

**MOODY MARINE LTD**

**Final Report (v4) for the:  
SFSAG NORTH SEA HADDOCK TRAWL  
& DANISH SEINE FISHERY**

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**The Scottish Fisheries Sustainable Accreditation Group (SFSAG)**

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# 1 SUMMARY

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The fishery under assessment is that for Haddock *Melanogrammus aeglefinus* in the North Sea (ICES Divisions IVa & IVb).

**The gears covers by this assessment are otter trawls and Danish seine. The client group is the Scottish Fisheries Sustainable Accreditation Group (SFSAG) and details of the vessels covered by the certificate can be found in Appendix F.**

## Assessment timeline:

Task	Date
Announcement of assessment	17 January 2008
Notification of Assessment Team nominees	26 June 2008
Notification of intent to use MSC FAM Standard Assessment Tree	4 November 2008
Notification of assessment visit and call for meeting requests	17 February 2009
Assessment visit	23-26 March 2009
Notification of Proposed Peer Reviewers	June 2009
Notification of Public Draft Report	May 2010
Notification of Final Report	September 2010

## Key strengths and weaknesses of the fishery management:

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

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

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

**Scores for each Principle:** the detailed scoring is presented in Appendix A. A summary of the overall scores is provided below:

MSC Principle	Fishery Performance
<b>Principle 1:</b> Sustainability of Exploited Stock	Overall : 94
<b>Principle 2:</b> Maintenance of Ecosystem	Overall : 83
<b>Principle 3:</b> Effective Management System	Overall : 95

**Recommendation:** the fishery attained a score of 80 or more against each of the MSC Principles and did not score less than 60 against any Indicators. It is therefore determined that the *SFSAG North Sea Haddock Trawl & Danish Seine Fishery* be certified according to the Marine Stewardship Council Principles and Criteria for Sustainable Fisheries.

**Conditions and timescales:** the fishery attained a score of below 80 against three Performance Indicators. The assessment team has therefore set three conditions for continuing certification that the client for certification is required to address. The conditions are applied to improve performance to at least the 80 level within a period set by the certification body but no longer than the term of the certification. As a standard condition of certification, the client shall develop an 'Action Plan' for Meeting the Conditions for Continued Certification', to be approved by Moody Marine. The Conditions are set out below.

#### CONDITION 1: MITIGATION MEASURES TO REDUCE BYCATCH

Outcome	2.1.2
PI	<b>Management strategy:</b> There is a strategy in place for managing retained species that is designed to ensure the fishery does not pose a risk of serious or irreversible harm to retained species.
SG60	There are measures in place, if necessary, that are expected to maintain the main retained species at levels which are highly likely to be within biologically based limits, or to ensure the fishery does not hinder their recovery and rebuilding. The measures are considered likely to work, based on plausible argument (e.g., general experience, theory or comparison with similar fisheries/species).
SG80	There is a partial strategy in place, if necessary that is expected to maintain the main retained species at levels which are highly likely to be within biologically based limits, or to ensure the fishery does not hinder their recovery and rebuilding. There is some objective basis for confidence that the partial strategy will work, based on some information directly about the fishery and/or species involved. There is some evidence that the partial strategy is being implemented successfully.
SG100	There is a strategy in place for managing retained species. The strategy is mainly based on information directly about the fishery and/or species involved, and testing supports high confidence that the strategy will work. There is clear evidence that the strategy is being implemented successfully, and intended changes are occurring. There is some evidence that the strategy is achieving its overall objective.
Scoring	<b>Overall score: 75</b> For <b>cod</b> and <b>saithe</b> this SG meets all the 100 guideposts. For <b>monkfish</b> and <b>whiting</b> the fishery meets the partial strategy requirements of SG 80 in that the cod recovery programme will be beneficial for these species. In all cases there is some actual and modelling evidence that the strategies being adopted are working and being implemented effectively, although further measures could be taken to reduce the bycatch of species such as whiting. This scoring issue scores 70.

Rationale	<p>The joint EU/Norway Management Plan includes the requirement to reduce bycatch in the haddock fishery. Considerable work has been conducted in trialling more selective gears for mixed whitefish fisheries in Scotland. There is now a need for the widespread adoption of locally suitable selective gear to reduce the incidental catch of species that may be subsequently discarded.</p>
Condition	<p>The client shall ensure that there is a partial strategy in place that is expected to maintain both retained species at levels which are highly likely to be within biologically-based limits, or to ensure the fishery does not hinder their recovery and rebuilding.</p> <p>To achieve this outcome, it is recommended that the SFSAG fleet should continue to collaborate proactively with research and development organisations engaged in seeking gear improvements aimed at reducing unwanted by-catch (both commercial and non-commercial) and other adverse environmental effects. On the basis of this joint research, the client fleet should, in consultation with both statutory and non-statutory organisations, adopt suitably selective gear to reduce discard levels of both whiting and cod.</p> <p>Evidence should be provided by the first annual surveillance there is a partial strategy in place that is expected to maintain the main retained species at levels which are highly likely to be within biologically based limits, or to ensure the fishery does not hinder their recovery and rebuilding. This will include verifiable information on selectivity and gear performance measured against current benchmark levels, which will be formally assessed at the third surveillance audit.</p>
Client action plan	<p>Members of the client group will continue to participate extensively in the development and trial of further selective gears to reduce discards through their participation in initiatives such as the Conservation Credits scheme, a Scottish response to regional management that promotes sustainable fishing practices, and the Scottish Industry Science Partnership (SISP), which helps fishers develop new, environmentally friendly, fishing gears. Furthermore, the group will seek to influence the on-going use and development of innovative net design and configuration of whitefish gear, Seasonal Closures (SC's), and Real Time Closures (RTC's) which together provide substantial protection for juveniles and vulnerable stocks such as cod and whiting</p> <p>The group will use current levels of selectivity and gear design as a benchmark from which to assess the need for further improvements; the group will deliver any necessary changes through their participation, and influence within the various stakeholder groups.</p> <p>It is expected that a formal partial strategy for the adoption of suitably selective gear will be in place within a year of initial certification and that there is evidence that this strategy is being implemented successfully within three years of certification.</p>
Consultation on condition	<p>The client group will use their strong links with Conservation Credits, SISP and the North Sea Regional Advisory Council (NSRAC), an advisory body to the European Commission, to advance the necessary changes as set out in the aforementioned condition (Condition 1) . Preliminary discussions have already taken place during consultation over the preparation of the Client Action Plan.</p>

## CONDITION 2: RECORDING TOTAL CATCH OF RETAINED SPECIES

Outcome	2.1.3
PI	Information / monitoring: Information on the nature and extent of retained species is adequate to determine the risk posed by the fishery and the effectiveness of the strategy to manage retained species.
SG60	<p>Qualitative information is available on the amount of main retained species taken by the fishery.</p> <p>Information is adequate to qualitatively assess outcome status with respect to biologically based limits.</p> <p>Information is adequate to support measures to manage main retained species.</p>
SG80	<p>Qualitative information and some quantitative information are available on the amount of main retained species taken by the fishery.</p> <p>Information is sufficient to estimate outcome status with respect to biologically based limits.</p> <p>Information is adequate to support a partial strategy to manage main retained species.</p> <p>Sufficient data continue to be collected to detect any increase in risk level (e.g. due to changes in the outcome indicator scores or the operation of the fishery or the effectiveness of the strategy).</p>
SG100	<p>Accurate and verifiable information is available on the catch of all retained species and the consequences for the status of affected populations.</p> <p>Information is sufficient to quantitatively estimate outcome status with a high degree of certainty.</p> <p>Information is adequate to support a comprehensive strategy to manage retained species, and evaluate with a high degree of certainty whether the strategy is achieving its objective.</p> <p>Monitoring of retained species is conducted in sufficient detail to assess ongoing mortalities to all retained species.</p>
Scoring	<p><b>Overall score: 75</b></p> <p>The main bycatch stocks are whiting, saithe, cod and to a lesser extent, monkfish.</p> <p>There is accurate and verifiable information on the landings of all retained species and the consequences for the status of affected populations. However there is only limited, mostly observer data on the <i>total quantity</i> of main retained species taken by the fishery (e.g. landings plus the quantity of retained species that may be discarded). As a result, the first scoring issue of SG80 is not fully met; therefore the assessment team has decided that a score of 70 is appropriate for this PI.</p> <p>For cod, saithe, plaice, whiting and monkfish information is sufficient to estimate outcome status with respect to biologically-based limits (80).</p> <p>For cod, saithe, plaice, whiting and monkfish information is adequate to support a partial strategy to manage main retained species (80).</p> <p>Monitoring of retained species is conducted in sufficient detail to detect any increase in risk level (e.g. due to changes in the outcome indicator scores or the operation of the fishery or the effectiveness of the strategy) (80).</p>
Rationale	<p>Notwithstanding ongoing gear developments to reduced discard levels, there continues to be widespread concern, shared by the assessment team, that the total catch of retained species is significantly greater than the quantities landed. The discarding of cod, haddock and whiting is not routinely recorded (current</p>

	<p>qualitative estimates of discards are made through observer programmes) and collection of such data would help to improve management measures for these species.</p>
Condition	<p>By the first surveillance audit, evidence must be presented that shows that measures have been developed to provide some accurate quantitative information on total catch (i.e. retained plus discarded catch) of all retained species.</p>
Client action plan	<p>The group will liaise with Government, fish selling offices, Producer Organisations and within its membership with a view to creating a flow of total catch information. This may be attached to existing documentation, such as official landing declarations, or take the form of bespoke record keeping for vessels landing MSC product. Alternatively, in order to satisfy the condition, vessels may make use of new technology as and when it develops. The group will liaise with MSS to develop a common standard for the reporting of total catch so that such information may ultimately support existing information.</p>
Consultation on condition	<p>Consultation on this condition have already taken place with external agencies e.g. fish selling offices, the POs and within SFSAG membership.</p> <p>Each vessel in the client group is required to sign terms of membership that stipulate that produce from the unit(s) 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</p> <p>In addition to this, the client group has been in liaison with Marine Scotland Science in the design of discard logging systems.</p>

### CONDITION 3: MITIGATION MEASURES TO REDUCE DISCARDING

Outcome	2.2.2
PI	Management strategy: There is a strategy in place for managing bycatch that is designed to ensure the fishery does not pose a risk of serious or irreversible harm to bycatch populations.
SG60	There are measures in place, if necessary, which are expected to maintain main bycatch species at levels which are highly likely to be within biologically based limits or to ensure that the fishery does not hinder their recovery. The measures are considered likely to work, based on plausible argument (e.g. general experience, theory or comparison with similar fisheries/species).
SG80	There is a partial strategy in place, if necessary, for managing bycatch that is expected to maintain main bycatch species at levels which are highly likely to be within biologically based limits or to ensure that the fishery does not hinder their recovery. There is some objective basis for confidence that the partial strategy will work, based on some information directly about the fishery and/or the species involved. There is some evidence that the partial strategy is being implemented successfully.
SG100	There is a strategy in place for managing and minimising bycatch. The strategy is mainly based on information directly about the fishery and/or species involved, and testing supports high confidence that the strategy will work. There is clear evidence that the strategy is being implemented successfully, and intended changes are occurring. There is some evidence that the strategy is achieving its objective.
Scoring	<b>Overall score: 75</b> There is a partial strategy (through the EC CPOA for sharks) in place for managing spurdog bycatch that is expected to maintain main bycatch species at levels which are highly likely to be within biologically based limits or to ensure that the fishery does not hinder their recovery. This includes a vessel-level approach of a move-on strategy in the case of spawning aggregations of this species. This is a large-mesh gear which will help minimise the capture of non-commercial species. However there is scope for the wider adoption of more selective gear to reduce bycatch further so does not quite achieve SG 80 (75). There is some objective basis for confidence that the partial strategy will work, based on some information directly about the fishery and/or the species involved. This is supported by the declining markets for, and landings of spurdog and the cessation of targeted fishing of this species (80). There is some evidence that the partial strategy is being implemented successfully. More selective trawl designs to reduce the level of by-catch will benefit this benthopelagic species (80).
Rationale	The joint EU/Norway Management Plan includes the requirement to reduce discards in the haddock fishery. Considerable work has been conducted in trialling more selective gears for mixed whitefish fisheries in Scotland. There is now a need for the widespread adoption of locally suitable selective gear to reduce the incidental catch of species that may be subsequently discarded.
Condition	The client shall ensure that there is a partial strategy in place that is expected to maintain discarded bycatch species at levels which are highly likely to be within

	<p>biologically-based limits, or to ensure the fishery does not hinder their recovery and rebuilding.</p> <p>To achieve this outcome, it is recommended that the SFSAG fleet should continue to collaborate proactively with research and development organisations engaged in seeking gear improvements aimed at reducing unwanted by-catch (both commercial and non-commercial) and other adverse environmental effects. On the basis of this joint research, the client fleet should, in consultation with both statutory and non-statutory organisations, adopt suitably selective gear to reduce discard levels of both whiting and cod.</p>
Client action plan	<p>Members of the client group will continue to participate extensively in the development and trial of further selective gears to reduce discards through their participation in initiatives such as the Conservation Credits scheme, a Scottish response to regional management that promotes sustainable fishing practices, and the Scottish Industry Science Partnership (SISP), which helps fishers develop new, environmentally friendly, fishing gears. Furthermore, the group will seek to influence the on-going use and development of innovative net design and configuration of whitefish gear, Seasonal Closures (SC's), and Real Time Closures (RTC's) which together provide substantial protection for juveniles and vulnerable stocks such as cod and whiting</p> <p>The group will use current levels of selectivity and gear design as a benchmark from which to assess the need for further improvements; the group will deliver any necessary changes through their participation, and influence within the various stakeholder groups.</p> <p>It is expected that a formal partial strategy for the adoption of suitably selective gear will be in place within a year of initial certification and that there is evidence that this strategy is being implemented successfully within three years of certification.</p>
Consultation on condition	Not required for this condition as no external parties are involved.

**The Assessment Team:** the assessment team for this fishery is as follows:

**Principal 1: Colin Chapman.** Colin Chapman graduated in 1962 with a B.Sc. in Zoology from the University of Nottingham and in 1977 with a BA in Mathematics from the Open University and was awarded a D.Sc. by the University of Nottingham in 1997. He joined the Marine Laboratory, Aberdeen in 1962 and initially worked on fish behaviour in relation to fishing gear. In 1972, transferred to the Shellfish Resources Section at Aberdeen and worked with this group, from 1988 as Section Head, until taking early retirement in 1997. In 1966, established a field research station at Upper Loch Torridon and carried out research there for many years, particularly on the ecology, behaviour and general biology of the Norway lobster (*Nephrops norvegicus*). Has published many scientific papers and research reports on this species, also on other shellfish and fish species and on the efficiency and selectivity of fishing gears. In 1987, was appointed by the Buckland Foundation to give the Buckland lecture series on *Nephrops* biology and fisheries. An active member on several ICES working groups including the ICES Nephrops Study Group and the Stock Assessment Working Group, from 1977-96. Appointed an Honorary Senior Lecturer by Aberdeen University in 1992. Since retirement has been involved in projects on nephrops, European lobsters, cockles, mussels, crab species and scallops as well as various teaching roles and part-time consultancy work.

**Principal 2: Tim Huntington.** Tim Huntington is a UK-based consultant specialising in fisheries, aquaculture and the aquatic environment. He has over twenty years experience in aquaculture and fisheries as a fisheries biologist. He has designed, managed and directed coastal, marine and freshwater resource management projects in Europe and many other countries worldwide and is an environmental impact assessment specialist with wide-ranging experience of fisheries and aquaculture development world-wide. He has extensive experience in fisheries, aquaculture and 'chain of custody' certification. His fisheries certification experience includes pre-assessments and full assessments in the UK, Netherlands, Canada, Maldives and the Pacific Region.

**Principal 3: Stephen Lockwood.** Stephen is an independent marine environment consultant and chairman of the Welsh Minister's fishing industry consultation group. Until 1999 he was Head of the UK Ministry of Agriculture, Fisheries and Food laboratory at Conwy, which undertook research and development work in the fields of fish and shellfish cultivation, and the environmental effects of fishing. At a personal level, he was responsible for providing advice to MAFF policy divisions, and through them to ministers, across the broad field of coastal zone management. Previously, he led research and providing scientific advice on the conservation of fish stocks and the management of fisheries, including the Western mackerel stock, Celtic Sea and Bay of Biscay Demersal fisheries, Pilchard (*Sardina pilchardus*) stocks and Western English Channel herring and sprats. He has published on stock assessment, fishery management and coastal development issues.

## 2 INTRODUCTION

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This report sets out the results of the assessment of the **SFSAG North Sea Haddock Trawl & Danish Seine Fishery** against the Marine Stewardship Council (MSC) Principles and Criteria for Sustainable Fishing.

### 2.1 THE FISHERY PROPOSED FOR CERTIFICATION

The MSC Guidelines to Certifiers specify that the unit of certification is “The fishery or fish stock (=biologically distinct unit) combined with the fishing method/gear and practice (=vessel(s) pursuing the fish of that stock) and management framework”. The fishery proposed for certification is therefore defined as:

**Table 1: Certification Unit**

<b>Species:</b>	Haddock <i>Melanogrammus aeglefinus</i>
<b>Geographical Area:</b>	North Sea (ICES Divisions IVa & IVb)
<b>Method of Capture:</b>	Demersal (otter trawls (single & multiple rigs) ; Danish seine
<b>Management System:</b>	<b>Legal:</b> EC Common Fisheries Policy; EU-Norway Agreement; National legislation <b>Enforcement:</b> Scottish Fisheries Protection Agency; Royal Navy; Norwegian Authorities <b>Science:</b> Fisheries Research Service / ICES
<b>Client Group:</b>	Scottish Fisheries Sustainable Accreditation Group (SFSAG) Ltd <b>Vessels to be covered by the certificate are listed in Appendix F</b>

The unit of certification (i.e. the certified fishery) is expected to be restricted to those vessels catching haddock and fishing out of Scottish ports – and so would exclude haddock caught as by-catch in directed fin-fish fisheries (except where these are part of another MSC certified fishery, such as the North Sea nephrops fishery). In the first instance the unit of certification would be limited to members of the SFSAG that are fishing for haddock on a full-time or part-time basis (the latter group being vessels also engaged in the nephrops fishery – see Table 4).

The client group has identified those vessels participating in the certified fishery. It should be noted that the MSC certification may require ‘operational’ conditions to be adopted by vessels, and so active participation by skippers would be required.

## 2.2 REPORT STRUCTURE AND ASSESSMENT PROCESS

The aims of the assessment are to determine the degree of compliance of the fishery with the MSC Principles and Criteria for Sustainable Fishing, as set out in Section 8.

This report sets out:

- the background to the fishery under assessment and the context within which it operates in relation to the other areas where haddock are fished
- the qualifications and experience of the team undertaking the assessment
- the standard used (MSC Principles and Criteria)
- stakeholder consultation carried out. Stakeholders include all those parties with an interest in the management of the fishery and include fishers, management bodies, scientists and environmental Non-Governmental Organisations (ENGO's)
- the methodology used to assess ('score') the fishery against the MSC Standard.
- a scoring table with the Scoring Indicators adopted by the assessment team and Scoring Guidelines which aid the assessment team in allocating scores to the fishery. The commentary in this table then sets out the position of the fishery in relation to these Scoring Indicators.

The intention of the earlier sections of the report is to provide the reader with background information to interpret the scoring commentary in context.

Finally, as a result of the scoring, the Certification Recommendation of the assessment team is presented, together with any conditions attached to certification.

In draft form, this report is subject to critical review by appropriate, independent, scientists ('peer review'). The comments of these scientists are appended to this report. Responses are given in the peer review texts and, where amendments are made to the report on the basis of peer review comments; these are also noted in the peer review text. Following peer review, the report is then released for public scrutiny on the MSC website.

The report, containing the recommendation of the assessment team, any further stakeholder comments and the peer review comments is then considered by the Moody Marine Governing Board (a body independent of the assessment team). The Governing Board then make the final certification determination on behalf of Moody Marine Ltd.

It should be noted that, in response to comments by peer reviewers, stakeholders and the Moody Marine Governing Board, some points of clarification may be added to the final report.

Finally, the complete report, containing the Moody Marine Ltd Determination and all amendments, will be released for further stakeholder scrutiny.

## 2.3 STAKEHOLDER MEETINGS ATTENDED

Information used in the main assessment has been obtained from interviews and correspondence with stakeholders in this fishery, notably:

**Table 2: People consulted over the assessment period**

Ref	Organisation	Names	Email
I1	Scottish Fisheries Sustainable Accreditation Group (Client Group)	George McCrae (Chairman) Mike Park (Chief Executive)	george@macraestephen.co.uk m.park@btconnect.com
I3	Seafood Scotland	Jess Sparks (Technical & Env. Manager)	jess@seafoodscotland.org
I3	Caley Fisheries	Jackie Tait	
I4	Northern PO.	Gary Masson	garymasson@btconnect.com
I5	Fishing vessel skippers	Bill Wiseman George West	
I6	Scottish Fisheries Protection Agency	David Terry (Area Manager - North & East)	david.terry@scotland.gsi.gov.uk
I7	North-East Scotland Fisheries Organisation (NESFO)	Robert Stevenson	robert.stevenson@nesfo.co.uk
I8	Representative selling agent; PFL	Graeme Murray	
I9	Fishing vessel skippers	Peter Bruce Michael Buchan Brian Buchan	peter.bruce418@btinternet.com
I10	Fisheries Research Services, Aberdeen	Bill Turrell Coby Needle Helen Dobby Nick Bailey Peter Wright Barry O'Neil	b.turrell@marlab.ac.uk c.needle@marlab.ac.uk h.dobby@marlab.ac.uk n.bailey@marlab.ac.uk p.wright@marlab.ac.uk B.Oneill@marlab.ac.uk
I11	Joint Nature Conservation Committee JNCC (Aberdeen)	Tom Blasdale	tom.blasdale@jncc.gov.uk
I12	Marine Scotland	Colin Faulkner (stock conservation) Stuart Baxter (stock conservation) Susan Ewart (Effort control manager) Jim Watson (quota management) Ewen Milligan (Prosecutions & enforcement) Alistair Stewart (Sea Fisheries Inspectorate) Andrew Brown (Fisheries Strategy & Environment) Sebastian Howell (Economic development)	
I13	Scottish Fishermen's Federation	Rory Campbell (Science and Environment Policy Officer)	r.campbell@sff.co.uk
I14	Scottish Natural Heritage	David Donnan	david.donnan@snh.gov.uk
I15	WWF Scotland	Louize Hill	lhill@wwfscotland.org.uk
I16	WWF UK	Giles Bartlett	GBartlett@wwf.org.uk
I17	MRI, Iceland	Haraldur A. Einarsson	haraldur@hafro.is

## 2.4 OTHER INFORMATION SOURCES

Published information and unpublished reports used during the assessment are listed (both by title and by reference) below:

### A. Listed by Title

Title	No
Albert, O.T. (1991). Distribution and trophic ecology of haddock ( <i>Melanogrammus aeglefinus</i> ) in the Norwegian Deep. Copenhagen. ICES. CM 1991/G:45. 15	TH43
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## 2.5 ABBREVIATIONS AND ACRONYMS USED IN THE REPORT

ACFM.....	Advisory Committee on Fisheries management (ICES), now renamed ACOM
ACOM.....	Advisory Committee for Fishery Management
ASCOBANS.....	Agreement on the Conservation of Small Cetaceans of the Baltic and North Seas
CCS.....	Conservation Credit Scheme
CCSG.....	Conservation Credits Steering Group
CCTV.....	Closed circuit television
CFP.....	Common Fisheries Policy
CL.....	Carapace length
CPUE.....	Catch per Unit Effort
Defra.....	Department of Environment, Food and Rural Affairs;
EC.....	European Commission
EEZ.....	Exclusive Economic Zone
EFF.....	European Fishery Fund
EFZ.....	Exclusive Fishery Zone
ETP.....	Endangered, threatened or protected species
EU.....	European Union
F.....	Fishing mortality rate
FRS.....	Fisheries Research Services (now part of Marine Scotland <sup>1</sup> )
FU.....	Functional Unit
GAM.....	Generalised Additive Model
IBA.....	Important Bird Areas
ICES.....	International Council for the Exploration of the Seas
JNCC.....	Joint Nature Conservation Committee
LPUE.....	Landings per Unit Effort
MFA.....	Marine and Fisheries Agency
MLS.....	Minimum Landing Size
MNCR.....	Marine Nature Conservation Review
MSC.....	Marine Stewardship Council
NBN.....	National Biodiversity Network
NESFO.....	North-East Scotland Fisheries Organisation
NFFO.....	National Federation of Fishermen's Organisations
NSRAC.....	North Sea Regional Advisory Council
OSPAR.....	The Convention for the Protection of the Marine Environment of the North-East Atlantic
PO.....	Producer Organisation
QSR.....	Quality Status Report
RAC.....	Regional Advisory Council

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<sup>1</sup> On April 1 2009, Fisheries Research Services (FRS) was merged with the Scottish Fisheries Protection Agency (SFPA) and the Scottish Government Marine Directorate to form Marine Scotland - Scotland's new marine management organisation.

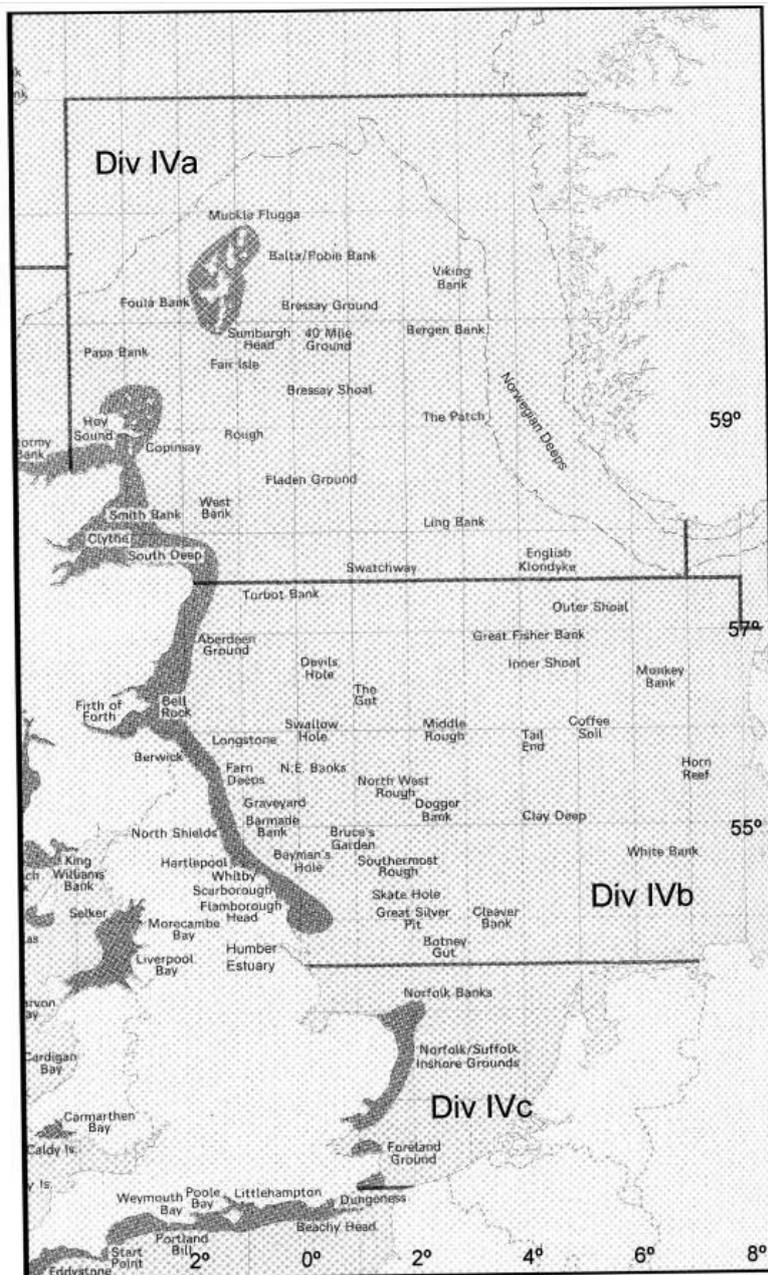
REGNS ..... Regional Ecosystem study group for the North Sea  
 RFS..... Responsible Fishing Scheme  
 RSPB..... Royal Society for the Protection of Birds  
 RTC..... Real Time Closure  
 SAC ..... Special Area of Conservation  
 SAMS ..... Scottish Association for Marine Science  
 SSC..... Seasonal Closure  
 SFF ..... Scottish Fishermen’s Federation  
 SFPA ..... Scottish Fisheries Protection Agency  
 SGMD ..... Scottish Government Marine Directorate (now Marine Scotland)  
 SISP ..... Scottish Industry Science Partnership  
 SMP..... Square Mesh Panel  
 SMRU ..... Sea Mammal Research Unit  
 SFSAG..... Scottish Fisheries Sustainable Accreditation Group  
 SNH ..... Scottish Natural Heritage  
 SPA ..... Special Protection Areas  
 SSB ..... Spawning Stock Biomass  
 STECF ..... Scientific, Technical and Economic Committee for Fisheries  
 SWFPA..... Scottish White Fish Producers Association  
 TAC..... Total Allowable Catch  
 UoC..... Unit of Certification  
 UK..... United Kingdom  
 UKOOA..... United Kingdom Offshore Operators Association  
 VMS ..... Vessel Monitoring System  
 VPA..... Virtual Population Analysis  
 WGFTFB ..... Working Group on Fishing Technology and Fish Behaviour (ICES)  
 WGNSSK..... Working Group on assessment of demersal stocks in North Sea and Skagerrak  
 WGSE..... Working Group on Seabird Ecology (ICES)  
 XSA..... Extended Survivors’ Analysis  
 Y/R..... Yield per recruit analysis

### 3 BACKGROUND TO THE FISHERY

#### 3.1 BIOLOGY OF THE TARGET SPECIES

The haddock (*Melanogrammus aeglefinus*) is the most valuable bottom living (demersal) fish species in the North Sea, with an annual value to Scottish fishermen of around £34 million (Table 3). Haddock are also fished commercially off the West Coast of Scotland, and there is another fishery at Rockall (57° 36' N; 13° 41' W). In the North Sea, haddock are found predominantly in the northern and central areas, but can be found as far south as the Humber Estuary (Fig 1). Fishing for haddock in the North Sea is concentrated in the area north of 55° N in ICES Sub-areas IVa, b.

Figure 1: Fishing grounds of the North Sea showing ICES Divisions IVa, b, c



Haddock are bottom feeding fish and occur mainly in waters from 40–200m deep. Their diet includes a wide range of benthic invertebrates (such as worms, brittle stars, sea urchins, and small molluscs) as well as other fish species. Invertebrates tend to be the main food of haddock during the winter, with fish forming most of their diet in the summer. The type of fish prey varies with location – sandeel are the main component of the diet in the central North Sea, and Norway pout are the most common fish eaten in the northern area. The diet of haddock also varies with age – fish prey is more important for larger haddock. Young haddock are themselves prey for other fish species such as saithe and other gadoids.

Source: from Lee & Ramster, 1981)

Haddock mature at around 2–3 years of age, and can spawn anywhere in the area between the eastern Scottish coast and the Norwegian Deep, with notable aggregations on Viking and Bergen Banks, to the west of Orkney and Shetland, and from Long Forties to Great Fisher Bank. Spawning takes place close to the sea bed, the optimal depth being around 100m. Inshore areas are favoured over offshore areas by smaller and younger fish. Spawning takes place over several weeks between February and early May. The timing and length of the spawning season varies according to the size and age of the local population, with age 2 fish spawning later. As a consequence, the spawning period in offshore areas can be double that of inshore areas. Spawning involves complex courtship and coupling between male and female, leading to synchronised release of gametes. A three year old female would produce around 300,000 eggs and these are released in many batches over the spawning season.

Haddock larvae spend the first few months of life in the upper water layers before moving to the seabed. They tend to remain close to the spawning areas, though some larvae are known to enter the North Sea from the spawning areas off the west coast of Scotland. The numbers of young fish which survive to enter the fishery as recruits varies greatly from year to year, often by a factor of 100 or more. A strong year class of recruits may only occur once every *c.* 10 years or so but will usually sustain the fishery for several years.

There is some debate among fisheries scientists about the existence of distinct sub-populations of haddock within the North Sea. Tagging studies have suggested that while adult shoals spread out from spawning areas, they do not inter-mix with haddock from distant spawning areas. There are also regional differences in maturity between populations. However recent evidence from genetic, tagging and parasite studies has challenged these proposed differences. For assessment purposes, ICES regards haddock in the North Sea and Skagerrak as forming a single unit stock.

There is a considerable scientific literature about the population ecology of this species and its role in the North Sea ecosystem, as well as the effects of haddock fishing on the stock and marine environment (C1, C2, C3, C4, C5, C6, C7, C8, C9, C10, C11, C18, C23).

### **3.2 HISTORY OF THE FISHERY**

Today's North Sea haddock fishery is much smaller than it was 40 years ago, when average annual landings were around 200,000 t, compared to current (2007) landings of around 27,000 t. The TAC for 2009 has been set at 42,110 t, of which the UK quota share is 27,507 t. The biomass of the haddock stock is largely dependent on the occasional strong year class recruiting to the fishable stock. Good year classes are difficult to predict but seem to occur, on average, about every 10 years. In 1967, there was an exceptionally large year class, roughly 10 times the average, and this sustained a large increase in fishing effort for many years. Above average year classes also occurred in 1974 and 1999 but were not as strong as that of 1967.

In recent years, it has been necessary to reduce fishing effort by the demersal fishing fleet and there has been significant decommissioning of Scottish vessels. As a result of decommissioning schemes in 2001–2002, and 2003–2004, 165 vessels were taken out of the Scottish fleet.

In 2007, haddock accounted for nearly 39% of the demersal fish landed in Scotland from the N. Sea, and 90% of Scottish haddock were landed in North Sea ports (Table 3).

**Most of the UK vessels fishing for haddock are based in Scotland, and many of these are members of the Scottish Fisheries Sustainable Accreditation Group (SFSAG). Around 192 boats are associated with the SFSAG application for MSC accreditation and form the client fleet (Appendix F).**

**Table 3: Landings of haddock by all vessels to Scottish ports in 2007**

<b>Port</b>	<b>Haddock (tonnes)</b>	<b>Value (£'000)</b>	<b>Demersal fish landings (t)</b>
<b>Eyemouth*</b>	214	238	437
<b>Aberdeen*</b>	1,929	2586	3,311
<b>Peterhead*</b>	16,529	21,257	35,549
<b>Fraserburgh*</b>	2,385	2,498	8,917
<b>Buckie*</b>	34	39	219
<b>Wick*</b>	1,665	2,263	6,959
<b>Shetland*</b>	3,786	4,984	12,814
<b>Lochinver</b>	811	1,000	3,129
<b>Kinlochbervie</b>	846	1,035	4,017
<b>Ullapool</b>	805	1,115	2,838
<b>Mallaig</b>	330	370	1,130
<b>Campbeltown</b>	104	108	172
<b>Oban</b>	49	63	105
<b>TOTALS</b>			
<b>All ports</b>	<b>29,509</b>	<b>37,579</b>	<b>79,946</b>
<b>* North Sea ports</b>	<b>26,542</b>	<b>33,865</b>	<b>68,206</b>

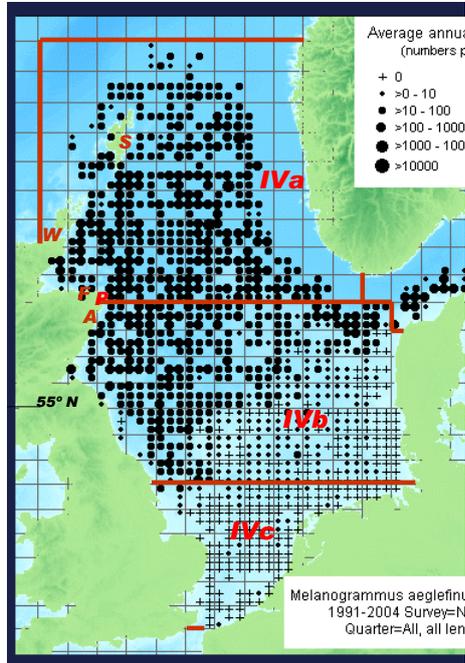
Source: Scottish Sea Fisheries Statistics, 2007 (C12)

Haddock are also targeted by other nations in the North Sea, principally Norway, who have a 23% share of the TAC. The Norwegians prosecute the fishery using a mixture of trawls, long-lines and gillnets; their landings in 2007 were 1,706t. Other nations taking part in the fishery, with their 2007 landings (t) in parentheses, are Belgium (178), Denmark (645), Germany (727) and Sweden (127).

### 3.3 FISHING LOCATIONS

The SFSAG fishing effort for North Sea haddock is concentrated in the northern and central areas of the North Sea, in areas north of 55° N, i.e. those areas in which haddock are found in greatest abundance (Fig. 2).

**Figure 2: Average catch of haddock in the North Sea (1991 – 2004)**



The average catch of haddock (number per hour, all sizes combined) in the North Sea (ICES Divisions IVa, b, c) during the ICES-coordinated International Bottom-Trawl Surveys 1991–2004.

A, Aberdeen; F, Fraserburgh; P, Peterhead; W, Wick; S, Shetland.

Adapted from ICES on-line FishMap:

<http://www.ices.dk/marineworld/fishmap/ices/default.asp?id=Haddock>

Scottish-based vessels fishing in the North Sea generally land their catch to the east coast ports, principally at Peterhead, Fraserburgh and Aberdeen, but also Wick and Shetland.

### 3.4 FLEET AND GEAR DESCRIPTION

A full list of nominated vessels comprising the client fleet is provided in Appendix F and some details of gears used by that portion of the fleet fishing for haddock are summarised in Table 4. There are 192 vessels in the client fleet fishing for haddock, of which 131 fish for them all year round and a further 59 vessels fish for haddock for part of the year (details are unknown for 2 vessels). The latter vessels fish for nephrops at other times of the year and are included in a parallel application for MSC certification of the northern N. Sea nephrops fishery, being conducted by the same assessment team. Although it is the haddock fishery seeking certification, it would be inappropriate to regard the fishery as a targeted haddock fishery, rather it should be regarded as a targeted demersal whitefish fishery, in which haddock is the main species sought after. As a mixed fishery it will be necessary to consider carefully the stocks of several other species that are caught with haddock.

Table 4 provides a break down of the main gear classifications involved in the fishery. The main gears are single demersal trawl, twin-trawl, seine net and pair seine-trawl. All these gears are governed by the same mesh regulations, requiring 120mm mesh cod-ends. Prior to 2005, pair seine and pair trawl were separate gear categories for the recording of official landing statistics but fishery officers found it increasingly difficult to distinguish between them; as a result the two gears were combined into one category from 2006 onwards (Table 5). In pair trawling, the two vessels tow each side of the net on a single wire warp, keeping about 0.2–0.3 miles apart to spread the mouth opening of the net. The drag of the gear is relatively low, since no otter boards are involved, allowing two relatively low power vessels to tow a much larger net than would be possible if they operated alone. The replacement of trawl warps by long (0.7 mile)

combination seine ropes (rope with wire core) is the main difference between pair trawling and pair seining. These long ropes lie on the sea bed and herd fish into the net path from a wide swept area. Pair seine gear is lighter than the equivalent trawl gear and fuel costs are generally lower.

Twenty-one of the client vessels use twin-rig gears consisting of two nets joined together. Under Scottish legislation in 2006, the use of multi-rig gear with more than two nets was prohibited (C13). The ban applies to any Scottish fishing vessel, wherever it may be fishing, and to any relevant British vessel fishing within the Scottish fishing zone. In the North Sea, the legislation allows twin-rig trawling with nets of mesh size 80 mm or more on the Fladen ground and south of 53° N. latitude in ICES area IVc; elsewhere such rigs must employ nets with a mesh size of 95 mm or more.

Of 185 client vessels (from a total of 192) for which full details are known, 19 are less than 15 m in length (10%), and 166 are >15m in length (90%), requiring, under EU legislation, the fitting of a VMS satellite monitoring system.

**Table 4: Details of Client Fleet**

Gear type	Numbers of vessels fishing for:		<i>Number and length range (LOA in m given in brackets) of vessels fishing with different gears, for demersal fish (mainly haddock), and for haddock or nephrops during the year. Note that gear listed in final column is that used for demersal whitefish fishing. (Details unknown for 2 other vessels).</i>
	haddock	nephrops or haddock	
Single nephrops trawl	8 (11.98 – 21.2m)	3 (10 – 15.36m)	
Twin nephrops trawl	1 (16.92m)	-	
Demersal trawl	70 (9.7 – 40m)	47 (10.87 – 27.85m)	
Twin demersal trawl	18 (16.3 – 25.75m)	8 (16.33 – 20.85m)	
Seine	28 (16.3 – 26.61m)	1 (16.5m)	
Pair seine–trawl	24 (20.82 – 28.35m)	2 (18.98 – 19m)	
<b>Totals</b>	<b>149</b>	<b>61</b>	

The categories of demersal trawl gear used in the N. Sea off the Scottish coast are now largely dictated by EU Cod Recovery Plans and Scotland's response to these in the form of the Conservation Credit Scheme (CCS) (C14, C15, C19, C20). Gears used in the demersal whitefish fishery (which might include nephrops as by-catch) and the targeted nephrops fishery are referred to as TR1 and TR2 trawls, with meshes of 100 mm or more and 70–99 mm respectively. In practice, most vessels fishing for haddock and other demersal species in the North Sea use trawls or seines (TR1) of mesh size 120 mm or greater. Vessels using these gears receive a basic 'days-at-sea' allocation which can be topped up by adopting other conservation measures, such as avoiding areas of high cod (*Gadus morhua*) abundance (Seasonal closures and 'Amber' areas, in addition to mandatory real time closures – RTC), and more selective gears, such as an 'Eliminator trawl' (C14, C16), an 'Orkney' trawl (C14, C17), or trawls with cod-ends of 130 mm mesh or greater. Also, vessels that historically have landed small quantities of cod can gain extra days fishing if they continue to land less than 5% cod and agree to fish outside certain areas. Subject to certain derogations, vessels signed up to the CCS may only carry on board one type of regulated gear ('one net rule'). Vessels must also agree to carry an observer for sampling of catches and discards. For full details of the CCS, see Section (§ 5.3.2).

The ‘Eliminator’ trawl is basically a USA design for the reduction of by-catch, especially cod, in their haddock fishery (C16). The main feature of the net is the use of very large mesh netting in the wings, forward part of the belly panel and in the top sheet. Under the CCS, the regulated ‘Eliminator’ trawl has 600 mm diamond mesh in the above net positions (C14). The ‘Orkney’ trawl is similar to the ‘eliminator’ trawl but has 300 mm diamond mesh netting in the above net positions (C14). Trials, with promising results, have also taken place to reduce cod by-catch using nets with 800 mm mesh panels in the lower wings and belly sheet (C21, C22).

### 3.5 LANDINGS AND TRENDS IN THE FISHERY

Information on landings of haddock by UK vessels in Scotland was provided by FRS from their Fisheries Management Database. Data were provided for the northern North Sea (ICES Sub-area IVa) and the central North Sea (Sub-area IVb), with the landings categorised according to the gear/vessel classifications used by the SFPA for recording data (Table 5).

**Table 5: Gear descriptions and codes used by SFPA to record landings data in Scotland**

Gear Code	Gear Description	Vessel length (feet) <sup>1</sup>	Landings composition
PSN+PTD	Pair seine + pair trawl <sup>2</sup>		
SEN	Seine net		
MTH	Heavy multiple trawl <sup>3</sup>	≥90	
MTR	Single demersal trawl	≥90	
MTD	Multiple trawl demersal	<90	
LTR	Light trawl	<90	
MTN	Multiple nephrops trawl	<90	Landings must comprise ≥30% nephrops by weight
NTR	Single nephrops trawl	<90	

<sup>1</sup>90 feet = 27.432m

<sup>2</sup>These 2 gears combined (as PTD) since 2005-6

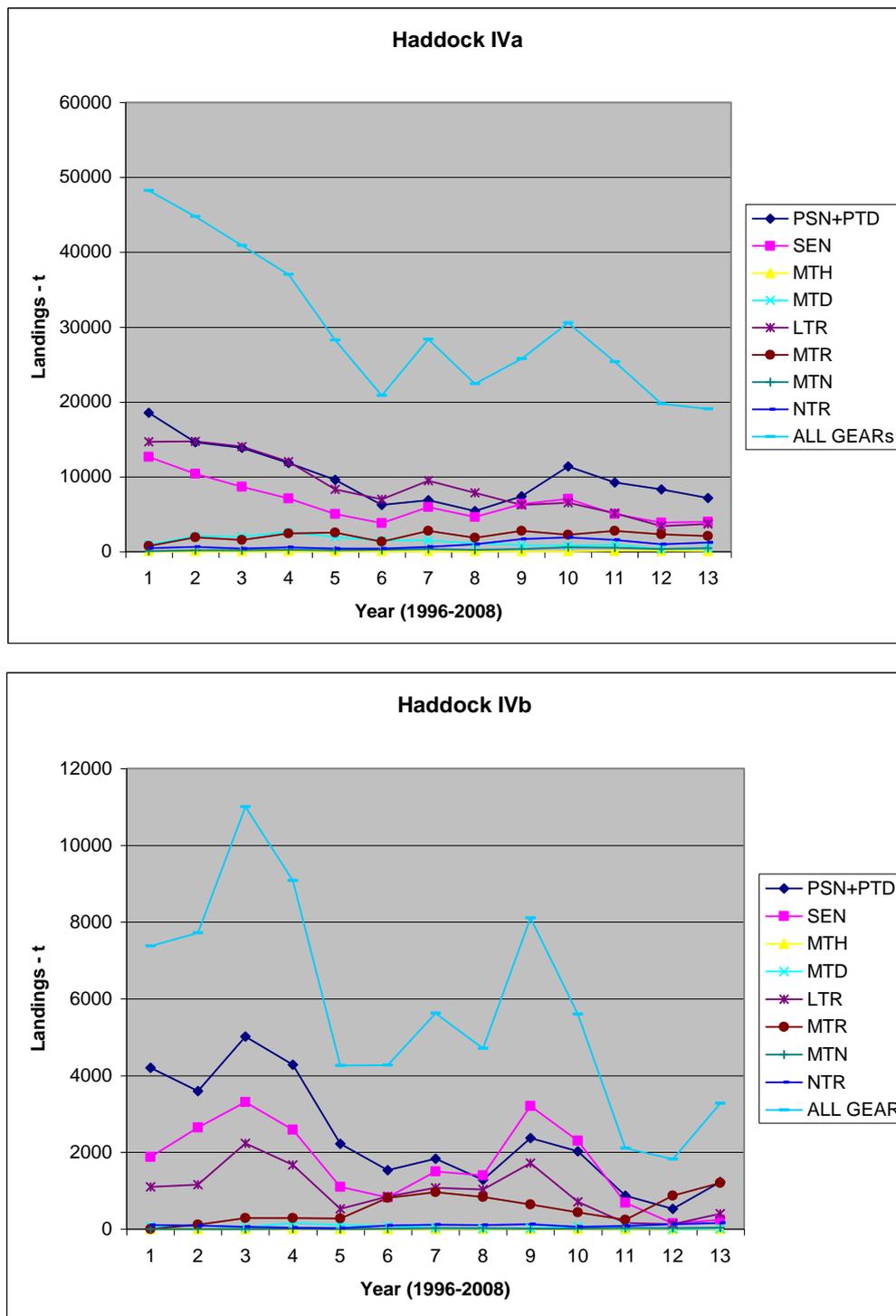
<sup>3</sup>Category introduced in 2006

A time series (1996 - 2008) of haddock landings by different gears from the northern and central North Sea is shown in Fig. 3. Landings of haddock at Scottish ports from the northern North Sea exceed those from the central part roughly by a factor of 5. In both areas there has been a decline in landings over the time period, reflecting reduced effort resulting from days-at-sea limits and recent vessel decommissioning programmes. Most of the landings in both areas have been made by pair trawls – seines (PSN+PTD), seine nets (SEN) and light trawl (LTR).

While haddock is the main species targeted by Scottish fishermen, accounting for about 40% of demersal fish landings (Table 3), several other species contribute to the overall landings. Time series of landings of the main by-catch species are shown in Fig. 4. The most important species are cod, whiting (*Merlangius merlangus*) monkfish (=angler fish, *Lophius piscatorius*) and saithe (*Pollachius virens*). Fig. 4 shows the general decline in landings, across all species in recent years, mirroring falls in stock biomass for some species, and also fishing effort. More details concerning cod and spurdog landings are given in Section 6.

**Figure 3: North Sea Haddock: time series (1996-2008) of landings (t) in ICES Sub-areas IVa (upper) and IVb (lower), by different gears into Scottish ports by UK vessels**

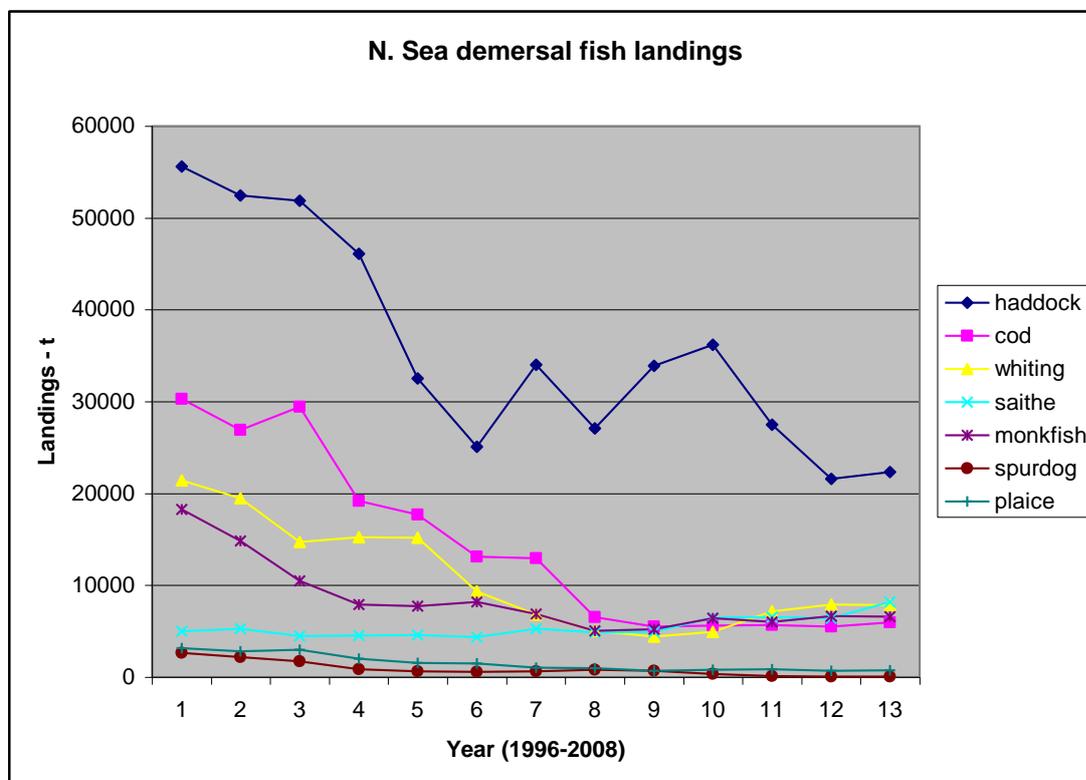
*See Table 5 for details of gear codes. Note different ordinate scales*



Source: from FRS Fisheries Management Database.

**Figure 4: Time series (1996-2008) of landings (t) of haddock and other main demersal fish species in the North Sea (ICES Sub-areas IVa & IVb combined), by UK vessels at Scottish ports**

*All gear categories combined.*



Source: from FRS Fisheries Management Database.

### 3.6 SAMPLING PROGRAMME BY SFF OBSERVERS

The importance of deriving reliable information on quantities and composition of discards, and researching mitigating methods to reduce them, has led to the Scottish Government funding additional sea-going observers as part of the Scottish CCS. Since August 2008, four observers have been employed full time, through the SFF, on this project which will run initially for two years. Their work will complement the existing observer programme of FRS and will follow FRS protocols in carrying it out. The SFF observer programme covers several topics designed to support the CCS, including; a) trials of novel gears, such as the ‘Orkney’ trawl (C14), aimed at reducing fish discards in demersal and, or nephrops trawls, b) data collection on catch and discards, c) data collecting on cod catch and distribution for triggering RTCs. Fishermen are being encouraged to put forward new ideas for more selective gears which can be tested as part of the observer programme (C19, C20). In 2008, SFF observers carried out three trips on whitefish fishing vessels during which 72 hauls were analysed for discards. So far in 2009 (up to the end of October), eight trips have been made and 135 hauls analysed.

## 4 STOCK ASSESSMENT

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### 4.1 MANAGEMENT UNIT

For assessment purposes ICES considers that haddock in the North Sea (Sub-area IV) and the Skagerrak (northern part of Division IIIa) form a unit stock which is assessed annually by the ICES Working Group on the Assessment of Demersal Stocks in the North Sea and Skagerrak (WGNSSK) (C28). There is a possibility that this stock is linked to the West of Scotland stock (ICES Div. VIa).

The overall management of the North Sea haddock fishery in UK territorial waters and the EU EEZ is determined by the EU Common Fisheries Policy. There are agreements in place that allow EU vessels to fish in Norwegian waters and vice versa. Fishing for haddock in the North Sea is governed by a long-term Management Plan, agreed between the EC and Norway, which has been in operation since 1999 (see Section 4.3).

Governance of this fishery is considered to be within a stable political environment. The only significant changes that are foreseeable would be the collapse of the EU–Norway management agreements, or Scottish independence. These arrangements are, however, governed by long-established international legal rules which make adverse impacts on the management of the haddock fishery unlikely despite any political or administrative changes.

### 4.2 ASSESSMENTS AND STOCK STATUS

Assessment of the state of the haddock stock, along with stocks of other species of demersal fish and nephrops, is carried out by ICES (WGNSSK). The Group meets annually and carries out assessments using information available up to the end of the previous year in order to provide management advice for the year following. This assessment advice is considered by the ICES Advisory Committee On Management (ACOM) and their report forms the official advice which is presented for consideration by the EC and ultimately by the Council of Ministers.

The most up-to-date ICES WGNSSK and ACOM reports available at the time this report was first drafted were those for 2008 (C26, C28). The following discussion is therefore mainly based on the 2008 reports. Subsequently, the 2009 ACOM report became available and, where appropriate, this has been used to update the advice (ICES Advice 2009, Book 6).

The working group assessment objectives are usually:

- To estimate the historical trends in landings, spawning stock biomass (SSB), recruitment and fishing mortality (F)
- To describe the state of the stock in relation to historic trends
- To define the likely short – medium term yield and biomass in relation to different fishing mortality scenarios

Assessment of the North Sea and Skagerrak haddock stock is carried out by WGNSSK using the Extended Survivors' Analysis (ESA) VPA program (C30, C31). The data used in the assessment are derived from (i) total reported landings, (ii) sampling for weight, length, age, (iii) observer recorded discards, (iv) fishing effort data from logbooks, CPUE or LPUE, (v) research vessel survey indices and (vi) data on natural mortality (M) from multi-species analyses. The Scottish data collected by FRS is comprehensive, comprising market sampling at all the main ports, observer discard trips, as mentioned earlier, and participation in FRS and international collaborative trawl surveys (C27).

**Table 6: Summary of stock assessment for haddock in ICES Sub-area IV (North Sea) & Div. IIIa north (Skagerrak), 1998-2008 (t ='000 tonnes)**

*Ind. By-catch refers to by-catch of haddock in the industrial fishery for Norway Pout*

Year	Recruits millions	SSB t	Catch t	Landings t	Discards t	Ind. By- catch t	Landings/SSB = harvest ratio (%)	Mean F Age 2-4
1998	9994	207	131	81	45	5.1	39	0.592
1999	137380*	161	112	66	43	3.8	41	0.698
2000	26774*	139	104	48	49	8.1	34	0.749
2001	2895	320	167	41	118	7.9	13	0.483
2002	3651	527	108	58	46	3.7	11	0.226
2003	3812	516	67	42	24	1.2	8	0.198
2004	3962	443	65	49	16	0.6	11	0.262
2005	39022*	384	57	48	9	0.2	13	0.315
2006	6383	307	56	38	18	0.5	12	0.519
2007	4454	218	63	32	31	.05	15	0.417
2008	4371	222						

\*above average year classes

From: C28, C26

The results in Table 6 indicate how SSB in 2002–2003 was strongly influenced by the relatively high recruitment of 0-group fish in 1999 and 2000. This is a feature of haddock population dynamics that stock biomass, and hence yield, are strongly dependent on occasional and unpredictable strong recruitment events. The quantity of discards was very high in 2001 (118kt), almost certainly as a result of higher recruitment in the previous two years. There was also an above average recruitment in 2005, though not as strong as that in 1999. The most recent recruitment estimates are very low, though higher than in the period 2001-2004. The Table shows that fishing mortality, averaged over fish aged 2–4, (F) was relatively high at the beginning of the time series, as was the harvest ratio.

#### 4.2.1 Precautionary Approach reference points

The estimates of SSB and F in Table 6 need to be considered in relation to precautionary approach reference points. For the haddock stock in the North Sea, ICES has proposed precautionary reference points for SSB and F. The precautionary level for SSB ( $B_{pa}$ ) has been set at 140,000t, while the corresponding precautionary fishing mortality ( $F_{pa}$ ) has been set at 0.7. Should SSB fall below  $B_{pa}$ , action should be taken to increase it; similarly, if F exceeds  $F_{pa}$ , then action should be taken to reduce it. ICES has also defined limit reference points,  $B_{lim}$  and  $F_{lim}$  which are set to indicate when a stock may be at serious risk of its reproductive capacity being impaired. For haddock, these reference points are set at SSB = 100,00 t and F = 1.0 respectively. It can be seen from Table 6 that the latest estimates of SSB and F indicate that the North Sea haddock stock may be considered as having full reproductive capacity (SSB > 140,000 t), and being harvested sustainably (F < 0.7).

The estimates of SSB for haddock in the North Sea show a continued decline, from 527,000 t in 2002 to 218,000 t in 2007, as the effect of the strong 1999 year class diminishes. Up to 2006, fishing mortality had fallen to levels around the target in the EU–Norway Management Plan (F=0.3; see Section 4.3) but F was 0.52 in 2006 and 0.42 in 2007, though still below the  $F_{pa}$  of

0.7. The most recent ACOM advice for 2009 shows that mean F in 2008 was estimated to be 0.251, which is below the target of 0.3 (ICES Advice 2009, Book 6).

### 4.3 MANAGEMENT ADVICE

The North Sea haddock stock is being managed according to a plan agreed between the EU and Norway. The 'Management Plan' was initially set up in 1999, was revised at the start of 2007 and will be reviewed again by the end of 2009.

The EU and Norway haddock Management Plan consists of the following elements:

1. Every effort shall be made to maintain a minimum level of SSB, greater than 100,000t ( $B_{lim}$ ).
2. For 2007 and subsequent years the Parties agreed to restrict their fishing on the basis of a TAC consistent with a fishing mortality rate of no more than  $F = 0.3$  for appropriate age groups, when the SSB in the end of the year in which the TAC is applied is estimated above 140,000 t ( $B_{pa}$ ).
3. Where the rule in para.2 would lead to a TAC which deviates by more than 15% from the TAC of the preceding year the Parties will establish a TAC which deviates by no more than 15% greater or 15% less than the TAC of the preceding year.
4. Where the SSB referred to in para.2 is estimated to be below  $B_{pa}$  but above  $B_{lim}$  the TAC shall not exceed a level which will result in a fishing mortality rate equal to:  
 $0.3 - 0.2 * (B_{pa} - SSB) / (B_{pa} - B_{lim})$ . This consideration over-rides para.3.
5. Where the SSB referred to in para.2 is estimated to be below  $B_{lim}$  the TAC shall be set at a level corresponding to a total fishing mortality rate of no more than 0.1. This consideration over-rides para.3.
6. In order to reduce discarding and to increase the SSB and the yield of haddock, the Parties agreed that the exploitation pattern shall, while recalling that other demersal species are harvested in these fisheries, be improved in the light of new scientific advice from *inter alia* ICES.
7. In the event that ICES advises that changes are required to the precautionary reference points  $B_{pa}$  (140,000 t) or  $B_{lim}$  (100,000 t) the Parties shall meet to review paras.1–5.
8. No later than 31 Dec. 2009, the Parties shall review the arrangements in paras.1-7, in order to ensure that they are consistent with the objectives of the plan. This review shall be conducted after obtaining *inter alia* advice from ICES concerning the performance of the plan in relation to its objectives.

The main elements of the plan comprise a target fishing mortality of 0.3 which is referred to as the harvest control rule ( $F_{HCR}$ ), a limit of  $\pm 15\%$  change in TAC from year to year provided SSB is above  $B_{pa}$  (140,000t), and a gradual reduction in F to 0.1 if SSB falls below  $B_{pa}$  towards  $B_{lim}$  (the 'sliding F rule'). ICES have evaluated this plan and accepted it as precautionary and appropriate for framing advice. The plan seems to be working well (Coby Needle, FRS, pers. comm.), and a management strategy evaluation, applying various simulations, suggests that the plan offers sustainability in terms of SSB and stability in quotas (C24, C25). It is estimated that adherence to the plan has contributed to relatively stable landings (C01); the 1999 year class has sustained the fishery for much longer than if the plan had not been in place and it should ensure that the 2005 year class is exploited sustainably. The target fishing mortality of 0.3 is equivalent to landings of 44,700 t in 2009 which should include the industrial trawl fishery by-catch. Accordingly, the EU has set the international TAC for North Sea haddock at 42,110 t in 2009, with the UK quota at 27,507 t.

## 4.4 OTHER FISH STOCKS

In Scotland, haddock is the main component in a mixed demersal fishery and it is necessary to consider the state, and management, of other fish stocks in the North Sea. Information on the landings and discards of the main species caught in the Scottish trawl and seine net fisheries is provided in Sections 3.5 & 6. Among the main species are cod, whiting (*Merlangius merlangus*), saithe (*Pollachius virens*), angler fish (*Lophius piscatorius*) and plaice (*Pleuronectes platessa*).

### 4.4.1 Cod

ICES considers North Sea cod as a stock suffering reduced reproductive capacity ( $SSB < B_{lim}$ ) and as being harvested unsustainably ( $F$  close to  $F_{pa}$ ). Two management plans are in place; the EU–Norway plan with the main objective to increase SSB and keep it above  $B_{lim}$  (70,000 t), and maintain fishing mortality at the target level of  $F = 0.4$ ; the cod recovery plan, comprising seasonal and other area closures, effort limits and conservation credit schemes, with the aim of reducing  $F$ , by 25% in the first year (2009) and then by 10% per year thereafter until target  $F$  is reached. The TAC for 2009 has increased to 28,798 t, UK quota 11,216 t (C01, C28).

### 4.4.2 Whiting

Biological reference points are not considered reliable by ICES and it is difficult to define the true stock status of North Sea whiting. SSB is currently low and fishing mortality is above the level perceived to be sustainable. Recruitment has been at a low level since 2003 and without good recruitment, the stock is unlikely to recover. The TAC for 2009 is 15,173t, UK quota 8,426t. Recent measures to improve survival of young cod, and increased use of more selective gears should be encouraged for whiting (C01, C28).

### 4.4.3 Saithe

Most saithe landings are reported from the North Sea, with about one tenth coming from the shelf edge to the west and NW of Scotland. The stock appears to be healthy; ICES considers that it has full reproductive capacity ( $SSB > B_{pa}$  since 1998) and is being harvested sustainably ( $F < F_{pa}$  since 1997). A joint EU/Norway Management Plan, similar to that for haddock, has operated since 2004, with the aim of maintaining SSB above  $B_{pa}$  (200,000t) and with a target  $F$  of 0.3. The EU TAC for 2009 has been set at 130,000t, UK quota 13,727t (C01, C28).

### 4.4.4 Angler fish (monkfish)

Angler fish in the North Sea and west of Scotland are likely to come from the same stock. No new assessments have been done by ICES and the stock status is poorly known. There is a need for more scientific monitoring of the stock and FRS have intensified their research effort on this species since 2005, with considerable help from the Scottish Industry (joint surveys, logbook records, observer coverage). ICES recommends no increase in effort until better statistics are available ( $F_{pa} = 0.3$ ). The EU TAC for angler fish in all EC and international waters was set at 16,912t, UK quota 11,224t which includes 278t from Norwegian waters of Sub-area IV (C01, C28).

### 4.4.5 Plaice

SSB is at a fairly low level between  $B_{pa}$  and  $B_{lim}$  and recent recruitment has been poor. According to the EU management plan adopted in 2007, fishing mortality should be reduced by 10% in 2009 and there is a 15% bound on year to year changes in TAC, which would equate to landings of 55,00t in 2009 (C28).

## 5 FISHERY MANAGEMENT FRAMEWORK

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### 5.1 FISHING RIGHTS AND LICENSING

The United Nations the Law of the Sea Convention (UNLOSC, 1977) made provision for coastal states to claim jurisdiction over an exclusive fishery zone (EFZ) to 200 nautical miles from baselines, or out to median lines where coastal states baselines are less than 400 miles apart. From the same date, the Commission of the European Communities (EC) assumed exclusive competence for the management of fisheries within European Union (EU) member states' EFZ. This arrangement was formalised in the conclusion of negotiations for an EU common fisheries policy (SJL1), and subsequent variations. EU legislation directly affecting the fishery under assessment is:

- **The Conservation Regulation** (EC) No. 850/98 (and subsequent amendments) covers technical measures for the conservation of fishery resources (SJL2). It is within this regulation that rules that govern minimum landings sizes, minimum mesh sizes, closed areas and restrictions of gear types are implemented.
- **The Control Regulation** (EC) No. 2847/93 (and subsequent amendments) covers the control of monitoring of conservation and fish stock management measures (SJL3). This includes setting rules for inspection at sea, vessel monitoring, and recording of catches and logbook completion. This regulation also covers rules on landing declarations, transport documents, sales notes and effort and catch report.
- **Quota Regulations** – In December each year the Council of Ministers determine total allowable catches (TACs; SJL4) based on the scientific advice they receive from the ICES Advisory Committee on Management [ACOM (SJL5), previously the Advisory Committee on Fisheries Management, ACFM] and the EC (STECF; SJL6). The CFP (EEC, 1983) includes provision *inter alia* for the 'relative stability' in the allocation of member states' annual quota allocation from the TAC. The policy of relative stability ensures that each member state with access to a given fish stock is allocated a fixed percentage of the TAC as its national quota. Member states are free to distribute this national quota among its national fishing fleet in a non-discriminatory manner.
- **Effort Regulations** – In addition to a cap on the quantity of fish that vessels may take each year from given stocks, i.e. TACs and quotas, the Council of Ministers is seeking to bring the total deployed fishing effort into line with the resources available by limiting the number of days fishing that each member state can deploy. Each nation has a total number of days at sea their fishing fleet can operate and each state distributes this effort among its domestic-registered fleets.

The UK government, and through its devolved powers, the Scottish Government, operates a restrictive licensing scheme covering the UK-registered fishing fleet (SJL7). Thus, only vessels with a current licence are allocated days at sea to fish and specifically, only licensed vessels with a North Sea haddock quota allocation can fish for North Sea haddock.

The international fishery, including fishing by UK-registered vessels, is subject to the terms of an EU–Norway long-term fishery management plan (see §4.3 above). The terms and objectives of this plan are an implicit element of the CFP and therefore, are fundamental to the management of UK fisheries and the fleets participating in the fisheries, i.e. including SFSAG vessels exploiting the North Sea haddock.

This management plan apart, neither the UK nor Scottish government have a haddock-specific management plan but the North Sea haddock fishery is an integral part of the whitefish fishery and it is governed by a set of objectives aimed at minimising the capture of cod in support of the EU cod recovery plans (see §5.4.2). In addition, the Scottish Government has established a Fisheries Council (SJL8) that is broadly based and has long-term environmental and resource utilisation at the core of its objectives (SJL9). The council is chaired by the Scottish minister for fisheries, or a senior official in his place, and includes a comprehensive range of representation from all sectors of the Scottish fishing industry (the client fleet is represented by the SFF), the principal Scottish umbrella environmental NGO body (Scottish Environment Link), financial institutions and other statutory bodies with environmental responsibilities.

The Scottish Fisheries Council objectives are, *inter alia*:

.... the Scottish Fisheries Council is to develop policies and initiate actions which will help the Scottish fishing industry to:

- Nurture the resources on which it depends.
- Play its part to safeguard the marine ecosystem....

.... establish measures which achieve:

- Sustainable and stable levels of commercial fish stocks in Scottish waters.
- Fishing patterns and methods which safeguard the marine environment....

.... The Council will take a particular interest in 2 themes:

*European fisheries and marine policies:* Much of the fisheries policies in Scotland stem from EU policies. Scotland has an important and increasingly authoritative voice in EU negotiations. Important reforms to EU fisheries policies are scheduled for discussion in the near future, such as a review of the Technical Conservation regulation, while the replacement of the current Common Fisheries Policy in 2012 is an issue of great significance for Scotland. EU marine policies, including the Birds and Habitats Directives, the Marine Strategy Directive and the EU Maritime Strategy, also have important implications for the Scottish fishing industry.

*Communities:* The Scottish Government recognises the need for fisheries policies to contribute to the sustainability of rural coastal communities. Marine policies such as marine spatial planning will also devolve decision making to a more local level, highlighting the need for interface between rural community and fisheries policies. Likewise, rural policies need to address the needs of fisheries dependent communities....

## **5.2 ADMINISTRATIVE ARRANGEMENTS AND BOUNDARIES**

### **5.2.1 Boundaries**

The UK has exclusive rights to fish within 6 miles of baselines. Between 6 and 12 miles, fishing by non-UK vessels is restricted to those with historic rights relating to specific fisheries and specific countries. In practice, no non-UK registered fishing vessels have historic rights to fish for demersal species in UK North Sea waters north of The Humber (Fig. 1). Whilst UK fishery ministers (Department of Environment, Food and Rural Affairs; Defra) retain responsibility for the day-to-day management of UK-registered fishing vessels fishing off the coast of England, Scottish ministers exercise devolved powers for the regulation of sea fishing within the Scottish zone of British sea fishery limits, including non-discriminatory conservation measures within 12 miles of baselines providing that such measures do not confound EU legislation. In addition, the Scottish government can introduce non-discriminatory conservation measures throughout the Scottish sector of the UK sector of EU waters but such measures can only be enforced on Scottish-based fishing vessels.

### **5.2.2 Administration of Quota**

The UK North Sea haddock quota is divided between Defra and the Scottish Government for allocation to English and Scottish-based vessels respectively. The Scottish share of the UK quota is divided by fixed percentages among the Scottish fish producer organisations (PO; SJJ10), with a percentage retained by Marine Scotland which manages it for Scottish-based vessels that are not members of a PO; so-called ‘non-sector’ vessels.

The Scottish POs distribute shares of the PO quota to the PO member vessels on an established fixed-percentage basis. Thus, once the international TAC has been agreed a PO skipper has a good idea of what his annual quota will be as it will be a percentage (PO allocation) of a percentage (Scottish Government allocation) of a percentage (UK allocation from international TAC). Once a PO skipper is aware of his annual quota allocation, he is permitted to take it as and when he chooses – subject to any short-term restrictions imposed by the PO on its members in response to market supply and demand. The percentage of Scottish quota retained by Marine Scotland for the benefit of non-sector vessels is made available on a tonnage-per-month basis for the sector. When the month’s tonnage is taken, the fishery is closed; there is no allocation to individual vessels.

In addition to quota that Scottish POs receive as their annual block allocation from Marine Scotland, they frequently engage in quota trading, both nationally and internationally. If they have quota for one species that is excess to their members’ requirements, they can trade it for additional quota of a more desirable species. Also, a PO can buy or lease additional quota from skippers who have retained a quota entitlement but it is excess to their needs, e.g. because they have sold their fishing vessel but retained their quota entitlement. If a PO accrues additional quota it is available for members’ use subject to the PO’s rules, but normally the skipper must pay for additional quota. Individual skippers may also operate in the quota-trade market irrespective of whether they are a PO member or not.

### **5.2.3 Administration of Days at Sea**

As with the initial allocation of quota, the UK total allocation of days at sea is divided among the home fishery departments for distribution among the UK fleet. The major split is between Defra and Marine Scotland; Marine Scotland manages the days-at-sea allocations among the Scottish-based fleet. All licensed fishing vessels covered by the regulation receive a basic allocation of days at sea relating to their size, fishery and gear type. In addition, vessels can qualify for additional days at sea if they meet additional constraints (e.g. using greater than the minimum cod-end mesh sizes) or participate in other optional conservation measures (e.g. observing voluntary closed areas); together these are known as the Conservation Credit Scheme (see §5.4.2). Although total fishing effort is allocated in terms of days, it is recorded by the Scottish Fishery Protection Agency (SFPA) in units of hours absence from (a designated) port. Intended departure and return to port must be reported by the skipper to the SFPA beforehand but they are also monitored through the satellite vessel monitoring system (VMS) and harbour movement records.

### **5.2.4 Closed areas**

Under the terms of the Inshore Fishing (Prohibition of Fishing and Fishing Methods) (Scotland) Order (C33), certain inshore areas are closed to the use of mobile gear to reduce gear conflicts and to protect fish nursery areas. A summary of the provisions is given in Table 7.

**Table 7: List of areas in Scottish inshore waters of the North Sea closed to mobile gear**

*List of areas in Scottish inshore waters of the North Sea closed to the use of mobile fishing gear under the terms of the Inshore Fishing (Prohibition of Fishing and Fishing Methods) (Scotland) Order 2004, SSI 2004 No. 276*

Area (No.)*	Miles from MHWS	Period of closure	Exemptions	Main aim of closure
Thurso and Dunnet Bays (19)		All year		Fish nursery area, static gear reserve
Sinclair Bay (20)		All year		Fish nursery area
The Berry-Costa Hd., Orkney (21)	2	May – Sept.		Fish nursery, static gear reserve
Dornoch Firth (22)		All year	Dredging mussels**	Fish nursery area
Cromarty Firth (23)		All year	Dredging cockles & mussels	Fish nursery area (herring)
Inverness Firth (24)		All year	Dredging cockles & mussels	Fish nursery area (herring)
Aberdeen-Mons Craig (25)	1	Oct.-March		Fish nursery area, static gear reserve
Mons Craig-Doolie Ness (26)	2	All year		Static gear reserve
Doolie Ness- Lang Craig (27)	1 1/2	Oct.-March April-Sept.	Montrose Basin	Static gear reserve
Lang Craig-Arbroath (28)	2	All year		Static gear reserve
St Andrews Bay, Tay Estuary (29)		All year		Fish nursery, static gear reserve
St. Abbs- Scot. /Engl. Border (30)	1	All year		Static gear & voluntary marine nature reserve

\* No. given refers to the relevant paragraph in Schedule 1 of the 1989 Order.

\*\* Mechanical dredge only, not suction dredging; the latter method is not permitted in any of the areas listed above.

Source: C33

### 5.3 LEGISLATION AND REGULATION

The North Sea haddock fishery is managed through an EU–Norway long-term management plan (1999) that is subject to reaffirmation at the annual EU–Norway fishery consultation meeting (SjL11). The agreement allocates the TAC ~80:20 EU:Norway from which the UK quota is ~85% the EU allocation. All licensed UK fishing vessels with North Sea haddock quota are permitted to fish in both EU and Norwegian waters. UK vessels are subject to the regulations of the Common Fisheries Policy, as enacted and up-dated through UK legislation (acts, statutory instruments and orders in council). When fishing within the English sector of EU waters or landing at a port in England, vessels are subject to the jurisdiction of the Defra Marine Fisheries Agency (MFA); in Scottish waters and ports it is the Scottish Fishery Protection Agency (SFPA). Beyond UK fishery limits, vessels remain subject to UK fishery conservation measures and regulations but fall under the jurisdiction, enforcement regime and rules of the corresponding coastal state (Denmark and Norway when fishing north of 55° N. Irrespective of where they are fishing, all fishing vessels >15 m in length are obliged to carry an operational satellite-linked vessel monitoring system (VMS). This is interrogated every 2 hours to give both the MFA and SFPA (and Norwegian Coastguard when fishing in the Norwegian sector) a current position of every UK registered fishing vessel (but it does not give information on

activity). All fish landed for sale in the UK is subject to regulation by the buyers and sellers registration and licensing scheme (see below).

In addition to UK legislation, all Scottish-based, UK-registered fishing vessels are subject to fishery control and conservation measures introduced for that purpose by Marine Scotland; principally these measures are part of the Scottish Conservation Credit Scheme (see below). Scottish conservation measures do not apply to other UK nor non-UK registered vessels. Whilst fishing within the Norwegian sector of the North Sea, *all* vessels (i.e. UK, EU, non-EU and Norwegian) are subject to the rules and regulations of the Norwegian fishery management and conservation regime – for so long as the vessel is within the Norwegian sector. Once a vessel returns to the EU sector, the CFP applies once more. Thus, whilst fishing in the Norwegian sector no discarding is permitted, all catches must be retained on board irrespective of fish size or whether the vessel has quota to land the species. Once a vessel crosses the median line and returns to EU waters, however, it is compelled by the current terms of the CFP to discard all fish smaller than the minimum permitted landing size and all fish for which the vessel does not have quota. Inevitably, this practice is a bone of contention between Norway and the EU and is currently subject to intense debate within the EU, with a possible view to emulating the Norwegian system in some form or other (SJL12, SJL13).

To complement and reinforce the discard ban, the Norwegians enforce a minimum *catching* size (27 cm) whereas in EU waters the more traditional minimum *landing* size (30 cm) prevails. The Norwegian authorities add further weight to the protection of juvenile fish by operating a real-time closure system where excessive numbers of undersize fish are recorded. (The Norwegian Coastguard implements an intensive at-sea catch monitoring programme throughout Norwegian jurisdictional waters.) As yet, real-time closures in EU waters only apply to Scottish-based vessels participating in the conservation credit scheme for minimising cod catches although all EU-registered vessels are encouraged not to fish in ‘closed’ areas.

Whether fishing in EU or Norwegian waters, all vessels must maintain a detailed record of fishing location, activity and retained catch by species. The logbooks (paper at present but electronic logbooks will be available shortly) differ between Norwegian waters and EU waters. The logbooks must be up to date, accurate (within a small margin of error) and available for inspection at any time that a fishery patrol wishes to board a vessel to inspect its fishing gear, retained catch and logbooks. If any detail of the gear in use, catch or logbooks fails to meet the standards or criteria specified under the CFP, the skipper can be subject to prosecution and penalties.

Once a skipper intends returning to port, whether to land the catch or to shelter from severe weather and thereby ‘save’ days at sea, he must notify the SFPA of his intentions and nominate the designated port at which he intends to arrive. If the intention is to land the catch, the skipper must also give notice of the quantities of fish by species; this enables the SFPA to plan their vessel–catch monitoring and surveillance and meet the vessel as it docks if they so wish.

As soon as the catch is landed, the fishing vessel skipper must lodge a copy of the vessel logbook with the local fishery inspectors. Within 48 hours of landing the catch, the skipper is also responsible for supplying the fishery inspectors with a landings declaration and copies of sales notes recording the sale of the catch. In practice, the landing declaration is invariably completed and submitted by the vessel’s selling agent although the skipper remains legally responsible for the accuracy of the declaration. Failure to comply with these regulations, including inaccurate declarations, can result in prosecution and penalties. In recent years the accuracy of the landings declarations relative to the quantity of fish actually landed has improved due to the introduction and implementation of the buyers and sellers regulations.

### 5.3.1 Buyers and Sellers Regulations

For a great many years there was a systemic problem throughout the fishing industry of greater quantities of fish being landed and sold than was being reported; the discrepancy was colloquially referred to as 'black fish'. In 2005 the UK government introduced a scheme whereby everyone engaged in the first sale or purchase of more than 25 kg fish per day anywhere in the UK has to register as either a buyer and, or seller of fish (SJL14). Not only does this regulation apply to designated ports with registered fish markets (auctions) but also to fish sold under contract between vessels and processors and private sales between skippers, or their agents, and buyers elsewhere. Failure to comply with these regulations can result in prosecution and penalties that include the possibility of deregistration and the loss of an individual's or company's right to engage in the sale or purchase of fish.

Whereas black fish landings and sales were recognised as an endemic problem in the recent past, it is the general perception and belief across all sectors of the industry, SFPA, Marine Scotland and Scottish government (SJL15) that, for all practical purposes, there is no longer a black-fish problem affecting Scottish fisheries and that official landing statistics are an accurate representation of the quantities of fish landed. However, this is not to say that there is absolutely no illegal landings or sales, but whereas they were once on a corporate scale they are now more likely to be between individuals such as a van driver–local fishmonger on a par with the 25 kg per day threshold for the regulations.

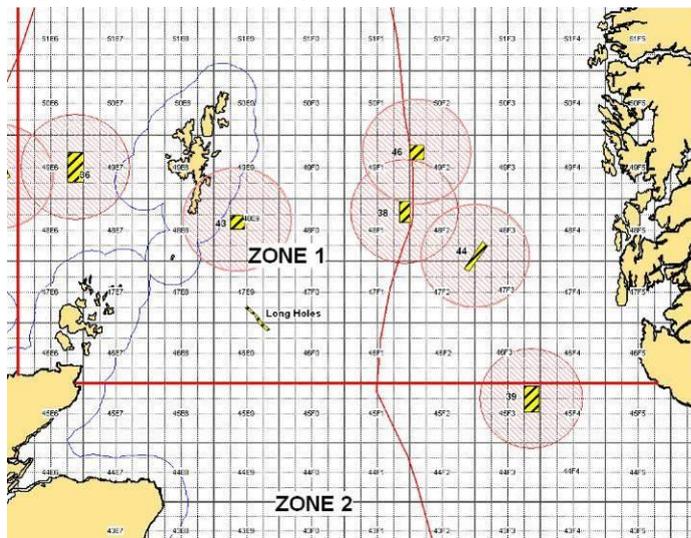
### 5.3.2 Scottish Government Conservation Credit Scheme

Scottish-based licensed fishing vessels receive an annual allowance of days at sea to fish that is allocated to individual vessels by Marine Scotland. Vessels can be allocated additional days at sea (but not additional quota) if they chose to participate in the Scottish Conservation Credit Scheme (SJL16). Conversely, they will be penalised days at sea if they sign-up to the scheme but are then found to be in breach of its rules. The scheme includes a range of measures to minimise the capture of cod and to reduce discards of all species through real-time closures and various technical measures. As haddock is a more sought after target species than is cod (the reverse of what would probably apply to most English vessels) the scheme is not thought to have any significant effects on haddock fishing effort *per se*.

#### ***Real-time Closures in support of the EU Cod Recovery Plan***

All Scottish-based vessels engaged in the North Sea haddock fishery are non-optional participants in the real-time closure (RTC) programme. If, during the course of fishing for haddock anywhere in the North Sea, a Scottish vessel catches more than 40 cod per hour (all size combined, not just undersize cod) they must report the catch and location immediately to the Scottish Fishery Protection Agency and leave the area. The SFPA will then notify the industry as a whole that a 7 x 7 mile area (or rectangle of equivalent area) around the reported location is closed to all Scottish towed-gear fishing for a period of 21 days. Vessels of other nations are also notified and encouraged to fish outside the 'closed' area; Defra has ruled that all UK-registered vessels must observe RTC areas notified by the SFPA.

**Figure 5: Cod recovery plan real-time closed areas in early March 2009**



Cod recovery plan real-time closed areas (yellow–black hatching) 16th March 2009. Red circles are commercial impact zones (area within which there should not be more than three RTC areas (SJL18).

Long Hole seasonal closure also shown near zone 1.

This industry self-policing is complemented by ‘forensic’ monitoring of fishing activity and landings by the SFPA within the Scottish sector of EU waters. If a vessel or group of vessels land a significant (by quantity or small size) catch of cod and the corresponding VMS records indicate that it all came from a small area, the SFPA will initiate at-sea monitoring and sampling of vessels in the area. If they find the catches to be predominantly small – undersize cod, the SFPA will initiate an RTC as described above.

During 2008, a total of 15 RTCs were initiated through the Conservation Credit Scheme, with as many as eight in effect at any given time; it is anticipated that the number will be much greater in 2009. Those in place 16 March 2009 are shown in Figure 5.

Vessels participating in the RTC scheme are awarded an additional 10% days at sea.

#### ***Amber Areas in support of the EU Cod Recovery Plan***

An Amber Area is an area in which cod abundance is insufficient to trigger the real-time closure mechanism but landing and VMS monitoring data over a 3 month period by SFPA indicate that it is an area in which cod are aggregated at higher densities than elsewhere. At present, there is no formal agreement or requirement to avoid such areas, but vessels that agree to keep clear of Amber Areas will gain an extra day at sea whilst Scottish-registered vessels that fish within an Amber Area will have a day at sea deducted from their allocation. Vessels which use approved selective gears can enter Amber Zones without penalty.

#### ***Seasonal Closures***

During the spawning season, cod tend to aggregate at a number of spawning grounds, four of which are closed to fishing as part of the recovery plan. These areas are Long Hole, Papa Bank, Stanhope Ground and Coral Edge. The location of the Long Hole area is shown in Fig. 5. This area was closed on 1<sup>st</sup> December 2008 with the aim of reopening it on 31<sup>st</sup> Mar., 2009, but because of the continued presence of cod, the closure is still in force at the time of writing (June 2009). The other three areas were proposed by the fishing industry and were closed as follows; Papa Bank (15 Jan–15 Mar.), Coral Edge (15 Jan–28 Feb.) and Stanhope Ground (21 Feb–30 Apr.).

[www.scotland.gov.uk/Topics/Fisheries/Sea-Fisheries/Compliance/closures](http://www.scotland.gov.uk/Topics/Fisheries/Sea-Fisheries/Compliance/closures)  
<http://openscotland.gov.uk/Resource/Doc 1061/0067717.doc>

### ***Optional Technical Measures***

All vessels fishing for haddock in the North Sea are obliged to meet the minimum technical regulation criteria (e.g. cod-end mesh sizes) prevailing at the time of fishing. Thus, all vessels were obliged to fish with a cod-end mesh size of not less than 110 mm with a square-mesh panel of not less than 120 mm in the sleeve or extension piece. Alternatively, vessels can fish with a 120 mm mesh cod end without fitting a square-mesh panel.

In addition, the Scottish Government has introduced a variety of national measures, some of which can gain additional days fishing for the vessel. A one-net rule limits vessels to carrying only one type of net on board, every net on board must comply with a single net specification. More particularly, once 90% of a whitefish vessel's cod quota has been taken it must use gear adapted to minimise further cod capture. (e.g. 'oversize' cod-end mesh, square mesh panels, the Orkney or Eliminator trawl). Vessels that opt to use these more selective gears throughout the year are awarded extra days at sea: 12% extra days for use of the 'Orkney' trawl (SJJ19) and 15% more days for the Eliminator trawl (SJJ20).

Scottish-based fishing vessels that wish to invest in fishing gear that is more selective than standard gear that complies with minimum CFP regulation criteria can apply for grant aid through the European Fishery Fund (EFF) administered by Marine Scotland (SJJ21).

As part of the CCS, vessels agree to carry FRS observers to monitor catch and discards. In addition, the Scottish Government is currently funding 4 additional observers to complement the FRS programme; this scheme is managed by the Industry (SFF) (Section 3.6)

## **5.4 HARVEST CONTROLS**

The principal harvest controls for any fishery fall into two categories, input controls and output controls. In essence, output controls are the TAC and quota regime enacted through the legislation and regulations described above and implemented by the monitoring, surveillance and enforcement described below. Input controls cover the when, where and how of fishing activity: days at sea, seasonal restrictions, area restrictions and fishing gear technical measures.

### **5.4.1 Input harvest controls**

There are no input controls specific to the North Sea haddock fishery. The controls all relate to any vessel fishing for whitefish, including haddock. All vessels receive a basic allocation of days at sea but it is possible for Scottish-based vessels to gain additional days (but not additional quota) by meeting and adhering to specific criteria in the Scottish Conservation Credit Scheme (see §5.3.2). Conversely, vessels that are registered participants in the scheme but are found to be in breach of the schemes rules can be penalised days at sea.

Seasonal and area restrictions all relate to the EU cod recovery plan (SJJ22), there are none that are specific to haddock other than a general policy of encouraging all fishing vessels to 'move on' if catches are dominated by undersize fish or fish smaller than the market will accept; i.e., do all that they can to minimise discards. Vessels that opt to use gear that has higher (cod) selectivity than standard permitted gear as part of the Conservation Credit Scheme, e.g. Eliminator or 'Orkney' trawls, will also tend to minimise catches of small and undersize haddock.

At present, there is a difference in the cod-end mesh regulations that apply in the Norwegian and EU sectors of the North Sea. The Norwegians enforce a minimum cod-end (stretched) mesh size of 120 mm whereas vessels fishing for haddock in EU waters can use 110 mm – providing that they also have a square mesh panel fitted in the topside of the sleeve or extension piece. In practice, the majority of SFSAG vessels fish with a 120 mm cod end as they are no less likely to fish in the Norwegian sector in the course of a trip than in EU waters. The fishing gear is liable to inspection at any time during a fishing trip by the appropriate fishery surveillance agency (see §5.5).

Any infringements of regulations governing the ‘when, where and how’ of fishing can render a vessel liable to prosecution and penalty.

#### **5.4.2 Output harvest controls**

As with input controls, there are no output controls specific to the North Sea haddock fishery (other than the species catch limitation covered by the annual haddock TAC and quotas). All controls stem from the CFP and apply to all North Sea whitefish fisheries, i.e. minimum landing size, quota control and management. Vessels must also remain clear of all seasonal and real-time closed areas that are part of the cod recovery programme. Whilst at sea, the skipper must keep an up-to-date logbook of fishing activity and retained catch. If the logbook is not up to date, or there is a significant discrepancy between the record of retained catch and what is found in the fish room during an inspection at sea, the skipper can be liable to prosecution and penalties.

The accuracy of the logbook for the trip, when submitted to the inspectors (SFPA) immediately on landing, is also checked against the statutory declaration of landings (and sales notes) that is made after sale of the fish, but within 48 h of landing. Again, any significant discrepancy between the logbook return and the landings declaration can result in prosecution and penalties.

To minimise the risk of any landed fish remaining unreported, only those who are registered as either a buyer or seller can engage in the first sale of fish in excess of 25 kg per day. Any person engaged in the illegal handling of fish is liable to prosecution and penalties.

At any time, fishery inspectors (SFPA) have the powers to enter premises to undertake a forensic audit of vessels’, sellers’ and buyers’ accounts to ensure that all fish landed is declared and that all landing declarations are accurate. Any significant irregularities can result in prosecution and penalty, including the loss of right to trade in fish; i.e. a business is liable to closure.

All vessels that are members of a producer organisation (PO) are given an annual allocation (tonnage) of haddock to land. In addition to making their statutory landing returns, skippers must also keep the PO informed of landings to ensure that neither the individual vessel nor the PO exceed their annual quota. Once a vessel has taken its quota it must cease fishing for haddock; similarly, once a PO has taken all its quota, all PO vessels must cease fishing for haddock. Any vessel that lands fish in excess of its quota is liable to sanctions by its PO as both the PO and individual skippers are liable to prosecution and penalties if the PO exceeds its quota allocation. POs endeavour to minimise this risk by buying additional quota if and when desirable or necessary (§5.3).

Vessels that are not members of a PO (non-sector vessels) are not allocated an individual tonnage but fish against a monthly tonnage (either per vessel or an aggregated total) made available each month. Once a vessel has taken its permitted tonnage, or the aggregated total has been taken by the non-sector fleet, fishing for haddock must cease. Any vessel landing haddock excess to its permitted tonnage or after the fishery has been closed for the month or season is liable to prosecution and penalties.

The fishery administrations which monitor fish landings endeavour to anticipate the point at which the national quota will be taken and give prior notice to the industry of the closure date for the fishery, assuming the quota is taken before 31 December. Any vessel retaining haddock on board or landing haddock after the fishery is closed is liable to prosecution and penalties.

## 5.5 MONITORING, CONTROL AND SURVEILLANCE

Within the Scottish zone of British Sea Fisheries Limits (an area of 127,000 square miles), day-to-day fishery management, monitoring, surveillance and enforcement is carried out by the Scottish Fisheries Protection Agency (SFPA), an agency of the Scottish Government (SJI23). The SFPA employs over 300 staff, and has 18 local offices (127 staff), including Aberdeen, Fraserburgh and Peterhead, the main whitefish ports. Fisheries are patrolled at sea by a fleet of 4 vessels (133 staff; Figure 6a) and 2 surveillance aircraft (contract crew; Figure 6b).

**Figure 6: A Scottish Fisheries Protection patrol vessel and surveillance aircraft**



a) Scottish Fishery Protection Vessel *Minna*. One of the SFPA patrol vessels with offshore monitoring and surveillance capabilities. (Photograph from SFPA website.)



b) SFPA Fishery surveillance aircraft Papa Bravo. Although the aircraft is owned by the SFPA it is crewed by contract staff. (Photograph from SFPA website.)

All fishing vessels over 15 m in length must carry an operational satellite-linked vessel monitoring system (VMS) whilst at sea. This enables the MFA and SFPA to monitor the distribution of the UK-registered fleet and locality of individual vessels. Nevertheless, the surveillance aircraft are also used to monitor the distribution of all fishing activity (not just Scottish or UK registered fishing vessels) around Scotland. They carry onboard sat-nav position fixing equipment and cameras for vessel identification and can provide evidence, in support of VMS records, of vessels that may be fishing in the wrong place or at the wrong time. The fishery patrol vessels have similar capability but their primary role is to undertake inspections at sea of fishing gear, catch and logbook records. All Scottish-based vessels are inspected at sea at least once per year; other at-sea inspections are made on a targeted, risk-based assessment of need. i.e. Inspection effort is focused on areas, activities or vessels that appear to offer greatest justification for an inspection. There is always at least one vessel on patrol within Scottish North Sea waters.

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

Vessel log sheets, landing declaration forms and sales notes are all forwarded to the SFPA head office in Edinburgh where the details are transferred to the Marine Scotland fishery database. From here, aggregate figures are forwarded to Defra, where the UK database is maintained and UK aggregate landings forwarded to the EC Fisheries Directorate. Two SFPA head-office staff

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

In the Norwegian part of the fishery, enforcement is carried out by the Coastguard and the Fisheries Directorates. All landings made by UK-registered vessels to non-UK ports are monitored by the receiving port fishery authority; landing statistics are relayed to the UK MFA (and through them SFPA for Scottish vessels). Any infractions of regulations will be subject to prosecution and penalties levied by the receiving nation. These local, third country, controls and monitoring notwithstanding, UK-registered fishing vessels must still report to UK authorities their intentions to land and provide the appropriate home authority with copies of the log sheet, landing declaration and sales notes, failure to do so can result in prosecution and penalties.

## **5.6 COMMUNICATION, CONSULTATION AND DISPUTE RESOLUTION**

Fishery management decisions affecting the Scottish White Fish Producers' Association (and client fleet) members are taken at many levels: Council of Ministers and European Commission, UK (Defra) and Scottish (Marine Scotland) ministers, enforcement agencies (SFPA), Scottish Fishermen's Federation (SFF) producer organisations (PO) and local associations (SFSAG). Each has a responsibility to ensure that every vessel owner, skipper, fish buyer and seller is fully informed and aware of not only the current regulations governing the industry but also what is being considered for the future. At each tier there is a varying degree of hard-copy notification to participants in the industry but specifically, Marine Scotland notifies every vessel owner and skipper individually of every consultation and significant change in the management regime and regulations (SJL24). In addition, all these organisations maintain web sites on which both the current regulations and consultations can be found. e.g.:

- EU: [http://ec.europa.eu/fisheries/index\\_en.htm](http://ec.europa.eu/fisheries/index_en.htm)
- UK consultation: <http://www.defra.gov.uk/marine/fisheries/index.htm>
- MFA: <http://www.mfa.gov.uk/protection/legislation.htm>
- Scottish Government consultations:  
<http://www.scotland.gov.uk/Consultations/Current>
- SFPA legislation: <http://www.sfpa.gov.uk/article.asp?ID=25>
- SFF: <http://www.sff.co.uk/>
- Producer organizations: there are seven in Scotland, their details are available at:  
[http://www.seafoodscotland.org/index.php?option=com\\_content&task=view&id=176&Itemid=72](http://www.seafoodscotland.org/index.php?option=com_content&task=view&id=176&Itemid=72)
- SFSAG latest news: <http://www.fishnewseu.com/latest-news/scottish.html>
  - Consultation: <http://www.fishnewseu.com/consultations.html>

In addition to these organizations that play a direct role in the information flow from the EC to fishing deck, the Sea Fish Industry Authority (Seafish; [www.seafish.org](http://www.seafish.org)) and Seafood Scotland ([www.seafoodscotland.org](http://www.seafoodscotland.org)) also maintain broad-ranging and informative websites in support of the industry's needs, both legally (SJL25) and practically (SJL26, SJL27).

In addition to these publicly available sources of information and consultation portals, the industry representative bodies, not least the Scottish Fishermen's Federation and the SFSAG itself have access to ministers, commissioners and officials in Brussels, London, Edinburgh and locally – although every fisherman consulted in the course of this assessment said that they invariably heard of changes to existing and introduction of new regulations before the local SFPA officer. Not only does this reflect positively on the effective lines of communication between the centre (Edinburgh) and the individual members of the fishing industry it reinforces the point that every fisherman consulted also said that he could speak by telephone to an informed individual in Marine Scotland in Edinburgh at any time he wished to.

There is also a variety of national and international standing committees and consultation forums that enable the industry to make its contribution to the future management of the industry and its fisheries. e.g. the Scottish Fisheries Council and the EU initiated North Sea Regional Advisory Council (SJL28), both of which include representatives from the SFSAG.

Regional Advisory Councils (in this case the North Sea RAC – NSRAC) bring together representatives from the fishery sector and other interest groups from around the North Sea who are affected by the Common Fisheries Policy CFP). The members include:

- Representatives of the catching sectors including ship-owners, small-scale fishermen, employed fishermen and producer organizations from each concerned EU Member State.
- Other representatives of the North Sea fisheries sector including processors, traders and other market organizations
- Representatives of other interest groups including environmental organisations and groups, aquaculture producers, consumers and recreational or sport fishermen affected by the CFP

The NSRAC may:

- Submit recommendations and suggestions of its own on matters relating to fisheries management to the Commission or Member States;
- Respond to requests for advice from the European Commission or member States  
Inform the Commission or Member States of problems relating to the implementation of Community rules;
- Conduct any other activities to fulfil its functions

The activities of the NSRAC are intended to be open and transparent and details of all its meetings are publicly available.

In the event that any individual in the SFSAG feels that he has a grievance or concern affecting him personally, or the management of the fishery in general, they are able to pursue it through the reverse chain to that used for the dissemination of information. i.e. SFSAG, SFF, SFC, SFPA, SGMD, ministers, EU officials and commissioners and, ultimately, the European Court of Justice or Human Rights. In practice, most disputes are dealt with locally, or on behalf of individuals by the SFSAG working with the SFPA and SGMD. The members of SFSAG consulted in the course of this assessment believed that the system was both effective and fair.

## **5.7 FISHERY-RELATED RESEARCH AND DEVELOPMENT**

Fishery research is undertaken by governmental and academic research institutions in response to a variety of stimuli. Scientists can anticipate the need and put forward proposals to national or EU funding institutions for support; the EC and Scottish or UK government can commission specific research in support of identified policy needs; the industry can identify a need and either commission research in its own right or persuade Scottish, UK or EU government agencies to fund the appropriate work. Thus, research is undertaken in support of the Scottish industry by Marine Scotland Science (previously the Fisheries Research Services (FRS), inc. the Marine Laboratory in Aberdeen), directly in support of the Scottish Government's policy needs, e.g. contributing to the annual stock assessments carried out under the auspices of ICES (SJL29) and in partnership with the industry through the Scottish Industry–Science Partnership (SISP; SJL30). The key element of this partnership is that not only are many projects instigated by the industry but they are actively engaged in the work alongside the scientists responsible for the research. Funds are also made available annually by Seafish (through the Industry Project Fund) to encourage the industry to either try innovative ideas or undertake investigations on its own behalf or to work in partnership with other agencies (SJL31).

FRS play a central part in the annual ICES working group stock assessment of North Sea haddock and the SISP programme for 2008–2009 is focussed on trawl-gear selectivity, not only but particularly means to reduce the catch of (undersize) cod in whitefish and nephrops fisheries. A new SISP project that will shortly get underway will investigate the possibility of using onboard CCTV to provide real-time monitoring of on-board activity (fishing or non-fishing) as a means to maximise the efficient use of days at sea. FRS also work in close collaboration with the Scottish industry in maintaining an at-sea observer programme to gather detailed information on the composition of the catch and the quantities of fish (and some other species) that are discarded at sea.

Vessels from the client fleet have participated, and continue to participate in both SISP and Seafish gear trials, observer programmes etc.

## **5.8 MONITORING & EVALUATING MANAGEMENT PERFORMANCE**

The key agency with measurable performance indicators is the SFPA. It is subject to annual review and assessment by the European Commission and must present an annual report of its performance in all spheres of its activities to the Scottish Minister and Scottish parliament (SJL32). As a publicly available document, this lays the SFPA open to review and evaluation not only by the government but by the industry, the people of Scotland and the sundry NGOs who espouse an interest in the rational use of marine resources.

The FRS has primary responsibility for the collection, collation and management of such data as are deemed necessary for the effective assessment of the North Sea haddock fishery and the exploited stock. (CEFAS provides supplementary data from English vessel landings in England.) Their work is subject to peer review by colleagues nationally and internationally, within the corresponding ICES assessment working group, and that group's work is reviewed by the ICES Advisory Committee for Fishery Management (ACOM – fisheries), the EC Science, Technical and Economic Fisheries Committee and by the scientific community at large when its work is published. ICES working group reports (SJL29) and subsequent ACOM advice (SJL5) are also placed in the public domain where they are subject to review and evaluation by all bodies and individuals who have an interest in the fishery and North Sea haddock stock.

## 6 ECOSYSTEM CHARACTERISTICS

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### 6.1 DESCRIPTION OF THE MARINE ENVIRONMENT

These fisheries take place in the northern and central areas of the North Sea, north of 55° N. The North Sea itself is a semi-enclosed water body, situated on the continental shelf of northwest Europe. Bounded by a number of countries, this relatively shallow sea (generally shallower than 200m) is strongly affected by both saline inflows from the north, and from freshwater inputs from the major rivers of the continent. It is a highly productive ecosystem, but primary productivity varies across the North Sea. Highest values of primary productivity occur in the coastal regions (influenced by terrestrial nutrient inputs), on the Dogger Bank, and at tidal fronts.

The North Sea is the focus of a range of human activities, including fishing, dredging, oil and gas exploration, shipping and as recipient for discharges from sources on land or offshore. In recognition of the potential impacts on the ecosystem, the Ministers at the 3rd Conference in The Hague in 1990 requested that OSPAR and ICES should establish a North Sea Task Force (NSTF), with one of the tasks being to produce a Quality Status Report (QSR) for the North Sea. This was completed in 1993 and identified fisheries as having major impacts on the North Sea ecosystem.

A range of information exists on elements of the North Sea ecosystem, including considerable knowledge on the oceanography, plankton, fish distribution and abundance, and the interactions between these fish components. Certain types of data, notably those related to fisheries, physical oceanography, plankton and nutrients, are measured typically throughout the North Sea, with many programmes covering several decades of observation. Other data, including biological effects (ecotoxicology), sediment chemistry (contaminants), species introductions, hazardous algal blooms in coastal waters and benthos surveys (to name a few) tend to be more localized (for example concentrated in coastal waters) or cover a more limited period of time, i.e., years rather than decades.

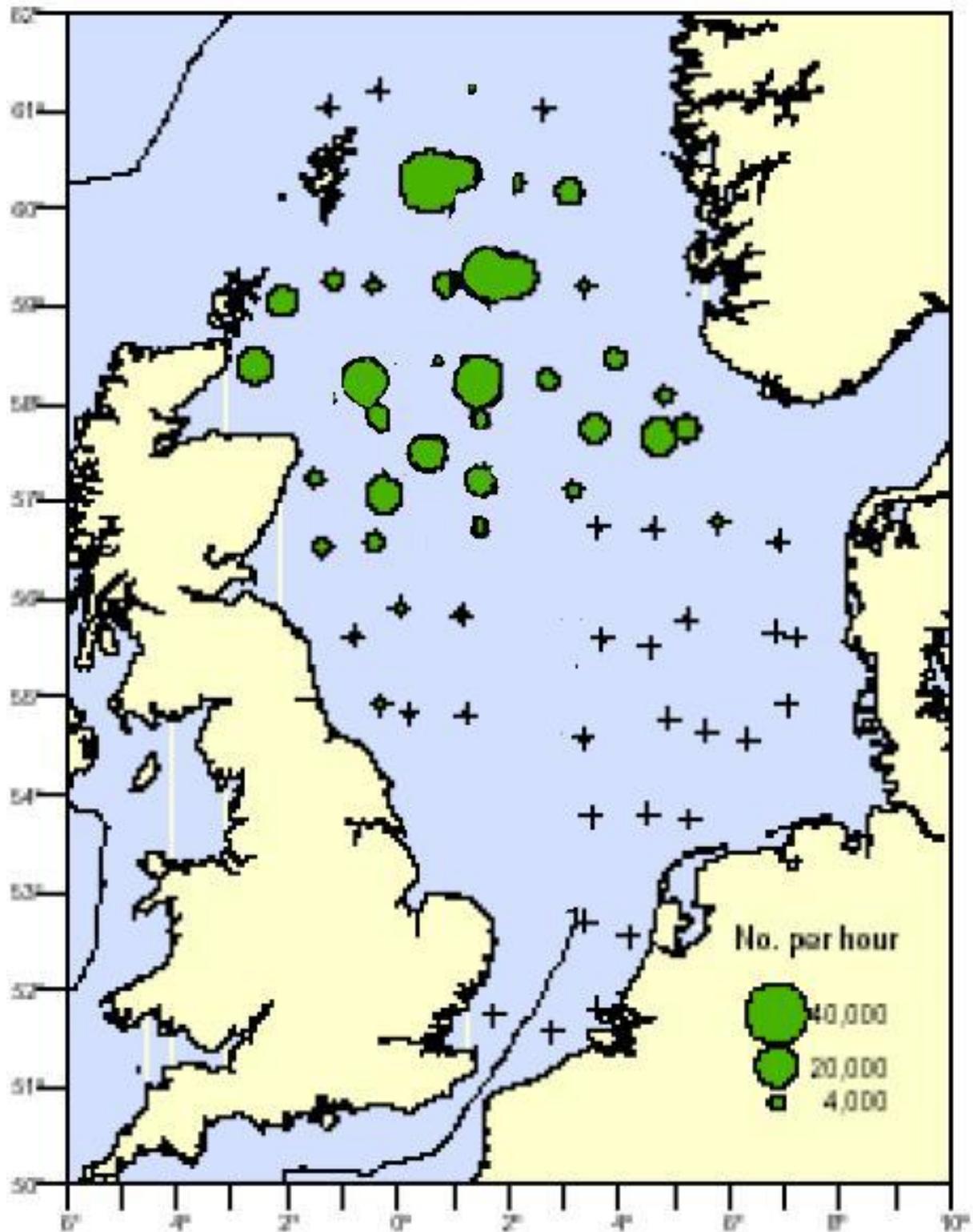
The process of linking these components of the North Sea ecosystem is beginning under the ICES Regional Ecosystem study group for the North Sea (REGNS), which includes Norwegian scientific representatives. Under these auspices, a workshop to progress an Integrated Assessment of the North Sea (9–11 May, 2004) and the meeting of the REGNS Study Group (12–13 May 2004) was held at ICES Copenhagen, Denmark. This aimed to seek agreement on the methodological approach (or framework) for undertaking an Integrated Ecosystem Assessment of the North Sea (IEA). The process aimed at bringing together information from a range of other ICES Working Groups and organisations (including OSPAR and SAHFOS). The next REGNS meeting took place in May 2006 which continued the task of drawing together different types of data relating to pressure and state changes in the North Sea Ecosystem and to undertake an integrated assessment. The assessment has provided some valuable insights into the significance of the relationships between different pressure and state changes at different scales and the time scales over which changes take place (TH36).

In the North Sea, haddock spawn between February and May, with peak spawning activity between mid-March and early April. The main spawning area is in the central northern North Sea between the Shetland Islands and the Norwegian Deep, and southwards towards the Fladen Ground (Knijn et al, 1993). After spawning, adult haddock disperse and migrate westward toward the Orkney and Shetland Islands and into the central part of the North Sea to feed. The eggs and larvae are pelagic and mainly distributed in surface waters to a depth of approximately 40 m (Bjorke & Saetre, 1994). At about seven months of age and at a length of about 5 cm, the young fish leave their pelagic phase, and enter a bottom-dwelling (demersal) phase. Haddock larvae feed on immature copepods (Russell, 1976), while decapod larvae, copepods and fish are

food items for juvenile haddock (Robb & Hislop, 1980). During the late summer the juveniles are at their highest density off the northeast coast of Scotland (Albert, 1991), see figure below.

**Figure 7: Catch rates of juvenile haddock (0 - 1-group) in the North Sea**

*Sampled by international bottom trawl surveys from August to September 1999*



Source: CEFAS, 2001

## 6.2 RETAINED BY-CATCH AND DISCARDING

Haddock are groundfish, caught in a mixed fishery that includes cod (*Gadus morhua*). A bycatch of cod is an inevitable consequence of fishing for haddock, although measures are taken to minimise this.

The North Sea haddock fishery is prosecuted in a region where cod stocks are considered by ICES as “*being harvested unsustainably and suffering reduced reproductive capacity. The spawning stock biomass is well below the precautionary limit [...] The 2001 to 2004 year classes are all estimated to have been below average; the 2005 year class is estimated from surveys to be more abundant but below average.*”

The EC has introduced a cod recovery plan for many areas, including the North Sea. This plan sets limits on the areas that can be fished, closed seasons, technical restrictions on fishing gear and limitations on the number of days fishing vessels can operate.

### 6.2.1 Haddock discards

Sub-area IV discard data are supplied by several countries, though most of the data submitted to ICES are collected by FRS observer trips on commercial vessels. In the future, these data will be supplemented by the SFF observer programme mentioned above (§ 3.6). The FRS observer programme generally aims to achieve 60–70 trips per year in the North Sea, plus another 20 trips in other areas. This programme has been running since 1978 and is the largest observer programme for monitoring catches and discards in Europe. During 2007–8, FRS observers measured over 45,000 haddock, as well as quantities of other species, and carried out haddock age determinations, by otolith reading, in 3000 of them (C27).

ICES estimations for Sub-area IV and Div. IIIa (north) indicate that the weight of haddock discards in 2007 was over 31,000 t, which was roughly comparable to the landings for human consumption, i.e. nearly 50% of the catch. Data for the last 10 years are shown in Table 8. Discarding was particularly high (42–70%) in 2000–2002, and in 2007 (49%), as a result of the strong recruitment peaks in 1999 and 2005 (see Table 6).

**Table 8: Catch, landings and discards of haddock (t) in ICES Sub-area IV (North Sea) and Div. IIIa (Skagerrak), 1998-2007**

Year	Catch	Landings	Discard	Discarded (%)
1998	131,315	81,054	45,160	34
1999	112,021	65,588	42,598	38
2000	104,457	47,553	4,8770	47
2001	166,960	40,856	118,225	70
2002	107,923	58,348	45,857	42
2003	66,805	41,964	23,691	35
2004	64,838	48,734	15,551	24
2005	57,162	48,357	8,637	15
2006	56,056	37,613	17,908	32
2007	63,226	32,130	31,048	49

Data from ICES WGNSSK, 2008 (C28).

Information on the discards from FRS observer trips on board Scottish vessels is summarised in a recent FRS report (C29). Table 9 provides overall discard rates for five different gear types sampled during the observer programme. Results for the North Sea show that nephrops trawl had the highest % discard rate, though quantities per haul were lower than for most gears targeting demersal fish. Information on cod, haddock and whiting discard rates for vessels in the client fleet is given in Table 10.

**Table 9: Discard rates in N. Sea for three key demersal species (1987-2008, Quarters 1-3 combined) by the main gear types sampled in Scotland.**

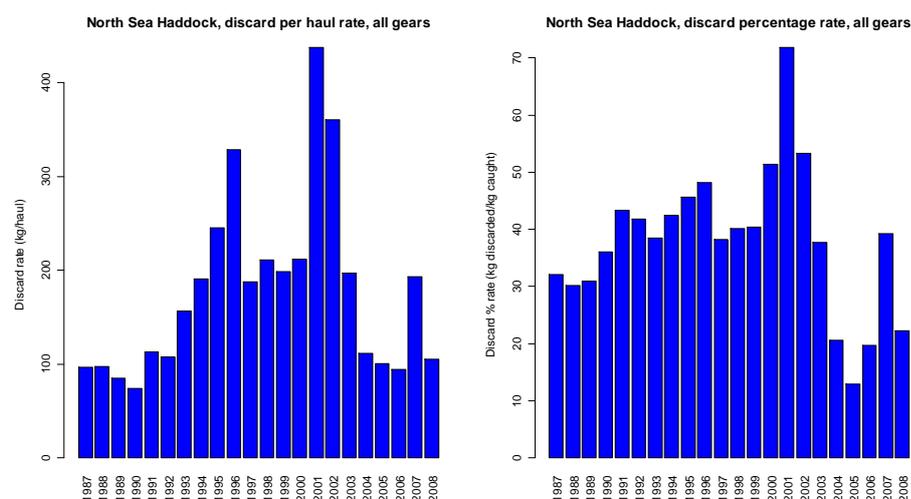
*Discard data given as kg/haul and % of catch discarded*

Gear	No. hauls	Discards Kg/haul (%)		
		Cod	Haddock	Whiting
Heavy trawl	66	288 (61.8)	256 (27.4)	32 (19.3)
Seine	76	311 (59.3)	123 (22.5)	10 (7.6)
Light trawl	50	173 (73.3)	30 (16.6)	1 (1.6)
Nephrops trawl	87	45 (89.0)	68 (64.3)	32 (54.6)
Pair trawl/seine	199	116 (50.8)	83 (16.0)	7 (10.6)
All gears	478			

From FRS observer programme (C29).

A time series (1987-2008) of discard data for North Sea haddock is shown in Fig. 8. Results show that discarding of haddock has declined in the most recent years; peaks in the data in 2001-2 and 2007 are very likely to be associated with the recruitment of strong year classes in 1999 and 2005.

**Figure 8: Discard (kg per haul) rate (left) and % rate (right) in North Sea haddock from the FRS observer monitoring programme 1987-2008 (Qs 1–3 only) (all gears combined)**



Data from C29.

Discards arise for several reasons; (a) fish are below the MLS (for North Sea haddock, this is 30cm); (b) fish are just over the legal size and discarded due to imprecise sorting on the fishing vessel; (c) fish are legal sized but are over quota; (d) fish are dumped because better quality fish have been caught later on a trip – referred to as ‘high-grading’. Recent information on haddock discards by Scottish vessels in the North Sea, above and below the MLS, is shown in the text-table below (K. Coull, FRS, pers. com.):

<b>Year</b>	<b>Total discard (%)</b>	<b>Discards &lt; MLS (a) (%)</b>	<b>Discards &gt; MLS (b)-(d) (%)</b>
2004	25	36	64
2005	15	47	53
2006	32	83	17
2007	50	77	23
2008	31	60	40

In the last three years, most haddock discards have been below the MLS (type (a)), though some over MLS fish have also been discarded for various reasons but mostly through imprecise sorting (b). Some ‘high-grading’ occurs but this now seems to be much less of a problem than previously.

### **6.2.2 White fish by-catch and discards of other species:**

While haddock is the main target species in the North Sea demersal fishery, several other species are important components of vessel landings. These species include cod, whiting, saithe, monkfish, plaice and spurdog. Landings of these species in recent years are shown in Fig. 4. In this section we give special attention to two species that are considered to be particularly vulnerable at the present time, namely cod and spurdog. Time series of landings of these two species by different fishing gears are shown in Figs. 9 and 10.

**Figure 9: Landings of cod in the North Sea (ICES Sub-areas IVa & IVb), 1996-2008, by different gears.**

See Table 5 for key to gears

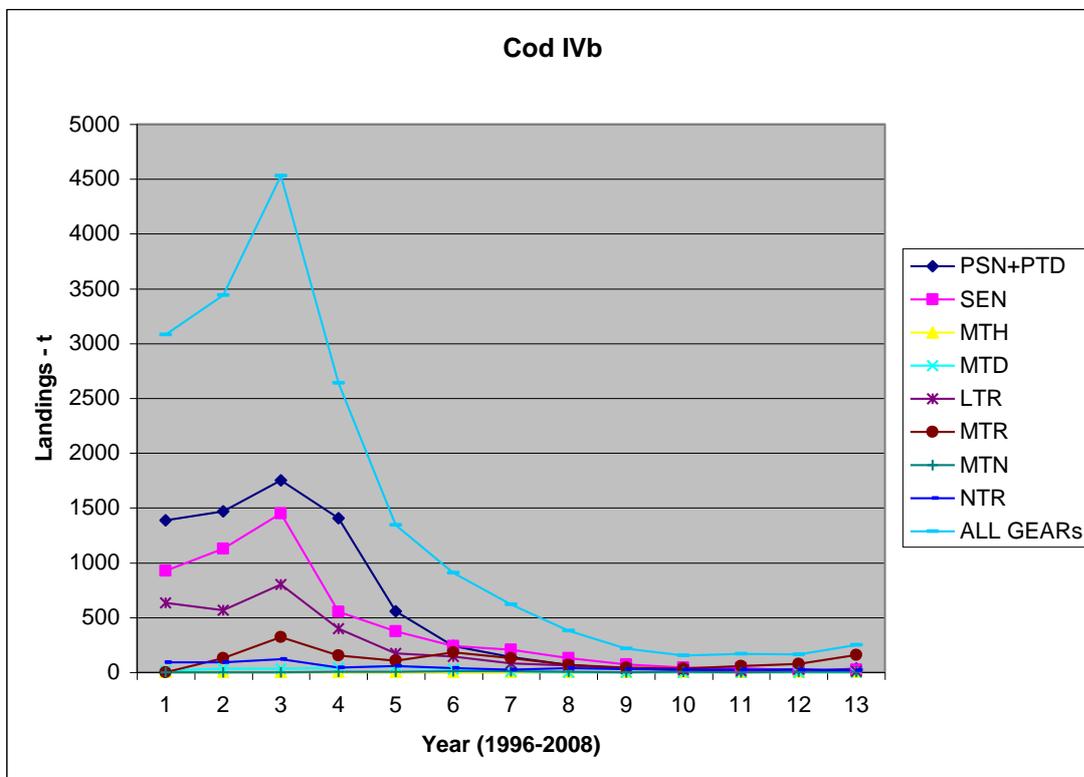
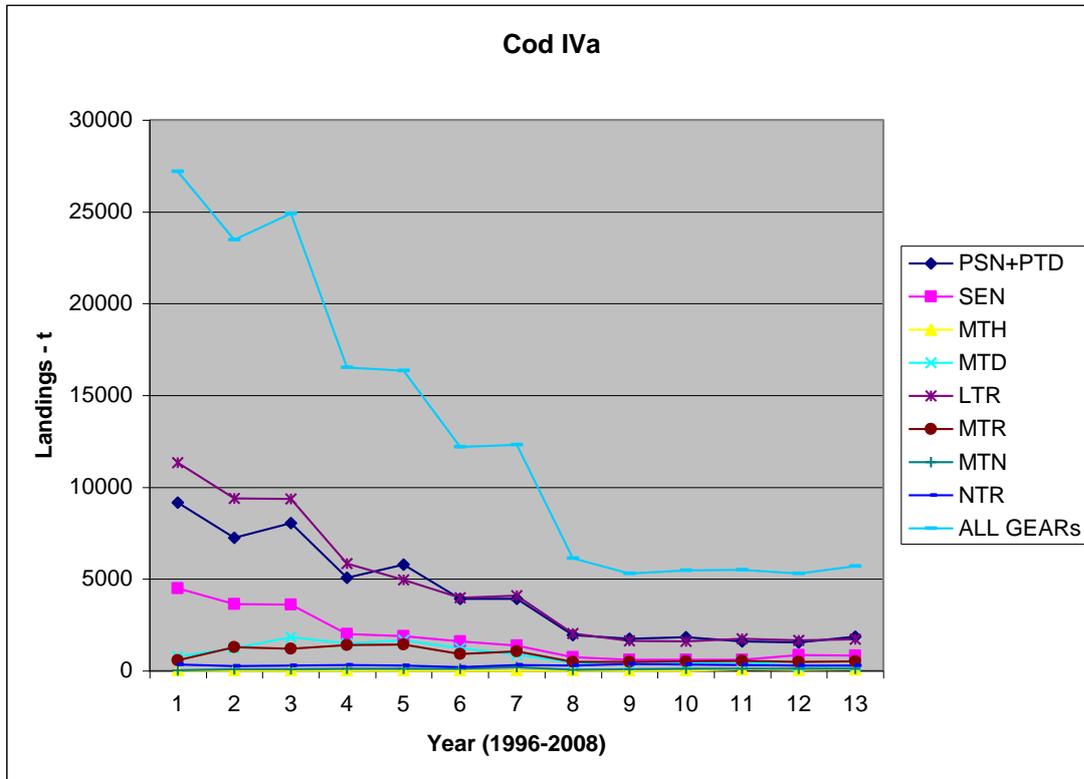
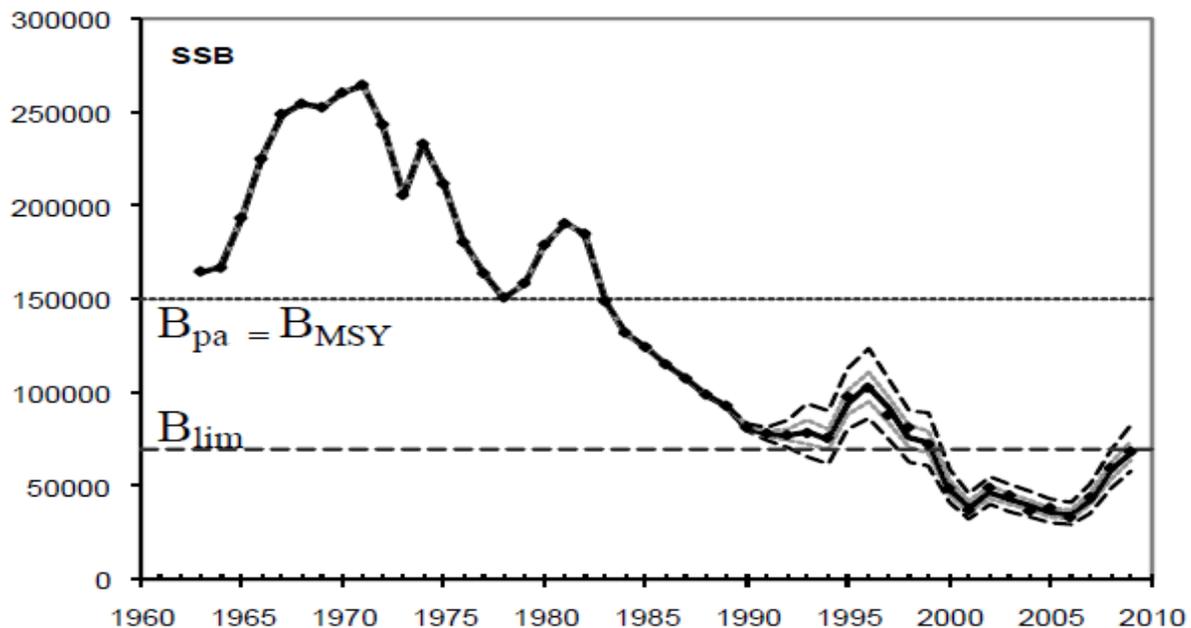


Fig. 9 shows that landings of cod in the North Sea have fallen sharply since the late 1990s, partly as a result of reduced fishing effort following vessel decommissioning, but also because of declining stock biomass (SSB). The SSB has increased since its historical low in 2006, but remains below  $B_{lim}$  (Figure 10). Fishing mortality declined after 2000, and although its most recent trajectory is considered uncertain, it is estimated to be well above the long-term objectives of maximum yield, and likely above  $F_{pa}$ .

**Figure 10: North Sea cod spawning stock biomass**



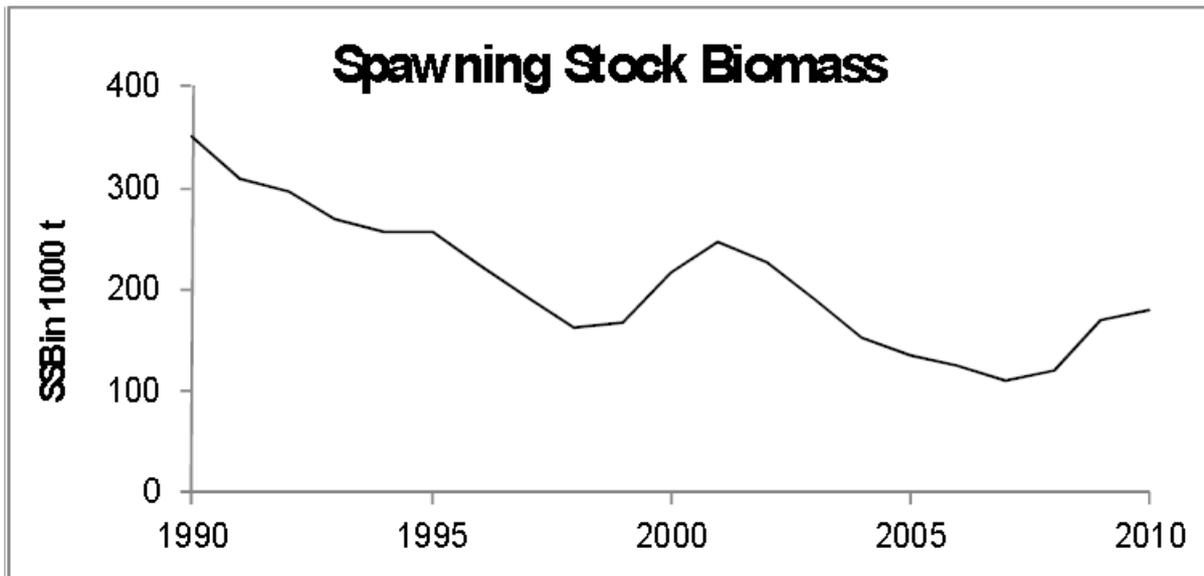
Source: ICES (2010a)

Most cod landings are made by pair trawl-seine (PSN + PTD), seine net (SEN) and light trawl (LTR). The North Sea cod stock is in a depleted state and the EU have in place a cod recovery plan, which in Scotland is being implemented through the CCS. Under this scheme, attempts are being made to reduce pressure on the cod stock by seasonal closures during the spawning season and by a programme of real-time closures (RTC) (see §5.3.2). In addition, vessels can gain an extra 'days-at-sea' allowance (but not extra quota) by using more selective gears. The main objective is a 25% reduction in cod mortality in 2009, followed by annual 10% reductions for the North Sea stock until a target fishing mortality ( $F=0.4$ ) has been achieved. These plans are being closely monitored on a monthly basis by the Conservation Credits Steering Group (CCSG), and a full scientific appraisal of the plans will be undertaken by STECF, probably at the end of 2009.

EU effort restrictions were introduced in 2003 (annual annexes to the TAC regulations) for the protection of the North Sea cod stock. In 2009, the management program switched from a days at sea to a kW/day system (2009 Council Regulation (EC) N°43/2009), in which different amounts of kW/days are allocated within each area by Member State to different groups of vessels depending on gear and mesh size. In 2008, STECF indicated that overall effort (kW/days) by demersal trawls, seines and beam trawls had been substantially reduced since 2002.

As a result of the above, fishing mortality of the other main by catch species, *whiting*, declined between 2003 and 2005 concomitant with this effort reduction, but  $F$  increased again between 2006 and 2008 despite a further nominal reduction in effort. SSB in 2009 is slightly higher than in 2008 but remains below average (see Figure 11 overleaf). Fishing mortality has been stable over the last 4 years. Recruitment has been very low between 2003 and 2007 with stronger recruitments estimated in 2008 and 2009, however the size of these recruitments are uncertain.

Figure 11: North Sea whiting spawning stock biomass

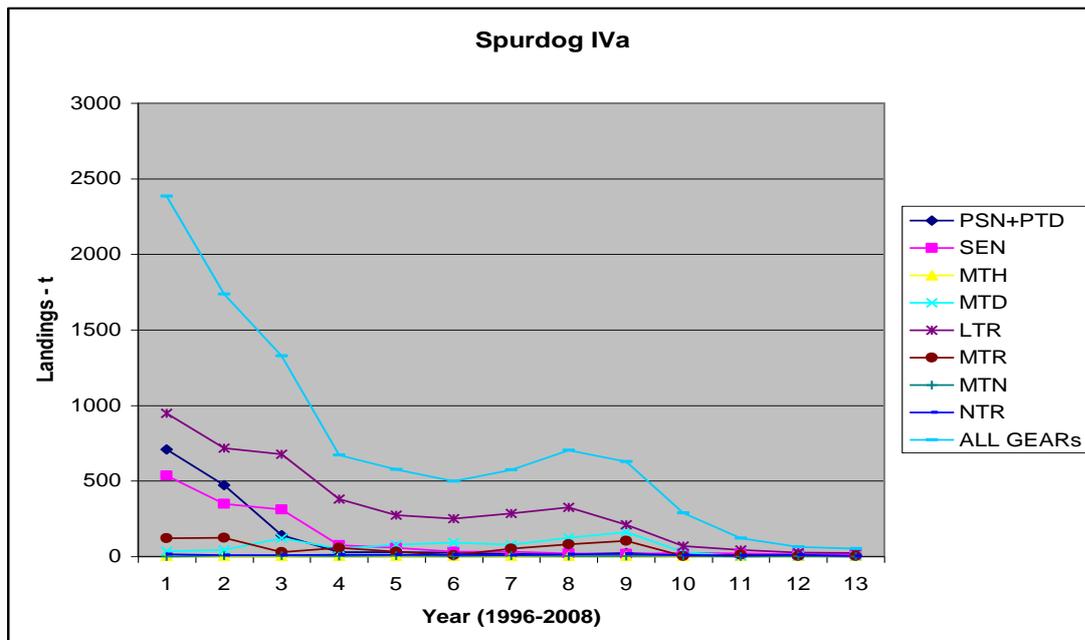


Source: ICES (2010b)

Landings of spurdog (*Squalus acanthias*) in the North Sea, by different gears, is shown in Fig. 10. Landings have fallen sharply in recent years. This species is listed in the 2007 IUCN Red List of endangered species where it is classified as 'vulnerable'. Landings of spurdog were restricted by a 5% by-catch limit in 2007 but this legislation has been replaced by a 50% cut in TAC and by a maximum size limit on individual fish of 100 cm to protect the most highly fecund females. The effectiveness of the latter measure depends on the survival of the discards which has been little studied hitherto.

Figure 12: Landings of spurdog (t) in the North Sea (ICES Sub-areas IVa & IVb), 1996-2008, by different gears

See Table 5 for key to gears



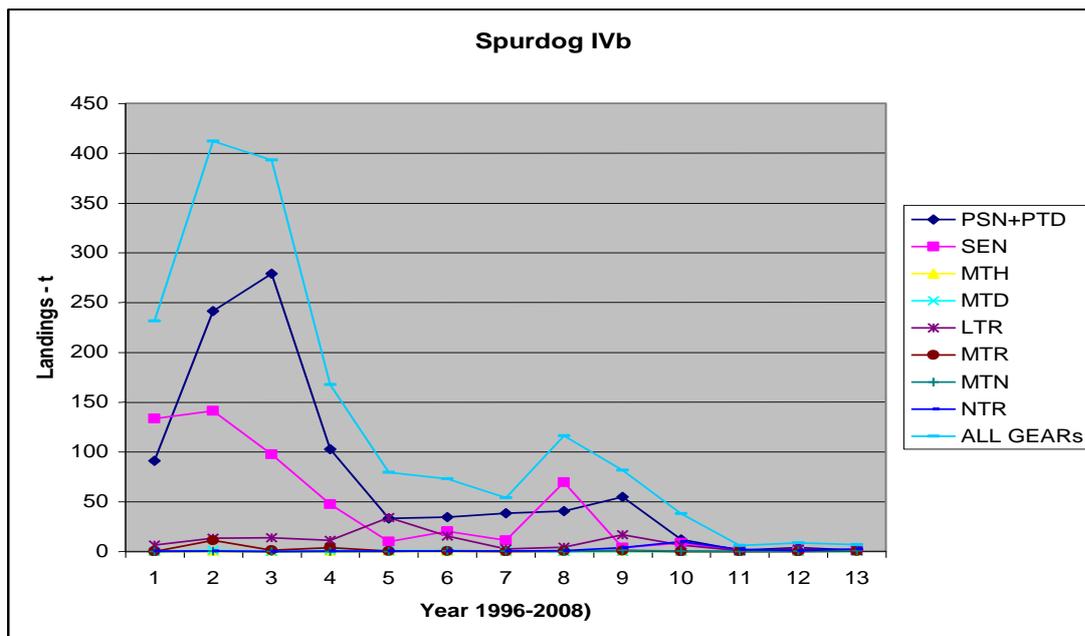
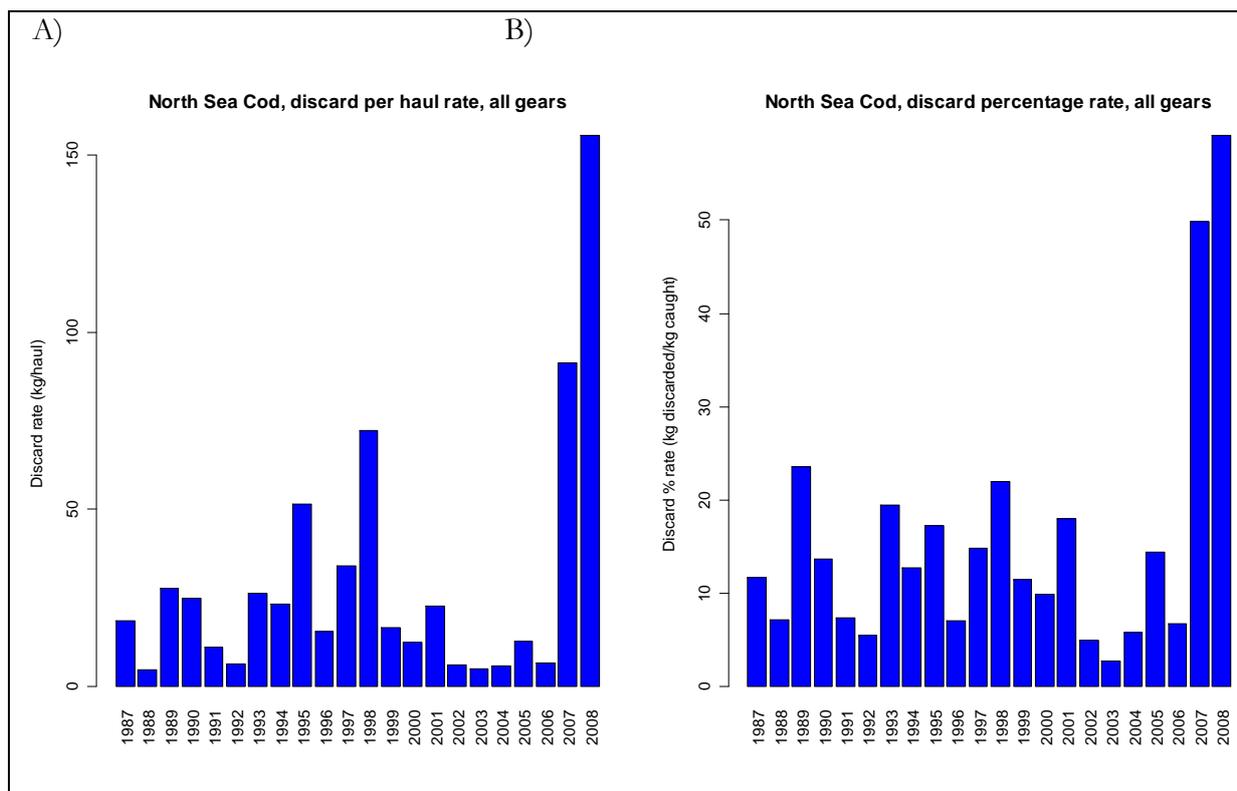
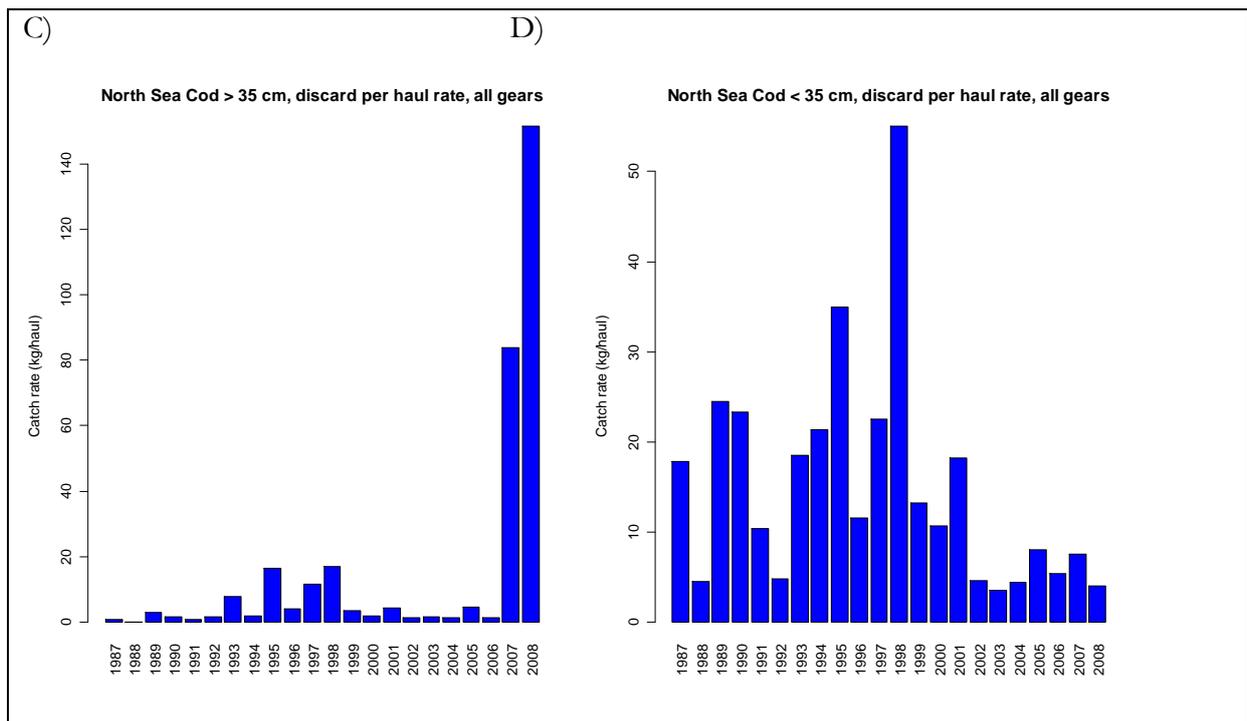


Figure 13: North Sea cod discard rate (kg per haul, all gears combined) for all size categories (A), > 35 cm (C), < 35 cm (D) and % discard rate for all sizes (B)

From FRS observer sampling programme, 1987–2008, Qs 1–3 only.

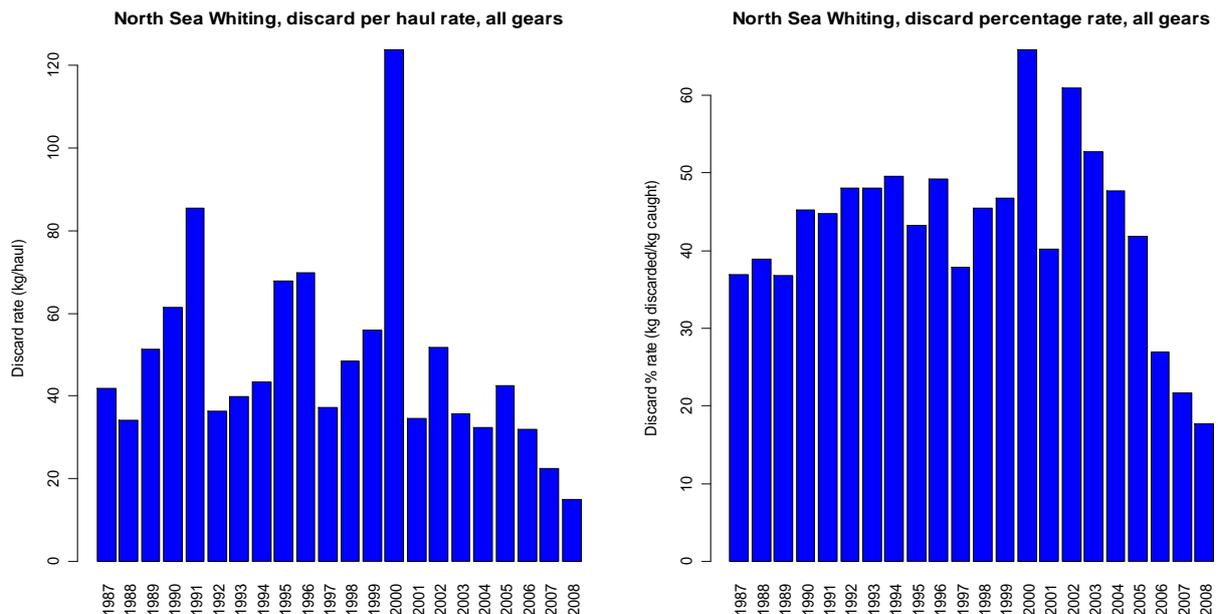




From C29.

Figure 10 shows that discard rates for cod in the North Sea remain high, particularly in the last 2 years (Fig. 10A, B) but there has been a change in the discard size categories, with adult cod (> MLS, 35 cm) predominating as quotas have become more restrictive (Fig. 10C). The steady decline in under-sized (< 35 cm) cod discards may be partly related to the use of more selective gears but may also reflect the fact that recruitment has been at a low level in recent years (Fig. 10D).

**Figure 14: Discard (kg per haul) rate (left) and % rate (right) in North Sea whiting from the FRS observer monitoring programme, 1987-2008 (Qs 1-3 only) (all gears combined)**



Data from C29.

As the figure above shows, recently there has been a steady decline in discards of whiting in the North Sea fishery, down to around 20% in 2008. Since recruitment has been stable, albeit at a low level, the decline in discard rate may, to some extent, reflect the use of more selective gears (Fig. 11).

### 6.2.3 Discard information for the client fleet

Information on levels of discarding of key demersal species, cod, haddock and whiting, by the client fleet is shown in Table 10. In the period 2004-2008, FRS observers sampled catch and discards on board 42 vessels in the client fleet during 193 trips in the North Sea. The gears sampled were heavy twin-rig trawls (24 trips), seine nets (90 trips), light trawl (26 trips) and pair trawl – seine (53 trips). The mesh sizes of these nets were mainly 100, 110, or 120mm (range 80 – 130mm).

**Table 10: Percentage of cod, haddock and whiting discarded on northern North Sea grounds by demersal fishing vessels in the client fleet, 2004-2008 and overall**

*FRS data, based on 193 observer trips (all demersal gears combined, excluding nephrops trawls)*

Year	No. samples	% discards by weight		
		Cod	Haddock	Whiting
2004	33	6.4	20.2	46.7
2005	37	13.3	11.3	33.9
2006	46	12.1	15.6	18.9
2007	38	53.6	32.2	12.1
2008	39	61.4	20.7	17.6

Table 10 shows that discard rates of cod by the client fleet were relatively low from 2004 to 2006 but have risen sharply since then, due mainly to quota restrictions, but also to the above average 2005 year class. Haddock discarding has generally been declining in recent years (Fig. 8) but was higher in 2007, possibly as a consequence of the relatively strong 2005 year class. Incidentally, the discard rate (%) for haddock by the client fleet in recent years (Table 10) is well below the discard rate for the Scottish fleet as a whole (text table above). The picture is more encouraging for whiting with recent discard rates generally declining in the client fleet and in the North Sea fishery as a whole (Fig. 12). Discards of other species include grey gurnard (*Eutrigla gurnardus*) and the lesser spotted dogfish (*Scyliorhinus canicula*), both common species in these waters.

### 6.3 SURVIVAL OF DISCARDS AND ESCAPEES THROUGH COD-END

It is generally assumed that fish caught by mobile gears suffer 100% mortality when discarded. Another factor that needs to be considered is whether fish that escape through the meshes of the net are likely to suffer any damage during capture and escape that adversely affects their chances of survival. This topic was studied during a major EU funded project during the 1990s (C32) in which haddock and whiting that escaped through nets of various mesh size (70-100mm) were captured in small mesh covers surrounding the cod end. Samples of these fish were then monitored in cages over several days to compare their survival with control fish caught by rod and line. The experiments showed that the survival of escaped haddock was high, varying from 90 to 96%, compared to 100% in line caught fish. The figures for whiting were similar, ranging from 90 to 100%. These data for whiting were not significantly different from the line caught control fish (89 – 100% survival). These studies suggest that mortality of gadoid fish escaping from trawl gear is very small compared to the high natural mortality of juvenile fish from other causes, and discard mortality. Since SMPs and other parts of trawls, including the cod-end, now use even larger meshes than those tested in the above trials, the mortality of escaping fish is probably even less than the already low values obtained.

## 6.4 INTERACTIONS WITH ENDANGERED, THREATENED OR PROTECTED (ETP) SPECIES

Annex V of the OSPAR Convention on the Protection of the North East Atlantic was ratified by the UK in June 2000. The actions that OSPAR Contracting Parties (including the UK) have agreed to co-operate on under Annex V include the development of an ecologically coherent network of well-managed Marine Protected Areas (MPAs) in the OSPAR territory of the North East Atlantic by 31 December 2010. We have therefore used the OSPAR list of threatened and/or declining species in the North Sea<sup>2</sup> as our basis for this analysis, although have also recognised relevant species considered by the IUCN ‘Red List’ (considered under 2.2 in the scoring).

**Table 11: Initial OSPAR List of Threatened and/or Declining Species in the North Sea**

Scientific name	English
<i>Arctica islandica</i>	Ocean quahog
<i>Nucella lapillus</i>	Dog whelk
<i>Ostrea edulis</i>	Flat oyster
<i>Sterna dougallii</i>	Roseate tern
<i>Cetorhinus maximus</i>	Basking shark
<i>Dipturus batis</i> (syn. <i>Raja batis</i> )	Common skate
<i>Raja montagui</i> (synonym: <i>Dipturus montagui</i> )	Spotted ray
<i>Gadus morhua</i> – populations in OSPAR regions II & III <sup>3</sup>	Atlantic cod
<i>Hippocampus guttulatus</i> (syn. <i>Hippocampus ramulosus</i> )	Long-snouted seahorse
<i>Hippocampus hippocampus</i>	Short-snouted seahorse
<i>Petromyzon marinus</i>	Sea lamprey
<i>Salmo salar</i>	Atlantic salmon
<i>Dermochelys coriacea</i>	Leatherback turtle
<i>Balaenoptera musculus</i>	Blue whale
<i>Eubalaena glacialis</i>	North Atlantic right whale
<i>Phocoena phocoena</i>	Harbour porpoise

**Fish:** three OSPAR listed species might be impacted by this fishery, these being the common skate (*Dipturus batis*, (syn. *Raja batis*), spotted ray (*R. montagui* (syn. *D. montagui*) and the Atlantic cod (*Gadus morhua*). An overview of North Sea elasmobranchs based on survey data was presented in Daan et al. (2005). The abundance of the four main skate species – *R. clavata*, *R. montagui*, *Leucoraja naevus* and *Amblyraja radiata* – appears to have been maintained or even increased since 1980. However the common skate (*Dipturus batis*) is depleted - it was formerly widely distributed in the North Sea but is now only rarely found and only in the northern North Sea. Fishermen report the occasional catches of North-east Atlantic spurdog *Squalus acanthias*, possibly during pupping aggregations. This species, although not included in the OSPAR or CITES lists, is considered as critically endangered by the IUCN Red List<sup>4</sup>.

<sup>2</sup> the North Sea, the English Channel, the Skagerrak and the Kattegat to the limits of the OSPAR maritime area, bounded on the north by latitude 62°N, on the west by longitude 5°W and the east coast of Great Britain, and on the south by latitude 48°N;

<sup>3</sup> the populations/stocks referred to in ICES advice as the North Sea and Skagerrak cod stock, Kattegat cod stock, cod west of Scotland, cod in the Irish Sea, cod in the Irish Channel and Celtic Sea.

<sup>4</sup> See <http://www.iucnredlist.org/details/44168>

**Sea mammals:** the UK is a signatory to the Agreement on the Conservation of Small Cetaceans of the Baltic and North Seas (ASCOBANS<sup>5</sup>), which covers the Baltic, Irish and North Seas, as well as a part of the NE Atlantic. The results of the two abundance surveys for harbour porpoise (SCANS-I and SCANS-II) led this body to call for a conservation plan for this species within the North Sea at the end of 2006. Discussions with the Sea Mammal Research Unit in St. Andrews suggests that encounters between sea mammals (e.g. dolphins, porpoises and seals) and trawl gears are random and very rare (Simon Northridge, SMRU, pers. comm., 3 April 2009). Discussions with a number of vessel skippers confirms this, with very occasional catches of porpoises (e.g. ‘once a decade’) and seals. If caught, the latter are usually drowned, although the occasional one can be released alive (Peter Bruce, *MFV Budding Rose*, pers. comm., 24 March 2009). Most of the vessels operating within this certification unit have undergone the Responsible Fisheries Scheme<sup>6</sup> certification process, which includes a policy statement and reporting system for cetacean and pinniped bycatch.

**Sea turtles:** no interactions with any sea turtles have been recorded from this fishery. The southern North Sea is the extreme limit of their range and the low sea water temperature is unfavourable for their survival (Brongersma, 1995).

## 6.5 HABITAT IMPACTS

### 6.5.1 Otter/Pair Trawls (single & multiple rigs)

The otter boards used by this fishery weigh around 1,000 kilograms in air and are towed at an oblique angle across the seabed. When fished over fine muddy sediments the boards are sometimes fitted with metal shoes up to 30 cm wide which are designed to prevent the boards digging too far into the sediment. The ground gear comprises a foot rope protected by rubber bobbins which will be less intrusive than the otter doors. No tickler chains are used. When fishing on harder ground, 150 mm diameter non-rotating discs are used that, when they foul, partially rotate against the tension imposed by the wire and then spring clear, allowing the gear to hop over solid obstructions. High resolution video images of sediment surfaces before and after otter trawling indicate that trawling reduces the overall surface roughness of the seabed (Schwinghamer *et al.*, 1996) although trawl doors may leave depressions. Ripples, detrital aggregations and surface traces of bioturbation are smoothed over by the mechanical action of the trawl and the suspension and subsequent redeposition of the surface sediment. Heavier particles will usually settle out immediately behind the doors, whilst finer sediments may settle up to 50 m behind the gear (Barry O’Neil, FRS, pers. comm., 25 March 2009). Tracks from otter trawls may still be visible in muddy sediments in sheltered areas after 18 months (Lindeboom & de Groot, 1998). Acoustic data collected on trawled experimental sites on the eastern Grand Banks, Canada, showed the effects of trawling could be detected to a depth of at least 4.5cm within the sediment (hard packed sand), and there was a general, although uneven, reduction in the complexity of the internal sediment structure (Schwinghamer *et al.*, 1996). While it has been relatively simple to detect the changes in abundance of large macroinfauna which result from fishing disturbance, smaller fauna (< 10 mm) show conflicting responses. Furthermore, one study suggests that fauna below a certain body size or mass are re-suspended by a pressure wave in advance of otter trawl doors, and are redistributed to the sides of the gear (Gilkinson *et al.* 1998). Chronic fishing has been shown to cause a shift from communities dominated by

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<sup>5</sup> See <http://www.ascobans.org/>

<sup>6</sup> The Seafish Responsible Fishing Scheme (RFS) has been developed to raise standards in the catching sector, enabling those within the seafood supply chain to demonstrate their commitment to the responsible sourcing of seafood. Based on a publicly available specification from the British Standards Institution (BSi), the RFS is an independent, audited assessment of the application of good practice by a vessel skipper and crew in their fishing operations. See <http://rfs.seafish.org/> for more details.

relatively sessile, emergent, high biomass species to communities dominated by infaunal, smaller-bodied fauna (Kaiser *et al.*, 2000).

Given that demersal towed gear have been used on these grounds for over a century, no gross changes in habitat structure and function is expected as a result of the activities of the fleet units under assessment. This said, the effects of fishing within European Marine Sites was reviewed by Sewell and Hiscock (2005), where it was noted that otter trawls have the potential to cause damage to erect epifauna such as sea pens and burrowing anemones. Areas unfished for nephrops were found to have a higher species diversity, numbers of individual organisms and biomass than fished areas. FRS in Aberdeen is currently coordinating research into the effect of towed commercial gears<sup>7</sup> (Barry O'Neil, FRS, pers. comm., 25 March 2009). It will permit the identification of combinations of fishing gear and seabed types in terms of the ecological and environmental interaction and as such inform the decision-making process with regards to directing fishing effort, the establishment of closed areas and the development of environmentally friendly fishing techniques. The project will comprise a number of fundamental studies carried out by FRS and the integration and coordination of research being carried out at Aberdeen University and Liverpool University.

### 6.5.2 Danish seine

The Danish seine is towed in a different manner to otter trawls, and is acknowledged to have a high degree of catch controllability and a more than “moderately responsible” environmental interaction<sup>8</sup> (WGFTFB, 2006). A forthcoming report on work conducted in Iceland investigating the environmental impact of the Danish seine net is also likely to suggest that the effect of this gear on benthic habitats is low (Haraldur A. Einarsson, MRI, pers. comm., 24 April 2009).

As with the ETP species, our baseline list of threatened or declining habitats comes from OSPAR.

**Table 12: Initial OSPAR List of Threatened and/or Declining Habitats (in the Greater North Sea)**

Description	OSPAR Regions where such habitats are under threat and/or in decline
Intertidal mudflats	All where they occur
Littoral chalk communities	All where they occur
<i>Lophelia pertusa</i> reefs	All where they occur
Maerl beds	III
<i>Modiolus modiolus</i> beds	All where they occur
Intertidal <i>Mytilus edulis</i> beds on mixed and sandy sediments	All where they occur
<i>Ostrea edulis</i> beds	All where they occur
<i>Sabellaria spinulosa</i> reefs	II, III
Sea-pen and burrowing megafauna communities	II, III
<i>Zostera</i> beds	All where they occur

<sup>7</sup> ‘The quantification of the physical, environmental and ecological impact of towed demersal fishing gears’ (MF0759 2006 - 2010)

<sup>8</sup> Controllability based on catch quality, species and size selection and environmental responsibility on habitat impact, energy cost, non-commercial bycatch and fish welfare.

**Intertidal mudflats:** This habitat type is not affected by these fisheries.

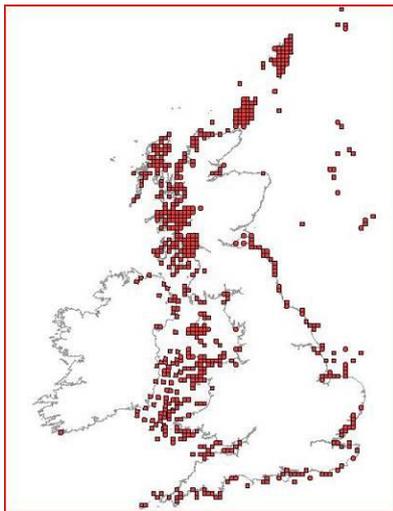
**Littoral chalk communities:** Mainly shallow (<5 m), so this habitat type is not affected by these fisheries.

***Lophelia pertusa* reefs:** With the exception of small encrusting colonies on oil platform supports, there are no significant colonies of cold water corals (e.g. *Lophelia pertusa*) in the North Sea (Murray Roberts, SAMS, pers. comm., 24 April 2009).

**Maerl beds:** Although live maerl has been found at depths of 40 m, beds are typically much shallower, above 20 m and extending up to the low tide level. As such, this habitat type is not affected by these fisheries.

**Horse mussel (*Modiolus modiolus*) beds:** The horse mussel *Modiolus modiolus* forms dense beds at depths of 5-70 m in fully saline, often moderately tide-swept areas off northern and western parts of the British Isles. Although it is a widespread and common species, true beds forming a distinctive biotope are much more limited and are not known south of the Humber and Severn estuaries. Beds are known from Shetland, Orkney, the Hebrides and other parts of western Scotland. Populations of *M. modiolus* have been detected in the Forties, Fulmar and Brae areas of the North Sea in depths of between 80 – 120 m (see figure below). This said, there are no known interactions between these fisheries in the North Sea and this habitat type.

**Figure 15: Distribution of the horse mussel *Modiolus modiolus* in UK waters**



Source: Marine benthic dataset (version 1) commissioned by UKOOA

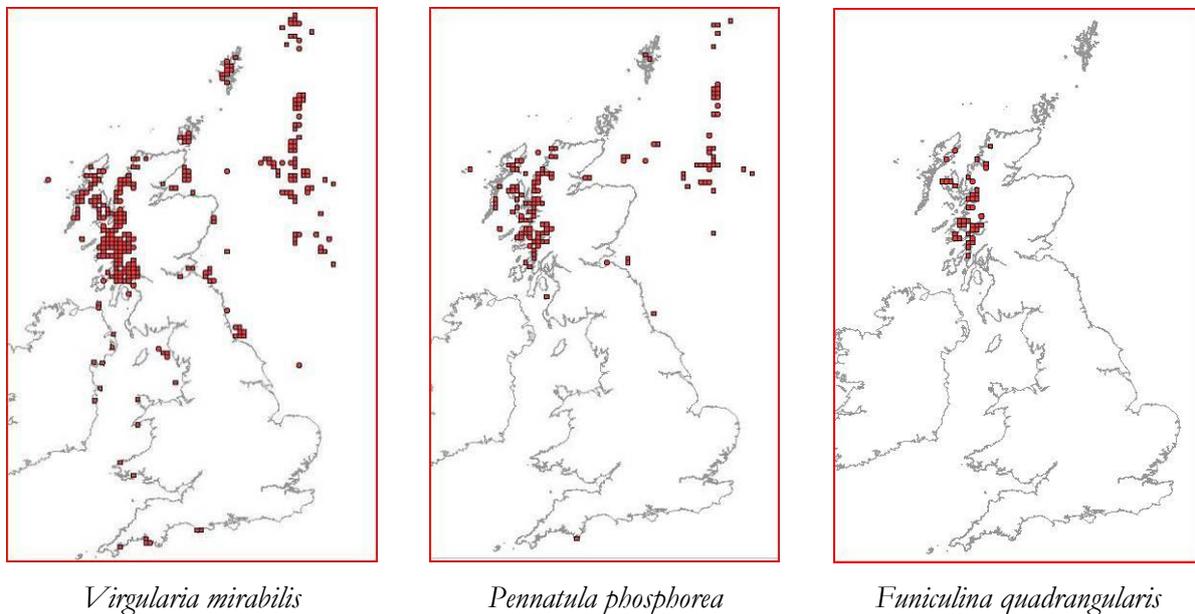
**Intertidal blue mussel *Mytilus edulis* beds on mixed and sandy sediments:** This habitat type is not affected by these fisheries.

**European flat oyster *Ostrea edulis* beds:** This habitat type is not affected by these fisheries.

**Honeycomb worm *Sabellaria spinulosa* reefs:** Although highly vulnerable to mobile fishing gears, this habitat type is not affected by these deeper-water fisheries.

**Sea-pen and burrowing megafauna communities:** Mud habitats in deep waters (circalittoral muds) provide stable conditions for populations of sea pens, typically *Virgularia mirabilis* and *Pennatula phosphorea* as well as the nationally scarce tall sea pen *Funiculina quadrangularis*<sup>9</sup>. The mud is also extensively burrowed by crustaceans, mainly the Norway lobster *N. norvegicus* (for which there is a targeted fishery) and the goby *Lesueurigobius friesii*, which may be present in burrow entrances. Offshore mud habitats can be characterised by the burrowing urchin *Brissopsis lyrifera* and the brittlestar *Amphiura chiajei*. Most information on sea pen populations in Scottish waters are restricted to coastal sea lochs, although there have been recent attempts to extend this knowledge seaward (Greathead et al, 2007) utilising video footage derived from nephrops stock assessment surveys. It is thought that the populations of the vulnerable *F. quadrangularis* are limited in the North Sea (none were recorded from FRS or MNCR data according to Greathead et al, 2007), although the less sensitive *Virgularia mirabilis* and *Pennatula phosphorea* may be more widely distributed, with the former found to be abundant in the outer Moray Firth and frequent or common in the Firth of Forth (Greathead et al, 2007). It is generally acknowledged that information on the offshore distribution of sea pens in the North Sea is poor.

**Figure 16: Records of three sea pen species (presence in 10 km squares)**



Source: NBN Gateway

**Zostera beds:** This shallow-water habitat type is not affected by these fisheries.

### **Strategies and mechanisms to protect habitats**

ETP habitats, together with their associated species and communities, are being increasingly protected by a number of different spatial mechanisms, usually being part of a marine protected area network. The North Sea is no exception and various different approaches are being used:

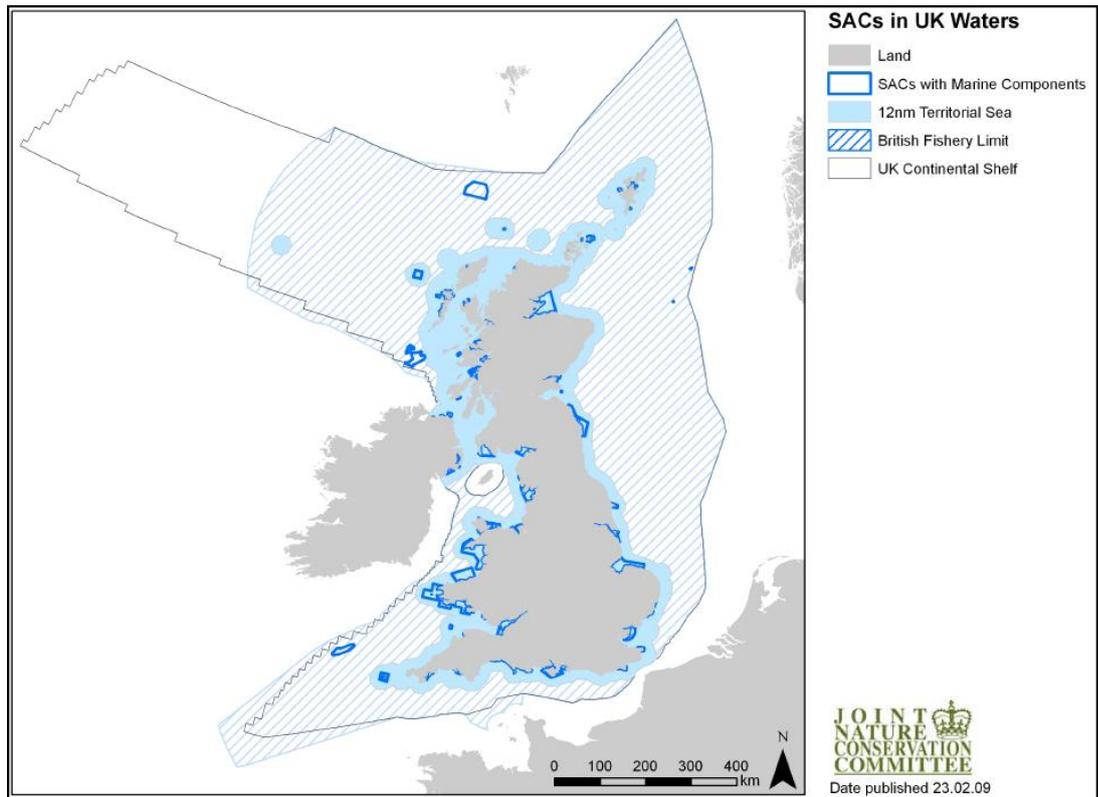
1. **Natura 2000:** Special Areas of Conservation (SACs) are being designated for habitats and species listed in the Habitats Directive. These will include SACs with marine components containing qualifying marine habitats or species. There are currently 76 SACs in inshore waters and 5 in offshore waters. The latter include the Braemar and Scanner pockmarks in Scottish waters and the Dogger Bank and North Norfolk Sandbanks and Saturn Reef in English waters.

<sup>9</sup> However, as *F. quadrangularis* is considered to be a bathyal species which 'intrudes' into sea lochs and fjords, it may only be nationally scarce in inshore waters.

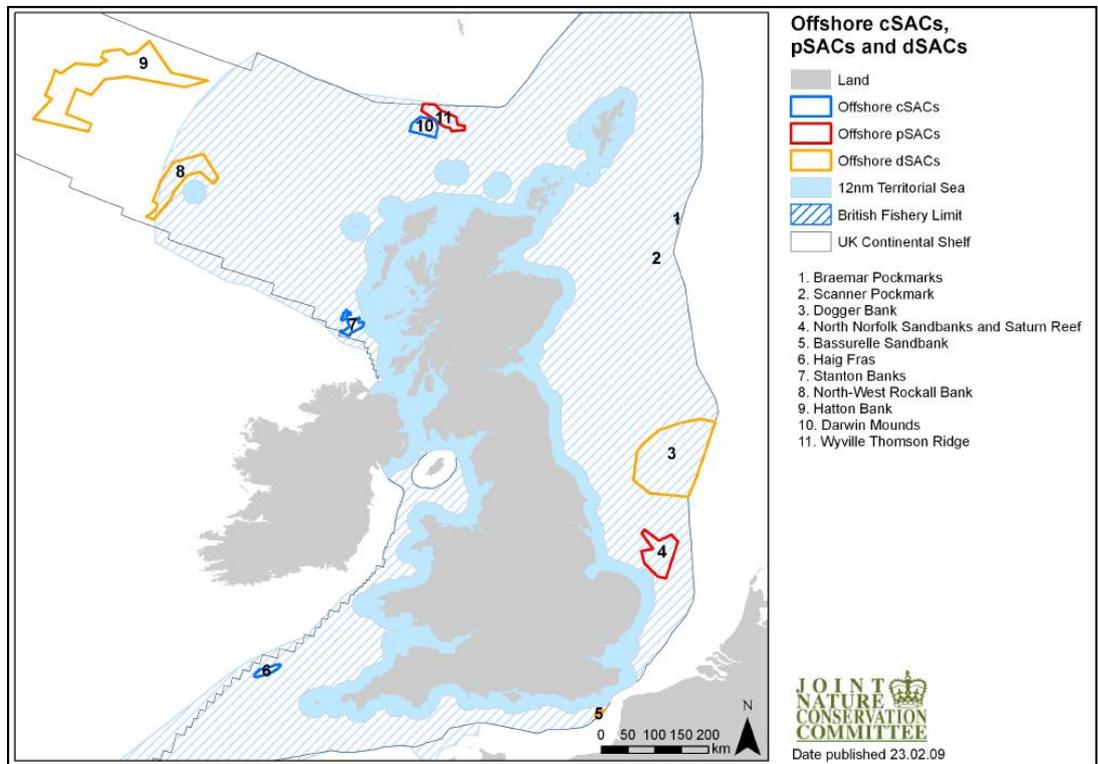
2. **National Marine Protected Areas:** The Marine and Coastal Access Bill provides for the designation of Marine Conservation Zones (MCZs) in English and Welsh territorial waters, and UK offshore waters. JNCC is responsible for giving advice and guidance on MCZ networks in UK offshore waters, and in the future may carry out monitoring of individual MCZs. The management measures required within MCZs will be decided on a site-by-site basis and will depend on what the site has been designated for. It is likely that there will be some sites where some activities are not allowed but others can occur. At present the implications for mobile fishing practises is unclear. There may however, be some sites where many activities are restricted. Marine Protected Areas (MPAs) in UK offshore waters adjacent to Scotland will be implemented through the Scotland Marine Protected Area Project. For UK offshore waters adjacent to Scotland, the Scottish Government is the appropriate authority for MCZ designation (where they will be known as MPAs).
3. **OSPAR Marine Protected Areas:** a key part of OSPAR's biodiversity strategy is to establish a network of marine protected areas which is both ecologically coherent and well-managed by 2010. The MPA network is intended to contribute both to protection of OSPAR threatened species and habitats and to the conservation of areas which best represent the range of species, habitats and ecological processes in the OSPAR area. Proposed areas (see map below) include the Durnock and Moray Firths, and Berwickshire and North Northumberland Coasts. OSPAR MPAs made subject to fisheries management plans, which are developed by the contracting party involved. As yet, these have not been determined for OSPAR MPAs relevant to this fishery.

**Figure 17: Marine Protected Areas in the Assessment Area**

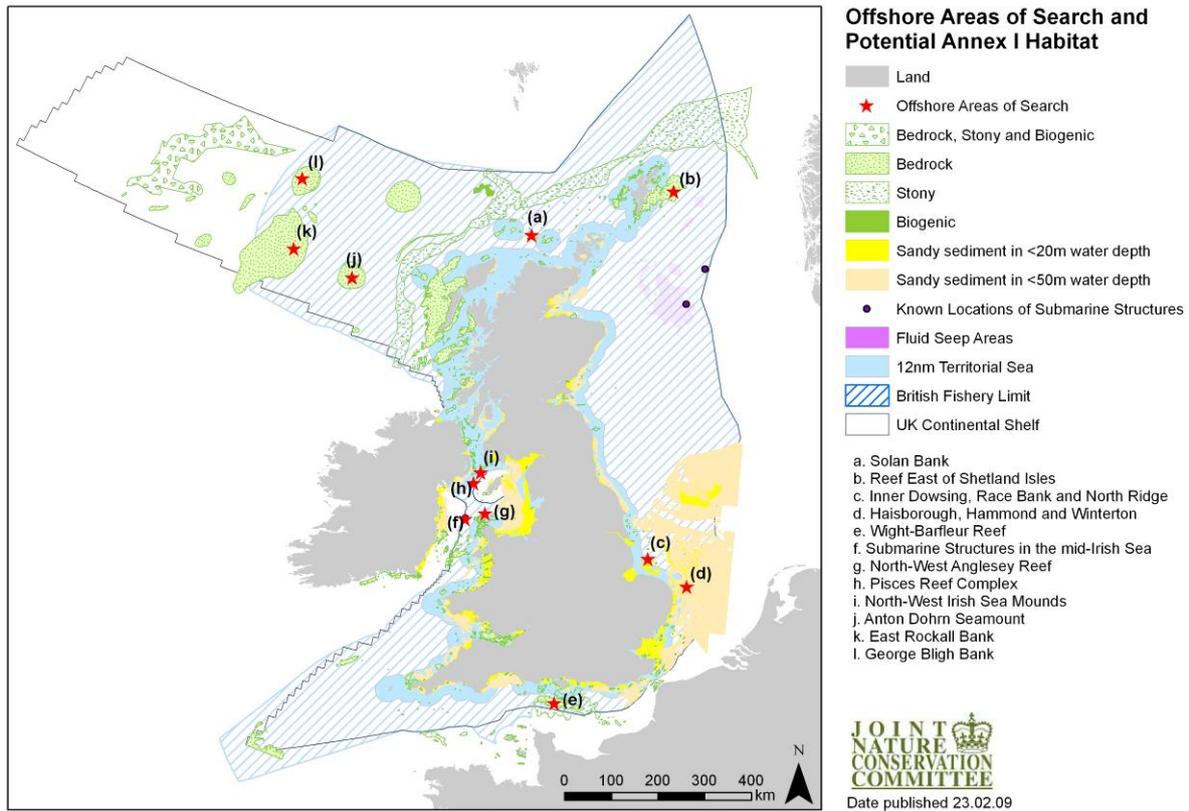
A. Inshore Marine SACs



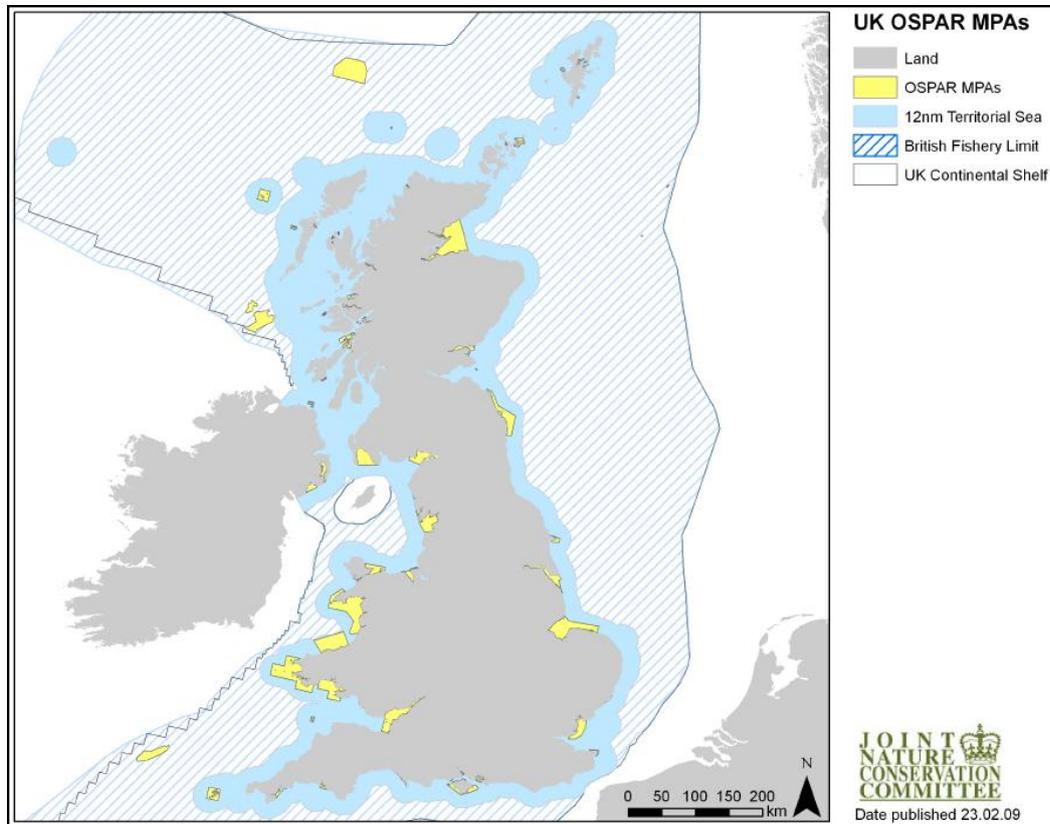
B. Offshore SACs



### C. Search areas for future SACs



### D. Proposed UK OSPAR MPA areas



The main offshore designations (the Braemar and Scanner pockmarks) are briefly described below. It should be mentioned that these areas currently do not have any statutory protection against fishing impacts, but they provide the means to spatially identify vulnerable areas.

**Braemar and Scanner pockmarks:** submarine structures made by leaking gases consist of rocks, pavements and pillars up to 4 m high. These carbonate formations are interspersed with gas vents that intermittently release gas. As well as providing a potentially favourable, sheltered habitat for a variety of marine species, submarine structures associated with active gas seeps may be of ecological significance because i) of the use of methane and its by-product, hydrogen sulphide, by chemosynthetic micro-organisms; ii) the carbonate structures provide increased habitat diversity and a hard substratum suitable for colonisation by certain benthic organisms (Judd, 2001<sup>10</sup>)

## 6.6 ECOSYSTEM EFFECTS

Specifically concerning the interactions of fish species such as haddock within the North Sea ecosystem, the feeding habits of this species have been examined (Sparre, 1984) through data collected during annual research surveys and during the two ‘years of the stomach’ programmes (1981, 1991). These studies underlie the Multispecies VPA (MSVPA) programme developed for the North Sea by the ICES Multispecies Assessment Working Group, which estimates the predation mortalities for nine commercially important fish stocks based upon key fish predators, and by seabirds and seals (Sparre, 1984; ICES 2006).

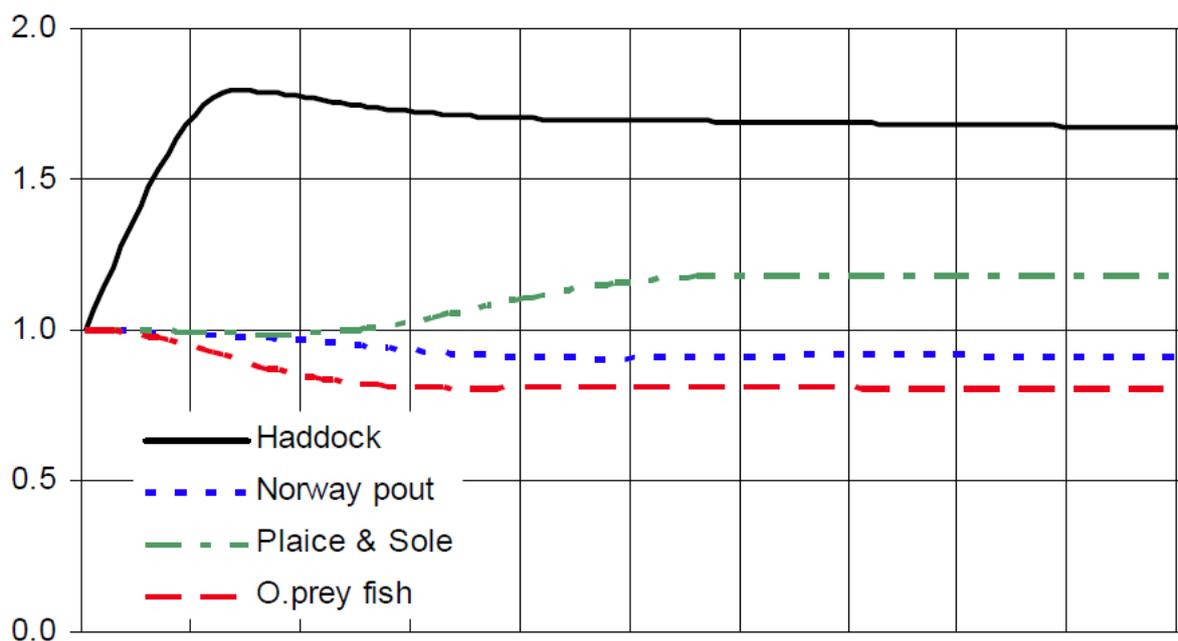
Detailed mass-balance trophic models of the North Sea have been developed using the EcoPath with EcoSim methodology (Daskalov & Mackinson, 2004; Mackinson & Daskalov, 2007). This allows the temporal and spatial simulation of alternative fishing and environmental change scenarios to be examined on ecosystem components. The North Sea model is one of the most comprehensive EcoPath models constructed: the model structure was set to 68 functional groups including mammals (3), bird (1), fish (45), invertebrate (13), microbial (2), autotrophic (1), discards (1) and detritus groups (2). The commercially important target fish species were divided into juvenile and adult groups (e.g. cod, whiting, haddock, saithe, herring *Clupea harengus*). Numerous fish species, which are also commercially and/or functionally important, were represented as single species or family groups (e.g. plaice, hake *Merluccius merluccius*, dab *Limanda limanda*, gurnards). The model is enumerated with estimates of biomass, production and consumption rates and diet composition compiled from survey data, stock assessments and literature sources and also contains information about landings and discards of various fishing gears grouped in 12 categories defined by the Data Collection Regulations. e.g., demersal trawls, pelagic trawls, drift nets, etc.

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<sup>10</sup> Judd, A.G. 2001. Pockmarks in the UK Sector of the North Sea. Technical report (TR\_002) produced for Strategic Environmental Assessment - SEA2. UK: Department of Trade and Industry.

One study looked at the impact of a ten year ban on haddock fishing (EFEP, 2004). They found that there is a rapid increase in the post-ban haddock biomass of about 80%, and then a gradual decline to about a 65% increase after a ten year simulation. There is about a 15% increase in the plaice and sole populations, but other than a 20% reduction in the category of ‘other prey fish’ and an 5% to 10% decrease in sand eel, whiting and Norway pout, the impact on forage species is relatively small. Harbour Porpoise fall by about 9%. The increase in plaice and sole is probably due to reduced competition with the other prey fish category, since these constitute the major feeders on annelids and echinoderms – these benthic invertebrates increase about 5%. As can be seen from the figure below, the category of ‘other prey fish’ declines rapidly when the fishery is closed and the haddock population increases, followed by the decline in Norway pout and only after about five years do we see the increase in plaice and sole. Results for a 50% and 20% reduction in fishing mortality were proportional.

**Figure 18: Relative changes in selected fish stocks over a ten year simulation caused by complete closure of the haddock fishery**



Source: EFEP (2004)

The stomach data from the ICES ‘years of the stomach’ were reanalysed in a new study by Kempf et al. (2008) in order to evaluate the influence of changes in predator-prey spatial overlap on the diet of North Sea cod and whiting. The large-scale response of North Sea cod and whiting populations to varying prey fields was analysed using generalised additive models (GAMs). It has been found that there is considerable overlap in the diets of haddock and cod, so it seems reasonable to assume that these species are competitors. Some studies have however indicated that they tend to feed in separate areas so that in fact the degree of competition might be quite low.

The effects of fishing gears on the seabed of the North Sea has been the focus of many studies, both from the impact on benthos, and the geochemistry of the seabed. The effects are most notable through the activities of the beam-trawl fleet, which targets flatfish rather than gadoids such as saithe. However, the effects of demersal trawling cannot be disregarded. Interactions with benthos have been found to vary. Comparisons of historical and modern data on benthic abundance and diversity have shown potential local effects (Frid et al, 2002) and more regional changes in sessile, scavenger and predator species (Rumohr & Kujawski, 2000). However, these shifts could be the result of a combination of the physical fishery impact of fishing and

additional potential food for scavenging and predator species provided by the large amounts of discards and moribund benthos. Other direct studied effects of fishing include the physical disturbance to the seabed, and the generation of seabed litter from discarded gears etc. Despite these clear, and in many cases quantifiable, effects, it is still very difficult to separate the effects of commercial fisheries from natural fluctuations in reproductive success and predator–prey interactions. However, models suggest that trawling reduces biomass, production, and species richness (Jones, 1992; Magorrian & Service, 1998; Tuck et al., 1998; Ball et al., 2000). The effects of trawling are greatest in areas with low levels of natural disturbance but small in areas with high rates of natural disturbance. For the North Sea, models suggest that the bottom trawl fleet reduced benthic biomass and production by 56% and 21%, respectively, compared with an un-fished situation (Hiddink et al., 2006).

The ICES Working Group on Seabird Ecology (WGSE) has a wide remit which includes the review of current approaches for identifying offshore seabird aggregations and delineating Important Bird Areas (IBAs) and Special Protection Areas (SPAs); the development of recommendations for a comprehensive monitoring programme for seabirds; and details of how to sample diet and how to report results of dietary studies in seabirds.

The different areas of ecosystem interactions are yet to be drawn together. However, this work has begun under the auspices of ICES.

## 7 OTHER FISHERIES AFFECTING TARGET STOCK

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### 7.1 HADDOCK FISHERIES

There are haddock fisheries off the west coast of Scotland, including a stock at Rockall (C01), and also further north, in the Arctic sea. These stocks are considered to be largely independent of the North Sea stock for management purposes. However, there is some evidence to suggest there may be a link between west of Scotland and North Sea haddock stocks. Fishing pressure within these other stocks would not be expected to adversely affect the North Sea haddock fishery, nor vice-versa. The assessment of the North Sea fishery would not, therefore, need to consider the management of the west coast of Scotland or Arctic stocks. It is likely that vessels within the client fleet would sometimes fish for haddock at Rockall (west of the so called 'French Line' (C14) since there are no 'days-at-sea' restrictions there. The availability of this fishing opportunity could reduce pressure on the North Sea haddock stock. It is a requirement of this concession that vessels must have VMS fitted so that their position can be monitored.

### 7.2 NEPHROPS-DIRECTED FISHERIES

The North Sea nephrops directed fishery overlaps with areas where haddock occur and there can be a significant by-catch of haddock in the nephrops fishery. Nephrops vessels are permitted to land a proportion of this, discarding the rest at sea. Since vessels trawling for nephrops are permitted to use smaller mesh trawls than vessels fishing for demersal fin fish, a significant proportion of the by-catch in this fishery is made up of juvenile haddock. The main concern for the haddock fishery is the quantity of haddock, particularly juveniles, discarded at sea by nephrops trawlers (Table 9).

Given the high levels of discards from the nephrops fishery, substantial attention has been made to developing strategies and methods to reduce bycatch. In terms of strategies, the cod recovery plan has been a major influence in changing fishing practices, both in terms of adopting new gear as well as changing fishing behaviour, especially through the Scottish Conservation Credit Scheme. A brief summary of recent work that has been done on gear trials relevant to this fishery is given below:

**Dunlin and Reese, 2003:** trials carried out by Seafish illustrate the extent of the bycatch that may be taken in a standard nephrops trawl, and show the reductions that can be achieved with a modified trawl design. These results show the modified trawl produced a gain in nephrops of 28%, and reductions in bycatch of haddock (62%), whiting (65%) and cod (11%).

**Kynoch *et al*, 2007:** trialled a new gear (95 mm codend with a 120 mm SMP) at various distances from the codend. Results showed that:

- 4-9 m from the codend showed that night time fishing resulted in greater catches of cod compared to day time – no difference was found for haddock, whiting and nephrops.
- In all cases except for the 9-14m panel, no significant loss of nephrops was detected for any gear and the proportions retained are close to 1.0 across the whole length range
- 95mm codend with 120mm SMP at 13-18m from the codline: retention of cod is still near to 100%, indicating that cod do not escape from either the 95mm codend or 120mm panel in this forward position. However, there is a clear improvement in selection for other roundfish in that about 50% of whiting and haddock escape at lengths around 32cm and 38cm respectively;

- 95mm codend with 120mm SMP at 9-14m or 4-9m from the codline: statistically there was no significant difference between the % retention of the two gears for any of the 3 fish species. There is a significant effect for cod (i.e. the proportion of cod retained is significantly below 1 in both cases and at 4-9m the relationship between retention and length is more marked). Haddock and whiting selection is better than with the panel at 13-18m.

**Revill et al, 2007:** used a standard 3 m long, 87 mm SMP 13-16 m aft of the fishing circle and two variants (i) 3 m long, 84 mm, 4.4 – 7.4 m aft of the fishing circle and (ii) 3 m long, 95 mm SMP 13-16 m aft of the fishing circle. They determined that:

- SMP variant I caught less small whiting, plaice, haddock and cod than the standard trawl with no difference in nephrops catches, although the total discards were significantly lower. This SMP variant essentially doubled the available area of SMP and it reduced discarded fish by 42% compared to the standard trawl.
- The trawl fitted with the SMP variant II caught less small whiting and cod than the standard trawl. There was no difference in the quantity of nephrops landed whole, but there were less (11%) nephrops for tails landed from this experimental trawl than from the standard trawl. This gear was better than the standard trawl catching fewer roundfish below MLS—whiting—45%, haddock—58% and cod —35%. This panel resulted in some nephrops loss (11% of the small nephrops for tailing).

**Catchpole and Revill (2008):** examined the behaviour of different nephrops and key bycatch species to different trawl designs and bycatch exclusion devices. This concluded that for reducing discards but retaining marketable fish, SMPs offer the most useful tool; to eliminate all bycatch and create a single-species fishery, grids and traditional nephrops trawls show most potential. Whatever the objectives of the new measures, it is likely that a short-term economic effect will follow, and some form of incentive may be required to implement effective measures.

An important element of the **Scottish Conservation Credits scheme** in 2008 has been the development and trialling of more selective fishing gears. One study looked at the *Selectivity of North Sea Nephrops gear using 100-120mm square mesh panels*, investigating the positions and mesh sizes for square meshed panels (SMPs) in *Nephrops* trawls, including the performance of the 110 SMP which already forms part of Conservation Credits. The trials looked at the effect of putting the SMP in the taper (T) or the extension (E) of the net and at SMPs with meshes of 110 and 120mm. The findings suggest that when the 110mm panel is placed in the extension it catches fewer small fish potentially reducing discards of haddock and whiting by substantial amounts with some loss of marketable fish. When placed in the tapered part of the net it is not effective. At 120mm mesh size an SMP in the taper can work but used in the extension this leads to higher losses of marketable fish. These gears did not lose *Nephrops*. Cod catches were small in these trials although reductions of smaller fish were apparent, especially with the 120mm SMP.

The client fleet includes vessels engaged in either, the North Sea haddock fishery, the nephrops fishery or both. Should certification be granted to both fisheries, it is expected that by-catches of the other species would be included.

## 8 STANDARD USED

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The MSC Principles and Criteria for Sustainable Fisheries form the standard against which the fishery is assessed and are organised in terms of three principles. Principle 1 addresses the need to maintain the target stock at a sustainable level; Principle 2 addresses the need to maintain the ecosystem in which the target stock exists, and Principle 3 addresses the need for an effective fishery management system to fulfil Principles 1 and 2 and ensure compliance with national and international regulations. The Principles and their supporting Criteria are presented below.

### 8.1 PRINCIPLE 1

**A fishery must be conducted in a manner that does not lead to over-fishing or depletion of the exploited populations and, for those populations that are depleted, the fishery must be conducted in a manner that demonstrably leads to their recovery.<sup>11</sup>**

The intent of this principle is to ensure that the productive capacities of resources are maintained at high levels and are not sacrificed in favour of short term interests. Thus, exploited populations would be maintained at high levels of abundance designed to retain their productivity, provide margins of safety for error and uncertainty, and restore and retain their capacities for yields over the long term.

#### **Criteria:**

1. The fishery shall be conducted at catch levels that continually maintain the high productivity of the target population(s) and associated ecological community relative to its potential productivity.
2. Where the exploited populations are depleted, the fishery will be executed such that recovery and rebuilding is allowed to occur to a specified level consistent with the precautionary approach and the ability of the populations to produce long-term potential yields within a specified time frame.
3. Fishing is conducted in a manner that does not alter the age or genetic structure or sex composition to a degree that impairs reproductive capacity.

### 8.2 PRINCIPLE 2

**Fishing operations should allow for the maintenance of the structure, productivity, function and diversity of the ecosystem (including habitat and associated dependent and ecologically related species) on which the fishery depends.**

The intent of this principle is to encourage the management of fisheries from an ecosystem perspective under a system designed to assess and restrain the impacts of the fishery on the ecosystem.

#### **Criteria:**

1. The fishery is conducted in a way that maintains natural functional relationships among species and should not lead to trophic cascades or ecosystem state changes.
2. The fishery is conducted in a manner that does not threaten biological diversity at the genetic, species or population levels and avoids or minimises mortality of, or injuries to endangered, threatened or protected species.

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<sup>11</sup> The sequence in which the Principles and Criteria appear does not represent a ranking of their significance, but is rather intended to provide a logical guide to certifiers when assessing a fishery. The criteria by which the MSC Principles will be implemented will be reviewed and revised as appropriate in light of relevant new information, technologies and additional consultations

3. Where exploited populations are depleted, the fishery will be executed such that recovery and rebuilding is allowed to occur to a specified level within specified time frames, consistent with the precautionary approach and considering the ability of the population to produce long-term potential yields.

### 8.3 PRINCIPLE 3

**The fishery is subject to an effective management system that respects local, national and international laws and standards and incorporates institutional and operational frameworks that require use of the resource to be responsible and sustainable.**

The intent of this principle is to ensure that there is an institutional and operational framework for implementing Principles 1 and 2, appropriate to the size and scale of the fishery.

#### A. Management System Criteria:

1. The fishery shall not be conducted under a controversial unilateral exemption to an international agreement.

The management system shall:

2. Demonstrate clear long-term objectives consistent with MSC Principles and Criteria and contain a consultative process that is transparent and involves all interested and affected parties so as to consider all relevant information, including local knowledge. The impact of fishery management decisions on all those who depend on the fishery for their livelihoods, including, but not confined to subsistence, artisanal, and fishing-dependent communities shall be addressed as part of this process.
3. Be appropriate to the cultural context, scale and intensity of the fishery – reflecting specific objectives, incorporating operational criteria, containing procedures for implementation and a process for monitoring and evaluating performance and acting on findings.
4. Observe the legal and customary rights and long term interests of people dependent on fishing for food and livelihood, in a manner consistent with ecological sustainability.
5. Incorporates an appropriate mechanism for the resolution of disputes arising within the system<sup>12</sup>.
6. Provide economic and social incentives that contribute to sustainable fishing and shall not operate with subsidies that contribute to unsustainable fishing.
7. Act in a timely and adaptive fashion on the basis of the best available information using a precautionary approach particularly when dealing with scientific uncertainty.
8. Incorporate a research plan – appropriate to the scale and intensity of the fishery – that addresses the information needs of management and provides for the dissemination of research results to all interested parties in a timely fashion.
9. Require that assessments of the biological status of the resource and impacts of the fishery have been and are periodically conducted.
10. Specify measures and strategies that demonstrably control the degree of exploitation of the resource, including, but not limited to:
  - a) setting catch levels that will maintain the target population and ecological community's high productivity relative to its potential productivity, and account for the non-target species (or size, age, sex) captured and landed in association with, or as a consequence of, fishing for target species;

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<sup>12</sup> Outstanding disputes of substantial magnitude involving a significant number of interests will normally disqualify a fishery from certification.

- b) identifying appropriate fishing methods that minimise adverse impacts on habitat, especially in critical or sensitive zones such as spawning and nursery areas;
  - c) providing for the recovery and rebuilding of depleted fish populations to specified levels within specified time frames;
  - d) mechanisms in place to limit or close fisheries when designated catch limits are reached;
  - e) establishing no-take zones where appropriate.
11. Contains appropriate procedures for effective compliance, monitoring, control, surveillance and enforcement which ensure that established limits to exploitation are not exceeded and specifies corrective actions to be taken in the event that they are.

## **B. Operational Criteria**

Fishing operation shall:

- 12. Make use of fishing gear and practices designed to avoid the capture of non-target species (and non-target size, age, and/or sex of the target species); minimise mortality of this catch where it cannot be avoided, and reduce discards of what cannot be released alive.
- 13. Implement appropriate fishing methods designed to minimise adverse impacts on habitat, especially in critical or sensitive zones such as spawning and nursery areas.
- 14. Not use destructive fishing practices such as fishing with poisons or explosives;
- 15. Minimise operational waste such as lost fishing gear, oil spills, on-board spoilage of catch etc.
- 16. Be conducted in compliance with the fishery management system and all legal and administrative requirements.
- 17. Assist and co-operate with management authorities in the collection of catch, discard, and other information of importance to effective management of the resources and the fishery.

## 9 BACKGROUND TO THE EVALUATION

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### 9.1 EVALUATION TEAM

**Lead Assessor:** Dr. Andrew Hough

**Project Coordinator:** Tim Huntington

**Principal 1: Colin Chapman.** Colin Chapman graduated in 1962 with a B.Sc. in Zoology from the University of Nottingham and in 1977 with a BA in Mathematics from the Open University and was awarded a D.Sc. by the University of Nottingham in 1997. He joined the Marine Laboratory, Aberdeen in 1962 and initially worked on fish behaviour in relation to fishing gear. In 1972, transferred to the Shellfish Resources Section at Aberdeen and worked with this group, from 1988 as Section Head, until taking early retirement in 1997. In 1966, established a field research station at Upper Loch Torridon and carried out research there for many years, particularly on the ecology, behaviour and general biology of the Norway lobster (*Nephrops norvegicus*). Has published many scientific papers and research reports on this species, also on other shellfish and fish species and on the efficiency and selectivity of fishing gears. In 1987, was appointed by the Buckland Foundation to give the Buckland lecture series on *Nephrops* biology and fisheries. An active member on several ICES working groups including the ICES Nephrops Study Group and the Stock Assessment Working Group, from 1977-96. Appointed an Honorary Senior Lecturer by Aberdeen University in 1992. Since retirement has been involved in projects on Nephrops, European lobsters, cockles, mussels, crab species and scallops as well as various teaching roles and part-time consultancy work.

**Principal 2: Tim Huntington.** Tim Huntington is a UK-based consultant specialising in fisheries, aquaculture and the aquatic environment. He has over twenty years experience in aquaculture and fisheries as a fisheries biologist. He has designed, managed and directed coastal, marine and freshwater resource management projects in Europe and many other countries worldwide and is an environmental impact assessment specialist with wide-ranging experience of fisheries and aquaculture development world-wide. He has extensive experience in fisheries, aquaculture and 'chain of custody' certification.

**Principal 3: Stephen Lockwood.** Stephen is an independent marine environment consultant and chairman of the Welsh Minister's fishing industry consultation group. Until 1999 he was Head of the UK Ministry of Agriculture, Fisheries and Food laboratory at Conwy, which undertook research and development work in the fields of fish and shellfish cultivation, and the environmental effects of fishing. At a personal level, he was responsible for providing advice to MAFF policy divisions, and through them to ministers, across the broad field of coastal zone management. Previously, he led research and providing scientific advice on the conservation of fish stocks and the management of fisheries, including the Western mackerel stock, Celtic Sea and Bay of Biscay Demersal fisheries, Pilchard (*Sardina pilchardus*) stocks and Western English Channel herring and sprats. He has published on stock assessment, fishery management and coastal development issues.

### 9.2 PREVIOUS CERTIFICATION EVALUATIONS

The fishery has not been previously assessed against the MSC standard.

### 9.3 INSPECTIONS OF THE FISHERY

Inspection of the fishery focused on the practicalities of fishing operations, the mechanisms and effectiveness of management agencies and the scientific assessment of the fisheries.

Meetings were held as follows. Some of the key issues discussed have been identified for each meeting.

Name	Affiliation	Date	Key Issues
George McCrae (Chairman) Mike Park (Chief Executive)	Scottish Fisheries Sustainable Accreditation Group (Client Group)	23/03/09	Unit of certification
Jackie Tait	Caley Fisheries	23/03/09	Confirmation of landings
Gary Masson	Northern PO.	23/03/09	Confirmation of landings
Bill Wiseman George West	Fishing vessel skippers	23/03/09	Fishing operations, bycatch, discards & ETP interactions
David Terry (Area Manager - North & East)	Scottish Fisheries Protection Agency	24/03/09	Fisheries monitoring, control & surveillance
Robert Stevenson	North-East Scotland Fisheries Organisation (NESFO)	24/03/09	Fisheries management
Graeme Murray	PFL	24/03/09	Confirmation of landings
Peter Bruce Michael Buchan Brian Buchan	Fishing vessel skippers	24/03/09	Fishing operations, bycatch, discards & ETP interactions
Bill Turrell Coby Needle Helen Dobby Nick Bailey Peter Wright Barry O'Neil	Fisheries Research Services, Aberdeen	25/03/09	Stocks (target and bycatch), gear research and interactions, discards, haddock biology
Tom Blasdale	Joint Nature Conservation Committee JNCC (Aberdeen)	25/03/09	Offshore environmental issues
Rory Campbell	Scottish Fishermen's Federation	25/03/09	SFF observer programme
Colin Faulkner (stock conservation) Stuart Baxter (stock conservation) Susan Ewart (Effort control manager) Jim Watson (quota management) Ewen Milligan (Prosecutions & enforcement) Alistair Stewart (Sea Fisheries Inspectorate) Andrew Brown (Fisheries Strategy & Environment) Sebastian Howell (Economic development)	Marine Scotland	26/03/09	Fisheries policy, management and regulation
Louize Hill	WWF	27/03/09	Environmental issues
David Donnan	Scottish Natural Heritage	27/03/09	Environmental issues

## 10 STAKEHOLDER CONSULTATION

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### 10.1 STAKEHOLDER CONSULTATION

A total of 34 stakeholders were identified and consulted specifically by Moody Marine. Information was also made publicly available at the following stages of the assessment:

Date	Purpose	Media
17 January 2008	Announcement of assessment	Direct E-mail/letter Notification on MSC website Advertisement in press
26 June 2008	Notification of Assessment Team nominees	Direct E-mail Notification on MSC website
4 November 2008	Notification of intent to use MSC FAM Standard Assessment Tree	Direct E-mail Notification on MSC website
17 February 2009	Notification of assessment visit and call for meeting requests	Direct E-mail Notification on MSC website
23-26 March 2009	Assessment visit	Meetings
07 July 2009	Notification of Proposed Peer Reviewers	Direct E-mail Notification on MSC website
14 May 2010	Notification of Public Draft Report	Direct E-mail Notification on MSC website
	Notification of Final Report	Direct E-mail Notification on MSC website

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### 10.2 STAKEHOLDER ISSUES

The main issues of concern raised during stakeholder consultation was that of the impact of the fishing method (bottom trawls) on non-target species and the level of discards from this fishery. This issue was carefully examined during the assessment of the fishery. The teams consideration of effects on non-target species is considered under PIs 2.1 (retained bycatch) and 2.2 (discarded bycatch).

The assessment team has considered further stakeholder comments in its review of the Public Certification Draft Report to produce this Final Report. Various minor changes have been made to clarify the text and ensure consistency in the scoring of the fishery against the MSC Principles, detailed in Appendix D.

## 11 OBSERVATIONS AND SCORING

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### 11.1 INTRODUCTION TO SCORING METHODOLOGY

The MSC Principles and Criteria set out the requirements of certified fishery. These Principles and Criteria have been developed into a standard (Fishery Assessment Methodology) assessment tree - Performance Indicators and Scoring Guideposts - by the MSC, which is used in this assessment.

The Performance Indicators (PIs) have been released on the MSC website. In order to make the assessment process as clear and transparent as possible, each PI has three associated Scoring Guideposts (SGs) which identify the level of performance necessary to achieve 100, 80 (a pass score), and 60 scores for each Performance Indicator; 100 represents a theoretically ideal level of performance and 60 a measurable shortfall.

For each Performance Indicators, the performance of the fishery is assessed as a 'score'. In order for the fishery to achieve certification, an overall weighted average score of 80 is necessary for each of the three Principles and no Indicator should score less than 60. As it is not considered possible to allocate precise scores, a scoring interval of five is used in evaluations. As this represents a relatively crude level of scoring, average scores for each Principle are rounded to the nearest whole number.

### 11.2 SCORING OF THIS FISHERY

The detailed scoring is presented in Appendix A. A summary of the weights and scores are presented in the table overleaf and the overall scores provided below:

MSC Principle	Fishery Performance
<b>Principle 1:</b> Sustainability of Exploited Stock	Overall : 94
<b>Principle 2:</b> Maintenance of Ecosystem	Overall : 83
<b>Principle 3:</b> Effective Management System	Overall : 95

**Table 13: Scoring Summary – SFSAG Haddock Fishery**

Prin- ciple	Wt (L1)	Component	Wt (L2)	PI No.	Performance Indicator (PI)	Wt (L3)	Weight in	Score	Contribution to Principle Score	
One	1	Outcome	0.5	1.1.1	Stock status	0.5	0.25	0.333 0.1667	95	23.75
				1.1.2	Reference points	0.5	0.25	0.333 0.1667	85	21.25
				1.1.3	Stock rebuilding			0.333 0.1667		0.00
	Management	0.5	1.2.1	Harvest strategy	0.25	0.125			95	11.88
			1.2.2	Harvest control rules & tools	0.25	0.125			90	11.25
			1.2.3	Information & monitoring	0.25	0.125			95	11.88
			1.2.4	Assessment of stock status	0.25	0.125			100	12.50
Two	1	Retained species	0.2	2.1.1	Outcome	0.333	0.0667		85	5.67
				2.1.2	Management	0.333	0.0667		75	5.00
				2.1.3	Information	0.333	0.0667		75	5.00
	Bycatch	0.2	2.2.1	Outcome	0.333	0.0667			80	5.33
			2.2.2	Management	0.333	0.0667			75	5.00
			2.2.3	Information	0.333	0.0667			80	5.33
	ETP species	0.2	2.3.1	Outcome	0.333	0.0667			100	6.67
			2.3.2	Management	0.333	0.0667			85	5.67
			2.3.3	Information	0.333	0.0667			85	5.67
	Habitats	0.2	2.4.1	Outcome	0.333	0.0667			80	5.33
			2.4.2	Management	0.333	0.0667			80	5.33
			2.4.3	Information	0.333	0.0667			95	6.33
	Trophic function	0.2	2.5.1	Outcome	0.333	0.0667			85	5.67
			2.5.2	Management	0.333	0.0667			80	5.33
			2.5.3	Information	0.333	0.0667			90	6.00
Three	1	Governance and policy	0.5	3.1.1	Legal & customary framework	0.25	0.125		100	12.50
				3.1.2	Consultation, roles &	0.25	0.125		100	12.50
				3.1.3	Long term objectives	0.25	0.125		90	11.25
				3.1.4	Incentives for sustainable fishing	0.25	0.125		100	12.50
	Fishery specific management system	0.5	3.2.1	Fishery specific objectives	0.2	0.1			90	9.00
			3.2.2	Decision making processes	0.2	0.1			90	9.00
			3.2.3	Compliance & enforcement	0.2	0.1			95	9.50
			3.2.4	Research plan	0.2	0.1			95	9.50
			3.2.5	Management performance	0.2	0.1			95	9.50

Overall weighted Principle-level scores		Either Or
Principle 1 - Target species	Stock rebuilding PI not scored Stock rebuilding PI scored	92.50
Principle 2 - Ecosystem		83.33
Principle 3 - Management		95.25

## **12 LIMIT OF IDENTIFICATION OF LANDINGS FROM THE FISHERY**

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Traceability of product from the sea to the consumer is vital to ensure that the integrity of the MSC standard is maintained. There are several aspects to traceability that the MSC require to be evaluated: Traceability within the fishery; at-sea processing; at the point of landing; and subsequently the eligibility to enter the chain of custody.

### **12.1 TRACEABILITY**

The combination of EC 'Buyers and Sellers of First Sale Fish' regulations, EC logbook and custom and practise provide a series of independent and verifiable mass-balance measures that would enable transgressions to be detected. The 'Buyers and Sellers' Act requires that all transactions at the first point of sale are fully recorded, allowing immediate traceability between the fishery and the first point of the chain of custody whilst the logbook provides a record of the time, location and nature (species and volumes) of the catch.

Each vessel in the client group is required to sign terms of membership that stipulate that produce from the unit(s) 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.

### **12.2 AT-SEA PROCESSING**

At-sea processing does not take place in this fishery.

### **12.3 POINTS OF LANDING**

Products from this fishery may be landed in ports in Scotland, the East coast ports of England and a number of named non-UK ports where regulatory recording and reporting of landings takes place. Non-UK ports are Hanstholm, Hirtshalls, Thyboron, Urk and Zeebrugge. Given that there are likely to be landings of similar but non-certified fish into these ports, it is important that an appropriate chain of custody is established. A key part of this will be traceability back to a named vessel from the client fleet listed in Appendix F.

### **12.4 ELIGIBILITY TO ENTER CHAIN OF CUSTODY**

At present haddock 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. Risks are considered very low as it is normal practise to fully identify and segregate fish by spp and vessel, backed-up by the buyers and sellers regulation.

The scope of this certification ends at the landing of haddock and associated product. Any organisations purchasing MSC product from vessels landing would need to ensure that their supplier had appropriate Chain of Custody Certification linking the landings to the client fleet.

Product from the certified fishery, defined in **Appendix F** is therefore eligible to enter future Chain of Custody. The proposed target eligibility date for certified material to enter the supply chain (covered by a valid chain of custody) is 12 November 2009, six months prior to publication of the Public Comment Draft Report.

## 13 ASSESSMENT RESULTS

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### 13.1 SUMMARY SCORES

The Performance of the Fishery in relation to MSC Principles 1, 2 and 3 is again summarised below:

MSC Principle	Fishery Performance
<b>Principle 1:</b> Sustainability of Exploited Stock	Overall : 92.5
<b>Principle 2:</b> Maintenance of Ecosystem	Overall : 83.3
<b>Principle 3:</b> Effective Management System	Overall : 95.3

It should be noted that the same scores were assigned to each gear type used (demersal trawl and Danish seine), on a precautionary basis (i.e. scoring was to the 'worst-case' situation).

**The fishery attained a score of 80 or more against each of the MSC Principles and did not score less than 60 against any Indicators. It is therefore determined that the SFSAG Haddock Demersal Trawl and Danish Seine Fishery be certified according to the Marine Stewardship Council Principles and Criteria for Sustainable Fisheries.**

### 13.2 CONDITIONS

As a standard requirement of the MSC certification methodology, the fishery shall be subject to (as a minimum) annual surveillance audits. These audits shall be publicised and reports made publicly available.

The fishery attained a score of below 80 against three Performance Indicators. The assessment team has therefore set three conditions for continuing certification that the client for certification is required to address. The conditions are applied to improve performance to at least the 80 level within a period set by the certification body but no longer than the term of the certification.

As a standard condition of certification, the client shall develop an 'Action Plan' for Meeting the Conditions for Continued Certification', to be approved by Moody Marine.

The conditions are associated with three key areas of performance of the fishery.

The Conditions are set out overleaf.

## CONDITION 1: MITIGATION MEASURES TO REDUCE BYCATCH

Outcome	2.1.2
PI	<b>Management strategy:</b> There is a strategy in place for managing retained species that is designed to ensure the fishery does not pose a risk of serious or irreversible harm to retained species.
SG60	There are measures in place, if necessary, that are expected to maintain the main retained species at levels which are highly likely to be within biologically based limits, or to ensure the fishery does not hinder their recovery and rebuilding. The measures are considered likely to work, based on plausible argument (e.g., general experience, theory or comparison with similar fisheries/species).
SG80	There is a partial strategy in place, if necessary that is expected to maintain the main retained species at levels which are highly likely to be within biologically based limits, or to ensure the fishery does not hinder their recovery and rebuilding. There is some objective basis for confidence that the partial strategy will work, based on some information directly about the fishery and/or species involved. There is some evidence that the partial strategy is being implemented successfully.
SG100	There is a strategy in place for managing retained species. The strategy is mainly based on information directly about the fishery and/or species involved, and testing supports high confidence that the strategy will work. There is clear evidence that the strategy is being implemented successfully, and intended changes are occurring. There is some evidence that the strategy is achieving its overall objective.
Scoring	<b>Overall score: 75</b> For <b>cod</b> and <b>saithe</b> this SG meets all the 100 guideposts. For <b>monkfish</b> and <b>whiting</b> the fishery meets the partial strategy requirements of SG 80 in that the cod recovery programme will be beneficial for these species. In all cases there is some actual and modelling evidence that the strategies being adopted are working and being implemented effectively, although further measures could be taken to reduce the bycatch of species such as whiting. This scoring issue scores 70.
Rationale	The joint EU/Norway Management Plan includes the requirement to reduce bycatch in the haddock fishery. Considerable work has been conducted in trialling more selective gears for mixed whitefish fisheries in Scotland. There is now a need for the widespread adoption of locally suitable selective gear to reduce the incidental catch of species that may be subsequently discarded.
Condition	The client shall ensure that there is a partial strategy in place that is expected to maintain both retained species at levels which are highly likely to be within biologically-based limits, or to ensure the fishery does not hinder their recovery and rebuilding. To achieve this outcome, it is recommended that the SFSAG fleet should continue to collaborate proactively with research and development organisations engaged in seeking gear improvements aimed at reducing unwanted by-catch (both commercial and non-commercial) and other adverse environmental effects. On the basis of this joint research, the client fleet should, in consultation with both statutory and non-statutory organisations, adopt suitably selective gear to reduce discard levels of both whiting and cod. Evidence should be provided by the first annual surveillance there is a partial strategy in place that is expected to maintain the main retained species at levels which are highly likely to be within biologically based limits, or to ensure the fishery does not hinder their recovery and rebuilding. This will include verifiable

	information on selectivity and gear performance measured against current benchmark levels, which will be formally assessed at the third surveillance audit.
Client action plan	<p>Members of the client group will continue to participate extensively in the development and trial of further selective gears to reduce discards through their participation in initiatives such as the Conservation Credits scheme, a Scottish response to regional management that promotes sustainable fishing practices, and the Scottish Industry Science Partnership (SISP), which helps fishers develop new, environmentally friendly, fishing gears. Furthermore, the group will seek to influence the on-going use and development of innovative net design and configuration of whitefish gear, Seasonal Closures (SC's), and Real Time Closures (RTC's) which together provide substantial protection for juveniles and vulnerable stocks such as cod and whiting</p> <p>The group will use current levels of selectivity and gear design as a benchmark from which to assess the need for further improvements; the group will deliver any necessary changes through their participation, and influence within the various stakeholder groups.</p> <p>It is expected that a formal partial strategy for the adoption of suitably selective gear will be in place within a year of initial certification and that there is evidence that this strategy is being implemented successfully within three years of certification.</p>
Consultation on condition	The client group will use their strong links with Conservation Credits, SISP and the North Sea Regional Advisory Council (NSRAC), an advisory body to the European Commission, to advance the necessary changes as set out in the aforementioned condition (Condition 1) . Preliminary discussions have already taken place during consultation over the preparation of the Client Action Plan.

## CONDITION 2: RECORDING TOTAL CATCH OF RETAINED SPECIES

Outcome	2.1.3
PI	Information / monitoring: Information on the nature and extent of retained species is adequate to determine the risk posed by the fishery and the effectiveness of the strategy to manage retained species.
SG60	<p>Qualitative information is available on the amount of main retained species taken by the fishery.</p> <p>Information is adequate to qualitatively assess outcome status with respect to biologically based limits.</p> <p>Information is adequate to support measures to manage main retained species.</p>
SG80	<p>Qualitative information and some quantitative information are available on the amount of main retained species taken by the fishery.</p> <p>Information is sufficient to estimate outcome status with respect to biologically based limits.</p> <p>Information is adequate to support a partial strategy to manage main retained species.</p> <p>Sufficient data continue to be collected to detect any increase in risk level (e.g. due to changes in the outcome indicator scores or the operation of the fishery or the effectiveness of the strategy).</p>
SG100	<p>Accurate and verifiable information is available on the catch of all retained species and the consequences for the status of affected populations.</p> <p>Information is sufficient to quantitatively estimate outcome status with a high degree of certainty.</p> <p>Information is adequate to support a comprehensive strategy to manage retained species, and evaluate with a high degree of certainty whether the strategy is achieving its objective.</p> <p>Monitoring of retained species is conducted in sufficient detail to assess ongoing mortalities to all retained species.</p>
Scoring	<p><b>Overall score: 75</b></p> <p>The main bycatch stocks are whiting, saithe, cod and to a lesser extent, monkfish.</p> <p>There is accurate and verifiable information on the landings of all retained species and the consequences for the status of affected populations. However there is only limited, mostly observer data on the <i>total quantity</i> of main retained species taken by the fishery (e.g. landings plus the quantity of retained species that may be discarded). As a result, the first scoring issue of SG80 is not fully met; therefore the assessment team has decided that a score of 70 is appropriate for this PI.</p> <p>For cod, saithe, plaice, whiting and monkfish information is sufficient to estimate outcome status with respect to biologically-based limits (80).</p> <p>For cod, saithe, plaice, whiting and monkfish information is adequate to support a partial strategy to manage main retained species (80).</p> <p>Monitoring of retained species is conducted in sufficient detail to detect any increase in risk level (e.g. due to changes in the outcome indicator scores or the operation of the fishery or the effectiveness of the strategy) (80).</p>
Rationale	<p>Notwithstanding ongoing gear developments to reduced discard levels, there continues to be widespread concern, shared by the assessment team, that the total catch of retained species is significantly greater than the quantities landed. The discarding of cod, haddock and whiting is not routinely recorded (current</p>

	qualitative estimates of discards are made through observer programmes) and collection of such data would help to improve management measures for these species.
Condition	By the first surveillance audit, evidence must be presented that shows that measures have been developed to provide some accurate quantitative information on total catch (i.e. retained plus discarded catch) of all retained species.
Client action plan	The group will liaise with Government, fish selling offices, Producer Organisations and within its membership with a view to creating a flow of total catch information. This may be attached to existing documentation, such as official landing declarations, or take the form of bespoke record keeping for vessels landing MSC product. Alternatively, in order to satisfy the condition, vessels may make use of new technology as and when it develops. The group will liaise with MSS to develop a common standard for the reporting of total catch so that such information may ultimately support existing information.
Consultation on condition	Consultation on this condition have already taken place with external agencies e.g. fish selling offices, the POs and within SFSAG membership. Each vessel in the client group is required to sign terms of membership that stipulate that produce from the unit(s) 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

### CONDITION 3: MITIGATION MEASURES TO REDUCE DISCARDING

Outcome	2.2.2
PI	Management strategy: There is a strategy in place for managing bycatch that is designed to ensure the fishery does not pose a risk of serious or irreversible harm to bycatch populations.
SG60	There are measures in place, if necessary, which are expected to maintain main bycatch species at levels which are highly likely to be within biologically based limits or to ensure that the fishery does not hinder their recovery. The measures are considered likely to work, based on plausible argument (e.g. general experience, theory or comparison with similar fisheries/species).
SG80	There is a partial strategy in place, if necessary, for managing bycatch that is expected to maintain main bycatch species at levels which are highly likely to be within biologically based limits or to ensure that the fishery does not hinder their recovery. There is some objective basis for confidence that the partial strategy will work, based on some information directly about the fishery and/or the species involved. There is some evidence that the partial strategy is being implemented successfully.
SG100	There is a strategy in place for managing and minimising bycatch. The strategy is mainly based on information directly about the fishery and/or species involved, and testing supports high confidence that the strategy will work. There is clear evidence that the strategy is being implemented successfully, and intended changes are occurring. There is some evidence that the strategy is achieving its objective.
Scoring	<b>Overall score: 75</b> There is a partial strategy (through the EC CPOA for sharks) in place for managing spurdog bycatch that is expected to maintain main bycatch species at levels which are highly likely to be within biologically based limits or to ensure that the fishery does not hinder their recovery. This includes a vessel-level approach of a move-on strategy in the case of spawning aggregations of this species. This is a large-mesh gear which will help minimise the capture of non-commercial species. However there is scope for the wider adoption of more selective gear to reduce bycatch further so does not quite achieve SG 80 (75). There is some objective basis for confidence that the partial strategy will work, based on some information directly about the fishery and/or the species involved. This is supported by the declining markets for, and landings of spurdog and the cessation of targeted fishing of this species (80). There is some evidence that the partial strategy is being implemented successfully. More selective trawl designs to reduce the level of by-catch will benefit this benthopelagic species (80).
Rationale	The joint EU/Norway Management Plan includes the requirement to reduce discards in the haddock fishery. Considerable work has been conducted in trialling more selective gears for mixed whitefish fisheries in Scotland. There is now a need for the widespread adoption of locally suitable selective gear to reduce the incidental catch of species that may be subsequently discarded.
Condition	The client shall ensure that there is a partial strategy in place that is expected to maintain discarded bycatch species at levels which are highly likely to be within

	<p>biologically-based limits, or to ensure the fishery does not hinder their recovery and rebuilding.</p> <p>To achieve this outcome, it is recommended that the SFSAG fleet should continue to collaborate proactively with research and development organisations engaged in seeking gear improvements aimed at reducing unwanted by-catch (both commercial and non-commercial) and other adverse environmental effects. On the basis of this joint research, the client fleet should, in consultation with both statutory and non-statutory organisations, adopt suitably selective gear to reduce discard levels of both whiting and cod.</p>
Client action plan	<p>Members of the client group will continue to participate extensively in the development and trial of further selective gears to reduce discards through their participation in initiatives such as the Conservation Credits scheme, a Scottish response to regional management that promotes sustainable fishing practices, and the Scottish Industry Science Partnership (SISP), which helps fishers develop new, environmentally friendly, fishing gears. Furthermore, the group will seek to influence the on-going use and development of innovative net design and configuration of whitefish gear, Seasonal Closures (SC's), and Real Time Closures (RTC's) which together provide substantial protection for juveniles and vulnerable stocks such as cod and whiting</p> <p>The group will use current levels of selectivity and gear design as a benchmark from which to assess the need for further improvements; the group will deliver any necessary changes through their participation, and influence within the various stakeholder groups.</p> <p>It is expected that a formal partial strategy for the adoption of suitably selective gear will be in place within a year of initial certification and that there is evidence that this strategy is being implemented successfully within three years of certification.</p>
Consultation on condition	Not required for this condition as no external parties are involved.

SCORING CRITERIA	SCORING GUIDEPOST 60	SCORING GUIDEPOST 80	SCORING GUIDEPOST 100
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## Appendix A: Scoring Table

Principle 1	A fishery must be conducted in a manner that does not lead to over-fishing or depletion of the exploited populations and, for those populations that are depleted, the fishery must be conducted in a manner that demonstrably leads to their recovery.
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1.1	Management Outcomes:
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1.1.1	<b>Stock Status:</b> The stock is at a level which maintains high productivity and has a low probability of recruitment overfishing	It is <u>likely</u> that the stock is above the point where recruitment would be impaired.	It is <u>highly likely</u> that the stock is above the point where recruitment would be impaired.  The stock is at or fluctuating around its target reference point.	There is a <u>high degree of certainty</u> that the stock is above the point where recruitment would be impaired.  There is a <u>high degree of certainty</u> that the stock has been fluctuating around its target reference point, or has been above its target reference point, <u>over recent years</u> .
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### Scoring Comments

Based on the most recent estimates of spawning stock biomass (SSB) (in 2008) and fishing mortality (F) (in 2007), ICES considers the North Sea haddock stock to have full reproductive potential and that it is being harvested sustainably. SSB in 2008 is estimated to have been over 222,000t which is above  $B_{pa}$ , SSB is strongly influenced by the level of recruitment which is sporadic in this species. SSB has been falling steadily, with the waning influence of the strong 1999 year class, but this decline has been partially alleviated by a moderately strong year class in 2005. This year class will not dominate the stock biomass in the same manner as that of 1999. It is predicted that SSB will continue to fall until the arrival of the next strong cohort of recruits.

In 2007,  $F = 0.417$ , which was below  $F_{pa}$  but above the target for the harvest control rule ( $F_{HCR} = 0.3$ ), under the joint EU/Norway Management Plan. A reduction in F to the target level of 0.3 should ensure a sustainable yield from the 2005 year class. The most recent ACOM report shows that in 2008 F was estimated to have fallen to 0.25 which is below the  $F_{HCR}$  specified in the Management Plan.

Score: 95

There is a high degree of certainty that the stock is above the point where recruitment would be impaired (100)  
 There is a high degree of certainty that the stock has been fluctuating around its target reference point, or has been above its target reference point, over recent years. F was estimated to be at or below  $F_{HCR}$  from 2002 to 2005, but has risen above target recently ( 0.52 in 2006 and 0.42 in 2007) (90)

### Audit Trace References

C1, C26, C28, ICES Advice 2009, Book 6

SCORING CRITERIA	SCORING GUIDEPOST 60	SCORING GUIDEPOST 80	SCORING GUIDEPOST 100
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1.1.2	<p><b>Reference Points:</b> Limit and target reference points are appropriate for the stock.</p>	<p><u>Generic</u> limit and target reference points are based on justifiable and reasonable practice appropriate for the species category.</p>	<p>Reference points are appropriate for the stock and can be estimated.</p> <p>The limit reference point is set above the level at which there is an appreciable risk of impairing reproductive capacity.</p> <p>The target reference point is such that the stock is maintained at a level consistent with <math>B_{MSY}</math> or some measure or surrogate with similar intent or outcome.</p> <p>For low trophic level species, the target reference point takes into account the ecological role of the stock.</p>	<p>Reference points are appropriate for the stock and can be estimated.</p> <p>The limit reference point is set above the level at which there is an appreciable risk of impairing reproductive capacity following consideration of relevant <u>precautionary issues</u>.</p> <p>The target reference point is such that the stock is maintained at a level consistent with <math>B_{MSY}</math> or some measure or surrogate with similar intent or outcome, <u>or a higher level</u>, and takes into account relevant precautionary issues such as the ecological role of the stock with a high degree of certainty.</p>
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<p><b>Scoring Comments</b></p>
<p>ICES has proposed precautionary approach (<math>B_{pa}</math>, <math>F_{pa}</math>) and limit (<math>B_{lim}</math>, <math>F_{lim}</math>) reference points for SSB and F in North Sea haddock, as follows: <math>B_{pa} = 140,000t</math>; <math>B_{lim} = 100,000t</math>; <math>F_{pa} = 0.7</math>; <math>F_{lim} = 1.0</math>. By comparison, current (2008) SSB = 222,000t, well above the precautionary limit, and current F (2007) = 0.417, well below the precautionary level.</p> <p>The limit reference point <math>B_{lim}</math> is above the level at which there is an appreciable risk of impaired reproductive capacity; <math>B_{pa}</math> provides an additional precautionary buffer.</p> <p>Neither of the above reference points are used directly as a target reference point for the fishery, the target is for a fishing mortality, <math>F = 0.3</math> as set out in the agreed EU/Norway Management Plan of and the TAC has been set such as to achieve and maintain this target. In the last three years (2007-2009), average F was 0.28. This approach is consistent with MSY (<math>F_{MSY} = 0.3</math>)</p> <p>There is no specific biomass target reference point though maintaining <math>F = F_{MSY}</math> should ensure that the stock fluctuates around the notional value of <math>B_{MSY}</math>. In species such as North Sea haddock, stock abundance and biomass are largely driven by large, but unpredictable, pulses of recruitment. The fishery has recently been dependent on the strong 1999 year class and now the moderate 2005 year class is contributing to much of the yield. The harvest strategy objective is to achieve optimal benefit from these year classes as they occur.</p>
<p><b>Score: 85</b></p>
<p>Reference points are appropriate for the stock and can be estimated (100).</p> <p>The limit reference point (<math>B_{lim}</math>) is set above the level at which there is an appreciable risk of impairing reproductive capacity (80).</p> <p>The target reference point is such that the stock is maintained at a level consistent with <math>B_{MSY}</math> or some measure or surrogate with similar intent or outcome (80).</p> <p>Haddock, being a predatory fish, is not a low level trophic species.</p>
<p><b>Audit Trace References</b></p>
<p>Refs C1, C26, C28, ICES Advice 2010, Book 6</p>

SCORING CRITERIA	SCORING GUIDEPOST 60	SCORING GUIDEPOST 80	SCORING GUIDEPOST 100
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1.1.3	<p><b>Stock Rebuilding:</b> Where the stock is depleted, there is evidence of stock rebuilding.</p>	<p>Where stocks are depleted rebuilding strategies which have a <u>reasonable expectation</u> of success are in place.</p> <p>Monitoring is in place to determine whether they are effective in rebuilding the stock within a <u>specified</u> timeframe.</p>	<p>Where stocks are depleted rebuilding strategies are in place.</p> <p>There is <u>evidence</u> that they are rebuilding stocks, or it is highly likely based on simulation modelling or previous performance that they will be able to rebuild the stock within a <u>specified</u> timeframe.</p>	<p>Where stocks are depleted, strategies are <u>demonstrated</u> to be rebuilding stocks continuously and there is strong evidence that rebuilding will be complete within the <u>shortest practicable</u> timeframe.</p>
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<b>Scoring Comments</b>
Not relevant as the stock is not depleted nor rebuilding
<b>Score: N/A</b>
<b>Audit Trace References</b>

SCORING CRITERIA	SCORING GUIDEPOST 60	SCORING GUIDEPOST 80	SCORING GUIDEPOST 100
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1.2	<b>Harvest Strategy (management)</b>		
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1.2.1	Harvest Strategy: There is a robust and precautionary harvest strategy in place	<p>The harvest strategy is <u>expected</u> to achieve stock management objectives reflected in the target and limit reference points.</p> <p>The harvest strategy is <u>likely</u> to work based on prior experience or plausible argument.</p> <p><u>Monitoring</u> is in place that is expected to determine whether the harvest strategy is working.</p>	<p>The harvest strategy is responsive to the state of the stock and the elements of the harvest strategy <u>work together</u> towards achieving management objectives reflected in the target and limit reference points.</p> <p>The harvest strategy may not have been fully tested but monitoring is in place and <u>evidence</u> exists that it is achieving its objectives.</p>	<p>The harvest strategy is responsive to the state of the stock and is <u>designed</u> to achieve stock management objectives reflected in the target and limit reference points.</p> <p>The performance of the harvest strategy has been <u>fully evaluated</u> and evidence exists to show that it is achieving its objectives including being clearly able to maintain stocks at target levels.</p> <p>The harvest strategy is <u>periodically reviewed and improved</u> as necessary.</p>
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<b>Scoring Comments</b>
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The harvest strategy for this species is embodied in the joint EU-Norway Management Plan, which has been operating since 1999, was revised in 2007 and will be reviewed at the end of 2009. The main elements of the plan are a target fishing mortality rate of 0.3 which is referred to as the harvest control rule ( $F_{HCR}$ ), a limit of  $\pm 15\%$  change in TAC from year to year provided SSB is above  $B_{pa}$  (140,000t), and a gradual reduction in F to 0.1 if SSB falls below  $B_{pa}$  towards  $B_{lim}$  (the sliding F rule). The Plan is regarded by ICES as being precautionary and it is designed to be responsive to changes in stock status which should ensure sustainable SSB and steady yields in the future. The Management Plan has not been fully tested, but a Management Strategy Evaluation simulation exercise (C24), concluded that the Plan offers sustainability in terms of SSB and yields.

The Management Plan includes the requirement to improve the exploitation pattern in order to reduce discards of haddock (and other species) in this fishery. Norway has made more progress than the EU on this issue. Discarding of haddock by Scottish vessels is very high, particularly in years following above average levels of recruitment, and action to address this problem should be given higher priority, and should form part of the harvest strategy. It may be that cod recovery measures, such as the recently introduced CCS by Scotland, with incentives to use larger mesh nets and SMPs, may help to address the haddock discard problem. This issue is included as part of the general discard problem addressed by Condition 3.

<b>Score: 95</b>
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The harvest strategy is responsive to the state of the stock and is designed to achieve stock management objectives reflected in the target and limit reference points; exploitation pattern issue reduces score to 90.

The performance of the harvest strategy has not been fully evaluated but evidence from simulation modelling indicate that it should achieve its objectives, including being clearly able to maintain stocks at target levels (90).

The harvest strategy is periodically reviewed and improved as necessary. Due for review at the end of 2009 (100).

Therefore an overall score of 95 has been awarded.

<b>Audit Trace References</b>
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C1, C24, C28, C26
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SCORING CRITERIA	SCORING GUIDEPOST 60	SCORING GUIDEPOST 80	SCORING GUIDEPOST 100
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1.2.2	Harvest control rules and tools: There are well defined and effective harvest control rules in place	<p><u>Generally understood</u> harvest control rules are in place that are consistent with the harvest strategy and which act to reduce the exploitation rate as limit reference points are approached.</p> <p>There is <u>some evidence</u> that tools used to implement harvest control rules are appropriate and effective in controlling exploitation.</p>	<p><u>Well defined</u> harvest control rules are in place that are consistent with the harvest strategy and ensure that the exploitation rate is reduced as limit reference points are approached.</p> <p>The <u>selection</u> of the harvest control rules takes into account the <u>main</u> uncertainties.</p> <p><u>Available evidence indicates</u> that the tools in use are appropriate and effective in achieving the exploitation levels required under the harvest control rules</p>	<p><u>Well defined</u> harvest control rules are in place that are consistent with the harvest strategy and ensure that the exploitation rate is reduced as limit reference points are approached.</p> <p>The <u>design</u> of the harvest control rules take into account a <u>wide</u> range of uncertainties.</p> <p><u>Evidence clearly shows</u> that the tools in use are effective in achieving the exploitation levels required under the harvest control rules.</p>
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<b>Scoring Comments</b>
<p>Within the agreed Management Plan, the harvest control rule is the target level of fishing mortality rate, <math>F_{HCR} = 0.3</math>. Maintaining <math>F</math> close to the target level will ensure the sustainable exploitation of the moderately strong 2005 year class. The agreed TAC for 2009 of 42,000t has been set with aim of achieving target <math>F_{HCR} = 0.3</math>. Based on evaluation of the Plan, ICES has concluded that target <math>F_{HCR} = 0.3</math>, and with the TAC constrained to <math>\pm 15\%</math>, should lead on average to a &lt;5% risk of SSB being less than <math>B_{lim}</math> within the next 20 years. 'Fishing mortality in 2008 was estimated to by 0.25, which is below the target <math>F_{HCR}</math> of 0.3 specified in the joint EU-Norway management plan (ICES Advice 2009, Book 6).</p>
<b>Score: 90</b>
<p>Well defined harvest control rules are in place that are consistent with the harvest strategy and ensure that the exploitation rate is reduced as limit reference points are approached (100).  The design of the harvest control rules take into account a wide range of uncertainties (100).  Available evidence indicates that the tools in use are appropriate and effective in achieving the exploitation levels required under the harvest control rules (80).  Overall score 90.</p>
<b>Audit Trace References</b>
ICES Advice 2009, Book 6

SCORING CRITERIA	SCORING GUIDEPOST 60	SCORING GUIDEPOST 80	SCORING GUIDEPOST 100	
<p><b>1.2.3</b></p>	<p><b>Information / monitoring:</b> Relevant information is collected to support the harvest strategy</p>	<p><u>Some</u> relevant information related to stock structure, stock productivity and fleet composition is available to support the harvest strategy.</p> <p>Stock abundance and fishery removals are monitored and at least one indicator is available and monitored with sufficient frequency to support the harvest control rule.</p>	<p><u>Sufficient</u> relevant information related to stock structure, stock productivity, fleet composition and other data is available to support the harvest strategy.</p> <p>Stock abundance and fishery removals are <u>regularly monitored at a level of accuracy and coverage consistent with the harvest control rule</u>, and one or more indicators are available and monitored with sufficient frequency to support the harvest control rule.</p> <p>There is good information on all other fishery removals from the stock.</p>	<p>A <u>comprehensive range</u> of information (on stock structure, stock productivity, fleet composition, stock abundance, fishery removals and other information such as environmental information), including some that may not be directly relevant to the current harvest strategy, is available.</p> <p><u>All information</u> required by the harvest control rule is monitored with high frequency and a high degree of certainty, and there is a good understanding of the inherent <u>uncertainties</u> in the information [data] and the robustness of assessment and management to this uncertainty.</p>

Scoring Comments
<p>There is a comprehensive range of information available for the population modelling carried out by the annual ICES assessment working group. Information is collected by all countries and pooled for the assessment, which is carried out using the well known and tested XSA version of VPA. The outputs from the analysis provide all the necessary information on stock status relative to the harvest strategy and rule. The data used in the assessments on haddock are:</p> <ul style="list-style-type: none"> <li>i) Total reported landings based on logbook returns, sales notes. These data are more accurately known since the introduction of the EU Buyers &amp; Sellers legislation (C34).</li> <li>ii) Sampling programmes for weight, length, age. Scotland has the largest stake in the haddock fishery and provides most of the data for the assessment. Different fleets are covered by the sampling programme (nephrops trawl, demersal trawl, seine, pair trawl/seine).</li> <li>iii) Observer sampling of catch and discards; FRS programme (60-70 vessels per year) is now supplemented by SFF observer programme. Discard data combined with market samples to estimate removals by combined fleets.</li> <li>iv) Effort data from logbooks, CPUE and/or LPUE data.</li> <li>v) Research vessel surveys to provide abundance indices for tuning the XSA and for recruitment estimates. FRS research vessels are usually involved in four annual surveys; 2 International Bottom Trawl Surveys (IBTS, Q3 &amp; Q4), 1 International Young Fish Survey (IYFS, Q1) and an in-house Scottish Ground Fish Survey (SCOGFS, Q1). The survey data acts as a check on the accuracy of landings information.</li> <li>vi) Data on growth rates, age at maturity, and natural mortality from multi-species predation analysis. The latter data is based on historical estimates and is due for up-grading.</li> </ul>
<p><b>Score: 95</b></p>
<p>A comprehensive range of information (on stock structure, stock productivity, fleet composition, stock abundance, fishery removals and other information such as environmental information), including some that may not be directly relevant to the current harvest strategy, is available (100).</p> <p>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 the inherent uncertainties in the information [data] and the robustness of assessment and management to this uncertainty. However, natural mortality has not been assessed in detail since 1992. (90)</p>
<p><b>Audit Trace References</b></p>
<p>Refs C34, C27, C26, C28, C01</p>

SCORING CRITERIA		SCORING GUIDEPOST 60	SCORING GUIDEPOST 80	SCORING GUIDEPOST 100
1.2.4	<b>Assessment of stock status:</b> There is an adequate assessment of the stock status	<p>The assessment estimates stock status relative to reference points.</p> <p>The major sources of uncertainty are identified.</p>	<p>The assessment is appropriate for the stock and for the harvest control rule, and is evaluating stock status relative to reference points.</p> <p>The assessment takes uncertainty into account.</p> <p>The stock assessment is subject to peer review.</p>	<p>The assessment is appropriate for the stock and for the harvest control rule and takes into account the major features relevant to the biology of the species and the nature of the fishery.</p> <p>The assessment takes into account uncertainty and is evaluating stock status relative to reference points in a probabilistic way.</p> <p>The assessment has been tested and shown to be robust. Alternative hypotheses and assessment approaches have been rigorously explored.</p> <p>The assessment has been <u>internally and externally</u> peer reviewed.</p>

Scoring Comments
<p>The outputs from the assessment include estimates of recruitment, total stock biomass, spawning stock biomass (SSB), catch, landings, discards, industrial fish by-catch, harvest ratio, fishing mortality and historical trends in these estimates. The assessment provides short-term forecasts of recruitment, SSB and a range of catch options for different fishing mortalities. The assessment provides adequate information for the evaluation of stock status in relation to the harvest control rule and precautionary reference points. The XSA model has been used for many years and is well tried and tested. Estimates using several different sources of information were consistent. The assessment and forecasts are influenced by two strong year classes, in 1999 and 2005, and an assumption that the 2008-2010 year classes are weak. The WGNSSK assessments are reviewed by ACOM who are ultimately responsible for the official ICES advice. Before the advice is implemented in the form of TACs, the EC may ask its own advisory group, STECF to review the ACOM report. Assessments are also reviewed by an expert Review Group (RGNSSK) that examines the previous years working group report and makes proposals for improvement. Periodically ICES will organise a benchmark workshop to consider improvements to the assessment process.</p>
<b>Score: 100</b>
<p>The assessment is appropriate for the stock and for the harvest control rule and takes into account the major features relevant to the biology of the species and the nature of the fishery (100).  The assessment takes into account uncertainty and is evaluating stock status relative to reference points in a probabilistic way (100).  The assessment has been tested and shown to be robust. Alternative hypotheses and assessment approaches have been rigorously explored (100).  The assessment has been internally and externally peer reviewed (100).</p>
<b>Audit Trace References</b>
Refs. C1, C26, C28, interviews

SCORING CRITERIA	SCORING GUIDEPOST 60	SCORING GUIDEPOST 80	SCORING GUIDEPOST 100	
Principle 2	Fishing operations should allow for the maintenance of the structure, productivity, function and diversity of the ecosystem (including habitat and associated dependent and ecologically related species) on which the fishery depends			
2.1	Retained non-target species			
2.1.1	<p><b>Status:</b> The fishery does not pose a risk of serious or irreversible harm to the retained species and does not hinder recovery of depleted retained species.</p>	<p>Main retained species are <u>likely</u> to be within biologically based limits or if outside the limits there are <u>measures</u> in place that are <u>expected</u> to ensure that the fishery does not hinder recovery and rebuilding of the depleted species.</p> <p>If the status is poorly known there are measures or practices in place that are expected to result in the fishery not causing the retained species to be outside biologically based limits or hindering recovery.</p>	<p>Main retained species are <u>highly likely</u> to be within biologically based limits, or if outside the limits there is a <u>partial strategy</u> of <u>demonstrably effective</u> management measures in place such that the fishery does not hinder recovery and rebuilding.</p>	<p>There is a <u>high degree of certainty</u> that retained species are within biologically based limits.</p> <p>Target reference points are defined and retained species are at or fluctuating around their target reference points.</p>
<b>Scoring Comments</b>				
<p>The main bycatch stocks are <b>whiting, saithe, plaice</b> and <b>cod</b>. <b>Grey gurnard</b> also contribute to around 12% by weight of discards from this fishery in area IV. <b>Lesser spotted dogfish</b> also contribute to 1.4% by number but 8.2% by weight of discards. <b>Monkfish</b> is a high value species that is a minor by-catch (0.8% by weight). Total quantities landed are reported and recorded for assessment purposes but although quantities discarded are not recorded as routine, estimates gathered via the observer programme are also included in the ICES assessment procedures.</p> <p><b>Whiting:</b> stocks do not currently have defined reference points and stock assessments are based upon catch and survey data since 1990. The SSB is currently at the lowest level since this date and whilst fishing mortality has decreased through the time-series, but increased in recent years to twice <b>F<sub>max</sub></b>. Recruitment has been very low since 2001.</p> <p><b>Saithe:</b> based on the most recent estimates of SSB (in 2008) and fishing mortality (in 2007), ICES classifies the stock as having full reproductive capacity and being harvested sustainably. SSB was below <b>B<sub>pa</sub></b> from 1984 to 1998 (and was below <b>B<sub>lim</sub></b> from 1990 to 1993), but increased in the late 1990s and is estimated to have been at or above <b>B<sub>pa</sub></b> since 1998. Fishing mortality has declined since 1986, and has been below <b>F<sub>pa</sub></b> since 1997.</p> <p><b>Cod:</b> based on the most recent estimate of SSB (in 2008) and fishing mortality (in 2007), ICES classifies the North Sea (sub-area IV) stock as suffering reduced reproductive capacity but as being harvested sustainably. SSB has shown an increase since then but remains below <b>B<sub>lim</sub></b>. Fishing mortality has shown a decline since 2000, and is currently estimated to be just below <b>F<sub>pa</sub></b>. The 1997–2006 year classes are all estimated to have been well below average. The 2005 year class is estimated to be one of the most abundant amongst the recent below-average year classes. In 2005, ICES has advised that, on the basis of evaluations of harvest control rules for North Sea cod, target fishing mortalities (covering all catches) below 0.4 (ages 2–4) would result in a low risk of SSB falling below the conservation limit <b>B<sub>lim</sub></b> and would achieve high long-term yields.</p> <p><b>Grey gurnard:</b> is by far the most common gurnard in the North Sea. The status of the stock is unknown, but survey catches show a marked increase between the late 1980s and the late 1990s.</p> <p><b>Lesser spotted dogfish:</b> a common species in the North Sea, whose abundance and area occupied are increasing.</p> <p><b>Monkfish:</b> there are major uncertainties about catch and effort data for anglerfish, as well as limited knowledge about population dynamics and distribution. The available information is inadequate to evaluate spawning stock or fishing mortality relative to risk.</p>				
<b>Score: 85</b>				

SCORING CRITERIA	SCORING GUIDEPOST 60	SCORING GUIDEPOST 80	SCORING GUIDEPOST 100
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**Saithe** and **plaice** are within biologically based limits but the other main retained species (**cod**, **whiting** and possibly **monkfish**) are outside the limits. However there is a partial strategy of demonstrably effective management measures in place that are effective for these species via the cod recovery plan (esp. technical measures) , and in particular the Scottish Conservation Credit Scheme, such that this fishery is unlikely to hinder recovery and rebuilding. In the case of cod in 2009 there were 144 closures and involvement was mandatory for relevant Scottish vessels, and cod discarding rates have declined to 43%. Recent work tracking Scottish vessels in 2009 has concluded that vessels did indeed move from areas of higher to lower cod concentration following real-time closures during the first and third quarters (there was no significant effect during the second and fourth quarters). The cod spawning stock biomass has shown signs of recovery since 2006 suggesting that this partial strategy is effective. In the case of whiting, SSB in 2009 is slightly higher than in 2008 but remains below average. Fishing mortality has been stable over the last 4 years. Recruitment has been very low between 2003 and 2007 with stronger recruitments estimated in 2008 and 2009, however the size of these recruitments are uncertain.

**Audit Trace References:**

TH 20, TH21, TH22, TH33, TH34, I9, I10

<p>2.1.2</p>	<p><b>Management strategy:</b> There is a strategy in place for managing retained species that is designed to ensure the fishery does not pose a risk of serious or irreversible harm to retained species.</p>	<p>There are <u>measures</u> in place, if necessary, that are expected to maintain the main retained species at levels which are highly likely to be within biologically based limits, or to ensure the fishery does not hinder their recovery and rebuilding.  The measures are considered <u>likely</u> to work, based on plausible argument (e.g., general experience, theory or comparison with similar fisheries/species).</p>	<p>There is a <u>partial strategy</u> in place, if necessary that is expected to maintain the main retained species at levels which are highly likely to be within biologically based limits, or to ensure the fishery does not hinder their recovery and rebuilding.  There is some <u>objective basis for confidence</u> that the partial strategy will work, based on some information directly about the fishery and/or species involved.  There is some <u>evidence</u> that the partial strategy is being implemented successfully.</p>	<p>There is a <u>strategy</u> in place for managing retained species.  The strategy is mainly based on information directly about the fishery and/or species involved, and <u>testing</u> supports <u>high confidence</u> that the strategy will work.  There is <u>clear evidence</u> that the strategy is being <u>implemented successfully</u>, and intended changes are occurring.  There is some evidence that the strategy is achieving its <u>overall</u> objective.</p>
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**Scoring Comments**

The main bycatch stocks are **whiting**, **saithe**, **cod** and to a lesser extent, **monkfish**. Total quantities landed are reported and recorded for assessment purposes but although quantities discarded are not recorded as routine, estimates gathered via the observer programme are also included in the ICES assessment procedures. As a large mesh fishery, the fishery is designed to specifically avoid the need to discard and various technical measures are utilised to maximise this. The cod recovery programme is designed to minimise any adverse affects on the ability of this species (and associated demersal species) to rebuild depleted stocks. However there is scope for the wider adoption of more selective gear to reduce incidental catch further.

**Saithe:** the agreed EU–Norway management plan includes: i) maintain the SSB above 106 000 t, and 2) exploitation at  $F = 0.3$  when the stock is above Bpa. The management plan was evaluated by ICES in 2008 (ICES Advice 2008, Book 6, Section 6.3.3.3), and the management plan is considered by ICES to be consistent with the precautionary approach in the short term (< 5 years).

**Whiting:** the current minimum mesh-size in the targeted demersal roundfish fishery in the northern North Sea has resulted in reduced discards from that sector compared with the historical discard rates and recent measures to improve survival of young cod, such as the Scottish Credit Conservation Scheme and increased uptake of more selective gear in the North Sea has benefited whiting stocks. The whiting SSB in 2009 is slightly higher than in 2008 but remains below average. Fishing mortality has been stable over the last 4 years. Recruitment has been very low between 2003 and 2007 with stronger recruitments estimated in 2008 and 2009, however the size of these recruitments are uncertain.

SCORING CRITERIA	SCORING GUIDEPOST 60	SCORING GUIDEPOST 80	SCORING GUIDEPOST 100
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**Cod:** two management agreements are applicable: The EU–Norway agreement management plan has the main objective of keeping SSB above 70 000 tonnes (Blim), and reducing fishing mortality to 0.4. In addition the EU has adopted a recovery plan for this stock (Council Regulation (EC) 423/2004) with the aim to increase the SSB by 30% per year to Bpa. The above mentioned Scottish Credit Conservation Scheme is a key local tool to achieve this aim. In 2009 there were 144 closures and involvement was mandatory for relevant Scottish vessels, and cod discarding rates have declined to 43%. Recent work tracking Scottish vessels in 2009 has concluded that vessels did indeed move from areas of higher to lower cod concentration following real-time closures during the first and third quarters (there was no significant effect during the second and fourth quarters). The cod spawning stock biomass has shown signs of recovery since 2006 suggesting that this partial strategy is being implemented successfully.

**Monkfish:** at present there are no explicit management objectives for this stock; the European Community and Norway are currently discussing the joint management of this shared stock.

**Score: 75**

For **cod** and **saithe** this SG meets all the 100 guideposts.

For **monkfish** and **whiting** the fishery meets the partial strategy requirements of SG 80 in that the cod recovery programme will be beneficial for these species. In all cases there is some actual and modelling evidence that the strategies being adopted are working and being implemented effectively, although further measures could be taken to reduce the bycatch of species such as whiting. For this reason, this element scores 70.

A condition (Condition 1) has been set to address this Performance Indicator

**Audit Trace References:**

TH 20, TH21, TH22, TH33, TH34, I9, I10

SCORING CRITERIA	SCORING GUIDEPOST 60	SCORING GUIDEPOST 80	SCORING GUIDEPOST 100	
<p><b>2.1.3</b></p>	<p><b>Information / monitoring:</b> Information on the nature and extent of retained species is adequate to determine the risk posed by the fishery and the effectiveness of the strategy to manage retained species.</p>	<p><u>Qualitative information</u> is available on the amount of main retained species taken by the fishery.</p> <p>Information is <u>adequate</u> to <u>qualitatively</u> assess outcome status with respect to biologically based limits.</p> <p>Information is adequate to support <u>measures</u> to manage <u>main</u> retained species.</p>	<p><u>Qualitative information</u> and some quantitative information are available on the amount of main retained species taken by the fishery.</p> <p>Information is <u>sufficient</u> to estimate outcome status with respect to biologically based limits.</p> <p>Information is adequate to support a <u>partial strategy</u> to manage <u>main</u> retained species.</p> <p>Sufficient data continue to be collected to detect any increase in risk level (e.g. due to changes in the outcome indicator scores or the operation of the fishery or the effectiveness of the strategy).</p>	<p>Accurate and verifiable information is available on the catch of all retained species and the consequences for the status of affected populations.</p> <p>Information is <u>sufficient</u> to <u>quantitatively</u> estimate outcome status with a <u>high degree of certainty</u>.</p> <p>Information is adequate to support a <u>comprehensive strategy</u> to manage retained species, and evaluate with a <u>high degree of certainty</u> whether the strategy is achieving its objective.</p> <p>Monitoring of retained species is conducted in sufficient detail to assess ongoing mortalities to all retained species.</p>

Scoring Comments
<p>The main bycatch stocks are <b>whiting, saithe, cod</b> and to a lesser extent, <b>monkfish</b>. Total quantities landed are reported and recorded for assessment purposes.</p> <p><b>Saithe:</b> the stock is assessed using an age-based model (XSA), calibrated by two commercial CPUE series and two survey indices. Landings are routinely reported through logbooks and RBS records.</p> <p><b>Cod:</b> the age-based assessment model (B-ADAPT) used landings and discards, calibrated with two survey indices (from IBTS quarter 1 and quarter 3 surveys). For ICES Division IV and Division VIIId, discards were estimated from the Scottish discards sampling programme up until 2005 and raised to the total international fleet. Assessments and forecasts also make use of the quarterly IBTS surveys. A large part (approximately 50% in 2007) of the total catch used in the assessment is discards estimated from relatively low sample numbers compared to landings, and through estimation of unallocated mortality rates.</p> <p><b>Whiting:</b> commercial catch-at-age data is disaggregated by ICES into human consumption, discards, and industrial bycatch components. Partial fishing mortalities from these catch components are calculated from their average contribution over 2005–2007. Discards were estimated based on data from Scotland, England, Denmark and Germany and raised to the total international fleet in the North Sea (with the Scottish data getting three times the weight in the estimation but landing only approximately 50% of the total landings).</p> <p><b>Monkfish:</b> Data are currently being gathered, with improvements to both industry-related data and surveys covering Division VI and part of the North Sea. There are currently 3 years of survey-derived absolute abundance estimates and 2 complete years of Scottish data providing commercial catch data. ICES will provide updated advice in 2009.</p>
<p><b>Score: 75</b></p>
<p>There is accurate and verifiable information on the landings of all retained species and the consequences for the status of affected populations. However there is only limited, mostly observer data on the total quantity of main retained species taken by the fishery (e.g. landings plus the quantity of retained species that may be discarded). As a result, the <u>first scoring issue of SG80 is not fully met</u>; therefore the assessment team has decided that a score of 70 is appropriate for this PI.</p> <p>For cod, saithe, plaice, whiting and monkfish information is sufficient to estimate outcome status with respect to biologically based limits (80). All five species are managed through output controls e.g.</p>

SCORING CRITERIA	SCORING GUIDEPOST 60	SCORING GUIDEPOST 80	SCORING GUIDEPOST 100
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<p>TACs and therefore all attract substantial scientific investigation in order to establish clear biologically-based limits. For cod, saithe, plaice, whiting and monkfish information is adequate to support a partial strategy to manage main retained species (80). As discussed above, all five species receive considerable management attention, especially their role in this haddock-targeted, but mixed fishery. Monitoring of retained species is conducted in sufficient detail to detect any increase in risk level (e.g. due to changes in the outcome indicator scores or the operation of the fishery or the effectiveness of the strategy) (80). A <u>condition</u> (Condition 2) has been set to address this Performance Indicator</p> <p><b>Audit Trace References:</b></p> <p>TH 20, TH21, TH22, TH33, TH34, I9, I10</p>
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<b>2.2</b>	<b>Discarded species (also known as “bycatch” or “discards”)</b>
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<b>2.2.1</b>	<p><b>Status</b> The fishery does not pose a risk of serious or irreversible harm to the bycatch species or species groups and does not hinder recovery of depleted bycatch species or species groups.</p>	<p>Main bycatch species are <u>likely</u> to be within biologically based limits, or if outside such limits there are mitigation <u>measures</u> in place that are <u>expected</u> to ensure that the fishery does not hinder recovery and rebuilding.</p> <p>If the status is poorly known there are measures or practices in place that are expected result in the fishery not causing the bycatch species to be biologically based limits or hindering recovery.</p>	<p>Main bycatch species are <u>highly likely</u> to be within biologically based limits or if outside such limits there is a <u>partial strategy</u> of <u>demonstrably effective</u> mitigation measures in place such that the fishery does not hinder recovery and rebuilding.</p>	<p>There is a <u>high degree of certainty</u> that bycatch species are within biologically based limits.</p>
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<p><b>Scoring Comments</b></p> <p>There are no other main species (&gt;5% by weight) other than those considered in 2.1 above that are discarded, except for the lesser-spotted dogfish (<i>Scyliorbinus canicula</i>) whose abundance and area occupied is expanding. This species has a relatively higher productivity than similar elasmobranchs and can probably sustain current levels of by catch. One vulnerable elasmobranch which may be discarded in very small quantities (&lt;5%) is the spurdog (<i>Squalus acanthias</i>). The spurdog in the North Sea are currently managed by TAC quota and in 2007, the TAC was reduced by 20% to 841 t and spurdog bycatch in the North Sea was limited to 5% of the live weight of the retained catch. The 2008 TAC was set to 2 004 t (total landings for all areas except IIa &amp; IV was 2 087 t in 2006). The quota for areas IIa and IV for 2009 is 316 t (266 t EC and 50 t Norway) and likely to be set at zero for 2010.</p> <p><b>Score: 80</b></p> <p>Evidence shows that the abundance and area occupied by the lesser-spotted dogfish in the North Sea is expanding, suggesting that the catch of this species is highly likely to be within biologically-based limits. The catch and discard of the spurdog is now highly limited, and pupping aggregations are actively avoided, which constitutes a partial strategy of demonstrably effective mitigation measures in place such that the fishery does not hinder recovery and rebuilding where this is necessary (80).</p> <p><b>Audit Trace References:</b></p> <p>TH23, TH24 I9, I10</p>
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SCORING CRITERIA	SCORING GUIDEPOST 60	SCORING GUIDEPOST 80	SCORING GUIDEPOST 100
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<p>2.2.2</p>	<p><b>Management strategy:</b> There is a strategy in place for managing bycatch that is designed to ensure the fishery does not pose a risk of serious or irreversible harm to bycatch populations.</p>	<p>There are <u>measures</u> in place, if necessary, which are expected to maintain main bycatch species at levels which are highly likely to be within biologically based limits or to ensure that the fishery does not hinder their recovery.</p> <p>The measures are considered <u>likely</u> to work, based on plausible argument (e.g. general experience, theory or comparison with similar fisheries/species).</p>	<p>There is a <u>partial strategy</u> in place, if necessary, for managing bycatch that is expected to maintain main bycatch species at levels which are highly likely to be within biologically based limits or to ensure that the fishery does not hinder their recovery.</p> <p>There is <u>some objective basis for confidence</u> that the partial strategy will work, based on some information directly about the fishery and/or the species involved.</p> <p>There is <u>some evidence</u> that the partial strategy is being implemented successfully.</p>	<p>There is a <u>strategy</u> in place for managing and minimising bycatch.</p> <p>The strategy is mainly based on information directly about the fishery and/or species involved, and testing supports <u>high confidence</u> that the strategy will work.</p> <p>There is <u>clear evidence</u> that the strategy is being implemented successfully, and intended changes are occurring. There is some evidence that the strategy is achieving its objective.</p>
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<p><b>Scoring Comments</b></p>
<p>The EC has recently published a Community Plan of Action for the Conservation and Management of Sharks (which includes the lesser-spotted dogfish and the spurdog) that addresses issues such as identification and species-specific reporting, critical research, adjusting fishing effort and minimising wastage.</p>
<p><b>Score: 75</b></p>
<p>There is a partial strategy (through the EC CPOA for sharks) in place for managing spurdog bycatch that is expected to maintain main bycatch species at levels which are highly likely to be within biologically based limits or to ensure that the fishery does not hinder their recovery. This includes a vessel-level approach of a move-on strategy in the case of spawning aggregations of both these species. This is a large-mesh gear which will help minimise the capture of non-commercial species. However there is scope for the wider adoption of more selective gear to reduce bycatch further so does not quite achieve SG 80 (75).</p> <p>There is some objective basis for confidence that the partial strategy will work, based on some information directly about the fishery and/or the species involved. This is supported by the declining markets for, and landings of spurdog and the cessation of targeted fishing of this species (80).</p> <p>There is some evidence that the partial strategy is being implemented successfully. More selective trawl designs to reduce the level of by-catch will benefit this benthopelagic species (80).</p> <p>A <u>condition</u> (Condition 3) has been set to address this Performance Indicator</p>
<p><b>Audit Trace References:</b></p>
<p>TH23, TH24 I9, I10</p>

SCORING CRITERIA	SCORING GUIDEPOST 60	SCORING GUIDEPOST 80	SCORING GUIDEPOST 100	
<p><b>2.2.3</b></p>	<p><b>Information / monitoring</b> Information on the nature and amount of bycatch is adequate to determine the risk posed by the fishery and the effectiveness of the strategy to manage bycatch.</p>	<p><u>Qualitative information</u> is available on the amount of main bycatch species affected by the fishery.</p> <p>Information is <u>adequate</u> to <u>broadly understand</u> outcome status with respect to biologically based limits.</p> <p>Information is adequate to support <u>measures</u> to manage bycatch.</p>	<p><u>Qualitative information and some quantitative information are</u> available on the amount of main bycatch species affected by the fishery.</p> <p>Information is sufficient to estimate outcome status with respect to biologically based limits.</p> <p>Information is adequate to support a <u>partial strategy</u> to manage main bycatch species.</p> <p>Sufficient data continue to be collected to detect any increase in risk to main bycatch species (e.g. due to changes in the outcome indicator scores or the operation of the fishery or the effectiveness of the strategy).</p>	<p><u>Accurate and verifiable information</u> is available on the amount of all bycatch and the consequences for the status of affected populations.</p> <p>Information is <u>sufficient</u> to quantitatively estimate outcome status with respect to biologically based limits with a <u>high degree of certainty</u>.</p> <p>Information is adequate to support a <u>comprehensive strategy</u> to manage bycatch, and evaluate with a high degree of certainty whether a strategy is achieving its objective.</p> <p>Monitoring of bycatch data is conducted in sufficient detail to assess ongoing mortalities to all bycatch species.</p>

Scoring Comments
<p>However although estimates of discards are gathered by the observer programme (and utilised by the ICES stock assessment), they are not comprehensive but indicate that discards represent a very significant percentage of the catch.</p> <p>Following the recent adoption of the Community Plan of Action for the Conservation and Management of Sharks, Member States will need to improve species verification and data collection, and commit to a wide range of other measures including the development of RFMO Shark Management Plans for preservation of vulnerable species (specifically inc. dogfish; &amp; rays). The Action Plan also includes greater observer coverage on 'high risk' fisheries. The FRS / SFF both conduct representative observer programmes, including vessels of the client fleet.</p>
<p><b>Score: 80</b></p>
<p><u>Qualitative information and some quantitative information are</u> available on the amount of main bycatch species affected by the fishery (80). Observer data provides qualitative information on the species contribution and sufficient quantitative detail to allow estimations of total discarding levels.</p> <p>Information is sufficient to estimate outcome status with respect to biologically based limits (80). Survey data are the basis for the advice of skates, rays, and demersal sharks in the North Sea (e.g. the Independent Bottom Trawl Survey (IBTS) as well as roundfish sampling programmes undertaken by EU Member States. Since 2008 the EC has required species-specific landings data that has further improved survey accuracy.</p> <p>Information is adequate to support a <u>partial strategy</u> to manage main bycatch species (80). Observer information on the nature and scale of discarding is sufficient to support a partial strategy.</p> <p>Sufficient data continue to be collected to detect any increase in risk to main bycatch species (e.g. due to changes in the outcome indicator scores or the operation of the fishery or the effectiveness of the strategy) (80).</p>
<p><b>Audit Trace References:</b></p>
<p>TH25 I9, I10, I9, I10</p>

SCORING CRITERIA	SCORING GUIDEPOST 60	SCORING GUIDEPOST 80	SCORING GUIDEPOST 100
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2.3	Endangered, Threatened and Protected (ETP) species		
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2.3.1	<p><b>Status:</b> The fishery meets national and international requirements for protection of ETP species.</p> <p>The fishery does not pose a risk of serious or irreversible harm to ETP species and does not hinder recovery of ETP species.</p>	<p>Known effects of the fishery are <u>likely</u> to be within limits of national and international requirements for protection of ETP species.</p> <p>Known direct effects are <u>unlikely</u> to create <u>unacceptable impacts</u> to ETP species.</p>	<p>The effects of the fishery are known and are <u>highly likely</u> to be within limits of national and international requirements for protection of ETP species.</p> <p>Direct effects are <u>highly unlikely</u> to create <u>unacceptable impacts</u> to ETP species.</p> <p>Indirect effects have been considered and are thought to be unlikely to create unacceptable impacts.</p>	<p>There is a <u>high degree of certainty</u> that the effects of the fishery are within limits of national and international requirements for protection of ETP species.</p> <p>There is a <u>high degree of confidence</u> that there are <u>no significant detrimental effects (direct and indirect)</u> of the fishery on ETP species.</p>
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<b>Scoring Comments</b>
There is clear evidence from observer information that there is no significant interaction between this fishery and ETP fish, sea mammals or seabirds.
<b>Score: 100</b>
There is a high degree of certainty that the effects of the fishery are within limits of national and international requirements for protection of ETP species (80). This is primarily due to the very low levels of interaction reported by independent observers and the industry itself.
There is a high degree of confidence that there are no significant detrimental effects (direct and indirect) of the fishery on ETP species (80). This is primarily due to the very low levels of interaction reported by independent observers and the industry itself.
<b>Audit Trace References:</b>
TH23, TH24, TH25, III, I12, I14, I15

SCORING CRITERIA	SCORING GUIDEPOST 60	SCORING GUIDEPOST 80	SCORING GUIDEPOST 100	
<p>2.3.2</p>	<p><b>Management strategy</b> The fishery has in place precautionary management strategies designed to:</p> <ul style="list-style-type: none"> <li>- meet national and international requirements;</li> <li>- ensure the fishery does not pose a risk of serious or irreversible harm to ETP species;</li> <li>- ensure the fishery does not hinder recovery of ETP species; and</li> <li>- minimise mortality of ETP species.</li> </ul>	<p>There are <u>measures</u> in place that minimise mortality, and are expected to be highly likely to achieve national and international requirements for the protection of ETP species.</p> <p>The measures are <u>considered likely</u> to work, based on <u>plausible argument</u> (e.g. general experience, theory or comparison with similar fisheries/species).</p>	<p>There is a <u>strategy</u> in place for managing the fishery's impact on ETP species, including measures to minimise mortality, that is designed to be highly likely to achieve national and international requirements for the protection of ETP species.</p> <p>There is an <u>objective basis for confidence</u> that the strategy will work, based on <u>some information</u> directly about the fishery and/or the species involved.</p> <p>There is <u>evidence</u> that the strategy is being implemented successfully.</p>	<p>There is a <u>comprehensive strategy</u> in place for managing the fishery's impact on ETP species, including measures to minimise mortality, that is designed to achieve <u>above</u> national and international requirements for the protection of ETP species.</p> <p>The strategy is mainly based on information directly about the fishery and/or species involved, and a <u>quantitative analysis</u> supports <u>high confidence</u> that the strategy will work.</p> <p>There is <u>clear evidence</u> that the strategy is being implemented successfully, and intended changes are occurring. There is evidence that the strategy is achieving its objective.</p>

Scoring Comments
<p>There is clear evidence from observer information that there is no significant interaction between this fishery and ETP fish, sea mammals or seabirds.</p>
<p><b>Score: 85</b></p>
<p>Given the absence of any risk of serious or irreversible harm to ETP species from this fishery, there is no need for a fishery-specific strategy. However we consider that the <i>modus operandi</i> constitutes a proxy strategy for avoiding the risk of serious or irreversible harm to ETP species (100).</p>
<p>There is an objective basis for confidence that this approach has worked e.g. the <i>status quo</i>, based on observer information from the fishery and/or the species involved i.e. on-going operation of the fishery as it is currently practiced (80).</p>
<p>There is clear evidence from observer information that this approach is being implemented successfully, and intended changes are occurring. There is evidence that the strategy is achieving its objective (100).</p>
<p><b>Audit Trace References:</b></p>
<p>TH23, TH24, TH25, Ill, I,12, I14, I15</p>

SCORING CRITERIA	SCORING GUIDEPOST 60	SCORING GUIDEPOST 80	SCORING GUIDEPOST 100	
<p><b>2.3.3</b></p>	<p><b><i>Information / monitoring</i></b>            Relevant information is collected to support the management of fishery impacts on ETP species, including:            - information for the development of the management strategy;            - information to assess the effectiveness of the management strategy; and            - information to determine the outcome status of ETP species.</p>	<p>Information is <u>adequate</u> to <u>broadly understand</u> the impact of the fishery on ETP species.</p> <p>Information is adequate to support <u>measures</u> to manage the impacts on ETP species</p> <p><u>Information</u> is sufficient to <u>qualitatively</u> estimate the fishery related mortality of ETP species.</p>	<p>Information is <u>sufficient</u> to determine whether the fishery may be a threat to protection and recovery of the ETP species, and if so, to measure trends and support a <u>full strategy</u> to manage impacts.</p> <p><u>Sufficient data</u> are available to allow fishery related mortality and the impact of fishing to be <u>quantitatively</u> estimated for ETP species.</p>	<p>Information is <u>sufficient</u> to <u>quantitatively</u> estimate outcome status with a high degree of certainty.</p> <p>Information is adequate to support a <u>comprehensive strategy</u> 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.</p> <p><u>Accurate and verifiable information</u> is available on the magnitude of all impacts, mortalities and injuries and the consequences for the status of ETP species</p>

<b>Scoring Comments</b>
There is clear evidence from observer information that there is no significant interaction between this fishery and ETP fish, sea mammals or seabirds.
<b>Score: 85</b>
Information is sufficient to determine whether the fishery may be a threat to protection and recovery of the ETP species to indicate that there is no need to develop a full strategy to manage impacts. (90).
Sufficient data are available to allow fishery related mortality and the impact of fishing to be quantitatively estimated for ETP species (80). This is via independent observer and scientific survey reports.
<b>Audit Trace References:</b>
TH25, Ill, I,12, I14, I15

SCORING CRITERIA	SCORING GUIDEPOST 60	SCORING GUIDEPOST 80	SCORING GUIDEPOST 100
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2.4	Habitats		
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2.4.1	<p><b>Status</b> The fishery does not cause serious or irreversible harm to habitat structure, considered on a regional or bioregional basis, and function.</p>	<p>The fishery is <u>unlikely</u> to reduce habitat structure and function to a point where there would be serious or irreversible harm.</p>	<p>The fishery is <u>highly unlikely</u> to reduce habitat structure and function to a point where there would be serious or irreversible harm.</p>	<p>There is <u>evidence</u> that the fishery is highly unlikely to reduce habitat structure and function to a point where there would be serious or irreversible harm.</p>
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Scoring Comments
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**Otter trawl:** otter trawls will impact the benthic substrate though continued contact by the door assemblies and intermittent contact from the footrope and associated bobbins. However the North Sea has been subject to bottom trawling for over a century and is recognised to have reached a new equilibrium state and it is highly unlikely that further serious or irreversible harm will result from this fishery. There are past and on-going studies that are able to assess both the physical impact of bottom gears as well as their impacts on bottom communities. It is important to note that total otter trawl effort across the North Sea has declined by 28% since 1999 (Greenstreet et al., 2007).

**Danish seine:** the Danish seine is towed in a different manner to otter trawls, and is acknowledged to have a high degree of catch controllability and a more than “moderately responsible” environmental impact (WGF/TFB, 2006). A forthcoming report on work conducted in Iceland investigating the environmental impact of the Danish seine net is also likely to suggest that the effect of this gear on benthic habitats is low (Haraldur A. Einarsson, MRI, pers. comm., 24 April 2009).

Score: 80
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It is accepted that over a century of trawling has changed the physical nature of the North Sea seabed. However given the history of trawling in the North Sea and ongoing reductions in deployed fishing effort and the introduction of lighter gears, the fishery is highly unlikely to be the cause of any *further* reduction in the habitat structure and function to a point where there would be serious or irreversible harm (80). Fishing patterns are highly predictable, with effort being focused on known productive grounds thus limiting the expansion of the fishery to new areas.

Audit Trace References:
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TH9, TH13, TH14, TH15, TH17, TH18, TH19, TH34, TH35, I17

SCORING CRITERIA		SCORING GUIDEPOST 60	SCORING GUIDEPOST 80	SCORING GUIDEPOST 100
2.4.2	<p><i>Management strategy</i></p> <p>There is a strategy in place that is designed to ensure the fishery does not pose a risk of serious or irreversible harm to habitat types.</p>	<p>There are <u>measures</u> in place, if necessary, that are expected to achieve the Habitat Outcome 80 level of performance.</p> <p>The measures are considered <u>likely</u> to work, based on plausible argument (e.g. general experience, theory or comparison with similar fisheries/habitats).</p>	<p>There is a <u>partial strategy</u> in place, if necessary, that is expected to achieve the Habitat Outcome 80 level of performance or above.</p> <p>There is some <u>objective basis for confidence</u> that the partial strategy will work, based on some information directly about the fishery and/or habitats involved.</p> <p>There is <u>some evidence</u> that the partial strategy is being implemented successfully.</p>	<p>There is a <u>strategy</u> in place for managing the impact of the fishery on habitat types.</p> <p>The strategy is mainly based on information directly about the fishery and/or habitats involved, and testing supports high confidence that the strategy will work.</p> <p>There is <u>clear evidence</u> that the strategy is being implemented successfully, and intended changes are occurring. There is some evidence that the strategy is achieving its objective.</p>

Scoring Comments
<p><b>Otter trawl and Danish seine:</b> the current strategy is to reduce the energy demand of the gear (a proxy for its environmental impact on the ground), not least by reducing the drag and ground contact through the use of larger meshes, knotless netting, the use of pair trawls (no otter doors required) and the possible use of semi-pelagic gears (e.g. bottom trawls using pelagic doors). A key part of the strategy is also to remain within established fishing grounds rather than to impact new areas.</p>
<p><b>Score: 80</b></p>
<p>There is a partial strategy in place that is expected to achieve the Habitat Outcome 80 level of performance or above (80). The nature and scope for habitat modification as a result of bottom trawl use has been extensively studied, especially in the North Sea. This work has resulted in changes to otter door design as well as the footrope and its various roller assemblies in order to reduce bottom contact and drag. This, combined with the now standard use of electronic navigation equipment and charting to allow greater control over the location and type of ground being fished <u>represents a partial</u> strategy to reduce both the spatial extent and level of seabed contact. This is becoming increasingly important as the network of MPAs in the North Sea expands.</p> <p>There is some <u>objective basis for confidence</u> that the partial strategy will work, based on some information directly about the fishery and/or habitats involved (80). As mentioned above, there has been extensive work conducted recording the nature and scale of trawl fisheries, including measuring the recoverability of trawled grounds.</p> <p>There is some evidence that the <u>partial strategy is being implemented successfully</u> (80). Evidence from VMS and logbook data can be used to verify the location and nature of trawl fishing effort in the client fleet.</p>
<p><b>Audit Trace References:</b></p>
<p>15, 19, 110, 117</p>

SCORING CRITERIA	SCORING GUIDEPOST 60	SCORING GUIDEPOST 80	SCORING GUIDEPOST 100
<p><b>2.4.3</b></p>	<p><b>Information / monitoring</b> Information is adequate to determine the risk posed to habitat types by the fishery and the effectiveness of the strategy to manage impacts on habitat types.</p>	<p>There is a basic understanding of the types and distribution of main habitats in the area of the fishery.</p> <p>Information is adequate to broadly understand the main impacts of gear use on the main habitats, including spatial extent of interaction.</p>	<p>The nature, distribution and vulnerability of all main habitat types in the fishery area are known at a level of detail relevant to the scale and intensity of the fishery.</p> <p>Sufficient data are available to allow the nature of the impacts of the fishery on habitat types to be identified and there is reliable information on the spatial extent, timing and location of use of the fishing gear.</p> <p>Sufficient data continue to be collected to detect any increase in risk to habitat (e.g. due to changes in the outcome indicator scores or the operation of the fishery or the effectiveness of the measures).</p> <p>The distribution of habitat types is known over their range, with particular attention to the occurrence of vulnerable habitat types.</p> <p>Changes in habitat distributions over time are measured.</p> <p>The physical impacts of the gear on the habitat types have been quantified fully.</p>

Scoring Comments
<p>There have been a number of studies conducted on the impact of North Sea otter trawl fisheries on benthic habitats, as well as wider studies of these gears in similar habitats. Furthermore there is a study nearing completion which has examined the habitat impact of this fishery in considerable detail. The habitat themselves are reasonably well known, having been covered by various habitat mapping initiatives such as MESH (Mapping European Seabed Habitats) for the north-west Europe (using the European EUNIS habitat classification system). In addition there is the Marine Nature Conservation Review (MNCR) of benthic habitats and their associated communities in inshore areas, as well as a number of FRS studies of relevance (e.g. the nephrops CCTV burrow surveys). The extension of Natura 2000 to offshore marine sites has meant that key sites of scientific interest have also been identified and where appropriate, provided some level of protection.</p>
<p><b>Score: 95</b></p>
<p>The distribution of habitat types is known over their range, with particular attention to the occurrence of vulnerable habitat types (100). The North Sea is fairly shallow and has been well mapped for fisheries, oil and gas, aggregate resources and increasingly wind energy siting reasons.</p> <p>Sufficient data are available to allow the nature of the impacts of the fishery on habitat types to be identified and there is reliable information on the spatial extent, timing and location of use of the fishing gear. (80). Extensive VMS, logbook and over flight data are available for the client fleet's activities in the North Sea.</p> <p>The physical impacts of the gear on the habitat types have been quantified fully (100). There has been, and continues to be, extensive <i>in situ</i> and modelled monitoring of the impact of different gear types on the main biotypes in the North Sea.</p>
<p><b>Audit Trace References:</b></p>
<p>TH26, I10, I11, I12, I14, I15</p>

SCORING CRITERIA	SCORING GUIDEPOST 60	SCORING GUIDEPOST 80	SCORING GUIDEPOST 100
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2.5	<b>Ecosystem</b>		
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2.5.1	<b>Status</b> The fishery does not cause serious or irreversible harm to the key elements of ecosystem structure and function.	The fishery is <u>unlikely</u> to disrupt the key elements underlying ecosystem structure and function to a point where there would be a serious or irreversible harm.	The fishery is <u>highly unlikely</u> to disrupt the key elements underlying ecosystem structure and function to a point where there would be a serious or irreversible harm.	There is <u>evidence</u> that the fishery is highly unlikely to disrupt the key elements underlying ecosystem structure and function to a point where there would be a serious or irreversible harm.
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<b>Scoring Comments</b>
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As observed earlier, the North Sea has been subjected to bottom trawling for over a century and is recognised to have reached a new equilibrium state in terms of its ecological structure and function. Given the history of trawling in the North Sea and ongoing reductions in deployed fishing effort, the fishery is highly unlikely to cause any further reduction in ecosystem structure and function to a point where there would be serious or irreversible harm. It should be noted that (i) historically trawling effort has not been homogeneous, with effort greatly concentrated in preferred historic fishing grounds (Greenstreet et al., 1999, 2006, 2007; Jennings et al., 1999; Piet et al., 2000; Piet et al., 2007; Rijnsdorp et al., 1998) and (ii) otter trawl effort directed at fish, and seine gear effort all declined by 44%, and 62% respectively.

Key interactions are thought to be between haddock and other gadoid species, mammals such as seals and other fish that gadoids and mammals both feed upon. Food web studies (e.g. Ecopath) of haddock suggest that the species is not a critical prey species of any one predator species identified. There is no evidence of declines in marine mammal populations based on current monitoring information. Sufficient evidence is therefore available on the consequences of current levels of removal of target species to suggest no unacceptable impacts of the fishery on ecological systems within major fishing areas. With reference to non-target species, knowledge of the bycatch of key non-target commercial species is considered well known through observer programmes. Key species would include major by-catch species such as cod, saithe and whiting. Such gadoid species are the subject of regular stock assessments and advice. Most are also included in Ecopath assessments. The knowledge of the capture of other non-commercial non-target species remains limited, although the new reporting regulations will allow a sufficient time series to be developed to analyse this, and the impacts on the population can then be defined. Non-commercial species such as lesser-spotted dogfish do not form significant parts of the demersal/pelagic ecosystem.

<b>Score: 85</b>
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The fishery is highly unlikely to further disrupt the key elements underlying ecosystem structure and function to a point where there would be a serious or irreversible harm (85). Fishing patterns are highly predictable, with effort being focused on known productive grounds thus limiting the expansion of the fishery to new areas. Largely as a result of the Cod Recovery Plan (esp. technical measures), and in particular the Scottish Conservation Credit Scheme, this fishery is unlikely to hinder the recovery and rebuilding of depleted stocks such as haddock and whiting.

<b>Audit Trace References:</b>
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TH36, TH37, TH38, TH39, TH40, TH41, TH42, C26, I10, I11, I12, I14, I15
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SCORING CRITERIA	SCORING GUIDEPOST 60	SCORING GUIDEPOST 80	SCORING GUIDEPOST 100
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2.5.2	<p><b>Management strategy</b></p> <p>There are measures in place to ensure the fishery does not pose a risk of serious or irreversible harm to ecosystem structure and function.</p>	<p>There are <u>measures</u> in place, if necessary, that take into account potential impacts of the fishery on key elements of the ecosystem.</p> <p>The measures are considered likely to work, based on <u>plausible argument</u> (e.g., general experience, theory or comparison with similar fisheries/ ecosystems).</p>	<p>There is a <u>partial strategy</u> in place, if necessary, that takes into account available information and is expected to restrain impacts of the fishery on the ecosystem so as to achieve the Ecosystem Outcome 80 level of performance.</p> <p>The partial strategy is considered likely to work, based on <u>plausible argument</u> (e.g., general experience, theory or comparison with similar fisheries/ ecosystems).</p> <p>There is <u>some evidence</u> that the measures comprising the partial strategy are being implemented successfully.</p>	<p>There is a <u>strategy</u> that consists of a <u>plan</u>, containing measures to address all main impacts of the fishery on the ecosystem, and at least some of these measures are in place. The plan and measures are based on well-understood functional relationships between the fishery and the Components and elements of the ecosystem.</p> <p>This plan provides for development of a full strategy that restrains impacts on the ecosystem to ensure the fishery does not cause serious or irreversible harm.</p> <p>The measures are considered likely to work based on <u>prior experience</u>, plausible argument or <u>information</u> directly from the fishery/ecosystems involved.</p> <p>There is <u>evidence</u> that the measures are being implemented successfully.</p>
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Scoring Comments
<p>As yet there is limited meaningful application of the ecosystem approach to the demersal fisheries of the North Sea. However this is now recognised as a necessary approach and is being increasingly adopted at policy and strategic planning levels. With the development of multispecies modelling (e.g. EcoPath / EcoSim / MSVPA), the development of MPA networks to achieve the OSPAR commitments and the extension of the inshore Natura 2000 network it can be considered that a partial strategy is in place.</p>
<p><b>Score: 80</b></p>
<p>There is a partial strategy in place (mainly aimed at reducing overall fishing effort), output controls, technical measures to reduce the impact of gears on both habitats as well as the by-catch of non-commercial and ETP species. This also including that takes into account available information and is expected to restrain impacts of the fishery on the ecosystem so as to achieve the Ecosystem Outcome 80 level of performance (80). This level will increase as additional spatial protection is added through the expansion of the Natura 2000 and OSPAR networks.</p>
<p>The partial strategy is considered likely to work, based on a combination of stock assessments of affected species and experience based upon past operation of the fishery compared with current levels of activity (80).</p>
<p>There is some evidence that the measures comprising the partial strategy are being implemented successfully, based on the results of the cod recovery plan to date and fleet-related observer data (80).</p>
<p><b>Audit Trace References:</b></p>
<p>TH25, TH26, TH27, TH28, TH29, TH30, TH31, I10, I11, I12, I14, I15</p>

SCORING CRITERIA	SCORING GUIDEPOST 60	SCORING GUIDEPOST 80	SCORING GUIDEPOST 100
<p><b>2.5.3</b></p> <p><i>Information / monitoring</i></p> <p>There is adequate knowledge of the impacts of the fishery on the ecosystem.</p>	<p>Information is adequate to <u>identify</u> the key elements of the ecosystem (e.g. trophic structure and function, community composition, productivity pattern and biodiversity).</p> <p>Main impacts of the fishery on these key ecosystem elements can be inferred from existing information, but <u>have not been investigated in detail</u>.</p>	<p>Information is adequate to <u>broadly understand the functions</u> of the key elements of the ecosystem.</p> <p>Main impacts of the fishery on these key ecosystem elements can be inferred from existing information, but <u>may not have been investigated in detail</u>.</p> <p>The main functions of the Components (i.e. target, Bycatch, Retained and ETP species and Habitats) in the ecosystem are <u>known</u>.</p> <p>Sufficient information is available on the impacts of the fishery on these Components to allow some of the main consequences for the ecosystem to be inferred.</p> <p>Sufficient data continue to be collected to detect any increase in risk level (e.g. due to changes in the outcome indicator scores or the operation of the fishery or the effectiveness of the measures).</p>	<p>Information is adequate to <u>broadly understand the key elements</u> of the ecosystem.</p> <p>Main <u>interactions</u> between the fishery and these ecosystem elements can be inferred from existing information, and <u>have been investigated</u>.</p> <p>The impacts of the fishery on target, Bycatch, Retained and ETP species and Habitats are identified and the main functions of these Components in the ecosystem are <u>understood</u>.</p> <p>Sufficient information is available on the impacts of the fishery on the Components <u>and elements</u> to allow the main consequences for the ecosystem to be inferred.</p> <p>Information is sufficient to support the development of strategies to manage ecosystem impacts.</p>

Scoring Comments
<p>The functions of the North Sea ecosystem are broadly understood. An EcoPath / EcoSim model has been developed and has integrated the main interactions between the fishery and the ecosystem elements. The limited impacts on ETP species are reasonably well known and there is increasing data on vulnerable or threatened species in the deeper waters of the North Sea.</p>
<p><b>Score: 90</b></p>
<p>Information is adequate to broadly understand the key elements of the ecosystem (100). Knowledge of the food web related to haddock is reasonably well advanced for the North Sea, with good quantitative information as a result of stomach content research and other investigations that underpinned the development of the ecosystem management plan in the area. This information has also been sufficient to parameterise ecosystem models.</p> <p>Main impacts of the fishery on these key ecosystem elements can be inferred from existing information, but may not have been investigated in detail (80). Multispecies models have been applied within the region (e.g. multi-species Virtual Population Analysis (MSVPA)). Detailed mass-balance trophic models of the North Sea have been developed using the Ecopath methodology. This allows the temporal and spatial simulation of alternative fishing and environmental change scenarios to be examined on ecosystem components, including the predator-prey relationships with gadoid species. The ability of these programmes to derive multispecies fisheries advice is limited by the need for further biological information or the simplifying assumptions that must be made.</p> <p>The main functions of the Components (i.e. target, Bycatch, Retained and ETP species and Habitats) in the ecosystem are known (80). The structure and function of the retained by catch and discarded by catch stocks and interactions are reasonably well known. ESP species interacts are also known to be minimal. Due to the nature of bottom trawling, habitat interactions and the consequences for the structure and function of benthic communities are well known.</p>

SCORING CRITERIA	SCORING GUIDEPOST 60	SCORING GUIDEPOST 80	SCORING GUIDEPOST 100
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Sufficient information is available on the impacts of the fishery on the Components and elements to allow the main consequences for the ecosystem to be inferred (100). The extent of the landed target catch is fully understood and that of discards has been well estimated through the use of observer data and the results integrated into stock assessment modelling. ETP interactions are known from observer data to be minimal, and the physical impacts of trawl gear use are well documented.

Information is sufficient to support the development of strategies to manage ecosystem impacts (100). There is sufficient information to support the development of strategies to manage ecosystem impacts in the North Sea, although the spatial elements of these is only now being enabled through recent developments in marine spatial planning.

**Audit Trace References:**

TH25, TH26, TH27, TH28, TH29, TH30, TH31, I10, I11, I12, I14, I15

SCORING CRITERIA	SCORING GUIDEPOST 60	SCORING GUIDEPOST 80	SCORING GUIDEPOST 100
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Principle 3	The fishery is subject to an effective management system that respects local, national and international laws and standards and incorporates institutional and operational frameworks that require use of the resource to be responsible and sustainable
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3.1	Governance and Policy
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3.1.1	<p><b>Legal and/or customary framework</b></p> <p>The management system exists within an appropriate and effective legal and/or customary framework which ensures that it:</p> <ul style="list-style-type: none"> <li>- Is capable of delivering sustainable fisheries in accordance with MSC Principles 1 and 2;</li> <li>- Observes the legal rights created explicitly or established by custom of people dependent on fishing for food or livelihood; and</li> <li>- Incorporates an appropriate dispute resolution framework.</li> </ul>	<p>The management system is generally consistent with local, national or international laws or standards that are aimed at achieving sustainable fisheries in accordance with MSC Principles 1 and 2.</p> <p>The management system incorporates or is subject by law to a <u>mechanism</u> for the resolution of legal disputes arising within the system.</p> <p>Although the management authority or fishery may be subject to continuing court challenges, it is not indicating a disrespect or defiance of the law by repeatedly violating the same law or regulation necessary for the sustainability for the fishery.</p> <p>The management system has a mechanism to <u>generally respect</u> 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.</p>	<p>The management system is generally consistent with local, national or international laws or standards that are aimed at achieving sustainable fisheries in accordance with MSC Principles 1 and 2.</p> <p>The management system incorporates or is subject by law to a <u>transparent mechanism</u> for the resolution of legal disputes which is <u>considered to be effective</u> in dealing with most issues and that is appropriate to the context of the fishery.</p> <p>The management system or fishery is attempting to comply in a timely fashion with binding judicial decisions arising from any legal challenges.</p> <p>The management system has a mechanism to <u>observe</u> 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.</p>	<p>The management system is generally consistent with local, national or international laws or standards that are aimed at achieving sustainable fisheries in accordance with MSC Principles 1 and 2.</p> <p>The management system incorporates or is subject by law to a <u>transparent mechanism</u> for the resolution of legal disputes that is appropriate to the context of the fishery and has been <u>tested and proven to be effective</u>.</p> <p>The management system or fishery acts proactively to avoid legal disputes or rapidly implements binding judicial decisions arising from legal challenges.</p> <p>The management system has a mechanism to <u>formally commit</u> to the legal rights created explicitly or established by custom on people dependent on fishing for food and livelihood in a manner consistent with the objectives of MSC Principles 1 and 2.</p>
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SCORING CRITERIA	SCORING GUIDEPOST 60	SCORING GUIDEPOST 80	SCORING GUIDEPOST 100
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<b>Scoring Comments</b>
<p>The management regime is fully consistent with international and national laws in support of the EU Common Fisheries Policy. These laws, policies and the scientific advice upon which they are based are all consistent with the aims of MSC Principles 1 &amp; 2. The dispute resolution framework spans the full breadth of informal representation and discussion at local level through the various administrative and political tiers to recourse to national and European courts if necessary. These procedures are recognised and well understood by all who are involved and their effectiveness has been demonstrated to be accessible and effective since the introduction of the CFP in 1983. At both EU and national level there is a broad and flexible consultation procedure that enables all who have an interest in the fishery, whether catching sector or not, to contribute their views and, if necessary, challenge any decisions in the courts. Such challenges have occurred (albeit for other fisheries) and the courts decisions have been implemented (with respect to the UK government and devolved administrations at least). The Scottish Government Fisheries Council objectives shows clear intent that the rights and livelihoods of communities dependent on fishing, including this fishery, should be safeguarded although there is no legislation specifically underpinning this commitment.</p>
<b>Score: 100</b>
<p>Therefore:</p> <p>The management system is generally consistent with local, national or international laws or standards that are aimed at achieving sustainable fisheries in accordance with MSC Principles 1 and 2.</p> <p>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.</p> <p>The management system or fishery acts proactively to avoid legal disputes or rapidly implements binding judicial decisions arising from legal challenges.</p> <p>The management system has a mechanism to formally commit to the legal rights created explicitly or established by custom on people dependent on fishing for food and livelihood in a manner consistent with the objectives of MSC Principles 1 and 2.</p>
Audit Trace References
SJL1, SJL2, SJL3, SJL4, SJL5, SJL9, SJL11, SJL14, SJL16, SJL28

SCORING CRITERIA	SCORING GUIDEPOST 60	SCORING GUIDEPOST 80	SCORING GUIDEPOST 100
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<p><b>3.1.2</b></p>	<p><b>Consultation, roles and responsibilities</b>  The management system has effective consultation processes that are open to interested and affected parties.</p> <p>The roles and responsibilities of organisations and individuals who are involved in the management process are clear and understood by all relevant parties.</p>	<p>Organisations and individuals involved in the management process have been identified. Functions, roles and responsibilities are <u>generally understood</u>.</p> <p>The management system includes consultation processes that <u>obtain relevant information</u> from the main affected parties, including local knowledge, to inform the management system.</p>	<p>Organisations and individuals involved in the management process have been identified. Functions, roles and responsibilities are <u>explicitly defined and well understood</u> for <u>key areas</u> of responsibility and interaction.</p> <p>The management system includes consultation processes that <u>regularly seek and accept</u> relevant information, including local knowledge. The management system demonstrates consideration of the information obtained.</p> <p>The consultation process <u>provides opportunity</u> for all interested and affected parties to be involved.</p>	<p>Organisations and individuals involved in the management process have been identified. Functions, roles and responsibilities are <u>explicitly defined and well understood</u> for <u>all areas</u> of responsibility and interaction.</p> <p>The management system includes consultation processes that <u>regularly seek and accept</u> relevant information, including local knowledge. The management system demonstrates consideration of the information and <u>explains how it is used or not used</u>.</p> <p>The consultation process <u>provides opportunity and encouragement</u> for all interested and affected parties to be involved, and <u>facilitates</u> their effective engagement.</p>
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Scoring Comments
<p>There are clearly identified organisations and individuals involved in the management process from skippers on the Board of the SFSAG through the council of the SFF, Scottish Fisheries Council, North Sea Regional Advisory Council to the EC and EU Council of Ministers At each level the roles are explicitly defined and well understood. Similarly, the role of scientists contributing to the annual stock assessment process and the formulation of advice to the fishery commissions is defined but their exact role may be less clearly understood the further one moves from active involvement in the management process. The transparency of eh assessment process has increased substantially in recent years as representatives of the industry have become involved in ICES meeting and procedures in addition to their more long-established involvement in the administrative and political process. More specifically, the Scottish Industry Science Partnership enables the catching sector to make a direct contribution to information gathering and the knowledge base upon which scientific assessments depend. The multi-tiered consultation opportunities ensure that anyone who wishes to be engaged in the management process can contribute to it. The most significant forum for multi-party consultation is the North Sea RAC and nationally it is the Scottish Fisheries Council.</p>
<p>Score: 100</p>
<p>Therefore, 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.</p> <p>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.</p> <p>The consultation process provides opportunity and encouragement for all interested and affected parties to be involved, and facilitates their effective engagement.</p>
<p>Audit Trace References</p>
<p>Numerous organisations' consultation web sites given in text report §6.7; SJL8, SJL10, SJL12, SJL13, SJL28</p>

SCORING CRITERIA	SCORING GUIDEPOST 60	SCORING GUIDEPOST 80	SCORING GUIDEPOST 100	
3.1.3	<p><b>Long term objectives</b> The management policy has clear long-term objectives to guide decision-making that are consistent with MSC Principles and Criteria, and incorporates the precautionary approach.</p>	<p>Long-term objectives to guide decision-making, consistent with MSC Principles and Criteria and the precautionary approach, are <u>implicit</u> within management policy.</p>	<p><u>Clear</u> long-term objectives that guide decision-making, consistent with MSC Principles and Criteria and the precautionary approach, are <u>explicit</u> within management policy.</p>	<p><u>Clear</u> long-term objectives that guide decision-making, consistent with MSC Principles and Criteria and the precautionary approach, are <u>explicit</u> within and <u>required</u> by management policy.</p>

Scoring Comments
<p>All fisheries within EU waters are governed by the long-term management objectives of the CFP which, inter alia, now includes the commitment to an ecosystem approach to fishery management. Where stocks are shared by the EU–Norway, they are subject to the terms of annual fisheries management agreements. The agreement reached in 1999 included a specific management plan (renewed each year) for the long-term management of the North Sea haddock stock. This plan has been evaluated by ICES which considers it to be consistent with precautionary principles for fish stock conservation and management. The natural high variability in haddock recruitment makes long-term sustainable management problematic and hence, the management plans and fishery policy strategies affecting this stock are less robust than might normally be hoped for.</p>
<p><b>Score: 90</b></p>
<p>Clear long-term objectives that guide decision-making, consistent with MSC Principles and Criteria and the precautionary approach, are explicit within and required by management policy.</p>
<p><b>Audit Trace References:</b></p>
<p>SJL1, SJL5, SJL11, SJL13, SJL17, SJL21</p>

SCORING CRITERIA	SCORING GUIDEPOST 60	SCORING GUIDEPOST 80	SCORING GUIDEPOST 100	
<p><b>3.1.4</b></p>	<p><b>Incentives for sustainable fishing</b> The management system provides economic and social incentives for sustainable fishing and does not operate with subsidies that contribute to unsustainable fishing.</p>	<p>The management system provides for incentives that are consistent with achieving the outcomes expressed by MSC Principles 1 and 2.</p>	<p>The management system provides for incentives that are consistent with achieving the outcomes expressed by MSC Principles 1 and 2, and seeks to ensure that negative incentives do not arise.</p>	<p>The management system provides for incentives that are consistent with achieving the outcomes expressed by MSC Principles 1 and 2, and <u>explicitly considers</u> incentives in a <u>regular review</u> of management policy or procedures to ensure that they do not contribute to unsustainable fishing practices.</p>

Scoring Comments
<p>There are no incentives aimed explicitly at the North Sea haddock fishery, it is part of the wider North Sea mixed whitefish fishery. As with all other fisheries, there is a substantial body of negative incentives (e.g. swinging fines) that encourage all who are engaged in or associated with the fishery to observed the current regulations and quota management regime. On the positive side, the Scottish Government has established a Conservation Credit Scheme that reward skippers with additional days fishing (but not additional quota) for participating in and abiding by the rule of additional measures to conserve North Sea cod. Both sides of this incentive framework – penalties and additional fishing opportunities – are subject to annual review that engages the industry and other interested parties in consultation.</p>
<p>Score: 100</p>
<p>The management system provides for incentives that are consistent with achieving the outcomes expressed by MSC Principles 1 and 2, and explicitly considers incentives in a regular review of management policy or procedures to ensure that they do not contribute to unsustainable fishing practices.</p>
<p>Audit Trace References</p>
<p>SJL8, SJL14, SJL16, SJL18, SJL19, SJL20, SJL22, SJL28</p>

SCORING CRITERIA	SCORING GUIDEPOST 60	SCORING GUIDEPOST 80	SCORING GUIDEPOST 100
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3.2	Fishery- specific management system		
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3.2.1	<b>Fishery- specific objectives</b> The fishery has clear, specific objectives designed to achieve the outcomes expressed by MSC's Principles 1 and 2.	<u>Objectives</u> , which are broadly consistent with achieving the outcomes expressed by MSC's Principles 1 and 2, are <u>implicit</u> within the fishery's management system.	<u>Short and long term objectives</u> , which are consistent with achieving the outcomes expressed by MSC's Principles 1 and 2, are <u>explicit</u> within the fishery's management system.	<u>Well defined and measurable short and long term objectives</u> , which are demonstrably consistent with achieving the outcomes expressed by MSC's Principles 1 and 2, are <u>explicit</u> within the fishery's management system.
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Scoring Comments
<p>The fishery is managed within the terms of a long-term EU–Norway stock management agreement which ICES judges to meet precautionary criteria and, hence, is consistent with MSC Principles 1 &amp; 2. This plan is implemented through the CFP and the allocation and distribution of quota to participating SFSAG vessels. The short-term objectives are established through the scientific assessments of ICES, its advice to the international fishery commissions (EU &amp; Norway) and the setting of annual TAC and quotas. The Scottish Fishery Protection Agency has explicit responsibility for ensuring the industry's compliance with all aspects of the CFP, not the least of which is ensuring that quotas are not exceeded. This responsibility is underpinned, <i>inter alia</i>, by the 'Buyers and Sellers' legislation that puts any individual or company at risk of losing their rights to trade in fish if they fail to comply with the quota regulations. Within the uncertainties stemming from the inherent variability in haddock recruitment, all evidence available indicates that the measures available and implemented are an effective mechanism for achieving objectives. The information gathered by observer programmes has demonstrated that there are no problems in this fishery associated with ETP species or other significant environmental concerns. It is well defined and measured for Principle 1, and also major by-catch species in Principle 2, but less well defined for other aspects, such as habitat and ecosystem impacts.</p>
Score: 90
Well defined and measurable short and long term objectives, which are demonstrably consistent with achieving the outcomes expressed by MSC's Principles 1 and some elements of Principle 2, are explicit within the fishery's management system. The remaining elements of Principle 2 have short and long-term objectives but these are less well defined and measurable.
Audit Trace References
SJL1, SJL4, SJL5, SJL11, SJL12, SJL14, SJL15, SJL17, SJL18

SCORING CRITERIA	SCORING GUIDEPOST 60	SCORING GUIDEPOST 80	SCORING GUIDEPOST 100	
<p><b>3.2.2</b></p>	<p><b>Decision-making processes</b> The fishery-specific management system includes effective decision-making processes that result in measures and strategies to achieve the objectives.</p>	<p>There are <u>informal</u> decision-making processes that result in measures and strategies to achieve the fishery-specific objectives.</p> <p>Decision-making processes respond to <u>serious issues</u> identified in relevant research, monitoring, evaluation and consultation, in a transparent, timely and adaptive manner and take <u>some</u> account of the wider implications of decisions.</p>	<p>There are <u>established</u> decision-making processes that result in measures and strategies to achieve the fishery-specific objectives.</p> <p>Decision-making processes respond to <u>serious and other important issues</u> identified in relevant research, monitoring, evaluation and consultation, in a transparent, timely and adaptive manner and take account of the wider implications of decisions.</p> <p>Decision-making processes use the precautionary approach and are based on best available information.</p> <p><u>Explanations</u> are provided for any actions or lack of action associated with findings and relevant recommendations emerging from research, monitoring, evaluation and review activity.</p>	<p>There are <u>established</u> decision-making processes that result in measures and strategies to achieve the fishery-specific objectives.</p> <p>Decision-making processes respond to <u>all issues</u> identified in relevant research, monitoring, evaluation and consultation, in a transparent, timely and adaptive manner and take account of the wider implications of decisions.</p> <p>Decision-making processes use the precautionary approach and are based on best available information.</p> <p><u>Formal reporting</u> to all interested stakeholders describes how the management system responded to findings and relevant recommendations emerging from research, monitoring, evaluation and review activity.</p>

Scoring Comments
<p>Since initial agreement of the CFP (1983) and more recently the EU–Norway agreement affecting North Sea haddock (1999) there have been well established decision-making processes for the management of North Sea haddock, based on ICES scientific advice. In recent years that has been a greater reluctance shown by the Council of Ministers to stray from the ICES advice than was the case in the early days of the CFP. Nevertheless, there is the inherent risk that the vagaries of political convenience can undermine rigorous implementation of agreed policies, objectives and scientific recommendations. Whatever the decision finally reached, the Council of Ministers is provided with the widest possible range and variety of advice from ICES, the industry and NGO; most through formally established channels (e.g. NSRAC) but also through independent pressure groups. This range of opinion and advice undoubtedly contributes to debate and decision making in the Council of Ministers – and similarly at national and local management levels. Although ICES advice and the 1999 EU – Norway agreement for the management of North Sea haddock are based on a precautionary approach one can never be certain that this approach is carried right through the management procedures that set the actual TAC and quotas. The reporting of management decisions affecting the stock, fishery and SFSAG involves a cascade system based on legal publications (e.g. Council Regulations) through the provision of information on organisation web sites (EU,</p>

SCORING CRITERIA	SCORING GUIDEPOST 60	SCORING GUIDEPOST 80	SCORING GUIDEPOST 100
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government, NSRAC, SFF, Seafish, Seafood Scotland, SFSAG etc). The results of fishery-related research commissioned or undertaken by, for example, the EC, Scottish Industry–Science Partnership or Seafish Industry Project Fund are all reported formally and made available on the corresponding website; much of it is also written up for publication in scientific peer-review journals.

Score: 90

There are established decision-making processes that result in measures and strategies to achieve the fishery-specific objectives (100).

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 (80).

Decision-making processes use the precautionary approach and are based on best available information (100)

Explanations are provided for any actions or lack of action associated with findings and relevant recommendations emerging from research, monitoring, evaluation and review activity (80).

Audit Trace References

SJL1, SJL8, SJL10, SJL19, SJL20, SJL28,

SCORING CRITERIA	SCORING GUIDEPOST 60	SCORING GUIDEPOST 80	SCORING GUIDEPOST 100	
<p><b>3.2.3</b></p>	<p><b>Compliance and enforcement</b> Monitoring, control and surveillance mechanisms ensure the fishery's management measures are enforced and complied with.</p>	<p>Monitoring, control and surveillance <u>mechanisms</u> exist, are implemented in the fishery under assessment and there is a reasonable expectation that they are effective.</p> <p>Sanctions to deal with non-compliance exist and there is some evidence that they are applied.</p> <p>Fishers are <u>generally thought</u> to comply with the management system for the fishery under assessment, including, when required, providing information of importance to the effective management of the fishery.</p>	<p>A monitoring, control and surveillance <u>system</u> has been implemented in the fishery under assessment and has demonstrated an ability to enforce relevant management measures, strategies and/or rules.</p> <p>Sanctions to deal with non-compliance exist, <u>are consistently applied</u> and thought to provide effective deterrence.</p> <p><u>Some evidence exists</u> to demonstrate fishers comply with the management system under assessment, including, when required, providing information of importance to the effective management of the fishery.</p> <p>There is no evidence of systematic non-compliance.</p>	<p>A <u>comprehensive</u> monitoring, control and surveillance system has been implemented in the fishery under assessment and has demonstrated a consistent ability to enforce relevant management measures, strategies and/or rules.</p> <p>Sanctions to deal with non-compliance exist, are consistently applied and <u>demonstrably</u> provide effective deterrence.</p> <p>There is a <u>high degree of confidence</u> that fishers comply with the management system under assessment, including, providing information of importance to the effective management of the fishery.</p> <p>There is no evidence of systematic non-compliance.</p>

Scoring Comments
<p>The Scottish Fisheries Protection Agency (and Marine &amp; Fisheries Agency) maintains a very comprehensive monitoring, control and compliance system that has demonstrated a consistent ability to enforce relevant management measures, strategies and rules. Although there has always been a range of penalties to underpin enforcement, the significant step was the introduction of 'Buyers and Sellers' legislation with provision for the ultimate sanction of removing an individual's or company's right to trade in fish. Since the introduction of this legislation, there is widespread recognition and acceptance that the corporate evasion of regulations and non-compliance with statute and rules was widespread if not rife hitherto, no longer occurs. Illegal, unreported landings may still occur but if they do it is considered to be a trivial level relative to the total quantities of fish landed and reported. Consequently, there is a high degree of confidence that the information necessary for effective assessment and management is being gathered and supplied. The principle short come is with respect to the routine gathering and provision of information on quantities of fish caught but not landed.</p>
<p>Score: 95</p>
<p>A comprehensive monitoring, control and surveillance system has been implemented in the fishery under assessment and has demonstrated a consistent ability to enforce relevant management measures, strategies and/or rules (100). Sanctions to deal with non-compliance exist, are consistently applied and demonstrably provide effective deterrence (100). Some evidence exists to demonstrate fishers comply with the management system under assessment, including, when required, providing information of importance to the effective management of the fishery (80). There is no evidence of systematic non-compliance (100).</p>
<p>Audit Trace References</p>
<p>SJL14, SJL18, SJL23, SJL24</p>

SCORING CRITERIA		SCORING GUIDEPOST 60	SCORING GUIDEPOST 80	SCORING GUIDEPOST 100
3.2.4	<p><b>Research plan</b> The fishery has a research plan that addresses the information needs of management.</p>	<p><u>Research</u> is undertaken, as required, to achieve the objectives consistent with MSC's Principles 1 and 2.</p> <p>Research results are <u>available</u> to interested parties.</p>	<p>A <u>research plan</u> provides the management system with a strategic approach to research and <u>reliable and timely information</u> sufficient to achieve the objectives consistent with MSC's Principles 1 and 2.</p> <p>Research results are <u>disseminated</u> to all interested parties in a <u>timely</u> fashion.</p>	<p>A <u>comprehensive research plan</u> provides the management system with a coherent and strategic approach to research across P1, P2 and P3, and <u>reliable and timely information</u> sufficient to achieve the objectives consistent with MSC's Principles 1 and 2.</p> <p>Research <u>plan</u> and results are <u>disseminated</u> to all interested parties in a <u>timely</u> fashion and are <u>widely and publicly available</u>.</p>

Scoring Comments
<p>There is no formally agreed research plan dedicated to the North Sea haddock fishery or any of its component parts. In common with most fisheries in the NE Atlantic the research needs are coordinated (often informally) through ICES, not least through the annual meeting of the appropriate assessment working group. This coordination ensures that the appropriate research necessary to underpin and improve the annual stock assessment process is carried out in a timely manner to the necessary standard. Within a wider context, the SFSAG and other participating in the North Sea haddock fishery do contribute to supporting research projects and programmes by taking observers as part of the ongoing discard-information gathering programme, itself part of the Scottish Conservation Credit scheme. Whichever aspect of whatever programme, the work all makes a positive contribution to criteria covered by MSC Principles 1 &amp; 2. Research results are made known through a variety of mechanisms and sources from the popular trade press through organisations' web sites to scientific peer-review journals.</p>
<p>Score: 95</p>
<p>A comprehensive research programme provides the management system with a reasonably coherent and strategic approach to research across P1, P2 and P3, and reliable and timely information sufficient to achieve the objectives consistent with MSC's Principles 1 and 2 (90). Research plan and results are disseminated to all interested parties in a timely fashion and are widely and publicly available (100)</p>
<p>Audit Trace References</p>
<p>SJL16, SJL19, SJL20, SJL30, SJL31, SJL29</p>

SCORING CRITERIA	SCORING GUIDEPOST 60	SCORING GUIDEPOST 80	SCORING GUIDEPOST 100
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<p><b>3.2.5</b></p>	<p><b>Monitoring and management performance evaluation</b>  There is a system for monitoring and evaluating the performance of the fishery-specific management system against its objectives.</p> <p>There is effective and timely review of the fishery-specific management system.</p>	<p>The fishery has in place mechanisms to evaluate <u>some</u> parts of the management system and is subject to <u>occasional internal</u> review.</p>	<p>The fishery has in place mechanisms to evaluate <u>key</u> parts of the management system and is subject to <u>regular internal</u> and <u>occasional external</u> review.</p>	<p>The fishery has in place mechanisms to evaluate <u>all</u> parts of the management system and is subject to <u>regular internal</u> and <u>external</u> review.</p>
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Scoring Comments
<p>ICES stock assessments are subject to internal peer review during the course of the actual assessment process and by ACOM before ICES advice is formulated and passed to the fishery commissions (EU–Norway). There are also ad hoc reviews undertaken by individual scientists and reported at the ICES annual science meeting. More formally, ICES commissions periodic reviews of its entire assessment and advice procedures. One such review is in hand at present. The performance of the EC is subject to internal audit and ongoing scrutiny by a plethora of institutions from parliaments of member states to various NGO and pressure groups. At national level, the fishery departments of UK government and devolved administrations are subject to scrutiny and review by parliamentary panels, individual MPs, industry bodies, NGO and pressure groups. Most particularly, the enforcement agencies, SFPA and MFA, prepare annual reports which are submitted to their ministers and laid open to public scrutiny. These reports include reviews of performance against predetermined performance indicators. These national enforcement agencies are also subject to review by the EC.</p>
<p>Score: 95</p>
<p>The fishery has in place mechanisms to evaluate all parts of the management system, internal evaluations are regular but external evaluations are less so (95).</p>
<p>Audit Trace References</p>
<p>SJL5, SJL32, SJL29</p>

## Appendix B: Peer Review Reports

A Peer Review panel was assembled for this fishery. Potential peer reviewers were approached on the basis of their experience of one or more of the following; the fishery under assessment, fishery management, stock assessment issues and relevant ecosystem interactions.

Brief details of each reviewer are provided below.

**Dr. Mike Pawson:** Mike Pawson recently retired as senior fisheries advisor at Cefas, Lowestoft, after 39 years carrying out biological research and providing scientific advice to Defra, the EC and other national and international organisations on fish stock abundance (marine teleosts, elasmobranchs, salmonids and eels), technical conservation measures and fisheries management regulations, and on related monitoring, sampling, survey and research programmes. Between 1974 and 1980, he initiated and led acoustic surveys for blue whiting and mackerel and trawl surveys in the North Sea (1975-1979). From 1980 to 1990, Mike designed and managed MAFF's coastal fisheries programme, implementing biological sampling, trawl surveys, a fishermen's logbook scheme and socio-economic evaluation of sea bass fisheries, and between 1990 and 2000 he led the Cefas Western demersal team, providing analytical assessments and management advice for 12 finfish stocks. During this time he was co-ordinator of the Anglo-French English Channel Fisheries Study Group (1989-1997) and chairman of the ICES Southern Shelf Demersal Stock Assessment Working Group (1996-98), and subsequently chaired the ICES Seabass Study Group (2000-04) and Elasmobranch Study Group (2001-02).

**Dr. David Bennett:** David Bennett has 40 years experience in fisheries research, specialising in the biology, population dynamics, and assessment of commercially exploited fish and shellfish stocks (e.g. lobsters, crabs, Nephrops, shrimps) the provision of national and international fisheries management advice, and fisheries aspects of environmental impact studies. He chaired the ICES Working Group on Nephrops stocks, has been a member of a number of ICES Working and Study Groups, and an expert for DG XIV of the EU Commission. More recently as a consultant he has been a member of the MSC teams that assessed the UK NESFC Lobster and Bass fisheries and reassessed the Loch Torridon Nephrops Creel Fishery. He has peer reviewed the original MSC Loch Torridon assessment, the Burry Inlet Cockle, the Vietnamese Ben Tre Clam fishery, and is currently reviewing the Clyde and Stornaway Nephrops trawl and creel fisheries, and the Southern North Sea Nephrops, SFSAG North Sea Nephrops, and SFSAG North Sea Haddock Trawl & Danish Seine fisheries.

## PEER REVIEW REPORT A

### Presentation

The presentation of information requires some editorial attention, in particular to reduce the repetition of information such as the details of the assessment team (in the Summary and section 9.1), the assessment timetable (in the Summary and section 10.1), and the overall scores against the MSC principles (in the Summary, section 11.2 and section 13). Whilst the information content of the report is in most cases adequate to support the scoring table marks and the attendant comments, there is probably too much unnecessary detail in Section 5, Management. The use of acronyms should be standardised throughout the report, giving the full name at first mention, and then only using the relevant acronym thereafter. The same applies to the use of scientific Latin names for fish species, which should only be used at first mention, and to the use of Divisions for IVa and IVb (these are not sub-areas). Also, codes (presumably referring to the author of the section) are used for references in all but the sections on ETP species and habitat impacts (6.4 - 6.6).

**MML response: These issues have been addressed. In particular, two versions of the literature references have been provided, allowing cross-referencing by (i) author and (ii) team reference code.**

**2.2 report structure and assessment process:** note that the fishery under assessment does not necessarily bear any relation to areas where northern shrimp are fished.

**MML response: Reference to northern shrimp deleted.**

**Fishery Proposed for Certification:** though the UoC is denoted as the **SFSAG North Sea Haddock Trawl Fishery**, some 50 vessels use seines.

**MML response: UoC revised to specifically include Danish seine vessels**

**3.1 Biology of the target species:** page 16, 1<sup>st</sup> paragraph, second last sentence repeats earlier comments, and spawning behaviour is probably irrelevant.

**MML response: Repeated phrase removed; the spawning behaviour is possibly of interest in relation to aggregation behaviour and vulnerability of adult fish at this stage in the life-cycle.**

You suggest that there is some doubt about the existence of distinct sub-populations of haddock within the North Sea, and conflicting evidence from genetic, tagging and parasite studies about the integrity of the IVa,b “stock”. What is the answer, and what are the implications for management (section 4.1)?

**MML response: ICES regard North Sea and Skagerrak haddock as forming a single unit stock for the purposes of assessment. This has been made clear by an addition to the text.**

**3.2 History of the fishery:** you say that it has recently been necessary to reduce fishing effort, but is this for haddock or more generally? Also note that the number of boats associated with the SFSAG application for MSC accreditation (the UoC) is variously quoted as around 360 (this page), 190 (**3.3 Fleet and gear description**), 185 just above **Table 4**, and 192 (**Appendix F**).

**MML response: The reduction in effort applies to demersal fisheries generally; text modified accordingly. The discrepancies in relation to vessel numbers have been put right. There are now 210 client vessels listed in Appendix F but information about target species is unknown for 2 of them, hence the totals in Table 4 amount to 208 vessels; information about vessel lengths in relation to VMS is only available for 200 vessels.**

In **Table 1**, it would be useful to see how many boats/landings were made to each port, and which of these ports' landings are considered to be from Divisions IVa + IVb. Were catches in 2007 typical of recent years?

**MML response:** These comments seem to refer to **Table 3** not **Table 1**. Details on boat numbers and individual landings to each port would be time-consuming to acquire; it can be assumed that the landings made into the listed North Sea ports were derived from ICES Divisions IVa & IVb. The 2007 information in **Table 3** provides a 'snapshot' of the haddock fishery, based on the most up-to-date data available at the time the report was first drafted, and this represented a partial update on 2005 information in the MML Pre-assessment Report. Comparing the two sets of data indicates that haddock landings have declined, as expected, but the overall value of the fishery has remained the same, as has the relative importance of North Sea landings of haddock compared to the Scottish total (95% in 2005, 90% in 2007). The relative port landings tend to vary from year to year and in all probability there is no such thing as a 'typical year'.

**3.3 Fleet and gear description:** given the complex nature of the fishery within which haddock are taken in the North Sea, there is ample scope for confusion about mesh sizes allowed or used by the various gears. Is it possible to indicate this in **Table 5**? The caption against **Table 4** indicates that some vessels in the UoC may fish exclusively for haddock at times, but you say elsewhere that this is always a mixed demersal fishery, with haddock as one target species. Please also standardise vessels lengths in metres.

**MML response:** The mesh sizes in use in the haddock fishery vary greatly and will depend on the options available in the Conservation Credit Scheme and which package vessels sign up to. The mesh sizes applying to TR1 & TR2 trawls are given in Section 3.3. In **Table 5**, the bottom two gears would correspond to TR2, the rest to TR1. An idea of mesh sizes in use is available from the FRS observer sampling programme and this is mentioned in Section 6.2.3.

Footnote to **Table 4** has been modified to remove ambiguity.

Footnote to **Table 5** includes conversion of 90 ft to 27.432 m.

In the para. immediately above **Figure 2**, and elsewhere, you infer that the general decline in landings, across all species in recent years, reflects the fall in fishing effort (which is not shown), but this is chiefly due to a decline in stock biomass for most species, which has required effort to be cut. The same, incorrect, inference is found in the comments about **Figure 8**.

**MML response:** Text modified to clarify that decline in landings (**Fig. 3**) reflects both falls in SSB and fishing effort. With reference to **Fig. 8** (now **Fig. 9**), the text is very clear in stating that "landings of cod in the North Sea have fallen sharply since the late 1990s, partly as a result of reduced fishing effort following vessel decommissioning, but also because of declining stock biomass".

**4.1 Management unit:** You speculate that governance of this fishery could change if Scotland were to achieve independence. Surely, the fishery is managed independently from others in the UK anyway, and Scotland is highly unlikely to become independent from the EC.

**MML response:** It is not clear whether Scottish independence would alter the management of this fishery to any significant extent, other than perhaps revised quota arrangements.

**4.2 Assessment and stock status:** Why is the strong 2000 year class not considered a contributory factor in boosting stock biomass and yield (along with the 1999 year class)? Note

that the most recent recruitment estimates are higher than those for the 2001-2004 year classes, and that the harvest ratio was only based on landings, not total catch.

**MML response:** Text modified to include these points, and Table 6 modified to make it clear that harvest ratios are based on landings/SSB.

**4.2.1 Precautionary Approach reference points:** Is the historic SSWB/recruit relationship the basis for the precautionary level for SSB ( $B_{pa}$ ) to be set at 140,000t, and  $F_{pa}$  at 0.7 and, if so, are these still appropriate in view of climate change?

**MML response:** Reference points are generally derived from stock/recruitment (S/R) relationships; climate change will undoubtedly have to be considered in the future and S/Rs, reference points and other parameters will have to be re-evaluated by assessment working groups; ICES is aware of these issues and hosted a major conference at Bergen in 2004 on the effect of climate change on fisheries (see ICES Journal of Marine Science vol. 62, published in 2005).

**4.3 Management Advice:** You claim that adherence to the management plan has contributed to stable and increased yields, but this is only in terms of catch, not landings, see point above;

**MML response:** The text here was taken from reference C01; however, text has been modified to indicate 'reasonably stable landings' resulting from the Management Plan.

The information in section 5.2 **Fishing locations**, belongs in section 3.3, not here.

**MML response:** Subsection moved to Section 3.

**5.4.2 Scottish Government Conservation Credit Scheme:** is it the case that vessels opting to use more selective gears that are awarded extra days at sea are still bound by catch quota regulations? This whole section repeats a lot of information presented earlier, but is well written.

**MML response:** The answer is already in the text: "Vessels can be allocated additional days at sea (but not additional quota) if they chose to participate in the Scottish Conservation Credit Scheme" – and again under 5.5.2

**6.5.2 (sic) Output harvest controls:** you state that there are no output controls specific to the North Sea haddock fishery, but are not catch quotas output controls?

**MML response:** Comment added & paragraph numbers changed

**5.6 Monitoring, control and surveillance:** the level of detail in this section far exceeds that in most other parts of the report, and could usefully be abridged (we don't need to view ships and planes, for example).

**MML response:** The text is considered proportionate to the issues involved. The photos add some flavour, but are not strictly necessary.

**6.1 Description of the marine environment:** provides a detailed account of what types of information is available, and is being collected, but insufficient description of the characteristics of the North Sea and how these relate to the haddock and its fishery.

**MML response:** Text updated to give greater detail of haddock-preferred habitats and distribution

**6.2.1 Haddock discards:** the information presented in **Table 8** is the same as in **Table 6**, and need not be repeated. In the following discussions, tables and figures, please make it clear whether discard rates are by number or weight of fish (presumably the latter).

**MML response:** While there is duplication of the data in **Tables 6 & 8**, the latter contains the additional column of % discard rates and the whole table should be retained for completeness. All discard rates are derived from relative weight data; where this is not clear (e.g. in some of the fig. legends), modifications have been made.

You suggest that **Figures 10 and 11** show that the use of more selective gears has had a beneficial effect in cutting discards of juvenile cod and whiting in the North Sea fishery, but this could equally be because recruitment has recently been poor.

**MML response:** In the case of whiting, there has been a marked decline in discard rates since about 2003 despite the fact that recruitment has been reasonably stable, though at a low level, during this period. This suggests the trend may be due to changes in exploitation pattern. In the case of cod, the picture is less clear cut; recruitment has been low since 1998 and it is possible that discard rates are at least partly related to fluctuations in the level of recruitment. The text has been modified to reflect these issues.

**6.2.3 Discard information for the client fleet:** With respect to **Table 10**, you suggest that discard rates of cod by the client fleet have risen sharply since 2006, due the above-average 2005 year class, but this is not apparent in **Fig. 10D**. Also, note that **Figure 7** is not about client fleet, and that the all-year means in **Table 10** are essentially meaningless.

**MML response:** Yes, but the bulk of the discarded biomass is from fish >35 cm and the increase in discard rates can be clearly seen in **Table 10D**. Agree **Fig. 7** is the whole Scottish fleet. Mean summary of **Table 10** has been removed.

**6.5 Habitat impacts, 6.5.1 Otter/Pair Trawls (single & multiple rigs):** you note that Sewell and Hiscock (2005) have reviewed the effects of fishing within European marine sites, but do not elaborate the status of these sites (closed to fishing?) or what results they obtained. It is unclear whether the OSPAR list of threatened and/or declining habitats in the North Sea (**Table 13**) is relevant only to seining (probably not), and a comment that 2 centuries of demersal towed gear fishing has probably obliterated those habitats/communities that might be expected to occur in areas where the UoC fishes would not be out of place. With respect to **Strategies and mechanisms to protect habitats**, it would be useful to provide a summary of potential interactions between the haddock fishery and SACs or MPAs in existence or designated.

**MML response:** Relevant findings of Sewell & Hiscock added to text. The text below the OSPAR list details those potentially affected by this fishery. Text on MPAs updated.

**6.6 Ecosystem effects:** 1<sup>st</sup> and 2<sup>nd</sup> paras. Why is saithe singled out when discussing interactions of fish species within the North Sea ecosystem, and what is the relevance and implications of the results of the work described to haddock and its fishery? Similarly, has the work of the ICES Working Group on Seabird Ecology any relevance to haddock?

**MML response:** Linkages to trophic models of the North Sea have been made to the fisheries under assessment. As review of the work of the ICES Working Group on Seabird Ecology does not suggest any particular relevance

**7.2 Nephrops-directed fisheries:** Surely, should certification be granted to *either* the haddock or nephrops fisheries, by-catches of other species would have to be included. **Section 7** introduces a number of issues without providing any assessment of the implications for the haddock or the UoC, which is required.

**MML response:** If certification is granted for either species (haddock or the other SFSAG fisheries under assessment, nephrops), no other species will be covered by the certificate. The main issues of interaction are the haddock bycatch and high discard rate in nephrops trawls; these are addressed in the report and Conditions 1 & 3.

### Scoring Table, Appendix A

I have only commented where there appears to be a conflict between comments, the evidence provided in the report, or the mark given.

**1.1.2. Limit and target reference points are appropriate for the stock:** I have already drawn attention to the lack of detail for the basis of the reference points, especially when discarding mortality appears to be such an issue (see Condition 3), but accept that ICES knows what it is doing. However, there is very little evidence that the target reference point takes into account relevant precautionary issues such as the ecological role of the stock with a high degree of certainty, and I suggest that a mark of 100 is too high.

**MML response:** This is a reasonable comment and one of the performance criteria has been reduced to a score of 80, giving an overall score for the PI of 95. Text also amended to indicate that haddock is not a low trophic level species.

**1.2.2. There are well defined and effective harvest control rules in place:** I have no problem with the comments, but marks of 100 and 75 suggest an overall score of 85-90, not 95.

**MML response:** This is a fair comment; there are 3 criteria in this performance indicator, scored at 100, 100 & 75, therefore an overall score of 90 would be appropriate and has been implemented.

**2.3.3 Relevant information is collected to support the management of fishery impacts on ETP species:** I see no evidence in the report that information is sufficient to quantitatively estimate outcome status with a high degree of certainty.

**MML response:** This is based upon independent observer data from FRS and (in the Farne Deeps) CEFAS and now supplemented by SFF observer programme. However it is accepted that this information is not fully quantitative and this element of the PI has been reduced from 100 to 90.

**2.4.3. Information is adequate to determine the risk posed to habitat types by the fishery and the effectiveness of the strategy to manage impacts on habitat types:** To say that “the physical impacts of the gear on the habitat types have been quantified fully (100) is not substantiated in the report. In fact, this is the weakest part of the assessment, and is recognised in **Recommendation 1**.

**MML response:** We consider that the large amount of research – both past and ongoing (e.g. the current MSS project entitled ‘The quantification of the physical, environmental and ecological impact of towed demersal fishing gears’ (MF0759 2006 - 2010) see page 64) – on bottom trawl impacts warrants a score of 100.

**3.2.4 The fishery has a research plan that addresses the information needs of management.** I agree that the relevant projects are in place, but there needs to be an explicit plan to gain a mark as high as 95, and this appears to be lacking.

**MML response:** We consider that we have this issue covered adequately in our description of the *status quo*. We would rather have an informal – but focused – *modus operandi* that works than a ‘box-tickers’ formal plan that produced little of value.

#### **Certification recommendation**

Though I consider that some of the marks awarded are too high, and that there is a lack of information presented on some aspects (stock identity, biological reference levels, environmental impacts), I agree with your assessment that the overall Performance of the fishery would pass in relation to MSC Principles 1, 2 and 3, and that the **SFSAG Haddock Trawl Fishery** be certified according to the Marine Stewardship Council Principles and Criteria for Sustainable Fisheries. The Conditions and actions required seem appropriate and reflect the concerns raised in the report, and in my review.

## PEER REVIEW REPORT B

### SUMMARY & OVERALL COMMENTS

This is a competent and comprehensive assessment of the North Sea Haddock Trawl & Danish Seine Fishery against the MSC Principles and Criteria for Sustainable Fisheries. The Report provides an authoritative overview of the fishery and the majority of the issues that relate to the three MSC Principles. In the main, I concur with the comments and scoring in the Scoring Table. I was initially sceptical of the very high score for Principal 1. However, the scoring comments support the score of 97, but see my comments about discards (next 6 paragraphs). I have made some suggestions for text amendments and questioned a small number of the scores. I have made some suggestions for changes to the Conditions and Recommendations.

My main concern is with the high level of haddock discards (see 7.2.1\*. Haddock Discards - Table 8, Figure 7 (up to 70% discarded) and 7.2.3. Discard information for the client fleet - Table 10.). There is no mention of this problem in the Scoring Table. While it is quite acceptable to give high scores for 1.1.1 Stock Status and 1.1.2. Reference Points, surely it is not acceptable, in terms of sustainability, to have a fishery with an exploitation pattern that can result in 70% (2001) (second highest 49% in 2007) of the haddock catch being discarded. I accept that these high levels occurred following periodic peaks in recruitment. However, it just shows that either the current nets in use result in large quantities of small (possibly under-sized) haddock being caught and discarded, and/or at times of high abundance the market will not accept the large quantities being caught, particularly of small “rounders” (ungutted small haddock), except at very low prices. \*Note that Section numbering has been changed (now Section 6, not 7) in the final version of the report. This applies elsewhere in this review.

**MML response: PI 1.2.1 has been modified to include exploitation pattern as part of the harvest strategy and the need to reduce discards as per the joint EU/Norway management plan. However, the discards are included in the assessment and this issue does not appear to compromise the overall sustainability of the stock. The score for one of the criteria in the PI has been reduced (from 100 to 90%) but the overall score of 95 remains appropriate. Also mentioned in the PI text is the fact that in cod recovery plan (CCS in Scotland) there are already incentives to use larger mesh gears and SMPs, though it is too early to quantify the effects. STECF will be conducting a review before the end of 2009.**

**Information from FRS (K. Coull, pers. com.) indicates that the proportion of discards above the MLS (30 cm in the N. Sea) varies from year to year but is now less of a problem than it was a few years ago. This category of discards are mostly just over the MLS as a result of imprecise selection during sorting, and generally not due to ‘high-grading’.**

The problem of discarding is recognised in the EU-Norway Management Plan element 6. Norway seems to be making much more effort than the UK to minimise haddock discards (see 6.4. paragraph 3). The Assessment Report also recognises the problem of variable recruitment – see 1. SUMMARY Key strengths and weaknesses of the fishery management: Principle 1, last sentence:- “Strict management controls are therefore needed to ensure that good year classes, when they occur, are harvested sustainably.” However, no action to achieve this is recommended. There would appear to be scope for the clients to make further reductions in haddock discards.

**MML response: The Conditions address this problem in the wider context of reporting catch and reducing discards of other species, as well as haddock.**

I think the appropriate place to raise this issue in the Scoring Table is at 1.2. Harvest Strategy. This would entail a reduction in some of the scores within 1.2. It would be possible to meet some of the reference points by adopting a harvest strategy that strove to improve the exploitation pattern and match catches to markets, so avoiding the high levels of haddock discards. A reduction in discarding would also reduce the dependency of the ICES haddock stock assessment on estimates of discard levels from the observer programmes.

If this argument is accepted then there are also consequences for the scoring and comments for Principle 2, 2.1 Retained non-target species and 2.2 Discarded Species.

**MML response: The text in PI 1.2.1 has been amended to address the discard issue, but this is just one aspect of the harvest strategy which mainly seems to be working well (the latest ACOM advice shows F in 2008 was 0.25 which is below the  $F_{HCR}$  target of 0.3). An appropriate reduction in score for one of the criteria has been made but this does not alter the overall PI score.**

This issue requires more attention by the clients. The Recommendation – Mitigation measures to reduce discarding - should be made a Condition, with a reference to the EU-Norway Management Plan.

**MML response: Changes have been made to PI 2.2.2, resulting in an overall score of 75. Consequently the previous recommendation has been strengthened to become Condition 3.**

I am not familiar with the market for small haddock, but I have often seen references in the fishing press to problems with “rounders” (small un-gutted haddock). The assessors should investigate this, and if it is still a problem, suggest a Condition or Recommendation that seeks to discourage catching small haddock and consequential discarding if the market is poor.

**MML response: See early response to discard issue. ‘High grading’ of so called ‘rounders’ occasionally occurs but is now much less of a problem than previously. Improvement to the exploitation pattern would address this issue.**

There is a general lack of focus in many sections of the Report, with regard to the clients and the client fleet. I have drawn attention to some of the sections where comments that relate directly to the clients need to be added.

**MML response: Addressed throughout report**

More attention could be drawn to the sustainability credentials of the client fleet by mentioning any additional conservation measures they use or plan to use. Otherwise it could be argued that, based on the supporting ICES advice of sustainable fisheries all vessels exploiting the stock within the certification boundary should equally have the potential to use the MSC logo.

**MML response: This has been addressed in the Action Plan provided by the Client fleet to address the two conditions, esp. Condition 1 that is designed to improve the uptake of more selective gear by vessels that might be included in the UoC.**

### **(C). GENERAL COMMENTS ON THE MAIN REPORT.**

The report is extremely detailed and appears to be reassuringly authoritative.

#### **3.4. Landings and trends in the fishery**

There are several references to reduced landings explained by falling fishing effort due to decommissioning and days-at-sea restrictions. But why was the fishing effort reduced in the first place – fishing mortality too high, falling stock biomass? Did landings initially fall as stock biomass and catch rates fell, and as a consequence fishing effort was reduced to match lower TACs and quotas.

**MML response: A similar comment was made in Peer Review (A). Text has been modified to clarify that decline in landings generally reflects both falls in SSB and fishing effort.**

#### **4.2. Assessments and Stock Status.**

Table 6 and subsequent paragraph. (See also 7.2.1. Tables 8 & 9 and text.)

No mention of discard trends in the paragraph after Table 6. Does the very high level of discards (118kt) in 2001 indicate a poor exploitation pattern that caught large numbers of small haddock from the very large 1999 year class (see paragraph after Table 9), and/or was this discarding because of a lack of a market for “rounders”? Discards have increased again in 2007, and is the same problem with the 2005 year class. Is there any evidence that any recently implemented technical measures, e.g. cod recovery programme, have resulted in reduced haddock discards? The EU-Norway Management Plan element 6 refers to discarding, and acknowledges there is a problem.

**MML response: Reference above to Section 7.2.1 should be to 6.2.1 (\*see earlier comment). The paragraph after Table 6 has been amended to highlight the link between recruitment level and subsequent discarding. The problem of exploitation pattern and haddock discards has now been addressed in PI 1.2.1. Evaluation of the Scottish CCS is being conducted by STECF; hopefully this will include possible effects on discarding generally, not just of cod. Text has been amended to include recent information on discards in relation to the MLS.**

#### **5.1. Fishing rights and licensing**

To what extent is the SFSAG involved in the Scottish Fisheries Council?

**MML response: Comment added to report.**

#### **5.2. Fishing Locations**

This is the first mention of the SWFPA (Scottish White Fish Producers Association). As SWFPA is mentioned several times in subsequent sections, rather than SFSAG, an explanation is needed in an earlier section as to how this organisation relates to SFSAG – the client. I note that the filename for this draft report uses “SWFPA”. Are the two groups synonymous? The two acronyms seem to be interchangeable within the Report.

**MML response: The client name changed from SWFPA to SFSAG mid-way through the assessment. This has now been clarified in the report.**

### 5.3.2. Administration of Quota.

The vessels in the client fleet belong to nine different POs (Appendix E). Are there any deleterious implications for the certification of the client fleet when they are members of nine different POs? Each PO has its own reporting arrangements and quota allocation, which it manages on behalf of its members. For example, could this create problems in terms of traceability (see also 13.1)?

**MML response: Traceability is a chain of custody problem, not a topic covered under fishery sustainability. We have reported on the way in which PO's operate their members' quotas and on how these are policed and enforced. The SFSAG has assured us that these arrangements do not give them any specific cause for concern operationally or in compliance**

### 5.4. Legislation and Regulation.

Paragraph 3. Norway seems to be making much more effort than the UK to minimise haddock discards.

**MML response: Possibly so, but the key word is 'seems'; ie the rules are there but the extent to which they are followed effectively is a moot point. Report text not altered.**

#### 5.4.2. Scottish Government Conservation Credit Scheme

What impact has this scheme had on haddock fishing? Has it impacted on the distribution of effort, has it made life more difficult for haddock fishers? A comment about the consequences and likely future impacts would be beneficial.

**MML response: Comment added.**

#### Optional Technical measures.

How has the client fleet responded to the opportunities for incentives? Have they shown a willingness to enhance their sustainability credentials? Have the clients shown any initiatives (see Stornaway Nephrops Trawl Fishery: Certification Report, Section 5.) with regards to improving their exploitation pattern to reduce haddock discards, e.g. by initiating gear trials and adoption of technical measures above those required by current regulations?

**MML response: This is covered in several parts: e.g. 3.5, 5.8, 6.5.1 et al. Identified weaknesses are also addressed in the Client Action Plan. However they have already taken pre-emptive actions, such as participating in various gear trials and also participating in the SFF observer programme.**

See also 5.5.1. Input harvest controls. 3rd paragraph. This is the first mention of any activity by the client fleet to minimise haddock discards. More emphasis should be placed on this action.

**MML response: Text amended.**

### 5.7. Communication, Consultation and Dispute Resolution

Is there any direct involvement by the client (SFSAG) or the client fleet in the various stakeholder organisations? One would expect to see the client and the fleet being active in such organisations if they have the sustainability credentials to justify certification.

**MML response: Text amended**

## 5.8. Fishery-Related Research and Development

Does the client fleet participate in the Scottish Industry–Science Partnership or the Seafish funded Industry Project Fund?

**MML response: Text amended.**

## 5.9. Monitoring & Evaluating Management Performance

Does CEFAS have any input (data or research) to the ICES haddock assessment?

**MML response: Text amended**

### 6.2.2. White fish by-catch and discards of other species

Why has [quote: 1<sup>st</sup> paragraph, 4<sup>th</sup> sentence] “In this section [7.2.2.] we give *special attention to two species* that are considered to be particularly vulnerable at the present time, namely cod and spurdog.” What about whiting, though some whiting data is presented in Figure 11? Whiting is described (section 5.4.2. Whiting) as being [quote] “Biological reference points are not considered reliable by ICES and it is difficult to define the true stock status of North Sea whiting. SSB is currently low and fishing mortality is above the level perceived to be sustainable. Recruitment has been at a low level since 2003 and without good recruitment, the stock is unlikely to recover.” More emphasis on whiting should have been given in 7.2.2.

**MML response: More attention to exploitation pattern and discards in relation to the target species will likely have knock-on effects in relation to whiting. The data in Fig. 12 shows a marked decline in whiting discard rates since about 2003 despite the fact that recruitment has been reasonably stable, though at a low level, during this period. This suggests the trend may be due to changes in exploitation pattern with the gradual adoption of larger mesh gears and SMPs. The text has been amended to cover this point.**

Quote: 1<sup>st</sup> sentence after Figure 10 :- “Figure 10 shows that discard rates for cod in the North Sea remain high, particularly in the last 2 years (Fig. 10A, B) but there has been a change in the discard size categories, with adult cod (> MLS, 35 cm) predominating as quotas have become more restrictive (Fig. 10C).” See also Table 10 and text for the client fleet. Note that this comment, and others below, refer to Fig. 11 in the new version of the report.

This is an undesirable trend that one would not expect to see if the Scottish Conservation Credits Scheme (CCS) was being implemented by the client fleet to help achieve the objectives of the EU Cod Recovery Plan. This raises questions about the efficacy of this scheme and the commitment of the client fleet.

**MML response: Not necessarily so; it could be far worse if there were the current highly restricted quota but no real time closures etc. It does show, however, that the battle is far from over. This will also be addressed through Condition 1.**

Quote: 2<sup>nd</sup> sentence after Figure 10 :- “The steady decline in under-sized (< 35 cm) cod discards is encouraging, suggesting that the use of more selective gears is having a beneficial effect (Fig. 10D).” See also Table 10 and text for the client fleet.

This is a positive outcome for which more emphasis should be made on behalf of the sustainability credentials of the client fleet. (See also comments above at 6.4.2.)

**MML response: Peer Reviewer (A) also questioned this issue and suggested that lower levels of recruitment could help to explain the trend in discard rates. Text has been amended to cover this possibility.**

Have the clients shown any initiatives (see Stornaway Nephrops Trawl Fishery: Certification Report, Section 5.) with regards to improving their exploitation pattern to reduce fish discards, e.g. by initiating gear trials and adoption of technical measures above those required by current regulations?

**MML response: The CCS provides incentives for using larger mesh gears and SMPs and vessels are assumed to be in the scheme. The SFF observer programme includes investigations of new gear developments and ideas that have been put forward by the industry, e.g. the ‘Orkney trawl’. SFIA are also involved in trials of gears made from knotless netting to reduce drag and fuel consumption.**

### **6.3. Survival of discards and escapees through cod-end**

I assume these studies in the 1990s did not use square mesh panels – the devices mainly used now to enhance fish escapes. The square-mesh panels, and many other parts of trawls including the cod-end, in use now are of meshes larger than those (70-100mm) used in the trials. This all points to the likely outcome that the use of larger meshes and square mesh panels probably cause even less mortality than the already low values obtained in these trials. It would be useful to make this point, if the assessors agree.

**MML response: This is a useful comment and the text has been modified to cover this point.**

### **6.4. ETP and 7.5. Habitat Interactions.**

The Sections on ETP, SACs, MCZs, MPAs are descriptive but lack focus and conclusions relative to the haddock fishery assessment. The Braemar and Scanner pockmarks paragraph is the exception where it is mentioned that the SFSAG have agreed not to fish in that area.

**MML response: Text on MPAs updated.**

### **6.4. Sea Mammals**

This is the first mention of the “Responsible Fisheries Scheme” – needs an explanation of the Seafish scheme.

**MML response: Explanation provided.**

### **6.5. Habitat Interactions.**

Last paragraph:- Dogger Bank. To what extent does the client fleet fish on the Dogger Bank for haddock?

**MML response: None – text removed,**

### **6.6. Ecosystem effects.**

Another example of a very interesting text of a generic nature, but totally lacking any direct reference to this haddock fishery.

**MML response: Linkages to haddock fishing and the ecosystem added.**

### **7.2. Nephrops-Directed Fisheries.**

There is scope here to provide a summary of the extensive work being undertaken to reduce fish, including haddock, discards in nephrops trawls (for details to summarise see 7.2.5. Strategies and methods and strategies of reducing bycatch and discards, in the SFSAG North Sea Nephrops Trawl Fishery Report.)

**MML response: Summary added.**

## 10.2. Stakeholder issues.

Surely there were some!

**MML response: Issues raised by stakeholder issues have been integrated into the main report.**

## 11. OBSERVATION AND SCORING

### 11.2. Scoring of this fishery

Table 13 is a very useful addition to the report layout. I have commented in previous peer reviews that the full scoring table is comprehensive, but difficult to assimilate and summarise. This table gives a welcome overview. The “green” column of scores allows the immediate identification of strong and weak performances and requirements for Conditions.

I do wonder how useful it is to have the weightings shown here, rather than in the scoring table. They are somewhat repetitive and because of the 1.1.3 stock rebuilding option this has created two extra columns. In Table 13 the “Or” columns could be omitted, as it does not apply here, to reduce complication. I did initially find the “Either” and “Or” columns and the note a little confusing, especially as the columns are not labelled A-J as referred to in the note. The weightings could be rounded up to three significant figures or one decimal place to ease reading and reduce the implication of spurious precision.

**MML response: These tables, and their formatting, are standardised. We will contribute to reviewing their content / format for future assessments.**

Overall though a welcome improvement in presentation.

### 12.1. Traceability

See my comment above at 5.3.2. regarding numerous POs.

**MML response: Traceability is a chain of custody problem, not a topic covered under fishery sustainability. We have reported on the way in which POs operate their members’ quotas and on how these are policed and enforced. The SFSAG has assured us that these arrangements do not give them any specific cause for concern operationally or in compliance.**

## 13. ASSESSMENT RESULTS

### 13.1. CONDITIONS

I am concerned about the high haddock discard rates in this fishery. In (B). SUMMARY & OVERALL COMMENTS above I have drawn attention to the issues and suggested that the Recommendation – Mitigation measures to reduce discarding - should be made a Condition, with a reference to the EU-Norway Management Plan.

**MML response: Changes have been made to PI 2.2.2, resulting in an overall score of 75. Consequently the previous recommendation has been strengthened to become Condition 3.**

If I am correct in believing that there is still a problem with the landing of “rounders”, then I suggest that an additional Condition or Recommendation could be made to address the problem. (See (B). SUMMARY & OVERALL COMMENTS for details of these proposals.)

**MML response: High-grading seems to be less of a problem now than it was previously so that a condition on this issue alone does not appear to be justified. Condition 3 should be adequate to address the issue of discards generally.**

## **(D). REVIEW OF THE SCORING TABLE.**

Comments are referenced to the Scoring Table notation.

### **PRINCIPLE 1.**

See my comments above ((B). Summary & Overall Comments) regarding high levels of haddock discards and the potential consequences for comments and scoring within these components.

### **PRINCIPLE 2.**

2.1 /2.2. See my comments above ((B). Summary & Overall Comments) regarding high levels of haddock discards, and the potential consequences for comments and scoring within these components.

#### **“2.1 Retained non-target species”**

#### **“2.2 Discarded species (also known as “bycatch” or “discards””**

I do find these definitions and the subsequent scoring guideposts very confusing. In a directed fishery for haddock there is a catch that is sorted into landings and discards (dealt with in Principle 1). For Principle 2 the fishery also has a bycatch of other (non-targeted) species (commercial and non-commercial) that are sorted into landings (retained commercial non-target - 2.1) and discards (commercial non-target and non-commercial – 2.2). 2.1 should not be discussing discards (see 2.1.3.) 2.2 should be discussing discards but refers back to 2.1 (see 2.2.1.). 2.2 continually uses the term “bycatch” in a section headed “Discarded species”. In Table 13 the headings are “2.1 Retained species” and “2.2 Bycatch”. There is scope for clarification of the terms in use.

**MML response: We accept the potential for confusion here. MSC consider retained species (i.e. those covered under P2.1) to be those species retained and landed but not included in the Unit of Certification (e.g. in this case all those species landed except haddock). Bycatch species (i.e. those considered under P2.2) are those that are not retained but are either discarded or are part of unobserved mortality. It is possible that a species may be potentially considered under both P2.1 and P2.2 (e.g. cod is both retained but in some circumstances, may also be discarded. We have therefore reviewed the text and tried to eliminate some of the confusion.**

#### **2.5.3. The two sub-scores of 100 seem rather high.**

**MML response: We consider that the amount of work done on evaluating the North Sea ecosystem justifies the score of 100 (Element 1). We also consider that information needed to support the development of strategies to manage ecosystem impacts (e.g. on target species, bycatch, discards and habitat impacts) also to be well known, and the major short-falls already addressed under Condition 3.**

### **PRINCIPLE 3.**

The score of 100 is too high as it is based solely on the incentives for implementing the cod recovery plan. There is scope for additional incentives to encourage fishers to implement changes to their fishing gear to further help improve their exploitation pattern on both haddock (target species) and non-target species. (See my comments above ((B). Summary & Overall Comments) regarding high levels of haddock discards.)

**MML response: These shortcomings are recognised elsewhere in the assessment - and in Condition 1**

3.2.4. The scoring comments would benefit from a little more detail of those carrying out research e.g. Universities, FRS, CEFAS, Seafish, NGOs.

**MML response: We consider that there is sufficient in the narrative text of the report and the supporting references.**

## **Appendix C: Client Action Plan**

### **General Statement**

The Client Group (referred to as ‘the group’) is fully committed to the delivery of this action plan to the best of its ability. The group is acutely aware of the political nature of some of the suggested actions, and the problems inherent with this. As some conditions may, ultimately, require change at European level, the group feels it must point out that, as the client, it is limited in its ability to bring about such change, but will make every effort to influence the necessary institutions and bodies.

Political realities aside, the client group is committed to delivering the various outputs contained in this action plan.

### **Conditions 1 and 3: Mitigation Measures to Reduce (1) Bycatch and (3) Discarding**

Members of the client group will continue to participate extensively in the development and trial of further selective gears to reduce discards through their participation in initiatives such as the Conservation Credits scheme, a Scottish response to regional management that promotes sustainable fishing practices, and the Scottish Industry Science Partnership (SISP), which helps fishers develop new, environmentally friendly, fishing gears. Furthermore, the group will seek to influence the on-going use and development of innovative net design and configuration of whitefish gear, Seasonal Closures (SC’s), and Real Time Closures (RTC’s) which together provide substantial protection for juveniles and vulnerable stocks such as cod and whiting

The group will use current levels of selectivity and gear design as a benchmark from which to assess the need for further improvements; the group will deliver any necessary changes through their participation, and influence within the various stakeholder groups.

### **Condition 2: Recording Total Catch of Retained Species**

The group will liaise with Government, Fish-selling offices, Producer Organisations and within its membership with a view to creating a flow of total catch information. This may be attached to existing documentation, such as official landing declarations, or take the form of bespoke record keeping for vessels landing MSC product. Alternatively, in order to satisfy the condition, vessels may make use of new technology as and when it develops. The group will liaise with MSS to develop a common standard for the reporting of total catch so that such information may ultimately support existing information.

## Appendix D: Stakeholder Comments

Two written comments have been received by the assessment team:

### 1. From Dr. Ian Boyd ((received by email on 15 May, 2010).

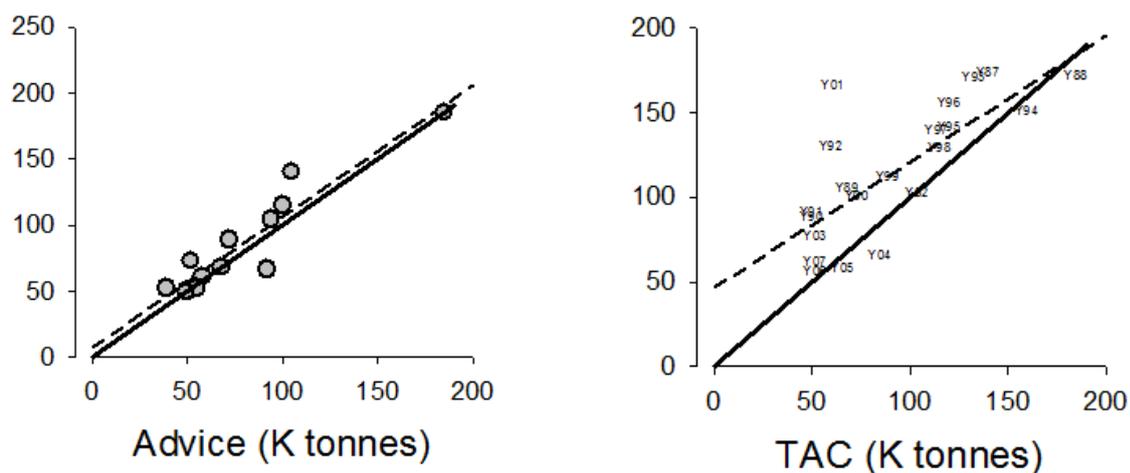
*I am sorry that I have not read your document so what I have to say may well already be covered.*

*In the attached [see **Figure 19** below], I have plotted the catch (as reported by ICES) against the TAC for the NS Haddock fishery. You'll see that there have been some very serious differences between the catch and the TAC. Although in recent years this appears to be less of a problem that it was during the 1990s, there are some recent years when there has been overfishing by this definition. I suggest we have to be careful that the factors that caused this to happen have been eliminated from the system.*

*I would also point out that there may be a case for saying that  $F$  in this fishery is much too high. The biological justification for having an upper limit on  $F$  of 1.0 with a "precautionary"  $F$  of 0.7 makes little sense in an ecological context, even if it can be justified in a purely single-stock fisheries production scenario. Recent realised  $F$  appears to be much lower (about 0.32 over the past 5 years) which is encouraging, but is still probably at the upper end of what can be deemed acceptable in an ecological context and has probably been helped by some strong year classes through that time. Although it is difficult to be precise about what level of  $F$  is needed in order to make the NS Haddock fishery ecologically sustainable, it is likely to be significantly below current levels. Moreover, the system that is used for setting  $F$  does not appear to be constructed in a manner that takes this in to account. If we take the long-term mean  $F$  for this fishery and an indication of the fishing mortality in to the future, we might expect an  $F$  of  $>0.7$  and this would be allowed within the management rules. I fail to see how this is a credible management regime.*

### Figure 19: Stakeholder submission

The annual TAC for North Sea haddock, plaice and herring plotted against the annual ICES Advice (a) and the annual catch plotted against the annual TAC (b) for the period 1987 to the present. In (b) the points are plotted as the year. The estimated catch included discards. Each dot represents a different year. The solid line illustrates the line that the points would lie on if the management system was followed perfectly from the preceding step in the sequence. The dashed line shows the actual relationship. The distance of the dashed line from the solid line gives a relative measure of the faithfulness with which the scientific advice is translated in to a TAC (a) and the TAC is translated in to a catch (b).



**MMM response:** The key to the North Sea haddock assessment is really that the joint Norway-EU Management Plan (MP), introduced in 2008, seems to be working well. Adherence to the MP has contributed to lower fishing mortality, as well as increased and more stable yields. The Plan is provisionally accepted by ICES as being precautionary and they conclude that the fishery is being harvested sustainably, with the stock having full reproductive capacity. As Ian Boyd

points out, fishing mortality on haddock was very high up to the early 1990s but has since declined sharply; since 2002,  $F$  has fluctuated around the target value of 0.3 (=  $F_{msy}$ ), the 'harvest control rule' advised in the MP.  $F$  has been below 0.3 in the last two years, ie since the MP was introduced. The other reference points ( $B_{lim}/F_{lim}$ ,  $B_{pa}/F_{pa}$ ) are incorporated into the MP in order to trigger additional conservation measures should spawning stock biomass (SSB) decline and reproductive capacity is at risk. Evaluations of the MP have been carried out and suggest that the risk of SSB declining to  $B_{lim}$  is < 12% in any one year. It is worth noting that the decline in fishing mortality has not really been aided by recruitment of strong year-classes during this period. The last big year-class was in 1999, there was a modest peak in 2005 and 2009 seems to be about average, but in all other recent years recruitment has been poor. The aim of management must be to obtain optimum benefit from good year-classes when they occur. Sporadic and unpredictable pulses of recruitment are characteristic of haddock and this does lead to a degree of uncertainty.

I think the recent changes I made to one of the performance indicator scores addresses the main point made by Prof. Boyd in emphasising that the target for the fishery is  $F = F_{msy} = 0.3$  and that under the MP this is being met.

**We also note that Prof. Boyd's comments are general observations and not based on an actual review of this assessment (see first line of Prof. Boyd's comments).**

2. From Daniel Suddaby, Sr. Fishery Certification Manager, MSC (received by email on 11 June, 2010).

#	Type of finding	Scheme requirement	Reference	Details
1.	Major	FCM 3.4.5: <i>...shall specify conditions in terms of measurable outcomes or results expected, the specific timeframe over which the condition must be met</i>	Condition 1, p. 3	No timeframe is given for this condition.
2.	Major	FCM 3.4.8: <i>...shall consult with all relevant entities when setting conditions, if those conditions</i>	Condition 1, p. 3 Condition	This condition involves collaboration with external entities, e.g. research and development organizations, and
		<i>are likely to require investment of time or money by these entities, or changes to management arrangements or regulations, or re-arrangement of research priorities by these entities.</i>	3, p. 7	therefore requires consultation to determine whether the condition is achievable by the fishery client and realistic in the time frame specified (once a timeframe has been specified as per #1).
3.	Major	TAB D-029 v1, 9: <i>CBs shall include a detailed summary of verbal submission received during the site visits (issues of concern material to the outcome) ... and explicit responses from the assessment team.</i>	Section 10.2 Appendix D	A list of stakeholder meetings is included in the report but no detailed summary is included regarding any material "issues of concern" that were discussed or the responses of the team.
4.	Major	PA 12, 6: <i>...the target reference point shall not be considered to meet the requirements of the third scoring issue of PI 1.1.2 under SG 80. For example, in the European context, BPA or FPA as given in ICES advice are rarely consistent with BMSY or FMSY. Therefore if BPA or FPA are identified as the targets used in management, the rationale for PI 1.1.2 would have to explain how this is consistent with BMSY in the given case to warrant a score of 80. If this can not be shown, then a score of less than 80 shall be assigned.</i>	p. 91	PI 1.1.2: The rationale given is insufficient to explain how the target reference points given are consistent with BMSY or proxy, therefore the score of 95 is not justified.  For guidance on how to provide an adequate rationale, see the examples given in PA 12.
5.	Major	FCM appendix 1: 5.1 <i>...provide a detailed rationale which justifies the scores assigned to each of the performance indicators</i>	p.97	PI 2.1.1: The rationale does not justify the score. No evidence is provided that the partial strategy is <u>demonstrably effective</u> for each of these species such that the fishery <i>does not</i> hinder recovery and rebuilding.
6.	Major	FCM appendix 1: 5.1 <i>...provide a detailed rationale which justifies the scores</i>	p. 98	PI 2.1.2: The rationale does not justify the score. No evidence is provided that there has been

		<i>assigned to each of the performance indicators</i>		testing and high confidence that strategies will work for cod.
7.	Major	FCM appendix 1: 5.1 <i>...provide a detailed rationale which justifies the scores assigned to each of the performance indicators</i>  FCM v6, Appendix 1, 4.4: <i>This commentary shall make direct reference to the relevant indicator or scoring guidepost.</i>	P2	All PIs: As above, all rationales must justify scores with direct reference to the scoring guidepost. Rationales for many PIs for P2 are insufficient and must be improved in order to justify the scores for these PIs.
8.	Major	FCM v6, Appendix 1, 5.2: <i>In accordance with Section 3.5 of this methodology the report shall describe the system of tracking and tracing of fish and fish products in the fishery.</i>	Section 12.1, page 82 - Traceability	This section does not describe the system of tracking and tracing of fish in the fishery.
9.	Major	FCM v6, Appendix 1, 5.2: <i>The report shall (...) describe known risk factors prior to or after the point of first landing that may influence subsequent chain of custody assessments.</i>	Section 12.3, page 82 – Points of landing	This section does not describe the known risk factors prior to or after the point of first landing and how it may influence subsequent chain of custody.
10.	Major	FCM v6, Appendix 1, 5.2: <i>The report shall set out the scope of the fishery assessment in the context of the assurances the certification body can make about the point to which products from the fishery can be traced (...).</i>	Section 12.3, pg 82 Points of landing  Section 12.4, page 82 - Eligibility to enter chains of custody	This section does not precisely describe the point to which products from the fishery can be traced (the names of the 11 UK ports are not given).  This section does not clearly indicate the limit of the scope of the fishery assessment and does not determine which products from the fishery can be traced.
11.	Major	TAB D-021, 4: <i>The target eligibility date, rationale and assessment shall be included in the traceability section of the 'Preliminary Draft</i>	Section 12.4, pg 82 – Target eligibility date	The target eligibility date is not included.

		<i>Report', the 'Public Comment Draft Report' and the 'Final Report'</i>		
12.	Major	FCM v6, Appendix 1, 5.2: <i>The report shall specifically state whether products may or may not enter further chains of custody.</i>	Section 12.4, pg 82 - Eligibility to enter chains of custody	The reading of the section suggests that each vessel needs CoC certification.
13.	Guidance	N/A	p. 1	This assessment timeline should be updated. If the assessment timeline for the fishery itself is more than 30 days out of date please see the requirements in TAB D-028.

### MML response

No.	MSC's requirements	MML response
1	FCM 3.4.5: <i>...shall specify conditions in terms of measurable outcomes or results expected, the specific timeframe over which the condition must be met</i>	Timeframe included and condition reinforced
2	FCM 3.4.8: <i>...shall consult with all relevant entities when setting conditions, if those conditions are likely to require investment of time or money by these entities, or changes to management arrangements or regulations, or re-arrangement of research priorities by these entities.</i>	Details of consultation with external entities added.
3	TAB D-029 v1, 9: CBs shall include a detailed summary of verbal submission received during the site visits (issues of concern material to the outcome) ... and explicit responses from the assessment team.	New appendices added.
4	PA 12, 6: ...the target reference point shall not be considered to meet the requirements of the third scoring issue of PI 1.1.2 under SG 80. For example, in the European context, BPA or FPA as given in ICES advice are rarely consistent with BMSY or FMSY. Therefore if BPA or FPA are identified as the targets used in management, the rationale for PI 1.1.2 would have to explain how this is consistent with BMSY in the given case to warrant a score of 80. If this can not be shown, then a score of less than 80 shall be assigned.	Text altered and score reduced from 95 to 85 for the following reasons:  The limit and precautionary reference points are not used as target reference points in management of the fishery (except to adjust harvest strategy if SSB declines below Bpa).  The target reference point is $F = F_{msy} = 0.3$ , as laid down in the Management Plan. This is consistent with the MSY approach and should mean that stock biomass fluctuates around $B_{msy}$ , which in any case can only be highly variable because of the high recruitment swings. Over the last 3 years (2007-9) $F$ has averaged 0.28, suggesting that the plan is working. This information comes from the latest ACOM report (ICES Advice 2010, Book 6).
5	FCM appendix 1: 5.1 ...provide a detailed	Further evidence is provided that the measures

No.	MSC's requirements	MML response
	rationale which justifies the scores assigned to each of the performance indicators	being implemented under the Cod Recovery Plan and ancillary measures (e.g. Scottish Conservation Credit Scheme) have been demonstrably effective in ensuring that the recovery and rebuilding whitefish species such as cod and whiting is not hindered by this fishery.
6	FCM appendix 1: 5.1 ...provide a detailed rationale which justifies the scores assigned to each of the performance indicators	Further evidence is supplied that the above mentioned Cod Recovery Plan and ancillary measures (e.g. Scottish Conservation Credit Scheme) resulted in more responsible fleet behaviour and a recovery in cod spawning stock biomass levels since 2006.
7	FCM appendix 1: 5.1: ...provide a detailed rationale which justifies the scores assigned to each of the performance indicators FCM v6, Appendix 1, 4.4: This commentary shall make direct reference to the relevant indicator or scoring guidepost.	All other Performance Indicators in Principle 2 have been reviewed and improved where necessary.
8	FCM v6, Appendix 1, 5.2: In accordance with Section 3.5 of this methodology the report shall describe the system of tracking and tracing of fish and fish products in the fishery.	Provided improved detail on the system of tracking and tracing of fish in the fishery.
9	FCM v6, Appendix 1, 5.2: The report shall (...) describe known risk factors prior to or after the point of first landing that may influence subsequent chain of custody assessments.	Further describes the known risk factors prior to or after the point of first landing and how it may influence subsequent chain of custody.
10	FCM v6, Appendix 1, 5.2: The report shall set out the scope of the fishery assessment in the context of the assurances the certification body can make about the point to which products from the fishery can be traced (...).	Further describes the point to which products from the fishery can be traced. Whilst we have narrowed the areas where the landing parts are, we do not feel it necessary to stipulate the actual ports of landing in the UK. We have also clearly indicated the limit of the scope of the fishery assessment.
11	TAB D-021, 4: The target eligibility date, rationale and assessment shall be included in the traceability section of the 'Preliminary Draft Report', the 'Public Comment Draft Report' and the 'Final Report'	Target eligibility date added.
12	FCM v6, Appendix 1, 5.2: The report shall specifically state whether products may or may not enter further chains of custody.	Section changed so it no longer suggests that each vessel requires individual CoC certification.
13	This assessment timeline should be updated. If the assessment timeline for the fishery itself is more than 30 days out of date please see the requirements in TAB D-028.	This assessment timeline has been updated.

## **Appendix E: Site visit meetings**

Meetings were held with a number of key stakeholders during the site visit (see Section 2.3 for details).

Under a recent MSC Directive (TAB D-029 v1: *Revised Requirements for Stakeholder Consultation in Fishery Assessments*, dated 23 February 2010), changes to the process of stakeholder consultation have been made to improve the quality and consistency of stakeholder consultation in the fishery assessment process without adding significant time or cost. It does so primarily by ensuring that current best-practice among certification bodies (CBs) is consistently applied across all assessments and CBs. The directive responds directly to specific concerns that have surfaced from a variety of stakeholders about their experiences engaging in MSC fishery assessments.

Whilst this Directive became effective on 1 May 2010, the site visit was conducted in March 2009 and this Public Comment Draft Report completed before TAB-D-029 was released. Formal minutes of each meeting were not taken and are therefore not included in this report, but the information supplied by stakeholders has been incorporated in this report.

The main issues of concern raised during stakeholder consultation was that of the impact of the fishing method (bottom trawls) on non-target species and the level of discards from this fishery. This issue was carefully examined during the assessment of the fishery. The teams consideration of effects on non-target species is considered under PIs 2.1 (retained bycatch) and 2.2 (discarded bycatch).

No written submissions have been received from stakeholders other than those identified in Appendix D.

**Appendix F: Registered vessels fishing in fishing area eligible to trade MSC certified species name to those companies and their processing plants listed in Table 1**

<b>Name</b>	<b>PLN</b>	<b>Member Org.</b>
Aalskere	K373	OFPO
Achieve	BF223	SFO
Achieve	FR100	SFO
Adorne	INS220	AFPO
Aeolus	BA808	SFO
Ajax	FR29	ASFPO
Alaska	LK 707	Shetland FPO
Alison Kay	LK 57	Shetland FPO
Allegiance	SH90	SWFPA
Altantia II	LK 502	Shetland FPO
Amethyst	BF19	SFO
AmityII	PD177	SFO
Antaries	BF27	SWFPA
Aquarius	BF89	SFO
Arcana	BF533	SFO
Arcturus	UL300	ASFPO
Arcturus	LK 59	Shetland FPO
Ardent	LK 472	Shetland FPO
Ardent II	INS127	AFPO
Arkh Angell	K616	OFPO
Athena	LK 237	Shetland FPO
Atlantic Challenge	PD197	SFO
Audacious	BF83	AFPO
Auriga	FR217	SFO
Benarkle	PD400	NESFO
Bold Venture III	BH234	ASFPO
Bonaventure	LH111	ASFPO
Bountiful	BF79	SWFPA
Boy Andrew	WK170	NESFO
Boy John	INS110	SFO
Budding Rose	PD418	NESFO
Budding Rose	BF156	SFO
Carina	BF803	SFO
Caspian	BF38	SFO
Castlewood	FR216	AFPO
Celestial Dawn	BF109	SFO
Challenger	KY985	FMA (P)
Clansman	LH74	ASFPO
Comrades	LK 325	Shetland FPO
Constant Friend	PD83	SFO
Content	WY797	SWFPA
Copious	WY170	ASFPO
Copious	LK 985	Shetland FPO
Coromandel	KY279	SWFPA
Courage	BF790	SWFPA
Crusader	KY995	FMA (P) & FPO
Crystal Stream	LH147	ASFPO

Daisy	PD245	ASFPO
Daystar	BF151	SFO
Defiant	LK 371	Shetland FPO
Deliverance	FR254	SFO
Demares	PD959	SFO
Demarus	FR173	SFO
Denarius	BF804	SFO
Denebula	ME50	APO
Devotion	LK 801	Shetland FPO
Discovery	BF268	NESFO
Elegance	PD33	SWFPA
Ellen Mac	BW186	ASFPO
Ellorah	BF12	SWFPA
Endeavour	LH169	ASFPO
Esorah	FR317	ASFPO
Fairline	PD325	NESFO
Fairway	LK 270	Shetland FPO
Faith Emily	LK 244	Shetland FPO
Faithful	BF187	SFO
Faithful	FR 129	NPO
Favonius	PD17	SFO
Fear Not II	PD354	NESFO
Fidelitas	LK 45	Shetland FPO
Fidelity	BH92	ASFPO
Flourish N	BF340	SFO
Fruitful Bough	CY51	ASFPO
Fruitful Bough	PD109	SFO
Fruitful Vine	BF240	SFO
Genesis	BF505	SFO
Gleaner	BF444	SFO
Glenugie	PD347	NESFO
Golden Splendour	PD1002	SFO
Golden West	FR363	SWFPA
Good Fellowship	BK172	ASFPO
Good Intent III	WY79	ASFPO
Gratitude	BF103	ASFPO
Green Pastures	BH156	ASFPO
Grenna Star	HL112	ASFPO
Guardian Angell	LK 272	Shetland FPO
Guide Me On	KY48	FMA (P)
Guide Us	KY340	ASFPO
Guide Us	FR4	SFO
Guiding Light	LK 84	Shetland FPO
Harvest Home	CY221	SFO
Harvest Hope	PD120	ASFPO
Harvester	PD98	ASFPO
Harvester	A825	SWFPA
Headway X	WY319	SFO
Heather Sprig	BCK181	SFO
Helenus	FR121	SWFPA

Horizon II	FR24	SWFPA
Horizon II	FR 24	NPO
JJ	HL11	ASFPO
Just Reward	KY198	FMA (P)
Kairos	BF36	SFO
Karen Ann II	FR559	NPO
Keila	K121	OFPO
Kiroan	AH45	SWFPA
Kristanjo	WY794	ASFPO
Lapwing	PD972	NESFO
Launch Out	KY374	FMA (P) & FPO
Liberty	BF34	SWFPA
Lindesfarne	INS51	SWFPA
Luc	SN36	ASFPO
Lynden II	FR151	SFO
Maimai	FR432	SFO
Maracestina	INS291	SFO
Margarets	LH232	ASFPO
Marigold	INS241	SFO
Millburn	FR83	SFO
Mizpah	BCK627	ASFPO
Mizpah	LK 173	Shetland FPO
Moray Endeavour	BCK17	SFO
Moremma	PD135	SFO
Nimrod	BH227	ASFPO
Nordfjodr	PD118	SFO
Norlan	BF362	SFO
Norlantean	K508	OFPO
North Eastern	SN45	ASFPO
Nova Spero	LH142	ASFPO
Ocean Bounty	PD182	NESFO
Ocean Challenge	BF85	SFO
Ocean Harvest	PD198	ASFPO
Ocean Harvest	FR145	SFO
Ocean Pioneer	FR928	SFO
Ocean Reaper	FR273	SFO
Ocean Reward IV	BCK83	SFO
Ocean Venture II	PD340	SFO
Ocean Way	LK 207	Shetland FPO
Opportune	WK171	NESFO
Osprey III	BF500	SFO
Pleides	BF155	SWFPA
Press On	BF65	SFO
Prevail	LK 117	Shetland FPO
Prolific	LK 986	Shetland FPO
Prospect	BF573	SFO
Provider	BF422	ASFPO
Provider	M196	FMA (P) & FPO
Quantas	KY996	SFO
Quiet Waters	LK 209	Shetland FPO

Rachel Jayne III	MT100	ASFPO
Radiance	INS240	NESFO
Radiant Star	LK 71	Shetland FPO
Rebecca	LH11	ASFPO
Rebecca	FR143	SFO
Rebekah-Jayne	OB235	SFO
Reknown	FR246	AFPO
Reliance II	BF800	SFO
Renown JW	LK 52	Shetland FPO
Resilient	LK 195	Shetland FPO
Rosebloom	INS353	SFO
Russa Taign	K1102	SFO
Ryanwood	FR307	NESFO
Sagittarius	LH77	ASFPO
Sanela	KY459	FMA (P) & FPO
Sanlormarho II	LH220	ASFPO
Sapphire	SY108	SFO
Sardonyx II	BF206	SFO
Serenity	BF24	NESFO
Shalimar	KY989	ASFPO
Shalimar	BCK598	SFO
Shalimar II	PD303	NESFO
Shamariah	FR245	SFO
Sharyn Louise	LK 250	Shetland FPO
Shaulora	BF794	SWFPA
Shekinah	FR34	SFO
Shemarah II	LH65	ASFPO
Sincere V	SH3	FMA (P)
Solstice	BF56	SFO
Sophie Louise II	SSS678	ASFPO
Spitfire	LH107	ASFPO
St Adrian	KY360	FMA (P) & FPO
Starlight	PD786	SFO
Starlight Rays	PD230	SFO
Sunlight Ray	WY101	ASFPO
Sunrise	FR359	NESFO
Sustain	PD378	SFO
Tamaralyn	DE35	FMA (P)
Tern	LH53	ASFPO
Ticino	F44	ASFPO
Tranquility	NS353	ASFPO
Tranquility	BF7	SFO
Tranquility	LK 63	Shetland FPO
Transcend	BF61	SFO
Uberous	FR50	SFO
Ubique	KY28	ASFPO
Valhalla	LK 687	Shetland FPO
Valkyrie	UL100	NPO
Venture	LK 641	Shetland FPO
Venture Again II	KY239	FMA (P) & FPO

<b>Venturous</b>	<b>LK 75</b>	<b>Shetland FPO</b>
<b>Viking Monarch</b>	<b>K58</b>	<b>OFPO</b>
<b>Virtuous</b>	<b>FR253</b>	<b>SFO</b>
<b>Vision</b>	<b>BF190</b>	<b>SFO</b>
<b>Wee Ardgour</b>	<b>KY154</b>	<b>FMA (P) &amp; FPO</b>
<b>Westerly Warrior</b>	<b>INS24</b>	<b>SWFPA</b>
<b>White Heather VI</b>	<b>LH1</b>	<b>ASFPO</b>
<b>Winaway</b>	<b>KY279</b>	<b>FMA (P) &amp; FPO</b>