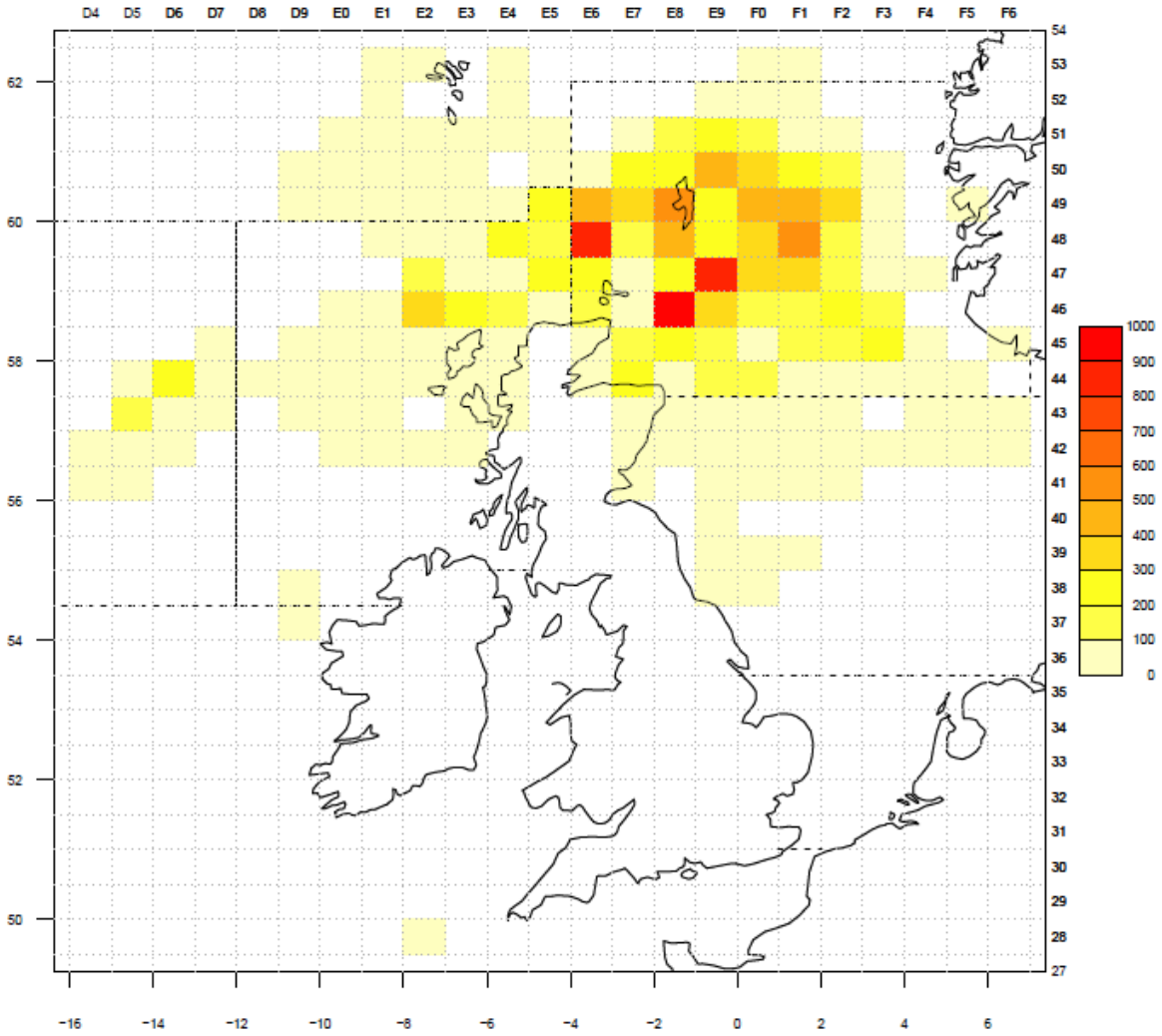


Figure 2. 2016 Fishing effort for demersal SFSAG fleet in term of days-at-sea (Source: Marlab)

2.3 Principle One: Target Species Background

2.3.1 Life history

Atlantic cod (*Gadus morhua*) are found across the north Atlantic and extend into Arctic waters. In the North Sea cod are approaching the southern limit of their geographical distribution which may be relevant to their future distribution if in response to climate change, the North Sea no longer offers optimal environmental conditions (Drinkwater, 2005).

Cod are one of the larger gadoids and may grow to 2 metres in length and reach an age of 25 years. In the North Sea they are typically about 30-100 cm in size and it is rare to find individuals older than 8-10 years. They grow rapidly with a one-year-old fish at about 25 cm reaching 100cm by the age of 6-7 years. In the past, North Sea cod reached spawning age at about 3.5 years but in recent years this has reduced to about 2.5 years and is an important change because it means a higher proportion of the total stock is able to spawn and is a major reason why the stock is considered to be in a better state now compared with some years earlier.

Spawning takes place in the late winter and early spring of each year from about February to April. Fish tend to congregate on traditional spawning grounds and these higher concentrations are often the target of fishing operations. It is believed fish return to the same spawning grounds from which they were born which leads to some separation of populations within the North Sea. It appears, for example, that fish forming the more southern component of the stock have become relatively less abundant than those that spawn in the north (ICES, 2016).

The eggs and larvae are pelagic. As they develop they metamorphose and by the late summer or early autumn they begin to spend more time closer to the seabed where they may mix with older cod. The larvae depend on plankton for food and are particularly reliant on copepods such as *Calanus*. These are an important source of food and their abundance appears to be important in the survival rate of young cod. There has been a change in the relative species abundance of *C. finmarchicus* and *C. heligolandicus* over recent decades and this may have adversely affected annual recruitment (Beaugrand and Kirby, 2010). As they get older, cod feed increasingly on other fish and are also highly cannibalistic. As a larger predator, they occupy a higher trophic level in the ecosystem.

2.3.2 The fisheries

For simplicity it is convenient to consider four main components in the fisheries that catch significant quantities of cod. These are:

- Gears, predominantly “otter trawls”, that use a mesh size larger than 100mm and target the roundfish that include cod, haddock and whiting as well as a more specific fishery for saithe. These vessels operate more in the northern North Sea over the whole continental shelf but with the saithe fishery occurring along the shelf edge (formerly known a TR1).
- Gears, mainly trawls, that use mesh sizes 70-100mm. These vessels target *Nephrops* as an important component of their catch but also take a bycatch of other

fish including cod. *Nephrops* are high value shellfish but for some vessels the catch of fish may also be an important part of the landed value (formerly known as TR2).

- Beam trawls that target flatfish. These may use mesh sizes anywhere between 80 and 120mm depending on the target species. Vessels using larger meshes target mainly plaice while those using 80mm target sole. These fisheries take place predominantly in the central and southern North Sea.
- Gillnets using 110–219 mm targeting cod and plaice operating off the Danish coast.

Although cod is fished by all the North Sea coastal states, the UK accounts for over 45% of the total average landings for 2011-2015, with Denmark (18%) and Norway (17%) taking the next largest proportions. Within the UK, Scotland accounts for the greatest share of the catch.

2.3.3 Stock assessment

Annual assessments of North Sea cod are carried out by ICES using data collected by the principal exploiting countries. They are based on data that include:

- total quantities of fish landed that are recorded by national authorities,
- quantities caught but discarded at sea obtained from on-board scientific observers, and
- estimates of abundance from two scientific survey vessels

Officially recorded landings are sometimes adjusted by ICES to account for misreported or unreported catches. Generally, these adjustments are small but may be large in some years. The mismatch between reported and actual landings is assumed to be negligible since 2006. The assessment method used (SAM, Nielsen and Berg, 2014) can account for bias/errors in reported catch, provided a good quality abundance index is available.

Data on discards are obtained from observer programmes. In the past this relied almost entirely on the Scottish sampling scheme, but in recent years sampling from other countries has become available. No discard samples are provided by Norway and it is assumed that its discarding pattern is similar to other countries in order to derive complete discard estimates.

Two internationally co-ordinated trawl survey abundance indices are used. These are the International Bottom Trawl Surveys (IBTS) in quarter 1 and quarter 3. These surveys are based on a sampling grid of 30x30 kilometre rectangles covering the North Sea, with each rectangle being sampled at least once but typically 2 or 3 times. In the most recent assessments, GAM models have been used to derive an abundance index from the raw data to correct for ship effects. The surveys also provide data on maturity and the latest assessments have updated the maturity ogive to reflect a lower age of first maturity in recent years.

As well as records of the quantities in catches and surveys, otoliths are taken to calculate the age composition of fish in the samples. This allows a fully age-based assessment of the stock. The primary assessment method on which advice is based is “SAM” (Nielsen and Berg, 2014). This is a state-space model where the fishing mortality and recruitment are

modelled as random walks through time. The state-space approach means that both observation error and process error can be estimated. SAM is conceptually similar to the time series models developed by Gudmundsson (2004). Time series smoothing of F allows the fishery selection pattern to evolve over time and therefore will more realistically reflect gradual changes to fishing fleets than models which assume a fixed time invariant selection pattern.

Natural mortality, M, is included in the assessment as known values by age and year. They are derived from multispecies assessment models (ICES, 2014) that consider predation by other fish, marine mammals and birds. To some extent there is an inconsistency in deriving M separately from one analysis which assumes M is dynamic and then using it as a fixed value in another. However, the bias to which such a process is subject is likely to be relatively unimportant when making estimates of stock status relative to reference points and when making short-term forecasts.

The model is fitted to catch-at-age data and survey data within a conventional maximum likelihood framework where the random effects are estimated using Laplace approximations. Retrospective testing of the model shows that it is internally consistent so that when data from a new additional year are added to the assessment, historical re-estimates of F and SSB are not substantially revised.

In addition to the SAM assessment the most recent assessment report discusses the use of "a4a" (Jardim et al., 2015) as an exploratory analysis. This method gave different estimates of recent SSB and F which appear to be related to the way mortality on the plus group is modelled and is an issue that needs further investigation.

The annual assessments are periodically augmented by benchmark assessments with the most recent conducted in 2015 (ICES, 2015b). These involve a thorough review of the data and methods used in the assessments so that new information and methodology can be incorporated. They are subject to external peer review.

2.3.4 Reference points

At present, ICES has identified the minimum SSB consistent with MSY as 165,000 tonnes. This is the value of MSY Btrigger and also the precautionary approach biomass (B_{pa}). It is based on the 1996 SSB (118,000t = B_{lim}), which produced the last large year class, scaled up by 1.4 to account for uncertainty. F_{MSY} has been calculated using the EQSIM software as 0.33. The analysis producing this value takes into account the probability of falling below B_{lim} and uses a recent recruitment time series that is believed to correspond to a period of poorer recruitment resulting from the current prevailing environmental regime. Older precautionary reference points are still incorporated in the cod recovery plan while the EU Norway agreement does not yet explicitly embrace F_{MSY}. The reference points are listed in the table below.

Table 2. North Sea cod reference points

Framework	Reference point	Value	Technical basis	Source
MSY approach	MSY Btrigger	165 000 t.	The default option of Bpa.(=1.4×Blim)	
	FMSY	0.33	EQSim analysis based on recruitment period 1988-2014	2015 assessment
Precautionary approach	Blim	118 000 t.	SSB associated with the 1996 year class	2015 assessment
	Bpa	165 000 t.	Blim multiplied by 1.4. This is the current ICES default approach.	
	Flim		Not defined	
	Fpa		Not defined	
EU Management plan	SSBlower	70 000 t.	Former Blim	EC 1342/2008
	SSBupper	150 000 t	Former Bpa	
	Flower	0.2	Fishing mortality when SSB <SSBlower.	
	Fupper	0.4	Fishing mortality when SSB>SSBupper	
EU-Norway agreement	SSBlower	118 000 t.	Revised Blim	2008 EU-Norway agreement
	SSBupper	165 000 t	Revised Bpa	
	Flower	0.2	Fishing mortality when SSB <SSBlower.	
	Fupper	0.4	Fishing mortality when SSB>SSBupper	

2.3.5 Stock trends

Detailed assessments of North Sea cod go back to the early 1960s when many countries began systematic sampling for the age of fish in the catches and scientific research vessel surveys adopted more statistically rigorous designs. Trends in the SSB, the number of recruits and fishing mortality rate can be seen in Figure 3. At the beginning of the time period the SSB was close to the 165,000t limit and it actually increased during the late 1960s and early 1970s to a peak of nearly 275,000t (Figure 3d). This was because the exploitation rate was modest and during this period annual recruitment was large (Figure 3c and b). At the same time high values of recruitment were also recorded in a number of similar species such as haddock and whiting and the period is often referred to as the “gadoid outburst” (Heath and Brander, 1999). It is thought that the gadoid outburst may be related to environmental conditions prevailing at the time which favoured the survival of newly born fish. This “outburst” coincides with a period when North Sea herring collapsed and it is possible the two events have some connection though this has not been established.

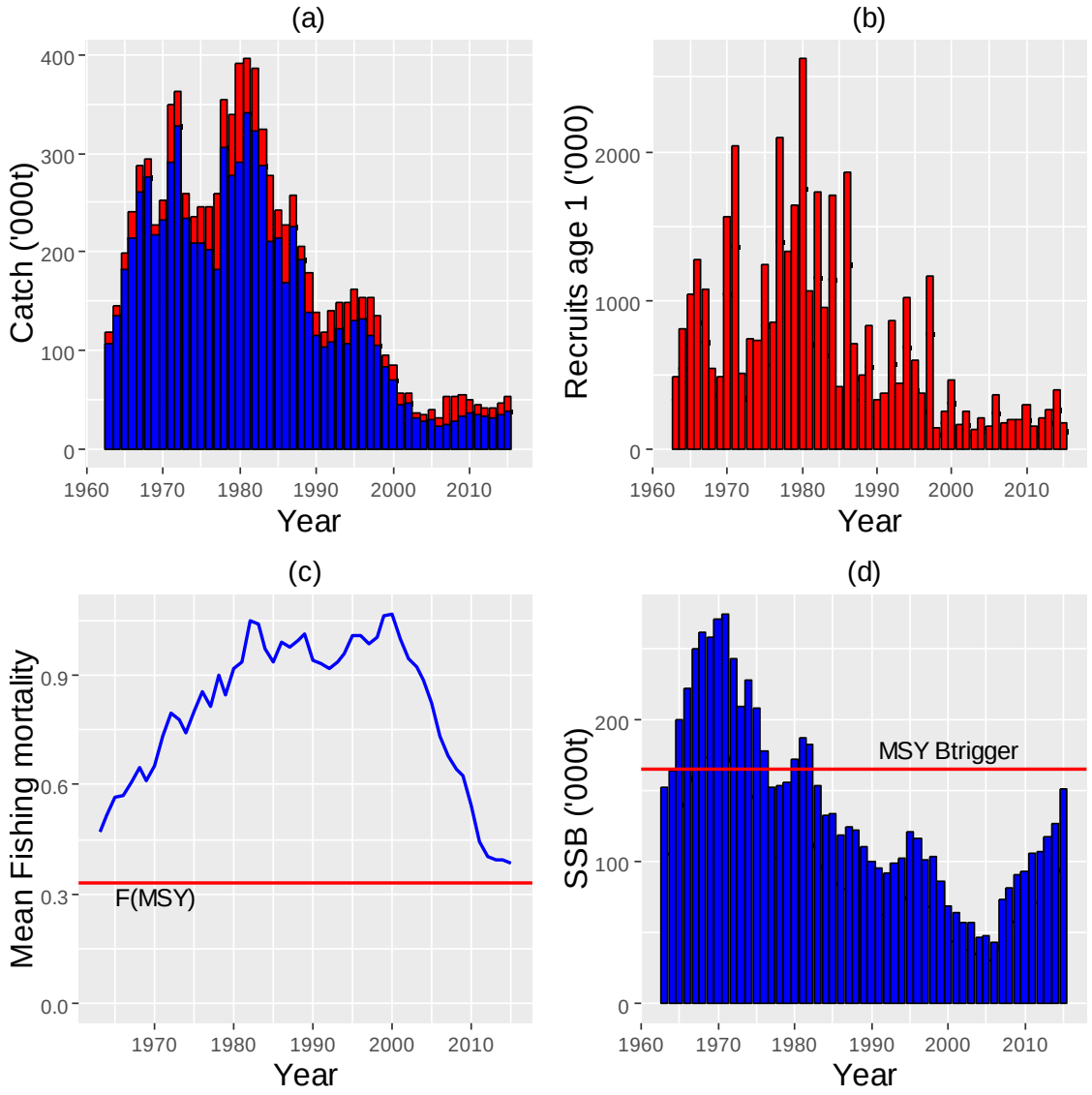


Figure 3. Summary of North Sea cod trends from ICES advice (ICES, 2016a). (a) the total catch split into landings (blue) and discards (red), (b) number of recruits at age 1, (c) the fishing mortality rate and (c) the spawning stock biomass (SSB). The MSY reference points used by ICES are shown in red. MSY Btrigger is the biomass below which management action is triggered.

The increasing stock biomass in the 1960s and less restrictive management regime encouraged the fishery to expand and the fishing mortality rate steadily increased from about 0.5 in 1963 to nearly 1.1 by 1982. This very high removal rate meant that the SSB was eroded and it has declined almost continuously since the mid-1970s with typically lower recruitment values that were insufficient to maintain the biomass. SSB reached its lowest point in 2006 with an estimated value of little more than 43,000t. Fortunately, by the beginning of the 21st century, the exploitation rate began to decline and the downward trend in SSB slowed and has now reversed. The 2015 exploitation rate stands at F=0.385 and is approaching the desired limit of F=0.33.

Although the reduction in exploitation rate and increase in SSB are important in judging the state of the stock, one should be cautious about the interpretation of this improvement. It is noteworthy that although the SSB has increased to values that in the 1960s were able to

produce large numbers of recruits, in fact recent recruitment remains very weak. It points to a possible environmental change that is unfavourable to the survival of very young fish and it means that the recovery so far is the result mainly of the better survival of older fish through reduced fishing rather than greater numbers of recruits being produced. In the long run, if this continues, the recovery of the stock will be limited.

A second point to note is that although the SSB has increased substantially since 2006 to a value of 151,000t, close to MSY $B_{trigger}$ and B_{pa} (at 165,000t), the total stock biomass (TSB) of cod which includes the juveniles, has not seen the same improvement. In Figure 4 it can be seen that the gap between the SSB and TSB is very large in the early years showing that much of the stock was dominated by young fish. In recent years this mixture has changed dramatically and young fish are now a much lower proportion of the total. It means that whereas the SSB in 2016 has recovered to almost the same value as in 1963, the TSB is still well below its level in the 1960s. In fact a large element of the apparent increase in the SSB is because a higher proportion of the stock is considered to be mature as a result of the younger age at which fish now mature. It is not purely due to an increase in the total biomass of the stock. For example, since the low point in 2006, the SSB has increased by 349% while the TSB has increased by only 196%. It is also noteworthy that the recovery in biomass has occurred mainly in the more northerly areas of the cod distribution and there is little evidence of improvement in the southern North Sea (Figure 4). This combined with the weaker increase in the TSB and continued poor recruitment in the stock means that caution should be exercised in how judge the improvement in the status of the stock is judged.

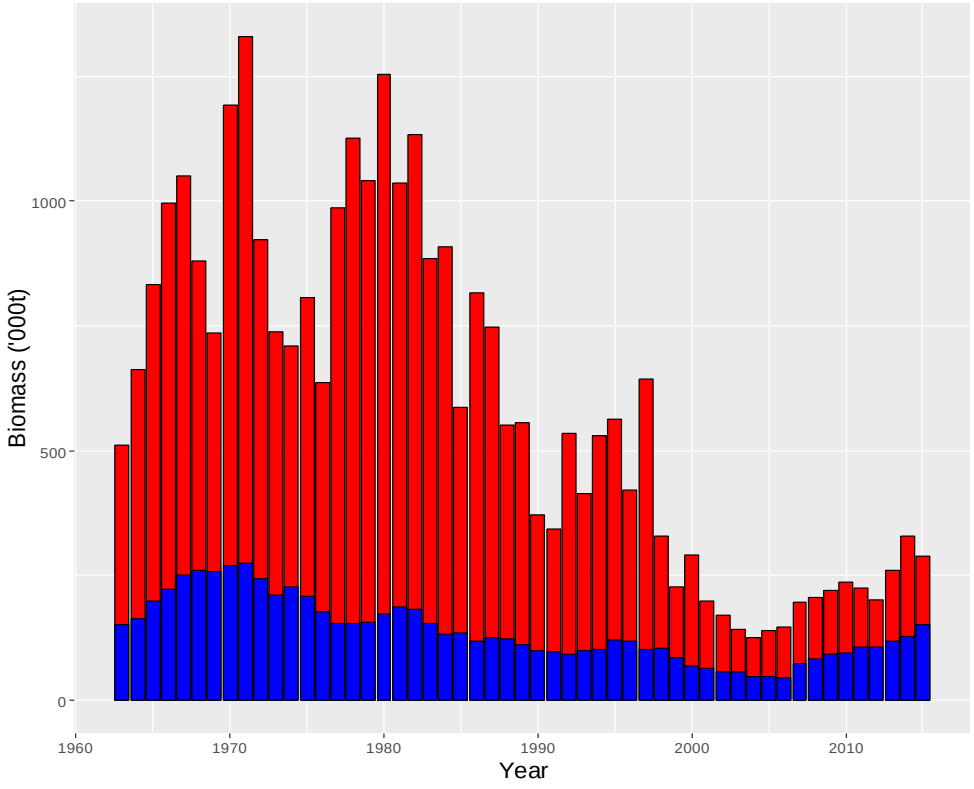


Figure 4. Trends in total cod biomass (red) and spawning stock biomass (blue) from ICES advice (ICES, 2016a). In recent years the SSB is a higher proportion of the total biomass because cod mature at a younger age.

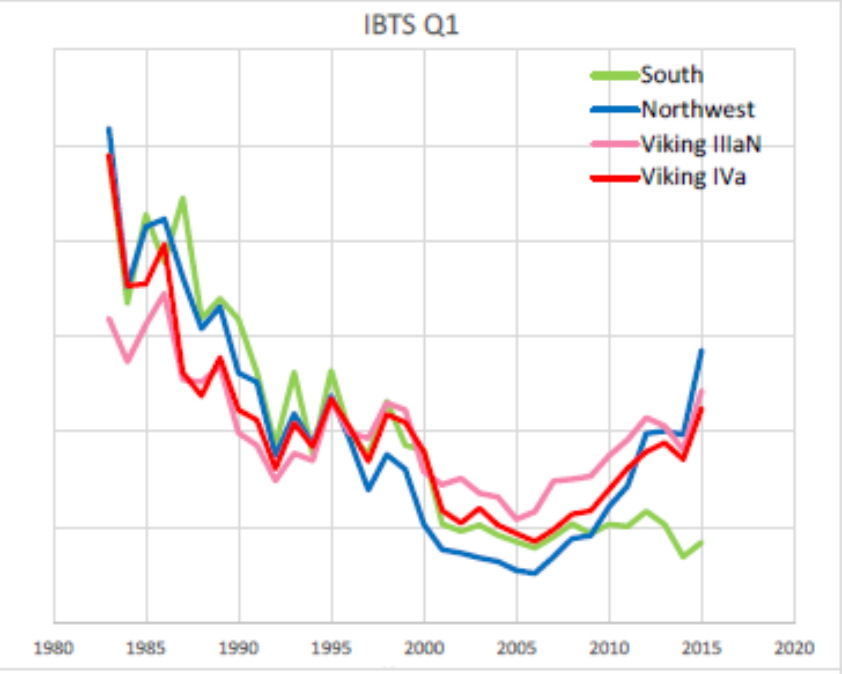


Figure 5. The relative abundance of cod in four sub-areas of the North Sea from the International Bottom Trawl Survey in quarter 1 for each area. There is no increase in abundance in the south (green) compared with other areas. (ICES 2016b).

2.3.6 Scientific advisory process

The North Sea cod stock is assessed annually by ICES, usually in the spring of each year. The assessments are reviewed for quality and scientific merit by two external reviewers. Once the assessments have passed the review process, the ICES "Advisory Committee" (ACOM) uses the analyses to provide advice on stock management to the European Commission and ICES member country governments. ACOM comprises experts from each of the ICES member countries nominated by their governments. It is also open to external observers who may contribute to the discussions at the discretion of the Chair. Typically the advice will suggest catch limits for the stock based on the management regime put in place by the relevant authorities, if judged precautionary. For cod this is the joint agreement between the EU and Norway which lays down the procedure for calculating TACs based on the current SSB and exploitation rate in relation to the desired target values.

While ICES plays a central role in the annual assessment and advice for cod, a second committee, the Scientific, Technical and Economic Committee for Fisheries (STECF) also makes an important contribution to management advice. STECF is a committee of independent experts appointed by the European Commission to provide advice on EU fisheries. Unlike ICES ACOM, STECF includes economic expertise and is able to advise on the economic consequences of management actions such as the choice of TAC for the coming year. It also plays a central role in evaluating long-term management plans for fish stocks and technical measures such as closed areas and effort limits. STECF provided much of the advice related to the long-term management plan for cod and its associated effort controls (see further on).

2.3.7 Management

2.3.7.1 Pre 1983-2000

There is a long history of fishery management in the North Sea but perhaps the most relevant is how management developed during the 1980s. Prior to 1983 most of the main European fish stocks were managed under the auspices of the North East Atlantic Fishery Commission (NEAFC) which facilitated joint management of fish stocks between the contracting parties to the convention. These included the main fishing nations in the region. Based on ICES advice, NEAFC set total allowable catches (TACs) that laid down the maximum total catch for each stock and how this would be shared among the contracting parties. While NEAFC provided a mechanism for the various countries to reach agreement on management (and other regulations), sanctions related to breaching the rules and their enforcement remained a matter for national governments.

Fishery management in the North Sea underwent a fundamental change in 1983 when the conservation pillar of the Common Fisheries Policy (CFP) was agreed and implemented. The agreement gave the European Commission legal competence in managing fisheries with the power to impose sanctions on those member states that did not comply with agreed regulations. It meant that for the first time in the joint management of shared resources in Europe there was a legally enforceable management regime covering the whole resource in EU waters. Although this had little immediate effect on the stocks, it laid the groundwork for more effective future fishery management. Not only did the CFP make provision for enforcement, it established common standards for mesh sizes, minimum landing sizes and, most importantly, rules for sharing jointly exploited stocks. Its great initial weakness was that there were no explicit management objectives agreed at political level. As a result many management measures (such as annual TACs) were *ad hoc* and frequently driven by the prevailing political pressures rather than clear longer term fishery objectives.

Cod stocks, and a number of other stocks that contributed to the same mixed fishery, continued to decline during the 1980s and 1990s. TACs set to limit or reduce exploitation rates were unsuccessful because often they were set too high, only restricted the recorded landings rather than the actual overall catch (which includes fish caught but discarded at sea) or were based on over-optimistic stock assessments. This failure was recognised by ICES who from 1991-1995 advised that fishing effort (such as days at sea by fishing vessels) should be reduced directly rather than relying on catch limits that were difficult to estimate accurately or operate effectively. Some member states such as the UK implemented effort limits but there was a failure to agree a community-wide regime.

2.3.7.2 2001-2008

Stocks continued to deteriorate and by 2001, ICES advice was in effect to close the cod fishery. The advice, while well intended, presented managers with a real operational problem because while it is possible to set a zero TAC for cod, unless fishing for the associated species (such as haddock and whiting) also ceased, there would be an inevitable bycatch of cod meaning they would still be caught but not landed. As a result measures to protect cod were weak so long as fisheries for the other species continued unhindered.

The poor state of a number of stocks and high vessel operating costs led the Scottish and UK Governments to introduce a major vessel decommissioning scheme which continued for a number of years. The scheme was targeted at active whitefish vessels and over a few years reduced the active fleet substantially. Other countries also implemented fleet reduction schemes. As a result, the exploitation rate on a number of key stocks including cod began to decline from around 2002 onwards.

2.3.7.3 Cod recovery plan 2009-2013

The beneficial effect of decommissioning schemes was not immediately apparent and even though exploitation rates showed some reduction, it was still high while SSB remained low. ICES therefore continued to advise zero or negligible catches. The recognition by managers that management needed to be strengthened resulted in the implementation of the cod recovery plan in 2009. The plan set out in Council Regulation (EC) No 1342/2008 of 18 December 2008 covered cod stocks, not only in the North Sea but also the Kattegat, West of Scotland and Irish Sea. Strictly speaking, the plan as it applied to the North Sea comprised two elements: a “recovery phase” and a “long-term management phase” of which the former is perhaps the most relevant since the long-term phase only applies after the SSB has been rebuilt. The recovery plan sought to reduce exploitation rate to F=0.4 by:

1) Setting out rules on how TACs should be set based on the estimated current SSB and exploitation rate;
2) Reducing fishing effort on the fleets that accounted for 80% of the EU cod catch in line with reductions in exploitation rate; and
3) Encouraging good practice by rewarding the implementation of conservation measures.

The plan has its strengths and weaknesses. Firstly (1) is important because laying down the TAC rule in a regulation prevented managers from setting values driven by short-term political expediency. Secondly (2) provides a mechanism for directly reducing exploitation rate without relying on a catch control that may be flawed. However, (3) is more equivocal since reward for adopting conservation measures was to escape some of the effort restrictions. It thus provided a mechanism to dilute the effort control instrument if the conservation measures proposed were less effective than direct effort reduction itself.

In many countries a variety of conservation measures were introduced that allowed some fleet sectors to avoid or offset direct effort reductions. These included real time closures (RTCs) and various selective gears such as separator trawls and square mesh panels that facilitate the escape of cod. RTCs were implemented by Scotland and consisted of closing areas of sea for a limited period when catch rates of cod in the area were high. Evaluating the effectiveness of such measures is extremely difficult because while fishing vessels may no longer fish in an area their effort is generally re-deployed to another area which is then more intensively fished. There may be some benefit but it is likely to be small compared to removal of effort altogether.

There is debate about the efficacy of the cod recovery plan (Kraak et al., 2013). During its operation, fishing effort did reduce, the exploitation rate declined and the SSB increased. How much of the improvement can be attributed to the various instruments remains a matter

of opinion. It is likely that the decommissioning schemes in the early 2000s were a major factor in reducing exploitation rate and this came before the recovery plan was implemented. However, the benefits of decommissioning were almost certainly enhanced and consolidated by the recovery plan even though the rate of reduction in exploitation rate was much slower than intended.

2.3.7.4 Long-term management phase 2014-2015

The gradual recovery of the cod SSB led ICES to advise that management could now be based on the long-term phase of the management plan. The key difference is that the rule for arriving at a TAC changes from the recovery phase. In essence the TAC is based on a fixed value for exploitation rate (F=0.4) when the SSB is above 150,000t. If the SSB lies between 70,000t and 150,000t the exploitation rate is reduced proportionately. After the adoption of this new rule, the SSB continued to increase but the exploitation rate appears to have levelled out.

2.3.7.5 Current management

The cod long-term management plan was conceived before the principle of MSY, to which fishery managers are now committed under the revised CFP, was fully embraced. Furthermore, the realisation that cod mature at an earlier age than previously assumed, and that recent recruitment has typically been much lower than historical values, requires a re-evaluation of SSB and exploitation rate reference points consistent with MSY. New analyses have been carried out by ICES to identify appropriate biomass and exploitation rate reference points consistent with the theory but as yet these have not been fully evaluated in terms of a long-term management plan. There is an expectation that the regulation setting out the cod recovery plan and the current long-term management plan will be repealed. This will remove days at sea controls but will also make cod subject to the “Landing Obligation” where discarding of cod at sea will be prohibited for many fleets. This technical change and the expected withdrawal of the UK from the EU may have a profound effect on the management of cod in the North Sea in the future.

2.3.7.6 The Landings Obligation (LO)

North Sea cod are likely to become subject to the so-called “Landing Obligation” in 2017. The reformed CFP of 2014 not only committed management to the full adoption of MSY, it also set out a framework intended to end the practice of discarding fish at sea by requiring vessels to land all fish caught and making these fish subject to quota restrictions. The issue of discarding is complex, but has a crucial bearing on the success of management.

In the case of cod, typical discard rates vary between 15-25% of the catch (by weight) though there have been a few years when quota restrictions were very severe, causing rates to reach 50% with substantial quantities of large fish being discarded. When cod were abundant in the 1960s and 1970s, discard rates were much lower, ranging from 5-10%. Since the process of discarding takes place at sea it is not easily monitored and accurate figures on the practice are hard to obtain. This has implications for scientific stock assessments, scientific advice and the enforcement of any discard ban.

The obligation to land all fish caught has a number of important consequences for the operation and potential success of management. Before the LO, TACs were based on a forecast of landings that assumed a certain quantity of fish would be discarded. The discards were calculated on the size distribution of the expected catch. The control therefore operated on the landings, not the total catch. With the application of the LO the fish previously counted as discarded will, presumably, need to be added to the TAC in order that all the fish can be landed legally, and given the relatively large rate of discarding of cod, this means the TAC may increase significantly. There is a risk that, if the enforcement at sea of a discard ban proves unsuccessful, the increased TAC might be used to increase the landings of commercial sized fish whilst continuing to discard unwanted bycatch. This would provide an incentive to increase exploitation rates by weakening catch limits. A challenge for managers is therefore to ensure that by inflating the TAC, discards are actually prevented and are landed.

2.3.8 Key Low-Trophic Level Species

Cod are not a key LTL species (see Section 2.3.1).

2.4 Principle Two: Ecosystem Background

2.4.1 Definition of main primary and secondary bycatch species

The FCR v2.0 defines 'primary' bycatch species as those where management tools and measures are in place that aim to regulate fishing in relation to some biologically based limit and/or target reference levels. Secondary species are those that do not meet the primary species definition, as well as those that are out of scope (e.g. reptiles, mammals, birds or amphibians) but that are not considered ETP. The definition of 'main' is generally made up of those species which typically make up >5% of the total catch (whether landed or not), or those species which are less resilient and make up more than 2% of the total catch.. For secondary species the designation of 'main' also automatically applies to the out of scope, non-ETP species.

The assessment team had two datasets with which to evaluate bycatch (i.e. non-cod catch). The first includes declared landings by Scottish vessels for all species for the relevant gear types. The other provides estimates of both landings and discards, for Scottish vessels landing anywhere plus other UK vessels landing into Scotland, but only for trawl gears (which, however, make up the majority of landings – 87% for 2013-15) and only for the main fish species (i.e. it does not include some species, notably *Nephrops*, and covers in total ~90% of trawl landings). Because the datasets have been produced in different ways from a slightly different pool of vessels, the team have not attempted to merge them, but rather have evaluated them separately, making a judgement in cases where the two give different results. The data are set out in Table 3 and Table 4.

Table 3. Declared landings for 2013-15 (tonnes live weight) of all species making up >1% of total landings over the three years by Scottish vessels using towed demersal gear, from the North Sea. Data provided by Marine Scotland Science.

Species	2013		2014		2015		all 3 years	
	Land-ings	% total	Land-ings	% total	Land-ings	% total	Land-ings	% total
Haddock (*Melanogrammus aeglefinus*)	29,898	37.4	25,589	34.2	21,790	31.5	77,277	34.5
Cod	10,490	13.1	10,374	13.9	10,797	15.6	31,662	14.1
Whiting (*Merlangius merlangus*)	9,486	11.9	8,519	11.4	7,756	11.2	25,760	11.5
Nephrops norvegicus	5,436	6.8	8,206	11.0	4,868	7.0	18,510	8.3
Saithe (*Pollachius virens*)	7,195	9.0	5,153	6.9	5,135	7.4	17,483	7.8
Monkfish (*Lophius piscatorius* and *L. budegassa*)	3,459	4.3	4,507	6.0	6,466	9.4	14,432	6.4
Plaice (*Pleuronectes platessa*)	4,343	5.4	3,478	4.7	3,519	5.1	11,339	5.1
Hake (*Merluccius merluccius*)	2,355	2.9	2,071	2.8	2,225	3.2	6,651	3.0
Ling (*Molva molva*)	1,838	2.3	1,751	2.3	1,758	2.5	5,348	2.4
Megrim (*Lepidorhombus*	1,654	2.1	1,417	1.9	1,112	1.6	4,183	1.9

whiffiagonis)								

Table 4. Estimated catch (declared landings plus estimated discards from CCTV vessels and observers) for the main finfish species, 2013-15 (tonnes live weight), from the North Sea. Data provided by MSS. Note: blank cell means no data.

Species	2013		2014		2015		all 3 years
	Catch	%	Catch	%	Catch	%	%
Haddock	33,917	34.5	32,710	30.3	29,345	29.9	31.5
Cod	17,415	17.7	17,079	15.8	20,451	20.8	18.1
Saithe	14,307	14.6	13,053	12.1	10,923	11.1	12.6
Whiting	11,430	11.6	11,969	11.1	12,430	12.7	11.8
Plaice	5,339	5.4	17,646	16.4	5,215	5.3	9.26
Monkfish	3,572	3.6	4,837	4.5	6,943	7.1	5.04
Hake	5,506	5.6			6,322	6.4	6.02
Ling	2,950	3.0	2,852	2.6	0	0.00	1.91
Megrim	1,740	1.8	1,658	1.5	1,223	1.2	1.52
Dab (*Limanda limanda*)			2,628	2.4	663	0.67	1.60
Grey gurnard (*Eutrigla gurnardus*)			1,288	1.2	1,721	1.8	1.46
Lemon sole (*Microstomus kitt*)	994	1.0	1,045	0.97	927	0.94	0.97
Witch (*Glyptocephalus cynoglossus*)	652	0.7	727	0.67	630	0.64	0.66
Pollack (*Pollachius pollachius*)	392	0.4	334	0.31	517	0.53	0.41
Flounder (P*latichthys flesus*)					766	0.78	0.78
Turbot (*Scophthalmus maximus*)	66	0.07	67	0.06	68	0.07	0.07
Red mullet (*Mullus* spp.)					39	0.04	0.04
Tusk (*Brosme brosme*)					39	0.04	0.04
Brill (*Scophthalmus rhombus*)			11	0.01	13	0.01	0.01
Sole (*Solea solea*)			4	0.00	11	0.01	0.01

Several species exceed 5% of the total landings/catch across both datasets, in all three years: haddock, whiting, saithe (both tables) and *Nephrops* (only in Table 3). Plaice exceeds 5% in both datasets each year except for 2014 total landings (4.7%). Hake never exceeds 5% in landings, but consistently exceeds 5% when discards are estimated (a lack of quota obliges Scottish fishermen to discard a relatively high proportion of hake catches). Monkfish exceeds 5% in two out of three years in terms of landings, but not when discards are estimated (because it is rarely discarded). No other species exceed 5% in any year in either of the datasets.

The datasets were also analysed by gear, to evaluate whether 'main' bycatch species differed across the various gear types in the UoA (see Table 5). For the landings data, gear categories were designated as follows:

- single trawl TR1 (mesh size >100mm, targeting demersal fish)
- twin trawl TR1 (as above)
- pair trawl TR1 (as above)
- single trawl TR2 (mesh size 80-99mm, targeting *Nephrops* or *Nephrops* plus fish; mainly small inshore vessels)
- twin trawl TR2 (as above; the larger *Nephrops* vessels)
- Scottish seine TR1 (mesh size >100mm, targeting demersal fish)
- Danish seine TR1 (as above, but rigged and deployed in a slightly different way)

The data including discards exist, however, only for trawl gears, so no analysis was possible for total catch (landings plus discards) for seine. Furthermore, the summary data provided by Marine Scotland only specify TR1 (targeting fish) vs. TR2 (targeting *Nephrops*), rather than the type of trawl (single vs twin vs pair), so for discards, a more detailed analysis by gear is not possible.

Based on the analysis of landings, 'main' bycatch species by gear are as follows:

- single trawl TR1: haddock, whiting, saithe, monkfish, plaice (and hake – see below)
- twin trawl TR1: haddock, whiting, saithe, monkfish, plaice, *Nephrops,* ling
- pair trawl TR1: haddock, whiting, saithe, hake
- single trawl TR2: haddock, whiting, *Nephrops*, monkfish (and dab – see below)
- twin trawl TR2: same
- Scottish seine TR1: haddock, whiting (and hake – see below)
- Danish seine TR1: same

Taking discards into account (for trawl gears only), the conclusions are as follows:

- trawl TR1: haddock, saithe, whiting, plaice
- trawl TR2: haddock, whiting, plaice and dab

Considering the species which appear as 'main' in one dataset but not in the other, the conclusions are as follows:

- monkfish: more important in landings than catch because rarely discarded – included as 'main' for single and twin trawls;
- *Nephrops*: not included in discards dataset – included as 'main' for all twin trawls and TR2 single trawls;
- ling: 'main' in landings for TR1 twin trawls only – does not show up in amalgamated catch data – included as 'main' for TR1 twin trawls;
- hake: frequently discarded due to lack of quota; but some data missing from catch data – included where >2% of landings (single and pair trawls TR1 and seines);
- dab: frequently discarded but some data missing from catch data – included for TR2 trawls.

Table 5. Declared landings for 2013-15 (tonnes live weight) by gear type, for all species making up >0.5% of total landings; other details as in Table 3.

Species	landings by gear type (tonnes), 2013-15							landings by species as a proportion of total landings by that gear type (%), 2013-15						
	single trawl TR1	twin trawl TR1	pair trawl TR1	single trawl TR2	twin trawl TR2	Danish seine TR1	Scottish seine TR1	single trawl TR1	twin trawl TR1	pair trawl TR1	single trawl TR2	twin trawl TR2	Danish seine TR1	Scottish seine TR1
haddock	28232	5341	26082	1549	450	1729	13890	**30.8**	**19.1**	**47.4**	**9.4**	**11.7**	**46.5**	**55.2**
cod	12616	3875	10431	165	48.2	692	3830	**13.8**	**13.9**	**18.9**	1.0	**1.3**	**18.6**	**15.2**
whiting	9704	2604	6350	1507	411	655	4531	**10.6**	**9.3**	**11.5**	**9.1**	**10.7**	**17.6**	**18.0**
nephrops	3606	1503	4.2	10957	2440		0.09	3.9	**5.4**	0	**66.3**	**63.4**	0	0
saithe	8054	2316	5869	296	44.9	135	768	**8.8**	**8.3**	**10.7**	1.8	1.2	3.6	3.1
monkfish	8835	3682	349	945	223	57.9	341	**9.7**	**13.2**	0.6	**5.7**	**5.8**	1.6	1.4
plaice	6120	3875	798	165	28.0	52.8	300	**6.7**	**13.9**	1.4	1.0	0.7	1.4	1.2
hake	1930	350	3558	55.8	13.4	139	605	2.1	1.3	**6.5**	0.3	0.3	3.7	2.4
ling	3122	1450	494	44.8	11.5	88.8	137	3.4	**5.2**	0.9	0.3	0.3	2.4	0.5
megrim	2393	1184	104	19.9	5.8	101	375	2.6	4.2	0.2	0.1	0.2	2.7	1.5
lemon sole	1147	373	209	167	36.2	31.9	102	1.3	1.3	0.4	1.0	0.9	0.9	0.4
witch	730	309	46.3	376	97.4	5.0	43.7	0.8	1.1	0.1	2.3	2.5	0.1	0.2

Table 6. Estimated catch (declared landings plus estimated discards from CCTV vessels and observers) by gear type (trawl only), 2013-15 (tonnes live weight), for species making up >1% of total catch for either gear type. Other details as in Table 4. Note: hake is missing from the 2014 dataset and dab from the 2013 dataset so the values below are estimated using the other two years.

Species	Estimated catch (landings plus discards) (tonnes) 2013-15		% in catch	
	Whitefish trawl (TR1)	*Nephrops* trawl (TR2)	Whitefish trawl (TR1)	*Nephrops* trawl (TR2)
Haddock	90949	5022	**34.3**	**12.9**
Cod	50366	4580	**19.0**	**11.8**
Saithe	37693	591	**14.2**	1.5
Whiting	29945	5885	**11.3**	**15.1**
Plaice	13591	14609	**5.1**	**37.6**
Hake	11176	650	6.2*	4.1*
Anglerfish	10666	1114	4.0	2.9
Ling	5346	456	2.0	1.2
Megrim	4486	135	1.7	0.35
Monkfish	3162	410	1.2	1.1
Lemon sole	2145	823	0.81	2.1
Grey Gurnards	2020	972	1.17	2.9
Witch	1281	532	0.48	1.4
Common Dab	367	2925	0.21	**8.7**

* hake: 2013+2015; dab and grey gurnard: 2014+2015 (due to missing data – see Table 4)

On this basis, the stocks identified as 'main' bycatch species are set out in Table 7; their classification (primary vs. secondary) is also given, as are details of their stock status and assessment. 'Minor' bycatch species are those identified in Table 4 but not listed in Table 7. They are instead listed in Table 11 (Section 2.4.5). Since all the gear types have been included in one UoA, all the 'main' species are considered in scoring for the UoA, even where they do not apply to one or more gear types. This is considered the most precautionary analysis given that both datasets are partial (as described above).

Table 7. Main primary and secondary species for this fishery, with information about stock definition, status and management framework.

Stock	Stock	Designation	Applies to which gears?	Stock status	Management	Ref.
Haddock	IIIa, IV and VIa	Primary	all	B_{2015}>MSY $B_{trigger}$; F_{2014}<F_{MSY}	EU-Norway management plan; but ICES provide advice based on MSY approach	ICES, 2015d
Whiting	IV and VIId	Primary	all	B_{2016}>MSY $B_{trigger}$; F_{2015}>F_{MSY}	EU-Norway management strategy or MSY approach	ICES, 2016c
Saithe	IIIa, IV and VI	Primary	all TR1 trawls	B_{2016}>MSY $B_{trigger}$; F_{2015}<F_{MSY}	EU-Norway management plan or MSY approach	ICES, 2016d
Plaice	IIIa and IV	Primary	single and twin TR1 trawls	B_{2016}>>MSY $B_{trigger}$; F_{2015}~=F_{MSY}	EU-Norway management plan (Regulation 676/2007); but ICES provide advice based on MSY approach	ICES, 2016e
Monkfish	IIIa, IV and VI	Secondary	all single and twin trawls	Stock size indicator is increasing	Framework for data-deficient stocks (category 3)	ICES, 2015e
Hake	Northern stock	Primary (see below)	single and pair TR1 trawls and seines	B_{2016}>>MSY $B_{trigger}$; F_{2015}<F_{MSY}	EU-Norway recovery plan no longer applies since biomass has exploded in recent years; advice follows MSY approach	ICES, 2016f
Ling	'Other areas'	Secondary	twin TR1 trawls	Stock size indicator is increasing	Framework for data-deficient stocks (category 3); precautionary TAC	ICES, 2015o
Dab	IIIa and IV	Secondary	all TR2 trawls	Stock size indicator fluctuating without trend	Framework for data-deficient stocks (category 3); combined TAC with flounder	ICES, 2015m
Nephrops	Fladen Ground (FU 7)	Primary	twin TR1 and all TR2 trawls	Abundance index~=MSY $B_{trigger}$; Harvest rate (2015)<<F_{MSY}	ICES' advice follows MSY approach; TAC set at North Sea level	ICES, 2016g
	Devil's Hole	Secondary		Below possible reference points	Approach for data-limited stocks; TAC set at North Sea level	ICES, 2016g
	Moray Firth (FU 9)	Primary		Abundance index>MSY $B_{trigger}$; Harvest rate (2015)<F_{MSY}	As Fladen Ground	ICES, 2016g
	Firth of Forth (FU 8)	Primary		Abundance index>MSY $B_{trigger}$; Harvest rate (2015)~=F_{MSY}	As Fladen Ground	ICES, 2016g

2.4.2 Management of main primary and secondary stocks

Note: This section is taken from the references in Table 7 except where otherwise indicated.

Haddock

Since 2014, ICES have provided advice for ICES Subareas IV and VI together, considering that there is a single stock across both areas. This means that the EU-Norway management strategy for North Sea haddock is no longer applicable as a basis for ICES advice; hence they provide advice based on the MSY approach. A 2014 evaluation of the management strategy, however, still concluded that it is consistent with the precautionary approach (ICES, 2014b). TACs are still set for the two areas separately. The SFSAG haddock fishery is MSC certified (date of certification May 2016) with a condition around the tools used to implement the harvest strategy – specifically, that the TAC should be divided between the two areas based on the proportion of fishable biomass in each area, rather than the historical split of landings (see MEC, 2016), with the condition due to be met by Year 3 of the existing certificate.

Whiting

The whiting stock assessment had an interbenchmark in 2016, which notably applied new estimates of natural mortality. Based on the new assessment, ICES re-evaluated the EU-Norway management strategy (fixed F=0.15) and concluded that with management on this basis, there is a risk of B dropping below B_{lim} of >5% (i.e. it is not precautionary). They therefore provided advice for 2017 based on the MSY approach – which uses the same F but adds a $B_{trigger}$ value – i.e. F=0.15 when B>$B_{trigger}$ (as it is estimated to be at present). For the moment, these two options result in the same 2017 TAC.

Saithe

The saithe stock assessment was benchmarked by ICES in 2016; the assessment methodology and tuning data series were both changed, which resulted in changes to the estimate of stock status and reference point values. On this basis, ICES provided advice based on the MSY approach (with the new reference point estimates) rather than the EU-Norway management plan (with old reference point values). However, they note in the advice that calculating the TAC based on the management plan results in a more conservative outcome than the MSY approach, which results in a large TAC increase in 2017 relative to 2016 (because F_{MP}<new F_{MSY}), and suggest that a TAC constraint might be appropriate if the MSY advice is followed in setting the TAC.

Plaice

ICES merged the assessments for ICES Division IIIa and Subarea IV in 2015, and since then, similar to haddock, there has been an issue with how the TAC is divided between the two areas. In 2016, ICES provided advice based on the MSY approach rather than the EU-Norway management plan for this reason. However, they note in the advice that using the management plan as the basis for setting the TAC '*does not raise immediate concerns*'.

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. Meanwhile, to provide advice ICES applies the framework for data-deficient stocks – category 3 (stocks for which there is some kind of biomass index available – in this case from Marine Scotland annual surveys). Changes in the TAC track changes in the biomass index, but with constraints; in this case, the index increased by >50% from 2012-2015, resulting in a constraint on the maximum TAC increase of 20% in 2017, according to the agreed framework.

Hake

Hake biomass in the North Sea has exploded since ~2008 and is now estimated to be ~6X higher than $B_{trigger}$. ICES provide advice based on the MSY approach (F_{MSY}), resulting in an advised TAC which has increased over the last few years, although not fast enough to avoid increasing rates of discarding due to high catch rates and lack of quota. The approach in setting the TAC appears to be to generally follow ICES advice but perhaps set the TAC a little higher (2012, 2013 and 2015); in 2016 with the introduction of the landings obligation, ICES advised on total catch and total landings; the TAC was set based on the advice for catch rather than landings. This approach is not entirely satisfactory from averyone's point of view (not least the fishery) but given the stock status does not appear to raise any sustainability concerns.

It was not completely clear, based on MSC's definitions, whether hake should be a 'primary' or a 'secondary' species, but since the existing reference points are still used in management, up to a point, it has been designated as a primary species.

Ling

For ling, ICES use a stock size indicator based on CPUE from the Norwegian longline fleet, which has been increasing consistently since ~2002. ICES provide biennial advice based on the framework for data-limited stocks (category 3), with a 20% uncertainty cap on the suggested increase in TAC for 2016-17. The sum of the various TACs, and the catch estimated by ICES in 2014 exceeded the advice for 2014/15 and also the increased advice for 2016/17 – but it is not completely clear whether the areas for these various estimates (advice vs. TACs vs. catch) match up exactly.

Dab

ICES (ICES, 2015a note that dab are '*one of the most abundant species*' in the North Sea[1]. North Sea dab were assessed by WGNSSK for the first time in 2014. The assessment is

[1] See also Under Milk Wood (Dylan Thomas): *And you alone can hear the invisible starfall, the darkest-before-dawn minutely dewgrazed stir of the black, dab-filled sea where the Arethusa, the Curlew and the Skylark, Zanzibar, Rhiannon, the Rover, the Cormorant, and the Star of Wales tilt and ride.*

largely based on the International Bottom Trawl Survey (ITBS) first quarter beam trawl survey data. An index of mature dab biomass was estimated by WGNSSK in 2014 and 2015, based on historical ITBS Q1 information The index has been stable in recent years, after an apparent increase in biomass from the start of the time series (~1965) to ~1990 (however, note that prior to 1983, the gear was not fully standardised, so this part of the time series needs to be treated with caution). ICES advice gives the time series from 1983 onwards and notes that '*survey indices show a highly variable abundance without trend*'.

ICES provides advice based on the framework for data-limited stocks (category 3). The advice is based on a comparison of the two latest index values (2014–2015) with the three preceding values (2011–2013), multiplied by the recent average catch (2012–2014) with a 20% 'uncertainty cap' on any increase if required (as in this case). Advice for dab is biennial; the 2015 advice (ICES, 2015a) applies to 2016 and 2017. The TAC in IIIa and IV is joint for dab and flounder, with which ICES does not agree; however catch (including discards) in 2014 did not exceed the ICES advice for 2016/17 (the first years for which advice was provided in terms of catch).

Nephrops

ICES provide advice based on functional units (FUs) but a TAC is set across the whole of ICES Subarea IV by adding together the advised TACs for each FU. ICES do not consider this precautionary, but in practical terms it seems to be working for the Scottish fishery; the stock status of the relevant FUs is appropriate. The stock assessments and reference points are empirical, based on towed camera surveys.

2.4.3 Management of discards

Scotland

Some forms of discarding, such as highgrading, have been banned under EU rules for many years, but other aspects of the CFP (notably relative stability for the distribution of quotas and minimum landing sizes) have tended to result in discarding. Since the most recent CFP reform, however, a 'landings obligation' has been progressively brought in for EU countries. Under the landings obligation, minimum landing sizes have been 'minimum conservation reference sizes' (their role in management is a little hazy), and a complete ban on discarding for quota species is being phased in. Full implementation of the discard ban is due for 1 January 2019[2]. The present situation is that different species have so far come under the discard ban for different fisheries. For this fishery, the situation is 2017 is as follows:

- >100mm mesh-size (TR1): required to land all saithe (if caught by a saithe-targeting vessel), plaice, haddock, whiting, cod, northern prawn, sole and *Nephrops*;
- 80-99mm (TR2): required to land all *Nephrops*, haddock, sole and northern prawn.

[2] Obviously no-one knows what will happen to this and other elements of EU fisheries regulation in Scotland after Brexit, which by the time this report is published will be looming. At time of writing it is pure speculation, and this will have to be taken into account during audits as (if) it becomes clear. However, it is worth noting that the UK was one of the strongest proponents of the landings obligation within the EU.

By our estimate, based on 2013-15 data this covers ~75% of the trawl landings (both TR1 and TR2) and ~95% of the seine landings from this fishery, although this analysis does depend on your definition of a 'saithe-targeting vessel'.

Additional species will be added in 2018, according to Marine Scotland[3].

Enforcement of the landings obligation is still in its early stage for the moment, and the focus of Marine Scotland Compliance has been to compare landings profiles with what would be expected given the gear, fishing area etc. In the future it is planned to use fully-documented vessels as a reference fleet to reinforce this approach. At-sea inspections are of course another element of enforcement, and these take place in both Scottish and Norwegian waters.

Despite the increasing focus on trying to limit discards, there remain some species which are required to be discarded; notably some species of skates in some areas where they are considered to be depleted (see under Elasmobranchs and ETP species below). In the past, concerns have been raised that this contradicts the Norwegian discard ban which is much more comprehensive than the EU landings obligation in its current state, but this is not in fact the case, as noted below.

Norway

Norway has had a ban on discarding for many years. It is not, as is often thought, total, but applies to a long list of species, including all commercially-important species. It is, however, permitted to discard fish if they have a reasonable chance of survival (such as in the case of elasmobranchs).

2.4.4 Elasmobranchs

Elasmobranchs may be classifed as ETP species if protected by national or international legislation; in this case EU fisheries regulations (Council Regulation 2016/72 of 22 January 2016 in which they are either classed as forbidden to land or as zero TAC species[4]; Table 8). In the absence of a protected status, elasmobranchs are classed as either primary or secondary species.

Table 8. Elasmobranch species protected by EU fisheries legislation (Regulation 2016/72 of 22 January 2016) and the areas concerned.

Species		Areas in which protected by EU fisheries legislation (Regulation 2016/72); EU and international waters	ETP for this fishery?
Starry ray	*Amblyraja radiata*	IIa, IIIa, VIId, IV	yes
Leafscale gulper shark	*Centrophorus squamosus*	IIa, IV, EU areas of I and XIV	yes
Kitefin shark	*Dalatias licha*	IIa, IV, EU areas of I and XIV	yes

[3] http://www.gov.scot/Topics/marine/Sea-Fisheries/discards

[4] Note: MSC guidance stipulates that where a zero TAC is put in place specifically to protect the species because of its poor conservation status, that species can be classed as ETP. See MSC Interpretations Log: http://msc-info.accreditation-services.com/questions/should-species-that-are-listed-under-the-prohibitions-set-out-in-eu-fisheries-regulations-be-regarded-as-etp-species/

Species		Areas in which protected by EU fisheries legislation (Regulation 2016/72); EU and international waters	ETP for this fishery?
Birdbeak dogfish	*Deania calcea*	IIa, IV, EU areas of I and XIV	yes
Common skate complex	*Dipturus batis*	IIa, III, IV, VI, VII, VIII, IX, X	yes
Great lanternshark	*Etmopterus princeps*	IIa, IV, EU areas of I and XIV	yes
Etmopterus pusillus	*E. pusillus*	EU and international waters of IIa, IV, I, V, VI, VII, VIII, XII, XIV	yes
Tope	*Galeorhinus galeus*	EU and international waters of IIa, IV, I, V, VI, VII, VIII, XII, XIV	no; only longline
Porbeagle	*Lamna nasus*	All areas	yes
Thornback ray	*Raja clavata*	IIIa	no
Norwegian ray	*Raja (Dipturus) nidarosiensis*	VIa, VIb, VIIa-c, e-h and k	no
White ray	*Raja alba*	VI, VII, VIII, IX, X	no
Undulate ray	*Raja undulata*	VI, X	no
Spurdog	*Squalus acanthias*	zero TAC in all areas	yes

Two sources of data were available to evaluate catch of elasmobranchs in this fishery: the Marine Scotland data on declared landings 2013-15 (landings only, all species but vulnerable to misidentification), and the data collected by observers under the 'PET' (=ETP) scheme (retained and discarded, all elasmobranch species identified by trained observers, but only a subsample of trips) (Table 9 and Table 10). (Further information about the PET dataset is provided below).

Table 9. Landings of elasmobranchs from landings declarations, tonnes live weight, 2013-15. Data provided by Marine Scotland. (LC: least concern; NT: near threatened; VU: vulnerable)

Elasmobranch species		Declared landings			Vulnerable?	Refs
		2013	2015	2015		
Leucoraja naevus	cuckoo ray	119	147	159	No – IUCN status LC; ICES review of survey data suggests stock ~stable	Ellis et al., 2015; ICES, 2015f
Raja montagui		84.7	77.3	97.8	No – LC	Ellis et al., 2007
Raja clavata	Thornback ray	27.4	53.1	52.2	No: Protected in IIIa but landings from there are a trivial part of this fishery; survey biomass index has increased sharply in recent years	ICES, 2015g
Scyliorhinus canicula	Small-spotted catshark	15.3	46.3	73.0	No – LC; stock size increasing	Ellis et al., 2009a; ICES 2015h
Leucoraja circularis	Sandy ray	0.12	8.18	9.18	*See below*	

Elasmobranch species		Declared landings			Vulnerable?	Refs
		2013	2015	2015		
Rostroraja alba	White skate	5.64	2.03	0	Not present in the North Sea, according to ref. – most likely misidentification	Dulvy et al., 2006
Dipturus batis	Common skate	1.15	0.01	0.28	ETP. Landing not permitted; most likely misidentification	
Amblyraja hyperborea		1.09	0.05	0	No – LC	Kulka et al., 2016
Raja brachyura	Blonde ray	0	0.12	0.40	No: IUCN – NT but landings too small. *See below*	Ellis et al., 2009b
Squalus acanthias	Spurdog	0.06	0.02	0	No: F<<F_{MSY} although biomass still depleted (<$B_{trigger}$)	ICES, 2014c; 2016l
Leucoraja fullonica	Shagreen ray	0	0.03	0.01	No: IUCN – VU but landings very small	McCully and Wallis, 2015
	Rays nei	59.7	54.4	16.5	-	-

Table 10. All species recorded by observers on the PETS bycatch recording sheets for 2014, covering 47 North Sea trips, TR1 and TR2, and for 2015, covering 105 trips; number of individuals. Species ordered by total number dead. Bycatch refers to either Primary or Secondary species.

Species		2015		2014		Categori-sation	Main?
Common name	Scientific name	Alive	Dead	Alive	Dead		
Starry ray	*Amblyraja radiata*	1	26	1	74	ETP	N/a
Cuckoo ray	*Leucoraja naevus*	16	1	3	41	Bycatch	No (Table 9)
Spurdog	*Squalus acanthias*	8	2	23	40	ETP	n/a
Small-spotted catshark	*Scyliorhinus canicula*	0	4	12	32	Bycatch	No (Table 9)
Flapper skate*	*Dipturus intermedia*	14	15	1	16	ETP	N/a
Starry smoothhound	*Mustelus asterias*	2	15	4	3	Bycatch	No; catch too low
Common skate*	*Dipturus batis*	3	2	4	2	ETP	N/a
Blue skate*	*Dipturus flossada*	2	2	0	1	ETP	N/a
Thornback ray	*Raja clavata*	0	2	0	0	Bycatch	No (Table 9)
Grey seal	*Halichoerus grypus*	1	0	0	1	ETP	N/a
Shagreen ray	*Raja fullonica*	1	2	0	0	Bycatch	No; too low
Rabbit ratfish	*Chimaera monstrosa*	0	0	0	1	Bycatch	No; too low

Species		2015		2014		Categori-sation	Main?
Common name	Scientific name	Alive	Dead	Alive	Dead		
Blonde ray	*Raja brachyura*	0	1	0	0	Bycatch	No; too low
Six-gilled shark	*Hexanchus griseus*	0	1	0	0	Bycatch	No; too low
Allis shad	*Alosa alosa*	0	1	0	0	ETP	N/a
Starling	*Sturnus vulgaris*	0	1	0	0	Bycatch	See below
Porbeagle	*Lamna nasus*	0	0	1	0	ETP	N/a
Skates nei	Rajidae	0	0	1	0	-	-

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

In relaton to sandy ray, the team noted that while declared landings of the species are non-trivial (~9 tonnes in 2015) it does not feature in the PET species database at all. The PET data are collected by trained observers, while the landings are identified by skippers or crew (albeit with some support such as ID guides), and McCully and Wallis (2015) notes that the species is frequently misidentified (confusion with the much more common congener *L. naevus* (cuckoo ray) being a key problem). The most likely explanation of this mismatch of data, therefore, is that most of the sandy ray declared in landings is not actually sandy ray, but rather other ray species, most likely mainly cuckoo ray. This would also explain the discrepancy between the existing SFSAG certifications (saithe: MEP, 2013 and haddock: MEC, 2016) in relation to the assessment of sandy ray bycatch; the saithe assessment, which resulted in a condition in relation to sandy ray bycatch, used landings data as the PET programme did not exist at that time, while the haddock assessment, which did not find any sandy ray bycatch, used the PETS data. As SFSAG continue to address the condition on the saithe fishery, this assumption will presumably be either verified or disproved.

Normally, any bycatch of an out-of-scope species (including birds) would automatically lead to the species being considered a ‘main’ bycatch species under the Secondary Species Component (2.2). However, in the case of the unlucky starling, it is clearly a freak event, and the team concluded that common sense should prevail: the starling is not therefore considered further. (Although starlings are reportedly declining in the UK, there is no source that considers that interactions with commercial fisheries are to blame.)

2.4.5 Minor bycatch species

MSC requires that minor bycatch species be listed and evaluated individually. Minor bycatch species have been identified from i) catch data from CCTV and observers (Table 4) and ii) species identified in the PET data (elasmobranchs only; Table 10). They are listed in Table 11. (Note: Some species are main for some gear types and minor for others – these are all considered under ‘main bycatch species’ above and are not included here.)

Table 11. Minor bycatch species, their categorisation and stock status and management

Species	Categorisation	Stock status	Management
Megrim	primary	$B>B_{trigger}$	TAC
grey gurnard (*Eutrigla gurnardus*)	secondary	unknown	none
Lemon sole (*Microstomus kitt*)	secondary	unknown	combined TAC with witch
Witch (*Glyptocephalus cynoglossus*)	secondary	unknown	combined TAC with lemon sole
Pollack (*Pollachius pollachius*)	secondary	unknown	none
Flounder (P*latichthys flesus*)	secondary	stable / fluctuating	combined TAC with dab
Turbot (*Scophthalmus maximus*)	secondary	declining	combined TAC with brill
red mullet (*Mullus* spp.)	secondary	unknown	none
Tusk (*Brosme brosme*)	secondary	increasing	precautionary TAC
Brill (*Scophthalmus rhombus*)	secondary	decreasing	combined TAC with turbot
Sole (*Solea solea*)	primary	$B>B_{trigger}$	TAC
Cuckoo ray (*Leucoraja naevus*)	secondary	unknown	none
Small-spotted catshark (*Scyliorhinus canicula)*	secondary	increasing	none
Starry smoothhound (*Mustelus asterias)*	secondary	increasing	none
Thornback ray (*Raja clavata)*	secondary	increasing	none
Shagreen ray (*Raja fullonica)*	secondary	unknown	none
Rabbit ratfish (*Chimaera monstrosa)*	secondary	unknown	none
Blonde ray (*Raja brachyura)*	secondary	unknown	none
Six-gilled shark (*Hexanchus griseus)*	secondary	unknown	none

2.4.6 ETP species

ETP species for this fishery are defined as follows:

- Species protected by national (Scottish, UK, Norway) or EU protected species legislation
- Species protected by EU fisheries legislation in certain areas
- Species on CITES Appendix I or the Convention on Migratory Species

In practice, this list is conveniently covered by the species included in the PETS scheme, as per Table 12, although this also includes some species which are not protected (e.g. some of the elasmobranchs – see above).

Table 12. 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*) Salmon (*Salmo salar*)	All species	All species	All species	Divers (Gavidae) Grebes (Podicipedidae) Cormorants (Phalacrocorocidae) Ducks, geese and swans (Anatidae) Auks (Alcidae)

A comparison of Table 8, Table 9 and Table 10 provides a list of elasmobranchs classified as ETP as given below – this is based on EU fisheries legislation (Regulation 2016/72). There are elasmobranchs with other sources of protection (e.g. basking sharks protected under UK law) but no evidence that any of these species interact with the fishery. According to the PETS dataset, there is evidence of two non-elasmobranchs from the list above interacting with the fishery: grey seals and allis shad. Grey seals (*Halichoerus grypus*) are protected under the Marine (Scotland) Act 2010 (they may not be killed except by licence or to relieve suffering). Allis shad is protected under Schedule 5 of the Wildlife and Countryside Act (1981).

The definitive list of ETP species interacting with this fishery is therefore:

- Species in the common skate complex (*Dipturus batis*, *flossada* and *intermedia*)
- Starry ray *Amblyraja radiata*
- Porbeagle *Lamna nasus*
- Spurdog *Squalus acanthias*
- Grey seal *Halichoerus grypus*
- Allis shad *Alosa alosa*

The elasmobranchs are subject to assessment and advice from ICES (ICES, 2015i,j,k), grey seal populations are surveyed by the Sea Mammal Research Unit (St. Andrews University; SMRU, 2015). Allis shad are at the very edge of their range in the North Sea, but are monitored elsewhere in the UK by the Environment Agency; however most of the population is in western France. Details of stock status and impacts are given in the rationales for the relevant Performance Indicators.

2.4.7 Habitats

2.4.7.1 Definitions

The MSC FCR v2.0 requires habitats interacting with the fishery to be defined as 'commonly-encountered', 'VME' or 'minor', with definitions as given in Table 13.

Table 13. Habitat definitions as per the MSC Fisheries Certification Requirements v2.0.

FCR reference	Definition
SA3.13.3.1	A **commonly encountered habitat** shall be defined as a habitat that regularly comes into contact with a gear used by the UoA, considering the spatial (geographical) overlap of fishing effort with the habitat's range within the management area(s) covered by the governance body(s) relevant to the UoA.
SA3.13.3.2	A **Vulnerable Marine Ecosystem (VME)** shall be defined as is done in paragraph 42 subparagraphs (i)-(v) of the FAO Guidelines (definition provided in GSA3.13.3.2). This definition shall be applied both inside and outside EEZs and irrespective of depth.
GSA3.13.3.2	**VMEs** have one or more of the following characteristic, as defined in paragraph 42 of the FAO Guidelines: • Uniqueness or rarity – an area or ecosystem that is unique or that contains rare species whose loss could not be compensated for by similar areas or ecosystems • Functional significance of the habitat – discrete areas or habitats that are necessary for survival, function, spawning/ reproduction, or recovery of fish stocks; for particular life-history stages (e.g., nursery grounds, rearing areas); or for ETP species • Fragility – an ecosystem that is highly susceptible to degradation by anthropogenic activities • Life-history traits of component species that make recovery difficult – ecosystems that are characterised by populations or assemblages of species that are slow growing, are slow maturing, have low or unpredictable recruitment, and/or are long lived • Structural complexity – an ecosystem that is characterised by complex physical structures created by significant concentrations of biotic and abiotic features
N/a	**Minor habitats** are those that do not meet the above definitions.

Commonly-encountered habitats in the Scottish part of the North Sea can be defined using UK predictive marine habitat mapping by McBreen et al. (2011) (Figure 6). For the area used by this fishery, they are (in order of spatial extent): sand (most of the northern North Sea); mud, fine mud or sandy mud (the Fladen Ground mainly); and coarse sediment (in patches). This excludes habitats very close inshore (e.g. infralittoral and estuarine).

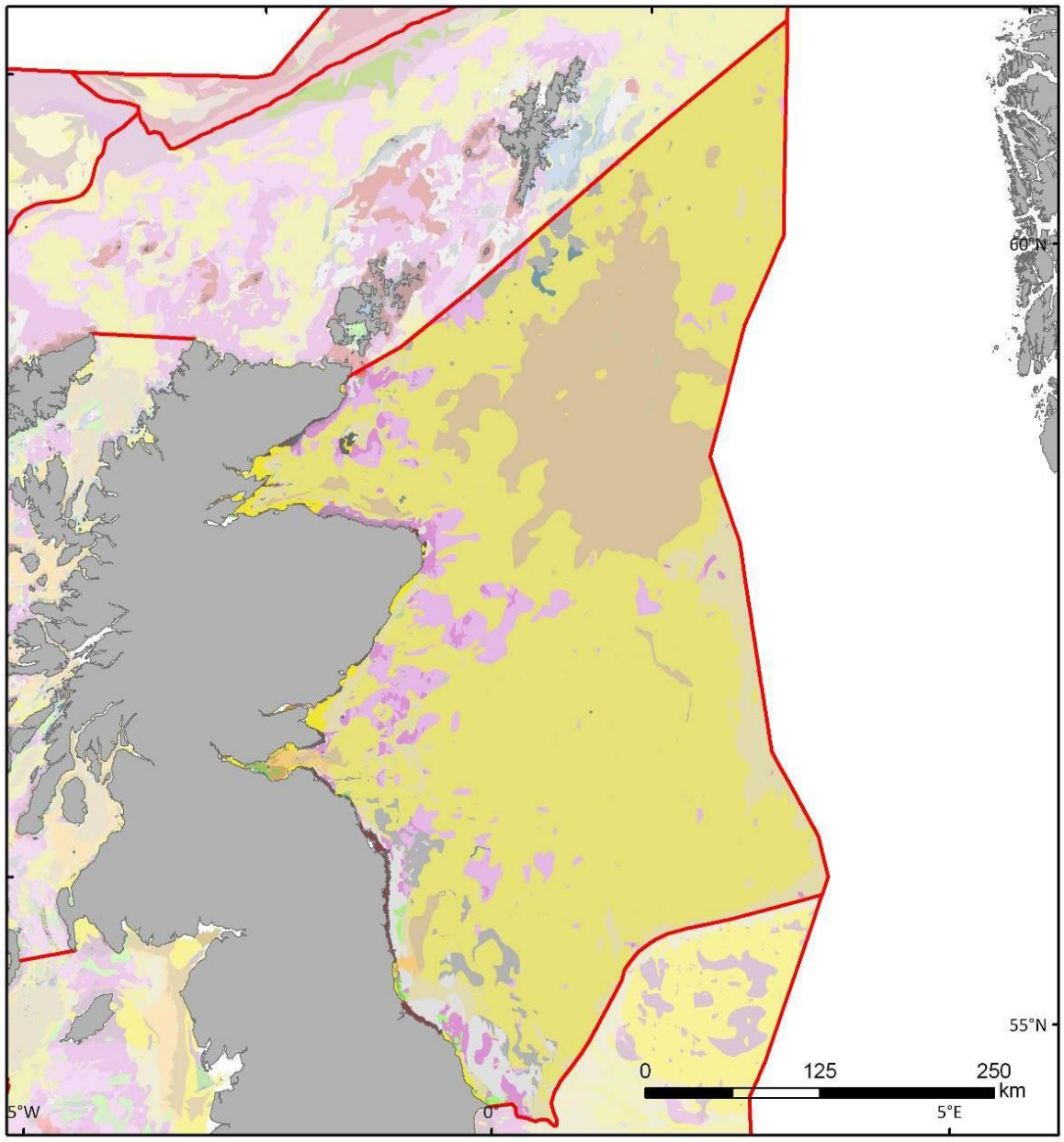


Figure 6. Results of predicting habitat mapping for the northern North Sea. Common habitats are yellow: A5.27 (deep circalittoral[5] sand), beige: A5.35, 36 and 37 (circalittoral sandy mud and fine mud, deep circalittoral mud), pink: A5.14 and 15 (circalittoral and deep circalittoral coarse sediment) (Figure 25 in McBreen et al., 2011).

For the Norwegian part of the northern North Sea, similar maps are available via the MAREANO interactive website[6]. For this area, commonly-encountered habitats are also sedimentary, ranging through the grain-size spectrum from gravelly sand to sand to silt to mud.

VMEs in Scottish waters have been identified based on the features used as 'search features' for the creation of the Nature Conservation MPAs (see under 'management'

[5] Definitions in McBreen et al., 2010: circalittoral: zone from 1% light penetration to wave base; deep circalittoral: wave base to 200m.
[6] http://www.mareano.no/en/maps/mareano_en.html#maps/188

below). The list of search features was developed by Scottish Natural Heritage / JNCC using a composite list of protected or threatened habitats and species provided by EU regulation (Habitat Regulation and others), domestic (UK or Scottish) legislation, Biodiversity Action Plan species and OSPAR threatened or declining habitat (Marine Scotland, 2013a). To identify VMEs which might be relevant to this fishery, we have combined the search features lists of 'habitat features' and 'low or limited mobility species' (see Table 14).

Table 14. Potential VMEs, their vulnerability, likely overlap with this fishery and conclusion as to whether they are identified as VMEs for this assessment, List of potential VMEs taken from Marine Scotland (no date given); http://www.gov.scot/Resource/Doc/295194/0114024.pdf.

Potential VME (from search features list)	Vulnerable to mobile demersal gear?	Overlaps with fishery – depth?	Overlaps with fishery – spatial area?	Identified as VME for this assessment?	Refs
Blue mussel beds *Mytilus edulis*	Yes	Generally in lower intertidal and shallow subtidal; can occur deeper in some places, but uncommon; lower depth bound thought to be set usually by predation (crabs, starfish)	Generally restricted to very close inshore because of subtidal predation	No	Summary of environmental requirements for mussels[7]
Burrowed mud with seapens / anemones	Yes	Wide depth range from a few metres to >500	Habitat for *Nephrops* so overlaps with the fishery by definition	Yes	Summary of *Nephrops* habitat and range[8]
Carbonate mounds	Yes	Mainly found 500-1000m but could have occurred shallower in the past	No known mounds in the North Sea; those that are known (West Scotland) closed to mobile gear	No	
Coral gardens	Yes	Yes	Only occur in 'Far West' area according to Marine Scotland	No	Lancaster et al., 2014a
Deep-sea sponge aggregations	Yes	Occur >250m	Faroe-Shetland Sponge Belt (see below) designated for this habitat	Yes	Henry and Roberts, 2014
Flame shell beds *Limaria hians*	Not relevant	Occur in tide-swept areas such as sea loch sills	All Scottish records are from the west coast	No	SNH[9]
Horse mussel beds *Modiolus modiolus*	Yes	Mussels can occur to ~250m, but beds seem to occur in inshore, sheltered areas: voes and sea lochs (Mair et al., 2000)	Extensive in sea lochs and bays in Orkney and Shetland; a large bed in NE Caithness, scattered	Yes	SNH[10]

[7] http://www.ukmarinesac.org.uk/communities/biogenic-reefs/br3_4.htm
[8] https://ec.europa.eu/fisheries/marine_species/wild_species/norway_lobster_en
[9] http://www.snh.gov.uk/docs/B988629.pdf
[10] http://www.snh.gov.uk/docs/B1017318.pdf

Potential VME (from search features list)	Vulnerable to mobile demersal gear?	Overlaps with fishery – depth?	Overlaps with fishery – spatial area?	Identified as VME for this assessment?	Refs
			records from the inner Moray Firth		
Inshore deep mud with burrowing heart urchins	Not relevant	In deep mud in sea lochs	Only Scottish records are from west coast	No	Tyler-Walters et al., 2012
Kelp and seaweed on sublittoral sediment	Unlikely to be practical for towed gear	Areas shallow enough for light penetration	Inshore / coastal	No	
Low or variable salinity habitats	Depends	Generally very shallow (estuaries)	No – not suitable habitat for target species	No	
Offshore deep-sea muds with bivalves and polychaetes	Depends	Offshore mud at any depth comes under this habitat definition	West and north of Scotland – may overlap with fishery NW of Shetland	Yes	
Offshore subtidal sand and gravel		‘Commonly-encountered’ habitat (Figure 6)			
Seagrass beds	Yes	Intertidal and areas shallow enough for light penetration; down to ~5m	Very coastal	No	Tyler-Walters et al., 2012
Sea loch egg wrack beds	?	Very shallow	In sea lochs	No	
Seamount communities	Yes	No – west coast only[11]	Only Scottish records from far offshore west	No	Tyler-Walters et al., 2012
Tide-swept coarse sand with burrowing bivalves	No, except if targeting bivalves via dredging	Inshore	Orkney and Shetland	No	
Tide-swept algal communities	Not relevant	Shallow subtidal	Narrows or channels with strong tidal currents; probably not recommended for trawling	No	
Burrowing sea anemone aggregations *Arachnanthus sarsi*	Yes	Down to ~35m	Only Scottish records from the west coast except one from Lunna	No	Tyler-Walters et al., 2012

[11] See http://www.gov.scot/Publications/2011/03/16182005/49

Potential VME (from search features list)	Vulnerable to mobile demersal gear?	Overlaps with fishery – depth?	Overlaps with fishery – spatial area?	Identified as VME for this assessment?	Refs
			Voe, Shetland which is not suited to mobile fishing gear		
Northern feather star aggregations *Leptometra celtica*	Yes	Usually a deep-water species (to at least 1000m); occurs exceptionally in shallower areas only where sheltered (e.g. sea lochs and voes) [12]	Mainly off the west coast although a few records in Shetland / Orkney; not in areas suited to mobile gear	No	Lancaster et al., 2014b;
Fan mussel aggregations *Atrina pectinata*	Yes	Down to 400m as long as sheltered from water movement	Seems to be extirpated from north and east coast	No	Lancaster et al., 2014c
Heart cockle aggregations *Glossus humanus*	Not relevant	Usually >50m	All Scottish records from west coast	No	Tyler-Walters et al., 2012
Ocean quahog aggregations *Arctica islandica*	Somewhat ('intermediate tolerance'; Lancaster et al., 2014d)	Wide depth range 10-300m or deeper	Many records from central and northern North Sea and Moray Firth	Yes	Lancaster et al., 2014d; Tyler-Walters et al., 2012

[12] See http://www.marlin.ac.uk/species/detail/2191

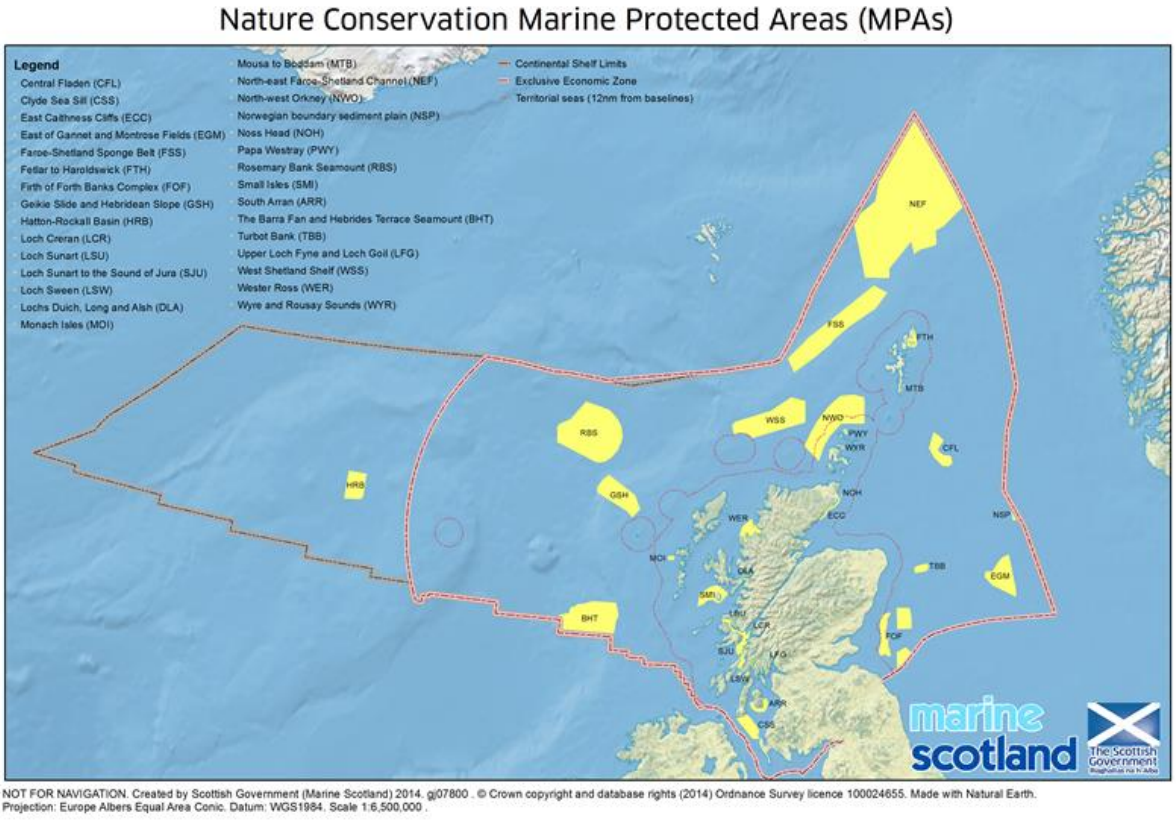
The likely impacts of the fishery on these VMEs is evaluated in the rationales for the relevant PIs.

2.4.7.2 Management

Alongside the existing network of Special Areas of Conservation (SACs - under the Habitats Directive), Scotland (and the rest of the UK) is putting in place a system of marine protected areas, aimed at (among other things) protecting threatened habitats and species listed under OSPAR. In Scottish waters these are called Nature Conservation Marine Protected Areas (NCMPAs). The management measures to be put in place in these MPAs were still under discussion with stakeholders at time of writing. The NCMPAs in Scottish waters are shown in Figure 7. ; all relevant protected areas (NCMPAs, MCZs, SCIs) are listed in Table 15.

No final decisions on management of the offshore MPAs have been taken as yet. 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 (and behind schedule). The conclusions of this paper for each site, in relation to demersal fishing, are summarised in Table 16. .

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.



NOT FOR NAVIGATION. Created by Scottish Government (Marine Scotland) 2014. gj07800 . © Crown copyright and database rights (2014) Ordnance Survey licence 100024655. Made with Natural Earth.
Projection: Europe Albers Equal Area Conic. Datum: WGS1984. Scale 1:6,500,000 .

Figure 7. NCMPAs in Scottish waters. See http://jncc.defra.gov.uk/page-5269

Table 15. All protected areas relevant to this fishery and their features and status. Information on NCMPAs available at http://jncc.defra.gov.uk/page-5269 (follow links for each site to find site description, designation order, management options paper and other information).

Protected area	Type	Features	Status
Central Fladen (CFL)	NCMPA	burrowed mud	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 offshore subtidal sand and gravel, offshore deep-sea muds	Designated by East of Gannet and Montrose Fields Marine Protected Area Order 2014(b); in force from 7 Aug. 2014
Faroe-Shetland Sponge Belt (FSS)	NCMPA	deep-sea sponges, offshore subtidal sand and gravel, ocean quahog (*Arctica islandica*) aggregations	Designated by Faroe-Shetland Sponge Belt Marine Protected Area Order 2014; in force from 7 Aug. 2014
NE Faroe-Shetland Channel (NEF)	NCMPA	deep-sea sponge aggregations (4-600m), deep-sea mud, deep-sea gravel	Designated by NE Faroe-Shetlands Channel Marine Protected Area Order 2014; in force from 7 Aug. 2014
Norwegian Boundary Sediment Plains (NSP)	NCMPA	ocean quahog (*Arctica islandica*) aggregations, offshore subtidal sand and gravel	Designated by Norwegian Boundary Sediment Plains Marine Protected Area Order 2014(b); in force from 7th August 2014
Braemar Pockmarks	SAC	submarine structures made by leaking gas (methane seeps / carbonate deposits)	SCI since December 2009
Scanner Pockmark	SAC	submarine structures made by leaking gas (methane seeps / carbonate deposits)	SCI since December 2009
Pobie Bank Reef	SAC	reef (bedrock / stony outcrops); also harbour porpoise; grey and common seal	SCI since Oct. 2012

Table 16. 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)	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	high probability of meeting conservation objectives

Protected area	Option for demersal towed gears		
	Do nothing	Reduce or limit	Eliminate
		permanent basis	
Faroe-Shetland Sponge Belt (FSS)	conservation objectives for sponge aggregations would not be met; risk for ocean quahog	for quahog suggest reducing/eliminating hydraulic and scallop dredging; for sponge aggregations there would still be a risk that conservation objectives would not be met	only option that would meet conservation objectives in areas where sponge aggregations occur
NE Faroe-Shetland Channel (NEF)	conservation objectives for sponge aggregations would not be met; risk for burrowed mud	suggest zoned approach for burrowed mud; for sponge aggregations there would still be a risk that conservation objectives would not be met	only option that would meet conservation objectives in areas where sponge aggregations occur
Norwegian Boundary Sediment Plains (NSP)	risk of not meeting conservation objectives for ocean quahog	restrict dredging as above	high probability of meeting conservation objectives if trawling and dredging are restricted

2.4.8 Ecosystem

In 2015, Marine Scotland published Scotland's National Marine Plan (Marine Scotland, 2015), 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. For the Norwegian waters of the North Sea and Skaggerak, an integrated ecosystem management plan was adopted by the Norwegian government in 2013 (Norwegian Ministry of Environment, 2013). Details of the likely impacts of the fishery on the ecosystem and the management as outlined in the plans are given in the rationales for the relevant PIs.

2.5 Principle Three: Management System Background

2.5.1 Jurisdiction

The North Sea cod stock is a shared stock between Norway and the EU. The UoC fishery takes place primarily in the EU Exclusive Economic Zone (EEZ), but after the recovery of the cod stock in recent years a small part of the catch is taken in the Norwegian EEZ.

2.5.2 Objectives

The current Common Fisheries Policy (CFP) regulation requires that member states, in accordance with international treaties such as the 1982 Law of the Sea Convention, the 1993 FAO Compliance Agreement and the 1995 Fish Stocks Agreement, apply the precautionary approach to fisheries management, and aim to ensure that exploitation of living marine biological resources restores and maintains populations of harvested species above levels which can produce the maximum sustainable yield. It is specifically mentioned that when targets relating to the maximum sustainable yield cannot be determined, multiannual (management) plans shall provide for measures based on the precautionary approach, ensuring at least a comparable level of protection for the relevant fish stocks. The maximum sustainable yield exploitation rate shall be achieved by 2015 where possible and, on a progressive, incremental basis at the latest by 2020 for all stocks. Precautionary reference points are required by the recovery and long-term management plans for North Sea cod.

Further objectives of the CFP include the implementation of the ecosystem-based approach to fisheries management, the collection of scientific data, elimination of discards, provision of conditions for economically viable and competitive fishing industries, adjustment of fishing capacity to the levels of fishing opportunities, and contributing to a fair standard of living for those who depend on fishing activities, bearing in mind coastal fisheries and socio-economic aspects.

2.5.3 Legal basis and management set-up

The fishery is managed at three levels: the international, EU and national levels. Cod is among the six North Sea stocks that are defined as jointly managed by Norway and the EU, based on the framework agreement between the two parties on fisheries cooperation from 1980 (in force 1981). The agreement provides the legal basis for the setting of TACs for joint stocks, transfers of fishing possibilities, joint technical measures and issues related to control and enforcement. The TACs for the jointly managed North Sea stocks are agreed in annual negotiations between the EU and Norway and split according to fixed distribution formulas, which for cod is 17 % to Norway and 83 % to the EU. The EU quota is then divided among member states according to the principle of relative stability, which implies that the UK gets 47 % of EU's North Sea cod quota. In turn, the major part of the UK quota is given to the Scottish fishing industry. The Production Organizations (POs) manage quota distribution at the regional level.

The fishery is managed within the context of EU's CFP, whose provisions are transposed into the Scottish legal system in the form of Scottish Statutory Instruments. CFP applies to all fishing activities in EU waters, including the EEZ, and to the activities of EU vessels

outside EU's marine jurisdiction. The main legal bases for fisheries management in Scottish territorial waters, as well as management of activities by Scottish registered fishing vessels outside Scottish territorial waters, are the 2013 Aquaculture and Fisheries (Scotland) Act and the 2010 Marine Act, with supplementary legislation at lower levels (secondary or subordinate legislation, such as specific requirements to fishing operations and gear). The regional distribution of responsibilities within UK fisheries management is fixed in an agreement between between the Fisheries Administrations of England (Defra – the Department for Environment, Food & Rural Affairs), Northern Ireland (the Department of Agriculture and Rural Development (Northern Ireland)), Scotland (Marine Scotland) and Wales (the Welsh Government) from 2012.

Marine Scotland is the implementing body under the Scottish Government, responsible for all components of fisheries management, from science to management and enforcement. In accordance with the Marine Act, its full special jurisdiction is limited to Scottish territorial waters, but it is also conferred the authority to enforce Scottish fisheries legislation in the EEZ and flag-state responsibilities towards Scottish registered fishing vessels outside EU waters. Marine Scotland works closely with the POs, which are delegated responsibility for managing fish quotas on behalf of their members. At a UK level, Marine Scotland works with a number of other bodies of governance, such as Defra and the Marine Management Organisation (MMO). MMO is a Non-Departmental Public Body (NDPB) under Defra, which delivers legal, monitoring and enforcement functions.

2.5.4 Stakeholders and consultation processes

Scottish fisheries management includes a sophisticated system for stakeholder consultation. The main mechanisms are:

i) Public meetings (regional fishing industry assemblies, quayside conversations and fishing sector focus groups);

ii) Advisory and working groups (the Inshore Fisheries Groups, the Inshore Fisheries Management and Conservation Group (IFMAC), the Fisheries Management and Conservation Group (FMAC) and the Scottish Discard Steering Group); and

iii) *Ad hoc* events, such as conferences.

FMAC was set up by the Cabinet Secretary (effectively: Minister) for Rural Affairs and the Environment in 2011, as part of a broader political and management effort to implement the cod recovery plan, and increase fishermen – and Scottish – influence in the forthcoming reform of the CFP. It is chaired by Marine Scotland and includes representatives from the fishing industry representative bodies, fish producer organizations, environmental organizations and Marine Scotland Policy and Science. FMAC makes recommendations to Marine Scotland – and, on request, to the Cabinet Secretary for Rural Affairs and the Environment – on matters connected to the development of fisheries legislation and policies, the allocation of fishing opportunities, management mechanisms and objectives for and strategies towards international negotiations. FMAC meets 3-4 times per year, and agendas and minutes from the meetings are available for download on Marine Scotland's website. Marine Scotland aims to circulate documents for discussion no less than four weeks in advance of meetings so as to allow time for the constituent organizations to consult with their members. Decisions are sought made through consensus, but objections are recorded in the

minutes, on request. Marine Scotland also seeks the opinion of stakeholders on running regulatory issues through occasional consultations papers posted on their website.

Another important interface between the industry and authorities are the POs. These are membership organizations for industry actors whose role, according to EU legislation, is to market the products of their members and implement measures that promote the concentration of supply and stabilize prices. POs are also allocated the vast majority of UK quotas by Fisheries Administrations and are responsible for managing these quotas on behalf of their members. There are currently 10 Scottish POs recognized by Marine Scotland, among them the Scottish Fishermen's Organisation (SFO). Other stakeholder organizations include Seafood Scotland, which was set up in 1999 to increase the value of return to the Scottish seafood sector, and the Scottish White Fish Producers Association (SWFPA), the largest fishing association in Scotland, which protects and promotes its members' interests across a range of national and international political arenas. SWFPA, in turn, is part of the Scottish Fishermen's Federation (SFF), which works to promote the collective interests of Scotland's ten geographically and sectorally defined fishermen's associations. The Federation plays an active role in advancing the interests of Scottish fishermen at national and international levels by lobbying government officials in Edinburgh, London and Brussels. It also plays a key role in helping to inform fisheries science, management of the marine environment; inshore fisheries management, marine spatial planning, marine safety regulations and industry recruitment and training programmes. An example of a more *ad hoc* based interface between different industry actors and authorities is the Gear Innovation and Technology Advisory Group (GITAG), which is hosted by SFF with Marine Scotland participation, established in 2015 to foster flexible working partnerships between fishermen, industry and public bodies, gear technologists and science in the implementation of the landing obligation in 2019.

The situation is similar at the international level, where user groups participate in the bilateral negotiations with Norway and meetings in NEAFC and the North Sea Advisory Council (NSAC); in the latter two, NGOs are also allowed to participate as observers. The Advisory Councils are the main consultation mechanism through which industry engages with management authorities at EU level. They include European industry and NGO representatives ensuring local knowledge is considered within the management system. They actively develop policy advice to the European Commission and are considered as part of the EU's management system. NSAC currently has 24 member organizations: 15 national fishing associations (including SSF and SFO) and 9 NGOs.

2.5.5 Resolution of disputes

At the national level, fishers can take their case to court if they do not accept the rationale behind an infringement accusation by enforcement authorities or the fees levied against them. Verdicts at the lower court levels can be appealed to higher levels. In practice, the vast majority of disputes are resolved within the management system, which incorporates ample formal and informal opportunities for fishers and other stakeholders to interact with the authorities, e.g. to clear out disagreement and conflict among users and between users and authorities.

At the international level, a state can institute proceedings against another state through mechanisms such as the International Court of Justice (ICJ) and the International Tribunal for the Law of the Sea (ITLOS), or bring a dispute before the Permanent Court of Arbitration (PCA). At the regional level, NEAFC in 2004 adopted a recommendation for compulsory dispute settlement. None of these mechanisms have so far been widely used as a means for solving fisheries disputes, but ICJ has over many decades had a number of cases regarding fisheries jurisdiction, and ITLOS has in recent years had cases on the prompt release of detained fishing vessels and the use of provisional measures. PCA was called upon in 2013 to solve certain aspects of the dispute between the EU and Faroe Islands regarding the coastal state management regime of Atlanto-Scandian herring. (The case was terminated a year later as agreement between the parties was reached.) There are no explicit mechanisms for the resolution of disputes in the EU–Norway regime for the North Sea fisheries, but – as is mostly the case also at the national levels – disagreement is sorted out through dialogue, negotiation and compromise.

2.5.6 Enforcement and compliance

Monitoring, control and surveillance (MCS) in the fishery is taken care of by Marine Scotland Compliance, in collaboration with enforcement authorities at UK and EU level (including the European Fisheries Control Agency) and exchange of information with relevant authorities in other states, including the Norwegian Directorate of Fisheries. All these agencies operate on the basis of a risk-based framework, identifying where enforcement resources can be best put to use at any time in order to optimize compliance.

The EU system for fisheries control is laid out in the Control Regulation, which entered into force on 1 January 2010. The Regulation applies to all activities covered by the CFP carried out on the territory of member states or in EU waters, and by EU fishing vessels or nationals of a member state. It requires all member states to adopt appropriate measures, allocate adequate financial, human and technical resources and set up all administrative and technical structures necessary for ensuring control, inspection and enforcement of activities under the CFP. The Regulation contains Titles (‘sections’ above chapter level) on, among other things, access to waters and resouces (Title III), control of fisheries (Title IV), control of marketing (Title V), surveillance (Title VI), inspections and proceedings (Title VII), enforcement (Title VIII) and common control programmes (Title IX). Among the substantial requirements are that member states operate a vessel monitoring system (VMS) and an automatic identification system (AIS), to be generally applied by vessels above 12 and 15 meters, respectively, and that they make the use of fishing logbooks mandatory for all vessels above 10 meters and electronic logbook for all vessels above 12 meters. The Regulation also introduces an obligation of member states to employ real-time closure of fisheries. Further, member states are obliged to carry out monitoring of fishing activities by inspection vessels or surveillance aircraft and physical inspections of fishing vessels; in addition to national inspectors, a pool of Community inspectors shall also be set up. Procedures are established for situations where infringements are detected, including enhanced follow-up when infringements are serious, such as misrecording of catches of more than 500 kg or 10 % of what is reported in the logbook. Further, provisions are given for proceedings and sanctions.

Marine Scotland Compliance carries out the UK's EU responsibilities for fisheries monitoring, control and surveillance in Scotland. It has 19 offices across the country and operates three surveillance vessels and two aircraft. In accordance with EU legislation, it takes care of information gathering through VMS (through the Marine Monitoring Centre) and electronic logbooks, and carries out all other obligations conferred upon Scotland, according the detailed reporting and control requirements in EU legislation to prevent, deter and eliminate illegal, unreported and unregulated fishing (IUU fishing). A Registration of Buyers and Sellers (RBS) Scheme has been fully operational in Scotland since 2005 and requires all buyers and sellers of first sale fish to be registered, and all auction sites of first sale fish and shellfish to be designated. All relevant regulations and information on enforcement actitities are available on Marine Scotland's website.

A smaller part of the client fishery takes place in the Norwegian EEZ, where MCS is a shared responsibility between the Directorate of Fisheries, the Coast Guard and regional sales organizations. The Directorate of Fisheries keeps track of how much fish is taken of the quotas of different vessels, vessel groups or other states at any given time, based on reports from the fishing fleet. Fishing vessels are required to have VMS and electronic logbooks, and real-time data are forwarded to the Directorate of Fisheries. The self-reported catch data can be checked at sales operations through the sales organizations, which have monopoly on first-hand sale of fish in Norway, and through physical checks performed by the sales organizations and the Directorate of Fisheries in port, and by the Coast Guard at sea.

In accordance with the EU Control Regulation, Member States are required to ensure that appropriate measures are systematically taken when violations of fishing regulations are detected, including administrative action or criminal proceedings, in order to provide effective deterrence. For serious infringements, a point system is to be applied, whereby fishermen are given a specified number of points for different kinds of violations. When a specific number of points is reached, the fishing licence shall be automatically suspended for a period of at least two months, increasing with repeated violations. In addition to the point system, a graduated system of penalties is used at national level in Scotland, ranging from oral advice to advisory letter, official written warning, various forms of statutory notices (such as revocation and suspension notices), financial administrative penalties (up to £10,000), other material enforcement measures (such as seizure and disposal of fish) and formal prosecution. Fixed penalty levels for different types of offences are publicly available; e.g. the lowest level of infringements leads to a penalty of £250 for a first-time offence and £500 the second time, while the case is referred to prosecution if the violation is repeated a second time.

According to Marine Scotland Compliance, the level of compliance is high in the fishery under assessment. In correspondence with the assessment team, they report that there were no enforcement issues with Scottish and UK administered fishing vessels during 2015 and early 2016 concerning North Sea cod specifically. They have given priority to the fishing areas where catches have been highest, and last-haul analysis inspections have regularly been carried out. The observance of the Scottish Cod Real Time Closure scheme has remained consistently good throughout the period, and closures are particularly respected by Scottish registered vessels. All prosecuted cases for the last decade are listed on the website of Marine Scotland Compliance. An average of eight cases have been prosecuted each year for the entire Scottish fisheries sector. Few infringements are of a serious nature.

The five cases prosecuted in 2015 were related to the failure to comply with e-log requirements (fined £2,000), failure to submit sales notes (fined £350), retention of skate after a closure (admonished), retention of ling after a closure (fined £4,000) and retention of mackerel after a closure (fined £3,000). There have been no cases involving cod since 2011.

As follows from the above, the fishery has in place a comprehensive system for MCS, including physical checks of fishing operations, catch and gear, as well as a fine-meshed sanctioning system. In addition to these coercive compliance mechanism, varioius forms of norm-, legitimacy- and communication-related mechanisms have proved effective to deliver compliance in other fisheries. In the fishery under assessment, there might be a degree of social control in the relatively small Scottish fishing communities, and the high level of user-group involvement may provide regulations with a degree of legitimacy that increases fishermen's inclination to comply with them. The same applies to the relationship between fishermen and enforcement officers, which is reported to be good. Inspectors are trained to approach the fishermen in as forthcoming a manner as possible – starting from the position that they are in compliance with regulations – and interfering with the fishing activities as little as possible (cf. referenced codes of conduct and enforcement strategies). Importantly, they perceive themselves as having a guidance-providing and not only a policing role towards the fishing fleet.

2.5.7 Review of the management system

The Scottish system for fisheries management is subject to a number of review mechanisms, covering all major parts of the management system. Marine Scotland – which is the overall fisheries management body in Scotland, responsible for all areas of fisheries management at national level, from science to regulation and enforcement – performs annual reviews of its own work, spanning all areas of the organization's responsibility. Annual reviews are also performed within different parts of the organization for scrutiny at higher levels; for example Marine Scotland Science submits annual review reports to the Marine Scotland Board. In 2010, an independent panel appointed by the Cabinet Secretary for Rural Affairs and the Environment evaluated the Scottish fisheries sector, including its system of governance. In 2015–2016, a comprehensive review of the performance and structure of Marine Scotland was conducted by the Scottish Government. The views of staff, customers and major stakeholders were sought, including their experience with Marine Scotland's efforts to communicate effectively with stakeholders. Similarly, at UK level, the Prime Minister in 2003 tasked the Strategy Unit with carrying out a review of options for a sustainable UK fishing industry in the medium to long term, published in 2004. The POs were subject to a comprehensive review by Marine Scotland in 2010–2011. The purposes, functioning and impact of the producer organizations were evaluated, including their management of quotas. All these reviews are publicly available on Marine Scotland's website.

At EU level, the CFP is reviewed in connection with the major revisions of its basic regulations every tenth year. In addition to internal review processes, an independent evaluation was commissioned by the European Commission ahead of the 2013 reform to assess the CFP from both a natural and social sciences point of view. The scientific component of the fishery under assessment is routinely assessed by ICES, as is the management plan for the fishery under assessment. A larger evaluation of the North Sea

management plans for demersal fisheries was performed in 2015 by the STECF, set up by the European Commission as a scientific expert body. Biological, economic, environmental and social aspects of the management plans were assessed.

3 Evaluation Procedure

3.1 Harmonised Fishery Assessment

In terms of Principle 1, overlap exists between this fishery and the DFPO Denmark North Sea & Skagerrak cod & saithe fishery (Acoura, 2016), for which the cod component was certified on the 5th September 2016. P1 scoring rationales were provided to the MEC assessment team by Acoura and harmonisation with the existing scores was carried out. Note however, that different trees were used for these assessments: this fishery was conducted against the FCRv2.0 while Acoura (2016) follows Annex CB of the MSC Certification Requirements v1.3. Scores were compared to the extent applicable; the differences are shown in Table 17.

Table 17. Differences in Principle 1 performance indicator scores for overlapping North Sea cod fisheries

Fishery	PI	Scoring issue	Scoring Guidepost			Justification
			60	80	100	
This fishery	1.1.1	a	Y	Y	N	The Acoura (2016) assessment is based on the June 2015 ICES advice. This assessment is based on the most recent advice, issued in November 2016, which shows a continued increase in the SSB. It is projected to increase to176,299t by the start of 2017 which is above MSY $B_{trigger}$. This is well above B_{lim} (118,000t) which produced the large 1996 year class.The team was satisfied that this change was significant enough for SG80 to be met. In the light of the uncertainty surrounding environmental effects on recruitment, SG100 continues to not be met.
Acoura (2016)	1.1.1	a	Y	N	N	
This fishery	1.2.1	a	Y	Y	N	As per the November (2016) advice, the MSY approach is more precautionary than the existing management strategy so revised reference points will only enhance the existing (non-MSY) ones. The previous EU-Norway harvest strategy was assessed by ICES to be consistent with the precautionary approach. On this basis, there is no reason to suggest that the harvest strategy 1) is no longer responsive to the state of the stock and 2) does not aim to reduce F and increase SSB beyond their respective reference points. The team was confident that SG80 should be met.
Acoura (2016)	1.2.1	a	Y	N	N	
This fishery	1.2.2	c	Y	Y	Y	Since the June (2015) ICES advice, F has continued to decline while SSB has continued to increase. This clearly shows that the tools in use are effective in controlling exploitation levels. The team was confident that SG100 should be met.
Acoura (2016)	1.2.2	c	Y	Y	N	

For Principle 3, this fishery overlaps with the SFSAG North Sea saithe (MEP, 2013) and North Sea haddock (MEC, 2016) fisheries. Harmonisation activies were carried out in-house as all SFSAG fisheries are managed by MEC, with some overlap in team members. A comparison of P3 scores in provided in Table 18.

Table 18. Comparison of Principle 3 performance indicator scores for overlapping SFSAG fisheries

Fishery	3.1.1	3.1.2	3.1.3	3.1.4	3.2.1	3.2.2	3.2.3	3.2.4	3.2.5
MEP (2013)	100	100	100	100	95	90	90	80	80
MEC (2016)	85	100	100	100	90	100	95	90	80
This fishery	85	100	100	-	90	100	100	-	90*

* 3.2.4 in the FCR v2.0

A difference in scoring for P3 was noted in relation to the following PIs:

- SI 3.2.3 c): In the haddock fishery, Marine Scotland reported some degree of misreporting between the North Sea (IVa) and West of Scotland (VIa) grounds. Therefore SI 3.2.3 c) was scored at 80. The same problem was not reported for the cod fishery, which has recently been most prevalent in the north of IVa. Hence, the present fishery was scored at 100 for this scoring issue, which gives a 100 score for PI 3.2.3.
- SI 3.2.4 a): While it is a principal challenge to claim that absolutely 'all' parts of a management system are subject to a particular mechanism (here: review), it is the opinion of the assessment team that the plethora of relatively comprehensive, frequent and easily accessible reviews of all major parts of the management system at both national and EU level comes closer to the criteria of 'all' than 'key' parts. From an opposite point of view, we cannot see that there are parts of the management system (that can reasonably be expected to be subject to review) for which there are no such mechanisms in place for this fishery. The team therefore concluded that SG100 is met.

3.2 Previous assessments

There are no previous assessments for this fishery.

3.3 Assessment Methodologies

This full assessment was undertaken in accordance with the MSC Fisheries Certification Requirements (FCR) version 2.0 for assessment procedure and scoring. Adjustments to the Default Assessment Tree were not required.

The MSC Full Assessment Reporting Template v2.0 was used to produce the report.

The Risk-Based Framework (RBF) was not used in this assessment.

3.4 Evaluation Processes and Techniques

3.4.1 Site Visits and Consultations

During the assessment process, one visit was held in Aberdeen, UK on the 21st and 22nd June 2016. The stakeholders consulted during and after the site visit are listed in Table 19 below.

Table 19. Stakeholders consulted during and after the Aberdeen site visit (21st and 22nd June 2016)

Name	Organisation	Type of consultation
Jennifer Mouat	The Aegir Consultancy / SFSAG representative	Provision of information during the site visit
Mike Park	Chief Executive Scottish White Fish Producers' Association / SFSAG representative	Provision of information during the site visit
Gordon Hart	Head of Access and Control, Marine Scotland	Provision of information on compliance via email correspondence
Liz Clarke	Marine Scotland Science. Marine Laboratory	Provision of information on landings and discard data via email correspondence
John Goold	Director of Marine, JNCC	Provision of information regarding NCMPAs via email correspondence
Nick Bailey	Marine Scotland Science. Marine Laboratory	Provision of information regarding NS cod ICES advice via telephone.
Chloe North	MSC Fisheries Outreach Officer, UK	Observer
Robin Cook	MEC	Assessor
Jo Gascoigne	MEC	Assessor
Geir Honneland	MEC	Assessor
Chrissie Sieben	MEC	Assessment team leader

Information obtained:

- SFSAG: Information about the functioning and management of the fishery (operations, data gathering and analysis, management structures and responsibilities, management plans, regulations, enforcement etc.);
- Marine Scotland Compliance: Information on enforcement, sanctions and non-compliance;
- Marine Scotland Science: Information on landings and discards data interpretation; observer data

3.4.2 Evaluation Techniques

a) Media announcements: MEC selected the MSC as media outlet. The MSC press release targeted a wide range of stakeholders within the sustainable seafood industry, ensuring that key stakeholders were notified of this fishery's announcement.

b) Methodology for information gathering: Review of data and documentation, interview of stakeholders.

c) Scoring process: Scoring was completed on the second day of the site visit, followed by additional email correspondence afterwards, mainly in relation to Principle 1.

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: The decision rule for MSC certification is as follows:

- No PIs scores below 60;
- The aggregate score for each Principle, rounded to the nearest whole number, is 80 or above.

The aggregate score for each Principle is calculated by taking the average score for each Component followed by the average of all the component scores.

e) Scoring elements: The set of scoring elements considered in the assessment are listed in Table 20.

Table 20. Scoring elements

Component	Scoring elements	Main/Not main	Data-deficient or not
Principle 1 (target species)	North Sea, Eastern English Channel and Skagerrak cod	N/A	No
Primary species	Haddock, whiting, saithe, plaice, hake, *Nephrops* FU 7, *Nephrops* FU 8 and *Nephrops* FU 9 (for stock definitions, see Table 7; Note: different species apply to different gears)	Main	No

	Megrim, sole	Not main	N/A
Secondary species	Monkfish, dab, ling, Devil's Hole *Nephrops* (for stock definitions, see Table 7; Note: different species apply to different gears)	Main	N/A
	See Table 11	Not main	N/A
ETP species	Starry ray, *Dipturus* complex, grey seal, allis shad, porbeagle, spurdog	N/A	No
Habitats	Commonly encountered: sedimentary habitat	N/A	No
	VMEs: burrowed mud, Arctica islandica aggregations	N/A	No

4 Traceability

4.1 Eligibility Date

The Eligibilty Date has been set as the date of certification, pending the successful outcome of this evaluation. Product caught by SFSAG after the date of certification will be eligible to enter further chains of custody.

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.

The 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 enforced through the relevant jurisdictions' fishery Monitoring Control and Surveillance systems and authorities (as detailed in Section 2.5.6). 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 fished (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.

EU traceability legislation now dictates that all fish brought to auction must be labelled with the vessel name, type of fishing (e.g. trawl, seine etc…) and ICES catch area prior to the sale so buyers can make informed purchasing decisions prior to and during the auction sale. Once sold, MSC certified stocks are invoiced by the auction under a different MSC-specific code setting out clearly on the invoice the difference between MSC and non-MSC purchases (this code is related directly to the species, gear and ICES area to ensure that only the correct certified stocks can be labelled as MSC on the invoice by the auction).

The combination of The Registration of Fish Buyers and Sellers and Designation of Fish Auction Sites Regulations 2005, EC logbooks and custom and practice provide a series of

independent and verifiable mass-balance measures that would enable transgressions to be detected.

The Registered Buyers and Sellers Regulation 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 21. 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. Note that any changes in fishing areas are logged.The separate labeled boxes also provide 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 cod 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/wp-content/uploads/2017/02/MSC-Saithe-and-haddock-Master-110217.pdf) (note: vessel list is the same as for currently certified haddock and saithe fisheries). 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 cod and other similar species (such as haddock). 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 Custody)	As described above, only basic processing (gutting) is completed on board the vessel and all fish are landed ‘whole’. The risk of mixing between certified and non-certified product during processing is seen to be low.

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/wp-content/uploads/2017/02/MSC-Saithe-and-haddock-Master-110217.pdf) (note: vessel list is the same as for currently certified haddock and saithe fisheries) and originating from within the Unit of Assessment covered by this assessment (see Section 2.1) shall be eligible to enter into 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 certification 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

No IPI stocks were identified in this assessment.

5 Evaluation Results

5.1 Principle Level Scores

The final principal scores are provided in the table below.

Table 22. Final Principle Scores

Principle	Score
Principle 1 – Target Species	90.0
Principle 2 – Ecosystem	85.3
Principle 3 – Management System	95.0

5.2 Summary of PI Level Scores

Princi-ple	Compo-nent	Wt	Performance Indicator (PI)		Wt	Score
One	Outcome	0.33	1.1.1	Stock status	0.5	70
			1.1.2	Stock rebuilding	0.5	100
	Manage-ment	0.67	1.2.1	Harvest strategy	0.25	85
			1.2.2	Harvest control rules & tools	0.25	85
			1.2.3	Information & monitoring	0.25	100
			1.2.4	Assessment of stock status	0.25	100
Two	Primary species	0.2	2.1.1	Outcome	0.33	95
			2.1.2	Management strategy	0.33	100
			2.1.3	Information/Monitoring	0.33	100
	Second-ary species	0.2	2.2.1	Outcome	0.33	80
			2.2.2	Management strategy	0.33	85
			2.2.3	Information/Monitoring	0.33	80
	ETP species	0.2	2.3.1	Outcome	0.33	75
			2.3.2	Management strategy	0.33	75
			2.3.3	Information strategy	0.33	75
	Habitats	0.2	2.4.1	Outcome	0.33	80
			2.4.2	Management strategy	0.33	80
			2.4.3	Information	0.33	80
	Eco-system	0.2	2.5.1	Outcome	0.33	90
			2.5.2	Management	0.33	85

Princi -ple	Compo- nent	Wt	Performance Indicator (PI)		Wt	Score
			2.5.3	Information	0.33	100
Three	Govern- ance and policy	0.5	3.1.1	Legal &/or customary framework	0.33	85
			3.1.2	Consultation, roles & responsibilities	0.33	100
			3.1.3	Long term objectives	0.33	100
	Fishery specific manage- ment system	0.5	3.2.1	Fishery specific objectives	0.25	90
			3.2.2	Decision making processes	0.25	100
			3.2.3	Compliance & enforcement	0.25	100
			3.2.4	Monitoring & management performance evaluation	0.25	90

5.3 Summary of Conditions

The SFSAG North Sea cod fishery achieved a score under 80 for four Performance Indicators. One of these was for PI 1.1.1, which automatically triggers scoring of 1.1.2 and therefore does not require a condition. In summary, three conditions were raised, summarised in Table 23. Note that these conditions and their timelines were harmonised with the SFSAG North Sea haddock fishery which was re-certified in May 2016. For further details, please see Appendix 1.2.

Table 23. Summary of conditions

Number	Condition	Performance Indicator
1	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 by the end of Year 4.	2.3.1
2	By the end of Year 4 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.	2.3.2
3	By the end of Year 3 there needs to be sufficient information available such that the impact of this fishery on common	2.3.3

	skate and starry ray can be quantitatively estimated, and hence it can be determined whether the fishery may be a threat to the recovery of the starry ray population and the common skate complex. This requires, as a minimum, a fleet-wide estimate of bycatch of starry ray and common skate, as well as some basis by which population-level trends can be evaluated for common skate (noting that ICES considers that existing data are insufficient for this purpose).	

5.4 Recommendations

No recommendations were made by the assessment team.

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

Acoura. 2016. Gaudian, G., and Scarcella, G. 2016. MSC Public Certification Report for the Danish North Sea Cod Fishery. Available online at: https://fisheries.msc.org/en/fisheries/dfpo-denmark-north-sea-skagerrak-cod-saithe/@@assessments (last visited: 14 November 2016).

Alheit, J., Möllmann, C., Dutz, J., Kornilovs, G,. Loewe, P. et al. 2005. Synchronous ecological regime shifts in the central Baltic and the North Sea in the late 1980s. Ices Journal of Marine Science 62: 1205–1215.

Beaugrand, G. 2004. The North Sea regime shift: evidence, causes, mechanisms and consequences. Progress in Oceanography 60: 245–262.

Beaugrand, G. and Kirby, R. R. (2010), Climate, plankton and cod. Global Change Biology, 16: 1268–1280. doi:10.1111/j.1365-2486.2009.02063.x

Beaugrand, G. Brander, K.M., Lindley, J.A., Souissi, S. and Reid, P.C. 2003. Plankton effect on cod recruitment in the North Sea Nature 426, 661-664, doi:10.1038/nature02164;

Beaugrand, G. Ibanez F. 2004. Monitoring marine plankton ecosystems. II: Long-term changes in North Sea calanoid copepods in relation to hydro-climatic variability. Marine Ecology-Progress Series 284: 35–47.

Clark, R.A. and Frid, C.L.J. 2011. Long-term changes in the North Sea ecosystem. Environmental Reviews 9, 131-187.

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. 62: 1322-1326. doi: 10.1016/j.icesjms.2005.04.023

Drinkwater, K. (2005). The response of Atlantic cod (Gadus morhua) to future climate change. ICES Journal of Marine Science, 62: 1327-1337.

Dulvy, N.K., Pasolini, P., Notarbartolo di Sciara, G. Serena, F., Tinti, F., Ungaro, N., Mancusi, C. & Ellis, J.E. 2006. Rostroraja alba. The IUCN Red List of Threatened Species 2006: e.T61408A12473706. http://dx.doi.org/10.2305/IUCN.UK.2006.RLTS.T61408A12473706.en.

Ellis, J., Dulvy, N. & Walls, R. 2015. Leucoraja naevus. The IUCN Red List of Threatened Species 2015: e.T161626A48949434. http://dx.doi.org/10.2305/IUCN.UK.2015-1.RLTS.T161626A48949434.en. Downloaded on 08 February 2016.

Ellis, J., Mancusi, C., Serena, F., Haka, F., Guallart, J., Ungaro, N., Coelho, R., Schembri, T. & MacKenzie, K. 2009a. Scyliorhinus canicula. The IUCN Red List of Threatened Species 2009: e.T161399A5415204. http://dx.doi.org/10.2305/IUCN.UK.2009-2.RLTS.T161399A5415204.en. Downloaded on 20 September 2016.

Ellis, J., Ungaro, N., Serena, F., Dulvy, N.K., Tinti, F., Bertozzi, M., Pasolini, P., Mancusi, C. & Noarbartolo di Sciara, G. 2009b. Raja brachyura. The IUCN Red List of Threatened Species 2009: e.T161691A5481210. http://dx.doi.org/10.2305/IUCN.UK.2009-2.RLTS.T161691A5481210.en. Downloaded on 20 September 2016.

Ellis, J., Ungaro,N., Serena,F., Dulvy,N.,Tinti,F., Bertozzi, M., Pasolini, P., Mancusi,C. & Noarbartolo di Sciara, G. 2007. Raja montagui. The IUCN Red List of Threatened Species 2007: e.T63146A12623141.http://dx.doi.org/10.2305/IUCN.UK.2007.RLTS.T63146A12623141.en. Downloaded on 20 September 2016.

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

EU 2008. COUNCIL REGULATION (EC) No. 1342/2008 of 18 December 2008 establishing a long-term plan for cod stocks and the fisheries exploiting those stocks and repealing Regulation (EC) No. 423/2004. Official Journal of the European Union, L 348/21.

EU 2008a. Directive 2008/56/EC on establishing a framework for community action in the field of marine environmental policy (Marine Strategy Framework Directive)

EU 2010. Directive 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)

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

EU 2016. Council Regulation 2016/72 of 22 January 2016 fixing for 2016 the fishing opportunities for certain fish stocks and groups of fish stocks, applicable in Union waters and, for Union fishing vessels, in certain non-Union waters, and amending Regulation (EU) 2015/104.

Fernandes, PG & Cook, R. 2013. Reversal of fish stock decline in the Northeast Atlantic. Current Biology, vol 23, no. 15, pp. 1432-1437., 10.1016/j.cub.2013.06.

Freyhof, J. & Kottelat, M. 2008. Alosa alosa. The IUCN Red List of Threatened Species 2008: e.T903A13091343. http://dx.doi.org/10.2305/IUCN.UK.2008.RLTS.T903A13091343.en.

Gudmundsson, G., 2004. Time-series analysis of abundance indices of young fish. ICES. Mar. Sci., 61, 176-183.

Heath, M.R. and Brander, K. (eds) (1999). Report of the Workshop on Gadoid Stocks in the North Sea during the 1960s and 1970s. ICES Cooperative Research Report. No. 244.

Henry L-A and Roberts J.M. 2014. Applying the OSPAR habitat definition of deep-sea sponge aggregations to verify suspected records of the habitat in UK waters. JNCC Report No: 508, February 2014

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

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

ICES 2013. World Conference on Stock Assessment Methods (WCSAM)(contribution to the Strategic Initiative on Stock Assessment Methods). ICES CM 2013/ACOM/SCICOM:02

ICES 2014a. Report of the Joint ICES-MYFISH Workshop to consider the basis for FMSY ranges for all stocks (WKMSYREF3). ICES CM 2014/ACOM:64

ICES, 2014b. 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, 2014c. 9.3.26 Spurdog (*Squalus acanthias*) in the Northeast Atlantic. In: ICES Advice 2014, Book, 9

ICES, 2014d. First Interim Report of the Working Group on Integrated Assessments of the North Sea (WGINOSE). 10-14 March 2014, Copenhagen.

ICES 2015a. Report of the Working Group on the Assessment of Demersal Stocks in the North Sea and Skagerrak (WGNSSK). ICES CM 2015/ACOM:13

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

ICES 2015c. Cod (*Gadus morhua*) in Subarea IV and Divisions VIId and IIIa West (North Sea, Eastern English Channel, Skagerrak). ICES Advice on fishing opportunities, catch, and effort. Greater North Sea and Celtic Seas ecoregions. In: ICES Advice 2015, Book 6

ICES 2015d. 6.3.10. Haddock (*Melanogrammus aeglefinus*) in Subarea IV and Divisions VIa and IIIa West (North Sea, West of Scotland, Skagerrak). ICES Advice on fishing opportunities, catch, and effort. Greater North Sea and Celtic Seas ecoregions. In: ICES Advice 2015, Book 6

ICES 2015e. 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). ICES Advice on fishing opportunities, catch, and effort Celtic Seas and Greater North Sea Ecoregions. In: ICES Advice 2015, Book 5

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

ICES, 2015g. 6.3.52 Thornback ray (*Raja clavata*) in Subarea IV and Divisions IIIa and VIId (North Sea, Skagerrak, Kattegat, and eastern English Channel). In: ICES Advice 2015, Book 6.

ICES, 2015h. 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: ICES Advice 2015, Book 6.

ICES, 2015i. 6.3.5 Common skate (*Dipturus batis*-complex) in Subarea IV and Division IIIa (North Sea, Skagerrak, and Kattegat). In: ICES Advice 2015, Book 6

ICES, 2015j. 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, 2015k. 9.3.27 Porbeagle (*Lamna nasus*) in the Northeast Atlantic. In: ICES Advice 2015, Book 9.

ICES, 2015l. 5.3.22 Megrim (*Lepidorhombus* spp.) in Divisions IVa and VIa (Northern North Sea, West of Scotland). In: ICES Advice 2015, Book 5.

ICES, 2015m. 6.3.7 Dab (*Limanda limanda*) in Subarea IV and Division IIIa (North Sea, Skagerrak and Kattegat). In: ICES Advice 2015, Book 6.

ICES, 2015n. 6.3.2 Brill (*Scophthalmus rhombus*) in Subarea IV and Divisions IIIa and VIId,e (North Sea, Skagerrak and Kattegat, English Channel). In: ICES Advice 2015, Book 6.

ICES, 2015o. 9.3.24 Ling (*Molva molva*) in Subareas VI-IX, XII, and XIV, and in Divisions IIIa and IVa (other areas). In: ICES Advice 2015, Book 9.ICES 2016a. Cod (*Gadus morhua*) in Subarea 4, Division 7.d and Subdivision 3.a.20 (North Sea, eastern English Channel, Skagerrak). ICES Advice on fishing opportunities, catch, and effort Greater North Sea and Celtic Seas ecoregions. In: ICES Advice 2016, Book 6

ICES 2016b. Report of the Working Group on the Assessment of Demersal Stocks in the North Sea and Skagerrak (WGNSSK). ICES CM 2016/ ACOM:14

ICES 2016c. 6.3.56 Whiting (*Merlangius merlangus*) in Subarea 4 and Division 7.d (North Sea and eastern English Channel). ICES Advice on fishing opportunities, catch, and effort Greater North Sea and Celtic Seas ecoregions. In: ICES Advice 2016, Book 6

ICES 2016d. 6.3.38 Saithe (*Pollachius virens*) in subareas 4 and 6 and Division 3.a (North Sea, Rockall and West of Scotland, Skagerrak and Kattegat). ICES Advice on fishing opportunities, catch, and effort Greater North Sea and Celtic Seas ecoregions. In: ICES Advice 2016, Book 6

ICES 2016e. 6.3.36 Plaice (*Pleuronectes platessa*) in Subarea 4 (North Sea) and Subdivision 3.a.20 (Skagerrak). ICES Advice on fishing opportunities, catch, and effort Greater North Sea and Celtic Seas ecoregions. In: ICES Advice 2016, Book 6

ICES 2016f. 9.3.32 Hake (*Merluccius merluccius*) in subareas 4, 6, and 7 and divisions 3.a, 8.a–b, and 8.d, Northern stock (Greater North Sea, Celtic Seas, and the northern Bay of Biscay). ICES Advice on fishing opportunities, catch, and effort Greater North Sea, Celtic Seas, and Bay of Biscay and the Iberian Coast ecoregions. In: ICES Advice 2016, Book 9

ICES 2016g. 6.3.27-9, 31. Norway lobster (*Nephrops norvegicus*) in Division 4.a, Functional Units 7, 8, 9 and 34. ICES Advice on fishing opportunities, catch, and effort Greater North Sea Ecoregion. In: ICES Advice 2016, Book 6

ICES, 2016h. 6.3.49 Sole (*Solea solea*) in Subarea 4 (North Sea). In: ICES Advice 2016, Book 6.

ICES, 2016i. Final Report of the Working Group on Integrated Assessments of the North Sea (WGINOSE) 14-18 March 2016 ICES Headquarters, Copenhagen, Denmark. ICES CM 2016/SSGIEA:06

ICES, 2016j. 6.2.2.2 Mixed-fisheries advice for Subarea IV (North Sea) and Divisions IIIa North (Skagerrak) and VIId (Eastern Channel)

ICES, 2016k. 6.3.27. Norway lobster (*Nephrops norvegicus*) in Division 4.a, Functional Unit 7 (northern North Sea, Fladen Ground). Update, 11 November 2016.

ICES, 2016l. 9.3.17. Spurdog (*Squalus acanthias*) in the Northeast Atlantic. 11 November 2016.

ICES. 2014. Interim Report of the Working Group on Multispecies Assessment Methods (WGSAM), 20–24 October 2014, London, UK. ICES CM 2014/SSGSUE:11. 104 pp.

Jardim, E., Millar, C. P., Mosqueira, I., Scott, F., Osio, G. C., Ferretti, M., Alzorriz, N. and Orio, A. 2015. What if stock assessment were as simple as a linear model? The a4a initiative. IC-ES Journal of Marine Science, 72: 232–236.

JNCC 2014. Central Fladen MPA - Assessment against the MPA Selection Guidelines v5.0 July 2014

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

Kraak, S. B.M, Bailey, N., Cardinale, M. , Darby, C. , DeOliveira, J., Eero, M., Graham,N., Holmes, S., Jakobsen,T., Kempf,A, Kirkegaard, E., Powell,J., Scott, R.D., Simmonds, E.J., Ulrich, C.,Vanhee,W.,Vinther, M. 2013. Lessons for fisheries management from the EU cod recovery plan. Marine Policy 37:200–221

Kulka, D.W., Barker, A.S., Pasolini, P., Orlov, A. & Walls, R.H.L. 2016. Amblyraja hyperborea. The IUCN Red List of Threatened Species 2016: e.T63119A68608464.http://dx.doi.org/10.2305/IUCN.UK.2016-1.RLTS.T63119A68608464.en.

Lancaster J. (Ed.), McCallum S., Lowe A.C., Taylor E., Chapman A. and Pomfret J. 2014a. Development of detailed ecological guidance to support the application of the Scottish MPA selection guidelines in Scotland's seas. Scottish Natural Heritage Commissioned Report No.491. Coral Gardens – supplementary document

Lancaster J. (Ed.), McCallum S., Lowe A.C., Taylor E., Chapman A. and Pomfret, J. 2014b. Development of detailed ecological guidance to support the application of the Scottish MPA selection guidelines in Scotland's seas. Scottish Natural Heritage Commissioned Report No.491. Northern Feather Star Aggregations on Mixed Substrata – supplementary document.

Lancaster J. (Ed.), McCallum S., Lowe A.C., Taylor E., Chapman A. and Pomfret, J. 2014c. Development of detailed ecological guidance to support the application of the Scottish MPA selection guidelines in Scotland's seas. Scottish Natural Heritage Commissioned Report No.491. Fan Mussel Aggregations – supplementary document.

Lancaster J. (Ed.), McCallum S., Lowe A.C., Taylor E., Chapman A. and Pomfret, J. 2014d. Development of detailed ecological guidance to support the application of the Scottish MPA selection guidelines in Scotland's seas. Scottish Natural Heritage Commissioned Report No.491. Ocean Quahog Aggregations – supplementary document.

Mackinson, S. and Daskalov, G., 2007. An ecosystem model of the North Sea to support an ecosystem approach to fisheries management: description and parameterisation. Sci. Ser. Tech Rep., Cefas Lowestoft, 142: 195 pp.

Mair J.M., Moore C.G., Kingston P.F. and Harries D.B. 2000. A review of the status, ecology and conservation of horse mussel Modiolus modiolus beds in Scotland. Scottish Natural Heritage Commissioned Report F99PA08.

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

Marine Scotland, (no date). Marine Protected Areas in Scotland's Seas: Guidelines on the selection of MPAs and development of the MPA network. Marine Scotland, Scottish Government, Scottish Natural Heritage and JNCC. Available at http://www.gov.scot/Resource/Doc/295194/0114024.pdf.

Marine Scotland, 2013a. Planning Scotland's Seas: Priority marine features background paper. Scottish Government, July 2013.

Marine Scotland, 2013b. Planning Scotland's Seas: National Marine Plan Sustainability Appraisal Report, July 2013.

Marine Scotland, 2015. Scotland's National Marine Plan: A Single Framework for Managing Our Seas. Scottish Government, 2015. Available at http://www.gov.scot/Resource/0047/00475466.pdf.

McBreen F., Askew N., Cameron A., Connor D, Ellwood H and Carter A. 2011. Predictive mapping of seabed habitats in UK waters. JNCC Report No. 446, UK SeaMap 2010

McCully, S. & Walls, R. 2015. Leucoraja fullonica. The IUCN Red List of Threatened Species 2015: e.T161461A48938639. http://dx.doi.org/10.2305/IUCN.UK.2015-1.RLTS.T161461A48938639.en. Downloaded on 20 September 2016.

McLeod M. 2014. Scottish MPA Project: Assessing the potential levels and effect of fisheries displacement as a consequence of

possible management measures for future inshore Marine Protected Areas. Marine Scotland. http://www.gov.scot/Resource/0044/00448930.pdf

MEC, 2016. Marine Stewardship Council (MSC) Reduced Re-Assessment Public Certification Report Scottish Fisheries Sustainable Accreditation Group (SFSAG) North

Sea haddock. https://www.msc.org/track-a-fishery/fisheries-in-the-program/certified/north-east-atlantic/SFSAG-north-sea-haddock-fishery/re-assessment-downloads/20160516_PCR_HAD104.pdf

MEP, 2013. MSC Public Certification Report for the North Sea saithe fishery by the Scottish Fisheries Sustainability Assessment Group (SFSAG). https://www.msc.org/track-a-fishery/fisheries-in-the-program/certified/north-east-atlantic/sfsag-saithe-certified-fishery/assessment-downloads-1/20131002_PCR_SAI298.pdf

Needle, C. L. (2015). Using self-testing to validate the SURBAR survey-based assessment model, Fisheries Research 171: 78–86. DOI: 10.1016/j.fishres.2015.03.001.

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

Norwegian Ministry of the Environment 2013. Integrated Management of the Marine Environment of the North Sea and Skagerrak (Management Plan). Meld. St. 37 (2012–2013) Report to the Storting.

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

Scharbert A., Beeck P., Rochard E., St. Pierre R. and Jatteau P. 2011. The re-introduction of the Allis shad (Alosa alosa) to the Rhine system (LIFE06 NAT/D/000005), Düsseldorf, April 2011.

SMRU, 2015. Scientific advice on matters related to the management of seal populations. Seal Mammal Research Unit, St. Andrews University. http://www.smru.st-andrews.ac.uk/documents/scos/SCOS_2015.pdf

Tyler-Walters, H., James, B. (eds.), Wilding, C., Durkin, O., Lacey, C., Philpott, E., Adams, L., Chaniotis, P.D., Wilkes, P.T.V., Seeley, R., Neilly, M., Dargie, J. and Crawford-Avis, O.T., 2012. Descriptions of Marine Protected Area (MPA) search features. A report produced by MarLIN (Marine Life Information Network), SMRU Ltd., Scottish Natural Heritage and the Joint Nature Conservation Committee, for the Scottish Marine Protected Areas Project.

Wildlife and Countryside Act 1981. http://www.legislation.gov.uk/ukpga/1981/69

Witbaard R. and Bergman M.J.N., 2003. The distribution and population structure of the bivalve *Arctica islandica* L. in the North Sea: what possible factors are involved? Journal of Sea Research 50, 11 – 25

Appendices

Appendix 1 Scoring and Rationales

Appendix 1.1 Performance Indicator Scores and Rationale

Evaluation Table for PI 1.1.1 – Stock status

PI 1.1.1		**The stock is at a level which maintains high productivity and has a low probability of recruitment overfishing**		
Scoring Issue		SG 60	SG 80	SG 100
a	Stock status relative to recruitment impairment			
	Guide post	It is **likely** that the stock is above the point where recruitment would be impaired (PRI).	It is **highly likely** that the stock is above the PRI.	There is a **high degree of certainty** that the stock is above the PRI.
	Met?	Y	Y	N
	Justification	The SSB in 2015 is estimated to lie between 125,031t-182,714t which corresponds to the range of SSB where observed historical recruitment reached its largest values (ICES, 2016a). Mean recruitment in this SSB range is 1.3 billion compared to the long-term mean of 0.76 billion and 0.4 billion for SSB values below 125,000t. As there is no reason to suggest that the magnitude of the SSB at the 2015 level will impair recruitment, SG80 is met. There are a number of studies that suggest current environmental conditions and ecosystem state may result in a higher probability of recruitment being below the historical mean (Beaugrand et al., 2003, O'Brien et al., 2000, Cook and Heath, 2005). This is an environmental effect and not the result of the size of the SSB but it raises doubt as to the level of PRI because historical recruitment performance may not be a reliable guide to performance under the current environmental conditions. Hence there is not a high degree of certainty that the stock is above PRI and SG100 is not met.		
b	Stock status in relation to achievement of MSY			
	Guide post		The stock is at or fluctuating around a level consistent with MSY.	There is a **high degree of certainty** that the stock has been fluctuating around a level consistent with MSY or has been above this level over recent years.
	Met?		N	N
	Justification	At present the stock is increasing from an historical low value. From the ICES (2016a) assessment, the interval estimate for SSB in 2015 [125,031t, 182,714t] encloses MSY $B_{trigger}$ (165,000t). The interval estimate of F in 2015 [0.327, 0.453] encloses the F_{MSY} value (0.33). Hence the stock is at a level consistent with MSY, but there remains a low probability it is still below MSY $B_{trigger}$. SG80 is not met. As the stock has been below MSY $B_{trigger}$ in the preceding decade, the SG100 level is not satisfied.		

References	Beaugrand et al., 2003 Cook and Heath, 2005 O'Brien et al., 2000 ICES, 2016a		
Stock Status relative to Reference Points			
	Type of reference point	**Value of reference point**	**Current stock status relative to reference point**
Reference point used in scoring stock relative to PRI (SIa)	B_{lim}	SSB=118,000 t	151,000/118,000 = 1.23
Reference point used in scoring stock relative to MSY (SIb)	MSY $B_{trigger}$ F_{MSY}	SSB=165,000 F=0.33	151,000/165,000=0.92 0.385/0.33=1.17
OVERALL PERFORMANCE INDICATOR SCORE:			**70**
CONDITION NUMBER (if relevant):			**See 1.1.2**

Evaluation Table for PI 1.1.2 – Stock rebuilding

PI 1.1.2		**Where the stock is reduced, there is evidence of stock rebuilding within a specified timeframe**		
Scoring Issue		SG 60	SG 80	SG 100
a	**Rebuilding timeframes**			
	Guide post	A rebuilding timeframe is specified for the 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 stock.
	Met?	Y		Y
	Justification	The stock has been subject to a recovery plan set out in EU (2008). This aims to reduce F to 0.4 and achieve a minimum SSB of 150,000t. The most recent ICES assessment (ICES, 2016a) indicates that rebuilding targets have been achieved with point estimates of SSB=151,000t and F=0.385. Article 2 of the reformed Regulation on the Common Fisheries Policy states that stocks have to be restored and maintained above biomass levels capable of producing maximum sustainable yield at the latest by 2020.This satisfies SG100.		
b	Rebuilding evaluation			
	Guide post	Monitoring is in place to determine whether the rebuilding strategies are effective in rebuilding the stock within the specified timeframe.	There is evidence that the rebuilding strategies are rebuilding stocks, **or it is likely** based on simulation modelling, exploitation rates or previous performance that they will be able to rebuild the stock within the specified timeframe.	There is **strong** evidence that the rebuilding strategies are rebuilding stocks, **or it is highly likely** based on simulation modelling, exploitation rates or previous performance that they will be able to rebuild the stock within the specified timeframe.
	Met?	Y	Y	Y
	Justification	The most recent ICES assessment indicates that rebuilding targets have been achieved with point estimates of SSB=151,000t and F=0.385. More recently the older B_{pa} value of 150,000t has been revised upward to 165,000t and while the stock has not reached this value with high certainty the current stock trajectory is upward and is projected to reach SSB=173,495 by 2018 assuming F=0.4 (the EU-Norway management plan value). This provides strong evidence, hence SG100 is satisfied.		
References		EU, 2008 ICES, 2016a		
OVERALL PERFORMANCE INDICATOR SCORE:				**100**
CONDITION NUMBER (if relevant):				**N/a**

Evaluation Table for PI 1.2.1 – Harvest strategy

PI 1.2.1		**There is a robust and precautionary harvest strategy in place**		
Scoring Issue		SG 60	SG 80	SG 100
a	Harvest strategy design			
	Guide post	The harvest strategy is **expected** to achieve stock management objectives reflected in PI 1.1.1 SG80.	The harvest strategy is responsive to the state of the stock and the elements of the harvest strategy **work together** towards achieving stock management objectives reflected in PI 1.1.1 SG80.	The harvest strategy is responsive to the state of the stock and is **designed** to achieve stock management objectives reflected in PI 1.1.1 SG80.
	Met?	Y	Y	N
	Justification	The EU–Norway management strategy was updated in December 2008. The EU has adopted a long-term plan with the same aims (EU management plan; EU, 2008). ICES evaluated the EU–Norway management strategy in 2009 and concluded that it was in accordance with the precautionary approach if implemented and enforced adequately. The strategy responds to stock status by reducing fishing mortality in proportion to the size of the SSB when it falls below B_{pa}. The HCR that has been in operation imposes effort reductions that reflects the required reductions in F on the fleets taking the largest proportion of the cod catch. TACs are set in line with the reduction in F so as to be consistent with the desired increase in SSB. In this respect, elements of the harvest strategy are considered to work together and SG80 is met. However, since the adoption of the harvest strategy, reference points have been revised so the current HCR cannot be said to be "designed" to achieve management objectives thus SG100 is not achieved.		
b	Harvest strategy evaluation			
	Guide post	The harvest strategy is **likely** to work based on prior experience or plausible argument.	The harvest strategy may not have been fully **tested** but evidence exists that it is achieving its objectives.	The performance of the harvest strategy has been **fully evaluated** and evidence exists to show that it is achieving its objectives including being clearly able to maintain stocks at target levels.
	Met?	Y	Y	N
	Justification	All recent ICES assessments show a continuing decline in F and increasing SSB since 2006 which suggests the perceived improvement is robust to analytical error and that management measures are effective. The most recent assessment indicates that management targets articulated in the 2008 recovery plan have been achieved. This satisfies SG80. The harvest strategy has not been fully evaluated in the light of changes to reference points which means SG100 is not met. However, in view of the revised maturity schedule for the stock, where fish mature at younger ages, the current strategy is likely to be conservative.		
c	Harvest strategy monitoring			
	Guide post	Monitoring is in place that is expected to determine whether the		

		harvest strategy is working.		
	Met?	Y		
	Justification	Article 25(2) of the revised Common Fisheries Policy (EU, 2013) sets out data collection requirements for fishery management purposes. All coastal states submit landings data and the relevant national scientific institutes submit age composition data for landings and discards. ICES also co-ordinates two annual international trawl surveys that cover the whole stock area. Using these data ICES conducts annual stock assessments that provide a basis for assessing the performance of the harvest strategy. ICES considers the data to be reliable.		
d	Harvest strategy review			
	Guide post			The harvest strategy is periodically reviewed and improved as necessary.
	Met?			Y
	Justification	ICES and STECF evaluated the EU–Norway management strategy for North Sea cod in 2009 and 2011. The latest ICES advice recommends a re-evaluation of the plan in view of revised reference points.		
e	Shark finning			
	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?	Not relevant	Not relevant	Not relevant
	Justification	The target species is not a shark.		
f	**Review of alternative measures**			
	Guide post	There has been a review of the potential effectiveness and practicality of alternative measures to minimise UoA-related mortality of unwanted catch of the target stock.	There is a **regular** review of the potential effectiveness and practicality of alternative measures to minimise UoA-related mortality of unwanted catch of the target stock and they are implemented as appropriate.	There is a **biannual** review of the potential effectiveness and practicality of alternative measures to minimise UoA-related mortality of unwanted catch of the target stock, and they are implemented, as appropriate.
	Met?	Y	Y	N
	Justification	Discarding of cod below the legal minimum landing size or commercial size is the principal cause of unwanted mortality. The effectiveness of technical measures to reduce bycatch is monitored through annual ICES assessments that use discard data to estimate unwanted mortality. For the UoA, ICES (2015a) describes technical measures that form part of the “Conservation Credits Scheme” in Scotland that have been implemented to reduce discards and analysis shows that these are associated with lower discard rates. There is no systematic biennial review and therefore SG80 is met but not SG100.		

References	EU, 2013 ICES, 2009 ICES, 2011 ICES, 2015a
OVERALL PERFORMANCE INDICATOR SCORE:	**85**
CONDITION NUMBER (if relevant):	**N/a**

Evaluation Table for PI 1.2.2 – Harvest control rules and tools

PI 1.2.2		There are well defined and effective harvest control rules (HCRs) in place		
Scoring Issue		SG 60	SG 80	SG 100
a	HCRs design and application			
	Guide post	**Generally understood** HCRs are in place **or available** that are **expected** to reduce the exploitation rate as the point of recruitment impairment (PRI) is approached.	**Well defined** HCRs are **in place** that **ensure** that the exploitation rate is reduced as the PRI is approached, are expected to keep the stock **fluctuating around** a target level consistent with (or above) MSY, or for key LTL species a level consistent with ecosystem needs.	The HCRs are expected to keep the stock **fluctuating at or above** a target level consistent with MSY, or another more appropriate level taking into account the ecological role of the stock, **most** of the time.
	Met?	Y	Y	N
	Justification	The current HCR is defined in EU (2008) and is a well-defined rule. When the biomass falls below B_{pa} the fishing mortality is reduced in proportion to the biomass. The HCR has been evaluated by ICES and is considered to be consistent with the precautionary approach (ICES, 2016a). Recent ICES assessments show recovery to the desired minimum biomass when applying the rule. SG80 is met. In view of the change in reference points the rule needs to be re-evaluated to determine that it is expected to keep the stock at or above MSY and therefore does not meet SG100.		
b	HCRs robustness to uncertainty			
	Guide post		The HCRs are likely to be robust to the main uncertainties.	The HCRs take account of a **wide** range of uncertainties including the ecological role of the stock, and there is **evidence** that the HCRs are robust to the main uncertainties.
	Met?		Y	N
	Justification	HCRs have been evaluated considering uncertainties in the observations, stock assessments and implementation error (ICES, 2009) and are likely to be robust. SG80 is met. The ecological role of the stock is not considered in these evaluations and hence SG100 is not met.		
c	**HCRs evaluation**			
	Guide post	There is **some evidence** that tools used **or available** to implement HCRs 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 HCRs.	**Evidence clearly shows** that the tools in use are effective in achieving the exploitation levels required under the HCRs.
	Met?	Y	Y	Y
	Justifi	The main tools for implementing the HCR are Total Allowable Catches (TACs) and effort control measures. These are set according to		

	cation	ICES advice based on annual assessments. Effort is reduced by limiting the days-at-sea by vessels taking a large proportion of cod. Operationally, Member States have used a variety of tools to ensure their fisheries comply with the HCR. These include decommissioning schemes to reduce effort, selective fishing gears that reduce bycatch of undersized cod and real time closures (RTCs) that close areas of high cod density to fishing. These tools support effort reduction either directly or by discouraging directed fishing for cod. The introduction of the Registration of Buyers and Sellers Scheme in the UK has ensured reported catches reflect the true catch and that they comply with TACs as required by the HCR. Fishing mortality as estimated from ICES assessments (e.g. ICES (2015a) shows continuous decline to the target fishing mortality which shows that together these measures contribute to controlling exploitation.
References		EU (2008) ICES (2009) ICES (2015a) ICES (2016a)
OVERALL PERFORMANCE INDICATOR SCORE:		**85**
CONDITION NUMBER (if relevant):		**N/a**

Evaluation Table for PI 1.2.3 – Information and monitoring

PI 1.2.3		Relevant information is collected to support the harvest strategy		
Scoring Issue		SG 60	SG 80	SG 100
a	Range of information			
	Guide post	**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, UoA 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	ICES conducted a benchmark assessment of North Sea cod in 2015 (ICES, 2015b) which reviews all the information and data relevant to the assessment and management. A considerable body of evidence of stock structure is available and reviewed in the report. Data used in assessments include age compositions for landings and discards that are reported to ICES by métier and this includes the UoA. Two annual surveys are used to provide information on stock distribution and abundance and these also provide information on oceanographic conditions. Data on fishery removals are considered good and improving, especially in relation to discards. The range of information is considered comprehensive. SG100 is met.		
b	Monitoring			
	Guide post	Stock abundance and UoA removals are monitored and at least one indicator is available and monitored with sufficient frequency to support the harvest control rule.	Stock abundance and UoA removals are **regularly monitored at a level of accuracy and coverage consistent with the harvest control rule**, and one or more indicators are available and monitored with sufficient frequency to support the harvest control rule.	**All information** required by the harvest control rule is monitored with high frequency and a high degree of certainty, and there is a good understanding of inherent **uncertainties** in the information [data] and the robustness of assessment and management to this uncertainty.
	Met?	Y	Y	Y
	Justification	The HCR requires a conventional age-based stock assessment using catch and survey data. These data are described in ICES (2105a) and are considered of good quality. Catch data are reported to ICES by quarter and métier. Two annual surveys are used in the assessment and modelling work has demonstrated consistence between the surveys (ICES, 2015a). Uncertainties in the assessment have been investigated at the benchmark assessment (ICES, 2015b) and the uncertainties in the HCR investigated using management procedure methods (ICES, 2011).		
c	Comprehensiveness of information			
	Guide		There is good information on all other	

	post		fishery removals from the stock.	
	Met?		Y	
	Justification	Data on removals are listed in ICES 2015a and cover all nations but with some years of incomplete reporting. Removals include estimates of landings, discards and industrial bycatch(fish for reduction to fishmeal etc). Data coverage has improved in recent years to include more countries reporting discards and age compositions by métier.		
References		ICES (2015a and b) ICES (2011)		
OVERALL PERFORMANCE INDICATOR SCORE:				**100**
CONDITION NUMBER (if relevant):				**N/a**

Evaluation Table for PI 1.2.4 – Assessment of stock status

PI 1.2.4		There is an adequate assessment of the stock status		
Scoring Issue		SG 60	SG 80	SG 100
a	Appropriateness of assessment to stock under consideration			
	Guide post		The assessment is appropriate for the stock and for the harvest control rule.	The assessment takes into account the major features relevant to the biology of the species and the nature of the UoA.
	Met?		Y	Y
	Justification	The HCR uses estimates of current fishing mortality and SSB to calculate changes to TACs and effort controls. The assessment estimates these quantities and is therefore appropriate for the HCR. The assessment takes into account changes to natural mortality resulting from trophic interactions and maturity. The features of the assessment are described in the benchmark assessment (ICES 2015b).		
b	Assessment approach			
	Guide post	The assessment estimates stock status relative to generic reference points appropriate to the species category.	The assessment estimates stock status relative to reference points that are appropriate to the stock and can be estimated.	
	Met?	Y	Y	
	Justification	The assessment estimates stock status relative to the Precautionary Approach (PA) and MSY reference points. The reference points take into account uncertainty. The PA reference points are based on recruitment impairment while the MSY values are conditioned on a stock-recruitment relationship. The bases for the reference points are given in ICES (2015c) and ICES (2016a). The assessment provides the information to calculate the reference points and the status of the stock in relation to these. It is important to note, however, that MSY values will change in response to changing maturity which has shown marked changes over recent years and the assumed stock-recruitment relationship. The latter appears to have changed in the past 20 years and reference points need to be carefully reviewed. SG80 is met.		
c	Uncertainty in the assessment			
	Guide post	The assessment **identifies major sources** of uncertainty.	The assessment takes uncertainty into account.	The assessment takes into account uncertainty and is evaluating stock status relative to reference points in a **probabilistic** way.
	Met?	Y	Y	Y
	Justifi	The assessment uses a state-space age structured model that estimates both measurement and process error (Nielsen and Berg,		

	cation	2014). These errors are taken into account in evaluating status in relation to reference points. The reference points themselves take into account estimation error, process error and structural uncertainty in the stock recruitment relationship (ICES, 2014a).		
d	Evaluation of assessment			
	Guide post			The assessment has been tested and shown to be robust. Alternative hypotheses and assessment approaches have been rigorously explored.
	Met?			Y
	Justification	The assessment method (SAM, Nielsen and Berg 2014) has been extensively tested. It was compared to other assessment methods at the World Conference on Stock Assessment Methods (ICES, 2013) and found to perform well. The assessment is routinely compared to other models including SURBAR (Needle, 2015) and a4a (Jardim et al., 2015) as a test of model uncertainty.		
e	Peer review of assessment			
	Guide post		The assessment of stock status is subject to peer review.	The assessment has been **internally and externally** peer reviewed.
	Met?		Y	Y
	Justification	The assessment is internally peer reviewed by an internal audit within the WGNSSK group itself and by the ICES Advisory Committee (ACOM). It is also reviewed by the EU Scientific, Technical and Economic Committee (STECF). Regular benchmark assessments are carried out in which key assumptions, input data and models used in the assessment are tested and reviewed by working group members and external peer reviewers.		
References	ICES (2013) ICES (2014a) ICES (2015b and c) ICES (2016a) Nielsen and Berg (2014) Jardim et al. (2015)			
OVERALL PERFORMANCE INDICATOR SCORE:				**100**
CONDITION NUMBER (if relevant):				**N/a**

Evaluation Table for PI 2.1.1 – Primary species outcome

<table>
<tr><td colspan="2">PI 2.1.1</td><td colspan="3">The UoA aims to maintain primary species above the PRI and does not hinder recovery of primary species if they are below the PRI.</td></tr>
<tr><td colspan="2">Scoring Issue</td><td>SG 60</td><td>SG 80</td><td>SG 100</td></tr>
<tr><td rowspan="4">a</td><td colspan="4">Main primary species stock status</td></tr>
<tr><td>Guide post</td><td>Main primary species are likely to be above the PRI

OR

If the species is below the PRI, the UoA has measures in place that are expected to ensure that the UoA does not hinder recovery and rebuilding.</td><td>Main primary species are highly likely to be above the PRI

OR

If the species is below the PRI, there is either evidence of recovery or a demonstrably effective strategy in place between all MSC UoAs which categorise this species as main, to ensure that they collectively do not hinder recovery and rebuilding.</td><td>There is a high degree of certainty that main primary species are above the PRI and are fluctuating around a level consistent with MSY.</td></tr>
<tr><td>Met?</td><td>Y – Haddock, whiting, saithe, plaice, hake, Nephrops (Fladen Ground, Moray Firth, Firth of Forth)</td><td>Y – Haddock, whiting, saithe, plaice, hake, Nephrops (Fladen Ground, Moray Firth, Firth of Forth)</td><td>Y – Haddock, saithe, plaice, hake, Nephrops (Fladen Ground, Moray Firth, Firth of Forth)
N – Whiting</td></tr>
<tr><td>Justification</td><td colspan="3">Main primary species by gear are:
<table>
<tr><td>Gear type</td><td>Main primary species</td></tr>
<tr><td>single trawl TR1</td><td>haddock, whiting, saithe, plaice, hake</td></tr>
<tr><td>twin trawl TR1</td><td>haddock, whiting, saithe, plaice, Nephrops, ling</td></tr>
<tr><td>pair trawl TR1</td><td>haddock, whiting, saithe, hake</td></tr>
<tr><td>single trawl TR2</td><td>haddock, whiting, Nephrops</td></tr>
<tr><td>twin trawl TR2</td><td>haddock, whiting, Nephrops</td></tr>
<tr><td>Scottish seine TR1</td><td>haddock, whiting, hake</td></tr>
<tr><td>Danish seine TR1</td><td>haddock, whiting, hake</td></tr>
</table></td></tr>
</table>

Relevant stocks / functional units are:

- haddock: IIIa + IV + VIa
- whiting: IV + VIId
- saithe: IIIa + IV + VI)
- plaice: IIIa + IV
- hake: northern stock
- *Nephrops:* Fladen Ground, Moray Firth, Firth of Forth

The most recent biomass estimate for all these stocks is at (*Nephrops* Fladen Ground) or above (all the other main species) MSY $B_{trigger}$, and hence considered to be 'highly likely' (SG80) to be above the PRI (see Table 7).

A 'level consistent with MSY' (SG100) requires that biomass B be above MSY $B_{trigger}$ (since MSY $B_{trigger}$ is the notional lower bound of estimates of B_{MSY}) and/or F be fluctuating around (or below) F_{MSY}. A high degree of certainty (SG100) requires a probability of 80% or above (if it can be measured quantitatively). Whether these conditions are met is evaluated in the table below for each main primary stock, based on the most recent ICES assessment.

Stock	B > MSY $B_{trigger}$?	Probability (ICES confidence intervals)?	F < F_{MSY}?	Probability (ICES confidence intervals)?	SG100 met?
Haddock	Y	>95%	Y	>95%	Y
Whiting	Y – at or above since 2008	not evaluated	N	-	N
Saithe	Y – since 1996	>95%	Y	>50% but <95%	Y
Plaice	Y – approximately 4X higher	not evaluated but logically >95%	Y but only for one year	not evaluated	Y
Hake	Y – approx. 7X higher	not evaluated but logically >95%	Y	not evaluated	Y
Nephrops Fladen	'Fluctuating around' ref. point since 2012; well above in 2016	-	Y – about one third of F_{MSY} proxy	not evaluated but logically >95% since F<<F_{MSY}	Y
Nephrops Moray	Y (proxy index) since at least 2006	>95%	Y (proxy index) but only for one year	not evaluated	Y

		Nephrops Forth	Y (proxy index) since at least 2006	>95%	'Fluctuating around' since 2012; below in 2015	not evaluated	Y
b	Minor primary species stock status						
	Guide post			For minor species that are below the PRI, there is evidence that the UoA does not hinder the recovery and rebuilding of minor primary species			
	Met?			Y			
	Justification	The only species making up <5% of landings which are classified as 'primary' are megrim and sole (see Table 11). Both these stocks are assessed to have B>MSY $B_{trigger}$ and F at or below F_{MSY}. There is therefore clear evidence (good stock status) that the fishery is not hindering recovery and rebuilding of these stocks.					
References	ICES (2016c-h,k) ICES (2015d,e, l)						

Gear type	**Scoring elements**	**Scores**
single trawl TR1	**haddock, whiting, saithe, plaice, hake, minor species**	**100, 80, 100, 100, 100, 100**
twin trawl TR1	**haddock, whiting, saithe, plaice, Nephrops, minor species**	**100, 80, 100, 100, 100, 100**
pair trawl TR1	**haddock, whiting, saithe, hake, minor species**	**100, 80, 100, 100, 100**
single trawl TR2	**haddock, whiting, Nephrops, minor species**	**100, 80, 100, 100**
twin trawl TR1	**haddock, whiting, Nephrops, minor species**	**100, 80, 100, 100**
Scottish seine	**haddock, whiting, hake, minor species**	**100, 80, 100, 100**
Danish seine	**haddock, whiting, hake, minor species**	**100, 80, 100, 100**
OVERALL PERFORMANCE INDICATOR SCORE:		**95**
CONDITION NUMBER (if relevant):		**N/a**

Evaluation Table for PI 2.1.2 – Primary species management strategy

PI 2.1.2		There is a strategy in place that is designed to maintain or to not hinder rebuilding of primary species, and the UoA regularly reviews and implements measures, as appropriate, to minimise the mortality of unwanted catch.		
Scoring Issue		SG 60	SG 80	SG 100
a	Management strategy in place			
	Guide post	There are **measures** in place for the UoA, if necessary, that are expected to maintain or to not hinder rebuilding of the main primary species at/to levels which are likely to above the point where recruitment would be impaired.	There is a **partial strategy** in place for the UoA, if necessary, that is expected to maintain or to not hinder rebuilding of the main primary species at/to levels which are highly likely to be above the point where recruitment would be impaired.	There is a **strategy** in place for the UoA for managing main and minor primary species.
	Met?	Y	Y	Y
	Justification	All the primary species (main and minor) are managed at EU-Norway level via an agreed scientific approach (the MSY approach in most cases; details in Table 7) incorporating reference points, a TAC and quotas allocated via agreed allocation keys at several levels (EU/Norway, within the EU, within the UK, within Scotland); none have a combined TAC with other species. This clearly constitutes a 'strategy' for managing these species; SG100 is met.		
b	Management strategy evaluation			
	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 measures/partial strategy will work, based on some information directly about the fishery and/or species involved.	**Testing** supports **high confidence** that the partial strategy/strategy will work, based on information directly about the fishery and/or species involved.
	Met?	Y	Y	Y
	Justification	The status of these stocks (see PI 2.1.1) gives high confidence that the strategy is working, based on information about the stocks (stock assessments). SG100 is met.		

c	Management strategy implementation			
	Guide post		There is **some evidence** that the measures/partial strategy is being **implemented successfully**.	There is clear evidence that the partial strategy/strategy is being implemented successfully and is achieving its overall objective as set out in scoring issue (a).
	Met?		Y	Y
	Justification	Using the ICES advice and information on TACs and quotas from the EU, it is possible to evaluate directly whether the strategy is being properly implemented. The only cases where the TAC has been set (slightly) exceeding scientific advice is the case of hake where the biomass has exploded and ICES acknowledge that the basis for their advice requires review. The stock assessments (summarised in ICES' advice) demonstrate that the stock objectives are being attained (i.e. B above MSY $B_{trigger}$) except for the case of Fladen Ground *Nephrops*, where the exploitation rate has declined well below the target level and the biomass is thought to have changed due to a '*complex interplay of factors*' (environmental, ecological and fishery-related) (ICES, 2016b). SG100 is met.		
d	Shark finning			
	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?	Not relevant	Not relevant	Not relevant
	Justification	No primary species are sharks		
e	Review of alternative measures			
	Guide post	There is a review of the potential effectiveness and practicality of alternative measures to minimise UoA-related mortality of unwanted catch of main primary species.	There is a **regular** review of the potential effectiveness and practicality of alternative measures to minimise UoA-related mortality of unwanted catch of main primary species and they are implemented as appropriate.	There is a **biennial** review of the potential effectiveness and practicality of alternative measures to minimise UoA-related mortality of unwanted catch of all primary species, and they are implemented, as appropriate.
	Met?	Y	Y	Y
	Justification	There is unwanted catch of species where there is insufficient quota to cover the total quantity caught, requiring discarding. If quota is insufficient at vessel, PO or national level, then generally this can be rectified via quota swaps – this is done all the time. In the case of hake, however, the quota is largely insufficient because the TAC has not been increasing fast enough to deal with the rapid increase in biomass in the North Sea over the last 8 years (and in any case, the market could probably not absorb larger landings). Hake is in this fishery an example of a 'choke species'. Choke species have been under extensive discussion since the introduction of the landings obligation, which requires this fishery to cease all discarding of quota species by 2019. There is also unwanted catch generated if undersized individuals are taken – these were previously required to be discarded under Regulation 850/1998, but as the landings		

		obligation is phased in are increasingly required to be landed. Scotland has an excellent track record of putting in place management aimed at reducing discards, including real-time closures for juvenile cod, as well as EU real-time closures for juvenile cod, haddock and saithe, the introduction of square-mesh panels and other selectivity improvements in the *Nephrops* fleet and other measures tested and implemented as part of the 'conservation credits' (FMAC) scheme (e.g. CCTV, echosounders and cameras on the net, separator trawls). The Gear Innovation Technical Advisory Group solicits ideas from skippers as part of the Scottish Industry Discards Initiative and the testing of these ideas is supported by 300 days of SFF observers. SeaFish also have a 'discard action group' which acts as a clearing house for research and information and a forum for discussion. This question is also under discussion at EU level at present, because it is clear that key EU regulations aimed at reducing unwanted catch (e.g. 850/1998, the Cod Recovery Plan) are not compatible with the landings obligation and other elements of the reformed CFP. It remains to be seen how this will work out since the EU without fails leaves these decisions to the last minute, but it is clear that more flexibility is required to reduce unwanted landings where discarding is no longer allowed. On this basis, it is clear that the discussion on how to reduce unwanted catch has been ongoing and is particular intensive at present; it is considerably more than 'biennial'. Various measures have been tested and when shown to work, are implemented. SG100 is met.
References		ICES, 2016b ICES advice as for 2.1.1 EU (2016) EU (1998) Information on the Scottish Discard Steering Group and the Scottish Industry Discards Initiative: http://www.gov.scot/Topics/marine/Sea-Fisheries/discards/engagement Seafish discards action group: http://www.seafish.org/responsible-sourcing/conserving-fish-stocks/discards/the-discard-action-group
OVERALL PERFORMANCE INDICATOR SCORE:		**100**
CONDITION NUMBER (if relevant):		**N/a**

Evaluation Table for PI 2.1.3 – Primary species information

PI 2.1.3		Information on the nature and extent of primary species is adequate to determine the risk posed by the UoA and the effectiveness of the strategy to manage primary species		
Scoring Issue		SG 60	SG 80	SG 100
a	Information adequacy for assessment of impact on main species			
	Guide post	Qualitative information is **adequate to estimate** the impact of the UoA on the main primary species with respect to status. OR If RBF is used to score PI 2.1.1 for the UoA: Qualitative information is adeqaute to estimate productivity and susceptibility attributes for main primary species.	Some quantitative information is available and is **adequate to assess** the impact of the UoA on the main primary species with respect to status. OR If RBF is used to score PI 2.1.1 for the UoA: Some quantitative information is adequate to assess productivity and susceptiblity attributes for main primary species.	Quantitative information is available and is **adequate to assess with a high degree of certainty** the impact of the UoA on main primary species with respect to status.
	Met?	Y	Y	Y
	Justification	For all the main primary species, stock status is known with a reasonable degree of certainty (see PI 2.1.1a). In relation to the impact of the UoA, landings are known and since the introduction of 'buyers and sellers' in the early 2000s, Marine Scotland is relatively confident about these figures. Discards are estimated from the vessels with onboard cameras and from observers – figures for the fish species are given in Table 4. For *Nephrops*, discard rates are also estimated based on quarterly sampling by Marine Scotland, and ICES considers that these figures 'represent the fishery adequately' (ICES, 2016g). On this basis, the team concluded that SG100 is met for all main primary species.		
b	Information adequacy for assessment of impact on minor species			
	Guide post			Some quantitative information is adequate to estimate the impact of the UoA on minor primary species with respect to status.
	Met?			Y
	Justification	Minor primary species are megrim and sole. The same applies to these species as to the main species above. SG100 is met.		

c	Information adequacy for management strategy			
	Guide post	Information is adequate to support **measures** to manage **main** primary species.	Information is adequate to support a **partial strategy** to manage **main** Primary species.	Information is adequate to support a **strategy** to manage **all** primary species, and evaluate with a **high degree of certainty** whether the strategy is achieving its objective.
	Met?	Y	Y	Y
	Justification	As described in PI 2.1.2, all primary species are subject to a detailed management strategy, as well as stock assessments which are able to evaluate with a 'high degree of certainty' (*sensu* P2) whether the objective of the strategy (B>MSY $B_{trigger}$) is being achieved.		
References		ICES advice as for 2.1.1		
OVERALL PERFORMANCE INDICATOR SCORE:				**100**
CONDITION NUMBER (if relevant):				**N/a**

Evaluation Table for PI 2.2.1 – Secondary species outcome

<table>
<tr><td colspan="2">PI 2.2.1</td><td colspan="3">The UoA aims to maintain secondary species above a biological based limit and does not hinder recovery of secondary species if they are below a biological based limit.</td></tr>
<tr><td colspan="2">Scoring Issue</td><td>SG 60</td><td>SG 80</td><td>SG 100</td></tr>
<tr><td rowspan="4">a</td><td colspan="4">Main secondary species stock status</td></tr>
<tr><td>Guide post</td><td>Main Secondary species are likely to be within biologically based limits.
OR
If below biologically based limits, there are measures in place expected to ensure that the UoA does not hinder recovery and rebuilding.</td><td>Main secondary species are highly likely to be above biologically based limits
OR
If below biologically based limits, there is either evidence of recovery or a demonstrably effective partial strategy in place such that the UoA does not hinder recovery and rebuilding.
AND
Where catches of a main secondary species outside of biological limits are considerable, there is either evidence of recovery or a, demonstrably effective strategy in place between those MSC UoAs that also have considerable catches of the species, to ensure that they collectively do not hinder recovery and rebuilding.</td><td>There is a high degree of certainty that main secondary species are within biologically based limits.</td></tr>
<tr><td>Met?</td><td>Y</td><td>Y</td><td>N - for all main secondary species</td></tr>
<tr><td>Justification</td><td colspan="3">Main secondary species by gear type are:
<table>
<tr><td>Gear type</td><td>Main secondary species</td></tr>
<tr><td>single trawl TR1</td><td>monkfish</td></tr>
<tr><td>twin trawl TR1</td><td>monkfish, ling, Nephrops (see below)</td></tr>
<tr><td>pair trawl TR1</td><td>none</td></tr>
<tr><td>single trawl TR2</td><td>monkfish, Nephrops, dab</td></tr>
<tr><td>twin trawl TR2</td><td>monkfish, Nephrops, dab</td></tr>
</table></td></tr>
</table>

Scottish seine TR1	none
Danish seine TR1	none

Relevant stocks / functional units are:

- Monkfish: IIIa + IV + VI
- *Nephrops:* Devil's Hole
- Ling: 'other areas' (IIIa, IVa, VI, VII, VIII, IX, XII, XIV)
- Dab: IV and IIIa

For monkfish ICES provide advice based on a Scottish survey index, which has been increasing since 2012. For 2017 they recommend an increase in the TAC of 20% which is the maximum permitted under the agreed framework for data-deficient stocks. On this basis, the team concluded that this stock is highly likely to be above biologically-based limits, in the sense of being above the point of any impairment of recruitment. Since no quantitative limits are defined, however, it is hard to argue for a 'high degree of certainty.

For Devil's Hole *Nephrops*, ICES base their advice on a periodic camera survey of burrow density (annual since 2009, except for 2013). They evaluate likely biomass as 'stable' and 2015 exploitation rate as 'below possible reference points'. ICES advice for 2017 and 2018 was for a harvest rate which would result in a precautionary limit of 20% on the increase in catch from this FU; it results in an exploitation rate of ~5.9%, which is outside the range of MSY proxies estimated for other *Nephrops* FUs (7.5-16%). On this basis, the team considered that the stock is highly likely to be above biologically-based limits, but since surveys show that biomass has declined somewhat since 2009, there is not a 'high degree of certainty'.

For ling, ICES provide advice based on an index derived from Norwegian longline CPUE, which has been increasing since 2002. For 2016/17 they recommend an increase in the TAC of 20% which is the maximum permitted under the agreed framework for data-deficient stocks. On this basis, the team concluded that this stock is highly likely to be above biologically-based limits, in the sense of being above the point of any impairment of recruitment. Since no quantitative limits are defined, however, it is hard to argue for a 'high degree of certainty.

For dab, ICES provide advice based on a survey index, which has been fluctuating without trend for the last few decades; dab is known to be very abundant in the North Sea. For 2016/17 they recommend an increase in the TAC of 20% which is the maximum permitted under the agreed framework for data-deficient stocks. On this basis, the team concluded that this stock is highly likely to be above biologically-based limits, in the sense of being above the point of any impairment of recruitment. Since no quantitative limits are defined, however, it is hard to argue for a 'high degree of certainty.

SG80 is met but SG100 is not met for all four stocks.

b	**Minor secondary species stock status**			
	Guide post			For minor species that are below biologically based limits', there is evidence that the UoA does not hinder the recovery and rebuilding of secondary species
	Met?			N
	Justification	Minor secondary species are listed in Table 11. None of these species have 'biologically-based limits' defined (in terms of reference points) so it is not possible to provide evidence regarding the need for recovery and rebuilding. Not met.		
References		ICES (2015e) ICES (2016g)		

Gear type	**Scoring elements**	**Scores**
single trawl TR1	**Monkfish, minor species**	**80, 80**
twin trawl TR1	**Monkfish, ling, *Nephrops*, minor species**	**80, 80, 80, 80**
pair trawl TR1	**Minor species**	**80**
single trawl TR2	**Monkfish, *Nephrops*, dab, minor species**	**80, 80, 80, 80**
twin trawl TR1	**Monkfish, *Nephrops*, dab, minor species**	**80, 80, 80, 80**
Scottish seine	**Minor species**	**80**
Danish seine	**Minor species**	**80**
OVERALL PERFORMANCE INDICATOR SCORE:		**80**
CONDITION NUMBER (if relevant):		**N/a**

Evaluation Table for PI 2.2.2 – Secondary species management strategy

PI 2.2.2		**There is a strategy in place for managing secondary species that is designed to maintain or to not hinder rebuilding of secondary species and the UoA regularly reviews and implements measures, as appropriate, to minimise the mortality of unwanted catch.**		
Scoring Issue		SG 60	SG 80	SG 100
a	**Management strategy in place**			
	Guide post	There are **measures** in place, if necessary, which are expected to maintain or not hinder rebuilding of main secondary species at/to levels which are highly likely to be within biologically based limits or to ensure that the UoA does not hinder their recovery.	There is a **partial strategy** in place, if necessary, for the UoA that is expected to maintain or not hinder rebuilding of main secondary species at/to levels which are highly likely to be within biologically based limits or to ensure that the UoA does not hinder their recovery.	There is a **strategy** in place for the UoA for managing main and minor secondary species.
	Met?	Y	Y	N
	Justification	In relation to main secondary species there is a strategy is place which appears to be maintaining the stocks above biologically-based limits (see PI 2.2.1a); ICES evaluate likely stock status based on Scottish surveys and provide advice based on an agreed framework (for data-deficient stocks), a TAC is then set based on ICES advice. There are, however, some issues with each of the stocks; for monkfish there are problems of species identification and aging which preclude a formal stock assessment model, for Nephrops the TAC is set for the whole of Subarea IV rather than by FU), for ling ICES advice is for 'other areas' covering a range of fisheries and most likely stocks, and for dab the TAC is combined with flounder; making the strategy 'partial' rather than complete. Since the stock status in good in all cases, and there are precautionary elements built into the partial strategy, SG80 is met but SG100 is not met for the main secondary stocks. For the minor secondary stocks, while there is an overall framework in place as described above, it does not apply in practice to all stocks. Tusk have a precautionary TAC, but flounder, witch, lemon sole, brill and turbot have combined TACs with other species, while grey gurnard, pollack, red mullet and the elasmobranch species have no management. SG100 is not met in full for minor species.		
b	Management strategy evaluation			
	Guide post	The measures are considered **likely** to work, based on plausible argument (e.g. general experience, theory or comparison with similar UoAs/species).	There is **some objective basis for confidence** that the measures/partial strategy will work, based on some information directly about the UoA and/or species involved.	**Testing** supports **high confidence** that the partial strategy/strategy will work, based on information directly about the UoA and/or species involved.
	Met?	Y	Y	N
	Justifi	For the main secondary species, there is an objective basis for confidence that the strategy will work, based on the survey information		

	cation	and its analysis as conducted by ICES and summarised in the advice. For all the stocks, ICES recommend that an increase in the total catch is possible for 2017 based on an increase in survey indices. However, since the analysis is only semi-quantitative (see PI 2.2.1a) it is not possible to say that 'testing supports high confidence' for main secondary stocks. SG80 is met but SG100 is not met for the main stocks. For minor stocks, while tusk has a partial strategy, there is not high confidence that the strategy will work (because there is limited knowledge about the stock; no reference points estimated). For the other minor species (lsee 11) there is not a full partial strategy. SG100 is not met for the minor species.		
c	Management strategy implementation			
	Guide post		There is **some evidence** that the measures/partial strategy is being **implemented successfully**.	There is clear evidence that the partial strategy/strategy is being implemented successfully and is achieving its objective as set out in scoring issue (a).
	Met?		Y	N
	Justification	It is difficult to evaluate whether the ICES advice is being implemented for the main secondary stocks, because the TAC is set over a different spatial area to that over which the ICES advice is provided. As noted in 2.1.2c, there is good confidence in both landings and discard estimates from Marine Scotland, and compliance with quotas. Hence SG80 is met for both main stocks. In relation to SG100 for main stocks, since there is not a clearly-defined objective (see SIa) then it is not met. For minor species, as noted above, only tusk is considered to have a partial strategy, so SG100 is not met in full for minor species.		
d	Shark finning			
	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	EU Regulation 605/2013 forbids shark finning on board EU fishing vessels. None of the elasmobranch species concerned here (see Table 11) have valuable fins in any case.		
e	Review of alternative measures to minimise mortality of unwanted catch			
	Justification	There is a review of the potential effectiveness and practicality of alternative measures to minimise UoA-related mortality of **unwanted** catch of main secondary species.	There is a **regular** review of the potential effectiveness and practicality of alternative measures to minimise UoA-related mortality of **unwanted** catch of main secondary species and they are implemented as appropriate.	There is a **biennial** review of the potential effectiveness and practicality of alternative measures to minimise UoA-related mortality of **unwanted** catch of all secondary species, and they are implemented, as appropriate.

	Met?	Y	Y	Y
	Guide post	See PI 2.1.2, scoring issue e. The review system at Scottish and EU level make no distinction between primary and secondary stocks, *sensu* MSC so the analysis is the same.		
References		ICES (2015e, m, n) ICES (2016g) EU (2016) 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		
OVERALL PERFORMANCE INDICATOR SCORE:				**85**
CONDITION NUMBER (if relevant):				**N/a**

Evaluation Table for PI 2.2.3 – Secondary species information

PI 2.2.3		**Information on the nature and amount of secondary species taken is adequate to determine the risk posed by the UoA and the effectiveness of the strategy to manage secondary species.**		
Scoring Issue		SG 60	SG 80	SG 100
a	Information adequacy for assessment of impacts on main secondary species			
	Guide post	Qualitative information is **adequate to estimate** the impact of the UoA on the main secondary species with respect to status. OR **If RBF is used to score PI 2.2.1 for the UoA:** Qualitative information is adequate to estimate productivity and susceptibility attributes for main secondary species.	Some quantitative information is available and **adequate to assess** the impact of the UoA on main secondary species with respect to status. OR **If RBF is used to score PI 2.2.1 for the UoA:** Some quantitative information is adequate to assess productivity and susceptibility attributes for main secondary species.	Quantitative information is available and **adequate to assess with a high degree of certainty** the impact of the UoA on main secondary species with respect to status.
	Met?	Y	Y	N for all main secondary species
	Justification	The main secondary stocks are assessed via empirical methods (survey or CPUE trends). For monkfish, ling and dab this gives a relative index of abundance, while for Devil's Hole *Nephrops* it is absolute (burrow density). In each case, however, it is sufficient to evaluate stock status and provide management advice based on the pre-agreed framework. Landings and discards are evaluated as for main primary stocks (described in PI 2.1.3a). SG80 is met for main secondary stocks. For none of the stocks, however, is it possible to evaluate stock status with 'a high degree of certainty' (qualitatively evaluated); for monkfish, ling and dab the measure is relative, while for *Nephrops* there has been a decline in burrow density in recent years despite low exploitation rates. SG100 is not met for the main secondary species.		

b	**Information adequacy for assessment of impacts on minor secondary species**			
	Guide post			Some quantitative information is adequate to estimate the impact of the UoA on minor secondary species with respect to status.
	Met?			N
	Justification	For none of the minor secondary species is there sufficient information to estimate stock status in absolute (as opposed to relative) terms. Some of the stocks (tusk, catshark, smoothhound, thornback ray) are increasing in the North Sea according to ICES so the impact of the UoA can be inferred to be small, but others are decreasing (turbot) or the stock status is unknown (the other minor secondary species) – see Table 11. Not met in full for minor species.		
c	Information adequacy for management strategy			
	Guide post	Information is adequate to support **measures** to manage **main** secondary species.	Information is adequate to support a **partial strategy** to manage **main** secondary species.	Information is adequate to support a **strategy** to manage **all** secondary species, and **evaluate** with a **high degree of certainty** whether the strategy is **achieving its objective**.
	Met?	Y	Y	N
	Justification	There is a strategy for the main secondary species identical to that for the primary species (see 2.1.2 and 2.2.2). Although the two main secondary stocks are classified as 'data-deficient', there is enough information from surveys to be able to provide management advice and set TACs. SG80 is met. The strategy applies to some of the minor secondary species (tusk). Some have a combined TAC with another species, which could be described as a 'partial strategy' (flounder/dab, lemon sole/witch, brill/turbot), but the others have no management strategy in place (see Table 11). For shagreen ray, rabbit fish and six-gilled shark, there is no information for the North Sea whatsoever. This is therefore not met in full for minor species. SG100 is not met.		
References	ICES, 2015e ICES, 2016g			

Gear type	**Scoring elements**	**Scores**
single trawl TR1	**Monkfish, minor species**	**80, 80**
twin trawl TR1	**Monkfish, ling, *Nephrops*, minor species**	**80, 80, 80, 80**
pair trawl TR1	**Minor species**	**80**
single trawl TR2	**Monkfish, *Nephrops*, dab, minor species**	**80, 80, 80, 80**
twin trawl TR1	**Monkfish, *Nephrops*, dab, minor species**	**80, 80, 80, 80**

Scottish seine	**Minor species**	**80**
Danish seine	**Minor species**	**80**
OVERALL PERFORMANCE INDICATOR SCORE:		**80**
CONDITION NUMBER (if relevant):		**N/a**

Evaluation Table for PI 2.3.1 – ETP species outcome

PI 2.3.1		The UoA meets national and international requirements for the protection of ETP species The UoA does not hinder recovery of ETP species		
Scoring Issue		SG 60	SG 80	SG 100
a	Effects of the UoA on population/stock within national or international limits, where applicable			
	Guide post	Where national and/or international requirements set limits for ETP species, the effects of the UoA on the population/stock are known and **likely** to be within these limits.	Where national and/or international requirements set limits for ETP species, the **combined effects of the MSC UoAs** on the population/stock are known and **highly likely** to be within these limits.	Where national and/or international requirements set limits for ETP species, there is a **high degree of certainty** that the **combined effects of the MSC UoAs** are within these limits.
	Met?	Y - all	Y - all	N - all
	Justification	The ETP species potentially interacting with this fishery are: • elasmobranchs protected in the North Sea under EU Regulation 2016/72 (starry ray, common skate complex, porbeagle, spurdog – See Table 10) • grey seals protected under the Marine (Scotland) Act • allis shad protected under Schedule 5 of the Wildlife and Countryside Act The regulations state that the species may not be landed (elasmobranchs) or deliberately killed (the other species; except under licence in the case of grey seals; but this has no bearing on the fishery). The team discussed whether this constitutes 'limits' for these species (i.e. limits of zero). Essentially, in this case, the PI is asking whether the fishery is likely to be acting within the requirements of the law as far as these species are concerned. The PET data (Table 10) suggest that interactions with these species are rare (more details given below); training is provided in handling and identification. On this basis, the effects of this fishery were considered to be highly likely to be within the limits of the law. The assessors checked the MSC website for any other North Sea fisheries being assessed under the FCR v2.0. With the exception of the Norway sandeel, pout and north sea sprat fishery (entered assessment December 2016 – no information on ETP species was available at the time of writing), this is the only MSC UoA evaluated under version 2.0. The question of combined effects therefore does not apply. SG80 is met but except for the fully-documented vessels and trips with observers there is not a high degree of certainty, so SG100 is not met in full.		
b	Direct effects			
	Guide post	Known direct effects of the UoA are likely to not **hinder recovery** of ETP species.	Known direct effects of the UoA are **highly likely** to not **hinder recovery** of ETP species.	There is a high degree of confidence that there are no significant detrimental direct effects of the UoA on ETP

				species.
	Met?	Y	Y – porbeagle, spurdog, seal, shad N – starry ray, common skate	Y – porbeagle, seal, shad N – starry ray, common skate, spurdog
	Justification	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. The scheme was considered by the team to be representative of the fishery and that the effects of the fishery are therefore considered to be known. 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 record only one interaction with a porbeagle, released alive. On this basis, the team considered that there is a 'high degree of confidence' that that the fishery is not having significant detrimental effects on porbeagle – 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 102 individuals (100 dead) in 152 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 10), so it is not clear that the requirement to discard promptly has much effect for this species. 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 100 dead individuals came from one tow, all the 2015 interactions came in the period Sept-Dec). The team concluded that since regulatory requirements are being met following ICES advice, direct impacts could be evaluated (qualitatively) as 'unlikely' to hinder recovery (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. 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 152 trips observed in 2014 and 2015, interactions were as follows: *D. intermedia*: 15 alive, 31 dead *D. batis*: 7 alive, 4 dead		

		D. flossada: 2 alive, 3 dead The team considered that the scoring outcome is the same for this species as for starry ray. Spurdog Although the stock is still well below $B_{trigger}$, the harvest rate has dropped to well below the proxy MSY level and ICES considers that there are signs of recovery of the biomass in recent years. Since the overall fishing mortality is apparently at an appropriate level, the fishery is highly unlikely to hinder recovery of this stock. SG80 is met. There is not, however, a high degree of confidence, since the stock biomass is still low and recovery has only just started. SG100 is not met. 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 dataset 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 2015 advice is the same as for 2014: it estimated the total UK population of grey seals at 111,600 animals in 2013; an increase from 2009 (estimated ~99,000). The population has increased around the North Sea in recent years, and is stable elsewhere. New survey data and advice is due to be presented in 2016, but was not yet available at time of writing. 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; SG100 is met. Allis shad The PET data includes one allis shad (dead) for 2015 and none for 2014. IUCN report that the population in France is 'large' and the species is ranked as 'least concern' on the red list. On this basis, the team likewise concluded that there can be a high degree of confidence that this fishery is not having any significant impact on the population, for which the northern North Sea is and has always been at the edge of its range in any case (Scharbert et al., 2011; Freyhof and Kottelat, 2008). SG100 is met. Note: This analysis is harmonised with the SFSAG haddock fishery (MEC, 2016), which uses the same data, except that PET trips from Sept-Dec 2015 have been added here. The new data results in allis shad being added to the list of ETP species here but does not change the outcome in any substantive way.		
c	Indirect effects			
	Guide post		Indirect effects have been considered and are thought to be **highly likely** to not 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 – all	N - all
	Justification	The team considered that indirect effects are unlikely (e.g. ghost fishing, noise disturbance etc.) 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 (2016) Marine (Scotland) Act (2010) Wildlife and Countryside Act 1981 (Schedule 5) ICES, 2016l ICES (2015i, j and k) SMRU (2015) Scharbert et al. (2011) Freyhoff and Kottelat (2008) MEC (2016)

Score porbeagle	**85**
Score starry ray	**75**
Score common skate complex	**75**
Score grey seal	**85**
Score allis shad	**85**
Score spurdog	**80**
OVERALL PERFORMANCE INDICATOR SCORE:	**75**
CONDITION NUMBER (if relevant):	**1**

Evaluation Table for PI 2.3.2 – ETP species management strategy

PI 2.3.2		**The UoA has in place precautionary management strategies designed to:** • **meet national and international requirements;** • **ensure the UoA does not hinder recovery of ETP species.** **Also, the UoA regularly reviews and implements measures, as appropriate, to minimise the mortality of ETP species.**		
Scoring Issue		SG 60	SG 80	SG 100
a	Management strategy in place (national and international requirements)			
	Guide post	There are **measures** in place that minimise the UoA-related 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 UoA'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 UoA'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	N
	Justification	Note: Either Scoring Issue a or b is scored here. This SI need not be scored if <u>there are no</u> requirements for protection or rebuilding provided through national ETP legislation or international agreements. Either this scoring issue is scored or the one below. According to advice from MSC (email from Stephanie Good, 16/9/16), the 'requirements for protection and rebuilding' can be any national or international requirements for protection and rebuilding, such as requirements not to target, safe handling practices, codes of conduct etc.; they are not the same as the 'limits' in 2.3.1 scoring issue a above. On this basis, this scoring issue applies here (and presumably to all ETP species or they would not qualify as 'protected' and hence as ETP.) ICES provide advice on all four elasmobranch species (summarised in 2.3.1 above), which is in summary to avoid catching where possible. The requirements, as set out in EU (2016) are i) not to target, have on board or land; and ii) if brought on board alive to handle following best practice and to discard as soon as possible (or in the case of spurdog, a zero TAC – i.e. do not land). 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 as if additional measures are possible and could be explored, 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. The situation is similar for allis shad, in that it is clear that the fishery is not having any significant impact (see analysis in 2.3.1); there is a strategy in place in general to protect UK populations (monitoring, a ban on recreational and commercial fishing, some work on removing barriers to migration) but nothing specific to this fishery (because it is not required). SG80 is met but SG100 is not.		
b	Management strategy in place (alternative)			
	Guide post	There are **measures** in place that are expected to ensure the UoA does not hinder the recovery of ETP species.	There is a **strategy** in place that is expected to ensure the UoA does not hinder the recovery of ETP species.	There is a **comprehensive strategy** in place for managing ETP species, to ensure the UoA does not hinder the recovery of ETP species
	Met?	Not relevant	Not relevant	Not relevant
	Justification	[Scoring issue need not be scored if there are requirements for protection or rebuilding provided through national ETP legislation or international agreements.] See scoring issue a		
c	Management strategy evaluation			
	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 an **objective basis for confidence** that the measures/strategy will work, based on **information** directly about the fishery and/or the species involved.	The strategy/comprehensive 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, spurdog, grey seal, allis shad N – common skate, starry ray	Y – porbeagle, grey seal, allis shad N – common skate, starry ray, spurdog
	Justification	For porbeagle, grey seal and allis shad, quantitative data (the PET data) give a high degree of confidence that interactions with this fishery are very low. Scientific advice for porbeagle and grey seal (ICES, SMRU) confirm that the population trend is increasing; for allis shad, this fishery is not operating anywhere near the core population areas (see references in 2.3.1). SG100 is met. For spurdog, interactions are more significant, but ICES advice shows that fishing mortality is $<<F_{MSY}$ (proxy), and that biomass is starting to recover. There is therefore an objective basis for confidence that the strategy for spurdog is working. SG80 is met. As noted, above, although there is a 'quantitative analysis' as required for SG100, the biomass needs to make more progress towards the trigger reference point before there is 'high confidence' that it is working – SG100 is not 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.		
d	Management strategy implementation			
	Guide post		There is some **evidence** that the measures/strategy is being implemented successfully.	There is **clear evidence** that the strategy/comprehensive strategy is being implemented successfully and is achieving its objective as set out in scoring issue (a) or (b).
	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, although some identification issues appear to remain (see Table 9 and Table 10); distinguishing the ray species is not always very easy. SG80 is therefore met. For grey seal and allis shad, 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), and for the elasmobranchs, discard mortality is not quantified, although it is assumed to be high.		
e	Review of alternative measures to minimize mortality of ETP species			
	Guide post	There is a review of the potential effectiveness and practicality of alternative measures to minimise UoA-related mortality of ETP species.	There is a **regular** review of the potential effectiveness and practicality of alternative measures to minimise UoA-related mortality of ETP species and they are implemented as appropriate.	There is a **biennial** review of the potential effectiveness and practicality of alternative measures to minimise UoA-related mortality ETP species, and they are implemented, as appropriate.
	Met?	Y	Y	N – grey seals Y – other ETP species
	Justification	The ongoing review and improvement of management in relation to discards is described in detail in the rationale for PI 2.1.2e – this also applies to all the species here except grey seal. For grey seals, the SMRU advice (annual) includes an assessment of seal bycatch in commercial fisheries (mainly in static net fisheries); they have a unit dedicated to monitoring and evaluating bycatch of all marine mammal species in fisheries, as well as from fish farms, turbines etc. This includes a review of, and recommendations on, measures such as pingers to reduce mortality in applicable situations (not this fishery). On this basis, and given that interactions with grey seals are very low according to observer data, the team concluded that this was sufficient for SG80 to be met. Note this scoring has been harmonised with the SFSAG haddock (MEC, 2016) and saithe (MEP, 2013) fisheries.		

References	EU Regulation 2016/72 Marine (Scotland) Act 2010 SMRU, 2015. MEC (2016) MEP (2013) ICES, 2016l

Score porbeagle	**90**
Score starry ray	**75**
Score common skate complex	**75**
Score grey seal	**85**
Score allis shad	**90**
Score spurdog	**85**
OVERALL PERFORMANCE INDICATOR SCORE:	**75**
CONDITION NUMBER (if relevant):	**2**

Evaluation Table for PI 2.3.3 – ETP species information

PI 2.3.3		**Relevant information is collected to support the management of UoA 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	Information adequacy for assessment of impacts			
	Guide post	Qualitative information is **adequate to estimate** the UoA related mortality on ETP species. OR If RBF is used to score PI 2.3.1 for the UoA: Qualitative information is **adequate to estimate productivity and susceptibility** attributes for ETP species.	Some quantitative information is **adequate to assess** the UoA related mortality and impact and to determine whether the UoA may be a threat to protection and recovery of the ETP species. OR If RBF is used to score PI 2.3.1 for the UoA: Some quantitative information is adequate to assess productivity and susceptibility attributes for ETP species.	Quantitative information is available to assess with a high degree of certainty the **magnitude of UoA-related impacts, mortalities and injuries and the consequences for the status** of ETP species.
	Met?	Y	Y – spurdog, porbeagle, grey seal, shad N – common skate, starry ray	N
	Justification	Information about interactions with this fishery comes from the PET scheme, which covered 47 trips in 2014, and 105 trips in 2015 (Table 10). It is not possible to scale these data up to provide accurate 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, spurdog and porbeagle have a quantitative stock assessment, grey seal a periodic survey, starry ray a survey abundance index and the common skate species nothing. For allis shad, the main centre of population is western France where the species is surveyed as it passes river impoundments (fish ladders etc.). Overall, SG60 is met (qualitative estimate of fishery-related mortality from PET data). SG80 is met for spurdog, porbeagle, grey seal and allis shad since the overall status or trend in stock status can be evaluated quantitatively, and mortality rates from the PET trips are low enough to be able to infer with confidence that the impact of the fleet on the population is ~negligible. For common skate, SG60 is notmet because of a lack of population-level data, while for starry ray, SG80 is not met because the impact of the fleet may be non-neglible, and cannot be assessed quantitative, because the PET data cannot be scaled up to fleet level. SG100 is not met for any species, because the PET data cannot be scaled up to the whole fleet.		

b	Information adequacy for management strategy			
	Guide post	Information is adequate to support **measures** to manage the impacts on ETP species.	Information is adequate to measure trends and support a **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 and allis shad, impacts from direct killing and disturbance or from freshwater pollution and barriers to migration, which are more of a concern for these species than fisheries interactions); however, trends can be measured at least qualitatively from the PET data (as well as from other sources of information as described in scoring issue a, except for common skate). 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) it cannot be met.		
References	ICES (2015i, j and k) ICES, 2016l SMRU (2015) Freyhoff and Kottelat (2008)			

Score porbeagle	**80**
Score starry ray	**70**
Score common skate complex	**70**
Score grey seal	**80**
Score allis shad	**80**
Score spurdog	**80**
OVERALL PERFORMANCE INDICATOR SCORE:	**75**
CONDITION NUMBER (if relevant):	**3**

Evaluation Table for PI 2.4.1 – Habitats outcome

PI 2.4.1		**The UoA does not cause serious or irreversible harm to habitat structure and function, considered on the basis of the area(s) covered by the governance body(s) responsible for fisheries management.**		
Scoring Issue		SG 60	SG 80	SG 100
a	Commonly encountered habitat status			
	Guide post	The UoA is **unlikely** to reduce structure and function of the commonly encountered habitats to a point where there would be serious or irreversible harm.	The UoA is **highly unlikely** to reduce structure and function of the commonly encountered habitats to a point where there would be serious or irreversible harm.	There is **evidence** that the UoA is highly unlikely to reduce structure and function of the commonly encountered habitats to a point where there would be serious or irreversible harm.
	Met?	Y	Y	N
	Justification	The fishery takes place in an area which has been trawled consistently for many years, although trawl effort has reduced by ~a quarter in the last two decades; habitat protection needs to be seen in this context. Commonly-encountered habitats in the northern North Sea are sedimentary habitats; mainly sand with extensive patches of silt and mud and some smaller patches of coarse (gravelly) sediment. Burrowed mud, while quite extensive (see Figure 6), is considered under VMEs below. These commonly encountered types of habitat are not particularly vulnerable to disturbance from demersal fishing gear, although some differences may be apparent between trawled and untrawled areas; the team did not consider, however, that this constitutes 'serious or irreversible harm' for these habitat types. SG80 is met. In relation to SG100, while there is extensive research evidence that demersal fishing causes changes to various different habitat types (reviewed in Kaiser et al., 2001), the evidence required here would be something specific to the area / habitat in question; it might become available as management is put in place for the new MPAs (see PI 2.4.2 below) and hence adjacent areas can be compared over a gradient of fishing pressure. For the time being, however, SG100 is not met.		
b	VME habitat status			
	Guide post	The UoA is **unlikely** to reduce structure and function of the VME habitats to a point where there would be serious or irreversible harm.	The UoA is **highly unlikely** to reduce structure and function of the VME habitats to a point where there would be serious or irreversible harm.	There is **evidence** that the UoA is highly unlikely to reduce structure and function of the VME habitats to a point where there would be serious or irreversible harm.
	Met?	Y	Y	N
	Justifi	VMEs potentially overlapping with this fishery are identified as burrowed mud, *Arctica islandica* (ocean quahog) aggregations, deep-		

	cation	sea sponge aggregations, *Modiolus* (horse mussel) beds and offshore mud with bivavles and polychaetes (Table 14). Burrowed mud: Burrowed mud is typical *Nephrops* habitat, of which the largest area overlapping this fishery (see Figure 6) is the Fladen Ground. The key feature of this habitat potentially at risk from demersal fishing is seapens. The most abundant seapen species found in the Fladen Ground are *Pennatula phosphorea* and *Virgulana mirabilis*, both of which can retract as a response to disturbance, but the rare tall seapen (*Funiculina quadrangularis*) also occurs – this species cannot retract so is more vulnerable. It occurs with a brittlestar species which is thought to be an obligate commensual (JNCC, 2014). The central Fladen Ground is designated as a NCMPA (Table 15) but no management measures have been put in place as yet. JNCC rate the area as at 'medium risk' from demersal fishing and oil and gas infrastructure. On the basis that the key area of this VME is designated, management measures are being developed and trawl effort has declined sharply in this area (exploitation rate at ~one third of target levels), the team considered that further serious or irreversible harm is not likely for this VME – SG80 is met. SG100 is not met for the reasons given for scoring issue a. *Arctica islandica*: Ocean quahogs live just below the sediment surface with just their syphons protruding. Lancaster et al. (2014d) rate the likely recovery from sediment disturbance / smothering as moderate (since they can survive a period of anoxia and can change their depth within the sediment) but the likely recovery from removal from the sediment as low (due to shell damage or predation), so the type of impact of a given fishing gear on the sediment is crucial. They mention beam trawls and dredges specifically, but neither of these gear types is relevant in this fishery. Likewise, the management options papers (see Table 16) suggest restricting scallop and hydraulic dredging to protect *Arctica* aggregations. Witbaard and Bergman (2003) note the likely impact of beam trawling on *Arctica* populations in the southern North Sea, but show that the Fladen population is (or was in 2000 – the most recent data available) much more healthy, with higher biomass and evidence of periodic successful recruitment; the species dominates the biomass in some areas. On this basis, it is not thought likely that the gear used in this fishery (single- or twin otter trawls in this area) is likely to result in wholesale removal of clams from the sediment, particularly since improvements in design have reduced the pressure of trawl doors of a given size on the sediment (with the main aim of reducing fuel consumption). It is worth noting, however, that since the species is long-lived and recruitment is sporadic, a population will take a long time to recover from a mortality event. Three NCMPAs in the North Sea have *Arctica* aggregations as a designated feature (East of Gannet and Montrose fields, the Faroe-Shetland Sponge Belt and the Norwegian Boundary Sediment Plains; Table 15). As for the Central Fladen Ground, management is still under discussion. The team concluded that for the same reasons as for burrowed mud above, SG80 is met and SG100 is not met. Sponge aggregations: The fishery potentially overlaps with sponge aggregations in the Faroe-Shetland sponge belt (FSS), which has been designated as a NCMPA for this reason. A comparison of Figure 1 (landings by ICES rectangle) with Figure 7 (location of NCMPAs including FSS) suggests there is some fishing in this general location. According to Tyler-Walters et al. (2012), however, the sponges occur from 250-1300m, which is largely outside the depth range of this fishery (down to ~200m although it may go a little deeper occasionally). On this basis, it seems that any overlap of this fishery with this habitat is likely to be limited. Furthermore, it is known that sponges are damaging to catch and gear, and fishermen avoid areas known to have high densities of sponges as far as possible. On this basis, SG80 is met, but lacking more than circumstantial evidence, SG100 is not met. *Modiolus* beds: The main areas of concern for *Modiolus* in relation to this fishery are the beds in NE Caithness and the beds in the inner Moray Firth. The Moray Firth beds are in a SAC, which SNH considers gives them sufficient protection; the bed in NE Caithness

		is in a fishery area but is protected by some restrictions on towed gear, according to SNH. Otherwise, the habitat is widespread in bays and voes in Orkney and Shetland, where it is not likely to overlap with this fishery. On this basis SG80 is met but SG100 is not met. Deep-sea mud with bivales and polychaetes: This would be a 'commonly-encountered' habitat for much of northwest and west Scotland, but only overlaps with this fishery on the margins in the far north-west of the fishing area. Although the habitat is described as 'deep-sea', they really mean 'offshore'; and it can occur within the depth range of this fishery. Since the description of the habitat covers a range of biotopes it is a bit hard to evaluate the likely impact of trawling, but since the main fauna mentioned in the habitat description is infaunal, and since the overlap with the fishery is marginal, the team concluded that SG80 is met.	
c	**Minor habitat status**			
	Guide post			There is **evidence** that the UoA is highly unlikely to reduce structure and function of the minor habitats to a point where there would be serious or irreversible harm.
	Met?			N/a
	Justification	No minor habitats have been identified.		
References		JNCC (2014) ICES (2016g) Kaiser et al. (2001) Lancaster et al. (2014d) Tyler-Walters et al. (2012) Witbaard and Bergman (2003)		
OVERALL PERFORMANCE INDICATOR SCORE:				**80**
CONDITION NUMBER (if relevant):				**N/a**

Evaluation Table for PI 2.4.2 – Habitats management strategy

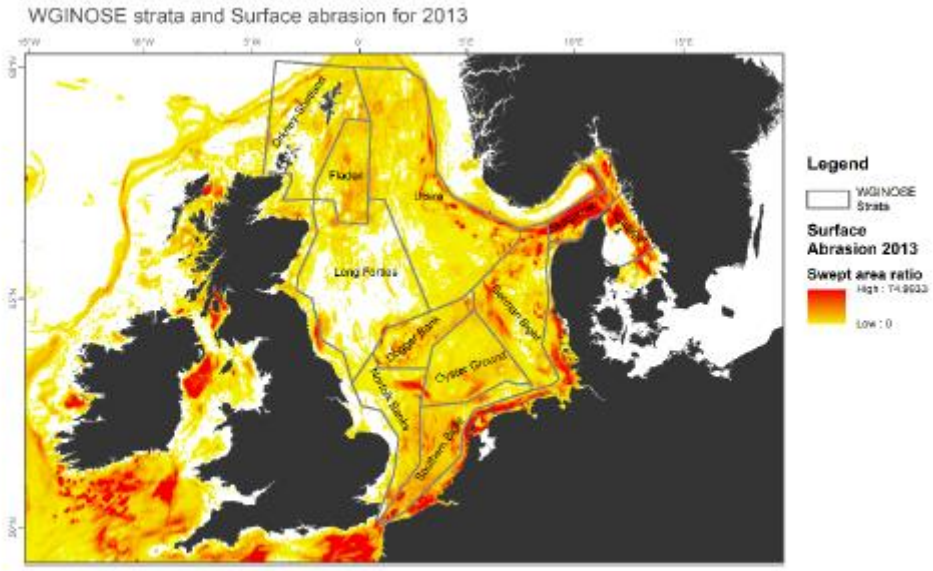
PI 2.4.2		There is a strategy in place that is designed to ensure the UoA does not pose a risk of serious or irreversible harm to the habitats.		
Scoring Issue		SG 60	SG 80	SG 100
a	Management strategy in place			
	Guide post	There are **measures** in place, if necessary, that are expected to achieve 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 all MSC UoAs/non-MSC fisheries on habitats.
	Met?	Y	Y	N
	Justification	The team considered that the process of designating 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 'partial strategy' for managing the impact of the fishery on habitats which applies to the core area of the fishery (i.e. Scottish waters); partial because it is not yet fully implemented. The fishery also takes place in Norwegian waters of the northern North Sea. Norway has relatively extensive closed areas for cold-water corals, and has set a target to protect 10% of coastal and marine areas by 2020 (see integrated plan for the Barents Sea, 2011); it is not known as yet, however, whether this will include areas used by the fishery in the North Sea. On this basis, the strategy is designated a 'partial' strategy, hence SG80 is met but SG100 is not met.		
b	Management strategy evaluation			
	Guide post	The measures are **considered likely** to work, based on plausible argument (e.g. general experience, theory or comparison with similar UoAs/habitats).	There is some **objective basis for confidence** that the measures/partial strategy will work, based on **information directly about the UoA and/or habitats** involved.	**Testing** supports **high confidence** that the partial strategy/strategy will work, based on **information directly about the UoA 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 complete. Further, there is an objective 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	Management strategy implementation			
	Guide post		There is **some quantitative evidence** that the measures/partial strategy is being implemented successfully.	There is **clear quantitative evidence** that the partial strategy/strategy is being implemented successfully and is achieving its objective, as outlined in scoring issue (a).
	Met?		Y	N
	Justification	It is clear that the partial 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. Until management is finalised and implemented, it will not be possible to evaluate whether the partial strategy is achieving its objectives, so SG100 is not met.		
d	**Compliance with management requirements and other MSC UoAs'/non-MSC fisheries' measures to protect VMEs**			
	Guide post	There is **qualitative evidence** that the UoA complies with its management requirements to protect VMEs.	There is **some quantitative evidence** that the UoA complies with both its management requirements and with protection measures afforded to VMEs by other MSC UoAs/non-MSC fisheries, where relevant.	There is **clear quantitative evidence** that the UoA complies with both its management requirements and with protection measures afforded to VMEs by other MSC UoAs/non-MSC fisheries, where relevant.
	Met?	Y	Y	N
	Justification	The management requirements are not yet in place; there is thus nothing formal for the UoA to comply with as yet. Other SFSAG fisheries are certified (saithe, haddock) but these are essentially the same mixed fishery, hence there are no additional requirements coming from this source. Likewise, other MSC-certified fisheries operate in the same area under the same regulatory framework; there are no additional requirements in place for these fleets which are not in place for the Scottish fleet. Looking at compliance more widely, there are areas outside the North Sea which are closed to fishing for habitat protection (e.g. Darwin mounds), as well as areas of the North Sea which are closed for other reasons (e.g. high densities of juvenile cod), whether temporarily or quasi-permanently. These closures are well-enforced by VMS ('quantitative evidence') and widely respected by this fleet and others. There is thus no reason to suppose that closures or other management measures put in place under the NCMPA system would not be complied with. Hence the team considered that SG80 should be met. Since the analysis is somewhat hypothetical at present, however, the team concluded that SG100 may not be met.		
References	Marine Scotland (2013a) Marine Scotland (2015) Marine Scotland (no date) Norwegian Ministry of the Environment (2013) For information on NCMPAs: http://jncc.defra.gov.uk/page-5269; follow links for each site to find site description, designation order,			

	management options paper and business impact assessment
OVERALL PERFORMANCE INDICATOR SCORE:	**80**
CONDITION NUMBER (if relevant):	**N/a**

Evaluation Table for PI 2.4.3 – Habitats information

PI 2.4.3		**Information is adequate to determine the risk posed to the habitat by the UoA and the effectiveness of the strategy to manage impacts on the habitat.**		
Scoring Issue		SG 60	SG 80	SG 100
a	Information quality			
	Guide post	The types and distribution of the main habitats are **broadly understood**. OR If CSA is used to score PI 2.4.1 for the UoA: Qualitative information is adequate to estimate the types and distribution of the main habitats.	The nature, distribution and **vulnerability** of the main habitats in the UoA area are known at a level of detail relevant to the scale and intensity of the UoA. OR If CSA is used to score PI 2.4.1 for the UoA: Some quantitative information is available and is adequate to estimate the types and distribution of the main habitats.	The distribution of all habitats is known over their range, with particular attention to the occurrence of vulnerable habitats.
	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	Information adequacy for assessment of impacts			
	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. OR **If CSA is used to score PI 2.4.1 for the UoA:**	Information is adequate to allow for identification of the main impacts of the UoA on the main habitats, and there is reliable information on the spatial extent of interaction and on the timing and location of use of the fishing gear. OR **If CSA is used to score PI 2.4.1 for the**	The physical impacts of the gear on all habitats have been quantified fully.

		Qualitative information is adequate to estimate the consequence and spatial attributes of the main habitats.	**UoA:** Some quantitative information is available and is adequate to estimate the consequence and spatial attributes of the main habitats.	
	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). ICES WGINOSE have used VMS and logbook information to map surface and subsurface abrasion of sediments by fishing gear (see figure below for surface abrasion; the figure for sub-surface abrasion looks similar in spatial extent but less strong. It is not clear from the report how the distinction is made, but presumably it is based on type and size of fishing gear.)  Figure 5.2a. WGINOSE strata and surface abrasion map (ICES, 2015). Figure. Surface abrasion map developed by ICES WGINOSE (ICES, 2016i).		

		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, (even if it were possible to quantify gear impacts on habitats 'fully') so SG100 is not met.		
c	Monitoring			
	Guide post		Adequate information continues to be collected to detect any increase in risk to the main habitats.	Changes in habitat distributions over time are measured.
	Met?		Y	N
	Justification	The footprint of the fishery is continually monitored, because Marine Scotland use VMS data to allocate landings and discards by ICES rectangle on a routine basis (as per Figure 1), as well as for compliance purposes. The mapping of VMS data on to habitats may not be done routinely, but has been done periodically, for example, in relation to MPA planning – see for example the Fishery Displacement Study which is being used to inform management decision-making for the inshore MPAs (McLeod, 2014). 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 maps on an ongoing basis, so SG100 is not met in full.		
References	Scotttish Marine Habitat Atlas: http://www.gov.scot/resource/doc/345830/0115129.pdf McBreen et al. (2011) Marine Scotland (2015) MAREANO: http://www.mareano.no/kart/mareano_en.html?language=en Kaiser et al. (2001) ICES (2016i) McLeod, 2014			
OVERALL PERFORMANCE INDICATOR SCORE:				**80**
CONDITION NUMBER (if relevant):				**N/a**

Evaluation Table for PI 2.5.1 – Ecosystem outcome

PI 2.5.1		The UoA 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	Ecosystem status			
	Guide post	The UoA 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 UoA 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 UoA 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	This fishery is a mixed fishery, with the species taken in largest quantities being haddock (~30% of the total catch). Cod and the 'main' primary and secondary species together make up ~95% of the catch. The cod stock has of course recovered from low levels due to management measures (see Principle 1), and this has presumably had a variety of knock-on effects on the North Sea ecosystem. The other stocks are in good shape (see PIs 2.1.1 and 2.2.1 above). There is a management strategy in place for all these stocks, which seems to be working (see Principle 1 and 2.1.2). Discard rates are lower than they have been for many years. The gear will have an impact on the benthic ecosystem, but a system of protected areas is in place and being expanded (see 2.4.1 and 2.4.2). The evidence suggests that the North Sea ecosystem is mainly influenced by climate-driven bottom-up forces rather than predator-driven top-down forces (e.g. Beaugrand, 2004; Alheit et al., 2005; Beaugrand and Ibanez, 2004). Through the running of an Ecopath model with Ecosim, Mackinson and Daskalov (2007) suggest that the removal of cod or haddock from the North Sea ecosystem through fishing mortality would result in a reduction in predation on prey species, but unlikely to cause a trophic cascade that would impact other elements in the North Sea ecosystem; indeed, this is an experiment that has been tried, and impacts do not appear to be irreversible. The ICES working group WGINOSE (2014, 2016) evaluated the status of the North Sea ecosystem via PCA using as input >100 state or pressure variables. For the 2014 analysis of the northern North Sea, PC1 accounted for 29% of the variability, and including the following key variables: decreasing cod landings, decreasing otter trawl effort, increasing hake biomass, increasing herring biomass and increasing *Calanus heligolandicus* (see Figure below). The updated analysis in 2016 divided the North Sea into smaller areas (Orkney-Shetland, Fladen, Utsira and Long Forties are most relevant here); this analysis gives a similar overall pattern but a much more explicit indication that environmental change is significant (1984-2013), with a strong signal of increasing temperature at Orkney-Shetland and Fladen and a strong signal of increasing nutrients at Utsira and Long Forties. In other words, the ecosystem has been changing over the last 30 years, with trends driven by changes in fish stocks (decline and then recovery), fishing effort (reduction) and environmental change. Overall, the team concluded that while the ecosystem in the North Sea is certainly changing, this is being driven by very large-scale drivers such as overall fishing pressure and climate change, within which any impacts of this fishery are lost. Furthermore, fishery-related impacts have tended to reverse direction over the last few decades, as overall demersal fishing pressure has been reduced and		

		trends in associated stocks have started to reverse from decline towards recovery (see Principle 1 in relation to cod). On this basis, the team considered that the fishery is 'highly unlikely' to disrupt this ecosystem – SG80 is met. In relation to SG100, there is some evidence available in the form of studies such as those cited above and others, as well as the output of ecosystem models as noted above. 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.) The team considered that SG100 is partially met, and gave an overall score of 90.

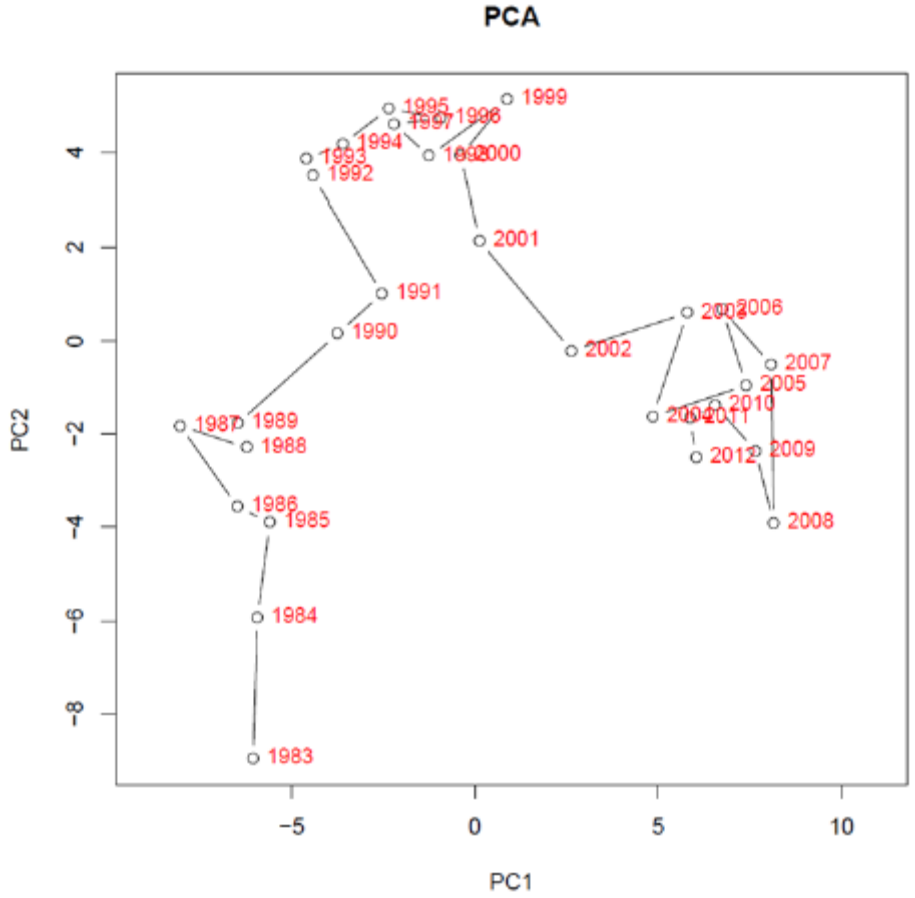


Figure: Trajectory of the PC1 and PC2 for a principle component analysis of the northern North Sea ecosystem (ICES, 2014d).

References

Beaugrand (2004)
Beaugrand and Ibanez (2004)
Alheit et al. (2005)
Mackinson and Daskalov (2007)

	Clark and Frid (2011) ICES (2014d) ICES (2016i)
OVERALL PERFORMANCE INDICATOR SCORE:	**90**
CONDITION NUMBER (if relevant):	**N/a**

Evaluation Table for PI 2.5.2 – Ecosystem management strategy

PI 2.5.2		There are measures in place to ensure the UoA does not pose a risk of serious or irreversible harm to ecosystem structure and function.		
Scoring Issue		SG 60	SG 80	SG 100
a	Management strategy in place			
	Guide post	There are **measures** in place, if necessary which take into account the **potential impacts** of the fishery on key elements of the ecosystem.	There is a **partial strategy** in place, if necessary, which takes into account **available information and is expected to restrain impacts** of the UoA on the ecosystem so as to achieve the Ecosystem Outcome 80 level of performance.	There is a **strategy** that consists of a **plan**, in place which contains measures to **address all main impacts of the UoA** on the ecosystem, and at least some of these measures are in place.
	Met?	Y	Y	Y
	Justification	Scotland has a National Marine Plan which has been developed as part of Scotland's response to the EU's Marine Strategy Framework Directive. The MSFD 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, with the overarching goal of achieving '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 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 For the Norwegian waters of the North Sea and Skaggerak, an integrated ecosystem management plan was adopted by the Norwegian government in 2013. The plan evaluates the status of the ecosystem, the main activities, the cumulative impact of these activities on different components of the ecosystem and sets goals for different parts of the ecosystem, as well as measures and monitoring indicators designed to achieve those goals – in other words, the framework and timetable is similar to that set for the EU by the MSFD. Overall, the team considered that the MSFD in itself constitutes an overarching strategy, as implemented by Scotland's National Marine Plan, while for Norway, there is a strategy that consists of a plan along similar lines. SG100 is met.		

b	Management strategy evaluation			
	Guide post	The **measures** are considered likely to work, based on plausible argument (e.g., general experience, theory or comparison with similar fisheries/ ecosystems).	There is **some objective basis for confidence** that the measures/partial strategy will work, based on some information directly about the UoA and/or the ecosystem involved	**Testing** supports **high confidence** that the partial strategy/strategy will work, based on information directly about the UoA and/or ecosystem involved
	Met?	Y	Y	N
	Justification	The Scottish 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 landings obligation • 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 for Scottish waters. The Norwegian Plan for the North Sea / Skaggerak includes the following (relevant) policy objectives for biodiversity and ecosystems and fisheries: • achieve good environmental status, particular vulnerable and/or valuable areas; • protection of habitats and species will ensure i) their continued role in the ecosystem; ii) the maintenance or recovery of threatened and protected species; iii) establishment of a network of representative MPAs; • an ecosystem approach to harvesting of marine organisms, such that ecosystem structure and function is maintained and undesirable bycatch minimised.		

		• avoid the introduction / spread of non-native species • manage fisheries such that they provide high sustainable long-term yield Measures to deliver these in relation to fisheries include (only those relevant here are given): • continue to develop ecosystem-based management • ensure that depleted stocks (e.g. cod) are rebuilt • encourage R&D on selectivity of fishing gear • reinforce at-sea and on-land enforcement • continue system of area closures for juveniles • continue elasmobranch surveys • participate in international efforts to ensure overall sustainability of North Sea fisheries and strengthen cooperation with the EU, particularly on the discard ban, selectivity and long-term management plans 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 habitat maps and the evaluation of cumulative impacts from different sources. 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 team noted that the plan is more detailed and specific than the Scottish plan, and concluded that SG100 could be met for the Norwegian North Sea. However, since SG100 is not met for Scottish waters, the overall score is 80.		
c	**Management strategy implementation**			
	Guide post		There is **some evidence** that the measures/partial strategy is being **implemented successfully**.	There is clear evidence that the partial strategy/strategy is being implemented successfully and is achieving its objective as set out in scoring issue (a).
	Met?	Y	Y	N
	Justification	The measures being put in place via both the Scottish and Norwegian plans boil down to 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. 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 Scottish 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. Cook and Heath, 2005; Mackinson and Daskalov, 2007; ICES WGINOSE (2014d and 2016i)) 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). This gives confidence that the measures are likely to work, based on information about the ecosystem. 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, protection of ETP species etc. – the implementation of these measures is discussed in the other P2 PIs above. On this basis, SG80 is met for all UoAs. In relation to SG100, since the Scottish National Marine Plan, the Norwegian North Sea-Skaggerak Plan and the MSFD are all relatively new, not all the measures required under these plans are yet in place, hence SG100 is not met in full, although it is partially met.
References		Marine Scotland (2015) Marine Scotland (2013b) Norwegian Ministry of the Environment (2013) EU (2008a) EU (2010) Cook and Heath (2005) Mackinson and Daskalov (2007)
OVERALL PERFORMANCE INDICATOR SCORE:		**85**
CONDITION NUMBER (if relevant):		**N/a**

Evaluation Table for PI 2.5.3 – Ecosystem information

PI 2.5.3		There is adequate knowledge of the impacts of the UoA on the ecosystem.		
Scoring Issue		SG 60	SG 80	SG 100
a	Information quality			
	Guide post	Information is adequate to **identify** the key elements of the ecosystem.	Information is adequate to **broadly understand** the key elements of the ecosystem.	
	Met?	Y	Y	
	Justification	This fishery is information-rich in all areas, with information including stock assessments for most species, including all the main primary and secondary species (see 2.1.1 and 2.2.1), ecosystem evaluations and models (e.g. ICES WGINOSE and WGECO; see also references for 2.5.1), evaluations of interactions between stocks and fisheries (e.g. ICES mixed fisheries advice for the North Sea), mapping of benthos (see 2.4.1 and 2.4.3) and ongoing work under the ecosystem management plans and the MSFD as discussed in 2.5.1 and 2.5.2. The key elements of the ecosystem are broadly understood.		
b	Investigation of UoA impacts			
	Guide post	Main impacts of the UoA on these key ecosystem elements can be inferred from existing information, but **have not been investigated** in detail.	Main impacts of the UoA on these key ecosystem elements can be inferred from existing information, and **some have been investigated in detail**.	Main interactions between the UoA and these ecosystem elements can be inferred from existing information, and **have been investigated in detail**.
	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. This considers the effect of the fishery on the key relevant stocks (haddock, cod, saithe, whiting, plaice, sole and *Nephrops*) in the North Sea (ICES, 2016j). 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. 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 (e.g. see Figure in 2.4.3b). ETP species interactions have also been investigated. Ecosystem models (as referenced in 2.5.1 and 2.5.2) have 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	Understanding of component functions			
	Guide		The main functions of the	The impacts of the UoA on P1 target species,

	post		components (i.e., P1 target species, primary, secondary and ETP species and Habitats) in the ecosystem are **known**.	primary, secondary and ETP species and Habitats 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 function of each of these components in the North Sea ecosystem is well known, and have been the subject of various kinds of modelling to further elucidate the importance of each component and interactions between these. SG100 is met.		
d	Information relevance			
	Guide post		Adequate information is available on the impacts of the UoA on these components to allow some of the main consequences for the ecosystem to be inferred.	Adequate information is available on the impacts of the UoA on the components **and elements** to allow the main consequences for the ecosystem to be inferred.
	Met?		Y	Y
	Justification	In general, as set out above, there is a great deal of information available about all aspects of the ecosystem and the fishery, allowing the main consequences for the fishery on the ecosystem to be inferred as done in the rationale for PI 2.5.1. SG100 is met.		
e	Monitoring			
	Guide post		Adequate data continue to be collected to detect any increase in risk level.	Information is adequate to support the development of strategies to manage ecosystem impacts.
	Met?		Y	Y
	Justification	Sufficient data continue to be collected on the fishery (landings, effort, VMS) to detect changes in risk, meeting SG80. Strategies are in place to manage ecosystem impacts (see 2.5.2). SG100 is met.		
References		ICES (2016j) Other references provided in PI 2.5.1.		
OVERALL PERFORMANCE INDICATOR SCORE:				**100**
CONDITION NUMBER (if relevant):				**N/a**

Evaluation Table for PI 3.1.1 – Legal and/or customary framework

PI 3.1.1		**The management system exists within an appropriate legal and/or customary framework which ensures that it:** • **Is capable of delivering sustainability in the UoA(s); 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	Compatibility of laws or standards with effective management			
	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 fishery is managed at three levels: the international, EU and national levels. Cod is among the six North Sea stocks that are defined as jointly managed by Norway and the EU, based on the framework agreement between the two parties on fisheries cooperation from 1980 (in force 1981). The agreement provides the legal basis for the setting of TACs for joint stocks, transfers of fishing possibilities, joint technical measures and issues related to control and enforcement. The TACs for the jointly managed North Sea stocks are agreed in annual negotiations between the EU and Norway and split according to fixed distribution formulas, which for cod is 83 % to the EU and 17 % to Norway. The EU quota is then divided among member states according to the principle of relative stability, which implies that the UK gets 47 % of EU's North Sea cod quota. In turn, the major part of the UK quota is given to the Scottish fishing industry. The Production Organizations (POs) manage quota distribution at the regional level. The fishery is managed within the context of EU's Common Fisheries Policy (CFP), whose provisions are transposed into the Scottish legal system in the form of Scottish Statutory Instruments. CFP applies to all fishing activities in EU waters, including the exclusive economic zone (EEZ), and to the activities of EU vessels outside EU's marine jurisdiction. The main legal bases for fisheries management in Scottish territorial waters, as well as management of activities by Scottish registered fishing vessels outside Scottish territorial waters, are the 2013 Aquaculture and Fisheries (Scotland) Act and the 2010 Marine Act, with supplementary legislation at lower levels (secondary or subordinate legislation, such as specific requirements to fishing operations and gear). The regional distribution of responsibilities within UK fisheries management is fixed in an agreement between the Fisheries Administrations of England (Defra – the Department for Environment, Food & Rural Affairs), Northern Ireland (the Department of Agriculture and Rural Development (Northern Ireland)), Scotland (Marine Scotland) and Wales (the Welsh Government) from 2012. Marine Scotland is the implementing body under the Scottish Government, responsible for all components of fisheries management,		

		from science to management and enforcement. In accordance with the Marine Act, its full special jurisdiction is limited to Scottish territorial waters, but it is also conferred the authority to enforce Scottish fisheries legislation in the EEZ and flag-state responsibilities towards Scottish registered fishing vessels outside EU waters. Marine Scotland works closely with the Producer Organisations (POs; see PI 3.1.2 b below), which are delegated responsibility for managing fish quotas on behalf of their members. At a UK level, Marine Scotland works with a number of other bodies of governance, such as Defra and the Marine Management Organisation (MMO). MMO is a Non-Departmental Public Body (NDPB) under Defra, which delivers legal, monitoring and enforcement functions. At EU and national level, there are effective and binding procedures in place to deliver management outcomes consistent with MSC Principles 1 and 2. At the international level, the 1980 cooperation agreement between Norway and the EU is binding, but it is not very specific; e.g it does not define which stocks are to be jointly managed or how quotas should be divided. In turn, the bilateral cooperation regime for the North Sea fish stocks works effectively, but management decisions made in the annual negotiations between Norway and the EU, including on quota distribution, are not binding. Therefore SG100 is not met.		
b	Resolution of disputes			
	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 UoA.	The management system incorporates or is 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	At the national level, there is an effective, transparent dispute resolution mechanism in place, as fishers can take their case to court if they do not accept the rationale behind an infringement accusation by enforcement authorities or the fees levied against them. Verdicts at the lower court levels can be appealed to higher levels. In practice, the vast majority of disputes are resolved within the management system, which incorporates ample formal and informal opportunities for fishers and other stakeholders to interact with the authorities (see PI 3.1.2 below), e.g. to clear out disagreement and conflict among users and between users and authorities. At the international level, a state can institute proceedings against another state through mechanisms such as the International Court of Justice (ICJ) and the International Tribunal for the Law of the Sea (ITLOS), or bring a dispute before the Permanent Court of Arbitration (PCA). At the regional level, the North-East Atlantic Fisheries Commission (NEAFC) in 2004 adopted a recommendation for compulsory dispute settlement. None of these mechanisms have so far been widely used as means for solving fisheries disputes, but ICJ has over many decades had a number of cases regarding fisheries jurisdiction, and ITLOS has in recent years had cases on the prompt release of detained fishing vessels and the use of provisional measures. PCA was called upon in 2013 to solve certain aspects of the dispute between the EU and Faroe Islands regarding the coastal state management regime of Atlanto-Scandian herring. (The case was terminated a year later as agreement between the parties was reached.) There are no explicit mechanisms for the resolution of disputes in the EU–Norway regime for the North Sea fisheries, but – as is mostly the case also at the national levels – disagreement is sorted out through dialogue, negotiation and compromise. Furthermore, the above goes to show that there are mechanisms in place within the Law of the Sea, and international law more widely, that the parties can invoke in cases of serious disagreement. However,		

		these mechanisms have not yet been tested and proven to be effective in cases most likely to arise in the context of the fishery under assessment, e.g. disputes on quota allocation or the technical regulation of fisheries. Therefore SG100 is not met.		
c	Respect for rights			
	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	At all levels of the management sysem, fish resources are distributed based on some level of historical usage and attention to the social context within which the fishery takes place. At the bilateral level, the TAC is divided between the EU and Norway based on historical fishing, which is explicitly prescribed by the bilateral framework agreement (Annex 1, which in Art. 1 is defined as an integral part of the agreement), and at least to some extent this also reflects the social and economic importance of the fishery for each country. The parties have also legally obliged themselves to give each others' vessels reciprocal access rights in their respective economic zones (Art. 1), and generally seek a mutually satisfactory balance in their fishing relations (Art. 2 b), Art. 3). At the regional level, the NEAFC Convention states as its objective to ensure the long-term conservation and optimum utilization of the fishery resources in the Convention Area, providing sustainable economic, environmental and social benefits (Art. 2). At EU level, member states are obliged, according to the 2013 CFP, to include social and economic dimensions in their criteria for allocation of quota rights, among them the contribution to the local economy and historic catch levels (Art. 17). Protection of the interests of coastal communities dependent on fisheries is also one of the rationales for the principle of relative stability in fishing rights between the member states (Recital (35)). Among the objectives of the CFP is to foster job creation and economic development in coastal areas (Recital (12)) and to contribute to a fair standard of living for those who depend on fishing activities, bearing in mind coastal fisheries and socio-economic aspects (Art. 2 f)). Marine biological resources in the outermost parts of the Union shall be secured special protection due their importance to the local economy, and certain types of fishing activities shall be limited to fishing vessels registered in the ports of those territories (Recital (21)). Hence, mechanisms to formally commit to the rights of people dependent on fishing for food and livelihood are in place in the management system, and SG100 is met.		
References	A Subject Specific Concordat between The Department for Environment, Food and Rural Affairs, Marine Scotland, The Welsh Government and The Department of Agriculture and Rural Development (Northern Ireland) ("The Administrations") On Management Arrangements for Fishing Opportunities and Fishing Vessel Licensing In the United Kingdom, 2 May 2012. Agreed Record of Fisheries Consultations between Norway and the European Union for 2016, 4 December 2015 and 16 December 2015. Agreement on Fisheries between the European Economic Community and the Kingdom of Norway, signed 27 February 1980, in force 16 June 1981.			

	Aquaculture and Fisheries (Scotland) Act, 2013. Convention on Future Multilateral Cooperation in North-East Atlantic Fisheries, 2006. EU (2016) Interview with the fishery client during site visit. Marine (Scotland) Act (2010). NEAFC Dispute Resolution Mechanism, Annex K – Amendment of the Convention on Dispute Settlement, 2004. Regulation (EU) No. 1380/2013 of the European Parliament and of the Council 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. Wakefield, J., Reforming the Common Fisheries Policy, Cheltenham: Edward Elgar, 2016. Website of Marine Scotland (http://www.gov.scot/Topics/marine).
OVERALL PERFORMANCE INDICATOR SCORE:	**85**
CONDITION NUMBER (if relevant):	**N/a**

Evaluation Table for PI 3.1.2 – Consultation, roles and responsibilities

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	Roles and responsibilities			
	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 functions, roles and responsibilities of all actors in the Scottish system for fisheries management are explicitly defined in the Aquaculture and Fisheries Act, the Marine Act and supporting legislation – all read in the context of relevant EU legislation – and are, according to our interviews during site visit, well understood for all areas of responsibility and interaction. They are also exemplarily described on Marine Scotland's website. As laid out under PI 3.1.1 a) above, governance functions are mainly performed by Marine Scotland, which is a directorate under the Scottish Government. Different user groups are well integrated in the management process; see PI 3.1.2 b). Also at the international level, the roles and responsibilities of the two coastal states are explicitly defined and well understood for all areas of responsibility and action. There is no evidence to the contrary in the team's interviews during site visits or other documentation provided by stakeholders. SG100 is met.		
b	Consultation processes			
	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	Scottish fisheries management includes a sophisticated system for stakeholder consultation. The main mechanisms are i) public meetings (regional fishing industry assemblies, quayside conversations and fishing sector focus groups); ii) advisory and working groups (the Inshore Fisheries Groups, the Inshore Fisheries Management and Conservation Group (IFMAC), the Fisheries Management and Conservation Group (FMAC) and the Scottish Discard Steering Group); and iii) *ad hoc* events, such as conferences. FMAC was set up by the Cabinet Secretary (effectively: Minister) for Rural Affairs and the Environment in 2011, as part of a broader political and management effort to implement the cod recovery plan, and increase fishermen – and Scottish – influence in the forthcoming reform of the CFP. It is chaired by Marine Scotland and includes representatives from the fishing industry representative bodies, fish producer organizations, environmental organizations and Marine Scotland Policy and Science. FMAC makes recommendations to Marine Scotland – and, on request, to the Cabinet Secretary for Rural Affairs and the Environment – on matters connected to the development of fisheries legislation and policies, the allocation of fishing opportunities, management mechanisms and objectives for and strategies towards international negotiations. FMAC meets 3-4 times per year, and agendas and minutes from the meetings are available for download on Marine Scotland's website. Marine Scotland aims to circulate documents for discussion no less than four weeks in advance of meetings so as to allow time for the constituent organizations to consult with their members. Decisions are sought made through consensus, but objections are recorded in the minutes, on request. Marine Scotland also seeks the opinion of stakeholders on running regulatory issues through occasional consultations papers posted on their website. Another important interface between the industry and authorities is the POs. The POs are membership organizations for industry actors whose role, according to EU legislation, is to market the products of their members and implement measures that promote the concentration of supply and stabilize prices. POs are also allocated the vast majority of UK quotas by Fisheries Administrations and are responsible for managing these quotas on behalf of their members. There are currently 10 Scottish POs recognized by Marine Scotland, among them the Scottish Fishermen's Organisation (SFO). Other stakeholder organizations include Seafood Scotland, which was set up in 1999 to increase the value of return to the Scottish seafood sector, and the Scottish White Fish Producers Association (SWFPA), the largest fishing association in Scotland, which protects and promotes its members' interests across a range of national and international political arenas. SWFPA, in turn, is part of the Scottish Fishermen's Federation (SFF), which works to promote the collective interests of Scotland's ten geographically and sectorally defined fishermen's associations. The Federation plays an active role in advancing the interests of Scottish fishermen at national and international levels by lobbying government officials in Edinburgh, London and Brussels. It also plays a key role in helping to inform fisheries science, management of the marine environment; inshore fisheries management, marine spatial planning, marine safety regulations and industry recruitment and training programmes. An example of a more *ad hoc* based interface between different industry actors and authorities is the Gear Innovation and Technology Advisory Group (GITAG), which is hosted by SFF with Marine Scotland participation, established in 2015 to foster flexible working partnerships between fishermen, industry and public bodies, gear technologists and science in the implementation of the landing obligation in 2019. The situation is similar at the international level, where user groups participate in the bilateral negotiations with Norway and meetings in NEAFC and the North Sea Advisory Council (NSAC); in the two latter, NGOs are also allowed to participate as observers. The Advisory Councils are the main consultation mechanism through which industry engages with management authorities at EU level. They include European industry and NGO representatives ensuring local knowledge is considered within the management system. They actively develop policy advice to the European Commission and are considered as part of the EU's management system. NSAC currently has 24

		member organizations: 15 national fishing associations (including SSF and SFO) and 9 NGOs. Representatives of the client fishery consulted during the site visit report that they concentrate their lobbying activities towards Marine Scotland, Defra and the European Commission. In addition to direct lobbying, of both a formal and an informal nature, they consider FMAC as their most important channel for influence at the national level and NSAC at the international level. They report consultation processes to be inclusive and transparent, with management authorities displaying consideration of the information obtained from stakeholders and explaining how it is used or not used. Such explanations are provided throughout all platforms available for interaction, in both oral and written form. Hence, SG100 is met.		
c	Participation			
	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	As follows from 3.1.2 b), the consultation processes provide ample opportunity for all interested and affected parties to be involved in discussions about fisheries management in Scotland. Authorities invite relevant stakeholders to meetings and seminars and actively seek their opinion on management measures, in direct meetings and in writing. The level of active encouragement and practical facilitation is considered appropriate to the scope and context of the fishery. SG100 is met.		
References		Agreed Record of Fisheries Consultations between Norway and the European Union for 2016, 4 December 2015 and 16 December 2015. Aquaculture and Fisheries (Scotland) Act, 2013. Convention on Future Multilateral Cooperation in North-East Atlantic Fisheries, 2006. Fisheries Management and Conservation (FMAC) Group Remit, FMAC/11/02, 2012. FMAC, agendas and minutes from meetings 2013–2015, available at http://www.gov.scot/Topics/marine/Sea-Fisheries/engagement/FMAC/Meetings. Interview with the fishery client during site visit. Marine (Scotland) Act 2010. REGULATION (EU) No 1379/2013 OF THE EUROPEAN PARLIAMENT AND OF THE COUNCIL of 11 December 2013 on the common organisation of the markets in fishery and aquaculture products, amending Council Regulations (EC) No 1184/2006 and (EC) No 1224/2009 and repealing Council Regulation (EC) No 104/2000. Report on Marine Scotland's Programme of Regional Fishing Industry Assemblies in 2014, Marine Scotland, 2015. Websites of FMAC (http://www.gov.scot/Topics/marine/Sea-Fisheries/engagement/FMAC), GITAG (http://www.gov.scot/Topics/marine/Sea-Fisheries/discards/GITAG), Marine Scotland (http://www.gov.scot/Topics/marine), NSAG		

	(http://www.nsrac.org), Producer Organisations (http://www.gov.scot/Topics/marine/Sea-Fisheries/management/17681/producerinterbranch), SFF (http://www.scottishfishermen.co.uk), SFO (http://www.sff.co.uk) and SWFPA (http://www.swfpa.com) .
OVERALL PERFORMANCE INDICATOR SCORE:	**100**
CONDITION NUMBER (if relevant):	**N/a**

Evaluation Table for PI 3.1.3 – Long term objectives

PI 3.1.3		**The management policy has clear long-term objectives to guide decision-making that are consistent with MSC fisheries standard, and incorporates the precautionary approach.**		
Scoring Issue		SG 60	SG 80	SG 100
a	Objectives			
	Guide post	Long-term objectives to guide decision-making, consistent with the MSC fisheries standard and the precautionary approach, are **implicit** within management policy.	Clear long-term objectives that guide decision-making, consistent with MSC fisheries standard and the precautionary approach are **explicit** within management policy.	Clear long-term objectives that guide decision-making, consistent with MSC fisheries standard and the precautionary approach, are **explicit** within **and required by** management policy.
	Met?	Y	Y	Y
	Justification	The current CFP regulation requires that member states, in accordance with international treaties such as the 1982 Law of the Sea Convention, the 1993 FAO Compliance Agreement and the 1995 Fish Stocks Agreement, apply the precautionary approach to fisheries management, and aim to ensure that exploitation of living marine biological resources restores and maintains populations of harvested species above levels which can produce the maximum sustainable yield (Recital (6), Art. 2). It is specifically mentioned that when targets relating to the maximum sustainable yield cannot be determined, multiannual (management) plans shall provide for measures based on the precautionary approach, ensuring at least a comparable level of protection for the relevant fish stocks (Art. 9). The maximum sustainable yield exploitation rate shall be achieved by 2015 where possible and, on a progressive, incremental basis at the latest by 2020 for all stocks (Art. 2). Since these objectives are both explicit and required by management policy, SG100 is met.		
References		Recovery and Long Term Management Plan for Cod, Annex 1 to the Agreed Record of Fisheries Consultations between Norway and the European Union for 2016, 4 December 2015 and 16 December 2015. Regulation (EU) No. 1380/2013 of the European Parliament and of the Council 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.		
OVERALL PERFORMANCE INDICATOR SCORE:				**100**
CONDITION NUMBER (if relevant):				**N/a**

Evaluation Table for PI 3.2.1 Fishery-specific objectives

PI 3.2.1		**The fishery-specific management system 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	Objectives			
	Guide post	**Objectives**, which are broadly consistent with achieving the outcomes expressed by MSC's Principles 1 and 2, are **implicit** within the fishery-specific 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-specific 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-specific management system.
	Met?	Y	Y	P
	Justification	Well defined and measurable short and long-term objectives consistent with achieving the outcomes of MSC Principle 1 are explicit in the management plan for this fishery, such as reference points for stock biomass and fishing mortality, as well as specific timelines for for the achievement of precautionary reference points. 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 P2-related objectives have been quantified. SG100 is only partially met.		
References		Recovery and Long Term Management Plan for Cod, Annex 1 to the Agreed Record of Fisheries Consultations between Norway and the European Union for 2016, 4 December 2015 and 16 December 2015. 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):				**N/a**

Evaluation Table for PI 3.2.2 – Decision-making processes

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.		
Scoring Issue		SG 60	SG 80	SG 100
a	Decision-making processes			
	Guide post	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	Established decision-making procedures in EU and the Scottish national fisheries management system – evolved over several decades and now codified in the 2013 CFP, the Scottish Marine and Fisheries Acts, as well as supporting legislation – ensure that strategies are produced and measures taken to achieve the fishery-specific objectives. This applies to the North Sea cod fisheries as it does to EU and Scottish fisheries in general; see PIs 3.1.1 and 3.1.2 above. Measures include, among other things, the establishment of TACs on the basis of scientific advice, regulation of access to the fishery and technical requirements such as gear restrictions; cf. P1 and P2 above. SG80 is met.		
b	Responsiveness of decision-making processes			
	Guide post	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	According to our interviews during the site visit, as well as ample documentation on Marine Scotland's website, the established decision-making procedures at national level in Scotland respond to all issues identified in research, monitoring, evaluation or by groups with an interest in the fishery. This is ensured through the formal and informal arenas for regular and *ad hoc* consultations between governmental agencies and the industry; cf. PI 3.1.2 above. In addition, there is close contact between authorities and scientific research institutions. User-group representatives claim that the relevant government agencies are open to any kind of input at any time, which is corroborated by information available at Marine Scotland's comprehensive website. Authorities' response to stakeholder input is transparent and timely and the ensuing policy options take adequate account of their advice. SG100 is met.		

c	Use of precautionary approach			
	Guide post		Decision-making processes use the precautionary approach and are based on best available information.	
	Met?		Y	
	Justification	Decision-making processes are based on relevant scientific research by the Marine Scotland Science, as well as ICES assessments and STECF input. EU and national legislation require the use of the precautionary approach (see 3.1.3), and the management plan for North Sea cod has been reviewed by ICES and found to be consistent with the precautionary principle (although it requires updating in light of the revised reference points – see Principle 1). SG80 is met.		
d	Accountability and transparency of management system and decision-making process			
	Guide post	Some information on the fishery's performance and management action is generally available on request to stakeholders.	**Information on the fishery's 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 the fishery's 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	As follows from PI 3.1.2 above, there are a number of arenas in the Scottish system for fisheries management where the industry and other stakeholders can provide their input to the management process, ranging from formalized platforms such as FMAC to direct consultations like quayside conversations and more informal, direct communication. Marine Scotland's website offers an impressive amount of written response from authorities to stakeholder input, such as minutes from meetings and response to public hearings (e.g. from consultation with stakeholders ahead of the introduction of electronic logbooks in 2008). The information on the official website is supplemented by a blog, where information is disseminated in an even more accessible manner. Furthermore, management performance is reported formally, in annual reports from scientific, regulatory and enforcement authorities, as well as in a range of reviews of the management system, all publicly available and duly distributed (cf. PI 3.2.4 below). This written documentation alone confirms that formal reporting by authorities is in place and in a satisfactory manner explains findings and relevant recommendations emerging from research, monitoring, evaluation and review activity. No indication to the contrary has been provided during interviews at the site visit and other stakeholder input. SG100 is met.		
e	Approach to disputes			
	Guide post	Although the management authority or fishery may be subject to continuing court	The management system or fishery is attempting to comply in a timely fashion	The management system or fishery acts proactively to avoid legal disputes or

		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.	with judicial decisions arising from any legal challenges.	rapidly implements judicial decisions arising from legal challenges.
	Met?	Y	Y	Y
	Justification	The national management authority is not subject to continuing court challenges. When occasionally taken to court by fishing companies, the management authority complies with the judicial decision in a timely manner. The management authority works proactively to avoid legal disputes through the tight cooperation with user groups at the regulatory level, ensuring as high legitimacy as possible for regulations and other management decisions, as well as guidance at fisherman level in order to prevent infringements; cf. PI 3.2.3 below. Only the most serious cases go to prosecution by the police and possible transfer to the court system. SG100 is met.		
References		Agreed Record of Fisheries Consultations between Norway and the European Union for 2016, 4 December 2015 and 16 December 2015. Aquaculture and Fisheries (Scotland) Act, 2013. Consultation on the Implementation of Detailed Rules on Electronic Recording and Reporting of Fishing Activities and on Means of Remote Sensing in Scotland, Scottish Government Marine Directorate, 2008. COUNCIL REGULATION (EU) 2016/72 of 22 January 2016 fixing for 2016 the fishing opportunities for certain fish stocks and groups of fish stocks, applicable in Union waters and, for Union fishing vessels, in certain non-Union waters, and amending Regulation (EU) 2015/104. Interview with the fishery client during site visit. Marine (Scotland) Act 2010. Regulation (EU) No. 1380/2013 of the European Parliament and of the Council 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. Website of Marine Scotland (http://www.gov.scot/Topics/marine).		
OVERALL PERFORMANCE INDICATOR SCORE:				**100**
CONDITION NUMBER (if relevant):				**N/a**

Evaluation Table for PI 3.2.3 – Compliance and enforcement

PI 3.2.3		Monitoring, control and surveillance mechanisms ensure the management measures in the fishery are enforced and complied with.		
Scoring Issue		SG 60	SG 80	SG 100
a	MCS implementation			
	Guide post	Monitoring, control and surveillance **mechanisms** exist, and are implemented in the fishery and there is a reasonable expectation that they are effective.	A monitoring, control and surveillance **system** has been implemented in the fishery 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 and has demonstrated a consistent ability to enforce relevant management measures, strategies and/or rules.
	Met?	Y	Y	Y
	Justification	Monitoring, control and surveillance (MCS) in the fishery is taken care of by Marine Scotland Compliance, in collaboration with enforcement authorities at UK and EU level (including the European Fisheries Control Agency) and exchange of information with relevant authorities in other states, including the Norwegian Directorate of Fisheries. All these agencies operate on the basis of a risk-based framework, identifying where enforcement resources can be best put to use at any time in order to optimize compliance. The EU system for fisheries control is laid out in the Control Regulation, which entered into force on 1 January 2010. The Regulation applies to all activities covered by the CFP carried out on the territory of member states or in EU waters, and by EU fishing vessels or nationals of a member state (Art. 2). It requires all member states to adopt appropriate measures, allocate adequate financial, human and technical resources and set up all administrative and technical structures necessary for ensuring control, inspection and enforcement of activities under the CFP (Art. 5). The Regulation contains Titles ('sections' above chapter level) on, among other things, access to waters and resouces (Title III), control of fisheries (Title IV), control of marketing (Title V), surveillance (Title VI), inspections and proceedings (Title VII), enforcement (Title VIII) and common control programmes (Title IX). Among the substantial requirements are that member states operate a vessel monitoring system (VMS) and an automatic identification system (AIS), to be generally applied by vessels above 12 and 15 meters, respectively (Art. 9, 10), and that they make the use of fishing logbooks mandatory for all vessels above 10 meters (Art. 14) and electronic logbook for all vessels above 12 meters (Art. 15). The Regulation also introduces an obligation of member states to employ real-time closure of fisheries (Art. 51-54). Further, member states are obliged to carry out monitoring of fishing activities by inspection vessels or surveillance aircraft (Art. 71) and physical inspections of fishing vessels (Art. 74-77); in addition to national inspectors, a pool of Community inspectors shall also be set up (Art. 79). Procedures are established for situations where infringements are detected (Art. 82-88), including enhanced follow-up when infringements are serious, such as misrecording of catches of more than 500 kg or 10 % of what is reported in the logbook (Art. 84). Further, provisions are given for proceedings (Art. 85-88) and sanctions (Art. 90-93) (see PI 3.2.3 b) below). Marine Scotland Compliance carries out the UK's EU responsibilities for fisheries monitoring, control and surveillance in Scotland. It has 19 offices across the country and operates three surveillance vessels and two aircraft. In accordance with EU legislation, it takes care of		

		information gathering through VMS (through the Marine Monitoring Centre) and electronic logbooks, and carries out all other obligations conferred upon Scotland, according the detailed reporting and control requirements in EU legislation to prevent, deter and eliminate illegal, unreported and unregulated fishing (IUU fishing). A Registration of Buyers and Sellers (RBS) Scheme has been fully operational in Scotland since 2005 and requires all buyers and sellers of first sale fish to be registered, and all auction sites of first sale fish and shellfish to be designated. All relevant regulations and information on enforcement actitities are available on Marine Scotland's website. A smaller part of the client fishery takes place in the Norwegian EEZ, where MCS is a shared responsibility between the Directorate of Fisheries, the Coast Guard and regional sales organizations. The Directorate of Fisheries keeps track of how much fish is taken of the quotas of different vessels, vessel groups or other states at any given time, based on reports from the fishing fleet. Fishing vessels are required to have VMS and electronic logbooks, and real-time data are forwarded to the Directorate of Fisheries. The self-reported catch data can be checked at sales operations through the sales organizations, which have monopoly on first-hand sale of fish in Norway, and through physical checks performed by the sales organizations and the Directorate of Fisheries in port, and by the Coast Guard at sea. Hence, the fishery has a comprehensive and transparent system for monitoring, control and surveillance, and there are a number of possibilities for enforcement authorities to physically check whether the data provided by fishers through self-reporting are indeed correct. In addition, VMS data enables control of whether area restrictions are observed. SG100 is met.		
b	Sanctions			
	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
	Justification	In accordance with the EU Control Regulation, member States are required to ensure that appropriate measures are systematically taken when violations of fishing regulations are detected, including administrative action or criminal proceedings, in order to provide effective deterrence (Art. 89). For serious infringements, a point system is to be applied (Art. 92), whereby fishermen are given a specified number of points for different kinds of violations. When a specific number of points is reached, the fishing licence shall be automatically suspended for a period of at least two months, increasing with repeated violations. In addition to the point system, a graduated system of penalties is used at national level in Scotland, ranging from oral advice to advisory letter, official written warning, various forms of statutory notices (such as revocation and suspension notices), financial administrative penalties (up to £10,000), other material enforcement measures (such as seizure and disposal of fish) and formal prosecution. Fixed penalty levels for different types of offences are publicly available; e.g. the lowest level of infringements leads to a penalty of £250 for a first-time offence and £500 the second time, while the case is referred to prosecution if the violation is repeated a second time. The comprehensive enforcement system (see PI 3.2.3 a)) combined with the high level of compliance (see PI 3.2.3 c)) makes it reasonable to assume that the system provides effective deterrence. SG100 is met.		
c	Compliance			
	Guide	Fishers are **generally thought** to comply with the management system for	**Some evidence exists** to demonstrate fishers comply with the management system under	There is a **high degree of confidence** that fishers comply with the

	post	the fishery under assessment, including, when required, providing information of importance to the effective management of the fishery.	assessment, including, when required, providing information of importance to the effective management of the fishery.	management system under assessment, including, providing information of importance to the effective management of the fishery.
	Met?	Y	Y	Y
	Justification	According to Marine Scotland Compliance, the level of compliance is high in the fishery under assessment. In correspondence with the assessment team, they report that there were no enforcement issues with Scottish and UK administered fishing vessels during 2015 and early 2016 concerning North Sea cod specifically. They have given priority to the fishing areas where catches have been highest, and last-haul analysis inspections have regularly been carried out. The observance of the Scottish Cod Real Time Closure scheme has remained consistently good throughout the period, and closures are particularly respected by Scottish registered vessels. All prosecuted cases for the last decade are listed on the website of Marine Scotland Compliance. An average of eight cases have been prosecuted each year for the entire Scottish fisheries sector. The total number of inspections in 2016 was 4,588, so the share of inspections resulting in prosecution is miniscule. Few infringements are of a serious nature. The five cases prosecuted in 2015 were related to the failure to comply with e-log requirements (fined £2,000), failure to submit sales notes (fined £350), retention of skate after a closure (admonished), retention of ling after a closure (fined £4,000) and retention of mackerel after a closure (fined £3,000). As follows from PI 3.2.3 a) and b) above, the fishery has in place a comprehensive system for monitoring, control and surveillance, including physical checks of fishing operations, catch and gear, as well as a fine-meshed sanctioning system. In addition to these coercive compliance mechanism, varioius forms of norm-, legitimacy- and communication-related mechanisms have proved effective to deliver compliance in other fisheries. In the fishery under assessment, there might be a degree of social control in the relatively small Scottish fishing communities, and the high level of user-group involvement (see PI 3.1.2 above) may provide regulations with a degree of legitimacy that increases fishermen's inclination to comply with them. The same applies to the relationship between fishermen and enforcement officers, which is reported to be good. Inspectors are trained to approach the fishermen in as forthcoming a manner as possible – starting from the position that they are in compliance with regulations – and interfering with the fishing activities as little as possible (see codes of conduct and strategies referenced below). Importantly, they perceive themselves as having a guidance-providing and not only a policing role towards the fishing fleet.		
d	Systematic non-compliance			
	Guide post		There is no evidence of systematic non-compliance.	
	Met?		Y	
	Justification	According to Marine Scotland Compliance and the Norwegian Directorate of Fisheries, there is no evidence of systematic non-compliance in the fishery. The assessment team has not come across other information indicating that this is not the case. SG80 is met.		
References		Code of conduct: Fishing Vessel Inspections at Sea, Marine Management Organisation and Royal Navy. Code of conduct: Fishing Vessel Inspections in Harbour, Marine Management Organisation and Royal Navy.		

	COMMISSION REGULATION (EC) No 1010/2009 of 22 October 2009 laying down detailed rules for the implementation of Council Regulation (EC) No 1005/2008 establishing a Community system to prevent, deter and eliminate illegal, unreported and unregulated fishing. COUNCIL REGULATION (EC) No 1224/2009 of 20 November 2009 establishing a Community control system for ensuring compliance with the rules of the common fisheries policy, amending Regulations (EC) No 847/96, (EC) No 2371/2002, (EC) No 811/2004, (EC) No 768/2005, (EC) No 2115/2005, (EC) No 2166/2005, (EC) No 388/2006, (EC) No 509/2007, (EC) No 676/2007, (EC) No 1098/2007, (EC) No 1300/2008, (EC) No 1342/2008 and repealing Regulations (EEC) No 2847/93, (EC) No 1627/94 and (EC) No 1966/2006. Email correspondence with Marine Scotland Compliance and the Norwegian Directorate of Fisheries. Financial Administrative Penalties for Fisheries Offences, Marine Management Organisation. Hønneland, G., Making Fishery Agreements Work, Cheltenham: Edward Elgar, 2013. Marine Management Organisation Compliance and Enforcement Strategy. REGULATIONS COMMISSION IMPLEMENTING REGULATION (EU) No 404/2011 of 8 April 2011 laying down detailed rules for the implementation of Council Regulation (EC) No 1224/2009 establishing a Community control system for ensuring compliance with the rules of the Common Fisheries Policy. Website of Marine Scotland Compliance (http://www.gov.scot/Topics/marine/Compliance).
OVERALL PERFORMANCE INDICATOR SCORE:	**100**
CONDITION NUMBER (if relevant):	**N/a**

Evaluation Table for PI 3.2.4 – Monitoring and management performance evaluation

PI 3.2.4		**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	Evaluation coverage			
	Guide post	There are mechanisms in place to evaluate **some** parts of the fishery-specific management system.	There are mechanisms in place to evaluate **key** parts of the fishery-specific management system	There are mechanisms in place to evaluate **all** parts of the fishery-specific management system.
	Met?	Y	Y	Y
	Justification	The Scottish system for fisheries management is subject to a number of review mechanisms, covering all major parts of the management system. Marine Scotland – which is the overall fisheries management body in Scotland, responsible for all areas of fisheries management at national level, from science to regulation and enforcement – performs annual reviews of its own work, spanning all areas of the organization's responsibility. Annual reviews are also performed within different parts of the organization for scrutiny at higher levels; for example, Marine Scotland Science submits annual review reports to the Marine Scotland Board. In 2010, an independent panel appointed by the Cabinet Secretary for Rural Affairs and the Environment evaluated the Scottish fisheries sector, including its system of governance. In 2015–2016, a comprehensive review of the performance and structure of Marine Scotland was conducted by the Scottish Government. The views of staff, customers and major stakeholders were sought, including their experience with Marine Scotland's efforts to communicate effectively with stakeholders. Similarly, at UK level, the Prime Minister in 2003 tasked the Strategy Unit with carrying out a review of options for a sustainable UK fishing industry in the medium to long term, published in 2004. The POs were subject to a comprehensive review by Marine Scotland in 2010–2011. The purposes, functioning and impact of the producer organizations were evaluated, including their management of quotas. All these reviews of the national Scottish component of the management system are publicly available on Marine Scotland's website. At EU level, the CFP is reviewed in connection with the major revisions of its basic regulations every tenth year. In addition to internal review processes, an independent evaluation was commissioned by the European Commission ahead of the 2013 reform to assess the CFP from both a natural and social sciences point of view. The scientific component of the fishery under assessment is routinely assessed by ICES, as is the management plan for the fishery under assessment. A larger evaluation of the North Sea management plans for demersal fisheries was performed in 2015 by the Scientific, Technical and Economic Committee for Fisheries (STECF), set up by the European Commission as a scientific expert body. Biological, economic, environmental and social aspects of the management plans were assessed. While it is a principal challenge to claim that absolutetly 'all' parts of a management system are subject to a particular mechanism (here: review), it is the opinion of the assessment team that the plethora of relatively comprehensive, frequent and easily accessible reviews of all major parts of the management system at both national and EU level comes closer to the critaria of 'all' than 'key' parts. From an		

		opposite point of view, we cannot see that there are parts of the management system that can reasonably be expected to be subject to review, for which there are no such mechanisms in place for this fishery. We therefore conclude that SG100 is met.		
b	Internal and/or external review			
	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	As follows from 3.2.4 a), all areas of Marine Scotland's work are subject to regular (annual) internal review. The 2010 evaluation of the Scottish fisheries sector, including its system of governance, is indisputably external as it was carried out by an independent panel. The comprehensive evaluation of Marine Scotland's structure, performance and impact carried out by the Scottish Government in 2015–2016 will arguably also count as external as it was not conducted within the management system as such (cf. CR). According to MSC 'case law', reviews by Auditors General, on behalf of the respective country's legislature, count as external to the country's system for fisheries management. A country's Government is part of the implementing branch of government, to which the system for fisheries management is subordinate. Hence, a review performed by the Government is admittedly 'less external' than one by the Auditor General, but in this case the governmental evaluation was carried out without participation by Marine Scotland's staff, other than as stakeholders on a par with a range of other actors within the fishery. The fact that two different external evaluations have been carried out in the seven years since Marine Scotland was established counts as evidence that external reviews of the national management system are performed as frequently as might reasonably be expected. In addition come reviews performed of the UK system, such as the 2004 review by the Prime Minister's Strategy Unit. The international part of the management system is also evaluated both internally and externally with some frequency. As follows from 3.2.4 a) above, the European Commission has commissioned independent evaluations in connection with the general reforms of the CFP, and the management plans are regularly reviewed by ICES and STECFT The fishery is cleary approaching an SG100 score on this SI, but the apparent lack of an overarching review strategy only warrants an SG80 score at this time.		
References	A Review of Marine Scotland, the Scottish Government, 2016. Evaluation of Management Plans: Evaluation of the Multi-Annual Plan for the North Sea Demersal Stocks, STECF 15/04, 2015. Marine Scotland Annual Review 2014. Marine Scotland Review of Scotting Fish Producers' Organisations: Report and Recommendations. Marine Scotland Science: Annual Report to the the Marine Scotland Board, 2015–2016. Net Benefits: A Sustainable and Profitable Future for UK Fishing, Prime Minister's Strategy Unit, 2004. Sissenwein, M. & Symes, D., Reflections on the Common Fisheries Policy: Report to the General Directorate for Fisheries and Maritime Affairs of the European Commission, 2007 The Future of Fisheries Management in Scotland: Report of an Independent Panel, the Scottish Government, 2010.			

OVERALL PERFORMANCE INDICATOR SCORE:	**90**
CONDITION NUMBER (if relevant):	**N/a**

Appendix 1.2 Conditions

The SFSAG North Sea cod fishery achieved a score under 80 for four Performance Indicators. One of these was for PI 1.1.1, which automatically triggers scoring of 1.1.2 and therefore does not require a condition. In summary, three conditions were raised, detailed in the tables below.

Note: with the exception of the addition of starry ray in Condition 3, these conditions are identical to those raised in the recently re-certified SFSAG haddock fishery (MEC, 2016); condition wording as well as milestones for Conditions 1 and 2 were therefore fully harmonised with the haddock fishery. This has resulted in a shortening of milestones by one year for the cod fishery as the action plan for haddock is already in its first year of implementation.

Table 24. Condition 1

Performance Indicator	PI 2.3.1: The UoA meets national and international requirements for the protection of ETP species. The UoA does not hinder recovery of ETP species
Score	75
Rationale	Scoring Issue b (SG80): Known direct effects of the UoA are **highly likely** to not **hinder recovery** of ETP 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 102 individuals (100 dead) in 152 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 10), so it is not clear that the requirement to discard promptly has much effect for this species. 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 100 dead individuals came from one tow, all the 2015 interactions came in the period Sept-Dec). The team concluded that since regulatory requirements are being met following ICES advice, direct impacts could be evaluated (qualitatively) as 'unlikely' to hinder recovery (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. 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 152 trips

	observed in 2014 and 2015, interactions were as follows: *D. intermedia*: 15 alive, 31 dead *D. batis*: 7 alive, 4 dead *D. flossada*: 2 alive, 3 dead The team considered that the scoring outcome is the same for this species as for starry ray.
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 were harmonised with the SFSAG haddock fishery (recertified May 2016) Years 2, 3 and 4: 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 4: 80)
Client action plan	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 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)

Table 25. Condition 2

Performance Indicator	PI 2.3.2: The UoA has in place precautionary management strategies designed to: • meet national and international requirements; • ensure the UoA does not hinder recovery of ETP species. Also, the UoA regularly reviews and implements measures, as appropriate, to minimise the mortality of ETP species
Score	75
Rationale	Scoring Issue c (SG80): There is an **objective basis for confidence** that the measures/strategy will work, based on **information** directly about the fishery and/or the species involved. For the ray species (starry ray and common skate), 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 were harmonised with the SFSAG haddock fishery (recertified May 2016) Year 1: Ensure that data collection plan is sufficient to provide an objective basis for evaluating whether bycatch in this fishery leads to 'unacceptable' impacts. Data collection. (Score: 75) Year 2: 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 3: Implement management strategy (Score: 75) Year 4: 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	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 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)

Table 26. Condition 3

Performance Indicator	PI 2.3.3: Relevant information is collected to support the management of UoA 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	Scoring Issue a (SG80): Some quantitative information is **adequate to assess** the UoA related mortality and impact and to determine whether the UoA may be a threat to protection and recovery of the ETP species. Information about interactions with this fishery comes from the PET scheme, which covered 47 trips in 2014, and 105 trips in 2015 (Table 10). It is not possible to scale these data up to provide accurate 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, spurdog and porbeagle have a quantitative stock assessment, grey seal a periodic survey, starry ray a survey abundance index and the common skate species nothing. For allis shad, the main centre of population is western France where the species is surveyed as it passes river impoundments (fish ladders etc.). Overall, SG60 is met (qualitative estimate of fishery-related mortality from PET data). SG80 is met for spurdog, porbeagle, grey seal and allis shad since the overall status or trend in stock status can be evaluated quantitatively, and mortality rates from the PET trips are low enough to be able to infer with confidence that the impact of the fleet on the population is ~negligible. For common skate, SG60 is not met because of a lack of population-level data, while for starry ray, SG80 is not met because the impact of the fleet may be non-neglible, and cannot be assessed quantitatively, because the PET data cannot be scaled up to fleet level. SG100 is not met for any species, because the PET data cannot be scaled up to the whole fleet.
Condition	There needs to be sufficient information available such that the impact of this fishery on common skate and starry ray can be quantitatively estimated, and hence it can be determined whether the fishery may be a threat to the recovery of the starry ray population and the common skate complex. This requires, as a minimum, a fleet-wide estimate of bycatch of starry ray and common skate, as well as some basis by which population-level trends can be evaluated for common skate (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 starry ray population and common skate complex (Score: 80)
Client action plan	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 whilst continuing data collection and provisional review of fishery impact 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.
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 Reviewer 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**	**CAB Response**
Justification: Overall, this is a fishery that has been moving towards sustainability. The stock status has been improving substantially in past years in response to measures that were designed to allow recovery of the cod stocks. Because effort has been decreasing the P2 state will also have improved, and I see no problems in P3. The document is generally well prepared and presents a large amount of relevant information. Nevertheless, I have some general comments here on issues that seem to have been overlooked in the assessment or where more detailed information could have been used, and have a number of comments on scoring under some of the evaluation criteria. I think that most of these comments can be dealt with by providing more information although one or two might need an extra condition. **Description of the fishery and the non-homogeneous nature of it** By the end of reading this assessment I still don't have a very good feeling for the nature of this fishery, and in particular where they fish and with what gears. The spatial distribution of fishing		Please see our responses to comments below A map showing the spatial distribution of the SFSAG fleet in terms of days at sea has been added to the background section.

effort is not given, and only the landings of cod from the whole Scottish fleet are given, which seem to include landings from outside the UoA. Landings also don't necessarily show were the vessels actually fish. In my view, we need maps showing the fishing effort for each gear type separately in addition to a map of landings. I feel quite uncomfortable in assessing a very wide range of different gears in a single assessment. Problems in one particular segment of the fishery (e.g. very high catches of ETP species) can be easily masked by good practice in other gears in an assessment like this because there are diluted by other fishing gears. For example, in this assessment the observer reports do not cover all the different gears used in this UoA.		Yes, this was not straightforward. For the landings data the team decided to amalgamate the gears to i) whitefish trawl (which includes single, twin and paired), ii) *Nephrops* trawl (single and twin) and iii) seines (Scottish and Danish; single and twin). The reason for this is that the catch estimates which include discards (a different dataset) are trawl only and only distinguish TR1 vs TR2 (not the type of trawl). The team also amalgamated the PET data across all gear types because there are not that many data points and most of them report zero interactions. However, the team have revisited this part of the report and separated out the data by gear type in more detail – this is possible for landings and ETP (PET) but not for discards, for the reasons explained above. The analysis of landings by gear type has been incorporated into the report (revised Table 5); it covers single, twin and pair trawls separately (in addition to TR1 and TR2 separately), and also separates out Scottish and Danish seines (all TR1). This has resulted in the addition of two new 'main' bycatch species (ling and dab). These have been added to the analysis for PIs 2.2.1, 2.2.2 and 2.2.3. The scoring for PIs 2.1.1, 2.2.1, 2.2.2 and 2.2.3 has been separated by gear type according the relevant suite of 'main' primary and secondary species for each gear type. This has changed the scoring as follows: 2.1.1: no change; 2.2.1: score for pair trawl and seines increased to 90 (because no 'main' secondary species); 2.2.2: score reduced to 85 (see below under specific comments for this PI); 2.2.3: score for pair trawl and seines increased to 85 (because no main secondary species). The new analysis for the PET data set is given in the new Appendix 2.1. The PIs on ETP species (2.3.1-3) have not been scored separately by gear type because it is clear from this analysis that this is not appropriate: there are not enough data, the sample sizes are skewed, observers are not allocated at random and catches of ETP species are rare and very patchy; therefore drawing conclusions about differential catches of ETP species by gear type from this dataset is not statistically appropriate.

		Nevertheless, some qualitative conclusions can be drawn which suggest that there is not a particular concern with amalgamating the data (i.e. there is not a gear type that stands out as having more interactions with ETP species than the others) – this is discussed below next to the specific comments on 2.3. It is also worth noting that Marine Scotland Science target effort in relation to monitoring (cameras and observers) in relation to their perception of risk (of discarding and ETP interactions), rather than sampling randomly. This means, we hope, that the dataset is precautionary in relation to the practice of the fleet as a whole. This is also the reason (we presume – see below) why they are unwilling to try and scale-up some of the datasets to fleet level.
Fishery induced evolution The assessment mentions that the age at maturity has declined substantially for cod, and implicitly argues that this means that it is easier to attain sustainability for the fishery. While this is true, the decline in the age at maturity could be due to fishery induced evolution (where size selective fisheries favour fish that mature early, and a population wide shift towards earlier maturation occurs as a result). This earlier maturation will result in a decrease growth of cod, and therefore a reduced MSY, because fish start to divert their energy to reproduction rather than growth at a smaller size. Although it means that it will be easier to manage the fishery sustainably (MSY occurs at a higher F), it is also undesirable in terms of maximizing sustainable fish production. The assessment does not reflect on this, and this can be interpreted as in effect 'rewarding' the reduction in age a maturity. Although the MSC does not have any criteria assessing fisheries induced evolution, it probably should, and this fishery should work towards		**Fishery induced evolution:** Please see comments under 1.1.1 below.

limiting and reversing it (although reversal will take a very long time). **Discards ban: being implemented in EU, already present in Norway** Although practices in the fishery may be compliant with 2016 rules, very little is said about how this fishery is going to deal with the Landing obligation that comes into full force in 2017 for this fishery. A ban in discarding has been in force in Norwegian waters for a long time, and the assessment also hardly mentions how this is being dealt with and complied with at the moment. In fact, it assumes that discarding practices are the same in Norwegian as in EU waters, which in effect assumes illegal behavior. Based on this I am not confident that there is a plan for adhering to discarding regulations in both the EU and Norway, and I would have had more confidence in the assessment if it had tackled this issue directly. The assessment writes 'There is a risk that, if the enforcement at sea of a discard ban proves unsuccessful, the increased TAC might be used to increase the landings of commercial sized fish whilst continuing to discard unwanted bycatch', therefore I think it would be reasonable to have a strategy in place to avoid this.		**Discards ban: being implemented in EU, already present in Norway** In relation to Principle 1, ICES assumes that discarding rates observed in EU waters apply in Norwegian waters because there is no monitoring programme in Norway to demonstrate otherwise. Discarding of cod is generally fairly low (compared to haddock and whiting) and is only of significance in sustainable exploitation if F is too high. Current assessments show F below 0.4 (the management plan value). The implementation of the landings obligation has tended to be year-by-year and often at the last minute – when the site visit was held in June 2016, it was not at all clear how it was going to apply in 2017. However, this is now known and is as follows (http://www.gov.scot/Topics/marine/Sea-Fisheries/discards): • >100mm mesh-size (TR1): required to land all saithe (if caught by a saithe-targeting vessel), plaice, haddock, whiting, cod, northern prawn, sole and *Nephrops* • 80-99mm (TR2): required to land all *Nephrops*, haddock, sole and northern prawn By our estimate and based on 2013-15 data this covers ~75% of the trawl landings (both TR1 and TR2) and ~95% of the seine landings (this depends, however, on the interpretation of a 'saithe-targeting vessel'). So it remains not as strict as the Norwegian discard ban for the moment (which includes all commercial species). In relation to conflicts between discarding regulation in the EU and Norway, this has been the case in the past; fish must be discarded in the EU but may not be discarded in Norway. The only solution to this is for vessels to store the fish whilst in Norwegian waters and discard it once back in EU waters – which is not following the spirit of the Norwegian discard ban for sure, but is the only option to avoid illegal behaviour on one side of the line or the other. This is reportedly rare these days, however, not only because of the landings obligation but also because of quota swaps, more selective gear, real-time closures and other management measures which have greatly increased selectivity. The EU still requires discarding of some species (depleted skates) but this is also permissible in Norwegian waters.

		A section has been added to the report on the management of discards in Scotland and Norway, setting this information out in detail. It is not fair to say that there is no strategy in place to minimise discarding; many requirements and measures such as square-mesh panels, real-time closures, juvenile closures, conservation credits etc. are in place, and Scotland has been a leader in this regard for many years before the landings obligation was even thought of. A full analysis is given in the rationale for 2.1.2 scoring issue e.

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]	**No**	**CAB Response**
Justification: The real problem that I see is that is unknown whether the bycatch of common skate and starry ray by this fishery is having any effects on their population. For common skate my subjective opinion is that fishing is certainly hindering recovery, for starry ray my feeling is that it is declining in response to climate change. These are however very complicated questions to answer, which would require both a proper quantification of the catches by this UoA in combination with developing of a proper assessment of the stocks of these species. Estimating the catches in more detail on its own is not going to achieve very much, and therefore I cannot see how these conditions is going to achieve SG80. Throughout the assessment it is noted that the observer records cannot be scaled up to the whole fishery anyway (although it is not clear why), so improving those records would still not achieve even an estimate of total catch. No concrete modifications in the operation of the fisheries are proposed, so it seems unlikely that any improvement of the state of starry ray and skate would result.		For starry ray, there is a biomass index (survey trends) and ICES note that a quantification of discard rates is the main missing element in the data; so it seems as if catch estimates would help a good deal. However, common skate is more of a problem because survey catch rates are too low to allow biomass index, and interaction rates in this fishery are likewise pretty low. The objective of the condition in this case was for catch rates to be evaluated with a view to reducing interaction rates with common skate to the lowest possible level (e.g. by identifying spatial and temporal hotspots or vessels with high interaction rates or whatever it may be). Even though overall interaction rates are low, it is apparent from the data that interactions are grouped – there tend to be occasional catches of several individuals at a time. This gives some objective basis for thinking that this approach might work. We agree that it is really difficult to evaluate with any confidence for common skate what impact the fishery is having on the stock, since population size in the North Sea cannot be evaluated. The objective of the condition, therefore, is to get interactions down to the level where it is reasonable to surmise that there is no population-level impact – which in this case needs to be just a small number per year. Following MSC practice, MEC is not allowed to provide any guidance to SFSAG on what would constitute an 'objective basis for confidence' that the strategy will work; part of the work on the condition is for SFSAG to work with MSS and/or others to try and define this for themselves. This will be an important consideration in the annual audits against this condition.

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]	**No**	**CAB Response**
Justification: See comments on the condition: in summary the actions will not lead to a change in practice in the fishery but are also not likely to reduce uncertainty about the state of the rays.		See response above

Performance Indicator Review

Please complete the appropriate table(s) in relation to the CAB's Peer Review Draft Report:

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	Yes	Yes	NA	Although I agree with the scoring, I have some issues: Recruitment is a lower levels than historic averages, suggesting that it might be impaired. This seems to be ignored in scoring. I would not say that there is a low probability that SSB is below MSY $B_{trigger,,}$ because if the error has a normal distribution it is most likely to be well below the mean. So this means the probability that SSB<MSY B $_{trigger}$ is quite high.	The SI refers to the size of the SSB in relation to recruitment. The SSB is at a level where maximum recruitment has been observed. Lower recent recruitment cannot be attributed to the size of the SSB and is probably the result of climate change. This is not relevant to the scoring in relation to the size of the SSB. The SSB is very unlikely to have a normal distribution because recruitment (which ultimately contributes to the SSB) is highly right skewed. Lognormal is much more likely. The assessment estimates the 95% CI for SSB in 2016 of 137278- 206952 with a mean of 168552 which means it must have more than a 50% chance of being above MSY

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
				Fisheries induced evolution, which is bad, seems to be used as an argument to say that sustainability is increased. Although this may be true, it is not a great example of sustainable fishing.	Btrigger (165000). The report points out that the age of maturity has reduced but does not link this to fishery induced evolution. The reduction in age of maturity could be the result of many factors both genetic and environmental. There is still considerable debate as to whether fishery induced evolution is detectable in the presence of substantial plasticity in reproductive traits that may respond to numerous biological and environmental changes. The way traits are expressed is dynamic so trying to achieve a particular "pristine" state is unrealistic and probably without useful definition.
1.1.2	Yes	Yes	NA		
1.2.1	Yes	Yes	NA		

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
1.2.2	Yes	Yes	NA		
1.2.3	Yes	Yes	NA		
1.2.4	Yes	Yes	NA		
2.1.1	Yes	Yes	NA	I don't understand why Devil's hole *Nephrops* and monkfish are classified as secondary species and not included here. This needs to be better explained. This is important because Devil's hole Nephrops is not in a good state and treating it as a primary species would worsen scores here.	This is explained at the top of the Principle 2 section in the main report (2.4): The FCR v2.0 defines 'primary' bycatch species as those where management tools and measures are in place that aim to regulate fishing in relation to some biologically based limit and/or target reference levels. In other words, they are secondary rather than primary because they don't have any reference points.
2.1.2	Yes	Yes	NA		
2.1.3	Yes	Yes	NA		

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
2.2.1	Yes	Yes	NA		
2.2.2	Yes	No	NA	A score of 80 seems generous when several species have a combined TAC, or for some species a total absence of any stock assessment and TAC. I would say that combined TACs for the minor species are measures rather than strategies, yielding a score of SG60 for those and a lower overall score.	At time of review, the only species with combined TACs were minor secondary species, and therefore they only entered the scoring at SG100. However, the more detailed analysis by gear (described above) has resulted in dab being promoted to a 'main' species for some gear types – this has a combined TAC with flounder. Based on the assessment and stock status, we concluded that this is sufficient for a 'partial strategy' meeting the requirement of SG80, but not of a strategy. Taking into consideration the peer reviewer's comment, the score for all the main secondary species has been reduced to 80.
2.2.3	Yes	Yes	NA		

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
2.3.1	No	No	NA	Observer reports are only available for Scottish trawl vessels but not seines, which means that part of the UoA has no information of catches of ETP species at all. It is not obvious that even all different types of trawls and all areas are covered by observers, so it is entirely possible that there are parts of the UoA that have very high catch rates of ETP species. It is rather optimistic to say that having some observer reports is the same as knowing that the effects of the fishery on ETP species are unlikely. Observer reports need scaling up to the whole fishery. I think that the statement that 'direct impacts could be evaluated (qualitatively) as 'unlikely' to hinder recovery (SG60 met)' is unjustified. How can you say that based on a just some observations of bycatch, without	There are some data from the PET scheme for seines (38 trips in total in 2014 and 2015 – the dataset we have). See Appendix 2.1 for an analysis of data coverage by gear type and ETP catches by gear type. As noted above, it is not really possible to draw any statistically-valid conclusions regarding catches by gear type from the dataset, although it gives the impression that TR1 gear is perhaps more likely to interact with ETP species that TR2 gear; it doesn't particularly suggest any difference between seines and trawls. Note that 'likely' in this regard following the MSC definition is a pretty low bar – a 60% probability. The only species where practically nothing is known about stock size and population dynamics is common skate (species complex),

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
				knowing the stock size and population dynamics? I think it is probably true, but the evidence provided does not back this up.	so presumably the comment applies only to this species. Marine Scotland are not willing to scale up the data to the entire fleet and with the data provided to us we are not able to try it either, so estimates remain qualitative. The team have attempted to make the best judgement, based on the relatively low number of individuals taken across the entire PET dataset as given in the rationale for 2.3.1. Essentially, there are several data scenarios under which SG60 (the lowest bar) can be met: 1. Quite a high catch which can be justified as not having a major impact based on quantitative information about popuation size, dynamics and trends. 2. Lower but still significant catch, compared with some information

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
					about population size or trends (e.g. such that you can estimate catch as a proportion of biomass or show that the population trend is upwards) 3. Very small catch can considered 'likely' not to be having an impact even in the absence of population-level data. This last scenario at the level 'likely' (SG60) more or less corresponds to the analysis of the peer reviewer 'I think it is probably true'.
2.3.2	Yes	Yes	NA		
2.3.3	Yes	No	NA	Stock status of ETP is provided and qualitative information on the catches is given, but UoA related mortality cannot be assessed because observer reports cannot be scaled up. We have no quantitative idea if any of the ETP species are affected by the UoA.	The logic of the scoring is that SG80 is only met for the species where some population-level information is available and ETP interactions are very low, such that it is possible to infer that the impacts of the fishery are negligible even without being about to scale

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
				SG80 is not met in my view.	up the PET data quantitatively. We did, however, reconsider the scoring for starry ray, given that fleet-level impacts may be non-trivial. This score was reduced from 80 to 60 and starry ray was added to the condition and action plan for this PI.
2.4.1	No	No	NA	A more quantitative analysis of gear-habitat interactions is possible, and in my view, required. The assessors should overlay VMS maps on habitat maps for both EU and Norwegian waters and explore the interactions quantitatively, rather than the current qualitative examination. This has to include Norwegian waters, for which habitat maps are not presented at the moment. I don't have much confidence in the assessments in Table 12 as they seem rather subjective. I think a good assessment requires a quantitative	Information is available on the habitats encountered and the impact of the fishery on these habitats and habitat types. The problem with a quantitative analysis, however, is that the MSC SGs are qualitative in nature. MSC attempt to 'quantify' them by defining the levels of probability ('likely', 'highly likely' etc.) as quantitative probabilities (see Table SA9) but in fact this is clearly nonsensical when applied to the rest of the SG (risk of 'serious or irreversible harm') which is not defined in any quantitative way; i.e.

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
				analysis of 1) the fraction of fishing of this UoA that occurs in each of these habitats, and 2) the fraction of each habitat that is fished by the UoA, where it is particularly important that 2) is low for vulnerable habitats.	does the 20% risk of impact mean that serious or irreversible harm cannot apply to more than 20% of that habitat? or there should be a <20% risk of it occuring anywhere in that habitat even if only 0.001%? Probably neither of those are the intent, but they are clearly very different, and illustrate the difficulties of attempting to apply quantitative evaluations to qualitative questions. Hence a quantitative analysis does not help much in trying to answer the question posed by the scoring guidepost. It is also not certain, with the nature of the data available, that such an analysis would be any more statistically valid. In relation to the Norwegian zone, as far as the team can tell, there are no published habitat maps for this area; the team has proceded on the assumption that North Sea

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
					habitats will continue in the same vein as in the Scottish zone (excluding the coastal zone where in any case these vessels may not fish). In relation to Table 12, we had added some references and tried to make the analysis of vulnerability and overlap more explicitly objective and quantitative by quoting values where available. To be more precautionary, Modiolus beds, deep-sea sponge aggregations and offshore deep-sea muds with bivalves and polychaetes were added to the list of VMEs which may overlap with the fishery, although the analysis suggests that amount of overlap is likely to be limited. (There is a balance to be struck between ensuring that all elements which might be impacted are included, and including elements which are

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
				I don't agree with the assessment that for Arctica serious or irreversible harm is unlikely, or at least not based on the evidence presented. These animals are very long-lived (100s of years), and have a high probability of being killed by the doors and clump of otter trawls. Whether or not their abundance will decrease in response to trawling is not easily assessed without estimates of the amount of fishing on their habitats, the mortality caused per trawl pass and their rate of population growth, and I feel that the assessment is too optimistic in saying there effects are not likely. Without a quantitative analysis of trawling rates on Arctica beds, mortality caused by a trawl	hardly impacted at all, since this latter approach can have the outcome of artificially inflating the overall score.) According to Witbaard and Bergman (2003), Arctica was abundant in the Fladen Ground up to 2000, making up 75% of the biomass in some areas. It is true that recruitment seems to be erratic, with occasional very large year classes continuing to dominate the population for many years. Some quantitative work such as suggested by the reviewer has been done for beam trawls; Witbaard and Bergman suggest a mortality rate for Arctica of 11% per year on the Dutch coast as a result of intensive beam trawling. The contrast that they show, however, between the Fladen Ground population (high biomass, evidence of recruitment) vs. populations in

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
				pass and an estimate of sustainable mortality, it is hard to say that there is no effect. This is particularly important because Arctica is concentrated in some areas that are target by Nephrops trawlers (e.g. the Fladen ground). SG80 is not met in my view.	the southern North Sea (biomass orders of magnitude lower, no evidence of recent successful recruitment) suggests that fisheries impacts which may be very significant in the southern North Sea are not having the same effect in the area of this fishery. Note that three additional VMEs have been added, as per the comment above.
2.4.2	Yes	No	NA	A series of MPAs without any management of trawling and seining activity are not a strategy in my view. There is no assessment of the impact on the seabed, so impossible to know if it works. The UoA could move all its fishing activities into these MPAs or onto the most vulnerable habitats if they wanted too, so it is hard justify saying that a strategy to avoid this happening is in place.	Agreed; it has been changed to a 'partial strategy' since it is not yet fully implemented. In our view, there are other ways to evaluate whether a (partial) strategy might work than a quantitative analysis of the impact of the fishery across all the different habitats concerned – if there were not, then practical conservation would be impossible. For example, the likely vulnerability of different geo- and bio-types can

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
				SG80 is not met in my view.	be estimated given their properties – natural levels of disturbance, cohesion, location in relation to the sediment surface, fragility, shape, structure, growth rate, recruitment rate etc etc. This assessment is of the fishery as it is – a big change in the distribution of fishing effort would certainly flag a review of these issues; as will a failure to progress with the implementation of the strategy.
2.4.3	No	No	NA	The vulnerability of the main habitats are not quantified, and the distribution of fishing activities and overlap with habitats is not monitored over time. It could be done using analyses of VMS but is not being done. SG80 is not met in my view for point c.	It is not done by the assessment team, certaintly, but then it is not within the scope of an MSC assessment. There is, however, evidence that it is done by Marine Scotland. Certainly the location of fishing effort is monitored routinely, because Marine Scotland use VMS data to allocate landings and discards by ICES rectangle on a

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
					routine basis (as per Figure 1), as well as to check against logbook declarations (e.g. over the boundary of areas IV and VI). The mapping of VMS data on to habitats may not be done routinely (this is not clear) but has been done, for example, in relation to MPA planning – see for example the Fishery Displacement Study which is being used to inform management decision-making for the inshore MPAs (McLeod, 2014). McLeod M. 2014. Scottish MPA Project: Assessing the potential levels and effect of fisheries displacement as a consequence of possible management measures for future inshore Marine Protected Areas. Marine Scotland. http://www.gov.scot/Resource/0044/00448930.pdf
2.5.1	Yes	Yes	NA	The team concludes that fishing	Fishing has an impact on marine

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
				pressure is changing the ecosystem, but concludes that 'any impacts of this fishery are lost' in the wider fishing impacts. I do not like such reasoning, surely this fishery contributes to these changes, so if they are undesirable this fishery is a part of the problem. This is a general problem of MSC assessments rather than one specifically for this assessment.	ecosystems – this much is clear. It is extremely likely that this fishery has had a measurable impact on the North Sea ecosystem. The argument is not so much that 'impacts are lost' but more in relation to the MSC SGs which require us to consider the risk not of any impact but of 'serious or irreversible harm'. MSC's definition of 'serious or irreversible harm' in relation to ecosystems is pasted below; it is not a great deal of help in relation to a quantitative analysis, but it is a pretty low bar: 'fundamentally alter', 'permanent changes' etc. A fishery has to be pretty disastrous to do that by itself. *Serious or irreversible harm to "structure or function" means changes caused by the UoA that fundamentally alter the capacity of the habitat or ecosystem to maintain its structure and function.* …

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
					For the ecosystem component, this is the reduction of key features most crucial to maintaining the integrity of its structure and functions and ensuring that ecosystem resilience and productivity is not adversely impacted. This includes, but is not limited to, permanent changes in the biological diversity of the ecological community and the ecosystem's capacity to deliver ecosystem services.
2.5.2	Yes	Yes	NA		
2.5.3	Yes	Yes	NA		
3.1.1	Yes	Yes	NA		
3.1.2	Yes	Yes	NA		
3.1.3	Yes	Yes	NA		

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
3.2.1	Yes	Yes	NA		
3.2.2	Yes	Yes	NA		
3.2.3	No	Yes	NA	Eight cases were prosecuted in Scotland in 2015 and this is interpreted as high compliance, but cases depend on enforcement effort as well as the number of infringements. This needs to be presented as the fraction of trips/vessels checked rather than against total number of vessels.	The reviewer is correct that the number of infringements must be seen in relation to the number of inspections. Like enforcement bodies in many other countries, Marine Scotland considers inspection statistics as confidential information. However, the assessment team has been informed that the total number of inspections in 2016 was 4,588. As mentioned in the justification of SI 3.2.3 c), on average eight infringements have been prosecuted annually in Scotland over the last few years. The share of prosecutions out of the total number of inspections is hence miniscule. Importantly, there have been no cases involving the North

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
					Sea cod fishery the last couple of years. Information on the total number of inspections has been added to the report, but the score remains unchanged (the reviewer did not ask for a changed score).
3.2.4	Yes	Yes	NA		

Appendix 2.2 Peer Reviewer 2

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 YES**	**CAB Response**
Justification: The report has information to support the scoring of most SIs. However, several aspects of the P1 section need improvement. There are also a few SI where the information provided is not sufficient to support the conclusion but that information is available in the report, and in some cases the conclusions reached are incorrect (see below for more information).		The reviewer's comments include a number of misconceptions that we have responded to in detail below. There is an unsupported assumption that the LO will cause data and assessments to deteriorate and an error in the reviewers interpretation of MSY. See comments further on.

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 YES**	**CAB Response**
Justification: The conditions raised are appropriate and well justified. However, one further condition is likely to emerge from the rescoring of 1.2.2. SI where inconsistencies were identified.		The current HCR is consistent with MSY so there is no need for a new condition. See comments further on.

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: In general the client's action plan is sufficient to close the conditions raised, with some actions already taken place.		No response required

Performance Indicator Review

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	Yes	No	NA	SIa. Although I agree that "*there is no reason to suggest that the magnitude of the SSB at the 2015 level will impair recruitment*" this is not an automatic justification for SG80 to be met. MSC criteria defines higly likely for SIa "greater than or equal to the 80th percentile."	The 95% confidence interval for current SSB is 125031-182,741t and is above Blim (118,000t) so more than meets the 80th percentile criterion. Blim is set at the level when the last large year class was observed demonstrating that current SSB produce large recruitment.
1.1.2	Yes	Yes	NA		
1.2.1	No	No	NA	Sib. It is stated in the report that F is stabilising (levelled out) in recent years. With increasing TACs due to the onset of the LO and the elimination of the effort system, associated to a lack of control at sea (all issues identifyed in the report) one may consider that F will in fact increase. This fact needs to be considered in the scoring. Sic The harvest strategy is changing considerably with the introduction of	SIb. An increase in F is purely speculative at this stage as the principal fishery controls remain in place. Although effort controls will no longer apply they were never intended to apply after the recovery phase. The main factor leading to a reduction in F is reduced fleet capacity. The changes resulting from the LO do not affect this. The score cannot be based in the presumption that F will increase.

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
				the LO, and existing monitoring at sea programes are likely to change (ex. refusal to get access to boats, low or no data on discards while discarding continues, etc). These issues need to be considered as catch data and thus stcok assessments can deteriorate, and SG rescored.	SIc. The harvest strategy is still based on the Precautionary Approach and MSY.The scientific data collection and control surveillance systems are still in place. They may change when the LO is fully implemented but Member States are still required to sample and report catches. There cannot be a presumption of deterioration in data collection.Good quality assessements can be conducted with scientific surveys alone and are unaffected by the LO.
1.2.2	No	No	New condition	SIa. The HCR has not been tested with the new reference points, while the HCR RP in place are not consistent with MSY (Fmp = 0.4 Is above Fmsy = 0.33) so biomass with fluctate at a level below MSY and thus SG 80 is not met. The condition should reflect the need for the HCR to be consistent with MSY. Sib. One	SIa. The current HCR is consistent with MSY. ICES gives the Fmsy range as 0.22-0.49 so the current HCR of F=0.4 is within this range. (ICES advice 2015, book 6). SIb. The LO will change the way the catch is landed not necessarily the amount caught so the main

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
				major uncertainty is the impact of the LO and this has not been tested, since implementation error cover only partially the effect of the LO (as mentioned below for example deterioration of data and associated stock assessment). Sic. The effort scheme has been abandoned so its effectivenness is no longer aplicable, while F has levelled out above the target F in recent years, and TACs have been increased specifically to address discards due to the LO, but have yet to be monitored at sea at significant levels. All of these issues may put into question "the effective in achieving the exploitation levels required under the HCRs."	elements of the HCR remain the same. The LO may improve catch estimates by making it easier to quantify all fish caught since these will be seen at the point of landing. There is a counter argument that assessments may actually improve as a result. SIc. EU effort controls were part of the recovery plan and were never part of the managed phase which now applies.There is no evidence as yet to show that the LO will cause exploitation levels to increase especially as the main factor reducing effort was the result of fleet decommissioning. The LO is intended to strengthen mangement not weaken it.
1.2.3	Yes	No	NA	SIa and SIc. I would very much doubt that "Data on fishery removals are considered good and improving, especially in relation to discards." at present and in the near future with	SIa and SIc. ICES has assessed the data as improving. More discard data have become available in recent years and misreporting of catches has

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
				the (non)-implementation of the LO so SG100 and SG80 are not met, respectively. Sib Again the impact of the LO on catch data and the assessment is highly uncertain therefore SG 100 is not met.	significantly reduced. All the monitoring programmes remain in place and are expected to continue after the LO. Research vessel data which are crucial to the assesment are unaffected by the LO. At present SG100 is fully met.
1.2.4	No	Yes?	NA	Sic One questions if the assessment has tested the impact of the LO, not only on the quality of catch data but also on fishing behaviour changes. SIe STECF no longer regularly reviews ICES advice.	SIc. The SI refers to the stock assessments, none of which have been carried out since the LO was introduced for cod in 2017. The assessments to date all take into account the critical aspects of uncertainty and are likely to continue to do so in the future as there is a process of assessment benchmarking in place used by ICES. SIe. The SI refers to the assessment not the advice. STECF reviews assessments when requested to do so and is a common occurrence.
2.1.1	Yes	Yes	NA	SIa. Hake is not jointly managed by	These comments probably belong

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
				EU-Norway, is its shared but not managed. SIe LO total implementation is 2019 (not 2017)	to 2.1.2? Regarding the landings obligation, point taken; this has been corrected. Regarding hake, we're not sure this is a fair statement. There is an issue at present which results essentially from the fact that the stock biomass has shot through the roof – but in the past this stock was subject to an agreed recovery plan (believe it or not).
2.1.2	Yes	Yes	NA		
2.1.3	Yes	Yes	NA		
2.2.1	No	Yes	NA	Sib. Note that in table 9: dab, flounder and brill have semi-quantitative assessments by ICES. Table needs to be corrected and SI should reflect these corrections.	Dab has now gone to be a main species (further to comments by the other peer reviewer, so has a more detailed analysis). For flounder 'unknown' has been replaced by 'stable / fluctuating' and brill by 'decreasing'. Nevertheless, it doesn't contribute much to the scoring of 2.2.1b (since

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
					these are 'minor' species) since it applies only to minor species which are below biologically-based limits; this is probably not the case here, but no specific limits have been defined.
2.2.2	No	No	NA	Sic The fact that a TAC is called analytical does not provide evidence that it has been set acording to scientific advice. Ling TACs have been routinely set above ICES advice.	Point taken; this has been corrected. It hasn't stopped the stock biomass from continuing to increase, however.
2.2.3	Yes	Yes	NA		
2.3.1	Yes	No	NA	SIa disagree with not relevant in the case of rays. The limit is 0 which can be achieved even if the fishery catches it by ensuring minimum post-release mortality. But I agree with Sib scoring.	SIa has now been scored.
2.3.2	Yes	Yes	NA		

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
2.3.3	Yes	Yes	NA		
2.4.1	Yes	Yes	NA		
2.4.2	Yes	Yes	NA	Sic "However, since in scoring issue a there is not deemed to be a full 'strategy', SG100 cannot be met here" is incorrect as SG100 refers also to a partial strategy.	Removed
2.4.3	Yes	Yes	NA		
2.5.1	Yes	Yes	NA		
2.5.2	Yes	Yes	NA		
2.5.3	Yes	Yes	NA		
3.1.1	Yes	Yes	NA		
3.1.2	Yes	Yes	NA		
3.1.3	Yes	No	NA	Although it is true that MSY is an	This PI relates to the overarching

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
				explicite objective in the CFP, the objective specified in the Norway_EU agreement is above Fmsy, so SG 100 is only partially met.	management context of the fishery, not the fishery-specific management system, which is dealt with under PI 3.2.1.
3.2.1	Yes	Yes	NA		
3.2.2	Yes	Yes	NA		
3.2.3	Yes	No	NA	SIa. The present MCS system is not able to enforce the LO, a relevant management measures, so one could possibly consider that SG80 is not met, let alone SG100. Since Sib and SIC are scored in relation to SIa, respective scoring needs to be revisited.	The landing obligation – if that is what the peer reviewer is referring to – has not yet been implemented in the fishery. This issue will have to be considered at the annual surveillance audits once the obligation is indeed implemented.
3.2.4	No	No	NA	SIa. What about a review of the performance of the EU-Norway agreement?I don't think such review exist, while ICES has not evaluated the plan under the new stock perception, and thus SG100 cannot be met.	As argued in the justification under SI 3.2.4 a), it is a principal challenge to claim that absolutetly 'all' parts of a management system are subject to review. However, it is the opinion of the assessment team that the plethora of relatively

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
					comprehensive, frequent and easily accessible reviews of all major parts of the management system at both national and EU level comes closer to the critaria of 'all' than 'key' parts. From an opposite point of view, we cannot see that there are parts of the management system that can reasonably be expected to be subject to review, for which there are no such mechanisms in place for this fishery. As for the international level, a distinction must be made between the EU-Norway 'agreement' and the EU-Norway 'management plan'. The former is updated every year in the annual negotiations between the parties, and a review is somewhat irrelevant since it is a political agreement, mainly involving exchanges of quota shares between the parties. The latter is a management plan that sets out the harvest control rule

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
					(HCR) for the fishery. The plan was evaluated by ICES in 2009 and found to be consistent with the precautionary approach. Since then, because the biological assumptions about cod have changed the management plan needs to be re-evaluated, and ICES has indicated that this is needed. There are mechanisms to do this, but it can only be done when ICES agrees with managers precisely which values for the MSY reference points should be used. ICES has not yet given a specific value, only a range of MSY reference points so work still needs to be done. In the meantime, the current HCR uses reference values that are within the range of the MSY estimated by ICES so the current plan is still OK. That said, the main issue of this PI is evaluation of the management *system*, i.e. the *structures* and *processes* surrounding

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
					management practice, and not the *contents* of management decisions.

Optional: General Comments on the Peer Review Draft Report (including comments on the adequacy of the background information if necessary) can be added below and on additional pages

The report has extensive background information in the different sections, but this information is not used and referred to when scoring several PIs. Therefore, further explanation is needed in the scoring tables, particularly in P1 section on harvest strategy and harvest control rules.
Please see our responses above to specific PI comments

Smaller comments:
-page 21. "Typically the advice will suggest catch limits for the stock based on the management regime put in place by the relevant authorities", if judge precautionary.
Added

- page 25. "With the application of the LO the fish previously counted as discarded will *need* to be added to the TAC in order that all the fish can be landed legally,…". Not necessarily. The LO clear objective is to reduce unwanted catch so if TAC equal catch, then the incentive to reduce unwanted catch is reduced. The TAC could have been set for example at X% of discards, so I question the "*need"*.
The terminology "need" has been softened.

- page 25. Key LTL species: perhaps reference to the section on biology is needed, to add to simply stated "Cod are not a key LTL species"
Done

- table 9. Three species stock status are missing: dab, flounder and brill.
Added – note that dab is now a main species and is thus discussed under Section 2.4.2

- page 47. the implementation of the LO is supposed to have started in 2015, in the North Sea cod fisheries in 2017, and to have full coverage of all fisheries in 2019. Is the objective of GITAG only to work for the implementation of the LO in 2019?
Demersal species will be added to the discard ban in 2017 and 2018. A full ban for all quota stocks will come into effect from 1 January 2019.

- Please add complete reference to the scoring tables.
This is not a requirement, complete references are provided in the reference list in Section 6.

Appendix 2.3 Analysis of PET data by gear type to respond to peer review

2015 data:
Analysis by gear mesh size

Species	Gear mesh size			
	>100 (TR1)	80-99 (TR2)	<70	unspecified
allis shad	1			
blonde ray		1		
cuckoo ray	1	16		
catshark	4			
common seal		2		
grey seal	2			
6-gilled shark	1			
common skate	5			
blue skate	3			1
flapper skate	25	2		
spurdog	8	2		
shagreen ray	3			
smoothhound	6	11		
starling	1			
starry ray	26			
thornback ray		1		
# trips	96	48	2	2
total # ETP interactions (all spp.)	88	35	0	1
ETP/trip	0.92	0.73	0	0.5

Analysis by gear type

Species	Gear type									
	single trawl TR1	twin trawl TR1	pair trawl TR1	single trawl TR2	twin trawl TR2	single trawl <70	single seine TR1	twin trawl unspecified mesh	unspecified gear TR2	unspecified gear and mesh
allis shad			1							

blonde ray					1					
cuckoo ray				16			1			
catshark		4								
common seal		5		2						
grey seal							2			
6-gilled shark	1									
common skate										
blue skate	1						2			1
flapper skate	1	18	2		2		5			
spurdog		5	3		2					
shagreen ray		3								
smoothhound		1	5		11					
starling		1								
starry ray			26							
thornback ray					1		1			
# trips	21	34	28	21	25	2	13	1	2	1
total # ETP interactions (all spp.)	3	37	37	18	17	0	11	0	0	1
ETP/trip	0.14	1.09	1.32	0.86	0.68	0	0.85	0	0	1

2014 data:

Analysis by mesh size

Species	Gear mesh size		
	>100 (TR1)	80-99 (TR2)	<70
chimaera	1		
cuckoo ray	44		
catshark	44		
porbeagle	1		
grey seal	1		
common skate	6		
blue skate	1		
flapper skate	16	1	
skate (unidentified)	1		

spurdog	59		
smoothhound	12		
starry ray	68		
# trips	94	12	1
total # ETP interactions (all spp.)	254	1	0
ETP/trip	2.70	0.08	0

Analysis by gear type

Species	Gear type											
	single trawl TR1	twin trawl TR1	pair trawl TR1	single trawl TR2	twin trawl TR2	single seine TR1	pair seine TR1	mixed trawl TR1	single trawl <70	unspecified trawl TR2	single trawl unspecified mesh	twin trawl unspecified mesh
chimaera								1				
cuckoo ray		12				8		24				
catshark		18						26				
porbeagle	1											
grey seal						1						
common skate		4	1			1						
blue skate								1				
flapper skate		9			1			7				
skate unidentified								1				
spurdog			5			51		3				
smoothhound			8			4						
starry ray		59				5		4				
# trips	3	29	12	7	3	24	1	25	1	2	3	5
total # ETP interactions (all spp.)	1	102	14	0	1	70	0	67	0	0	0	0
ETP/trip	0.33	3.52	1.17	0	0.33	2.92	0	2.68	0	0	0	

Appendix 3 Stakeholder submissions

No written stakeholder submissions were received prior to the publication of the Public Comment Draft Report. Verbal submissions received during the site visit focused on the provision of information and no concerns were raised about the fishery under assessment.

(REQUIRED FOR FR AND PCR)

1. 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

Pending the successful outcome of this assessment, the surveillance for this fishery has been set as default (Level 6), requiring 4 on-site surveillance audits.

Deviations from the standard surveillance schedule (i.e. annually, by the anniversary date of the certificate) are currently not foreseen.

The fishery surveillance programme is shown below.

Fishery Surveillance Program

Surveillance Level	Year 1	Year 2	Year 3	Year 4
Level 6	On-site surveillance audit	On-site surveillance audit	On-site surveillance audit	On-site surveillance audit

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)*