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PROJECT INSHORE

Project Inshore

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Contents

Glossary

ACOM	Advisory Committee (ICES)
ASCOBANS	Agreement on the Conservation of Small Cetaceans of the Baltic, North East Atlantic, Irish and North Seas
BDC	Biodiversity data centre
CAB	Conformity Assessment Body
CEFAS	Centre for Environment, Fisheries and Aquaculture Science
CFCA	Community Fisheries Control Agency
CFP	Common Fisheries Policy
CITES	Convention on Trade in Endangered Species of Wild Flora and Fauna
COM	Common Organisation of the Markets
Defra	Department for Environment, Food and Rural Affairs
EC	European Commission
EEZ	Exclusive Economic Zone
EFF	European Fisheries Fund
EMS	European Marine Site
ETP	Endangered, Threatened and Protected Species
EU	European Union
EUNIS	European Nature Information System
FCI	Food Certification International
HCR	Harvest Control Rule
ICES	International Council for the Exploration of the Sea
IFCA	Inshore Fisheries and Conservation Authorities
IUCN	International Union for Conservation of Nature
IUU	Illegal, unreported and unregulated
JNCC	Joint Nature Conservation Committee
OSPAR	Oslo and Paris Conventions
MCS	Monitoring, Control & Surveillance
MCZ	Marine Conservation Zone
MMO	Marine Management Organisation
MoU	Memorandum of Understanding
MPA	Marine Protected Area
MSC	Marine Stewardship Council
NEAFC	North East Atlantic Fisheries Commission
NFFO	National Federation of Fishermen's Organisations
NGO	Non-governmental Organisation
NUTFA	New Under Ten's Fishermen's Association
Nm	Nautical mile
PI	Performance Indicator
PO	Producer Organisation
PSA	Productivity Susceptibility Analysis

RAC	Regional Advisory Council
RBF	Risk based Framework
RFMO	Regional Fisheries Management Organisation
SAC	Special Areas of Conservation
SAGB	Shellfish Association of Great Britain
SG	Scoring Guidepost
SI	Scoring Issue
SICA	Scale Intensity Consequence Analysis
SNCBs	Statutory Nature Conservation Bodies
SPA	Special Protection Areas
STECF	Scientific, Technical and Economic Committee for Fisheries
TAC	Total Allowable Catch
UoC	Unit of Certification
VMS	Vessel Monitoring System
WGNEW	Working Group on New MoU Species.

Executive Summary

Introduction

» Project Inshore is an ambitious initiative led by Seafish, Marine Stewardship Council (MSC) and Shellfish Association of Great Britain which was officially launched on 8th June 2012 coinciding with World Oceans Day. The UK Fisheries Minister, Richard Benyon noted at the time that Project Inshore "…should help to ensure that our inshore fleet can continue to flourish, that fish stocks are managed sustainably and our marine environment is given the protection it needs". This project has now carried out MSC pre-assessments for an extensive range of fisheries around the English coast. In the next stage f the project, the results of these pre-assessments will form the basis for Strategic Sustainability Reviews for English Inshore fisheries to provide a road map to guide future management decisions.

» The funding for the project comes from a diverse range of sources notably the European Fisheries Fund (EFF), the Sustainable Fisheries Fund and industry (Seafish, UK retailers and processors). Other partners in the project include the Marine Stewardship Council, Shellfish Association of Great Britain (SAGB) and Seaweb's Seafood Choices.

» The Sussex Inshore Fisheries and Conservation Authority (IFCA) (previously the Sussex Sea Fisheries Committee) piloted a multi species fishery methodology in 2010 with its 'Navigating the Future' Inshore Fisheries Sustainability Pilot (Dapling *et al*., 2010). Navigating the Future utilised the MSC pre-assessment criteria to evaluate the performance of 26 local inshore fisheries. Project Inshore carries this model forward on a nationwide scale for key commercial fisheries operating within the remaining IFCA districts.

» Food Certification International Ltd (FCI) is the company selected and appointed to undertake Project Inshore. FCI Ltd is a Conformity Assessment Body (CAB) accredited to carry out MSC assessments.

Approach & Structure

» Project Inshore consists of three stages which progress from a broad overview of English inshore fisheries to strategic targeted action as follows:

» Stage 1 (completed in October 2012): Macro analysis and profiling of English inshore fisheries including:

- Data collection/ information gathering phase.
- Broad scale analysis of English fisheries.
- Development of list of fisheries (species/gear combination) to progress to Stage 2 pre-assessment.

» Stage 2: Pre-assessment of English fisheries based on an aggregated/matrix approach for assessing each selected fishery (species / gear combination) in relation to the Marine Stewardship Council (MSC) standard. The key output of Stage 2 will provide a preliminary determination of how closely each performance indicator of each fishery meets the MSC standard.

» Stage 3: Development of bespoke Strategic Sustainability Reviews for each English Inshore Fisheries and Conservation Authority (IFCA). These assessments will facilitate English inshore fisheries moving towards a level judged sustainable by the MSC standard.

» This report forms the output of stage 2.

Recap of Stage 1

» Stage One involved collecting and collating available fisheries data to profile the English inshore fishing sector and enable some preliminary macro-analysis. This stage of the study formed the foundation to inform subsequent considerations, both about the selection of the fisheries to be pre-assessed and the detail of those selected fisheries. This enabled a synopsis of each species based on published information and empirical data obtained primarily from MMO and the IFCAs.

» After initial scoping and analysis, fisheries were selected for further investigation and pre-assessment during stage 2 of the project using the following criteria:

  - Importance of the fishery based on volume and value of national and inshore landings (based on ICES rectangles that overlap IFCA districts) in 2010?
  - Whether part of the fishery already certified?
  - Whether the species is an important retained species in certain target fisheries?
  - Whether the fishery has been important during the past five consecutive years?
  - Whether the fishery is important to specific IFCAs?
  - Whether there is potential for future fisheries to be developed for this species?

» Stage One did not select fisheries based on the likely outcomes of an MSC assessment or even the availability of information to inform an assessment as this is only assessed during Stage 2. In terms of value, species with landings worth less than £100,000 were not selected, with the following exceptions:

  - The fishery is locally important (i.e. concentrated in only one or two areas);
  - The species is nationally important;
  - The species is an important retained species in other target fisheries; or
  - Landings of the species have had significant growth in recent years i.e. it is an emerging or important future fishery.

» By applying this rationale, a list of key commercial species for the English inshore sector was carried forward for pre-assessment during Stage 2 of Project Inshore.

A pre-assessment is not a full assessment

» Across the entire pre-assessment process the assessment team have met with a wide range of stakeholders, drawn on a large dataset of fisheries statistical information, and referred to a long reference list of relevant articles. In spite of this, the pre-assessment still does not go into the level of detailed and rigorous scrutiny, which is undertaken as part of a full assessment. For this reason, it cannot be guaranteed that every last issue in relation to all fisheries have been identified, or that the outcome of a full assessment process can be predicted with absolute accuracy. There may still be some unforeseen additional issues that arise once a fuller public consultation exercise is undertaken as part of any full assessment.

» In general the pre-assessment team has taken a precautionary approach to scoring, with borderline issues typically scored down. For this reason there may be some fisheries that under closer examination and more rigorous argumentation could achieve higher scores than indicated in this pre-assessment, but by contrast some other fisheries may, under closer examination, score below the levels described here.

» Above all, the pre-assessment gives an accurate picture of the relative position of English Inshore fisheries in relation to the MSC principles and criteria.

Stage 2 Pre-assessment Scoring

» Pre-assessment scoring during stage 2 of the project has been carried out against the Marine Stewardship Council (MSC) environmental standard for sustainable fishing. Details about the standard are contained within the stage 1 report, or are available on-line at http://www.msc.org/about-us/standards/standards/msc-environmental-standard

» Under each MSC principle are a series of components, and under each component are a series of Performance Indicators (PI). Within each PI a set of scoring issues are defined and the assessment team draw on available evidence and expert judgement to determine and justify where scoring issues are met by the fishery under pre-assessment.

» In Project Inshore, three shades of blue are used to indicate a state of readiness for MSC certification. Individual performance indicators must achieve a score above 60 for the fishery to achieve MSC certification. Then, the average score of all performance indicators, across each of the three principles – stock status, environmental impact and fishery management must be 80 or above.

» If, at full assessment, a fishery achieves a score of 60-80 (a light blue indicator) on a certain performance indicator, a condition would be placed as part of the certification of the fishery. This would result in a requirement to improve the performance (and therefore the performance indicator score) to one of best practice over the duration of the fishery certification.

» Although the project is called 'Project Inshore' in the approach to scoring it has been a challenge to exactly determine what is meant by 'inshore'. This report discusses in detail some of the issues of scale that influence scoring at an MSC full assessment. It is notable that:

  - Most stocks targeted by the inshore sector are also fished further offshore by larger vessels – so the impact all fishing activity must be considered for stock management purposes.
  - It is hard to classify 'inshore' vessels and there will always be discussion of the appropriate vessel size limits. However, many smaller vessels fish outside 6nm and many large vessels fish within 6nm. So a clear spatial distinction is also difficult.
  - When fish are landed into English coastal ports it is not recorded whether they were caught inside 6nm or outside 6nm and there is no restriction from fishing both sides of the 6nm boundary on the same trip. The closest approximation that can be made is by looking at landings information from the statistical recording rectangles which overlap with the inshore area.
  - For these reasons, the data informing this study typically relates to landings by English registered vessels into English ports.

Approach to scoring Principle 1

» Principle 1 considers the status and management of the whole stock, not just the fishery under assessment. Therefore even though English inshore fisheries may be expected to have a small or even negligible impact on widely distributed stocks, the assessment has to take all fishing mortality into account, to determine how well the overall stock is managed.

» Principle 1 considers both the current state of the target stock (i.e. whether it is depleted) and the effectiveness of the information, stock assessment and harvest strategy. Where stock status is not known (in some data deficient fisheries) the MSC standard also allows assessors to

undertake a risk based assessment framework, which considers stock productivity and susceptibility to capture (by all gears) to inform scoring of P1.

Results of Principle 1 Pre-assessment

» Seventy six stocks were identified within English territorial waters from landings data that are clearly shared with other countries and depend on ICES for the management advice. For scoring purposes these were divided according to the amount of information available to inform management decisions and the degree to which precautionary harvest strategies have been developed and implemented.

» Those fisheries that scored best were managed by means of a Long Term Management Plan based on good information. These fisheries have well-defined harvest control rules that take into account uncertainty and ensure that exploitation rate is reduced as the limit reference points are approached. Generally such well informed management has led to good stock status, so those fisheries which have good status as well as good management are likely to pass an MSC assessment (at least at Principle 1). These include: Herring (North Sea / Irish Sea), Saithe (North Sea & West of Scotland), Haddock (North Sea), Plaice (North Sea).

» Other stocks may have the requisite information and management frameworks, but stock status is not currently sufficient to meet the MSC requirement. An example of this is Cod (North Sea).

» There are twenty one fish stocks included under the ICES framework for management advice with inadequate information on the biology and the fisheries targeting these stocks. Stocks which lack sufficient information to guide management decision making can be scored using the MSC Risk based framework. In most cases where these stocks are commercially exploited the results of the RBF indicate high risk. This does not mean that those stocks are overexploited or depleted, but merely that the risk of over-exploitation is such that good management can only be assured if based on more fishery specific information.

» Eighty Non ICES assessed stocks were identified including most shellfish species exploited in English inshore waters. Shellfish species include; clams, cockles, mussels, scallops, oysters, whelks, periwinkles, lobsters, crabs, shrimps, squid, and cuttlefish.

» The majority of these non ICES assessed stocks have inadequate information to support the development of a harvest strategy and well defined harvest control rules. Stock assessment procedures are not developed and stock status is unknown. The application of the RBF methodology indicates that these fisheries pose medium or high risk to the productivity of the species vindicating the need for stock assessment.

Approach to scoring principle 2

» In assessing principle 2, the fisheries were grouped gear by gear. Fish species caught within each gear were considered either as retained or discarded and the impact of the gear type on habitats and ecosystem was evaluated.

» The scale of impact is based on the spatial scale all fishing effort by that gear on that stock. In most cases the scores currently presented in P2 therefore assume a wide distribution of effort by the gear type. As such, these might be expected to be worse case scenarios. Scores could potentially be improved by demonstrating a reduced localised footprint and impact (for example by IFCA byelaws) if it can be demonstrated that the scale of fishing effort is restricted to the jurisdictional scale and issues of chain of custody are addressed. Steps by the inshore fleet and inshore managers to manage and reduce impact within Inshore waters will be most benefitial where the UoC is demonstrably restricted to those waters.

» Principle 2 requires that the status of the particular fishery under assessment is scored against five different criteria (retained species, discard species, habitat impacts, impacts on Endangered,

Threatened and Protected species, and Ecosystem impacts). This is only possible with good fishery specific information on the fisheries and associated habitat and ecosystem.

» In the absence of fishery specific data, expert judgment, qualitative information and analogous information can be drawn upon, but only at a lower level of scoring. To achieve scores of 80 or over for many principle 2 performance indicators quantitative fishery specific data is required. It is therefore routine for pre-assessments to recommend that a fishery wishing to proceed to full assessment should undertake some independent and scientifically robust quantitative assessment of the fisheries ecosystem impacts. Fisheries which have supporting information based upon observer work which is able to detail catch profiles – including discard and ETP profiles - are therefore likely to score higher.

» More detailed information on catch profiles will also help determine what are considered 'main' retained and bycatch species. If a fishery is able to quantitatively demonstrate that is does not have any 'main' retained or bycatch species, then scores of 80 are automatically achieved for these performance indicators.

Results of Principle 2 Pre-assessment

» The nature of mixed fisheries in the English Inshore waters means that many fisheries have the potential to retain a number of other species. In the scoring exercise the status of all the other species likely to be retained by the same gear in the same area are used to inform the status of retained species for a given fishery. This highlights that there are a relatively small number of stocks which would lead to detrimental scoring (<60) when retained by a particular gear.

» By addressing all commercial species as potentially retained, only non-commercial bycatch species are treated as discards. The scoring indicates that no single non-commercial discard species is likely to cause a fishery to score at less than SG60 but that there are some species which could be vulnerable to certain gears and where there is a clear need for more information (in particular in relation to catch profiles) to support scoring at full assessment.

» The same applies in the case of Endangered, threatened and protected (ETP) species. It should also be noted however that the requirements for management are greater for ETP species than for other P2 criteria (requiring a 'strategy' rather than a 'partial strategy' at SG80) therefore any English fishery wishing to move forward with MSC certification would benefit by developing a fishery specific management policy for ETP species.

» For habitats and ecosystem, scores are generally lower for mobile demersal gears, such as trawl, beam trawl and dredges. There are scale issues which have a significant bearing on some of the gears under principle 2 (see section 2.2.3 of this report for an explanation of scale issues). The scoring is generally based on the impact of the full range of the gear, this often means that local inshore management measures are only credited where it can be shown that the fishery (and the definition of the UoC) is spatially restricted.

» Most mobile and impacting gears (beam trawl / dredge) have a harder time meeting the MSC standard with a greater need for information and effective (spatial) management.

» A less impacting gear fishing the same stock has a comparatively better chance of passing an MSC assessment.

» There is at least the potential for all fishing gears operating in English Inshore fisheries to pass MSC certification and in most cases examples of certified gear already exists somewhere. However for more impacting gears, the level of information and precautionary management required is likely to be considerably greater in order to demonstrate that management can ensure that impacts are not serious or irreversible. For these more impacting gears, such as dredges and demersal towed gear the low scores presented in this pre-assessment do not

necessarily present a definitive barrier to certification but they do indicate that further work appears to be required before they can confidently enter the full assessment process.

» Almost all gears will attract some conditions somewhere in P2. Those scoring well in one area often score poorly in another.

» Lack of information about particular interactions often leads to reduced scores. This is normal for P2 pre-assessments and can be corrected in preparation for full assessment.

Approach to scoring Principle 3

» The approach to scoring Principle 3 has been to consider the management frameworks that will influence scoring against the MSC principle 3 criteria. This is based on experience of previous assessments and an understanding of the influence of certain characteristics on scores.

» All fisheries being put through the assessment are categorized according to the management applied to those fisheries. This seeks to distinguish where (i) fishery specific management decisions are primarily taken at an EU (or even coastal states) level, where (ii) the lead in fishery specific management decisions appears to be taken by the national fisheries administration (i.e. DEFRA / MMO) or where (iii) fishery specific decisions are taken and applied at a more local (IFCA or Regulating Order grantee level)

» Where is unclear which level of management jurisdiction is the primary decision maker, this is reflected in the scoring.

Results of Principle 3 Pre-assessment

» There are relatively few difficulties identified in non-fisheries specific governance & policy. All legal frameworks and long term high level objectives are complaint with the requirements of the MSC standard.

» However, a possible non-fishery specific, or national level exception to this is due the lack of clarity in management roles where responsibility is shared. In particular for non pressure stocks, the division of responsibility for management between MMO / IFCA and the division of responsibility for delivering scientific support for managers between CEFAS / IFCAs

» Additionally, where inshore fisheries are perceived as 'open access' – i.e. where there is no restriction on boats coming into exploit a recovered resource - they scored more poorly in relation to 'incentives'.

» When looking at fishery specific management the results indicate that fisheries with established EU Long term Management plans or managed within a strong local framework which links management decisions to objectives, such as fisheries managed by Regulating Order score best. This echoes the findings of principle 1.

» For pressure stocks without long term management plans, for non-pressure, non-quota stocks or more 'inshore' stocks, the decision making processes and the fishery specific objectives which guide those objectives are often unclear.

» The current IFCA process of byelaw review is intended to more clearly link management actions to objectives / need, so could improve scores.

» Timeliness of adaptive management response may be slower where management flexibility is not built into byelaw.

» Some species are subject to little if any fisheries specific management and many have no consideration of stocks.

Summary of Overall Results & Findings

- The results of the pre-assessment stage of Project Inshore should be viewed in the context in which they were developed – with due regard for the earlier comments about "A pre-assessment is not a full assessment". Where a fishery is shown not to meet the requisite MSC pass mark, this does not necessarily mean that the fishery is unsustainable or that the resource is over exploited. In many cases there is simply insufficient information about the stock to determine its status, so the low scores simply reflect this uncertainty and indicate that management processes are not currently structured to allow informed and adaptive to ensure sustainable stock exploitation.
- Where perceived gaps in management occurs within IFCA waters, this does not mean that the IFCAs are failing to manage the stocks. This is not an evaluation of IFCA performance or an evaluation of the performance of one IFCA versus another. In almost all cases resolving the gaps in management will require a more multi-dimensional approach, recognising that fish cross jurisdictional boundaries.
- A significant initial challenge for the management for English Inshore resources (in particular for non pressure stocks) is the definition of stock boundaries, or functional management units. Once determined at a national level these will in turn inform the most appropriate jurisdictional scale at which to manage stocks. IFCA stock management priorities would then be expected to focus on the more local stocks which can appropriately be managed at that jurisdictional scale.
- Where stock boundaries are not clearly determined, it has the potential to lead to confusion in 'roles & responsibilities' in particular in relation to the lead authority for management decisions. Where stocks are considered more 'national' or cross boundary it may be expected that stock management science might be provided at a national level, but again there is potential for increased clarity over where responsibility for delivering science to managers lies.
- A further challenge for management of fisheries in English Inshore waters is the lack of accurate fisheries information – both of effort and landings – at a spatial scale appropriate to the management of the resource. Although this to some extent undermines scoring of the information performance indicators, it will likely prove to be of even greater critical importance when seeking to address the management weaknesses identified for some English Inshore fisheries. Many of the problems identified in this pre-assessment of English fisheries stems from this lack of information. In some instances (informing P2 and P3) this could be rectified relatively quickly. Other aspects such as stock information may require time-series data and therefore require a long-term plan to develop an information base before the MSC standard can be met.
- The stocks currently assessed as being best placed to move forward for MSC full assessment are generally EU pressure stocks, managed by means of a Long Term Management Plan (either EU or Coastal States).
- Of the resources managed at a more local or Inshore level, those where management is clearly devolved to a local level by means of a Regulating or Hybrid Order are most likely to meet the requirements for informed precautionary adaptive management.
- The majority of stocks assessed under Project Inshore are not currently expected to meet the MSC standard. The reasons for this vary from stock to stock but include:
    - Stock status known to be below a limit reference point (the point at which recruitment may be impaired).
    - Stock status unknown, but cumulative risk of fishing activities assessed to be high risk.
    - Insufficient harvest control rules, which clearly state how resource exploitation will be controlled in event of a indication of declining stock status.

» Where stocks have been shown to meet the MSC standard at principle 1, the fisheries are likely to meet the MSC standard when using less impacting gears – typically gears which are more selective with a lesser habitat impact. However, the perceived more impacting gears, may also be shown to pass for certain fisheries, however the requirements for good management (probably spatial) and good information of impacts is increased. Additionally where the local impact of such gears is already thought to be well managed, it must be shown that the fishery is spatially restricted in order for these local management measures to the main determinant of scores at full assessment.

Carrying forward to full MSC Assessment

» In total some around 50 UoCs have been highlighted as having short and medium term opportunities to move forward to full MSC assessment. In addition there is the potential for this number to be added to by presenting evidence to support the assessment of a wider range of gears. That suggests that for the majority of remaining English Inshore fisheries (some 400 species / gear combinations) considered in this pre-assessment would not be currently expected to meet the MSC standard and the implementation of management sufficient to demonstrate the sustainability required of an MSC assessment requires a more long term programme of work. This will be explored in more detail in Stage 3 of Project Inshore.

» In most cases the proposed UoC for full assessment should seek to be as big as possible – to include all fishing within a stock boundary using a specified gear. As such, in most cases IFCAs (or local fishery clients) which share a stock would benefit from pursuing MSC certification (or indeed pursuing management initiates) collectively. It is also worth noting that although different gears must be treated as different UoCs, these can be combined into a single assessment report – thus saving costs on site visits and surveillance. This is most common where different gears target the same stock (therefore mainly P2 scores will vary between UoCs).

» The only reason to restrict a proposed UoC for full certification to a single IFCA is therefore if management of a local stock is carried out at an IFCA level (P1) or management of fleet impacts within the IFCA jurisdiction would lead to substantially increased scores under P2 compared with the fleet activity beyond the IFCA boundary.

» In the excel summary matrix of results that has been produced as part of Stage 2 of Project Inshore, it is possible for IFCAs to see the other IFCAs that also have overlapping fisheries (stock & gear), in these cases it is likely to always be cost effective to increase the size of UoC to include all IFCAs.

Proposed Work for Stage 3 of Project Inshore

» Starting in June 2013 stage 3 of Project Inshore will focus on working with IFCAs to develop roadmaps towards sustainability for English inshore fisheries. This will highlight commonalities and potential efficiencies between regions, species and gears for the future management.

» This will include consideration of strategic approaches to management priorities, development of appropriate management tools and where necessary remedial work including, where appropriate, focused research.

» This will be informed by and guided by an understanding of those management actions that are within the IFCAs remit and power and with due regard for the other commitments and resource constraints that determine IFCA priorities. Where management actions are required, that are beyond the remit and power of the IFCAs these will also be clearly highlighted.

» Follow up and support from 2014 from MSC representative to use the findings as a roadmap towards sustainability and to attract develop business case for investment.

1 Introduction

Project Inshore is an ambitious initiative led by Seafish, Marine Stewardship Council (MSC) and Shellfish Association of Great Britain (SAGB) launched in June 2012 . The UK Fisheries Minister, Richard Benyon noted at the time that Project Inshore "…*should help to ensure that our inshore fleet can continue to flourish, that fish stocks are managed sustainably and our marine environment is given the protection it needs*". This project has carried out MSC pre-assessments for an extensive range of fisheries around the English coast. By the end of the project the results of these pre-assessments will go on to form the basis for Strategic Sustainability Reviews for English Inshore fisheries to provide a road map to guide future management decisions.

The funding for the project comes from a diverse range of sources notably the European Fisheries Fund (EFF), the Sustainable Fisheries Fund and industry (Seafish, UK retailers and processors). Other partners in the project include the Marine Stewardship Council, Shellfish Association of Great Britain and Seaweb's Seafood Choices.

The Sussex Inshore Fisheries and Conservation Authority (IFCA) (previously the Sussex Sea Fisheries Committee) piloted a multi species fishery methodology in 2010 with its 'Navigating the Future' Inshore Fisheries Sustainability Pilot (Dapling *et al*., 2010). Navigating the Future utilised the MSC pre-assessment criteria to evaluate the performance of 26 local inshore fisheries. Project Inshore carries this model forward on a nationwide scale for key commercial fisheries operating within the remaining IFCA districts.

Food Certification International Ltd (FCI) is undertaking Project Inshore. with an experienced MSC assessment team that includes experts from Hambrey Consulting, Marine Institute (Ireland), PAH Medley, MERC Environmental ltd, Nautilus Consultants, Poseidon and TD Southall.

1.1 Approach to Project Inshore

FCI's input into Project Inshore consists of three stages, progressing from a broad overview of English inshore fisheries to strategic targeted action as follows:

- **Stage 1**: Macro analysis and profiling of English inshore fisheries including:
  - Data collection/ information gathering phase.
  - Broad scale analysis of English fisheries.
  - Development of list of fisheries (species/gear combination) to progress to Stage 2 pre-assessment.
- **Stage 2**: **Pre-assessment of English fisheries** based on an aggregated/matrix approach for assessing each selected fishery (species / gear combination) in relation to the Marine Stewardship Council (MSC) standard. The key output of Stage 2 will provide a preliminary determination of how closely each performance indicator of each fishery meets the MSC standard.
- **Stage 3**: Development of bespoke Strategic Sustainability Reviews for each English Inshore Fisheries and Conservation Authority (IFCA). These assessments will facilitate English inshore fisheries moving towards a level judged sustainable by the MSC standard.

The output of stage 1 was delivered in October 2012 and is now publically available on-line from the Seafish website[1]. This report forms the output of Stage 2. Work on stage 3 is due to be completed by December 2013.

[1] http://www.seafish.org/media/publications/Project_Inshore_Stage_1_Report.pdf

1.2 Pre-assessment Scope

This pre-assessment began and has therefore been undertaken under the MSC certification requirements v1.2. However, a new version of the certification requirements was released in January 2013, during stage 2. Assessors were aware of changes in the updated version of the requirements and could therefore give consideration to any relevant changes.

This stage 2 of Project Inshore conducts MSC pre-assessments of English fisheries. As with any MSC pre-assessment, the report details the findings of these pre-assessments of English Inshore fisheries and in so doing:

- Reviews the fisheries in the context of the Marine Stewardship Council's Principles and Criteria for sustainable fishing;
- Defines possible Units of Certification (UoC) for the fisheries in terms of species, geographic area and gear used;
- Gives a recommendation as to which of the fisheries are likely to comply with the Marine Stewardship Council Principles and Criteria for "well managed fisheries";
- Recommends which units of certification (UoCs) could proceed to the full assessment stage with a reasonable prospect of achieving a successful outcome;
- Identifies the main issues likely to prevent a successful outcome for any fishery for which full assessment is not recommended at this stage (gap analysis).
- Highlights those areas where the fishery might be required to provide additional information and / or documentation, or where specific new development or research work may be required;

Although the overall purpose of this pre-assessment is similar to a standard MSC pre-assessment, the approach taken is slightly different. Primarily this is because most MSC pre-assessments are carried out on a single fishery, or at most a few connected Units of Certification (UoCs).

Project Inshore requires undertaking a simultaneous pre-assessment of many stocks and many gears across a range of management jurisdictions. This is more complex and requires a different approach which inevitably means that variations in the methodology are required. However, the advantages are considerable – not just in terms of cost saving, but most importantly in generating pre-assessment results that have more strategic value for fisheries managers in looking at where to focus effort. The approach has resulted in a variation to the MSC certification requirements for pre-assessment. A variation request was therefore made and submitted to MSC, and this was approved in July 2012.

FCI can confirm that all of the fisheries covered by this pre-assessment are within the permitted scope of the MSC program. During the pre-assessment process the assessors have not identified any fishery that is being conducted under a controversial unilateral exemption to an international agreement and that none of the pre-assessed fisheries use destructive fishing practices such as poisons or explosives. Such fisheries would automatically fail the MSC standard.

1.3 Data Sources

The data presented in the stage 1 report is primarily taken from national databases of fisheries information. In addition specific data requests were made to the IFCAs and MMO for further relevant information, such as surveillance data.

In stage 2 assessors are required to score 'status' as part of the pre-assessment process using the scientific literature. ICES is a key source of scientific information about many of the stocks fished by the English Inshore fleet. This enables scoring of status or impact to be based on available evidence. A full reference list of the additional information used to inform the pre-assessment scoring is contained in Appendix A. In general, scoring where evidence is lacking is typically precautionary and so the provision of increased amounts of evidence should lead to increases in scores.

Note: Pre-assessment is not full assessment.

Across the entire pre-assessment process the assessment team have met with a wide range of stakeholders, drawn on a large dataset of fisheries statistical information, and referred to a long reference list of relevant articles. In spite of this, the pre-assessment still does not go into the level of detailed and rigorous scrutiny, which is undertaken as part of a full assessment. For this reason, it cannot be guaranteed that every last issue in relation to all fisheries have been identified, or that the outcome of a full assessment process can be predicted with absolute accuracy. There may still be some unforeseen additional issues that arise once a fuller public consultation exercise is undertaken as part of any full assessment.

In general the pre-assessment team has taken a precautionary approach to scoring, with borderline issues typically scored down. For this reason there may be some fisheries that under closer examination and more rigorous argumentation could achieve higher scores than indicated in this pre-assessment, but by contrast some other fisheries may, under closer examination, score below the levels described here.

Above all, the pre-assessment gives an accurate picture of the *relative position* of English Inshore fisheries in relation to the MSC principles and criteria.

1.3.1 Data uncertainties and information constraints

It is not the function of an MSC pre-assessment to provide an empirically accurate account of a fishery. Indeed this is not necessary to inform the scoring exercise that is carried out. However, it is the role of the MSC pre-assessment process to review available information and make a determination as to the adequacy of that information for management purposes.

The stage 1 report highlighted a number of data inaccuracies. The site visit exercise at the start of stage II identified further inaccuracies in the data that is collected in relation to English Inshore Fisheries. This does not undermine the validity of the stage 1 process – indeed arguably it enhances it, by clearly demonstrating challenges for management in obtaining accurate data. It is not critical to have an accurate picture of landings to produce a correct pre-assessment (or even full assessment) conclusion. However the lack of accuracy should be reflected in the scoring of the 'information' performance indicators. In short, poor information does not impact on the quality of the pre-assessment findings, but it does reduce the relevant pre-assessment scores.

1.4 Report Layout

The report follows the typical MSC reporting structure, taking each principle, and within each principle, each criteria in turn. It may be useful to view this report in conjunction with the stage 1 report, which collates much of the background information on the fisheries considered in stage 2.

The report is presented in the following sections:

Section 1: Introduction (this section)

Section 2: Project Inshore pre-assessment methodology

Section 3: Scoping of P1 issues

Section 4: Scoping of P2 issues

Section 5: Scoping of P3 issues

Section 6: Summary of Project Inshore pre-assessment findings

Section 7: Recommendations for P1, P2 and P3 (Gap Analysis)

As highlighted in the next section, in relation to methodology, this stage of Project Inshore has also generated a scoring matrix where each performance indicator is scored for each fishery (stock / gear combination) and a short comment is provided against each score. This matrix is presented as a reporting output to Stage II of Project Inshore, and again it may be useful to view this report in conjunction with the excel summary matrix.

2 Project Inshore Pre-assessment Methodology

2.1 Stage 1

Stage 1 involved collecting and collating available fisheries data to profile the English Inshore fishing sector and enable some preliminary macro analysis. This stage of the study forms the foundation to inform subsequent considerations, both about the selection of the fisheries to be pre-assessed and the detail of those selected fisheries. This enabled a synopsis of each species based on published information and empirical data obtained primarily from MMO and the IFCAs.

After initial scoping and analysis, fisheries were selected for further investigation and pre-assessment using the following criteria:

- Importance of the fishery based on volume and value of national and inshore landings (based on ICES rectangles that overlap IFCA districts) in 2010?
- Whether part of the fishery already certified?
- Whether the species is an important retained species in certain target fisheries?
- Whether the fishery has been important during the past five consecutive years?
- Whether the fishery is important to specific IFCAs?
- Whether there is potential for future fisheries to be developed for this species?

Stage 1 has not selected fisheries based on the likely outcomes of an MSC assessment or even the availability of information to inform an assessment as this is only assessed during Stage 2. In terms of value, species with landings worth less than £100,000 were not selected, with the following exceptions:

- The fishery is locally important (i.e. concentrated in only one or two areas);
- The species is nationally important (and landed into English ports from non-inshore ICES rectangles);
- The species is an important retained species in other target fisheries; or
- Landings of the species have had significant growth in recent years i.e. it is an emerging or important future fishery.

At the conclusion of the Stage 1 work, a summary report was produced that provided an important reference document for the assessment team in stage 2. However, stage 1 should not be used either to provide an indication of the likely certification outcome, or as a definitive indicator of the scale of English Inshore fisheries – in particular by making inference from the value figures presented, which are likely to contain inaccuracies, as will be explored further in stage 2.

2.2 Stage 2

2.2.1 Site Visits

A site visit is not required for an MSC pre-assessment but it is invariably useful for the assessment team and has the added benefit of informing stakeholders on the assessment process.

During October and November 2012, members of the Project Inshore assessment team undertook site visits to all of the English IFCA regions. The regional teams had a spread of expertise across the 3 MSC principles. This provided an opportunity for the assessment team and stakeholders to review the information collated in stage 1 of the report and identify discrepancies between the statistical information available from national datasets and the situation on the ground.

A full list of the stakeholders that the assessment team met with as part of the Project Inshore pre-assessment site visit is contained in Appendix B.

2.2.2 Scoring

All members of the assessment team met in Edinburgh from the 21st – 25th January 2013 to undertake scoring of the fisheries selected for pre-assessment. There were three break out groups; one for each principle. This enabled the usual scrutiny of teamwork (which is a characteristic requirement of full MSC scoring exercises) but without the time restriction of having to address each principle in turn. To maintain cross-principle rigour and consistency of approach, results were presented in plenary sessions at the end of each day.

The pre-assessment team discussed in detail, drawing on experience, research and available statistical data, to deduce a score. The key resource for principle 1 for most stocks was ICES assessment advice. For species lacking an ICES assessment (or where that assessment was highly uncertain), a separate risk based analysis was undertaken. The Risk Based Framework (RBF) was developed for use in the MSC standard where information was insufficient to guide scoring. More detail on the RBF is available on the MSC website. How and where the RBF was used in this pre-assessment under principle 1 is detailed in Appendix D.

In assessing principle 2, the fisheries were grouped gear by gear. Fish species within each gear were considered either as retained or discarded and the impact of the gear type on habitats and ecosystem was evaluated. For principle 3 the assessment was undertaken on fleet sector management groupings (see section 5 for further explanation).

The principle scores for each of the over 400 UoCs considered were then compiled into a single matrix to review overall performance of each unit of certification. For each UoC the pre-assessment provides indicative scores against each MSC performance indicator:

Colour Code	MSC score	Description
V. Light Blue	< 60	**Not meeting the minimum MSC standard**, therefore preventing the fishery from certification until the issue is resolved.
Light Blue	60 – 80	**Within the minimum MSC standard**, but below "good practice", therefore triggering a binding condition at the time of full assessment.
Blue	> 80	**Meeting or exceeding "good practice"**; the level required for unconditional MSC certification.

Scoring is not to the same level of detail or rigour as a full assessment. For example, it may not stated which scoring issues within a given performance indicator have been met or not met (although in many cases if a single scoring issue is the main hurdle to certification this will be referred to), meaning that a precise score has not been determined.

The scores generated were recorded in an excel spreadsheet, recording both the score (v. light blue, light blue or blue) and also a brief comment as to the main reasons for that score for each performance indicator. The spreadsheet also contains a summary where the scores for the stock (principle 1) are combined with the scores for the gear (principle 2) and the scores for the management regime (principle 3) to produce a single row of scores for each fishery (UoC). A simple calculation was used to determine the overall likely score at principle level (essentially an average calculation but with weightings as those used in a full assessment, and with an over-ride meaning that if a single performance indicator was scored below 60, then the principle average would automatically be below 60, again reflecting the MSC scoring requirements). Finally a single score was produced to provide an indication of readiness for full MSC assessment for every UoC (stock / gear combination), taking the combined outputs of all 3 principles.

This excel spreadsheet is available as a reporting output of Project Inshore Stage II. In addition, a summary version of this spreadsheet has been made available to each IFCA containing just the UoCs within their district – but also highlighting the other IFCAs that have overlapping UoCs, to highlight the potential for strategic approaches to management (and full MSC assessment).

2.2.3 Determining the scale of a fishery

In approaching scoring, there are a number of issues of scale which influence the definition of the UoC for full assessment. These in turn influence how scores are determined across the 3 principles and how any gaps identified during the scoring exercise should be strategically addressed. A brief explanation of these scale issues is provided below. There are 3 main factors that relate to the scale of a 'fishery' as defined in an MSC assessment.

1. **The biological scale of the resource**. This is the stock boundary (either as defined by science or as determined according to a practical management unit). In scoring principle 1 of an MSC assessment the management of all fisheries mortality on that stock, by all gears over the entire stock range must be considered. From the perspective of the IFCA or, more generally of inshore fisheries, this means that if a stock is more widely distributed than their own inshore jurisdiction, the management of the stock beyond their boundary will inform the principle 1 assessment scores.

2. **The spatial scale of fishing effort**. This is the scale of the activity of the boats & gear types which are included in the assessment. In scoring principle 2 of an MSC assessment, it is the distribution and impact of fishing activity of the fleet under certification that will determine the P2 scores. From the perspective of the IFCA or, more generally of inshore fisheries, this means that there is potential for an IFCA or a tightly defined fleet to demonstrate a more minimal or better managed ecosystem impact in the area over which they have jurisdiction and so support improved P2 assessment scores. However, fishing by the same fleet beyond the jurisdiction of the IFCA may not enjoy the same boost in scores from IFCA led management. *However, it should be remembered that if a fisheries Unit of Certification is to be defined as vessels only fishing within the 6nm jurisdiction of the IFCA, then it must be demonstrated from a Chain of Custody point of view that fish caught beyond 6nm, will not be sold with fish from within 6nm*.

3. **The jurisdictional scale of management**. This is the limit of authority of the fishery management. The processes and structures of this management authority will be key factors of influence in the scoring of the fishery specific elements of principle 3 of an MSC assessment. Any management measures taken at a smaller spatial scale – such as IFCA initiatives - would only be credited where it is first demonstrated that the fishery as defined by the Unit of Certification (either in biological scale of the resource or spatial scale of fishing effort) is restricted to that jurisdiction.

In a simple fishery, the scale of 1, 2 & 3 above would overlap. And in many of the previously certified MSC fisheries this is largely speaking the case, but for inshore fisheries the situation is often more complex. There are therefore some fisheries and some elements of MSC scoring that IFCAs have a greater influence over than others and by understanding this, the strategic sustainability review of stage 3 of Project Inshore can be more efficiently focused. For example:

- IFCAs are best placed to influence the scoring of principle 1 when the biological scale of the stock is at a similar (or smaller) spatial scale to the jurisdictional scale of management. Indeed IFCA actions are likely to be the primary determinant of P1 management success in these cases. In these tightly restricted fisheries IFCA management actions will also be the key determinant of P2 and P3 scores.
- Inshore Fisheries can also benefit from a well managed stock with a larger biological scale, where management is carried out by a management authority with a larger jurisdictional scale (i.e. EU) in the scoring of Principle 1. An example of this would be a pressure finfish stock, restricted by TAC and managed in accordance with a long term management plan.
- However, in order to gain any P2 benefit for fisheries on a more widely distributed stock and boost scores in relation to the ecosystem impact of the fleet under assessment it would need to be demonstrated that the spatial scale of fishing effort was less than the biological scale of the resource and overlapped with the jurisdictional scale of management.
- Inshore fisheries (and IFCAs) are comparatively powerless to influence the P1 scores of more widely distributed stocks which do not have good management in place. Even efforts to increase P2 scores by demonstrating a reduced localised impact of the fleet under assessment will not change the scores for P1.

In scoring the MSC pre-assessment during stage 2 of Project Inshore the following approaches have been taken to issues of scale:

1. For principle 1 the scale used for scoring is the biological scale of the overall stock and all fishing mortality (by all gears – not just the gear defined in the UoC) on that stock.
2. For principle 2 the scale is based on the spatial scale all fishing effort by that gear on that stock. In most cases the scores currently presented in P2 therefore assume a wide distribution of effort by the gear type. As such, these might be expected to be worse case scenarios. Scores could potentially be improved by demonstrating a reduced localised footprint and impact (for example by IFCA byelaws) if it can be demonstrated that the scale of fishing effort is restricted to the jurisdictional scale and issues of chain of custody are addressed. Steps by the inshore fleet and inshore managers to manage and reduce impact within Inshore waters will be most benefitial where the UoC is demonstrably restricted to those waters.
3. For principle 3 the scale used is the jurisdiction scale of all relevant tiers of management (EU, National, Inshore) and the relationship between these and the biological scale of the stock.

3 Scoping of P1 issues

The generic structure for the Principle 1 performance indicators (PIs) focuses on two key aspects of a fishery's performance:

1. Outcomes: The current status of the target stock resource; and
2. Harvest Strategy (Management): A precautionary and effective harvest strategy.

Outcome related PIs consider the impact of the fishery on the target species, and particularly whether the species/stock is at sustainable levels.

Harvest Strategy (Management) related PIs look at whether a management strategy is in place to ensure that harvest of the target species is maintained within sustainable levels. PIs under *Management* in Principle 1 consider the measures control rules and tools that are being used specifically to manage the impact of the fishery on the target species.

3.1 Approach to scoring Principle 1

Note: Principle 1 considers the status and management of the whole stock, not just the fishery under assessment. Therefore even though English inshore fisheries may be expected to have a small or even negligible impact on widely distributed stocks, the assessment has to take all fishing mortality into account.

In MSC assessments, defining the stock unit is the first step to be undertaken under Principle 1. A fish stock is variously defined as:

- "arbitrary groups of fish, large enough to be essentially self-reproducing, with members of each group having similar life history characteristics" (Hilborn and Walters, 1992).
- 'a group within a species population which have sufficient spatial and temporal integrity to warrant consideration as self perpetuating units' (Pawson 1995).
- 'a semi-discrete group of fish with some definable attributes which are of interest to fishery managers' (Begg & Waldman, 1999)

The biogeographical definition of a fish stock is not always clear and is rarely the genetically distinct population that exists in theoretical fisheries management and in almost all cases there is likely to be some degree of mixing between populations.

Definitive proof of stock discreteness would require studies such as tagging and genetic analysis. However the results may still prove inconclusive and in many other cases the cost of the research on an individual fishery may not be justified. For this reason proof of genetic discreetness is not a requirement for MSC assessment – or good management. If guided by international law and the adoption of the precautionary approach in a data-poor situation, then the lack of definitive stock definition should not be a barrier to the adoption of precautionary management actions. Better therefore to recognise that fish stock definition is an imprecise science, and make use of the best available data to establish reasonable working hypotheses for stock assessment purposes.

For a number of species that are managed based on ICES advice, stock units are already defined; ICES subdivisions or a combination of subdivisions are used to define stock boundaries. However there are also species for which ICES does not provide stock unit boundaries. For those species, stock units were defined to strike a balance between available scientific information on stock structure and a pragmatic approach to draw stock boundaries for management purposes as described in the following section.

3.1.1 Stock structure vs. pragmatic approach to draw stock boundaries

Management is more likely to be successful if the stock boundaries or structure are correctly identified. If managers know the 'domain' over which they should be managing exploitation, then appropriate governance arrangements can be established, which may involve joint arrangements with neighboring IFCAs or MMO or wider still with the RACs or EU. Secondly knowledge of the stock structure is obviously important in identifying potential units of MSC certification.

Techniques include surveys of distribution, genetics, tagging, oceanographic and larval dispersal modeling. For many specieis there is very little data or information on stock structure in English inshore waters, but certain inferences can be made based on the distribution, biology, life cycle and behavior of the species. The eventual determination on stock boundaries is often a compromise; the scientific data can give clues on the likely stock structure, but managers will need to take a pragmatic decision to draw the borders as best fit to the scientific information.

ICES have already taken pragmatic decisions in identifying stocks for the purposes of assessment. Stocks are assessed by ICES sub-division or combination of sub-division.

In the case of shellfish many stocks are local and isolated (from other stocks). Such stocks would probably include clams, cockles and oysters. These species have particular substrate requirements and occur in estuarine or intertidal areas where the recruitment process may be closed or with limited capacity for dispersal.

Scallop and razor clams beds distributed offshore are likely to be connected by larval dispersal so although there may be separate adult populations of these species they are partially or totally connected to other beds through the larval dispersal phase. In that case recruitment to individual beds will be difficult to manage but once recruitment to the bed occurs then the adult biomass can be managed.

Crustaceans such as lobsters and crabs have pelagic larvae and in addition migrate along the coast or to and from the coast to varying degrees. Individual stocks are unlikely to occur within IFCA areas and are more likely to be regionally structured; Irish Sea, Channel, Southern, North Sea etc.

3.1.2 Scoping P1 Issues

The pre-assessment distinguishes between *ICES assessed stocks* and *Non ICES assessed stocks*. ICES assessed stocks are clearly shared with other countries with ICES providing management advice. Non-ICES assessed stocks include most shellfish species exploited in English inshore waters.

One of the primary factors affecting whether fish or shellfish stocks meet MSC certification requirements is the information available. This not only affects the advice that can be given for these stocks, but is also a strong indicator of whether any effective management system is in place to conserve them. While stocks generally do not fall into clear groupings, many do have common problems, which if addressed together, might be dealt with efficiently.

3.2 ICES assessed stocks

Seventy six stocks were identified within English territorial waters from landings data that are clearly shared with other countries and depend on ICES for the management advice. This section is structured according to the level of information and management available for the stocks under consideration.

3.2.1 Stocks with Inadequate Information

There are twenty one fish stocks included under the ICES framework for management advice with inadequate information on the biology and the fisheries targeting these stocks. Pre-assessment scores and the main gaps identified for each of these stocks are shown in (Table 3.2.1).

Stock assessment procedures are not developed for any of these stocks and stock status is unknown. The RBF methodology was therefore applied and indicates that these fisheries pose a high risk on the productivity of the species vindicating the need for stock assessment, unless the risk score is decrease through the implementation of a precautionary harvest strategy (see section 3.4).

Problems associated with all Principle 1 performance indicators may be difficult to solve in the short term. Developing harvest strategies requires obtaining relevant information to design the harvest strategy. Time series data are particularly important for determining stock status and it may take a considerable time to build a sufficiently long series.

In most cases landings are recorded. For gurnards, species are not differentiated as it is only recently that landings have been recorded by species. For some species discarding has been significant and therefore catches, which are required for stock assessment, may not be well estimated. In every case, there is significant doubt about an adequate index of abundance, which is required in the PI 1.2.3.

The lack of data suggests no proper harvest strategy and a well-defined harvest control rule is lacking. In most cases it might be argued that management would take action if overfishing was discovered, and therefore the harvest control rule is “generally understood”. However, this has not been the case for halibut and in no case are there tools to reduce harvest. Exceptions are North Sea and Channel (IV+IIIa VIId/e) Brill, North Sea (IV+IIIa) Turbot and Channel (VII d/e) Turbot. In those three cases a TAC exists, which could be applied to reduce catches, and therefore it might be argued that the SG60 is met.

Table 3.2.1. Stocks lacking data and information on which to base a harvest strategy or to determine stock status.

SS= Stock Status; RP= Reference Points; SR= Stock Rebuilding; HS= Harvest Strategy; HCR= Harvest Control Rule; INF= Information/Monitoring; ASS= Assessment of Stock Status.

Species	Stock Area	SS	RP	SR	HS	HCR	INF	ASS	Main Gaps
Flounder	Irish Sea (VII a/f)	<60 (RBF)	80 (RBF)	NA	<60	<60	<60	80 (RBF)	There is inadequate information, no apparent harvest strategy and the stock status is unknown. The application of the Risk Based Framework indicates fisheries posing a high risk on the productivity of the species.
Flounder	Channel (VII d/e)	<60 (RBF)	80 (RBF)	NA	<60	<60	<60	80 (RBF)	
Turbot	Irish Sea (VIIa)	<60 (RBF)	80 (RBF)	NA	<60	<60	<60	80 (RBF)	
Witch	Irish Sea (VIIa)	<60 (RBF)	80 (RBF)	NA	<60	<60	<60	80 (RBF)	
Witch	Western approaches (VII f/e)	<60 (RBF)	80 (RBF)	NA	<60	<60	<60	80 (RBF)	
Black Seabream	North Sea and Channel (IV VII d/e)	<60 (RBF)	80 (RBF)	NA	<60	<60	<60	80 (RBF)	
Red Gurnard	Western (VIId–k)	<60 (RBF)	80 (RBF)	NA	<60	<60	<60	80 (RBF)	
Other Gurnards	NE Atlantic	<60 (RBF)	80 (RBF)	NA	<60	<60	<60	80 (RBF)	
Grey mullet	Channel and North Sea (IV VII d-f)	<60 (RBF)	80 (RBF)	NA	<60	<60	<60	80 (RBF)	
Pouting	Undefined	<60 (RBF)	80 (RBF)	NA	<60	<60	<60	80 (RBF)	
Blonde ray	North Sea and Channel (IVa VII d/e)	<60 (RBF)	80 (RBF)	NA	<60	<60	<60	80 (RBF)	
Blonde ray	Irish and Celtic Sea (VII a/f/g)	<60 (RBF)	80 (RBF)	NA	<60	<60	<60	80 (RBF)	
Small-eyed ray	Channel (VII d/e)	<60 (RBF)	80 (RBF)	NA	<60	<60	<60	80 (RBF)	
Halibut	North Atlantic	<60 (RBF)	80 (RBF)	NA	<60	<60	<60	80 (RBF)	No harvest strategy is reported for this stock There is no HCR and no tools to implement an HCR.

									The application of the Risk Based Framework indicates fisheries posing a high risk on the productivity of the species. Furthermore a qualitative assessment indicates that the stock is also suspected of being severely overfished and no rebuilding plan is in place.
Grey Gurnard	North Sea and Eastern Channel (IV IIIa VIId)	<60 (RBF)	80 (RBF)	NA	60-80	<60	<60	80 (RBF)	The strategy is to reduce catches, which can be achieved. But the basis for this, with inadequate data, is unsound. There is no evidence of the implementation of a harvest control rule and the use of any tool to control exploitation rates. The application of the Risk Based Framework indicates fisheries posing a high risk on the productivity of the species.
Grey Gurnard	Celtic Sea and West of Scotland (VI VII a-c, e-k)	<60 (RBF)	80 (RBF)	NA	60-80	<60	<60	80 (RBF)	
Red mullet	Celtic Sea and Western Channel (VII e-g)	<60 (RBF)	80 (RBF)	NA	<60	<60	<60	80 (RBF)	The harvest strategy is ill-defined. There is no harvest control rule and tools to control exploitation rates. Currently no TAC has been set for this species, and preliminary data on stock identity suggest the presence of more than one stock in the ICES area. Although available information suggests that the stocks are above the point where recruitment would be impaired, the stock is not analytically assessed. The application of the Risk Based Framework indicates fisheries posing a high risk on the productivity of the species.
Smoothh ound	NE Atlantic	<60 (RBF)	80 (RBF)	NA	<60	<60	<60	80 (RBF)	
Turbot	Channel (VII d/e)	<60 (RBF)	80 (RBF)	NA	<60	<60	<60	80 (RBF)	No explicit harvest strategy in place. There is no harvest control rule and tools to control exploitation rates. An assessment of turbot in the Channel was undertaken some time ago, but due to data problems, this is now considered inadequate. The application of the Risk Based Framework indicates fisheries posing a high risk on the productivity of the species.
Brill	North Sea and Channel (IV+IIIa VIId/e)	<60 (RBF)	80 (RBF)	NA	60-80	60-80	<60	80 (RBF)	These brill and turbot stocks are managed jointly. A harvest control rule does exist, of sorts, and a TAC exists to reduce catches if required. However, there is inadequate information to evaluate whether the current control is sufficient. The application of the Risk Based Framework indicates fisheries posing a high risk on the productivity of the species.
Turbot	North Sea (IV+IIIa)	<60 (RBF)	80 (RBF)	NA	60-80	60-80	<60	80 (RBF)	

3.2.2 Stocks with Some Information but no precautionary Harvest Strategy

Table 3.2.2 shows the scores and main gaps for ICES assessed stocks that have some information, but no precautionary harvest strategy. There is relevant information related to stock structure, stock productivity and fleet composition to support the development of a harvest strategy. Stock abundance and fishery removals are monitored and at least one indicator is available and monitored with sufficient frequency to support the development of a harvest control rule. However there are no harvest control rules and tools developed for any of these stocks.

Stock status is unknown for all these stocks with the exception of Haddock and Whiting in the Irish Sea. The RBF methodology has therefore been applied and indicates that fisheries pose a high risk on the productivity of the species vindicating the need for stock assessment, unless the risk score is decrease through the implementation of a precautionary harvest strategy (see section 3.4). The outcome of the RBF for the anchovy fishery, however, indicated that the fishery was likely to be low to medium risk. Some of the attributes that prevented a conclusion of high risk included the short the high productivity and dispersive nature of the stock and the low to medium intensity of activity.

An assessment has been carried out for Irish Sea (VIIa) Haddock based on a new approach used by ICES for data limited stocks. This adjusts catches in response to trends in the abundance index. While the approach appears reasonable, it does not fit easily within the MSC framework, but can be interpreted as meeting the requirements under the *assessment of stock status PI* and based on *Reference Points*. In this case, however, the problems with the data (discarding) undermined the reliability of this assessment approach.

The state of the whiting stock is uncertain, although available information suggests that the stock is currently at a low level and likely to be well below B_{LIM}. Landings have been declining since the early 1980s, reaching their lowest levels in the 2000s. The survey results indicate a decline in relative SSB. Total mortality has been variable over the time series. Current fishing mortality is likely to be above possible MSY targets.

The harvest strategy for the ray species should include more technical measures based on the considerable knowledge that exists on their ecology. Spatial, seasonal, and technical measures can be used to improve stock status and regulate fishing mortality because rays have defined spatially discrete life history stages and stock–recruitment relationships.

Table 3.2.2. ICES assessed stocks with some information but no precautionary Harvest Strategy. SS= Stock Status; RP= Reference Points; SR= Stock Rebuilding; HS= Harvest Strategy; HCR= Harvest Control Rule; INF= Information/Monitoring; ASS= Assessment of Stock Status.

Species	Area	SS	RP	SR	HS	HCR	INF	ASS	Main Gaps
Dab	Western (II, V, VI, VII (excl. d), VIII, IX, X, XII, XIV)	<60 (RBF)	80 (RBF)	NA	<60	<60	60-80	80 (RBF)	Stock status has not been determined and the harvest strategy has not been defined, so there is no HCR, reference points or stock assessment. The application of the Risk Based Framework indicates fisheries posing a high risk on the productivity of the species.
Dab	Channel (VII d)	<60 (RBF)	80 (RBF)	NA	<60	<60	60-80	80 (RBF)	
Cuckoo ray	Irish and Celtic Sea (VII a/f/g)	<60 (RBF)	80 (RBF)	NA	<60	<60	60-80	80 (RBF)	
Small-eyed ray	Celtic Sea (VII f/g)	<60 (RBF)	80 (RBF)	NA	<60	<60	60-80	80 (RBF)	
Bass	NE Atlantic	<60 (RBF)	80 (RBF)	NA	60-80	<60	60-80	80 (RBF)	There is a partial harvest strategy consisting of appropriate technical measures, but no way to adjust the harvest if required or effective monitoring of the stock.
Pollack	North Sea (IV IIIa)	<60 (RBF)	80 (RBF)	NA	60-80	<60	60-80	80 (RBF)	The application of the Risk Based Framework indicates fisheries posing a high risk on the productivity of the species.
Haddock	Irish Sea (VIIa)	<60	<60	NA	60-80	<60	60-80	60-80	There is a partial harvest strategy consisting of appropriate technical measures, but no way to adjust the harvest if required. There is however a stock assessment suitable for data limited stocks, but may not be appropriate in this case because of discarding.
Whiting	Irish Sea (VIIa)	<60	<60	<60	<60	<60	60-80	<60	Whiting is suspected of being overfished and, with no effective harvest strategy, is not rebuilding.
Anchovy	Southwest	60-80 (RBF)	80 (RBF)	NA	60-80	<60	60-80	80 (RBF)	There are no harvest control rules and tools implemented. Although adequate relevant information, including all catches, is available to support a harvest strategy, it is not clear at this stage that there is an indicator available to support a harvest control rule.
John dory	Western Approaches (VIIe-j VIII a,b)	<60 (RBF)	80 (RBF)		60-80	<60	60-80	80 (RBF)	No explicit harvest strategy (HCR or stock assessment) is reported for these stocks and there is no evidence of an effective strategy. The available data are limited in terms of time series as well as other data to support the development of a harvest strategy. Available indicators imply it is unlikely that recruitment is currently impaired. However, there are no stock assessment or reference points. The application of the RBF determined that fishing poses a high risk on the productivity of these species.
Lemon sole	Western and Channel (VII a/f/e)	<60 (RBF)	80 (RBF)		60-80	<60	60-80	80 (RBF)	
Pollack	Celtic Sea and West of Scotland (VI VII a-c, e-k)	<60 (RBF)	80 (RBF)		60-80	<60	60-80	80 (RBF)	There is a partial harvest strategy for Pollack, and specifically the HCR may not be able to reduce harvest sufficiently. Pollack is mainly caught recreationally, and data from this fishery are incomplete as well as limiting the effectiveness of management measures. Available indicators imply it is unlikely that recruitment is currently impaired. However, there

									are no stock assessment or reference points. The application of the RBF determined that fishing poses a high risk on the productivity of these species.
Cuckoo ray	North Sea and Channel (IVa IIIa VIId)	<60 (RBF)	80 (RBF)		60-80	<60	60-80	80 (RBF)	There is insufficient information on rays to evaluate status fully, but the indicators imply stock status has improved in recent years and therefore it is unlikely that recruitment is currently impaired. Rays are discarded and so catches are not well recorded. Available indicators imply it is unlikely that recruitment is currently impaired. However, there are no stock assessment or reference points. The application of the RBF determined that fishing poses a high risk on the productivity of these species.
Spotted ray	North Sea and Eastern Channel (IV VIId)	<60 (RBF)	80 (RBF)		60-80	<60	60-80	80 (RBF)	
Spotted ray	Irish and Celtic Sea (VII a/f/g)	<60 (RBF)	80 (RBF)		60-80	<60	60-80	80 (RBF)	
Thornback ray	North Sea and Channel (IVa IIIa VII d/e)	<60 (RBF)	80 (RBF)		60-80	<60	60-80	80 (RBF)	
Thornback ray	Irish and Celtic Sea (VII a/f/g)	<60 (RBF)	80 (RBF)		60-80	<60	60-80	80 (RBF)	

3.2.3 Stocks with Some Information and a partial Harvest Strategy

Table 3.2.3 shows scores and main gaps for ICES assessed stocks with some information related to stock structure, stock productivity and fleet composition and a partial harvest strategy in place.

Stocks of flounder, monkfish, lemon sole, witch, sprats and pilchard are not assessed, reference points are not defined and stock status is not known quantitatively. The application of the RBF methodology indicates that these fisheries pose a high risk on the productivity of flounder, monkfish, lemon sole, and witch. A medium risk was estimated for sprats and pilchard fisheries due to the high productivity and dispersive nature of these stocks and the medium intensity of activity. Unless a precautionary harvest strategy is developed to reduce the risk that fishing poses on sprats and pilchard species stock assessment procedures would need to be implemented to estimate stock status in relation to biologically estimated reference points.

There is relevant information related to stock structure, stock productivity and fleet composition to support the development of a harvest strategy. 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. However, in general, available information is not of sufficient quality to support a full harvest strategy, but key information is present in all cases to develop an appropriate precautionary strategy. What data are missing or of poor quality varies in each case, but includes unrecorded discards, misreporting and insufficient catch sampling. Whether the harvest strategy is robust to these issues has not been demonstrated.

Harvest control rules exist in each case, but with exception of Eastern Channel (VIId) Plaice and Celtic Sea and West of Scotland (VIIb–k and VIIIa,b,d) Megrim, the Harvest Control Rule is not well defined or has not been shown to be robust to uncertainties. The Eastern Channel (VIId) Plaice and the Celtic Sea and West of Scotland (VIIb–k and VIIIa,b,d) Megrim HCR is based on a good quality biomass index used for data limited stocks. The HCR appears justified in this case where problems can be attributed to the data quality rather than robustness of the rule.

In the case of western horse mackerel and NEA mackerel the elements of the harvest strategy are not working together. Horse mackerel spawning stock biomass is decreasing and fishing mortality is increasing and if this trend continues the stock will be overfished (i.e. $F > F_{MSY}$). Therefore there is no evidence at present that the harvest strategy is achieving its objectives.

Countries exploiting the shared NEA mackerel stock are not working together in the implementation of the harvest control rule. This has caused the suspension of a number of MSC certificates. The lack of co-operation in implementing the strategy between countries exploiting this stock determines that the harvest strategy is not likely to work based on undergoing disputes in the allocation of TACs.

Cornwall Sardine fishery is already MSC certified and conditions for certification include the implementation of precautionary management rules. Any new fishery would be expected to join the action plan implemented by the Cornwall sardine fishery. There are requirements for implementing a harvest strategy and control rules which are responsive and reactive to the state of the stock and can reduce the exploitation rate before there is an appreciable risk of impairing reproductive capacity. Given the requirement to harmonise, other sardine fisheries could be expected to pass Principle 1 as long as they adhere to the same or better harvest strategies.

Horse mackerel, sprats, and pilchards are listed as a mandatory key low trophic species (see Box CB1 CR AnnexCB in v1.3 of the MSC Certification Requirements) unless evidence is available otherwise. Reference points that take the ecological role of the stock into account are required for these species.

Table 3.2.3. Stocks with Some Information and a partial Harvest Strategy. SS= Stock Status; RP= Reference Points; SR= Stock Rebuilding; HS= Harvest Strategy; HCR= Harvest Control Rule; INF= Information/Monitoring; ASS= Assessment of Stock Status.

Species	Stock Area	SS	RP	SR	HS	HCR	INF	ASS	Main Gaps
Plaice	Celtic Sea (VII f/g)	<60	60-80	<60	60-80	60-80	60-80	60-80	Both stocks are overexploited and below possible limit reference points. While the plaice harvest strategy appears not to be succeeding, the cod harvest strategy appears to be rebuilding the stock. Catch data quality are reduced primarily by discarding and misreporting.
Cod	Irish Sea (VIIa)	<60	80-100	60-80	80-100	60-80	60-80	80-100	
Flounder	North Sea (IV+IIIa)	<60 (RBF)	80 (RBF)	NA	60-80	60-80	60-80	80 (RBF)	There has been no stock assessment and the harvest strategy has not been well defined. The application of the RBF determined that fishing poses a high risk on the productivity of these species. Stock assessment, clear reference points and a well-defined HCR are required for this stock, which should result from a stock assessment.
Monkfish / Angler	North Sea (IV IIIa VI)	<60 (RBF)	80 (RBF)	NA	60-80	60-80	60-80	80 (RBF)	The data uncertainty is due to discarding, which also undermines the well-defined harvest control rule because the tool, a catch limit, used to implement the rule may not be effective. The application of the RBF determined that fishing poses a high risk on the productivity of these species. Stock assessment and reference points are required.
Lemon sole	North Sea and Eastern Channel (IV IIIa VIId)	<60 (RBF)	80 (RBF)	NA	60-80	60-80	60-80	80 (RBF)	In ICES Areas IIa and IV, a combined annual TAC is set for lemon sole and witch. There is a lack of a clear harvest strategy which is responsive to the state of these stocks and the HCR is only generally understood. It is not clear that data are sufficient for a harvest strategy and no stock assessment has been carried out.
Witch	North Sea (IV IIIa VIId)	<60 (RBF)	80 (RBF)	NA	60-80	60-80	60-80	80 (RBF)	The application of the RBF determined that fishing poses a high risk on the productivity of these species. Stock assessment and reference points are required
Whiting	Western (VIIe–k)	80-100	80-100	NA	80-100	60-80	60-80	80-100	The harvest strategy is incomplete. The HCR lacks a plan for stock recovery should biomass decline. Discarding is a significant uncertainty in the data. A stock assessment has been completed and the stock appears in good condition.
Plaice	Eastern Channel (VIId)	60-80	60-80	80-100	60-80	80-100	60-80	80-100	The stock is below target levels but there is a well-defined HCR for rebuilding. The main problem with the data is incomplete discard estimates and uncertain stock structure.
Megrim	Celtic Sea and West of Scotland (VIIb–k and VIIIa,b,d)	60-80	60-80	NA	60-80	80-100	60-80	80-100	While suitable data exist, it is of too poor quality to allow the state of the stock to be determined. The harvest strategy lacks clear objectives and is not adequately responsive to evaluations of fishery performance.
Horse Mackarel	Western Stock	80-100	60-80	NA	60-80	60-80	60-80	80-100	Horse mackarel (Scombers) is listed as a mandatory key low trophic species (see Box CB1 CR Annex CB v1.3) unless evidence is available otherwise. The definition of the target reference point does not take into account the ecological role of the stock The elements of the harvest strategy are not working together. SSB is decreasing and F is

									increasing and if this trend continues the stock will be overfished (F > FMSY). One of the intentions of the HCR was to limit variation in TAC by applying an artificial cap on the level of change. This part of the HCR has been overridden both while the stock has declined through the addition of a clause to the rule, and more recently when it has prevented TAC recovering. The biological sampling need to improve. The only fishery-independent information for this stock is a measure of egg production from surveys conducted every three years.
Mackerel	NEA Mackerel	80-100	60-80		<60	60-80	60-80	80-100	Although stock size is at sustainable levels, fishing mortality remains above the level stipulated in the management plan and above both the precautionary level and the level likely to lead to maximum sustainable yield. Mackarel (Scombers) is listed as a mandatory key low trophic species (see Box CB1 CR Annex CB v1.3) unless evidence is available otherwise. The definition of the target reference point does not take into account the ecological role of the stock. Countries exploiting the shared NEA mackerel stock are not working together in the implementation of the harvest control rule. This has caused the suspension of a number of MSC certificates. The lack of co-operation in implementing the strategy between countries exploiting this stock determines that the harvest strategy is not likely to work based on undergoing disputes in the allocation of TACs. It is not clear that the coastal states agreement TAC on landed catch is able to control all sources of mortality to ensure the harvest control rule is fully effective, with Iceland catch and slippage likely to be the main sources of uncontrolled mortality. The information on all fishery removals from the stock is incomplete. Notably, slippage is not fully monitored and could be a significant proportion of the catch, and the Working Group believes that there is still substantial under-reporting.
Pilchard	Bay of Biscay	60-80 (RBF)	80 (RBF)	NA	60-80	60-80	80-100	80 (RBF)	The Cornwall sardine fishery is already MSC certified. Conditions for certification include the implementation of a harvest strategy and control rules which are responsive and reactive to the state of the stock and can reduce the exploitation rate before there is an appreciable risk of impairing reproductive capacity. Pilchard (Clupeidae) is listed as a mandatory key low trophic species (see Box CB1 CR Annex CB v1.3) unless evidence is available otherwise. The definition of the target reference point needs to take into account the ecological role of the stock

Sprat	Channel (VIId,e)	60-80 (RBF)	80 (RBF)	NA	60-80	60-80	60-80	80 (RBF)	The harvest strategy for this data-limited stock is to maintain or reduce catches. However it is not certain that the harvest strategy is effective. There is a lack of evidence that elements of the strategy are working together and there is no evidence that it is achieving objectives yet. However there is no well-defined harvest control rule in place. A TAC system exists that could reduce exploitation if required. However there is no evidence that the TAC is effective in controlling exploitation rates as there are no estimates of fishing mortality. The stock structure of sprat populations in the Celtic Seas eco-region is not clear and the information available is insufficient to evaluate stock trends and exploitation. Sprat (Clupeidae) is listed as a mandatory key low trophic species (see Box CB1 CR Annex CB v1.3) unless evidence is available otherwise. The definition of the target reference point needs to take into account the ecological role of the stock.
Sprat	North Sea (IV)	60-80 (RBF)	80 (RBF)	NA	60-80	60-80	60-80	80 (RBF)	

3.2.4 Stocks with Adequate Information and a partial Harvest Strategy

Table 3.2.4 shows scores and the main gaps for stocks with adequate information and a partial harvest strategy in place.

Sufficient relevant information related to stock structure, stock productivity, and fleet composition is available to support a precautionary harvest strategy. Stock abundance and fishery removals are monitored at a level of accuracy and coverage consistent with the harvest control rule and stock indicators are available and monitored with sufficient frequency to support the harvest control rule. Adequate data includes good coverage within surveys, complete or near-complete catch data (including discard estimates if necessary) and sufficient sampling of catches for the stock assessment.

All these stocks have an effective harvest strategy and a well-defined harvest control rule except for the requirement that the exploitation rate is reduced as the limit reference point is approached. Exceptions are Irish Sea (VIIa) Sole, North Sea (IV+IIIa) Dab, and Nephrops stocks (Functional Units 6, 8 & 14).

Irish Sea (VIIa) Sole has no effective harvest strategy or Harvest Control Rule. At best North Sea (IV+IIIa) Dab only has a “generally understood” Harvest Control Rule and there is little evidence that the harvest strategy overall is responsive to the stock status.

A harvest strategy is in place for Nephrops with a TAC set and a number of management and control measures. However the geographic scale at which the TAC and effort regulations are applied is not deemed appropriate by ICES and any robust harvest strategy should instead address the exploitation of each Functional Unit independently. Harvest control rules are in place; however tools used to implement the harvest control rules (i.e. TAC) are not implemented appropriately.

All stocks except for North Sea (IV+IIIa) Dab have a stock assessment. Although there has been some assessment of North Sea (IV+IIIa) Dab, the assessment has not been relative to reference points. The application of the RBF methodology indicates that fisheries pose a high risk on the productivity of North Sea Dab. Unless a precautionary harvest strategy is developed to reduce the risk that fishing poses on the North Sea Dab stock assessment procedures would need to be implemented to estimate stock status.

Table 3.2.4. The stocks which have sufficient data and information to support a harvest strategy, and have some sort of harvest control rule which is a critical component of the harvest strategy. SS= Stock Status; RP= Reference Points; SR= Stock Rebuilding; HS= Harvest Strategy; HCR= Harvest Control Rule; INF= Information/Monitoring; ASS= Assessment of Stock Status.

Species	Stock Area	SS	RP	SR	HS	HCR	INF	ASS	Main Gaps
Dab	North Sea (IV+IIIa)	<60 (RBF)	80 (RBF)	NA	60-80	60-80	80-100	80 (RBF)	Although there appears to be sufficient information, there are no reference points and no stock assessment has been carried out. The application of the RBF determined that fishing poses a high risk on the productivity of these species
Sole	Irish Sea (VIIa)	<60	80-100	<60	<60	<60	80-100	80-100	The data and stock assessment indicate that the stock is overfished. There is no effective harvest control rule or rebuilding plan and overall the harvest strategy has been ineffective.
Haddock	Western and Channel (VII b-k)	60-80	60-80	80-100	80-100	60-80	80-100	80-100	The target for these stocks is FMSY, and in all cases the fishing mortality is higher than this level. There is no defined limit reference point and no well-defined HCR that ensures the exploitation rate is reduced as a limit reference point is approached. Reference points for Plaice not defined in a management plan.
Plaice	Western Channel (VIIe)	60-80	<60	80-100	80-100	60-80	80-100	80-100	
Hake	Northern Stock (IIIa IV VI VII VIII a/b/d)	60-80	60-80	80-100	80-100	60-80	80-100	80-100	
Sole	Eastern Channel (VIId)	60-80	60-80	80-100	80-100	60-80	60-80	80-100	
Whiting	North Sea and Eastern Channel (IV VIId)	60-80	60-80	NA	80-100	60-80	80-100	80-100	There is no limit or target reference point to allow the stock status to be precisely evaluated. There is no well-defined HCR that ensures the exploitation rate is reduced as a limit reference point is approached.
Sole	Western Channel (VIIe)	80-100	60-80	80-100	60-80	80-100	80-100	80-100	There is no defined limit reference point and no well-defined HCR that ensures the exploitation rate is reduced as a limit reference point is approached.
Sole	Celtic Sea (VII f/g)	80-100	60-80	NA	80-100	60-80	80-100	80-100	
Cod	Celtic Sea (VII e-k)	80-100	80-100	NA	80-100	60-80	80-100	80-100	The only additional requirement is that there should be a well-defined HCR that ensures the exploitation rate is reduced as a limit reference point is approached.
Nephrops	Farn Deeps (FU6; IVb; 38-40 E8-E9 37 E9)	<60	80-100	60-80	60-80	<60	80-100	80-100	The UWTV survey indicates that the stock status has declined since 2005 and has been rebuilding to just below MSY Btrigger since 2009. Harvest rate is above FMSY. There is evidence of sperm limitation due to high F on males posing risk on recruitment overfishing. Reduced harvest rates recommended avoiding sperm limitation and reducing risk on recruitment overfishing. To protect the stock in this functional unit, management should be implemented at the functional unit level.

	Firth of Forth (FU8; IVb; 40-41 E7; 41 E6)	60-80	80-100	<60	60-80	<60	80-100	80-100	The stock remains above MSY Btrigger but has declined over the last three years. The harvest rate remains above FMSY. To protect the stock in this functional unit, management should be implemented at the functional unit level.
	Irish Sea East (FU14; VIIa 35-38 E6; 38 E5)	80-100	60-80		60-80	<60	80-100	80-100	Biomass reference points not defined To protect the stock in this functional unit, management should be implemented at the functional unit level.

3.2.5 Stocks with Adequate Information and a Harvest Strategy

Table 3.2.5 shows scores and the main gaps for stocks with adequate information and a full harvest strategy in place.

Sufficient relevant information related to stock structure, stock productivity, and fleet composition is available to support a precautionary harvest strategy. Stock abundance and fishery removals are monitored at a level of accuracy and coverage consistent with the harvest control rule and stock indicators are available and monitored with sufficient frequency to support the harvest control rule.

Well-defined harvest control rules that take into account uncertainty and ensures that exploitation rate is reduced as the limit reference points are approached are in place for all demersal stocks. Tools used (i.e. TACs) are considered to be effective in achieving exploitation levels required under the harvest control rules.

In some cases the harvest strategy applies a newly developed data limited approach. There is a general lack of evidence, which has yet to accumulate, that this new approach is effective in these case. ICES points that some approaches are still being evaluated and may change based on their actual or expected performance.

The North Sea herring stock is already MSC certified and conditions for certification include the definition of reference points and harvest control rules consistent with the harvest strategy. Herring is listed as a mandatory key low trophic species (see Box CB1 CR AnnexCB in v1.3 of the MSC Certification Requirements) unless evidence is available otherwise. Therefore the definition of reference points requires taking into account the ecological role of the stock.

Table 2.3.5. The stocks which have sufficient data and information to support a harvest strategy, and have a well-defined harvest control rule. SS= Stock Status; RP= Reference Points; SR= Stock Rebuilding; HS= Harvest Strategy; HCR= Harvest Control Rule; INF= Information/Monitoring; ASS= Assessment of Stock Status.

Species	Stock Area	SS	RP	SR	HS	HCR	INF	ASS	Main Gaps
Ling	Southern (IIIa IVa VI VII VIII IX XII XIV)	60-80	60-80	NA	60-80	80-100	80-100	60-80	The harvest strategy is relatively new for these data limited stocks, and there is insufficient evidence yet that it can meet objectives. Well defined reference points are missing. Further evidence is required that the "data limited" approach used for the stock assessment is robust.
Monkfish / Angler	Western and Channel (VII b-k, VIII a/b/d)	60-80	60-80	NA	60-80	80-100	80-100	60-80	
Red mullet	North Sea and Eastern Channel (IV IIIa VIId)	60-80	60-80	NA	60-80	80-100	80-100	60-80	
Cod	North Sea and Eastern Channel (IV IIIa VIId)	<60	80-100	80-100	80-100	80-100	80-100	80-100	The fishery meets all requirements, except the stock status is below the limit reference point making it ineligible. North Sea cod could pass MSC certification once the stock is above the limit reference point and rebuilding is shown to be fast enough.
Sole	North Sea (IV)	60-80	80-100	80-100	80-100	80-100	80-100	80-100	Fishing mortality has not yet been reduced to the target level.
Plaice	Irish Sea (VIIa)	80-100	60-80	NA	80-100	80-100	80-100	80-100	The data limited HCR has implicit reference points, but these need to be defined to meet MSC requirements.
Plaice	North Sea (IV)	80-100	80-100	NA	80-100	80-100	80-100	80-100	These stocks may pass Principle 1 without a condition.
Haddock	North Sea (IV IIIa)	80-100	80-100	NA	80-100	80-100	80-100	80-100	
Saithe	North Sea and West of Scotland (IV IIIa VI)	80-100	80-100	NA	80-100	80-100	80-100	80-100	
Herring	North Sea	80-100	60-80	NA	80-100	60-80	80-100	80-100	Herring is listed as a mandatory key low trophic species (see Box CB1 CR AnnexCB v1.3) unless evidence is available otherwise. The definition of reference points does not take into account the ecological role of the stock A well-defined harvest control rule is in place. However, it has proved to be not entirely consistent with the harvest strategy and can be considered to be still under development.
Herring	Irish Sea	80-100	60-80	NA	80-100	60-80	80-100	80-100	The Management plan has not yet been implemented and the limit reference point is not still being used by management. Herring is listed as a mandatory key low trophic species (see Box CB1 CR AnnexCB v1.3) unless evidence is available otherwise. The definition of reference points does not take into account the ecological role of the stock There is a well-defined control rule which has the objective of keeping a constant fishing mortality at FMSY, but there is no well-defined plan to reduce this exploitation rate as limit reference point is approached

3.3 Non ICES Assessed Stocks

Eighty Non ICES assessed stocks were identified including most shellfish species exploited in English inshore waters. Shellfish species include; clams, cockles, mussels, scallops, oysters, whelks, periwinkles, lobsters, crabs, shrimps, squid, and cuttlefish.

The following section is structured according to the levels of information and management for the species under consideration.

3.3.1 Stock with inadequate Information

The majority of stocks have inadequate information to support the development of a harvest strategy and well defined harvest control rules. Those stocks include; Clams in the Southern region, Cockles in the Southern and Devon regions, Mussels stocks in Devon, the Eastern and North Eastern regions, Native oysters in the Southern, Eastern and Kent Essex regions, Pacific oysters in the channel, Razor Shell in the Eastern, Cuttlefish in the Channel, Squid in the Western Approaches and North Sea, Spider Crab in the South West and Southern, Velvet crab in the North Sea, Eastern channel, and South West, Crawfish in the Southwest, Brown shrimp in the Northwest and Bristol channel, Whelks in the Western channel and North Sea and Periwinkle in all areas.

Pre-assessment scores for Principle 1 performance indicators and the main gaps associated are showed in Table 3.3.1.

Stock assessment procedures are not developed and stock status is unknown. The application of the RBF methodology indicates that these fisheries pose medium or high risk to the productivity of the species vindicating the need for stock assessment. The difference in risk level is due to differences in species productivity. The lack of precautionary harvest strategies determines a high susceptibility risk score for all species (see section 3.4)

The harvest strategy for cockles, clams and razor clams stocks is the Southern and Devon region is designed around a high minimum size regulation. Native oysters in the Southern and Eastern region are managed through seasonal closures, daily fishing hours and minimum landing size. These measures may be expected to protect the stock from recruitment impairment. However monitoring procedures are not implemented to determine if the harvest strategy if working toward maintaining the stock at high productive levels.

Mussel fisheries in the Northwest region target seed mussels and adult mussels. Some estimates of stock structure and abundance are available through independent surveys but they are not carried out in a systematic basis. There are no management measures, control rules or monitoring procedures implemented determining thus that the harvest strategy is inadequate. Mussel fisheries in Devon, the Eastern and North Eastern regions target adult mussels. No information is available, other than landings, to support the development of a harvest strategy.

Fishery removals of crabs, cuttlefish and squid are monitored but information for stock indicators is poor to support the development of a harvest control rule.

Harvest control rules, responsive to the status of the stock, to control exploitation rates are not developed for any of the stocks under this section.

Table 3.3.1. Stocks with no monitoring procedures to support the development of a harvest strategy. SS= Stock Status; RP= Reference Points; SR= Stock Rebuilding; HS= Harvest Strategy; HCR= Harvest Control Rule; INF= Information/Monitoring; ASS= Assessment of Stock Status.

Species	IFCA	Stock	SS	RP	SR	HS	HCR	INFO	ASS	Main Gaps
Cockles	Devon	Exe Estuary	60-80 (RBF)	80 (RBF)	NA	<60	<60	<60	80 (RBF)	Landings are recorded but it is unclear if all removals are accounted for. No stock indicators available to support the development of Harvest Control Rules MLS as only management measure to protect the stock. Monitoring is not in place to determine whether the HS is working. No Harvest Control Rules responsive to stock status.
	Southern	Poole Harbour	60-80 (RBF)	80 (RBF)	NA	<60	<60	<60	80 (RBF)	
		Solent	60-80 (RBF)	80 (RBF)	NA	<60	<60	<60	80 (RBF)	
		Pothmouth	60-80 (RBF)	80 (RBF)	NA	<60	<60	<60	80 (RBF)	
	North East	Humber	60-80 (RBF)	80 (RBF)	NA	<60	<60	<60	80 (RBF)	
Manila Clam	Southern, Sussex	Poole Harbour	<60 (RBF)	80 (RBF)	NA	<60	<60	<60	80 (RBF)	
Carpet Clam	Southern	Poole Harbour	60-80 (RBF)	80 (RBF)	NA	<60	<60	<60	80 (RBF)	
Razor Shell	Eastern	Wash	<60 (RBF)	80 (RBF)	NA	<60	<60	<60	80 (RBF)	
Mussel	Devon	Exe Estuary	60-80 (RBF)	80 (RBF)	NA	<60	<60	<60	80 (RBF)	No information is available, other than landings. No stock indicators available to support the development of Harvest Control Rules MLS as only management measure to protect the stock. Monitoring is not in place to determine whether the HS is working. No Harvest Control Rules responsive to stock status.
		Dart Estuary	60-80 (RBF)	80 (RBF)	NA	<60	<60	<60	80 (RBF)	
		Yealm Estuary	60-80 (RBF)	80 (RBF)	NA	<60	<60	<60	80 (RBF)	
		Teign Estuary	60-80 (RBF)	80 (RBF)	NA	<60	<60	<60	80 (RBF)	
		Taw-Torridge Estuary	60-80 (RBF)	80 (RBF)	NA	<60	<60	<60	80 (RBF)	
	Eastern	Wash	60-80 (RBF)	80 (RBF)	NA	<60	<60	<60	80 (RBF)	
	North Eastern	North East	60-80	80	NA	<60	<60	<60	80	

			(RBF)	(RBF)					(RBF)	
	Northwest	Dee	60-80 (RBF)	80 (RBF)	NA	<60	<60	<60	80 (RBF)	Fishery targeting seed and adult mussels. However there is no harvest strategy composed of measures, control rules and monitoring procedures to ensure that the fishery does not pose a risk to the productivity of the stock. No harvest control rules in place Landing data available. However no indicators available. Some information is available through surveys but its frequency is not considered sufficient to support the harvest strategy
		Heysham flat	60-80 (RBF)	80 (RBF)	NA	<60	<60	<60	80 (RBF)	
		Morecombe Bay	60-80 (RBF)	80 (RBF)	NA	<60	<60	<60	80 (RBF)	
		Wirral	60-80 (RBF)	80 (RBF)	NA	<60	<60	<60	80 (RBF)	
Native Oyster	Southern	Southern	60-80 (RBF)	80 (RBF)	NA	<60	<60	<60	80 (RBF)	No information is available, other than landings. No indicators available to support development of Harvest Control Rules.
Native Oyster	Eastern	Eastern	60-80 (RBF)	80 (RBF)	NA	<60	<60	<60	80 (RBF)	Harvest strategy includes seasonal closures, daily fishing hours and minimum landing size. However no monitoring is in place to determine whether the harvest strategy is working. No harvest control rules in place
Native Oyster	Kent	Kent Essex	60-80 (RBF)	80 (RBF)	NA	<60	<60	<60	80 (RBF)	No information is available, other than landings. No stock indicators available to support the development of Harvest Control Rules.
Pacific Oyster	Kent, Southern, Sussex	Channel	60-80 (RBF)	80 (RBF)	NA	<60	<60	<60	80 (RBF)	MLS as only management measure to protect the stock. Monitoring is not in place to determine whether the HS is working No harvest control rules in place
Cuttlefish	SC; CW; DV; SO; SX; KE; EA; MMO	Channel	<60 (RBF)	80 (RBF)	NA	<60	<60	<60	80 (RBF)	Landings recorded but unclear if all removals are accounted for. No indicators available to support development of Harvest Control Rules. No Harvest Control Rules responsive to stock status. No Harvest Strategy
Squid (Loligo forbesi)	SC; CW; DV; SO; SX; MMO; EU	Western Approaches	<60 (RBF)	80 (RBF)	NA	<60	<60	<60	80 (RBF)	
Squid (Loligo vulgaris)	SC; CW; DV; SO; SX; MMO; EU	Western Approaches	<60 (RBF)	80 (RBF)	NA	<60	<60	<60	80 (RBF)	
Squid (Loligo forbesi)	EA; NE; NO; MMO; EU	North Sea	<60 (RBF)	80 (RBF)	NA	<60	<60	<60	80 (RBF)	
Squid (Loligo vulgaris)	EA; NE; NO; MMO; EU	North Sea	<60 (RBF)	80 (RBF)	NA	<60	<60	<60	80 (RBF)	
Spider crab	CW; DV; SC	South West	<60 (RBF)	80 (RBF)	NA	<60	<60	<60	80 (RBF)	Fishery removals are monitored but information for stock indicators is poor to support the development of Harvest Control Rules
	SO	Southern	<60 (RBF)	80 (RBF)	NA	<60	<60	<60	80 (RBF)	MLS as only management measure to protect the stock. Monitoring is not in place to determine whether the HS is working.
Velvet crab	NO; NE; EA	North Sea	<60 (RBF)	80	NA	<60	<60	<60	80	No Harvest Control Rules responsive to stock status

				(RBF)					(RBF)	
	SO; SX; KE	Eastern Channel	<60 (RBF)	80 (RBF)	NA	<60	<60	<60	80 (RBF)	
	CW; DV; SC	South West	<60 (RBF)	80 (RBF)	NA	<60	<60	<60	80 (RBF)	
Crawfish	CW; SC; DV; MMO	Southwest	60-80(RBF)	80 (RBF)	NA	<60	<60	<60	80 (RBF)	
Brown Shirmp	NW	Northwest	<60 (RBF)	80 (RBF)	NA	<60	<60	<60	80 (RBF)	Fishery removals are monitored but information for stock indicators is poor to support the development of Harvest Control Rules MLS as only management measure to protect the stock. Monitoring is not in place to determine whether the HS is working. No Harvest Control Rules responsive to stock status.
	CW; DV	Bristol Channel	<60 (RBF)	80 (RBF)	NA	<60	<60	<60	80 (RBF)	
Whelk	DV; MMO	Bristol Channel	<60 (RBF)	80 (RBF)	NA	<60	<60	<60	80 (RBF)	Fishery removals are monitored but information for stock indicators is poor to support the HCR MLS as only management measure to protect the stock. Monitoring is not in place to determine whether the HS is working. No Harvest Control Rules responsive to stock status.
	DV; SO; MMO	Western Channel	<60 (RBF)	80 (RBF)	NA	<60	<60	<60	80 (RBF)	
	SX; KE; SO; MMO	Eastern Channel	<60 (RBF)	80 (RBF)	NA	<60	<60	<60	80 (RBF)	
	EA; NE; MMO	North Sea	<60 (RBF)	80 (RBF)	NA	<60	<60	<60	80 (RBF)	
Periwinkle	NO	Northumberland	60-80 (RBF)	80 (RBF)	NA	<60	<60	<60	80 (RBF)	No information is available, other than landings. No indicators available to support the development of Harvest Control Rules No harvest strategy in place No harvest control rules in place
	NE	Northeast	60-80 (RBF)	80 (RBF)	NA	<60	<60	<60	80 (RBF)	
	EA	Eastern	60-80 (RBF)	80 (RBF)	NA	<60	<60	<60	80 (RBF)	
	KE	Kent and Essex	60-80 (RBF)	80 (RBF)	NA	<60	<60	<60	80 (RBF)	
	SX	Sussex	60-80 (RBF)	80 (RBF)	NA	<60	<60	<60	80 (RBF)	
	SO	Southern	60-80 (RBF)	80 (RBF)	NA	<60	<60	<60	80 (RBF)	
	DV	Devon & Severn	60-80 (RBF)	80 (RBF)	NA	<60	<60	<60	80 (RBF)	
	CW	Cornwall	60-80 (RBF)	80 (RBF)	NA	<60	<60	<60	80 (RBF)	
	SC	Scilly	60-80 (RBF)	80 (RBF)	NA	<60	<60	<60	80 (RBF)	
	NW	Northwest	60-80 (RBF)	80 (RBF)	NA	<60	<60	<60	80 (RBF)	

3.3.2 Stock with some Information but no precautionary Harvest Strategy.

Information is available to support the development of a precautionary harvest strategy for stocks of brown crab, lobsters, brown shrimp and scallops (table 3.3.2). Fishery removals are monitored and there is some information for using Catch per Unit Effort as an indicator of stock biomass. However fishery removals are not monitored at a level of accuracy sufficient to support well-defined harvest control rules.

Brown crabs and lobsters stocks are the only stocks assessed analytically. Reference points used to assess stock status are appropriate. Target reference points are defined as 35% of spawning potential at F zero. Generally limit reference points are defined at half of MSY (of F_{MSY}). The assessment is appropriate for the stock and estimates the status relative to reference points. However uncertainty is identified but is not taken into account.

Recent (2012) assessments indicate that the Brown Crab stock in the Western Channel is at sustainable levels. Fishing mortality is close to F_{MSY} and the stock biomass is close to or at B_{MSY}. The Celtic Sea and Eastern Channel Brown crab stocks are likely to be above the limit reference point and the point at which recruitment would be impaired. However stock biomass is below MSY levels for both stocks. Fishing mortality for the Eastern Channel Brown crab is close to the limit at which recruitment is impaired. It is likely that recruitment is being impaired for the Central and Southern North Sea Brown Crabs stocks. Male and female stock biomass is close to or below the biomass limit reference point for both stocks and Current F is above the limit at which recruitment is expected to be impaired.

The Western Channel Brown Crab harvest strategy of using very high minimum landing sizes to protect spawning potential and recruitment is expected to achieve the management objective and likely to work. However the harvest strategy relies on a minimum landing size measure and it is not responsive to the state of the stock. There are no rules in place to control exploitation rates although changes in the technical measures that are in place could theoretically be used to control exploitation on the stock e.g. as exploitation increases increase the MLS. For the rest of the Brown crab stocks management measures in place have been unresponsive to changes in stock status and exploitation rates as indicated by the poorer stock status.

Brown crabs stocks in the North Irish Sea and South East of Scotland are not assessed analytically. The application of the RBF methodology indicates that fishing poses a medium risk to the productivity of brown crab. A medium risk was estimated based on having a minimum lading size greater than the size at maturity and assuming high discard survivability (see section 3.4).

Six lobster stocks were defined in English waters: southeast/southern, Yorkshire, the North East, Southwest, East and Thames regions.

The status of all lobster stocks is generally poor and the harvest strategy as designed, is not achieving its objectives. Lobster stocks in the southeast/southern, Yorkshire, and the North East regions are assessed to be below the limit reference points at levels where recruitment is impaired. The lobster stock in the southwest region is highly likely to be above the limit reference point and the point where recruitment would be impaired. However stock size is estimated to be below the MSY target level. Stock status of all the above lobster stocks are defined as depleted (i.e. below the target level). Reference points used to assess stock status are appropriate. Target and limit reference points are taken to be 15% and 35%, respectively, of spawning potential per recruit relative to that at F_0. These reference values are not based on any information on stock-recruitment dynamics in lobster stocks but are taken from a meta-analysis of fish stocks generally.

The assessment is appropriate for the lobster stock and estimates the status relative to reference points. However, the methods are length based and assume stocks are in equilibrium. Uncertainty is identified but is not taken into account. There are monitoring procedures in place for stock

assessment to support the harvest strategy. Data on landing, effort, fleet composition and fishery removals is collected. Therefore stock status is assessed subject to significant uncertainty.

The harvest strategy in place for lobster stock includes a number of technical conservation measures, however they are not being effective in achieving the objective reflected in the target and limit reference points. A common problem for all lobster stocks is the lack of harvest control rules. There are no rules in place to control exploitation rates although changes in the technical measures that are in place could theoretically be used to control exploitation on the stock e.g. as exploitation increases, increase the MLS. Management measures in place have been unresponsive to changes in stock status and exploitation rates as shown by the fact that limit reference points have been reached without revision of those management measures. The assessments indicate that very significant reductions in fishing mortality would be required to maintain stock above the target reference points. Operationally this may be very difficult to achieve. Table 6.6 describes the main gaps for Lobster stocks and table 6.7 shows reassessment score results for Lobster stocks.

Lobster stocks in the East and Thames regions were pre-assessed using the risk based framework (see Section 3.4). The application of the RBF methodology indicates that fishing poses a high risk on the productivity of lobster. A lack of precautionary conservation measures determined a high risk score.

The application of the RBF to assess the stock status of scallops and brown shrimp stocks estimated a high risk score. There is no harvest strategy in place for scallop at the unit stock level other than a minimum landing size. It is not clear how effective the minimum landing size is in protecting spawning potential. There are no conservation measures for brown shrimp indicating high susceptibility to fishing and a subsequent high risk score.

Table 3.3.2. Stocks with some information available but harvest strategy and control rules in place unlikely to achieve the minimum acceptable standard. SS= Stock Status; RP= Reference Points; SR= Stock Rebuilding; HS= Harvest Strategy; HCR= Harvest Control Rule; INF= Information/Monitoring; ASS= Assessment of Stock Status.

Species	IFCA	Stock	SS	RP	SR	HS	HCR	INF	ASS	Main Gaps
Brown Crab	NW; MMO; EU	North Irish Sea	60-80(RBF)	80 (RBF)	NA	<60	<60	60-80	80 (RBF)	Available information fails short of being sufficient to support the development of a harvest strategy. There may be other fishery removals by other gears not accounted for. Stock size below the target reference point for all stocks except for the Rebuilding strategies needed for stock with stock size below MSY levels. Harvest Strategy not expected or likely to achieve the objectives reflected in the reference points (Except for the Western Channel Stock) Harvest control rules not in place to reduce exploitation rates in response to a decline in stock size or an increase in fishing mortality. Stock assessment does not take into account identified uncertainty The application of the RBF determined that fishing poses a medium risk on the productivity of these species.
	NO; MMO; EU	South East (Scotland)	60-80 (RBF)	80 (RBF)	NA	<60	<60	60-80	80 (RBF)	
	CW; DV; SC; MMO; EU	Celtic Sea	60-80	80-100	<60	<60	<60	60-80	60-80	
	CW; DV; SC; SO; MMO; EU	Western Channel	80-100	80-100	NA	60-80	<60	60-80	60-80	
	SX; KE; MMO; EU	Eastern Channel	60-80	80-100	<60	<60	<60	60-80	60-80	
	KE; EA; MMO; EU	Southern North Sea	<60	80-100	<60	<60	<60	60-80	60-80	
	NE; MMO; EU	Central North Sea	<60	80-100	<60	<60	<60	60-80	60-80	
Lobsters	E; MMO	East	<60 (RBF)	80 (RBF)	NA	<60	<60	60-80	80 (RBF)	Available information fails short of being sufficient to support the development of a harvest strategy. There may be other fishery removals by other gears not accounted for. Minimum Landing Size as only management measure to protect the stock. Monitoring is not in place to determine whether the harvest strategy is working. No Harvest Control Rules responsive to stock status The application of the RBF determined that fishing poses a high risk on the productivity of these species.
	KE; MMO	Thames	<60 (RBF)	80 (RBF)	NA	<60	<60	60-80	80 (RBF)	
	KE; SX; SO; MMO	Southeast and Southern	<60	80-100	<60	<60	<60	60-80	60-80	Stock size below the limit reference point for southeast/southern, yorkshire and North East stocks. Southwest stock above the limit reference point but below MSY levels. Rebuilding strategies needed for all lobsters stocks. Harvest Strategy not expected or likely to achieve the objectives reflected in the
	NE; MMO	Yorkshire	<60	80-100	<60	<60	<60	60-80	60-80	

	CW; DV; SC; MMO	Southwest	60-80	80-100	<60	<60	<60	60-80	60-80	reference points Harvest control rules not in place to reduce exploitation rates I response to a decline in stock size or an increase in fishing mortality. Information available on the biology and the fishery not sufficient to support the harvest strategy Stock assessment does not take into account identified uncertainty.
	NE; NH ;MMO	North east	<60	80-100	<60	<60	<60	60-80	60-80	
Brown Shrimp	EA	Wash	<60 (RBF)	80 (RBF)	NA	<60	<60	60-80	80 (RBF)	Available information fails short of being sufficient to support the development of a harvest strategy. No Harvest Control Rules responsive to stock status No Harvest strategy in place
	NE	Humber	<60 (RBF)	80 (RBF)	NA	<60	<60	60-80	80 (RBF)	
Scallops	SO; SX; KE; MMO; EU	Eastern Channel	<60 (RBF)	80 (RBF)	NA	<60	<60	60-80	80 (RBF)	Data on landings, effort, and fleet composition are available. Catch rate indicators are potentially available. There are significant removals by fleets from other jurisdictions which are recorded. However information is not available in a spatially explicit manner sufficient to support the development of a harvest strategy. No Harvest Control Rules responsive to stock status There is no harvest strategy in place at the unit stock level other than a minimum size rule. Other strategies are generic to scallop fishing (e,g, gear restriction, Watts days at sea). Monitoring is not in place to determine if the harvest strategy is working.
	SC; CW; DV; MMO; EU	Western Channel	<60 (RBF)	80 (RBF)	NA	<60	<60	60-80	80 (RBF)	
	NW; MMO; EU	Liverpool Bay	<60 (RBF)	80 (RBF)	NA	<60	<60	60-80	80 (RBF)	
	CW	Bristol Channel	<60 (RBF)	80 (RBF)	NA	<60	<60	60-80	80 (RBF)	

3.3.3 Stocks with adequate information and a harvest strategy.

Fisheries with a harvest strategy composed of management control rules and monitoring procedures include cockle fisheries in the North West, the Thames and the Wash, and the mussel fishery in the Fenham Flat. Table 3.3.3 shows preassessment scores and the main gaps associated for each stock.

Biomass of cockles and mussels stocks is estimated through independent surveys. However stock status is not assessed in relation to biological reference points and therefore the risk based framework was applied to assess the risk that fishing poses on the productivity of these stocks. The application of the RBF methodology indicates that due to the high productivity of cockles and mussels the risk is estimated as medium to low. Fisheries with a precautionary harvest strategy were estimated to pose a low risk on the species productivity (See Section 3.4).

The harvest strategy of cockle fisheries in the North West is composed of a number of management measures, control rules and monitoring procedures. Management measures include minimum landing size, season closure, close areas, permits and TACs. The harvest strategy is responsive to the size of the stock limiting exploitation and closing the fishery when the biomass is low. However there is no evidence that the elements of the harvest strategy are working together toward maintaining the stock at high productive levels. The stock status is recruitment dependent. Fisheries operate on a single year class with unknown source sink dynamics, which determines that fishing effort in the region may be impairing recruitment. In Morecombe Bay, Ribble and Wirral stocks are currently depleted. Although monitoring of the harvest strategy is in place through annual surveys it is not adequately resourced and there may be significant uncertainty in the stock biomass estimates. Information on fishery removals is poor because of the large number of hand gatherers involved adding uncertainty to the use of TAC as the tool to control exploitation rates and the overall cohesiveness of the elements of the harvest strategy. Therefore, although all harvest strategy PIs would likely achieve the minimum acceptable mark, all would require improvements prior entering full assessment.

The harvest strategy of the cockle fishery in the Thames is composed of minimum size, seasons, closed areas, fishery closures, permits and TACs accounting for uncertainty in the recruitment process. Evidence indicates that exploitation may be effectively controlled. The harvest strategy is designed to close fisheries when biomass is low. Based on experience it may work to limit exploitation. Monitoring of the harvest strategy is in place through annual surveys. Sufficient data on stock biomass, productivity (age structure, growth), and fleet composition seems to be available. Removals and changes in stock biomass are monitored. However it is unclear if there are other fishery removals unaccounted for (recreational).

The harvest strategy of the cockle fishery in the Wash limits exploitation to 33% of biomass and includes size restrictions and area closures. Annual survey biomass estimates indicates that the strategy is not impairing recruitment. There are a number of clearly defined conservation measures and rules such as MLS, closed areas and TAC. The TAC is adjusted annually in response to changes in biomass. The TAC rule is ad hoc but based on experience there is evidence that it is sufficiently precautionary. Evidence clearly shows that the tools effectively control exploitation rate. There is sufficient information available to support the harvest strategy in the form of annual surveys, biomass estimates and recruitment strength. Stock abundance and fishery removals are monitored and all fishery removals are accounted for. The assessment is based on a direct spatially explicit estimate of biomass and size structure. The assessment does not indicate status of the stock relative to reference points. Although there is significant uncertainty with respect to future recruitment this is not assessed but experience indicates that the HCRs are sufficiently precautionary.

The harvest strategy of the mussel fishery in the Fenham Flat is composed of a minimum landing size control rules and monitoring procedures. Control rules limits exploitation of legal sized mussels to 33% of biomass but are not well to reduce exploitation rates as the risk of recruitment overfishing

increases. However it is unclear if the strategy is working. Recruitment to the stock has declined significantly although it is unlikely to be due to fishing. There is sufficient information available to support the harvest strategy in the form of annual surveys, biomass estimates and recruitment strength. Stock abundance and fishery removals are monitored and all fishery removals are accounted for.

Table 3.3.3. Fisheries with adequate information and harvest strategy. SS= Stock Status; RP= Reference Points; SR= Stock Rebuilding; HS= Harvest Strategy; HCR= Harvest Control Rule; INF= Information/Monitoring; ASS= Assessment of Stock Status.

Species	IFCA	Stock	SS	RP	SR	HS	HCR	INFO	ASS	Main Gaps
Cockles	NW	Cumbria	60-80 (RBF)	80 (RBF)	NA	60-80	60-80	60-80	80 (RBF)	The stock status is recruitment dependent. Fisheries operate on a single year class with an unknown source sink dynamics which determines that fishing effort in the region may be impairing recruitment. there is no evidence that the elements of the harvest strategy are working together toward maintaining the stock at high productive levels TAC in place but uncertain if it is effective in controlling exploitation rates. Monitoring of the harvest strategy is in place through annual surveys significant uncertainty in the stock biomass estimates. Information on fishery removals is poor due to hand gatherers involved in the fishery.
		Morecombe Bay (7)	60-80 (RBF)	80 (RBF)	NA	60-80	60-80	60-80	80 (RBF)	
		Ribble	60-80 (RBF)	80 (RBF)	NA	60-80	60-80	60-80	80 (RBF)	
		Wirral	60-80 (RBF)	80 (RBF)	NA	60-80	60-80	60-80	80 (RBF)	
	KE	Thames	80-100 (RBF)	80 (RBF)	NA	80-100	80-100	60-80	80 (RBF)	Unclear if all removal are accounted for
	E	Wash	80-100 (RBF)	80 (RBF)	NA	80-100	80-100	80-100	80 (RBF)	No gaps identified (all PIs likely scoring above 80)
Mussel	NO	Fenham Flat	60-80 (RBF)	80 (RBF)	NA	60-80	60-80	80-100	80 (RBF)	Control rules limits exploitation of legal sized mussels to 33% of biomass but are not well defined to reduce exploitation rates as the risk of recruitment overfishing increases Unclear if the harvest strategy is working. Recruitment to the stock has declined significantly although it is unlikely to be due to fishing.

3.4 Summary of Principle 1 scores

Seventy six ICES assessed stocks and eighty Non ICES assessed stocks were pre-assessed. The preparedness of fisheries to enter full assessment and being eligible for MSC certification depends on the robustness of the harvest strategy in place. A robust harvest strategy is composed of procedures to obtain relevant information about the biology of the species and the fisheries to support a suite of management conservation measures and control rules.

The readiness of fish and shellfish stocks pre-assessed depends therefore on the level of information and management available.

3.4.1 Stocks with Inadequate Information:

None of these stocks are eligible yet for certification.

Relevant information needs to be collected to support the design of a precautionary harvest strategy prior any of these fisheries enter full assessment. Stock assessment procedures should be implemented for all stocks, unless the implementation of a precautionary management measures provide evidence that the risk that fishing poses on the species conservation is low. Tables 3.2.1 and 3.3.1 show ICES assessed and Non ICES assessed species under this group category.

3.4.2 Stocks with some information but with no harvest strategy:

None of these stocks are eligible yet for certification.

There is relevant information related to stock structure, stock productivity and fleet composition to support the development of a harvest strategy. Stock abundance and fishery removals are monitored and at least one indicator is available and monitored with sufficient frequency to support the development of a harvest control rule. **However there are no harvest control rules and tools developed for any of these stocks.** Tables 3.2.2 and 3.3.2 show ICES assessed and Non ICES assessed species under this group category.

3.4.3 Stocks with some information and a partial harvest strategy:

There are number of ICES assessed stocks within this category which may have sufficient information & a partial harvest strategy for certification (Table 3.5.1). The Harvest Control Rule for these species is well defined and has been shown to be robust to uncertainties. However, in general, **available information is not of sufficient quality to support a full harvest strategy. This should be addressed before any full assessment**.

Cornwall Sardine fishery is already MSC certified and conditions for certification include the implementation of precautionary management rules. Any new fishery would be expected to join the action plan implemented by the Cornwall sardine fishery. There are requirements for implementing a harvest strategy and control rules that are responsive and reactive to the state of the stock and can reduce the exploitation rate before there is an appreciable risk of impairing reproductive capacity. Given the requirement to harmonise, any sardine fishery could be expected to pass Principle 1 as long as it adheres to the same or better harvest strategy.

Table 3.5.1. Stocks with some information and a partial harvest strategy eligible for certification.

Species	Stock Area
Whiting	Western (VIIe–k)
Plaice	Eastern Channel (VIId)
Megrim	Celtic Sea and West of Scotland (VIIb–k and VIIIa,b,d)
Horse Mackarel	Western Stock
Pilchard	Bay of Biscay

3.4.4 Stocks with Adequate Information and a partial Harvest Strategy

There are number of ICES assessed stocks which are eligible for certification within this category (Table 3.5.2) which have an effective harvest strategy and a well-defined harvest control rule. However the **harvest control rules are not defined to reduce exploitation rates as the limit reference point is approached.** This would trigger a condition for certification during any full assessment.

Table 3.5.2. Stocks with adequate information and a partial harvest strategy eligible for certification.

Haddock	Western and Channel (VII b-k)
Plaice	Western Channel (VIIe)
Hake	Northern Stock (IIIa IV VI VII VIII a/b/d)
Sole	Eastern Channel (VIId)
Whiting	North Sea and Eastern Channel (IV VIId)
Sole	Western Channel (VIIe)
Sole	Celtic Sea (VII f/g)
Cod	Celtic Sea (VII e-k)

3.4.5 Stocks with Adequate Information and a Harvest Strategy

There are number of ICES assessed stocks and non-ICES assessed stocks with adequate data and a full harvest strategy which are eligible for certification.

3.4.5.1 ICES assessed stocks:

Table 3.5.3 shows stock eligible for certification. Sufficient relevant information related to stock structure, stock productivity, and fleet composition is available to support a precautionary harvest strategy. Stock abundance and fishery removals are monitored at a level of accuracy and coverage consistent with the harvest control rule and stock indicators are available and monitored with sufficient frequency to support the harvest control rule.

Well-defined harvest control rules that take into account uncertainty and ensures that exploitation rate is reduced as the limit reference points are approached are in place for all demersal stocks. Tools used (i.e. TACs) are considered to be effective in achieving exploitation levels required under the harvest control rules.

In the case of North Sea and Eastern Channel cod the fishery meets all requirements, except the stock status is below the limit reference point making it ineligible. North Sea Eastern Channel cod could pass MSC certification once the stock is above the limit reference point and rebuilding is shown to be fast enough

The North Sea herring stock is already MSC certified and conditions for certification include the definition of reference points and harvest control rules consistent with the harvest strategy. Herring is listed as a mandatory key low trophic species (see Box CB1 CR AnnexCB v1.3) unless evidence is available otherwise. Therefore the definition of reference points requires taking into account the ecological role of the stock.

Table 3.5.3. Stocks with Adequate Information and a full Harvest Strategy

Ling	Southern (IIIa IVa VI VII VIII IX XII XIV)
Monkfish / Angler	Western and Channel (VII b-k, VIII a/b/d)
Red mullet	North Sea and Eastern Channel (IV IIIa VIId)

Cod	North Sea and Eastern Channel (IV IIIa VIId)
Sole	North Sea (IV)
Plaice	Irish Sea (VIIa)
Plaice	North Sea (IV)
Haddock	North Sea (IV IIIa)
Saithe	North Sea and West of Scotland (IV IIIa VI)
Herring	North Sea
Herring	Irish Sea

3.4.5.2 Non ICES assessed stocks

Fisheries with a harvest strategy composed of management control rules and monitoring procedures include cockle fisheries in the North West, the Thames and the Wash, and the mussel fishery in the Fenham Flat.

The harvest strategy of the cockle fishery in the Thames and the Wash is robust and precautionary. They are pre-assessed to be eligible for certification.

Although there are some areas of uncertainty regarding the effectiveness of the harvest strategy for the mussel fishery in the Fenham Flat and the cockles fisheries in the North West they are pre-assessed to be eligible for certification with some remedial work.

Fishery removals of cockles fisheries in the north west is poor because of the large number of hand gatherers involved adding uncertainty to the use of TAC as the tool to control exploitation rates and the overall cohesiveness of the elements of the harvest strategy. Therefore, although a full harvest strategy is in place, improvements regarding the quality of the information to support the harvest strategy are needed prior entering full assessment.

The mussel fishery in the Fenham Flat is composed of a minimum landing size control rules and monitoring procedures. However it is unclear if the strategy is working. Recruitment to the stock has declined significantly although it is unlikely to be due to fishing.

3.4.6 Eligibility of Using the Risk based Framework during a Full Assessment

Generally all fisheries assessed using the RBF obtained a medium to high risk score, except in a few instances where an argument could be put forward for a lower susceptibility score. Cockles and the Thames and the Wash, Mussels in the Fenham Flat were the only species/stocks that scored low risk under the Productivity Susceptibility Analysis. The high productivity of these species summed to a precautionary harvest strategy determines that these fisheries could be eligible for certification without the use of stock assessment and reference points. If any of these arguments were to be used in a full assessment they would need rigorous examination and supporting justification in order to support what might otherwise be regarded as a subjective decision.

4 Scoping of P2 issues

4.1 Retained Species

The MSC pre-assessment scores for the retained species component for species PIs are presented by main gear type in Table 4.1.1. Justifications for these scores are provided overleaf.

Table 4.1.1: Retained Species Component pre-assessment scoring

Main gear class	Species group	Species	Stock	Management Authority(ies)	Retained species Component		
					2.1.1: Status	2.1.2: Management	2.1.3: Information
Towed nets	Demersal finfish	Bass	NE Atlantic	SC; CW; DV; SO; SX; KE; EA; NE; NO; NW; MO; EU	60-80	60-80	60-80
		Cod	Irish Sea (VIIa)	NW; MO; EU	60-80	60-80	60-80
			Celtic Sea (VII e-k) & North Sea; Eastern Channel (IV IIIa VIId)	NO; NE; EA; KE; SX; SC; CW; DV; SO; MO; EU	80-100	80-100	60-80
		Grey Gurnard	North Sea; Eastern Channel (IV IIIa VIId)	NO; NE; EA; KE; SX; SO; MO; EU	80-100	60-80	80-100
			Celtic Sea; W of Scotland (VI VIIa-c, e-k)	SC; CW; DV; SO; SX; KE; NW; MO; EU	60-80	60-80	80-100
		Red Gurnard	Western (VIId-k)	SC; CW; DV; SO; SX; KE; MO; EU	60-80	<60	80-100
		Other Gurnards	NE Atlantic	SC; CW; DV; SO; SX; KE; EA; NE; NO; NW; MO; EU	60-80	<60	80-100
		Haddock	Irish Sea (VIIa)	NW; MO; EU	80-100	60-80	80-100
			Western & Channel (VIIb-k); North Sea (IV IIIa)	NO; NE; SC; CW; DV; SO; SX; KE; MO; EU	80-100	80-100	80-100
		John dory	Western Approaches (VIIe-j VIIIa,b)	SC; CW; DV; SO; SX; KE; NE; NO; MO; EU	80-100	60-80	80-100
		Monkfish / Angler	North Sea ; Channel (IV IIIa VI)	NO; NE; EA; KE; MO; EU	60-80	60-80	80-100
			Western; Channel (VIIb-k, VIIIa,b,d)	SC; CW; DV; SO; SX; KE; NW; MO; EU	80-100	80-100	80-100
		Red mullet	North Sea; Eastern Channel (IV IIIa VIId)	NO; NE; EA; KE; SX; SO; MO; EU	80-100	80-100	80-100
			Celtic Sea; Western Channel (VIIe-g)	SO; KE; EA; NE; NO; MO; EU	80-100	<60	80-100
		Saithe	North Sea; West of Scotland (IV, IIIa VI)	SC; CW; DV; NO; NE; MO; EU	80-100	80-100	80-100
		Whiting	Irish Sea (VIIa)	NW; MO; EU	<60	<60	80-100
			Western (VIIe-k) & North Sea; Eastern Channel (IV VIId)	SC; CW; DV; SO; SX; KE; EA; NE; NO; MO; EU	80-100	80-100	80-100
	Demersal flatfish	Brill	North Sea; Channel (IV&IIIa VIId/e)	SC; CW; DV; SO; SX; KE; EA; NE; NO; NW; MO; EU	60-80	60-80	80-100
		Dab	North Sea (IV IIIa)	KE; EA; NE; NO; MO; EU	60-80	80-100	80-100
			Western(II, V, VI, VII (excl. d); VIII, IX, x, XII, (XIV); Channel (VIId)	CW; DV; SO; NW; CW; DV; SX; KE; MO; EU	60-80	<60	80-100
		Flounder	North Sea (IV IIIa)	KE; EA; MO; EU	60-80	80-100	80-100
			Irish Sea (VIIa/f); Channel (VIId/e)	NW; CW; DV; SO; SX; KE; MO; EU	60-80	<60	80-100
		Halibut	North Atlantic	NO; NE; MO; EU	60-80	<60	80-100
		Lemon sole	North Sea; Eastern Channel (IV IIIa VIId)	SO; SX; KE; EA; NE; NO; MO; EU	60-80	80-100	80-100
			Western; Channel (VIIa/f/e)	SC; CW; DV; SO; MO; EU	60-80	80-100	80-100
		Megrim	Celtic Sea; West of Scotland (VIIb-k & VIIIa,b,d)	SC; CW; DV; MO; EU	80-100	80-100	80-100
		Plaice	North Sea (IV); Western Channel (VIIe); Irish Sea (VIIa); Eastern Channel (VIId)	KE; EA; NE; NO; NW; SX; SO; DV; CW; MO; EU	80-100	80-100	80-100
			Celtic Sea (VII f/g)	SC; CW; DV; MO; EU	<60	60-80	80-100
		Sole	Irish Sea (VIIa)	NW; MO; EU	<60	<60	80-100
			Celtic Sea (VIIf/g); Western Channel (VIIe); Eastern Channel (VIId); North Sea (IV)	SC; CW; DV; SO; SX; KE; NO; NE; EA; MO; EU	80-100	80-100	80-100
		Turbot	North Sea (IV & IIIa); Channel (VIId/e)	SC; CW; DV; SO; SX; KE; SC; NO; NE; EA; MO; EU	60-80	60-80	80-100
			Irish Sea (VIIa)	NW; MO; EU	60-80	<60	80-100
		Witch	North Sea (IV IIIa VIId)	NO; NE; MO; EU	60-80	80-100	80-100
			Irish Sea (VIIa)	NW; MO; EU	60-80	<60	80-100
			Western Approaches (VIIf/e)	SC; CW; DV; MO; EU	60-80	80-100	80-100
	Pelagic finfish	Horse mackerel	Western Stock	CW; DV; MMO; EU	80-100	60-80	60-80
			North Sea	SX; SO; KE; NE; NO	60-80	60-80	60-80
		Sprat	Channel (VIId,e); North Sea (IV)	CW; DV; SX; KE; MMO; EU	60-80	60-80	60-80
	Elasmo-branchs	Blonde ray	North Sea; Channel (Iva, VIId/e); Irish & Celtic Sea (VII a/f/g)	SX; KE; EA; NE; NO; SC; CW; DV; MO; EU	60-80	<60	60-80
		Cuckoo ray	North Sea; Channel (Iva IIIa VIId)	SC; CW; DV; SO; SX; KE; EA; NE; NO; MO; EU	80-100	60-80	80-100
			Irish Sea & Celtic Sea (VIIa/f/g)	SC; CW; DV; MO; EU	80-100	<60	80-100
		Small-eyed ray	Channel (VIId/e)	SC; CW; DV; SO; SX; KE; MO; EU	60-80	<60	60-80
			Celtic Sea (VIIf/g);	SC; CW; DV; MO; EU	80-100	60-80	80-100
		Spotted ray	North Sea; Eastern Channel (IV VIId); Irish & Celtic Sea (VIIa/f/g)	SO; SX; KE; EA; NE; NO; SC; CW; DV; MO; EU	80-100	60-80	80-100
		Thornback ray	Irish Sea & Celtic Sea (VIIa/f/g); North Sea; Channel (Iva IIIa VIId/e)	SC; CW; DV; SC; SO; SX; KE; EA; NE; NO; MO; EU	80-100	60-80	80-100
		Smooth-hound		SC; CW; DV; SO; SX; KE; EA; NE; NO; NW; MO; EU	80-100	60-80	60-80
	Cephalopods	Cuttlefish	Channel	SC; CW; DV; SO; SX; KE; EA; MMO	60-80	60-80	80-100
		Squid spp.		SC; CW; DV; SO; SX; EA; NE; NO; MMO; EU	60-80	60-80	80-100
	Crustacea	Brown shrimp		EA; NE	80-100	<60	80-100
				NW; CW; DV	<60	<60	80-100
		Nephrops		NW, NE; NO; MO; EU	60-80	<60	80-100
Dredges	Bivalves	Scallop		SC; DV; SO; SX; KE; NW; CW; MMO; EU	80-100	60-80	80-100
Static nets	Demersal Finfish	Hake	Northern Stock (IIIa IV VI VII VIII a/b	SC; CW; DV; SO; SX; KE; NE; NO; NW; MO; EU	80-100	80-100	80-100
		Ling	Southern (IIIa IVa VI VII VIII IX XII XI	SC; CW; DV; SO; SX; KE; EA; NE; NO; NW; MO; EU	60-80	80-100	80-100
		Grey mullet	Channel and North Sea (IV VII d-f)	SC; CW; DV; SO; SX; KE; EA; NE; NW; MO; EU	60-80	<60	80-100
		Pollack		KE; NE; NO; MO; EU	60-80	60-80	80-100
				SC; CW; DV; SO; SX; KE; NW; MO; EU	60-80	60-80	80-100
		Pouting		SC; CW; DV; SO; SX; KE; EA; NE; MO; EU	60-80	<60	80-100
	Pelagic Finfish	Herring	North Sea Autumn Spawners	K&E; EA; NE; NO;	80-100	80-100	80-100
Encircling nets	Pelagic finfish	Anchovy	Southwest	CW; DV; MMO; EU	60-80	60-80	<60
		Pilchard	Bay of Biscay	CW; DV; EA?; MMO; EU	60-80	60-80	80-100
Hooks	Pelagic finfish	Mackerel	NE Atlantic	MMO; EU	80-100	<60	60-80
Traps	Crustacea	Brown crab		CW; DV; SC; SX; KE; EA; NE; NO; NW; MMO; EU	60-80	<60	80-100
				CW; DV; SC; SO; MMO; EU	<60	<60	80-100
		Spider crab		CW; DV; SC; SO; MMO; EU	<60	<60	80-100
		Velvet crab		CW; DV; SC; SO; SX; KE; NO; NE; EA	<60	<60	80-100
		Crawfish		CW; SC; DV; MMO	60-80	<60	80-100
		Lobster		CW; DV; SC	60-80	<60	80-100
				KE; E; NE; NH; NE; KE; SX; SO; MMO	<60	<60	80-100
	Gastropod	Whelk		EA; NE; SX; KE; SO; DV; MMO	60-80	<60	80-100

The approach to the retained component has been to assess the Unit of Certification i.e. main gear type[2] based on operation at a national (English) level, therefore the assessment is applicable to UK vessels operating within both inshore and offshore English waters (i.e. inside and outside 6 nm). Therefore the scores presented in the summary table 4.1.1 are applicable at an English national level and within all IFCAs.

A first level analysis was undertaken to identify the 'main' retained species e.g., those that constitute more than 5% of the total catch by weight, are of particular value to the fishery or are particularly vulnerable. Based on this, a number of species / fisheries were screened out as 'minor' retained species as follows:

Table 4.1.2: Species not qualifying as 'main' bycatch species

Species / Stock	Reason for being classed as minor retained species
Black sea bream (*Spondyliosoma cantharus*): North Sea and Channel (IV VII d/e)	< 5% of retained catch (towed gears)
Carpet shell clam (*Venerupis decussate* or *Tapes decussate*): Poole Harbour	Rarely retained in non-target fisheries
Manila clam (*Tapes philippinarum*): Poole Harbour	Rarely retained in non-target fisheries
Cockle (*Cerastoderma edule*): Cumbria, Morecombe Bay, Ribble, Wirral, Thames Estuary, Exe Estuary, Avon Estuary, Teign Estuary, Dart Estuary, Humber, Poole Harbour, Solent, Portsmouth, Wash	Rarely retained in non-target fisheries
Mussel (*Mytilus edulis*): Exe Estuary, Wash, Dart Estuary, Yealm Estuary, Teign Estuary, Plymouth Sound, Taw-Torridge Estuary, Northeast, Fenham Flat, Dee, Heysham Flat, Morecombe Bay, Wirral	Rarely retained in non-target fisheries
Native oyster (*Ostrea edulis*): Kent & Essex, Chichester Harbour, Southern, Eastern	Rarely retained in non-target fisheries
Pacific oyster (*Crassostrea gigas*): Channel	Rarely retained in non-target fisheries
Razorshell (*Ensis ensis*): NO LANDINGS	Little target or bycatch landings
Razorshell (*Ensis directus*): Wash	Rarely retained in non-target fisheries
Shore crab (*Carcinus maenus*): NO LANDINGS	Rarely retained in non-target fisheries
Periwinkle (*Littorina littorea*): Northumberland, Northeast, Eastern, Kent and Essex, Sussex, Southern, Devon & Severn, Cornwall, Scilly & Northwest	Rarely retained in non-target fisheries

If it can be demonstrated that a particular fishery undergoing assessment does not have any 'main' retained species – i.e. gear selectivity is such that no retained bycatch species constitutes more than 5% of the catch (or if less than 5% qualifies as main on account of vulnerability) then the fishery would achieve a score of at least SG80 when scoring retained species outcome (and likely management too). The scoring discussed in the next sections of this report is therefore predicated on these species being qualified as 'main'.

[2] As each species may be caught by a variety of different gears, for simplicity this pre-assessment has assigned a major gear type to which the species is most vulnerable as a retained species.

4.1.1 Retained Species: Outcome Status (PI 2.1.1)

This PI examines the impact of the fishery outcome status of the main retained species. The four scoring issues include the *retained species stock status* (SG60, SG80 & SG100), *target reference points* (SG100), *recovery and rebuilding* (SG60 & SG80) and *measures if poorly understood* (SG60).

It should be noted that there is a strong link between the scoring for a given stock under Principle 1 in this pre-assessment and that same species if considered as a retained bycatch. Generally speaking the scoring thresholds and requirements for a species when being scored as a bycatch species are lower than when being scored as a target species. Additionally, under principle 2 only the impact of the gear under certification is considered, whereas under principle 1 the cumulative impact on the stock of all fisheries mortality is considered. As a result, whilst the scoring for the stock under principle 1 provides the foundation for that same stocks scoring when considered as a bycatch retained, there is the possibility for scores to be higher under principle 2 than under principle 1.

As in the P1 assessment, in the cases where ICES stock assessments have been conducted, or the stock status is reasonably well known, the pre-assessment followed the standard MSC methodology. However in the majority of stocks lacking stock assessment where it was not possible to quantitatively determine the impact[3] of the assessed fishery on the P2 species, each species / stock combination underwent the PSA (productivity / susceptibility analysis) component of the risk-based framework (RBF) methodology. Although this was used for the same species / stock combinations as when applied in P1, this particular analysis, whilst using the same productivity scoring, looked at the susceptibility of the species a*t the fishery level* and *for the main gear type* only (P1 looks at the cumulative impact of all gear types and fisheries over the whole of the stock's distribution).

The results of the PSA are shown in Appendix D. Whilst the overall outcome scores are discussed by gear type below, it is worth briefly examining the patterns that emerged from the PSA analysis:

Productivity: elasmobranch species, especially rays, performed poorly in the productivity analysis. Many are high trophic level species with a low fecundity and large size at maturity. Blonde ray, thornback and small-eye rays did particularly badly in the overall PSA due to their shallow-water preferences which makes them particularly vulnerable to inshore fisheries.

Susceptibility: the key variable for susceptibility of these inshore fisheries is the extent to which inshore fishing effort overlaps with the distribution of the whole stock. The other elements of susceptibility – vertical overlap, selectivity and post-capture mortality were less influential (for instance, since this is for retained species it was presumed that post-capture mortality for all retained species is high). Therefore intertidal or predominantly shallow-water (e.g., <10 m) species fared poorly, as it was presumed that English inshore waters represented at least 30% of their overall species distribution. Many of these were non-quota shellfish or crustaceans. Most of the quota species did better in the susceptibility component, mainly because they have widespread stocks, most of which are out of reach of the inshore fisheries.

In line with all the PIs under Principle 2, this assessment has taken place primarily at a gear level. The following sections examine how the different stocks fared on a gear by gear basis.

4.1.1.1 Towed gears

Demersal finfish: the majority of species would be likely to pass with conditions (e.g., 60-80) or unconditionally (e.g., 80-100), see table overleaf. The one exception that might not be currently expected to meet SG60 is Irish Sea (VIIa) whiting, thus affecting the certification of towed gear

[3] By impact, we mean changes to the population size, reproductive capacity, age / size / sex structure and / or geographic range.

fisheries in NW-IFCA. The status of whiting is not certain, but is currently at a low level and likely to be well below Blim. Cod stocks elsewhere are in better condition and are likely to pass at P2 level. This includes the North Sea (IV) and Eastern Channel (VIId) stock that although below its current limit reference point, is in recovery and current management measures are expected to ensure that these inshore fisheries do not hinder their recovery. Haddock (all areas), red mullet (all areas); John Dory (all areas); saithe (IV), grey gurnard (IV, IIIa & VIId) and whiting (VIIk, VIId & IV) are also all in good condition and likely to exceed SG 80 for P2.2.1. Other species such as bass, black sea bream, other gurnards and North Sea monkfish are less certain, but should pass with conditions.

Table 4.1.3: Scores for PI 2.1.1 (retained species status) for demersal finfish retained in towed nets

Species	Management Authority(ies)	2.1.1: Status
Bass	SC; CW; DV; SO; SX; KE; EA; NE; NO; NW; MO; EU	60-80
Cod	NW; MO; EU	60-80
	NO; NE; EA; KE; SX; SC; CW; DV; SO; MO; EU	80-100
Grey Gurnard	NO; NE; EA; KE; SX; SO; MO; EU	80-100
	SC; CW; DV; SO; SX; KE; NW; MO; EU	60-80
Red Gurnard	SC; CW; DV; SO; SX; KE; MO; EU	60-80
Other Gurnards	SC; CW; DV; SO; SX; KE; EA; NE; NO; NW; MO; EU	60-80
Haddock	NW; MO; EU	80-100
	NO; NE; SC; CW; DV; SO; SX; KE; MO; EU	80-100
John dory	SC; CW; DV; SO; SX; KE; NE; NO; MO; EU	80-100
Monkfish / Angler	NO; NE; EA; KE; MO; EU	60-80
	SC; CW; DV; SO; SX; KE; NW; MO; EU	80-100
Red mullet	CW; NO; NE; EA; KE; SX; SO; MO; EU	80-100
	SO; KE; EA; NE; NO; MO; EU	80-100
Saithe	SC; CW; DV; NO; NE; MO; EU	80-100
Whiting	NW; MO; EU	<60
	SC; CW; DV; SO; SX; KE; EA; NE; NO; MO; EU	80-100

Demersal flatfish: like demersal finfish, the demersal flatfish stocks were also mainly likely to pass with conditions e.g., (60-80). They are likely to be retained catch in inshore trawl fisheries as well as beam trawls, and may also be caught in bottom-set gill and trammel nets. The two stocks that might not be expected to meet SG60 are the Celtic Sea plaice and the Irish Sea sole. In the case of Celtic Sea (VII f/g) plaice in SW England (e.g., the Scillies and the northern coasts of Cornwall and Devon), the stock has been below reference points for some time, with a continuing high level of effort. The Irish Sea (VIIa) sole stock has been below Blim since 2006 and fishing morality – whilst stable – remained well above FMSY. It is therefore outside limits and there are no measures within the bycatch fishery (that can be expected to ensure that rebuilding takes place. This said, sole landings by in the NW IFCA area over 2010 were less than 10 tonnes, so it may well not be a main bycatch in most fisheries.

A number of plaice and sole fisheries also did well in the retained species status assessment. The Irish Sea (VIIa) and channel (VIId & VIIe) plaice stocks are increasing and fishing mortality much reduced from historic highs. With the low landings in the NW (c. 88 t in 2012), this fishery is highly unlikely to impact the Irish Sea stock. In contrast plaice is an important retained species all along the channel and whilst fishing mortality remains high, the stock is well above BMSY. Similarly sole landings along the channel coast (which include the certified gillnet fishery in Hastings in VIId) are

high but the stock biomass is healthy and above BMSY. The North Sea sole stock is also above BMSY, despite fishing mortality remaining above FMSY and is also likely to pass without conditions for P2.1. The Celtic Sea sole stock is also in good condition, but fishing mortality has been below FMSY for some years.

Table 4.1.4: Scores for PI 2.1.1 (retained species status) for demersal flatfish retained in towed nets.

Species	Management Authority(ies)	2.1.1: Status
Brill	SC; CW; DV; SO; SX; KE; EA; NE; NO; NW; MO; EU	60-80
Dab	KE; EA; NE; NO; MO; EU	60-80
	CW; DV; SO; NW; CW; DV; SX; KE; MO; EU	60-80
Flounder	KE; EA; MO; EU	60-80
	NW; CW; DV; SO; SX; KE; MO; EU	60-80
Halibut	NO; NE; MO; EU	60-80
Lemon sole	SO; SX; KE; EA; NE; NO; MO; EU	60-80
	SC; CW; DV; SO; MO; EU	60-80
Megrim	SC; CW; DV; MO; EU	80-100
Plaice	KE; EA; NE; NO; NW; SX; SO; DV; CW; MO; EU	80-100
	SC; CW; DV; MO; EU	<60
Sole	NW; MO; EU	<60
	SC; CW; DV; SO; SX; KE; NO; NE; EA; MO; EU	80-100
Turbot	SC; CW; DV; SO; SX; KE; SC; NO; NE; EA; MO; EU	60-80
	NW; MO; EU	60-80
Witch	NO; NE; MO; EU	60-80
	NW; MO; EU	60-80
	SC; CW; DV; MO; EU	60-80

Pelagic finfish: the two pelagic finfish species that might be retained by other fisheries are horse mackerel and sprat. They are mostly a bycatch of other mid-water trawl fisheries, usually targeting mackerel and herring. Despite a poor knowledge of stock trends, their innate high productivity and the low spatial overlap of inshore fisheries with their wide pelagic habitat means that they are likely to pass at SG60, albeit with some conditions. The one exception is the western stock of horse mackerel which is likely to pass unconditionally.

Table 4.1.5: Scores for PI 2.1.1 (retained species status) for pelagic fish retained in towed nets.

Species	Management Authority(ies)	2.1.1: Status
Horse mackerel	CW; DV; MMO; EU	80-100
	SX; SO; KE; NE; NO	60-80
Sprat	CW; DV; SX; KE; MMO; EU	60-80

Elasmobranchs: as a reflection of their potential vulnerability to fishing (which is reflected in the PSA scoring), there has been an increased level of research focus on elasmobranchs in EU waters. This suggests that for most species stocks are stable or increasing, and thus would probably pass as retained bycatch species. However some, such as blonde rays (all areas) and small-eyed rays (VIId/e) may incur conditions due to their less certain status.

Table 4.1.6: Scores for PI 2.1.1 (retained species status) for elasmobranchs retained in towed nets

Species	Management Authority(ies)	2.1.1: Status
Blonde ray	SX; KE; EA; NE; NO; SC; CW; DV; MO; EU	60-80
Cuckoo ray	SC; CW; DV; SO; SX; KE; EA; NE; NO; MO; EU	80-100
	SC; CW; DV; MO; EU	80-100
Small-eyed ray	SC; CW; DV; SO; SX; KE; MO; EU	60-80
	SC; CW; DV; MO; EU	80-100
Spotted ray	SO; SX; KE; EA; NE; NO; SC; CW; DV; MO; EU	80-100
Thornback ray	SC; CW; DV; SC; SO; SX; KE; EA; NE; NO; MO; EU	80-100
Smooth-hound	SC; CW; DV; SO; SX; KE; EA; NE; NO; NW; MO; EU	80-100

Cephalopods: although the two cephalopod species – cuttlefish and squid – achieved a full pass using the RBF in Principle 1, the PSA with P2.1.1 gave a less certain result, indicating that these species would probably pass, but maybe with some conditions. However, given that these fisheries are highly seasonal, area-specific and limited to the Channel fisheries, their inclusion as main retained catch in towed fisheries is both patchy and uncertain, so may well not be in issue in many trawl fisheries.

Table 4.1.7: Scores for PI 2.1.1 (retained species status) for celphalopods retained in towed nets

Species	Management Authority(ies)	2.1.1: Status
Cuttlefish	SC; CW; DV; SO; SX; KE; EA; MMO	60-80
Squid spp.	SC; CW; DV; SO; SX; EA; NE; NO; MMO; EU	60-80

Crustacea: brown shrimp scored badly in the PSA, mainly due to the high level of aerial and vertical overlap between some towed gears, especially beam trawls, with their inshore habitat. However this result is considered to be highly precautionary, and that in some cases (esp. on the Wash and Humber areas), inshore fisheries might well not impact on stock status and that measures might be taken that would be expected to reduce bycatch to an acceptable level.

Table 4.1.8: Scores for PI 2.1.1 (retained species status) for crustaceans retained in towed nets

Species	Management Authority(ies)	2.1.1: Status
Brown shrimp	EA; NE	80-100
	NW; CW; DV	<60

4.1.1.2 Dredges

Bivalves: the only likely main retained bivalve bycatch in dredges is likely to be scallops. A reasonably productive species, they have a widespread distribution in waters 10 – 110 m and thus have reduced aerial overlap with the inshore fisheries. There may also be some level of selectivity in the case of hydraulic dredges that eliminate scallop bycatch. As a result the PSA indicated an unconditional pass (SG80) for retained species for all the dredge fisheries with scallop bycatch.

4.1.1.3 Static nets

Demersal finfish: pollock, grey mullet, pouting and ling bycatch from all these fisheries are likely to be within biological limits, albeit with some possible conditions on establishing a strategic approach to bycatch management where necessary.

Table 4.1.10: Scores for PI 2.1.1 (retained species status) for demersal finfish retained in static nets

Species	Management Authority(ies)	2.1.1: Status
Hake	SC; CW; DV; SO; SX; KE; NE; NO; NW; MO; EU	80-100
Ling	SC; CW; DV; SO; SX; KE; EA; NE; NO; NW; MO; EU	60-80
Grey mullet	SC; CW; DV; SO; SX; KE; EA; NE; NW; MO; EU	60-80
Pollack	KE; NE; NO; MO; EU	60-80
	SC; CW; DV; SO; SX; KE; NW; MO; EU	60-80
Pouting	SC; CW; DV; SO; SX; KE; EA; NE; MO; EU	60-80

4.1.1.4 Encircling nets

Pelagic finfish: both anchovy and pilchards are important targeted catches in the SW and may be a bycatch in some herring fisheries. The PSA suggested that a conditional pass (SG60) is likely with both species, but this is considered precautionary as volumes are likely to be low and may not be classed as main bycatch. This is supported by the fact that the Cornish sardine and various Bay of Biscay purse seine fisheries for pilchard are already certified as target species.

Table 4.1.11: Scores for PI 2.1.1 (retained species status) for pelagic finfish retained in encircling nets.

Species	Management Authority(ies)	2.1.1: Status
Anchovy	CW; DV; MMO; EU	60-80
Pilchard	CW; DV; EA?; MMO; EU	60-80

4.1.1.5 Traps

Crustacea: with the exception of crawfish, based on the RBF the majority of these inshore fisheries - where crab or lobster are likely to be main bycatch – find it difficult to meet SG60 at P2.1.1 level. Although they are generally reasonably productive species, there is a high degree of vertical and aerial overlap which depressed the PSA scores. This said, the only trap fisheries not targeting crabs or lobsters are those for whelks and cuttlefish, where the bycatch of these commercial species is low, with the exception of spider crab (Lawler and Vause, 2009). Therefore crustacean bycatch is not likely to be an issue with the majority of fisheries in English inshore waters. Brown crab bycatch in all areas except the North Sea should pass on a conditional basis, whilst by caught lobster in the SW could pass without conditions.

Table 4.1.12: Scores for PI 2.1.1 (retained species status) for shellfish retained in pots & traps

Species	Management Authority(ies)	2.1.1: Status
Brown crab	CW; DV; SC; SX; KE; NW; MMO; EU	60-80
	EA; NE; NO; MO; EU	<60
Spider crab	CW; DV; SC; SO; MMO; EU	<60
Velvet crab	CW; DV; SC; SO; SX; KE; NO; NE; EA	<60
Crawfish	CW; SC; DV; MMO	60-80
Lobster	CW; DV; SC	60-80
	KE; E; NE; NH; CW; DV; SC; NE; KE; SX; SO; MMO	<60

Gastropods: the whelk populations in English waters are not well known. The RBF PSA suggests that any fishery with a main whelk bycatch would probably pass at SG60, but with conditions. In practice whelk landings are all from targeted fisheries and thus would only very rarely be retained as a bycatch.

Table 4.1.13: Scores for PI 2.1.1 (retained species status) for shellfish retained in pots & traps

Species	Management Authority(ies)	2.1.1: Status
Whelk	EA; NE; SX; KE; SO; DV; MMO	60-80

4.1.1.6 Synthesis

It is worth re-iterating that if it can be demonstrated that a particular fishery undergoing assessment does not have any 'main' retained species then the fishery would achieve a score of at least SG80 when scoring retained species outcome.

When assessing those species which do qualify as 'main' the RBF, in the form of a PSA, was used in about 80% of the assessment of this PI, as there was little formal stock information on many of these non-pressure stock species. In many cases this resulted in a conditional pass, mainly as the inshore fishery tended to have limited aerial overlap with the wider distribution of these stocks. However in the case of shallow water species, many of the PSA analyses indicated a potential impact on retained species stocks and they scored less than the SG 60.

It should be stated that many of the PSA analyses are considered to be highly precautionary and may not reflect the actual impact of bycatch in individual inshore fisheries.

4.1.2 Retained Species: Management (PI 2.1.2)

This PI examines the management strategy undertaken to ensure that the fishery does not pose a risk of serious or irreversible harm to the main retained species. The four scoring issues include the *level of management in place* (SG60, SG80 & SG100), *evaluation of this management strategy approach* (SG60, SG80 & SG100), *the level of successful implementation of this strategy* (SG80 & SG100) and *whether this strategy is achieving its overall objective* (SG100).

To obtain an unconditional pass (>80) it must be demonstrated that there is a partial strategy in place (if necessary); and for a conditional pass (>60) there must be measures in place (if necessary). There are established definitions for what constitutes 'measures', 'partial strategy' and 'strategy' which are detailed within the MSC Certification Requirements and Guidelines. To provide context, a partial strategy may be a series of measures not specifically designed to manage retained species, but indirectly work to achieve this, for example a mesh size that is designed to limit the minimum landing size of a target species may also serve to reduce the level of bycatch. The qualifier 'if necessary' is in place for those fisheries that are known not to impact the status of retained species and therefore do not require management.

It should be borne in mind that many inshore fisheries are by their nature mixed fisheries. As such, the MSC distinction of a target and a bycatch species is artificial, as the bycatch may well form an economically important component of the catch, however the requirement that all species caught are scored somewhere in the assessment (either as a target under P1 or as a bycatch under P2) remains.

4.1.2.1 EU and National level management

Many retained bycatch species are managed at national level. In the case of many inshore species, this is mostly through output controls such as a total allowable catch (TAC) quota allocation and minimum landing sizes. National level input controls, such as time at sea restrictions, are used more of offshore fisheries.

Key pieces of UK legislation that regulate target and retained bycatch alike include the following:

1. **Sea Fish (Conservation) Act 1967:** This Act contains provisions relating to:
   - Restriction on commercial use of undersize fish
   - Size limits for fish (set under EU Council Regulation 850/98).
   - Regulation of nets and other fishing gear
   - Power to restrict fishing for sea fish
2. **Sea Fisheries (Shellfish) Act 1967 (as amended).** This Act provides for the establishment of several and regulating orders to manage shellfish stocks including crustaceans and molluscs. Provisions include the following:
   - Power to make orders for shellfish
   - Power to grant several and regulating orders
   - Regulation on the taking and sale of certain crabs and lobsters including a prohibition on taking or selling egg bearing or soft shelled edible crab.
3. **Fisheries Act 1981**. This Act provides for the regulation of sea fishing and the enforcement of European fisheries regulations in the U.K. The Sea Fish Industry Authority is also constituted under its provisions and other notable sections relate to fish farming and the regulation of whaling.

4.1.2.2 IFCA level management

In contrast to much of the output-oriented nature of national level management, inshore fisheries management measures tend to be much more input-orientated, as this tends to be simpler to set and enforce. The IFCA Byelaws have been reviewed and these together with information obtained during the site visits, have informed the IFCA level assessment. Alternative scoring is presented only where IFCA management has made material difference to the pre-assessment score given at a national level. The IFCA Byelaws result in additional management over and above that assessed at a national scale, and therefore will only lead to an increase in scores compared to the national level management assessment.

It should be noted that the current IFCA bylaws are based on the previous SFC byelaws with an appropriate geographic adjustment where necessary. These byelaws are currently undergoing a complete review at present and this analysis will need to be reviewed when this becomes available.

There are four key management approaches taken by the IFCAs to ensuring that the stocks of both target and bycatch species are not impacted by these inshore fisheries. These are summarized as follows and examined in further detail below:

1. Minimum Landings Sizes (MLS) restrictions.
2. Gear limitations or measures to increase selectivity.
3. Spatial and temporal restrictions on fishing gear use.
4. Other technical and regulatory measures.

Minimum Landings Sizes (MLS). MLS measures ensure that catches are restricted to market size individuals only, with the intention that juvenile or undersize animals are able to escape alive. As mentioned above, there are EU level MLS limits for most finfish and shellfish set out in Annex XII of Regulation 850/98. Undersized animals must be returned immediately to the sea. All the IFCAs have set MLS for key finfish and shellfish species that are similar to the EU requirements, although some differences exist, especially for crustaceans such as lobster and crab species (e.g., male edible crab in Cornwall and Devon are only permitted to be landed at 160 mm, not the 140 mm EU requirement).

Gear limitations or measures to increase selectivity. Allied to the MLS restrictions above, gear limitations will change the selectivity and efficiency of fishing gears. This includes minimum mesh sizes for static gears, cod end meshes for towed gears, the use of escape gaps and panels in traps and nets respectively, as well as mandatory specifications for dredges and other mechanical equipment. Escape gaps in lobster parlour pots are required on the bother with Devon in Cornwall, throughout the Devon & Severn area, in Kent & Essex and the North Eastern IFCAs. Some of these measures may be established for certain areas within an IFCA e.g., the gillnet mesh size restrictions in the Manacles and Runnelstone areas off Cornwall. Gear limits might also include a limit on the number of units a particular vessel might operate e.g., the number of dredges that might be towed alongside or the number of pots that might be set by a permit holder. The only IFCA with a pot limit is Northumberland IFCA (800 pots per permit).

Spatial and temporal restrictions for gear use. *Spatial restrictions* are a common measure used for inshore fisheries to protect sensitive habitats and have the indirect benefit of providing conservation or refuge areas for both mobile and sessile animals. They are particularly popular for strongly habitat associated shellfish such as scallops, as well as conserving sensitive habitats from towed gears. As such, they are usually designated for certain gear types, but may also have vessel length or power restrictions. A common spatial restriction is on fixed engines in areas that might result in the over-exploitation of a species that frequents a narrow geographic zone, such as migrating salmon passing through estuarine areas. *Temporal restrictions* are used to avoid aggregations of vulnerable species at key times in their life cycle or – such as the time restrictions on scallop dredging in Devon – to reduce overall effort on scallops and their bycatch. Some temporal restrictions can be triggered by stock depletion limits (esp. for bivalves) or by other triggers such as excess seabird bycatch in the St

Ives gillnet fishery in Cornwall. These temporal restrictions may ban either access to an area (e.g., depth or seaward distance-delimited areas, nature conservation zones or known spawning or nursery areas), the use of certain gear types or the fishing for a certain species (e.g., shellfish bed closures).

Other measures. Various other technical and regulatory measures might be used to limit the impact of fisheries on fish and shellfish stocks. This might include the permitting the use of certain gears to better manage fisheries (e.g., shellfish across all the IFCAS), bans on the landing of berried lobsters, restrictions in vessel length and power, and the prohibition of retained animals or certain uses e.g., as bait.

4.1.2.3 Retained Species Management

With the background of the scoring above, this following section provides some analysis of the fisheries and how they perform against the scoring guidelines.

Our approach has been to look first at the P1 scoring[4], which looks at the management of the whole stock unit, and then to consider the fisheries-specific measures in place in order to score P2.1.2. Our basic premise is that (i) this was only conducted for main bycatch species and (ii) that the P2.1.2 score will be equivalent or better than the stock-wide scores for both P1.2.1 and P1.2.2. In order to improve upon the P1 scores, the fishery must demonstrate that there are fisheries-level measures (SG 60), partial strategies (SG80) and full strategies (SG100) in place that warrant such an improvement.

Demersal finfish

Many of the quota species such as cod, haddock and whiting had unconditional passes (except for the Irish Sea VIIa stocks) due to the harvest strategy approaches taken in these mixed fisheries as part of the cod recovery plan, including restricted days at sea as well as quota-limited landings. A number of other species, mainly non-quota e.g., pollock, grey gurnard and the Irish Sea (VIIa) stocks of cod and haddock may also have partial strategies (e.g., meet SG 80) but there is not necessarily sufficient confidence that these are working, so are more likely to attract conditional passes. A small number of demersal fish species such as pouting, grey mullet and red gurnard are not managed at EU / national level and do not seem to have any effective measures in place at IFCA level may cause any fishery under assessment in which they are a main bycatch species to not meet the SG60 requirement.

Demersal flatfish

The majority of demersal flatfish are reasonably well managed and should achieve an unconditional pass as a retained bycatch species. These include all the plaice, sole, lemons sole stocks, as well as species like megrim. Whilst many of these would be conditional passes at P1 level, additional measures at fishery level, such as restrictions on trawl areas, limitations on vessel power and length, etc. see their scores improved at P2 level. Some species, namely turbot (North Sea and Channel), Celtic Sea plaice and North Sea and Channel brill may well pass at P2.1.2, albeit with conditions, mainly because they have effective TACs and some fisheries-level measures. However some species such as dab, flounder, halibut and Irish Sea stocks of sole, turbot and witch do not meet the SG60 requirement and do not appear to have any additional measures at IFCA level to justify meeting SG80.

Pelagic finfish

Herring is well managed at stock level, and whilst the harvest control strategy has not been fully evaluated, bycatch of this species should not be an issue. The majority of other small pelagic species should also pass, but are likely to require some form of conditions to ensure that a partial strategy is

[4] Specifically 1.2.1 Harvest strategy and 1.2.2 harvest rules and tools

established and is being implemented effectively. Given that many of these stocks are wide-ranging and of fished heavily in deeper waters outside the IFCA jurisdiction, it may be necessary to develop a strategy that ensures the relatively light inshore exploitation does not pose a risk to these stocks. The only species where a pass might not be possible in North East Atlantic mackerel, where the current uncertainty of quota allocation and the consequential risk to the stock at a wider level is not mitigated by any IFCA level management measures.

Elasmobranchs

As discussed earlier, many elasmobranchs are vulnerable to over-exploitation, both as a target and as a retained bycatch. Whist targeted in some fisheries, it is frequently landed as bycatch from mixed demersal fisheries. In P1, all the ray species did not reach the SG 60 score as there are no reference points and quota management has its flaws e.g., encourages regulatory discards where quotas are set too low. However, with the exception of cuckoo rays in the Irish and Celtic Seas, we suggest that the spatial and power restriction to bottom-trawl mixed fisheries in inshore waters means that conditional passes may be possible for most elasmobranchs. However these will need to be built into a more coherent strategies over the longer term.

Cephalopods

At P1 level both the Channel cuttlefish and the various squid species stocks all failed to reach SG60 for both P1.2.1 and 1.2.2 as they lack both any form of harvest strategy or control rules. However the consistent landings by inshore vessels would appear to suggest that additional measures may not currently be necessary, so a conditional pass may well be possible for both cuttlefish and squid bycatch. However this will require the development of a partial strategy, based on objective evidence that it will be effective, in order to reach the SG80 level. This might focus on the level and nature of exploitation, but also could consider indirect measures, such as enhancing recruitment through the preservation of eggs on traps.

Crustaceans

The crustacean fisheries all performed poorly in this assessment, with only brown crab in the Western Channel being considered as a possible conditional pass. All the other crab, lobster and brown shrimp stocks fail to reach the SG60 level, mainly due to the lack of confidence in the use of the MLS as a harvest control tool. This said, almost in all cases crustaceans are a target catch and rarely a main bycatch, and thus this negative assessment is unlikely to impact on the certification of other fisheries. It could be argued that the more precautionary MLS by some IFCAs e.g., Cornwall may be considered as an additional, fisheries-specific measure, but the current unrestricted effort (with the notable exception of pot limits in the Northumbrian IFCA) suggests that this precautionary stance is warranted.

Bivalves

The only bivalves that might appear as a main bycatch are scallops. All four scallop stocks fail to reach SG60 for P1.2.1 and 1.2.2, again due to uncertainty over the effect of the MLS restrictions on stock status. However all the IFCAs have spatial and / or temporal limits on the use of dredges and bottom trawls and this may allow the SG60 level to be reached e.g., a conditional pass. This will depend upon the particular gear and fishery involved, and the potential for developing a partial strategy to ensure that the level of bycatch does not pose a risk to these stocks.

Gastropods

Like the crustacean trap fisheries, apart from the MLS (which is higher than size at maturity) there are no controls or restrictions on whelk fishing mortality. As such it fails both P1.2.1 and P1.2.2. There do not seem to be any additional fishery-specific measures for whelks at IFCA level, and thus any significant whelk bycatch is unlikely to achieve SG60 and thus might fail the associated fishery. This said, it is not thought that whelks form a main bycatch for many fisheries, so this poor performance may not be an issue in terms of whelk as a bycatch.

4.1.3 Retained Species: Information / Monitoring (PI 2.1.3)

Performance indicator 2.1.3 requires that '*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 species*'.

Information on volume and nature of retained, non-target species landed in England is collected at a number of different levels:

Registration of Buyers and Sellers (RBS) Scheme: the RBS Scheme has been fully operational in England since 2005 under 'The Registration of Fish Buyers and Sellers and Designation of Fish Auction Sites Regulations 2005 (England)'. This legislation requires that all buyers and sellers of first sale fish are registered and that all auction sites of first sale fish are designated. In this, *registered buyers* (e.g., individuals, partnerships, corporate bodies or companies) who buy fish direct from a vessel or an agent have to submit buyer's sales notes to the local MMO office within 48 hours (24 hours if electronic[5]) of the sale taking place. Likewise *registered sellers* (those selling first sale fish by competitive bidding at a designated auction site) are required to complete a seller's sales note and submit them to the local MMO office within 48 hours (24 hours if electronic) of the sale taking place. In addition, buyers and sellers are also required to keep records of each purchase and sale. These records have to be made available for inspection at all reasonable times and kept for a minimum of two years.

RBS returns includes information on the vessel, the volume and value of each species sold as well as the ICES rectangle where the catches were made. These data are then compiled by MMO and where appropriate, cross-referenced with logbook and inspection data where a 10% difference is tolerated. In theory, this should provide accurate and verifiable information on the catch of all retained species landed in England (and thus meet SG100 for the first scoring element) but in practice there are instances of non-compliance, such as direct sales by unregistered sellers and to un-registered buyers. This might be particularly so for low volume, high value species such as lobsters and bass. However this may be mitigated by the incentive for fishermen to report landings to maintain an official track record (Callum Gough, MMO Penzance, pers. comm., 7 March 2013). This system is maintained by MMO and IFCAs are not provided direct access to the RBS data.

Shellfish License Entitlement Returns. At *IFCA level*, individual IFCA's are required to issue a permit to holders of a shellfish fishing entitlement, which can be awarded to registered fishing vessels <16 m. Anyone catching more than 25 crab and 5 lobster daily are considered as commercial fishers. These require that a monthly return showing accurate information regarding the weight in kilograms of lobster, crab, velvet crab and whelk taken from within the IFCA region, together with information on the types and number of fishing gear employed and the area fished. However in some cases e.g., NW IFCA this monthly shellfish return is only mandatory for vessels over 10 m, although <10 m vessels are covered by the national shellfish licensing scheme (see next). In Cornwall, the permit is given to any registered vessel, regardless of whether it has a shellfish entitlement on its fishing license. The threshold of 25 crabs/5 lobsters is the limit applied to vessels without sufficient track record during the qualifying period to obtain a shellfish entitlement. In this way, many of the smaller registered commercial vessels area able take a small but important catch of shellfish species without a shellfish entitlement.

At a *national level*, commercial fishing vessels targeting shellfish are required to submit a separate shellfish return. Since 2006 this has included vessels under 10 m in length - prior to this change it is thought there was substantial under-reporting of shellfish landings by Defra (Bannister, 2006). One issue with these data is that, whilst information on daily landings are requested, the data are aggregated within the database, thus reducing its value to fisheries managers. In addition, the

[5] Any business with a turnover of more than €200,000 must submit electronic returns

spatial resolution of the national shellfish returns are at ICES rectangle level, whilst IFCA returns are at a much finer scale. This is also complicated by the act that some boats fish both within and outside IFCA waters in the same trip, which may lead to mis-reporting of catch areas. There is currently effort to automate this process to improve its efficiency and resolution (see overleaf).

Box 1: Pilot project for automating <10 m shellfish data returns

A small working group made up of the Department for Environment, Food and Rural Affairs (Defra), the Centre for Environment, Fisheries and Aquaculture Science (Cefas), Marine Management Organisation (MMO) and inshore fisheries and conservation authorities (IFCAs) has been established to review data collected under the restrictive shellfish licensing system, which was introduced back in 2006. This is to ensure it meets the needs of fisheries managers and scientists and to provide them with the confidence to make management decisions which will safeguard these important fisheries, but also for the industry themselves.

As part of this, a pilot project involving a collaboration between Defra, Cefas, MMO and the Devon and Severn IFCA has recently been launched to explore automated methods for the capture of shellfish activity for the under 10 metre sector with the aim of streamlining the data capture process.

Two data collection systems are being trialled – one internet-based and the other a manually completed lottery ticket-style computer readable form. The pilot is being run over six months in conjunction with the South Devon and Channel Shellfishermen and results will be available in early 2013.

Source: MMO

Fisheries-specific recording: some English fisheries, such as the Cornish Sardine Management Association (CMSA) require logbook records of retained catches for their own management purposes. These may or may not be shared with the MMO.

Logbooks: as with the rest of the EU[6], English and UK fishing vessels over 10 m in length must submit a logbook of catches by species, volume[7], gear type and area with a permitted 10% tolerance for estimation errors. Vessels over 12 m are now only allowed to use electronic logbooks (e-logbooks) with daily transmissions for vessels. If the e-logbook systems should fail at sea, vessels must still report their catches dally. All fishing activity submitted electronically may be viewed by Royal Navy patrol vessels as well as fisheries administration and enforcement staff. The *CEFAS logbook scheme* was used to estimate net and line catch and effort by inshore vessels less than 10m (<10m) in size but in 2007, the logbook scheme was suspended due to Defra spending cuts.

In **summary**, with a combination of the RBS, and shellfish returns at both national and IFCA levels, the first element of the P2.1 SG80 (*qualitative information and some quantitative information are available on the amount of main retained species taken by the fishery*) should be easily exceeded in all cases, even if some under-reporting is taking place. Likewise in most fisheries there is sufficient information to support a partial strategy to manage the main retained species (third 2.1 scoring element), although in some cases (e.g., species with a high unaccounted recreational catch such as bass and black sea bream) they may only achieve the SG 60 level for this third element. In addition where either are extensive hand-gathering for some bivalve species e.g., cockles, these might also not reach the SG 80 level. However it was concluded that in all cases there is sufficient data to detect any increase in risk level (e.g., SG 80 for the fourth scoring element).

[6] See Council Regulation (EC) 1224/2009

[7] indicating quantities of each species caught & kept onboard above 50 kg live-weight equivalent

4.2 Discard Species

Section CB3.8.1 of the MSC certification requirements gives clear guidance on what should be considered Bycatch species under the MSC scheme. The MSC scheme requires that the impacts of the fishery on each potentially affected organism be evaluated according to criteria contained in one of four Components – (target stock, retained species, bycatch species or endangered, threatened or protected species). At the outset of any pre-assessment or full assessment, it must be decided under which component each species affected by the fishery will be considered. Each species must only be considered once and evaluation must take into account all effects e.g. capture related mortality (including discarding), as well as unrecorded fishery related mortality e.g. damaged/broken shells, dropouts from nets etc.

Many English inshore fisheries are mixed fisheries, which often target and capture a small number of main species but which may also capture a range of other species, many of which are marketable, incidentally. In assessing, which species were to be considered under the bycatch, PI for English inshore fisheries it became apparent that the majority of species with which the various fisheries interact are potentially saleable and are therefore retained and landed. In this regard therefore, most affected species have been considered as retained catch and are assessed at Principle 1 (target stock) and/or under the retained species PI of Principle 2. Furthermore, an additional number of species are considered as endangered, threatened and protected species and these are more appropriately considered under the ETP PI.

The MSC scheme considers bycatch as species in the catch that are never retained and which are discarded. While the pre-assessment process has not been able to confirm the full range of organisms that inshore fisheries may interact with, sufficient information is available to conclude that species of fish, sharks and rays and skates, marine mammals, birds, reptiles, molluscs and aquatic invertebrates are all impacted to varying degrees by different gear types in different areas.

Inshore fisheries are characteristically data deficient in many respects and there is a clear lack of basic information in relation to bycatch profiles for many English inshore fisheries. Both quantitative and qualitative data are only available in a limited number of cases – those fisheries best served with information include those specialized bivalve fisheries that are often subject to several or hybrid orders and are required to conduct appropriate assessments as part of a fishing plan in order to obtain annual fishing permits. These fisheries include many coastal shellfish dredge fisheries for oyster, mussels, cockles, where these take place within European Marine Sites. As part of the consenting process for these fisheries, fishers – through the IFCA's- are required to carry out appropriate assessments in advance of fishing in order to determine the likely scale of impact on the conservation features within any affected site. Outside of these fisheries, there are few quantitative studies on bycatch in inshore fisheries and very little specific data has been available to inform the pre-assessment.

4.2.1 Discarded Species: Outcome Status (PI 2.2.1)

Bycatch species are those species that are captured along with target species that are not retained and that are discarded as well as those that die because of unobserved fishing mortality where those species have not already been assessed under P1 as target species or under other components in Principle 2 (Retained or Endangered, Threatened and Protected species). Assessment teams are required to determine which bycatch species are considered 'main' and which are not ('minor') for scoring at SG60 and SG80. 'Main' for the bycatch outcome PI refers to the catch size and vulnerability of species caught. A species that comprises less than 5% of the total bulk catch by weight would normally be considered a 'minor' species (i.e. not 'main') unless it is of particular vulnerability or if the total catch in the fishery is very large.

As described in detail in the Stage 1 report, the MSC has sought to develop an alternative route to certification for small scale or data deficient fisheries where these are very often characterized by low level of data in relation to stock sizes and fisheries impacts. The Risk Based Framework (RBF) provides an alternative means for scoring some components of Principle 1 and Principle 2 and may thereby provide another route to certification in circumstances where information is not sufficient to allow scoring using the default assessment tree.

The RBF requires a fishery to clearly demonstrate low risk (either low intensity on a large scale population or a highly productive population with low susceptibility to capture). There are two main risk assessment tools which can be used: the first a low level precautionary analysis of the scale and intensity of the fishery and the likely consequence (Scale Intensity Consequence Analysis- SICA); the second a slightly more in depth analysis of species productivity against susceptibility to capture (Productivity Susceptibility Analysis - PSA). The PSA scores the species against key biological parameters to determine productivity (age at maturity, fecundity, tropic level, maximum size etc), and compares this against susceptibly of the species to be caught by a given gear (selectivity, spatial overlap etc). In practice SICA assessments are deliberately weighted to conclude high risk (given the low level of information). In most cases therefore the PSA analysis forms a more useful and insightful tool for use during pre-assessment.

For the bycatch outcome status PI (2.2.1) the fishery is evaluated for conformity with the requirement that 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. Conformity is evaluated by considering the fisheries interaction and performance under three scoring issues:

a. bycatch species stock status

b. recovery and rebuilding

c. measures in place if status is poorly understood

At SG80, the requirement for scoring issue a. is that main bycatch species are highly likely to be within biologically based limits. Scoring issue b. only becomes relevant where one or more bycatch species are outside of biologically based limits, in which circumstances scoring issue b. requires that there is a partial strategy of demonstrably effective mitigation measures in place such that the fishery does not hinder recovery and rebuilding of affected stocks.

In evaluating the performance of inshore fisheries in the context of bycatch, the analysis has focused on the most sensitive species that the fisheries are routinely believed to interact with and which are never retained during normal fishing operations. The approach taken identified those species meeting with the definition of bycatch on account of the likelihood that fishing causes some level of direct mortality combined with a consideration of the likely catch volume or vulnerability of species to fishing pressures. Using this approach a small number of species was identified as being potential bycatch (under MSC criteria) and these were selected for evaluation using risk-based methodologies. The list of fish bycatch species across all fisheries is quite small, although a range of invertebrate species may also be affected by fishing and a small number of these are included in the evaluation.

Bycatch species identified and the gear types with which they are believed to interact are as follows:

- Nursehound – *Scyliorhinus stellaris* (demersal and beam trawl, setnets, dredges, longline)
- Lesser spotted dogfish - *Scyliorhinus canicula* (demersal and beam trawl, setnets, dredges, longline)
- Dragonet - *Callionymus lyra* (demersal and beam trawl, setnets, dredges)
- Starry ray - *Amblyraja radiata* (demersal and beam trawl, setnets, dredges, longline)

- Smelt - *Osmerus eperlanus* (demersal trawl)
- Green shore crab - *Carcinus maenas* (pots, traps and creels)
- Swimming crab - *Liocarcinus spp*. (pots, traps and creels)
- Green sea urchin - *Psammechinus miliaris* (demersal trawls, beam trawls, dredges).
- Ocean quahog - *Arctica islandica* (demersal trawls, beam trawls, dredges)

A PSA analysis has been conducted for each species that a gear type is considered likely to interact with. The result for the PSA analysis for 2.2.1 by gear type and bycatch species is presented in Table 4.2.1.

Table 4.2.1: PSA Analysis for discard bycatch species by gear type.

		Productivity								Susceptibility					Summary		
Species	Gear	Average age at maturity	Average max age	Fecundity	Average max size	Average size at Maturity	Reproductive strategy	Trophic level (fishbase)	Total Productivity	Areal overlap	Vertical overlap	Selectivity	Post-capture mortality	Total (multiplicative)	PSA Score	Risk Category	MSC score
Green shore crab	pot/trap	1	1	2	1	1	2	3	*1.6*	2	3	2	1	*1.3*	**2.02**	Low	>80
Swimming crab	pot/trap	1	1	2	1	1	2	3	*1.6*	2	3	2	1	*1.3*	**2.02**	Low	>80
Lesser spotted dogfish	setnet	2	2	3	1	2	3	3	*2.3*	1	3	3	3	*1.7*	**2.82**	Med	60-80
Nursehound	setnet	2	2	3	2	2	3	3	*2.4*	1	3	3	3	*1.7*	**2.94**	Med	60-80
Lesser spotted dogfish	dredge	2	2	3	1	2	3	3	*2.3*	1	3	3	3	*1.7*	**2.82**	Med	60-80
Ocean quahog	dredge	3	3	3	1	1	1	3	*2.1*	2	2	3	2	*1.6*	**2.66**	Med	60-80
Nursehound	dredge	2	2	3	2	2	3	3	*2.4*	1	3	3	3	*1.7*	**2.94**	Med	60-80
Lesser spotted dogfish	dem trawl	2	2	3	1	2	3	3	*2.3*	2	3	3	2	*1.9*	**2.96**	Med	60-80
Nursehound	dem trawl	2	2	3	2	2	3	3	*2.4*	2	3	3	2	*1.9*	**3.07**	Med	60-80
Dragonet	dem trawl	1	1	2	1	1	1	3	*1.4*	1	3	3	3	*1.7*	**2.18**	Low	>80
Green sea urchin	dem trawl	1	1	2	1	1	1	3	*1.4*	3	2	3	2	*1.9*	**2.36**	Low	>80
Starry ray	dem trawl	2	2	3	1	2	2	3	*2.1*	1	3	3	1	*1.2*	**2.46**	Low	>80
Smelt	dem trawl	1	2	2	1	1	1	2	*1.4*	2	2	3	3	*1.9*	**2.36**	Low	>80
Ocean quahog	dem trawl	3	3	3	1	1	1	3	*2.1*	3	3	3	2	*2.3*	**3.16**	Med	60-80
Lesser spotted dogfish	longline	2	2	3	1	2	3	3	*2.3*	1	1	3	2	*1.1*	**2.55**	Low	>80
Nursehound	longline	2	2	3	2	2	3	3	*2.4*	1	1	3	2	*1.1*	**2.68**	Med	60-80

Table 4.2.2 presents a summary of PSA scoring for all species affected by each gear type. Importantly, where an impact was deemed to be acceptable i.e. low risk, for the most impacting gear (generally trawls and beam trawls) no further evaluation was conducted for other gear types and the score indicated for the evaluation for trawl impacts has been carried through to other gear types that may catch the same species (but at lower overall levels). It is not possible to score any better than low risk (equivalent to a score of 80) using the RBF therefore further evaluation of status for lesser impacting gears is beyond the MSC methodology. Table 4.2.3 summarises predicted bycatch component scoring for 2.2.1, 2.2.2, and 2.2.3 for the main gear classes that have been considered in the pre-assessment

Table 4.2.2: Overall predicted MSC scoring outcomes for 2.2.1, based on results of PSA.

Main gear class	Gear	Species	2.1.1:
TOWED NETS	Demersal trawl/beam trawl	Green shore crab	>80
		Swimming crab	>80
		Lesser spotted dogfish	60-80
		Nursehound	60-80
		Dragonet	>80
		Green sea urchin	>80
		Starry ray	>80
		Smelt	>80
		Ocean quahog	60-80
	Pelagic trawls	no main bycatch species	>80
DREDGES	Shellfish dredges	Green shore crab	>80
		Swimming crab	>80
		Lesser spotted dogfish	60-80
		Green sea urchin	>80
		Ocean quahog	60-80
	Scallop dredge	Ocean quahog	60-80
	Hydraulic dredge	Green shore crab	>80
		Swimming crab	>80
		Lesser spotted dogfish	60-80
		Ocean quahog	60-80
NETS	Gillnet	Lesser spotted dogfish	60-80
		Nursehound	60-80
		Starry ray	>80
	Trammelnet	Lesser spotted dogfish	60-80
		Nursehound	60-80
		Starry ray	>80
	Encircling / drift nets	no main bycatch species	>80
HOOKS and LINES	Longlines	Lesser spotted dogfish	>80
		Nursehound	60-80
		Starry ray	>80
	Hooks & lines, trolling	no main bycatch species	>80
POTS and TRAPS	Traps, pots and creels	Green shore crab	>80
		Swimming crab	>80
HAND HARVEST	Hand collected	no bycatch species	>80

Table 4.2.3: Summary of predicted bycatch component PI scores for the main gear classes in English Inshore fisheries.

Gear		Discarded Bycatch Component		
		2.2.1: Status	2.2.2: Management	2.2.3: Information
Demersal trawl	Demersal otter trawl	60-80	60-80	60-80
	Fly-shooting	60-80	60-80	60-80
Beam trawl	Beam trawl	60-80	60-80	60-80
Dredge	Scallop dredge	60-80	60-80	60-80
	Scallop dredge in Cornwall, Devon & Severn, Eastern and North Eastern IFCAs	60-80	60-80	60-80
	Shellfish dredge	60-80	60-80	60-80
	Hydaulic dredge	60-80	60-80	60-80
	Hydraulic dredge (D&S to	60-80	60-80	60-80
Pelagic trawl	Pelagic otter trawl	>80	>80	>80
Set and drift nets	Set trammel nets	60-80	60-80	60-80
	Set gill nets (70-90 mm)	60-80	60-80	60-80
	Encircling gillnets	>80	>80	60-80
	Drift nets (P & D)	>80	>80	60-80
Hooks	Long line	60-80	60-80	60-80
	Rod & line	>80	>80	>80
	Hooks and lines	>80	>80	>80
	Trolling lines	>80	>80	>80
Pots and traps	Creel/parlour	>80	>80	>80
	Whelk pots	>80	>80	>80
	Cuttle/squid traps	>80	>80	>80
Hand collection	Hand raking	>80	>80	>80
	Hand raking in Eastern, North Western and Southern IFCAs	>80	>80	>80
	Scuba diving	>80	>80	>80

The vulnerability of species to particular gear types has been assessed using a precautionary methodology and the indicated outcome MSC scores are considered to be representative of a 'worst case' scenario. In this context, the outcomes are predictions based on a general understanding that fisheries may interact with certain bycatch species. The score that will ultimately be assigned to a fishery will not meet with SG80 for 2.3.1 where one (or more) species are considered to be medium risk or higher through PSA analysis. Improvement in outcome scores are contingent on data becoming available that would enable a comparison of the fisheries impacts to be made in the context of biologically based limits for affected stocks and then only where impacts are deemed to be within limits.

By considering the most vulnerable species for risk based assessment of fishery impacts, the approach inevitably means that many fisheries that capture more than the target stock are likely to incur a condition (scoring between 60-80) in a full assessment where there is a lack of qualitative and quantitative data in relation to bycatch profiles and stock status for any potential Units of Certification.

In circumstances where more specific data are available to allow evaluation of a fisheries performance under the bycatch component using the MSC normal assessment procedure, it is probable that outcome will be significantly different. Important to note is the fact that analysis has not identified any high-risk bycatch species i.e. species that would cause any particular UC to fail at full MSC assessment.

Some gear types have no indicated bycatch species, accordingly scores for hooks and line and trolling lines are considered to meet with SG80. The same is the predicted outcome for pelagic trawls, encircling and drift nets and hand gathering/collecting. Current general understanding of fisheries that use these gear types is that they have very low volumes of bycatch (<5% of total catch weight) and that no vulnerable species are taken as bycatch that are not considered as ETP.

4.2.1.1 Mobile nets

Demersal trawls and beam trawls. Predicted scoring of the outcome indicator PI for demersal trawl and beam trawl fisheries bycatch has largely influenced by general understanding of the broad range of organisms that trawl fisheries are known to impact. Trawling is largely indiscriminate and inherent selectivity of nets is designed primarily with target stocks in mind rather than unintended or unwanted bycatch species such as many vulnerable invertebrate species or larger fish species such as nursehound . Little data have been available that have allowed the assessment team to gain an understanding of bycatch profiles for specific fisheries and trawl fisheries are known to capture specimens of many vulnerable species of ray and skates for example. In addition, trawl fisheries are widely implicated in the reduction in the prevalence of the Ocean quahog *Arctica islandica*.

The Ocean Quahog is a long-lived species with a very slow growth rate. Populations of 40-80 years old specimens with a substantial proportion over 100 years old have been observed. Mechanical damage and incidental catch of *Arctica islandica* from bottom fishing gear is known to damage shells and lead to direct mortality (Piet *et al*., 1998; Fonds, 1991; Klein & Witbaard, 1995). This is thought to have a particularly negative effect on sub-adult specimens as shell strength is closely correlated with physical size. The ocean quahogs are known to be capable of sustaining some shell damage, but repeated encounters with fishing gears is likely to result in mortality. Evidence of irregular recruitment and/or low juvenile survival means that recovery may be very slow in areas where quahog population numbers become depleted. Other invertebrate species evaluated using PSA indicated likely low levels of risk to those species; however trawling over rough ground such as bedrock or bedrock and boulders is associated with destruction of many sessile attached organisms. A full assessment of a fishery occurring on hard substrates may well result in a failure due to unacceptable impacts in relation to some invertebrate species. For now associated risks to bycatch species from demersal and beam trawling are considered to be medium based on the evaluation.

4.2.1.2 Dredges

Scallop dredges – scallop dredging is known to have a significant impact on a broad range of invertebrate species, including other bivalve molluscs as well as sessile benthic infauna and epifauna. Dredges generally capture significant volumes of habitat forming shell debris that is likely to have sessile invertebrate organisms attached. Dredging is also likely to cause unobserved mortality to juvenile fish, elasmobranch egg cases, invertebrates such as sea urchins and burrowing echinoderms such as heart urchins. Much of the mortality is likely to be unobserved and unrecorded. However the mechanism of impact are well understood and risks for scallop dredging are understood to be medium or high for vulnerable species such as nursehound and ocean quahog for example.

Shellfish dredges – shellfish dredging is likely to impact local abundances of invertebrate species such as ocean quahog as well as larger animals such as elasmobranch species like nursehound. Impacts are both direct (through incidental capture and injury) as well as indirect – through habitat

disturbance and much of this may also be unobserved impact in that damaged/displaced or injured specimens do not necessarily get brought to the surface. Scoring predictions are based on the understanding of these potential impacts, however a full assessment would require specific data in relation to the UoC in order to allow for a fuller, more accurate evaluation of impacts to bycatch species. For now likely outcomes are all in the range of 60-80.

Hydraulic dredges – hydraulic dredging is associated with bycatch of many burrowing organisms, the most vulnerable of which is believed to be the ocean quahog. The risk to that species has been assessed as medium through PSA evaluation and supporting references all suggest that this method of fishing presents a significant threat to populations of the species. Other bivalve and echinoderm species are also likely to be impacted by the fishery. Affected species are not always seen in catches and much mortality is likely to be unrecorded through interactions that occur on or in the seabed. Many epifaunal sessile species are also known to suffer from hydraulic dredging and this impact also needs to be described and quantified as being within acceptable limits for all species in order to enable scoring at SG80. This is not possible from available information.

4.2.1.3 Pelagic trawls

Pelagic trawling is understood to present the greatest threat of discarding to the target stock. Discarding as bycatch of undersize or poor quality target stocks is considered as part of Principle 1. However the pre-assessment process has considered the issue of potential bycatch species in pelagic trawl fisheries and it is apparent that no bycatch species are likely to reach 5% of total catch weight and the various fisheries are unlikely to capture significant quantities of other vulnerable bycatch species. Species that potentially could be impacted include pelagic sharks such as porbeagle and basking shark (both ETP) or blue shark. While blueshark populations are known to have declined in the northeast Atlantic, bycatch in English pelagic trawl fisheries is has not been implicated in causing significant declines. Shad are also associated with being caught in pelagic trawls however these have been considered as ETP species.

4.2.1.4 Setnets and gillnets

Trammel nets – trammel nets are capable of catching a very wide range of fish, elasmobranch, bird and even molluscan species. While no data have been available in relation to specific fisheries, scoring at SG80 is considered highly unlikely for any such fisheries in the absence of accurate bycatch profile descriptions for potential UoC's. The most vulnerable species that is believed to be routinely encountered in trammel nets is the nursehound, and PSA analysis of fishery related impacts has indicated medium risk to this species. Some risk to invertebrate species may also exist through the use of anchors to hold nets in place.

Set gill nets – set gillnet are similar to trammel nets however due to the fact that they tend to be fished in deeper waters further form shore, the bycatch profile of these gears is frequently better than that for trammel net. However, the gear interacts extensively with sensitive elasmobranchs including nursehound and the outcome from interactions is frequently lethal as gears are often set for 24-48 hours, meaning that captured specimens are already dead on being brought to the surface in the gear. While no data have been available in relation to specific fisheries, scoring at SG80 is considered highly unlikely for any such fisheries in the absence of accurate bycatch profile descriptions for potential UoC's.

Encircling nets – considered to have negligible impact as they target species occurring in shoals and nets are not left to fish for extended soak times. In addition, entrapped specimens have some potential to escape uninjured. There is little or no interaction with the seabed so most invertebrate species will never be encountered. Scoring has indicated a likely outcome of SG80 however some supporting data would be required at full assessment of a fishery based on this means of fishing to support this prediction.

Drift nets – drift nets are in relatively limited use however they continue to be used for catching herring and mackerel as well as bass in some areas. Drift nets are likely to capture other species of fish – especially where they are used in shallow waters, however any such species are likely to be considered under retained or ETP species. Overall, there is no bycatch that would exceed 5% by weight of total catches and encounters with vulnerable species are likely to be with species that are considered as ETP. Scoring has been predicted at SG80 on this basis. No invertebrate species are believed to interact to a significant degree with drift nets. Jellyfish frequently get caught up in nets but they are relatively easily removed and returned to the sea with very good prospects for survival. Also, most jellyfish species occur with some abundance and are short-lived species.

4.2.1.5 Hooks & Lines

Longline – longline fisheries may capture nursehound and interactions maybe lethal depending on gear soak times. Additional mortality of released specimens may occur post capture as a result of hook injuries. Some physical seabed disturbance is likely due to anchoring of lines however impacts in terms of unrecorded mortality of benthic species is very unlikely and is not considered a threat that may impact even vulnerable species to a significant degree. The method of fishing is not very intensive and gear is generally very selective to the target stock according to bait used and hook size. Bait used in longline fisheries is considered under the retained species PI. Scoring is indicated at SG60-80 based on possible mortality of vulnerable species during extended soak times.

Hand line – hand line fisheries and trolling fisheries are exceptionally selective means of fishing and bycatch issues are negligible for these methods of fishing. Bycaught species, potentially also including vulnerable shark species such as nurse hound , have a high probability of post capture survival due to rapid dehooking and minimal trauma and injury. Scoring is considered likely to meet with SG80 in all circumstances.

4.2.1.6 Pots and traps

Pots and traps are associated with by catches of a range of mainly invertebrate species such as green crab, swimming crab and a number of other highly productive crustaceans, the most commonly caught having been assessed as being of low risk, therefore meeting with SG80. Some fish species may also be caught in traps, such as wrasse and conger eel, however where these are not retained the potential for post capture survival for fish retuned to the sea is obviously quite high. Unrecorded mortality of species due to seabed impacts are considered unlikely to be significant although heavy traps are likely to have some potential to cause damage to certain species including possibly ocean quahog. The pre-assessment however predicts likely outcomes for most trap/pot fisheries to meet with SG80 for bycatch species.

4.2.1.7 Hand collection

Handraking – hand raking is predicted to score at S80. Bycatch species are unlikely to be confused with target stocks during intetidal handraking. Hand raking potentially disturbs other bivalve species however it is not believed to result in significant damage to shells. Some unobserved mortality is likely for other bivalve species and possibly burrowing fauna such as the sand mason Lanice conchilega and heart urchin *Echinocardium cordatum*. These are abundant species that are likely to be low risk under PSA evaluation.

Hand collection – predicted to score at SG80.

Scuba diving – predicted to score at SG80.

4.2.2 Discarded Species: Management (PI 2.2.2)

Under the MSC scheme, the bycatch management PI (2.2.2) for the fishery under assessment is evaluated for conformity with the requirement that there is a strategy in place for managing bycatch species that is designed to ensure the fishery does not pose a risk of serious or irreversible harm to bycatch populations. Conformity with the standard at SG80 is evaluated by considering the fisheries interaction and performance under three scoring issues:

a. management strategy in place

b. management strategy evaluation

c. management strategy implementation

At SG80 the requirement for scoring issue a. is that there is a partial strategy in place, if necessary, 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. Scoring issue b. requires that 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, while scoring issue c. requires there to be some evidence that the partial strategy is being implemented successfully.

Potential for significant detrimental impacts on vulnerable bycatch species have been described for mobile net and dredge fisheries as well as for setnet and longline fisheries under 2.2.1. In evaluating performance of different gear types under 2.2.2, predicted scoring outcomes for full assessments are influenced to a significant degree by the predicted scoring for outcome status. Where outcome status indicates that there are significant risks to bycatch species (scoring predicted at SG60), the requirements for management responses to restrain potential impacts of the fishery are more obvious and responses need to be more explicit and purposeful in their design and implementation.

Accordingly the predicted scoring for the management PI for demersal trawl, beam trawl, dredge and setnet fisheries reflect the fact that the potential risks are from these gear types have been identified as significant. For scoring at SG80, appropriate levels of management that are proportionate to the scope and severity of identified risks and uncertainties should be in place. As a minimum management responses should meet with the MSC requirement of a partial strategy that is expected to maintain bycatch species within biologically based limits. Predicted scoring outcomes for the management PI for mobile gears and setnets are therefore at SG60 overall based on the fact that captures of potentially vulnerable species are likely and no formal management measures that are likely to be effective in controlling impacts are in place.

However, there are some measures in place that are likely to indirectly benefit management of bycatch species. Management of impacts to bycatch species is captured to an extent by elements of national/EU policies, strategies and regulations. High level controls such as national limits to vessel capacity and engine power can be shown to have some bearing on the scale of impact. Additional measures such as the proposed EU wide ban on discarding announced in 2013 and which is due to be phased in over coming years may add considerably to the suite of controls that manage impacts on bycatch in inshore fisheries by requiring all catches to be landed. This could aid management in a number of ways, not least of which would be by providing data in relation to the nature and scale of interactions.

IFCA level byelaws restrain fisheries by limiting the operation of fisheries spatially and temporally as well as limiting the gears that can be used. Gear specifications such as mesh size, maximum length of net and other criteria such as hanging ratio etc. may also be controlled through byelaws. A range of other regulations also apply in different IFCA's, such as minimum landing sizes, maximum size of vessels and types and numbers of dredges that can be used. There are however few measures which

re specifically intended to restrain impacts on bycatch species. Currently, IFCA resources are heavily committed in meeting with the requirements of the Marine and Coastal Access Act as well as with EMS legislation. Therefore there are few resources available for targeted initiatives that are intended to manage bycatch impacts. Additionally, scientific support to the IFCA's appears to be rather limited and costs associated with having research work undertaken by, for example, CEFAS, are likely to be prohibitive for most IFCA's. In addition, the difficult process of getting agreement amongst fishers and then gathering support for byelaws and for implementation of new byelaws does not help with the management of impacts.

Scoring outcomes are based on the fact that there are few measures at IFCA level that are seen as likely to restrain the impacts of the fishery on most bycatch species. Management does not make provision for collecting specific information for many fisheries that would allow for an evaluation of bycatch impacts. There are clear higher level objectives stated in the annual plans for all IFCA's which point to aspirations (and some times requirements in law) for IFCA's to maintain healthy productive ecosystem, however the mechanism by which the IFCAs hope to achieve this are not clearly set out nor are they reflected in a suitable range of fishery specific management measures. It is interesting to note that no IFCA's have in place mandatory Codes of Conduct for vessel operators. Although individual fishers may have signed up to the UK responsible fishing scheme, it would be appropriate to have clearer management directly at IFCA level. The network of proposed MPA's are a step in the right direction in terms of protecting marine resources, and these will inevitably eventually raise the bar with respect to managing fisheries impacts within designated and MCZ's. However this will most likely still leave large areas of coastal waters with few specific measures and no overall strategy or policy, for managing bycatch. For now, management of bycatch at IFCA level appears weak in the main and predictions are that fisheries which are identified as having potentially significant impacts on bycatch species will not sore higher than SG60 during a full MSC assessment. At the same time it is considered unlikely that any fisheries will score <60 and thereby fail an assessment outright on account of bycatch issues.

Hook and line fisheries, pelagic trawl fisheries, encircling an drift net fisheries as well as all hand gathering fisheries are predicted to score at SG80 for 2.2.2 during a full assessment on account of demonstrated low risk to bycatch species resulting from PSA analysis. It is considered that the fisheries are relatively clean or very clean with little or no bycatch and no catches of vulnerable species. Therefore current measures are likely to be adequate to restrain impacts on bycatch species for fisheries that use these gear types.

4.2.3 Discarded Species: Information / Monitoring (PI 2.2.3)

For the bycatch information PI (2.2.3) the fishery is evaluated for conformity with the requirement that 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. Conformity with the standard at SG80 is evaluated by considering the fisheries interaction and performance under three or four scoring issues, depending on whether scoring has used the RBF or not:

a. Information quality

b. Information adequacy for assessment of stocks

c. Information adequacy for management strategy

d. Monitoring

At SG80 the requirement for scoring issue a. is that qualitative and some quantitative information are available on the amount of main bycatch species affected by the fishery. For scoring issue b., SG 80 requires that information is adequate to support a partial strategy to manage main bycatch species. For scoring issue c., SG 80 requires that 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).

The main informational requirements for the bycatch information PI are:

- Fishery specific data on quantitative and qualitative nature of bycatch (including unrecorded mortality)
- Information on operational aspects of the fishery that may affect risk (such as landings, number of vessels, spatial and temporal fishing patterns, amount of gear deployed)
- Information relating to vulnerability and sensitivity of bycatch species and populations to fishery related impacts

Scoring issue a. considers whether adequate quantitative and qualitative information is available to allow the main bycatch species to be identified and quantities affected to be understood, in at least general terms. For most mobile net, dredge and setnet fisheries, available data simply will not support scoring this issue at SG80. Unless data from observer programmes that undertake bycatch monitoring and sampling are available it will be difficult to achieve scoring at SG80 for fisheries that are known to have potential bycatch issues (particularly those that have scored at SG60 using RBF for outcome indicator scores).

There is little (if any) ongoing monitoring of bycatch levels in inshore fisheries and the pre-assessment has been carried out in the absence of specific data for most gear types; against a backdrop where there is a clear understanding that there is potential for fisheries to interact significantly with vulnerable bycatch species in particular.

Information is incomplete in relation to all bycatch species that may be affected in different fisheries. To enable the pre-assessment to be carried out, a number of vulnerable species that are considered to be likely bycatch candidate species were identified and selected for PSA analysis. It is highly likely that other undetermined species are also affected as bycatch for some gear types. In a full MSC assessment, where data on interactions for specific gears show that there are additional main bycatch species, incomplete information with respect to the vulnerability to fishing pressures for some of these could become problematic and may hinder scoring beyond SG60. To be clear, the pre-assessment predicts scoring at SG60 for many species largely on account of a lack of fishery or gear specific bycatch information. Were gear specific information to be available to an assessment in relation to bycatch profiles for a given gear or fishery, bycatch species may be identified with greater

certainty. This would likely affect outcome indicator scores and scoring outcomes maybe influenced and be significantly different from those predicted at pre-assessment.

Pelagic trawl, encircling gillnets and herring/mackerel/bass drift nets as well as hook and line and hand collecting fisheries are likely to score at SG80 for bycatch information, based on the understanding that these fisheries are low intensity, have low overall impacts on Principle 2 components including negligible bycatch profiles. However, any full MSC assessments of such fisheries would still benefit from specific data being available that would allow for an understanding of the operation of the fishery and the risk to non-target species through unrecorded mortality. Fisheries should still aim to achieve the highest score possible for any PI's as the overall score at Principle level must still achieve 80 in order for a fishery to pass at full assessment.

Scoring issue b. is only scored where no stocks have been scored using the RBF. Therefore it is not relevant in the current pre-assessment. In terms of information adequacy for the management strategy, the pre-assessment has found that in some cases information is likely to be adequate to allow scoring at SG80, however in a significant numbers of other areas this information available.

Scoring issue c. evaluates information in the context that it supports a partial strategy to manage impacts to main bycatch species. The scoring issue is once again difficult to meet with in the absence of fishery specific bycatch data that would allow the bycatch profile of a fishery to be evaluated in the context of management objectives. Management needs to be informed of effectiveness (as is best measured by an understanding of changes in outcomes) if the effectiveness of strategies are to be evaluated. Therefore, the issue would most likely only achieve a score at SG60 for most gears that are associated with significant impacts e.g. mobile trawl, beam trawl, dredges, set net, longline; during a full assessment in the absence of fishery specific data on bycatch interactions that is updated at regular intervals. Data needs to be available in order to allow the effectiveness of strategies to minimize impacts to be gauged. A further key information gap here relates to uncertainty with respect to population statuses for affected bycatch species. It is difficult to gauge the impact of a fishery on bycatch species when there is insufficient information in relation to biologically based limits for the main bycatch species identified in the pre-assessment and most likely for many other species that would be identified through focused bycatch studies. This factor is also likely to influence scoring at full assessment, even where data have been provided that describes the bycatch profile for gear types under assessment.

Scoring issue d. evaluates whether sufficient information is collected on an ongoing basis that will detect change in risk to main bycatch species. There is a reasonable understanding of factors that affect the risk to bycatch species – even where there is a poor understanding of the species and quantities that may be involved. Most IFCA's have adequate local knowledge concerning the spatial and temporal operation of specific fisheries. This knowledge is sometimes supported by data in relation to vessel operations from VMS or sightings recording by patrol vessels and enforcement personnel. There is a general understanding of the amount of gear fished by vessels as well as catch levels, some of which is supported by official record keeping through logbook returns, shellfish returns etc. In addition, monitoring of coastal and transitional waters carried out in fulfillment of the EU Water Framework Directive collects information in relation to fish populations in coastal waters. Inshore resource assessment surveys conducted by IFCA's and over greater areas by scientific bodies such as CEFAS and the Environment Agency are likely to generate additional data that would be helpful in indicating population trends for some species that may be affected as bycatch. Future monitoring requirements for MPA's are also expected to add to the base of knowledge with respect to populations for species that are of little commercial interest as well as overall coastal ecosystem health. Scoring of this issue is likely to achieve SG80 for most fisheries.

4.3 Endangered, Threatened and Protected (ETP) Species

Section CB3.11 of the CR gives clear guidance on what constitutes Endangered, Threatened or Protected species under the MSC scheme.

Using this, a review of all species meeting with the given criteria - either species that are recognized by national ETP legislation or which are listed in Appendix 1 of CITES[8] binding international agreement and which may interact with one or more of the fishing gears in use, has been carried out.

Table 4.3.1 below summarises potential ETP species that may be encountered in English inshore fisheries and indicates the relevant designation or source of protection.

Table 4.3.1: Potential ETP species for English inshore fisheries

Species	Scientific name	CITES App.	Council Regs. 39[illegible]40/2013	EU 92/43/1992 Habitats Directive	Wildlife and Countryside Act 1981	EU 2009/147/EC Birds Directive
Mammals						
Harbour porpoise	*Phocoena phocoena*			Annex II		
Bottlenose dolphin	*Tursiops truncatus*			Annex II		
All cetaceans	*Cetacea spp*			Annex IV	Schedule 5 S9.5a	
Common seal	*Phoca vitulina*			Annex II		
Grey seal	*Halichoerus grypus*			Annex II		
Otter	*Lutra lutra*	App I		Annex II	Schedule 5 S9.5a	
Sharks, Rays Skates, fish						
Angel shark	*Squatina squatina*		Prohibited species all waters			
Common skate	*Dipturus batis*		Prohibited species ICES III-X			
White skate	*Rostroraja alba*		Prohibited species ICES VI-X			
Undulate ray	*Raja undulata*		Prohibited species ICES VI-X			
Guitarfish	*Rhinobatidae spp.*		Prohibited species all waters			
Porbeagle	*Lamna nasus*		Prohibited species all waters			
Spurdog	*Squalus acanthias*		0t TAC			
White shark	*Carcharodon*		all waters			
Giant manta ray	*Manta birostris*		all waters			
Basking shark	*Cetorhinus maximus*		all waters			
Sturgeon	*Acipenser sturio*	App I		Priority species	Schedule 5	
Allis shad	*Alosa alosa*			Annex II	Schedule 5 S9.1, S9.4a	
Twaite shad	*Alosa fallax*			Annex II	Schedule 5 S9.4a	
Atlantic salmon	*Salmo salar*			FW phase		
Sea lamprey	*Petromyzon marinus*			Annex II		
Seahorses	*Hippocampus spp.*			Anex II	Schedule 5 S9.2	
Invertebrates						
Horse mussel	*Modiolus modiolus*			1170 Reefs (Biogenic)		
Pink sea-fan	*Eunicella verrucosa*				Schedule 5 S9.2, S9.5a	
Fan mussel	*Atrina fragilis*				Schedule 5 S9.2, S9.5a	
Reptiles						
Marine turtles	*Cheloniidae spp*			Annex II	Schedule 5 S9.2, S9.5a	
Leatherback turtle	*Dermochelys coriacea*	App I			Schedule 5 S9.1, S9.5a	
Birds						
Birds spp						Annex I, III, IV

While the inclusion of some species in the table may seem unrealistic – e.g. White shark, Giant manta ray and European otter, all potential ETP species have been included in order to inform the project into the future.

[8] Convention for International Trade in Endangered Species see http://www.CITES.org

Different fishing gear types have varying potential to interact with ETP species. A broad-scale evaluation has been carried out of each fishing gears capability for interacting directly with different ETP species, based on seasonal and spatial patterns of use, technical parameters affecting the likelihood of interaction with particular species as well as the probable outcome of interaction, and vertical and horizontal overlap with ETP species distribution. Potentially significant indirect impacts to ETP species – such as disturbance, habitat destruction and competition for resources have also been considered in the evaluation. Table 4.3.2 summarises the findings of the evaluation the potential of the different gear types to interact with ETP species.

Table4.3.2: ETP species/fishing gear potential interactions matrix

Gear		Harbour porpoise	Bottlenose dolphin	Common seal	Grey seal	Otter	Angel shark	Common skate	White skate	Undulate ray	Guitar fish	Porbeagle	Spurdog	Giant manta ray	White shark	Basking shark	Sturgeon	Allis shad	Twaite shad	Atlantic salmon	Sea lamprey	Sea horses	Horse mussel	Pink sea fan	Fan mussel	Leatherback turtle	Birds spp.
Demersal trawl	Demersal otter trawl	■		■	■		■	■	■	■	■	■	■				■	■	■				■	■	■	■	■
	Fly-shooting						■	■	■	■	■	■	■				■	■	■				■	■	■	■	■
Beam trawl	Beam trawl						■	■	■	■	■		■										■		■		
Dredge	Scallop dredge						■	■	■	■	■												■		■		
	Scallop dredge in Cornwall, Devon & Severn, Eastern and						■	■	■	■	■												■		■		
	Shellfish dredge						■	■	■	■	■											■	■		■		
	Hydraulic dredge																					■	■				
Pelagic trawl	Pelagic otter trawl	■	■	■	■							■				■		■	■							■	■
Set and drfit nets	Set trammel nets	■		■	■	■	■	■	■	■	■	■	■			■	■	■	■				■			■	■
	Set gill nets	■		■	■	■	■	■	■	■	■	■	■			■	■	■	■				■			■	■
	Encircling gillnets	■	■	■	■							■				■		■	■							■	■
	Drift nets	■		■	■							■				■		■	■							■	■
Hooks	Long line (B)						■	■	■	■	■	■	■			■										■	■
	hand line																										
	Hooks and lines							■	■	■	■	■	■														
	Trolling lines																										■
Pots and traps	Creel/parlour															■							■	■	■	■	
	Whelk pots															■							■		■	■	
	Cuttle/squid traps															■							■		■	■	
Hand collection	Hand raking																										■
	Hand raking in Eastern, North Western and																										■
	Scuba diving																							■	■		

The approach to scoring the ETP component has been to focus on the broad-scale gear type, assuming that vessels operate within and without the 6nm limit set for IFCA's jurisdiction and as far as the 12nm territorial sea, taken from the relevant baseline[9].

ETP designations

Under the MSC scheme, the following instruments are the sources for ETP species designations in English coastal waters.

Convention on International Trade in Endangered Species (CITES): Roughly 5,000 species of animals and 29,000 species of plants are protected by CITES against over-exploitation through international trade. CITES works by subjecting international trade in specimens of selected species to certain controls. All import, export, re-export and introduction from the sea of species covered by the Convention has to be authorized through a licensing system. Each Party to the Convention must designate one or more Management Authorities in charge of administering that licensing system and one or more Scientific Authorities to advise them on the effects of trade on the status of the species. The species covered by CITES are listed in three Appendices, according to the degree of protection they need.

- Appendix I includes species threatened with extinction. Trade in specimens of these species is permitted only in exceptional circumstances. It is the highest level of protection and the minimum required CITES designation for a species to be considered ETP under the MSC scheme. Globally, approximately 950 animal and plant species are listed under CITES Appendix I globally.
- Appendix II includes species not necessarily threatened with extinction, but in which trade must be controlled in order to avoid utilization incompatible with their survival. In excess of 30,000 species of animal and plant are listed under Appendix II, however this designation has no relevance currently under the ETP component.
- Appendix II lists species that are protected in at least one country, which has asked other CITES Parties for assistance in controlling the trade.

Council Regulations 39 & 40 /2013: Effectively, these are the annually updated fishing regulations that implement TAC's and which clearly define fishing entitlements and restrictions to activities for EU registered fishing vessels, both within EU waters as well as some distant or non-EU waters where EU vessels may be active.

Under Article 12 paragraph 1 of Council Regulations 39[10] and 40[11] of 2013 it is prohibited for EU vessels to fish for, to retain on board, to tranship or to land a range of species (depending on where they have been captured), including all of those listed under the relevant section of Table 3. The regulation states that when accidentally caught, species referred to in paragraph 1 shall not be harmed. They shall be promptly released.

Other species are also controlled by Council Regulation 39/2013 including spiny dogfish (spurdog), for which the regulation sets a 0t TAC for 2013. There has been a 0t TAC for spurdog in most EU Waters for the past number of years in order to protect stocks. Importantly no landing of bycatch is permitted and landings of spurdog are in effect made illegal from ICES areas IV and VII amongst others.

[9] Admiralty Map of UK territorial seas and inland waters
[10] http://eur-lex.europa.eu/LexUriServ/LexUriServ.do?uri=OJ:L:2013:023:0001:0053:EN:PDF
[11] http://eur-lex.europa.eu/LexUriServ/LexUriServ.do?uri=OJ:L:2013:023:0054:0153:EN:PDF

Habitats Directive: Council Directive 92/43/EEC[12] on the conservation of natural habitats and wild fauna and flora lists a range of habitats (Annex I) and animal and plant species (Annex II) whose conservation requires the designation of Special Areas of Conservation. The significance of this legislation cannot be understated – much inshore fishing takes place within designated SAC's and the continuance of fishing operations in these areas is becoming ever more contingent on the fishery demonstrating through appropriate assessment of fishing activities, the implications for the site in view of the site's conservation objectives. In the light of the conclusions of the assessment of the implications for the site, competent national authorities can agree to commercial fishing activity only after having ascertained that it will not adversely affect the integrity of the site concerned and, if appropriate, after having obtained the opinion of the general public.

Additional measures of protection are provided for species within SAC's that are listed under Annex IV. Annex IV species includes all cetacea. Aspects of Annex IV therefore mirror the intent of CITES in preventing trade or exchange of protected species. Accordingly the provisions of Annex IV are also considered relevant in the context of MSC ETP species, although at time of writing the only group of animals explicitly included under the Annex and which that may have interactions with inshore fisheries are all cetacean species.

The Conservation (Natural Habitats) Regulations 1994 transposed the Habitats Directive into national law. The Regulations came into force on 30 October 1994, and have been subsequently amended several times. They apply to land and to territorial waters out to 12 nautical miles from the coast. The Conservation of Habitats and Species Regulations 2010 consolidate all the various amendments made to the 1994 Regulations in respect of England and Wales. In Scotland the Habitats Directive is transposed through a combination of the Habitats Regulations 2010 (in relation to reserved matters) and the 1994 Regulations. For UK offshore waters (i.e. from 12 nautical miles from the coast out to 200nm or to the limit of the UK Continental Shelf Designated Area), the Habitats Directive is transposed into UK law by the Offshore Marine Conservation (Natural Habitats) Regulations 2007.

Wildlife and Countryside Act 1981[13]: The Wildlife and Countryside Act 1981 consolidates and amends existing British legislation to implement the Convention on the Conservation of European Wildlife and Natural Habitats (Bern Convention) and Council Directive 79/409/EEC[14] on the conservation of wild birds (Birds Directive) in Great Britain.

The Act makes it an offence to intentionally or recklessly kill, injure or take any wild animal listed on Schedule 5, and prohibits interference with places used for shelter or protection, or intentionally disturbing animals occupying such places. The Act also prohibits certain methods of killing, injuring, or taking wild animals.

Under section 9 schedule 5, certain animals including otters and all cetaceans receive full protection meaning that the intentional killing, injuring or taking of these animals is prohibited as it possession of live or dead animals and the selling or offering for sale or possession or transporting for the purpose of sale.

A range of other vertebrate species including sturgeon, shad (Allis and Twaite), Basking shark, Angel shark and two species of seahorse found in Great Britain receive varying degrees of protection[15].

Invertebrate species including the Fan mussel and Pink seafan are also protected from deliberate killing.

[12] http://eur-lex.europa.eu/LexUriServ/LexUriServ.do?uri=OJ:L:2013:023:0054:0153:EN:PDF
[13] http://jncc.defra.gov.uk/page-1377
[14] Council Directive 79/409/EEC has now been replaced by Directive 2009/147/EC of the European Parliament and of the Council of 30 November 2009 on the conservation of wild birds
[15] http://www.naturenet.net/law/sched5.html

The relevance of the Wildlife and Countryside Act 1981 legislation has been considered in the context of MSC. The legislation introduces few species that are relevant in the fisheries context that are not already protected elsewhere by either CITES or binding international legislation, save for a number of marine invertebrate species. Nevertheless, the legislation meets with the CR (CB3.11.1) "species that are recognized by national ETP legislation" and therefore those additional species that may have interaction with inshore fisheries have been included in Table 3.

The Act also makes it an offence (with exception to species listed in Schedule 2) to *intentionally*:

- kill, injure, or take any wild bird,
- take, damage or destroy the nest of any wild bird while that nest is in use or being built or
- take or destroy an egg of any wild bird.

Special penalties are available for offences related to birds listed on Schedule 1, for which there are additional offences of disturbing these birds at their nests, or their dependent young. The Secretary of State may also designate Areas of Special Protection (subject to exceptions) to provide further protection to birds. The Act also prohibits certain methods of killing, injuring, or taking birds, restricts the sale and possession of captive bred birds, and sets standards for keeping birds in captivity.

Council Directive 2009/147/EC "Birds Directive": The European Union meets its obligations for bird species under the Bern Convention and Bonn Convention and more generally by means of Directive 2009/147/EC on the conservation of wild birds (the codified version of Council Directive 79/409/EEC as amended). The Directive provides a framework for the conservation and management of, and human interactions with, wild birds in Europe. Amongst the principal aims of the Birds Directive are:

- the maintenance of populations of all wild bird species across their natural range
- the identification and classification of Special Protection Areas (SPAs) for rare or vulnerable species listed in Annex I of the Directive, as well as for all regularly occurring migratory species, paying particular attention to the protection of wetlands of international importance
- the establishment of a general scheme of protection for all wild birds.
- Restrictions on the sale and keeping of wild birds.
- Prohibition of large-scale non-selective means of bird killing (Article 8).

It aims to achieve these objectives mainly through the designation of special protection areas within which further provisions of the Directive aimed at enhancing conservation or rebuilding of bird populations will apply. From the MSC perspective, the Birds directive is relevant to ETP legislation in that Article 4 Para. 4 states "In respect of the protection areas referred to in paragraphs 1 and 2, Member States shall take appropriate steps to avoid pollution or deterioration of habitats or any disturbances affecting the birds, in so far as these would be significant having regard to the objectives of this Article." Clearly therefore there is a requirement for the impacts of potentially damaging activities such as commercial fisheries and aquaculture on bird populations to be assessed, monitored and controlled. The intent of the legislation is considered to meet with the ETP criteria under CB3.11.1a.

In England, the provisions of the Birds Directive are implemented through the Wildlife & Countryside Act 1981, the Conservation (Natural Habitats, & c.) Regulations 2010 (as amended) and the Offshore Marine Conservation (Natural Habitats & c.) Regulations 2007 as well as other legislation related to the uses of land and sea.

A wide range of other statutory and non-statutory activities also supports the implementation of the Birds Directive in the UK. This includes national bird monitoring schemes, bird conservation research, and the UK Biodiversity Action Plan, which involves action for a number of bird species and the habitats that support them.

4.3.1 ETP Species: Outcome Status (PI 2.3.1)

The requirements of the ETP component are that the fishery meets with international and national requirements for protection of ETP species and that the fishery does not pose a risk of *serious* or *irreversible harm*[16] to ETP species and does not hinder recovery and rebuilding.

In assessing conformity of a fishery with the standard, three scoring issues are evaluated –

a. that the known effects of the fishery meet with national or international requirements (legislation or binding international agreement – but not IUCN)
b. direct effects (mortality, injury) are unlikely to create unacceptable impacts
c. indirect effects have been considered and are believed to be unlikely to create acceptable impacts

At SG80 (unconditional pass), the requirements for scoring issues a. are that fisheries are *highly likely* to meet with international and national requirements for ETP protection. For scoring issue b. the fishery should be *highly unlikely* to cause unacceptable direct impacts. For c., it should be *unlikely* that the fishery causes unacceptable indirect impacts. In probabilistic terms, *likely* and *highly likely* correspond to the 60th and 70th percentile in the distribution of outcomes e.g. there shall be at least a 60% probability that the impact of a gear on population status of ETP species is within biologically based limits for affected species).

The CR explicitly requires that "the team shall provide quantitative evidence of the degree of impact of the fishery on ETP species" (CB3.11.4.1 e.). It is therefore often difficult for fisheries to score well at the ETP outcome indicator score in the absence of fishery specific data in relation to ETP interactions, in particular where ETP species are known to overlap spatially and temporally with a fishing gear that is known for its potential to interact with ETP species. This may be the case despite anecdotal information or general understanding that a fishery has little or no impact on ETP species. General understanding and anecdotal information do not generally constitute sufficient evidence of acceptable levels of impact, except perhaps where inferences can be made from other geographically relevant fisheries that use the same gear in similar circumstances.

Under the MSC scheme, an assessment team may opt to use the Risk Based Framework for scoring ETP outcome status in the event that there is insufficient data to score using the default assessment tree, but only in circumstances where there are no requirements for protection and rebuilding of ETP populations. With the reasonably large list of species that are considered as ETP under various binding agreements or national/international legislation, there are explicit requirements for protection of species, meaning that RBF can not be used to score outcome status PI for ETP for any English inshore fisheries under the current provisions of the CR. In order to achieve MSC certification, fisheries should therefore aim to have available robust evidence that clearly demonstrates the level of impact that the fishery has for all ETP species.

Table 4.3.1 presents the predicted scores for gear types covered by the pre-assessment. Scoring the ETP component has been undertaken by evaluating the potential impact of a gear type at national level i.e. including all waters potentially covered by the pre-assessment. The approach captures the fact that many fisheries operate in more than one IFCA, frequently transcend the 6nm jurisdictional limit of the IFCA's and may extend outwards to 12nm and beyond in some cases. The approach also captures the fact that many ETP species are known to have wide spatial and temporal distributions and presence, while the precise distribution and temporal presence of other species is less well understood.

[16] serious or irreversible harm is considered not to have occurred where populations of ETP are maintained within biologically based limits

In taking this approach the scoring creates a 'worst case' scenario for all gear types considered. Accordingly, greater analysis at full-assessment should mean scores are no worse than predicted in the pre-assessment with some considerable scope for improvement on the predicted scores in light of greater/more specific evidence, deeper analysis, or geographical and other limitations to any eventual proposed Units of Certifications.

Where a reasonable possibility that scores indicated in Table 4.3.3 could be different for an ETP PI for particular fisheries (e.g. between similar fisheries in different IFCAs) based on specific information or management actions, this has been indicated and discussed in the text supporting the predicted 2.4.1 Outcome status PI.

Table 4.3.3: ETP components - likely scoring by gear class and Performance Indicator

Gear		ETP Component		
		2.3.1: Status	2.3.2: Management	2.3.3: Information
Demersal trawl	Demersal otter trawl	60-80	60-80	60-80
	Fly-shooting	60-80	60-80	60-80
Beam trawl	Beam trawl	60-80	60-80	60-80
Dredge	Scallop dredge	60-80	60-80	60-80
	Scallop dredge in Cornwall, Devon & Severn, Eastern and North Eastern IFCAs	60-80	60-80	60-80
	Shellfish dredge	60-80	60-80	60-80
	Hydraulic dredge	60-80	60-80	60-80
	Hydraulic dredge (D&S to K&E)	60-80	60-80	60-80
Pelagic trawl	Pelagic otter trawl	60-80	60-80	60-80
Set and drift nets	Set trammel nets	60-80	60-80	60-80
	Set gill nets (70-90 mm)	60-80	60-80	60-80
	Encircling gillnets	60-80	60-80	60-80
	Drift nets (P & D)	60-80	60-80	60-80
Hooks	Long line	60-80	60-80	60-80
	Rod & line	>80	60-80	>80
	Hooks and lines	>80	60-80	>80
	Trolling lines	>80	60-80	>80
Pots and traps	Pot/parlour	60-80	60-80	60-80
	Whelk pots	60-80	60-80	60-80
	Cuttle/squid traps	60-80	60-80	60-80
Hand collection	Hand raking	>80	60-80	>80
	Hand raking in Eastern, North Western and Southern IFCAs	>80	60-80	>80
	Scuba diving	>80	60-80	>80

4.3.1.1 Demersal otter trawl, Beam trawl, Danish seine fisheries

Northridge (1991) reviewed global captures of marine mammals in fishing gears. Demersal trawls are known to occasionally interact with both species of seal that are recorded from English waters in addition to occasional captures of harbour porpoise. The distribution of seals in English waters has been reviewed. Both harbour seal and grey seal are distributed along the east and south coasts of England, while grey seals are more restricted in their distribution. There is a significant overlap between many English fisheries and the distribution of seal haul outs and colonies. Young seals occasionally drown having entered trawls in order to attempt to feed on the accumulated catch. Overall, indications are that the level of mortality is low and previous MSC fishery assessments have not considered levels of interaction to be of a scale that puts the fishery outside of internationally

accepted standards. However, little specific data are available for any fisheries covered by the pre-assessment.

The distribution of harbour porpoise populations (there are four subpopulations in UK waters) is described in the ASCOBANS Conservation Plan for North Sea harbour porpoise available here. ASCOBANS refer to acceptable annual limits for human induced mortality of 1.7% of the populations for harbour porpoise. Published and anecdotal information in relation to fishing interactions has been reviewed and it is considered unlikely that interactions with harbour porpoise in demersal trawling occurs with significant frequency, while it is also unlikely that demersal trawling causes significant direct mortality in the context of the annual acceptable limit for the species. Most concern has been raised about harbour porpoise in the context of driftnet, setnet and pelagic trawl fisheries and this is reflected in the nature and volume of published material concerning marine mammal bycatch in the northeast Atlantic area.

Due to the lack of long sweeps and trawl doors as well as their low height opening, beam trawls present less risk of bycatch of seals and harbour porpoise and such events are exceptionally rare, the lack of published information possibly pointing to the probability that there is less risk associated with this particular trawl gear. A similar scenario is likely for Danish seine gear which does not use otter doors and which is not towed for long periods on the seabed, catches by Danish seine are traditionally much cleaner than are trawl catches and larger species such as seals and porpoises are likely to have a significantly greater opportunities for avoiding or escaping from these gears.

Despite the analysis for marine mammals, there are many published studies and reviews attesting to the likely unsustainable bycatch in demersal otter trawl, beam trawl and to a lesser extent Danish seine fisheries, of many elasmobranch species. Elasmobranchs are susceptible to overfishing, because they are very often long-lived and slow-growing, typically with low fecundity, late age at maturity and prolonged gestation period. Further, many species aggregate, rendering them vulnerable to various fishing gears. These life history characteristics render them susceptible to impacts in directed fisheries or through being taken as bycatch in other fisheries. There have been very significant declines in abundance and distribution for a number of species including Undulate ray, Common skate, Angel shark, Spurdog and White skate[17] [18]. The decline is so great that many are now listed as prohibited species under EU fishing regulations and the landing of these species is thereby no longer permitted – meaning that they now qualify for consideration under an MSC assessment as ETP. There is little doubt that bycatch in demersal trawling likely shares a significant portion of the responsibility for the decline in these species.

Additionally, demersal otter trawls are believed to interact with two species of shad- Twaite shad and Allis shad, both of which are known to be depleted and are subject to protective legislation. Atlantic sturgeon is believed to be extinct from UK waters – occasionally a specimen was captured in demersal trawls up to the 1950's. Previously abundant along all European coasts, Atlantic sturgeon is today restricted to a single, reproductive population that breeds in the Gironde River, France. The probability of any fisheries encountering this species is therefore considered to be negligible given the current population status. Some marine invertebrate species are considered as ETP under existing UK legislation. Two of these - Fan mussel and the Pink seafan are sessile species that are sensitive to impacts by mobile gears as well as some static gears (mainly pots and nets). Therefore they have been included in the ETP evaluation. Fan mussel are associated with soft sediments from shallow water down to 400m while Pink sea fans are associated with rocky habitat from shallow water down to 200m. Both species are believed to occur in English inshore waters within the range where trawlers would operate, as well as farther off shore. In England, both Fan mussels and pink sea fans are prevalent in south-western waters and in the Celtic Sea/Bristol Channel area.

[17] see http://www.sharktrust.org/en/bycatch
[18] http://www.cefas.defra.gov.uk/media/577769/mf047_fsp_report_2012_final_vb2.pdf

There are no published biologically based limits for most elasmobranch, shad, sturgeon or invertebrate species. There is also little fishery specific independent, verifiable data with respect to captures rates or interactions and the fate of many elasmobranch, shad and invertebrate species that may be encountered. Examples of datasets that would preferably be available to full assessments to aid in evaluation of ETP profiles for different gear types and fisheries include detailed bycatch studies, results of bycatch mitigation trials as well as more general fishery observer reports. As few studies of this nature have been carried out for many inshore fisheries, there is likely to be considerable uncertainty associated with the ETP profile for most demersal trawl, beam trawl or Danish seine fisheries. This makes scoring at SG 80 for 2.3.1 problematic. Information and general understanding is however expected to support scoring at least at SG60 for demersal trawls, beam trawls and Danish seines under 2.3.1.

In order to achieve a higher score for most English trawl fisheries there will be a need for fishery specific data that will indicate the risk that the respective fisheries present to the suite of ETP species that are known to occur within the area where the fishery operates. Data would ideally allow for an appraisal of risk based on qualitative and quantitative assessment of ETP interactions from the fishery itself or from another geographically relevant fishery that was broadly similar in terms of gear used, target species, grounds fished etc. Data in relation to spatial / temporal overlap between the fishery and species range / distribution (e.g. VMS) would also be useful for detailed evaluation of performance against 2.3.1 criterion.

Indirect consequences of demersal trawl fisheries on the range of ETP species affected have been considered and these are not considered to be as significant a threat as is direct mortality through capture. Indirect effect may include disturbance, competition for food or destruction of habitat. None of the gear types and their associated patterns of use are considered likely to have indirect effects that would result in significant changes in ETP species distribution or abundance.

4.3.1.2 Dredge fisheries

Scallop dredges. While scallop dredges are towed mobile gear, their relatively small individual size and the manner in which they are deployed means that larger specimens of ETP species such as seals and cetaceans are unlikely to suffer direct mortality due to entrapment. At worst, injury to such animals may result from gear contacts sustained during attempts to feed on fleeing fish, however it is very unlikely that adult specimens of seal or cetacean would ever be encountered in the gear. That said, scallop-dredging activity is associated with sedimentary seabed habitats and a range of organisms may be encountered including demersal elasmobranchs such as skates and rays (especially juveniles in inshore waters), horse mussel beds and fan mussels. Horse mussel beds are most associated with Northern UK waters (Scotland, Wales, Isle of Man etc). 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. Dense beds of young horse mussels also occur in the Bristol Channel but often seem not to survive to adulthood. Off North Sea coasts occasional beds occur between Berwickshire and the Humber, and probably elsewhere. Horse mussel beds are a biogenic reef forming organism, whose structures become important to many other species. Arguably this species could be considered under the Habitats component given its designation, however given that the species is the subject of a UK Biodiversity Action Plan[19] it has been included under the ETP component. Horse mussel beds have known sensitivity to scallop dredging and large scale damage to beds in the past has been attributed to scallop dredging

19 http://www.google.ie/url?sa=t&rct=j&q=&esrc=s&source=web&cd=1&ved=0CC4QFjAA&url=http%3A%2F%2Fjncc.defra.gov.uk%2Fpdf%2FUKBAP_BAPHabitats-18-HorseMusselBeds.pdf&ei=drxAUYPyH8KThgfdvoCQBg&usg=AFQjCNGqL7A0P2LhEr8Cgk0SnlWPF3qAMA&bvm=bv.43287494,d.ZG4&cad=rja

activity[20].

A recent assessment of a scallop dredge fishery in Shetland[21] scored the ETP outcome PI at SG100 on account of demonstrated low risk to ETP species. There was acknowledgement that the fishery did present some risk to mainly juvenile common skate and common skate egg capsules were occasionally recorded from dredges. Interactions with live skate were not believed to be lethal in many cases and there was an understanding that many organisms had a reasonable chance of survival post capture if released to the sea promptly.

Fan mussels are known to have a high susceptibility to interactions with benthic gears[22]. Interactions with fishing gear is likely to have lethal consequences on account of the fragility of the shells and the relative vulnerability of these large partially buried shells that protrude from the seabed. The species is known to have declined drastically in UK waters and much of this is attributed to the use of demersal trawls and dredges in particular. While it is unlikely that Fan mussels are likely to be encountered in any established scallop dredge fisheries, the species may warrant special consideration and evaluation in respect of new or developing fisheries using dredges on sedimentary seabed's.

The pre-assessment has predicted scores to be in the 60-80 range for ETP outcome status, working on the assumption that few if any data will be available in relation to any specific scallop dredging UoC's that may be proposed for full assessment. Once again, the scoring outcome is largely influenced by uncertainty rather than be specific knowledge in relation to the ETP profile for any particular scallop fisheries. Availability of relevant data in relation to bycatch and spatial and temporal operation of the fisheries would enable a more detailed evaluation and consequently a more precise scoring of the ETP outcome PI. There are reasonable grounds to expect that the scores could rise to 80 or above in such circumstances for scallop dredge fisheries.

Indirect effects of scallop dredging on ETP species will also need careful review in a full assessment due to the possible destruction of habitat that may be important to some ETP species.

Shellfish dredges. Shellfish dredging activity is localized but relatively wide spread around the English coastline. As distinct from hydraulic dredging, shellfish dredges tend to target cockles, oysters and mussels that live on or close to the surface of the seabed. Underlying seabed material tends to be predominantly sedimentary, but harder bottom types may also be fished, including gravels, stones and rock in some areas. Few data appear to be available with respect to ETP interactions with shellfish dredging activities in English waters. It is reasonable to expect that there is some direct interaction with juvenile skate and ray species, some of which frequent shellfish areas and inshore waters that are important for life history stages of many elasmobranchs. However it is likely that there is relatively little direct ETP interaction associated with shellfish dredging. Potential indirect interactions may involve destruction or detachment of egg cases as well as destruction of habitat, which may be important for attaching egg cases for some species. A principal human threat to seahorse populations results from commercial fishing activities that can result in destruction of key seahorse habitat such as beds of eelgrass. Some inshore shellfish dredging activities are believed to occur in areas where sea grass may also occur and there is potential for direct mortality through captures as well as indirect effects associated with habitat destruction. Potential interaction with elasmobranchs as well as potential indirect impacts (e.g. disturbance to seals/birds and competition for food with birds) have been recognized in the evaluation of this gear types ETP profile and is captured by the indicated scoring for 2.3.1 (60-80) for shellfish dredging activity. It is important to point out that there are likely to be cases where the score will be higher, such as where it can be

[20] http://www.habitas.org.uk/priority/species.asp?item=640

[21] http://www.msc.org/track-a-fishery/fisheries-in-the-program/certified/north-east-atlantic/shetland-inshore-crab-lobster-and-scallop/assessment-downloads-1/Public_Certification_Report_-_Final_-_ShetIS.pdf

[22] http://webarchive.nationalarchives.gov.uk/20110303145213/http://ukbap.org.uk/UKPlans.aspx?ID=123

demonstrated that potential seahorse habitat is not impacted during shellfish dredging activities and that indirect impacts on birds and seals is minimal based on existing data.

Hydraulic dredging. Insufficient data is available to verify ETP profiles for individual hydraulic dredge fisheries, however the expected ETP profile for this gear type includes potential direct mortality of seahorses and Fan mussels, where the fisheries take place on sea grass beds or in shallow coastal areas that have previously been unfished. Utilisation of this gear type in many previously fished areas is likely to have a negligible direct impact on any ETP species. Hydraulic dredges are slow moving, create a lot of background noise and physical stimuli that act as a deterrent or warning to many species. Most fish species have ample opportunity to avoid the gear meaning that captures of fish are infrequent. While the dredge footprint may be relatively small, repeated dredging up and down on small areas ensures that most ground is covered eventually and the potential impact on benthic communities maybe very significant. Predicted scoring at 60-80 for the ETP outcome PI once again is based largely on uncertainty surrounding the level and type of interaction. Improvements to the indicated score are likely to be readily achievable by reducing uncertainty with adequate supporting data for a fishery under full assessment.

Pelagic trawl. Pelagic trawling has potential to interact directly with a broad range of species including cetaceans, seals, porbeagle and basking shark, shad, leatherback sea turtles and many species of diving birds and seabirds. However, the principal concern with pelagic trawling relates to potential interactions with cetaceans, most notably harbour porpoise and Common dolphin, but also in relation to grey and harbour seal. Bycatch of all of these species in pelagic gears is well documented, especially in some parts of the Channel and southern North Sea.

Compared to many other fishing techniques evaluated here, there is a greater volume of data available in relation to the level of interaction of pelagic trawl gears with different species.

Morizuri *et al*. (1999) reviewed bycatch of marine mammals in eleven different pelagic trawl fisheries in the northeast Atlantic and identified levels of interaction between herring trawl, bass and sardine fisheries and cetaceans and seals. Requirements for monitoring under EU Regulation 812/2004 has resulted in a much clearer picture being available with respect to the nature and scale of ETP interactions with UK vessels. Annual reports are available online e.g. 2008 report. The fleets monitored in areas IV and VII include pelagic trawl fleets for herring, mackerel, horse mackerel, bass, sprat and sardine. Multiannual monitoring has indicated very low ETP bycatch rates for these fisheries. Consequently, scoring of PI 2.3.1 for pelagic trawls is likely to be >80 for all pelagic trawl fisheries unless specific data emerges that indicate unacceptable impacts in a fishery. It needs to be pointed out however that the possibility of significant cetacean interaction with pelagic trawl fisheries for bass could cause lower scoring in the event of a full assessment, if greater levels of data indicate a higher interaction within that fishery than is understood from the pre-assessment review.

Encounters of leatherback turtles are unlikely given the rarity of this species in UK waters however they do occur reasonably regularly, especially in the southwest[23]. On average over recent years there have been about 33 reports of Leatherback turtles per annum in UK waters. Interactions with fishing gear are known to occur. Pelagic trawls, demersal trawls, set nets, driftnets, pots and longline gear all have potential to interact with turtles. While the level of interaction is believed to be low this very likely to be related to the low incidence for the species. The most common method of incidental capture for leatherback turtles is entanglement in rope, particularly those used in pot fisheries targeting crustaceans and whelk. Rope entanglement occurs predominantly between July and October, on the north, west and south-west coasts of the UK and the south and west coasts of Eire[24].

[23] chartingprogress.defra.gov.uk/.../HBDSEG-FeederReport-sec3_6.pdf
[24] http://www.jncc.defra.gov.uk/pdf/jncc_310.pdf

Shad species are known to occur mainly in coastal and inshore waters[25]. Capture in commercial fishing gears has been implicated in the decline of the species in many areas and bycatch of shad in pelagic trawls seems plausible, if not likely, where fisheries take place in close proximity to land although it seems there is little specific data documenting interaction. Being a clupeid they are quite similar to herring and may escape notice when catches are being handled and landed. The possibility of shad interaction could become the subject of a conditional pass in the event of a full assessment however it is probable that his would be relate to the Information PI rather than the outcome PI.

4.3.1.3 Set trammel net fisheries

Trammel nets are generally deployed in pursuit of flatfish species in England, however they may be used to catch demersal, benthic and pelagic species in other areas. Generally, trammel nets (and gillnets) capture fish in one of several possible ways. The fish may become wedged i.e. held by the mesh around the body; gilled i.e. caught by the gills or entangled whereby the animal may be held by teeth, spines or other protrusions without necessarily penetrating the mesh. In addition, trammel nets may also retain fish in bags or pockets of netting when fish swim through an outer panel of large mesh, encounter the inner smaller mesh panel and push this mesh through the other outer panel, thereby creating a bag or pocket retaining the fish or other animal.

Although used extensively in inshore and sometimes in more offshore waters, monitoring of these fisheries has been very limited. On the basis of limited data available, it would appear that trammel nets may be less selective than other forms of gillnet for fish species and bycatch of birds, turtles and cetaceans are also on record for this gear type. The pattern of use of trammel nets – frequently in estuaries and shallow coastal waters, well within the depth range of many diving bird species means that trammel net bycatch frequently includes bird species, some of which are likely to be protected. The level of bycatch of birds is generally understood to be low – probably lower than any acceptable limit for the potential species affected, however there is no certainty about levels of interactions for specific fisheries. For other species such as cetaceans and seals, studies indicate that static nets generally may have a significant bycatch of cetaceans in particular in the Celtic Sea and North Sea. Many setnet fisheries do not employ all available means of mitigating against cetacean interaction. A Danish assessment of static net fisheries for Eastern Baltic cod failed MSC assessment on account of uncertainty over the level of bycatch of the severely depleted Baltic harbour porpoise in setnet fisheries[26]. Therefore a conditional pass is considered a likely outcome for PI 2.3.1 for a full MSC assessment involving trammel net fisheries, without further specific information in relation to capture rates and / or spatial and temporal information in relation to the operation of the fishery or the distribution of potentially affected species.

The Hastings Fleet sole trammel net MSC certification acknowledges that there is a bycatch of *Alosa* spp., however no data are given. As such it must be considered likely/plausible that there is some bycatch in this fishery, however given the paucity of data a conditional outcome on the outcome PI seems probable.

4.3.1.4 Set gillnet fisheries

A range of set gillnets are in use. There are targeted net fisheries for cod and gadoids in a number of IFCA's that includes the Channel and southwest/Celtic sea, while there are tangle net fisheries for turbot, anglerfish, brill and ray principally in the south, southwest and southeast. Small scale gillnetting for flatfish and other species also occurs in some IFCA's.

Setnet fisheries have potential to interact with a wide variety of ETP species. Tregenza *et al* (1997) describe bycatch of harbour porpoise in the Celtic Sea setnet fisheries during a programme of

[25] http://www.kentbap.org.uk/images/uploads/Allis_and_twaite_shad.pdf

[26] http://www.msc.org/track-a-fishery/fisheries-in-the-program/certified/north-east-atlantic/Denmark-Eastern-Baltic-cod/assessment-downloads-1/Public_Certification_Report_-_Final_-_DanEBC_-_29.03.11.pdf

monitoring, while Vinther and Larsen (2004) estimate bycatch of harbour porpoise in Danish North Sea gillnet fisheries using observer data. The indicated bycatch rate is considered unsustainable given the population estimates for the harbour porpoise in the Celtic Sea at the time the work was carried out. For the Danish fleet, estimates are that in the region of 5-6,000 harbour porpoise are taken in Danish set net fisheries annually. Northridge *et al* (2007) report on minke whale bycatch in static gear fisheries (including pots and gillnets) in Scottish waters. Seal bycatch is not routine but is also occasionally recorded for gillnets, although this is rare and mainly involves young inexperienced animals.

Due to their size and weight, larger specimens of ETP species such as ray and skate are not especially vulnerable to capture in gillnet fisheries, although such bycatch is very much associated with tangle net fisheries targeting turbot, anglerfish, brill and rays. Bird bycatch is not unusual within setnet fisheries and is a well-documented phenomenon especially where set nets are used in shallow coastal or transitional waters, well within the diving range of many protected and other bird species.

In addition, there is some concern at the indirect effects that may result from the use of gillnet and other static gears, chiefly through the effects of 'ghost fishing' by lost gears which may result in the on-going capture and mortality of both target and unwanted species including ETP species.

Once again there are little data available for informing assessments of inshore fisheries of levels of interaction between gillnet fisheries and ETP species. In assessing a fishery, an assessment team is likely to have to consider potential levels of impact based on analogies with other similar fisheries. These are far from ideal circumstances under which an assessment scoring decision must be reached and consequently any such decision will necessarily capture the associated uncertainty with respect to outcome.

The overall outcome indicator score for setnet gears is therefore very likely to be in the range 60-80 where interactions are considered likely to occur but for which there are no data in relation to ETP encounters, especially if there are no demonstrable mitigation actions implemented in the fishery. Scoring above 60 is contingent on the assumption that most set gillnet fisheries are small scale or localized and the associated ETP footprint is likely to be within limits of national or international requirements for the protections of ETP species. Importantly however the assessment needs to consider the cumulative impacts of all fisheries on any particular ETP species and needs also to consider indirect impacts fully.

4.3.1.5 Encircling gillnets

Encircling gillnets are used in some IFCA's to catch pelagic species such as bass, herring and mackerel and mullet for example. Fish become enmeshed in the net as they try to escape the gear. The ETP profile of such gears is uncertain but the manner in which they are used – selective targeted netting of shoals as opposed to gillnets that catch fish over long soak periods – suggests that the ETP profile is likely to be smaller than for other gears. The gear use is characterized by deployment by fishermen who remain in attendance and who leave the gear in the water for relatively short periods.

Again there is no specific data available on the level of ETP interaction, and while it can be expected that the gear encounters and captures certain species such as shad (which are pelagic) the low intensity of use suggests that scoring at 60-80 is likely. However in areas where spatial and temporal use patterns indicate low risk and there is some qualitative understanding of ETP bycatch, scoring above 80 may readily be possible.

Drift nets – apart from salmon and sea trout fisheries that are excluded from the pre-assessment, drift nets are used in many parts of the English coast to fish for a range of pelagic species such as sprat, herring, bass and mackerel as well as for mullet[27]. In the main, drift net fishing is a seasonal

[27] http://www.cefas.defra.gov.uk/publications/techrep/tech140.pdf

activity that takes place opportunistically as and when fish appear on the grounds. There are though clear patterns and the bass fishery may attract more focused effort in some areas. The technique of drifting usually takes place in the presence of the vessel from which the gear is deployed, nets being monitored for the duration of the deployment. Drift nets are mainly used to target pelagic species; therefore there are potential risks to pelagic ETP species including cetaceans, birds, basking shark and leatherback turtles amongst others. The level of risk will depend on which ETP species are present at the time drift nets are put out, as well as weather, tidal fluctuations and fishing effort. Northridge *et al* (1991) report high incidental catches of guillemots, razorbills and divers in drift nets from Danish fisheries, along with significant catches of auks in the salmon driftnet fisheries in Ireland and Denmark. Large pelagic species may become disoriented by the wall of netting and may attempt to swim through it, thereby becoming entangled and drowning. Bycatch of cetaceans, leatherback turtles and basking shark are also associated with drift nets and have previously been reported by Jefferson and Currey (1994), Pierpoint (2000) and Fowler *et al* (2004).

Occasionally, trammel nets may also be fished by drifting in areas of strong currents such as estuaries where flatfish and rays may be captured. This particular activity seems to be very localized and does not appear to be a widespread or popular means of fishing, however it presents a significant risk to ETP species where it does take place.

Due to concerns related to bird bycatch as well as bycatch of ETP species including cetaceans, reptiles and sharks, ETP outcome status for English inshore driftnet fisheries is likely to score 60-80 given the understanding that risks are generally believed to be moderate or low on account of the scale of the fisheries concerned and the intensity of effort together with an understating of the potential spatial and temporal overlap between gear use and ETP species distribution. More specific information would be required in order to allow higher scoring.

4.3.1.6 Hooks – longline, handline, hooks and line.

Hooks and lies are used to fish for a range of pelagic and demersal species. Pollock, mackerel, blue shark, turbot, brill and bass[28] are all targeted at different times or in different areas using hooks and lines fished either by hand or in longline arrangements where hooks are deployed off anchored main lines using snoods.

Hook and line fisheries are often considered to be one of the more selective means of fishing. This is generally true, however specific risks do exist in relation to marine mammals, large pelagics and birds, some of which are considered ETP species.

When deployed, bottom set longline gear is generally marked with surface ropes and buoys that may present a risk of entanglement to basking shark, most cetacean species and leatherback turtles in particular. There are many reported instances of bycatch in surface lines under such circumstances and the risk presented is related in part to the spatial and temporal overlap between ETP species distribution and longline gear use, physical parameters of the gear and environmental parameters such as water clarity and weather. Additionally, bird bycatch is relatively common during longline deployment, especially during daylight deployments when birds can see and follow the bait in the water as it sinks[29]. Drifting longlines are a little used technique of fishing in England although they may be used in parts of the southwest to drift for blue shark while in some other areas they may be used to catch bass.

Due to the manner in which they are utilized, longlines are considered to have a greater potential ETP footprint then are handlines or hooks and lines (rod & line) where the operator is most likely directly in control of the gear at most times and where gear is not left out during periods when the vessel is ashore. One possible exception to the view that handlines likely have a smaller ETP

[28] http://www.seafish.org/media/.../fs21_02_09_lured_long_lines_for_bass.p...
[29] http://www.rspb.org.uk/ourwork/policy/marine/international/advocacy/mitigationfactsheets.aspx

footprint than do longlines is where hooks and lines are fished using automated electric or hydraulic jigging machines. This understanding is not based on data from any fishery and as such is subjective and cannot be verified without detailed study.

At full assessment, longline fisheries are likely to incur a conditional pass, subject to the fishery fulfilling a condition that will allow the actual nature and scale of ETP interactions to be established and a robust appraisal of the risks to species to be made. Handline fisheries and possibly automated jigging machine fisheries are more likely to score above 80 at full assessment, subject to a more detailed evaluation of the risks associated with the gear and preferably supported by some relevant qualitative and quantitative data from the fishery itself.

Trolling lines present a minimal risk to any ETP species – in rare instances bird bycatch has been reported, but given that lures are towed underwater the likelihood of a bird being captured is naturally very low. Nevertheless, occasional captures may occur through birds diving and attempting to feed on hooked fish or on lures as they are deployed. Capture rates are uncertain but basic risk analysis based on extent of gear usage, manner of deployment and knowledge of the potential species involved (diving seabirds) suggests that the risk is likely to be low and that few specimens are captured by this gear type. Indirect effects – such as those that may result from lost gear or removal of foraging species etc. are likely to be minimal. Scoring of the outcome PI is therefore likely to meet with SG80.

4.3.1.7 Pots and traps – pot, parlour, whelk pots, cuttlefish traps

Due to the large number of surface lines that are associated with the use of fleets of pots that are used to catch a range of crustacean and molluscan species, encounters with large pelagic species are not uncommon and may present an immediate and direct threat to specimens who may become so entangled that they no longer are capable of swimming (Pierpont ,2000; Northridge, 1984; Northridge, 1988). The species involved potentially include porpoises, dolphin, whales, basking shark and leatherback turtle. The potential of gears to interact with ETP species is variable and is influenced strongly by spatial and temporal aspects of the fishery and ETP presence and environmental conditions. Many ETP species are ephemeral and bycatch that may be 'problematic' at one time or another may not occur during other periods. There is little fishery specific data available to inform the pre-assessment, however sufficient quantitative data exists to clearly demonstrate the potential risk that this gear type may present to certain species. In the absence of data that would allow for a reasonable estimation of rates of ETP interaction, scoring at SG60 is indicated.

Although pots and trap lines may also cause direct harm to several invertebrate species including pink seafan, fan mussel and biogenic reef forming horse mussel beds due to physical encounters as pots are lowered to the seabed or dragged during retrieval, the effects of this is likely to be highly localised. However some acknowledgement would be given to this potential impact during a full MSC assessment and it is likely that quantitative and qualitative data that demonstrates the likely level of interaction would assist in scoring at SG80

4.3.1.8 Hand collection

Hand collection – hand raking. Hand raking takes place in intertidal areas and few subtidal species can be expected to be encountered, the risk level is therefore perceived to be very low for this gear type and scoring at SG80 is considered highly likely for any UoCs that utilize this harvest method. Indirect effects associated with disturbance to nearby/adjacent seal and/or bird colonies will also need to be considered at full assessment.

Hand collection – scuba diving. Scuba diving is believed to have a negligible ETP footprint on account of the highly selective manner of fishing in which individual animals are selected for harvest

by hand. No fishing gear other than catch bags is used and there is no known interaction which is considered likely to have significant direct or indirect impacts on ETP species .

4.3.2 ETP species Management (PI 2.3.2)

The CR requires that where there are requirements of protection and rebuilding provided through national ETP legislation or international agreements, Table CB15 shall be used for evaluating the ETP management strategy PI.

Under the management strategy PI, the assessment is required to evaluate whether and to what extent the fishery has in place precautionary management strategies that re designed to:

- meet national and international requirements;
- ensure the fishery does not pose a risk of serious or irreversible harm to ETP species;
- ensure the fishery does not hinder recovery of ETP species; and
- minimise mortality of ETP species.

There are four scoring issues:

a. that there is a management strategy in place
b. evaluation of the strategy
c. evidence of implementation
d. evidence of success

At SG80 (unconditional pass), the fishery is required to have in place a strategy for managing the fisheries impact on ETP which is highly likely to meet with national and international requirements for protection.

Important here is the distinction between *measures/strategy/comprehensive strategy* which correspond to SG60/80/100. A strategy is defined as[30] "*a cohesive and strategic arrangement which may comprise one or more measures, an understanding of how it/they work to achieve an outcome and which should be designed to manage impact on that component specifically. A strategy needs to be appropriate to the scale, intensity and cultural context of the fishery, and could include voluntary or customary arrangements, agreements or practices, codes of practice (if they can be demonstrated to be working). A strategy should contain mechanisms for the modification fishing practices in the light of the identification of unacceptable impacts*"

For scoring issue a., clearly the bar is deliberately set quite high for the ETP component management PI, other P2 components only require that there be a *partial strategy* in place *if necessary* to manage a fisheries impacts on other components (Retained, Bycatch, Habitats and Ecosystem).

The expectation therefore is that there will always be some provision for management of ETP interactions, even when risks are very low. It is expected also that management of ETP will be explicit and will be reflected at all levels of the fishery management system – i.e. national, IFCA, fishery and individual vessel.

National level management is considered to comprise the range of documentation, statutes and policies that lead to designation of ETP species – this may include species action plans, biodiversity action plans, proposals for MCZ's and Natura 2000 network sites, regulations and legislation.

This is difficult to demonstrate without clear policies being decided on and implemented at IFCA or fleet level in relation to ETPs e.g. undertaking to insist on reporting of ETP interactions, clearly identifying local ETP species, producing guidance documentation for fishers, implementing Code of Conduct etc).

[30] GCB3.3 "General Requirements for Management Strategy PIs" provides guidance on what may be considered to constitute a management strategy.

At vessel level, there should be some demonstrable understanding amongst fishers of the threat that particular fisheries may present to ETP (such as through documented training) as well as a commitment to avoiding ETP interactions through e.g. through one off risk assessments of fishing operations and a commitment to recording and reporting ETP/fisheries interactions such as through ETP logs (electronic or paper). Specific measures to manage ETP impacts could be implemented through byelaws or fishing licence and/or permit conditions.

Scoring issue b. – management strategy evaluation –requires that there be some objective basis that the strategy will work. This can be based on information directly from the fishery – e.g. qualitative and/or quantitative data in relation to interactions, or using other measurable such as spatial/temporal distribution of ETP species and overlap with fishing gears. Effectiveness of any mitigation measures employed by the fishery to minimise ETP interactions or the potential for negative outcomes of interactions e.g. use of pingers, should be captured maybe considered under this scoring issue.

Scoring issue c. requires that there is evidence that the strategy is being implemented successfully.

A range of indictors can be considered as providing evidence of successful implementation. At the highest level, verifiable data in relation to ETP interactions allows for the most direct and robust evaluation of the success of management strategies within individual fisheries. However where it can be shown that particular mitigation measures (which have previously been identified as effective for managing ETP interactions and which are now included as part of the management strategy) are being routinely and consistently employed by the fishery then this could reasonably be interpreted as evidence of successful implementation, provided that other measures such as reporting of ETP interactions are operating within the fishery.

4.3.2.1 National/EU level management of ETP interactions

There is clear evidence that UK is active at policy level to increase sustainability and the greater application of the precautionary principle of fisheries including reducing the potential impacts on non-target species e.g. http://jncc.defra.gov.uk/page-2520.

The main source of legislation used to manage fishing activities in the seas of Europe is the Common Fisheries Policy (CFP). The objective of the Common Fisheries Policy, as defined in Article 2 of Council Regulation (EC) No 2371/2002 of 20 December 2002 on the conservation and sustainable exploitation of fisheries resources under the CFP is to ensure exploitation of living aquatic resources that provides sustainable economic, environmental and social conditions. To this end, the Article states, the Community should, among other things, minimise the impact of fishing activities on marine ecosystems, and the Common Fisheries Policy should be consistent with other Community policies, in particular with environmental policy.

The CFP sets clear requirements for the operation of commercial fisheries and is the main mechanism by which the harvest of resources is controlled (TAC's) as well as setting controls on fishing effort, fleet size, access rights and an extensive and detailed range of technical control measures. High-level legislation relating to fisheries, which explicitly contributes to the management of fisheries impacts on ETP, is not very well developed. The annually updated fishing legislation lists species that are prohibited from being retained onboard in the event of capture. However, other than list species that cannot be retained onboard, this legislation it does little to regulate or manage direct impacts of fishing gears.

Council Directive 92/43/EEC of 21 May 1992 on the conservation of natural habitats and of wild fauna and flora gives strict protection status to cetaceans and requires Member States to undertake surveillance of the conservation status of these species. Member States are also required to establish a system to monitor the incidental capture and killing of these species, to take further research and conservation measures as required to ensure that incidental capture or killing does not

have a significant impact on the species concerned. Accordingly. Council Regulation no 812/2004[31] laying down measures concerning incidental catches of cetaceans in European fisheries was introduced in order to fulfil the requirement of the Habitats Directive.

Under the regulation, member states are required to implement an observer programme within many fisheries that are known to present a credible threat to populations of cetaceans. The observer scheme requires minimum levels of coverage and specifies the gear types, ICES areas and fisheries that are to be monitored. In the UK, many pelagic and setnet fisheries are covered. For small sized fishing vessels less than 15 m overall length, which sometimes are unable to allow an additional person permanently on board as an observer, the regulation requires that data on incidental catches of cetaceans should be collected through scientific studies or pilot projects. Common monitoring and reporting tasks also need to be set. Under Article 2 it is prohibited for vessels of 12 m or over in overall length to use the fishing gear defined in Annex I in the areas, periods, and from the dates indicated without the simultaneous use of active acoustic deterrent devices. Effectively for the pre-assessment, this provision refers to bottom set gillnet fisheries in ICES subareas IV and VII. Due to the lower size limit of vessel that this requirement refers to – 12m – the relevance of this provision is considered to be minimal. Additionally, an even higher proportion of the vessels that are covered by the pre-assessment are believed to be <15m, hence much of the rest of the content of regulation 812 does not apply. Nevertheless there remains the clear requirement for scientific studies to be carried out on such components of the fleet in order to determine levels of impact.

European level initiatives to manage indirect impacts of fisheries on ETP such as through habitat destruction, depletion of prey species are reasonably well developed at policy level but are not always translated into protective measures within meaningful timeframes for MSC assessments. There has been increasing reference and momentum regarding the greater implementation of an ecosystem based approach to fisheries management in EU waters. If and when this becomes established as the normal approach for managing resources it is likely that the most harmful potential indirect effects (prey depletion, habitat destruction) of fisheries will be more effectively managed. For now, there seems little by way of benefit of the various legislative provisions in this regard. Recent initiatives such as the ban on shark finning are seen as positive developments overall and are indicative of intent to move forward however there is little by way of legislation that is of direct relevance to ETP species outside of the legislation that underpins EMS designations.

European Marine Sites legislation clearly defines the objectives in terms of conservation of natural habitats, flora and fauna, however it generally stops short of proposing specific management measures or initiatives for protection of habitats and species. The overall intent is to lay the framework down within which member states must introduce measures that will achieve objectives specified by the legislation. As such specific sections of the legislation e.g. Article VI of the habitats directive requires that 'plans' are only allowed to take place within SAC's where these have been subject to an appropriate assessment, the outcome of which indicates that there is no significant threat to conservation features or objectives. A similar requirement exists in relation to sites that are designated as SPA's. Within EMS there is a clear requirement for assessing likely impacts of activities and for ensuring that only those that can take place without compromising features can take place. Outside of European Marine Sites, the requirements for management are less prescriptive, except potentially in the case of Marine Conservation Zones (MCZ's).

The Marine and Coastal Access Act was introduced in 2009 to ensure clean, healthy, safe, productive and biologically diverse oceans and seas, and is putting in place better systems for delivering sustainable development of marine and coastal environment.

The main duties for IFCAs are set out in the Act. Each IFCA must manage the exploitation of sea fisheries resources in its district. In doing so it must:

[31] www. eur-lex.europa.eu/LexUriServ/LexUriServ.do?uri=OJ:L:2004...

- seek to ensure that the exploitation of sea fisheries resources is carried out in a sustainable way;
- seek to balance the social and economic benefits of exploiting the sea fisheries resources of the district with the need to protect the marine environment from, or promote its recovery from, the effects of such exploitation;
- take any other steps which in the authority's opinion are necessary or expedient for the purpose of making a contribution to the achievement of sustainable development; and
- seek to balance the different needs of persons engaged in the exploitation of sea fisheries resources in the district.

IFCAs must also seek to ensure that the conservation objectives of any MCZ in their districts are furthered, but there is uncertainty as to the full extent of the IFCA's role or responsibilities with respect to implementation of MCZ requirements.

The Act is broad in scope and several areas covered are of direct relevance to the management of fisheries impacts. Of key importance is the introduction of a flexible new mechanism for the designation of Marine Conservation Zones, which together with European Marine Sites will form a representative network of Marine Protected Areas. This will help fulfil the UK's European and International commitments for the establishment of coherent and representative network of Marine Protected Areas.

Progress is being made with respect to the designation of in excess of 120 new MCZ's in English waters and a period of public consultation will end on March 31st 2013. The scope for managing impacts of fisheries impacts within MCZ's is clearly defined[32]. "When a Marine Conservation Zone (MCZ) is designated, it does not automatically mean that fishing in that site will be restricted; some species, habitats and features protected by MCZs are not sensitive to fishing activities, and in these cases changes to fishing activities will not be needed. However, where MCZ interest features are vulnerable to fishing activities, some changes may need to be introduced to make sure that the MCZ interest features are maintained in, or able to reach, their conservation objectives. This is often described as introducing a 'management measure'. The design, implementation and enforcement of MCZ fisheries management measures is the responsibility of the Marine Management Organisation (MMO) and Inshore Fisheries and Conservation Authorities (IFCAs), informed by conservation advice from the Statutory Nature Conservation Bodies (SNCBs) such as Natural England and JNCC. Stakeholders in the regional MCZ projects, with input from regulators, such as the MMO, will identify possible options for management measures and these will be reflected in the impact assessments which need to accompany their proposals for MCZs"[33].

The Wildlife and Countryside Act 1981 forms part of national ETP management strategy in that it contributes to the legal definition of what species are considered as ETP species. Schedule 5 listing provides protection for certain wild animals including marine species from a range of impacts including deliberate killing or taking, possession or control, sale or offering for sale etc. However, however the defence clause allows protected species to be killed if this is "incidental to a lawful operation which could not reasonably have been avoided". This clause prevents prosecution of killings resulting from damaging activities such as fishing and agriculture.

The Natural Environment and Rural Communities Act came into force during 2006. Section 41 of the Act requires the Secretary of State to publish a list of habitats and species, which are of principal

[32] http://archive.defra.gov.uk/environment/marine/documents/protected/20121217-mcz-factsheet-sitemanage.pdf

[33] http://jncc.defra.gov.uk/PDF/MCZ_FisheriesManagementFactsheet.pdf

importance for the conservation of biodiversity in England. The list was been drawn up in consultation with Natural England, as required by the Act.

The S41 list is used to guide decision-makers, including local and regional authorities, in implementing their duty under section 40 of the Act, to have regard to the conservation of biodiversity in England, when carrying out their normal functions[34]. There are 943 species of principal importance included on the S41 list. These are the species found in England which were identified as requiring action under the UK Biodiversity Action Plan and which continue to be regarded as conservation priorities under the UK Post-2010 Biodiversity Framework[35] that replaced the BAP in 2011. The most recent England biodiversity strategy, 'Biodiversity 2020: A strategy for England's wildlife and ecosystem services' was published by Defra on 19 August 2011. The new strategy provides a picture of how England is implementing its international and EU commitments. It sets out the strategic direction for biodiversity policy for the next decade on land and at sea, and builds on the successful work that has gone before. The strategy refers extensively to fisheries and sets clear objectives in terms of halting and reversing the decline of biodiversity and loss of species, including cetaceans, skates and rays, sharks and seabirds. The strategy clearly states outcome ambitions that are relevant to marine biodiversity (Outcome 2 Outcome 2 – Marine habitats, ecosystems and fisheries; Outcome 3 – Species) and fisheries are listed as a priority for action in terms of reducing environmental pressures. The strategy explicitly refers to tackling bycatch issues, where necessary on a fishery specific basis.

At national level, the development of policies and strategies that are intended to manage the impact of fisheries on ETP lies largely with the Joint Nature Conservation Committee and Natural England.

JNCC provide advice on fishery policy and management with a view to promote the sustainable use of marine resources[36], while Natural England are responsible for advising Government and industry on marine conservation and seascape issues in England's territorial waters (from the coast out to 12 nautical miles offshore).

The primary remit of the marine section of Natural England is to provide practical advice based on best practice and grounded in science, to ensure delivery of the long-term benefits the government wants and that the natural environment needs for marine areas. NE are active in several areas that are considered key roles with respect to management of ETP impacts of fisheries. In this regard, NE advise Government on the designation of Marine Protected Areas (MPAs) and also inform the Marine Management Organisation and Inshore Fisheries and Conservation Authorities (IFCAs) - on the conservation objectives (including ETP species where these are identified) of MPAs and on particular operations that may impact conservation features of marine sites. Natural England have main responsibility for monitoring and reporting on the state of development of the MPA network, in the context of UK reporting on the wider environment, required under the Marine and Coastal Access Act, Habitats and Birds Directives and the Marine Strategy Framework Directive (MSFD). Natural England provide advice to Defra on a wide range of issues and legislation supporting the implementation of Government policy and the achievement of international commitments concerning the conservation and protection of species and habitats. NE work closely with JNCC with the specific objective of integrating MPA designation, monitoring and advice on management, and also wider policy advice to Government, across England's seas out to 200nm.

34 http://www.naturalengland.org.uk/ourwork/conservation/biodiversity/protectandmanage/habsandspeciesimportance.aspx

35 http://jncc.defra.gov.uk/pdf/UK_Post2010_Bio-Fwork.pdf

36 http://jncc.defra.gov.uk/pdf/1105%2520MARINE%2520CONSERVATION%2520ZONES%2520AND%2520FISHERIES-FINAL.pdf

4.3.2.2 Management of ETP at IFCA/fishery level

As part of the pre-assessment, a review of all IFCA byelaws and management responses to the issue of capture of endangered, threatened and protected species in fisheries was conducted. All IFCA's have a number of byelaws that address general issues such as maximum size or engine power of vessels, limitations on the use of certain gear types, temporal/spatial restrictions on fishing as well as restrictions on the use of specific gear types to capture certain species. Undoubtedly, many of these byelaws are useful and assist in managing indirect impacts of fishing activity of ETP species. Overall, however, few byelaws were found that were of direct relevance in the context of managing direct fisheries impacts (mortality, injury) on ETP species. A further key short-coming of ETP impact management at IFCA level is that there are no formal Codes of Conduct in place amongst member vessels in any IFCA. A CoC is considered a useful tool for managing fisheries impacts and allows for specific management measures to be implemented onboard during day to day fishing operations, such as reporting of interactions with ETP species, reporting loss of fishing gear etc. A CoC can also assist crews in improving their knowledge with regard to ETP species by helping with ETP identification and providing guidance on what action to take in the event of captures or interactions with ETP species.

Byelaws that may be considered to have some general relevance in the context of managing impacts on ETP are summarised below by IFCA (only a few of which are directly aimed at managing impacts on ETP species):

- **Isles of Scilly IFCA -**High level objectives concerning the sustainable management of marine resources and fisheries are captured in the annual plan. Restrictions on vessel size and use of dredges for scallop fishing. There is no mandatory Code of Conduct in place for fishing vessels.
- **Cornwall IFCA** – A voluntary Code of Practice in place with respect to netting for bass aimed at reducing harbour porpoise and common dolphin interactions. Restrictions on scallop dredging in certain areas. St Ives Bay gill net fishery – byelaw enabling the temporary closure of areas where bird bycatch exceeds a predetermined level over any consecutive five day period. Fixed engines byelaw requiring that all set nets be deployed with at least a depth of 3m of waters above the headline at all states of the tide. There is no mandatory Code of Conduct in place for fishing vessels.
- **Devon and Severn IFCA** - Significant restrictions to fishing activity in Lundy Marine Island marine reserve including a no take zone, potting and netting ban and no spearfishing area. Some restrictions on the use of trammel nets in estuaries mainly to protect salmon and sea-trout. Lyme Bay reefs protected through dredging and trawling ban. There is no mandatory High level objectives concerning the sustainable management of marine resources and fisheries are captured in the annual plan. Code of Conduct in place for fishing vessels.
- **Southern IFCA** – sea grass management strategy in place recommending against use of mobile gears on sea grass beds. Some restrictions on the use of fixed gears and manner of deployment in estuaries.. Ban on mobile gears on sea grass beds in Portland harbour SPA. High level objectives concerning the sustainable management of marine resources and fisheries are captured in the annual plan. There is no mandatory Code of Conduct in place for fishing vessels.
- **Kent and Essex** – various restrictions on herring fishing with trawls and drift nets. Whelk pot limit. Fixed gear restrictions for some areas. High level objectives concerning the sustainable management of marine resources and fisheries are captured in the annual plan. There is no mandatory Code of Conduct in place for fishing vessels.
- **Eastern IFCA**– various spatial and temporal restrictions on trawling and netting. Also on dredging. Illegal to retain onboard Tope or parts thereof. Vessel size restrictions. Research and environment plan document, Statement of Vision. High level objectives concerning the

sustainable management of marine resources and fisheries are captured in the annual plan. Research activity into sensitive species such as Lanice and Sabellaria spinulosa. Clear acknowledgement of IFCA High Level Objectives and more detailed targets and research themes for the environment team, including:

- Working in partnership with other organisations to gather and share data;
- Demonstrating an in-house capability to collect, analyse and interpret evidence to inform management policy decisions;
- The adoption of the principles of best practice in sustainable management of the marine environment; and
- The main issues affecting the sustainable exploitation of sea fisheries resources in the district are understood, and appropriate management plans for them are put in place.

There is no mandatory Code of Conduct in place for fishing vessels.

- **North Eastern IFCA** – extensive trawling and netting restrictions are in place. There are requirements for the use of acoustic deterrent devices on some bass nets. Prohibition on retention of tope *Galeorhinus galeus* or parts of tope. Flamborough Head no take zone byelaw. High level objectives concerning the sustainable management of marine resources and fisheries are captured in the annual plan. A strategic research plan is in place. The research plan provides for developing strategies for improving ecosystem based management. Under Research theme 2 – an undertaking to develop project that carry out an appropriate assessment of fishing gear interactions with designated features within protected areas. There is no mandatory Code of Conduct in place for fishing vessels.
- **Northumberland IFCA** – various restrictions of trawling, purse-seining and use of fixed gears. Pot limitations (800). High level objectives concerning the sustainable management of marine resources and fisheries are captured in the annual plan. There is no mandatory Code of Conduct in place for fishing vessels.
- **North Western IFCA** - various restrictions of trawling, purse-seining, use of fixed gears. Extensive range of byelaws that includes explicit prohibition of landing on skate and rays below MLS. However most are of little direct relevance to controlling or mitigating against direct ETP impacts. High-level objectives concerning the sustainable management of marine resources and fisheries are captured in the annual plan. There is no mandatory Code of Conduct in place for fishing vessels.

4.3.2.3 Scoring ETP Management PI

Scoring for all gear types for PI 2.3.2 is likely to be at SG60.

It should be pointed out at the outset that scoring of the management PI is made more difficult where there is uncertainty with respect to the outcome status score i.e. where scoring of 2.3.1 is <80, as it may not be possible to evaluate a fisheries performance with respect to some scoring issues at 2.3.2 in the absence of data/specific information on ETP interactions.

While higher-level management is reasonably well served with clear policies, biodiversity strategies and regulations, there is little direct management of fisheries impacts on ETP species at MMO, IFCA or fishery/vessel level. While it is apparent that there are very significant differences between the levels of impact between different harvest methods – and sometimes between the same harvest method in different areas, it is difficult to foresee scoring at SG80 for almost all fisheries on the basis that there is no strategy (as defined in the CR) in place for managing ETP impacts.

Clearly some fisheries are in greater need of management action in this regard than are others, however the CR does not capture this fact, requiring that all fisheries have in place an ETP management strategy. It is important however to point out that a strategy only needs to be proportionate to the scale, intensity and cultural context of a fishery. In many cases therefore, some relatively straightforward initiatives at IFCA level and amongst small groups of fishers seeking MSC certification may offer prospects for fisheries to improve their scores quite readily for this PI. Examples might include the implementation of vessel Codes of Conduct and voluntary reporting of interactions. Some clear initiatives or measures at IFCA level may also be appropriate, including perhaps the development of clear policies and explicit statements that capture the organizations position with respect to ETP species. The option of creating byelaws that aim to protect ETP species where there are known interactions should also be considered. The current system for creating byelaws within IFCA's is not straightforward however and this situation does is likely to affect the scoring of the management system PI for ETP species in a full MSC assessment.

The analysis has considered the fact that the IFCA's role in managing features within MCZ's and EMS are not very well defined in all cases. It is apparent that most IFCA's are very extensively involved in meeting with the requirements to manage its fisheries impacts on nature conservation features within designated sites and meeting with the current requirements draws an extraordinary amount of resources from IFCA's. The pre-assessment however recognizes the fact that MSC requirements do not stop at MPA boundaries and that management must consider the direct and indirect impacts of the fishery on ETP species and manage those accordingly in all marine areas where a fishery may operate.

4.3.3 ETP Species: Information / Monitoring (PI 2.3.3)

The ETP species information PI verifies conformity of the fishery with the MS requirement that 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.

Conformity is evaluated by determining the fisheries specific performance with respect to three scoring issues-;

a. Information quality
b. Information adequacy for assessment of impacts
c. Information adequacy for management strategy

At SG80, information from the fishery under assessment should be sufficient to allow fishery related mortality and the impact of fishing to be quantitatively estimated for ETP species. Information should also be adequate to determine whether the fishery may be a threat to protection and recovery of ETP species. Finally, information should be sufficient to measure trends and support a full strategy to manage impacts on ETP species.

Scoring of this PI requires that there be a reasonable level of information available with respect to the fishery e/g/ effort, temporal and spatial operation and a well as information regarding the presence and abundance of potentially affected ETP species. Due to the fact that there is little information with respect to many fisheries interactions with ETP species scoring at SG80 is once again made difficult.

Most IFCA's however do have some data in relation to spatial and/or temporal operation of the fleet, which would allow for some estimation of effort. In addition there are published data that indicate general levels of direct impacts associated with the use of different gear types for most fisheries.

In terms of scale of the fisheries, there is a general understanding of the scale of most fisheries in each IFCA, however there is no clear availability of landings data that would allow for any changes in risk patterns to be readily identified. Larger vessels (>12m) will all soon be required to carry VMS and logbook reporting requirements mean that effort and catches can be estimated by area and gear type. Smaller (<12m) vessels are not required to use VMS in most cases and there is therefore less information in relation to spatial and temporal patterns of fishing activity for smaller vessels.

Furthermore, other potential indicators such as for example, numbers of vessels operating, data in relation to the length of set nets fished/numbers of pots deployed/soak times etc. could all be useful in helping to monitor the fishery and identify changes in risks to ETP species. It is likely that at least some of this data is collected on an on-going basis within IFCA's and scoring has assumed that there is at least some data of this nature available.

There is good information on the occurrence of ETP species in English waters, including on many cases, seasonal patterns and variations in activity.

While overall the scoring of the ETP PI's has been fuelled largely by uncertainty due to a lack of information, this fact has been captured under the outcome PI (2.3.1) as the CR explicitly requires quantitative data be available to demonstrate the levels of direct interaction in a fishery.

It is highly probable that for most UoC's, a Condition would be raised under 2.3.1 during an assessment that would require the fishery to implement some kind of data collection undertaking which would allow levels of interaction to be both qualitatively and quantitatively estimated.

The issue therefore that needs to be scored under the Information PI are seen as information needs beyond this i.e. there should be no double scoring of the same issue/non-conformity with the standard. The remaining consideration relate to scoring issues b. and c.

On account of this it is considered that current levels of information would support scoring at SG80 for mobile gears including otter trawls, pelagic trawls and dredges (which clearly do have potential to cause significant impacts and to be a threat to protection and recovery of ETP species).

At SG80 for scoring issue b. there is a greater need for information in relation to the impact of static gears that would allow a robust estimation of whether the fishery may be a threat to protection and recovery of ETP species. In particular there is poor specific information that indicates rates of entanglement of large pelagics, cetaceans and seabirds with static nets and surface lines for static nets, pots and long-lines combined with relatively poor understanding of the population status for many of these species.

Scoring issue c. is considered likely to be met with existing levels of information for most fisheries, assuming that some indicators of risk levels such as ETP population status, average number of pots/amount of gear deployed, overall catch rates, landings data and spatial/temporal information are available for a fishery that enters full certification.

4.4 Habitats

The MSC pre-assessment scores for habitat component PIs are presented by gear type in Table 4.4.1. Justifications for these scores are provided below.

The approach to the habitat component has been to assess the Unit of Certification i.e. gear type based on operation at a national (English) level, therefore the assessment is applicable to UK vessels operating within both inshore and offshore English waters (i.e. inside and outside 6 NM). Therefore, unless otherwise stated, the scores presented in Table 4.4.1 are applicable at an English national level and within all IFCAs. An assessment has also been undertaken based on IFCA byelaws in place which may improve the habitat management PI score. Where scores are different for certain IFCAs, these have been provided as a separate row (with justifications presented in the Habitat Management PI section).

Table 4.4.1: Habitat Component pre-assessment scoring

		2.4.1: Status	2.4.2: Mngt	2.4.3: Info
Demersal trawl	Demersal otter trawl	60-80	60-80	60-80
Beam trawl	Beam trawl	<60	<60	60-80
Dredge	Scallop dredge	<60	<60	60-80
	Scallop dredge in Cornwall, Devon & Severn, Eastern and North Eastern IFCAs	<60	60-80	60-80
	Shellfish dredge	<60	<60	60-80
	Hydraulic dredge	<60	<60	60-80
Pelagic trawl	Pelagic otter trawl	>80	>80	>80
Set and drift nets	Set trammel nets	>80	>80	60-80
	Set gill nets	>80	>80	60-80
	Encircling gillnets	>80	>80	60-80
	Drift nets	>80	>80	60-80
Hooks	Long line	>80	>80	60-80
	Handlines and pole-lines	>80	>80	>80
	Hooks and lines	>80	>80	>80
	Trolling lines	>80	>80	>80
Pots and traps	Pot/parlour	>80	>80	60-80
	Whelk pots	>80	>80	60-80
	Cuttle/squid traps	>80	>80	60-80
Hand collection	Hand raking	>80	60-80	60-80
	Hand raking in Eastern, North Western and Southern IFCAs	>80	>80	60-80
	Scuba diving	>80	>80	60-80

To provide some context for scoring and begin harmonization considerations, a review of habitat component scores for MSC certified fisheries across Europe in the first instance and worldwide (where gear has not been certified in Europe) has been undertaken and is presented in Appendix F.

4.4.1.1 Risk based framework (RBF) for assessing habitat outcome status

The amount of information available for English inshore waters, including research on specific gear-habitat interactions and detailed knowledge on habitat mapping which identifies sensitive and/or vulnerable habitats, allows Habitat PIs within this pre-assessment to be assessed using the standard

MSC methodology, and means that the MSC RBF methodology is not required. However, it is interesting to understand how MSC scores may correlate, in particular in relation to recovery times of benthic habitats impacted by fishing gear. This has been provided as part of MSC methodology within the habitats Scale Intensity Consequence Analysis (SICA) Consequence Table for PI 2.4.1 (Table 4.4.2).

Table 4.4.2: Principle 2 SICA Consequence Table for PI 2.4.1, Habitats

Subcomponent	Consequence category (MSC Score)		
	1 (100)	2 (80)	3 (60)
Habitat types	No direct impact on habitat types. Impact unlikely to be detectable. Time taken to recover to predisturbed state on the scale of hours to days.	Detectable impact on distribution of habitat types. Time to recover from local impact on the scale of days to weeks, at larger spatial scales recovery time up to one year.	Impact reduces distribution of habitat types. Time to recover from local impact on the scale of months to a few years, at larger spatial scales recovery time of several years to less than two decades.
Habitat structure and function	No detectable change to the internal dynamics of habitat or populations of species making up the habitat. Time taken to recover to pre-disturbed state on the scale of hours to days.	Detectable impact on habitat structure and function. Time to recover from impact on the scale up to one year, regardless of spatial scale.	Impact reduces habitat structure and function. For impacts on non-fragile habitat structure, this may be for up to 50% of habitat affected, but for more fragile habitats, to stay in this category the % area affected needs to be smaller-- up to 20%. Time to recover from impact up to two decades.

4.4.2 Habitats: Outcome Status (PI 2.4.1)

The purpose of the Habitats Outcome Status PI is to ensure that the fishery does not cause serious or irreversible harm to habitat structure, considered on a regional or bioregional basis, and function. To obtain an unconditional pass (>80) the assessment must conclude that the fishery is highly unlikely (i.e. no more than 30% probability[37]) to reduce habitat structure and a function to a point where there would be serious or irreversible harm; to obtain a conditional pass (>60) the assessment must conclude that this is unlikely (i.e. no more than 40% probability[38]) to occur; and a fishery that does not meet this criterion will automatically fail (<60).

The summaries below for each gear type outline the available knowledge and research for habitat interactions focusing on the ability of habitat to recovery.

[37] Where 'highly unlikely' is interpreted by MSC methodology as there being no more than a 30% probability that the true status of the component is within the range where there is risk of serious or irreversible harm. Kinds of evidence for such a determination include: plausible argument and interpretation of direct observations across a range of viewpoints and hypotheses; based on analogy from similar situations that is supported by significant direct observations from the fishery; relies on an about even balance of qualitative assessment/expert judgement and quantitative assessment

[38] Where 'unlikely' is interpreted by MSC methodology as there being no more than a 40% probability that the true status of the Component is within the range where there is risk of serious or irreversible harm. Kinds of evidence for such a determination include: plausible argument, across a range of viewpoints and hypotheses; based on analogy from similar situations with limited direct observations from the fishery (e.g. qualitative or general observations); substantially relies on qualitative assessment and expert judgement

4.4.2.1 Demersal otter trawl

Bottom otter trawls encompass a large variety of designs, riggings and dimensions. Common components are a pair of otter boards or trawl doors, sweeps/bridles and one or more trawl nets (Valdemarsen *et al.* 2007). In a multirig configuration known as twin trawling, a weight called a clump, roller or sled is used to separate the two nets. Another form is pair trawling which is undertaken by two vessels that keep station some distance apart when towing which acts to hold open the net and therefore trawl doors are not necessary. With regard to impacting habitat it is the twin-rig trawl that has most interaction with the seabed, since this gear uses two otter boards and one weight 'sled' between nets, followed by the standard demersal trawl and pair trawling, which both use two otter boards.

The trawl otter doors and sled are generally made from steel and can each weigh up to 1 tonne. Trawl doors are positioned in such a way that the hydrodynamic forces, acting on them when the net is towed along the seabed, push the doors outwards and prevents the mouth of the net from closing. The ground rope of a demersal otter trawl typically consist of approximately 100mm diameter rubber rollers, with a tickler chain (typically comprising 12mm steel chain) spanning between the wing ends. To work effectively in catching demersal species, the gear must establish close contact with the seabed and is therefore likely to have an impact on benthic habitats.

Bottom fishing activities are capable of greatly reducing habitat complexity by either direct modification of the substratum or removal of the fauna that contribute to surface topography (Auster and Langton, 1998; Jennings and Kaiser, 1998).

The impact of demersal otter trawling on benthic habitats is well documented (e.g. Kaiser & Spencer 1994, Lindeboom & de Groot 1998, Bergmann & Santbrink, 2000, Jennings *et al* 2001, Schratzberger & Jenning, 2002, Hopkins 2003, Løkkeborg 2004, Trimmer et al 2005, Hiddink *et al* 2006, Kaiser *et al* 2006, etc).

Effects on habitat include the removal of major physical features, reduction of structural biota, reduction in habitat complexity, changes in sea floor structure and changes to benthic communities. Evidence of the physical impact has been documented through side scan sonar and ROV footage, as shown in Figure 4.4.1 (Hopkins, 2003). In some cases trawling has been shown to reduce the seabed to a flat homogenous plain. By directly or indirectly removing and flattening any relief, the seabed may lose much or its entire three dimensional structure. Benthic communities of larger, slow growing and long lived species are removed and replaced by less diverse communities of smaller, short lived and fast growing species. Hiddink *et al.* (2006) suggest that negative impacts of trawling are greatest in those areas where seabed habitats are not subject to high levels of natural disturbance. Benthic macrofauna are most affected by trawling activity; whereas burrowing and other smaller seabed infauna are less vulnerable (Bergmann & Santbrink, 2000; Dinmore *et al* 2004). Where trawling does not cause direct mortality to species or individual specimens, indirect consequences may arise whereby fauna is damaged or injured, making it more susceptible to being preyed upon by scavenging fauna (Kaiser & Spencer, 1994). Repeated trawling of the seabed may also modify benthic production processes (Humborstad, 2004).

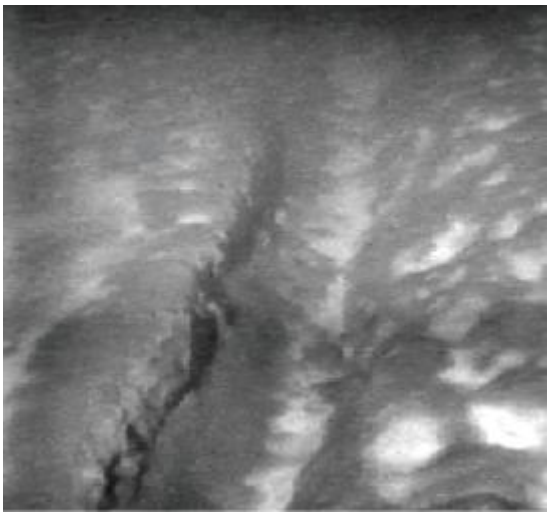


Figure 4.4.1: Remotely operated vehicle (ROV) recording at 60m depth in the southern Baltic Sea indicating a trawl mark which is approximately 0.5m deep and 1m wide (Hopkins, 2003).

It is known that demersal otter trawling has a significant initial effect on muddy-sand and mud habitats, but on the latter these effects have been shown to be short-lived with an apparent long-term, positive, post-trawl, disturbance response (Kaiser *et al*, 2006). This positive response may represent an increase in the abundance of smaller-bodied fauna, but a possible overall decrease in biomass (Jennings *et al*. 2001 Duplisea *et al*. 2002).

The rates of recovery for benthic communities following intensive trawling disturbance may range from weeks to years, with rates of recovery depending on rates of immigration, recruitment and growth (Schratzberger and Jennings, 2002). Slow-growing large-biomass biota such as sponges and soft corals are known to take much longer recover (up to 8 yr) than biota with shorter life-spans such as polychaetes (<1 yr) (Kaiser *et al*., 2006).

Based on the operational range of demersal otter trawls throughout English waters, including inshore and beyond 6 NM (see Stage 1 Report: Figure 3.12), together with the knowledge habitat interactions and range of recovery times which are relatively high for sensitive habitats, it is appropriate for habitat outcome status to score below 80, but above 60 thereby triggering a conditional pass.

4.4.2.2 Beam trawl

As with demersal otter trawling, the impacts of beam trawling on benthic habitats and associated communities are well researched (Evans *et al*, 1996, Hiddink *et al*, 2007, Jennings *et al*, 2001, Jennings *et al*, 2002, Kaiser and Spencer, 1996, Lindeboom and Groot, 1998, Piet *et al*, 2000, Rabout *et al*, 2008, Hinz *et al*, 2009, Lengkeek and Bouma, 2010).

A recent report on the impacts of beam trawl fisheries in the North Sea summarized 55 publications (Lengkeek and Bouma, 2010) and drew the following conclusions in relation to benthic communities in the North Sea:

- Long-lived, slow-growing species (such cold-water sponges and -corals and large bivalves) are most negatively affected by beam trawling activities;
- Shifts occur in the benthic species composition as a result of beam trawling activities;
- Ecosystems changes occur as a result of beam trawling activities through alteration of production levels, food chains or population structures;
- Beam trawling activities lead to loss of benthic biodiversity;

- Beam trawling activities temporarily increase the food availability for scavengers;
- In many areas recovery times take longer than between-trawling intervals;
- Beam trawling activities cause direct mortality of certain species;
- Impacts of beam trawling on benthic communities differ between habitats. In sandy areas impacts are lower than in muddy areas or areas with coarse gravel;

Kaiser *et al* (2006) present recovery rates for habitats subject to beam trawling activity. For muddy sand habitats recovery to within 20% of control sites (i.e. -20%) is 29 days and to -10% is 236 days. If the Unit of Certification can be limited to muddy sand habitats then this recovery rate could provide argument for a higher score if the assessment was undertaken using the RBF methodology. No data are available on the recovery rates in gravel or sand habitats, although significant-strong initial drops are recorded by Kaiser (*et al.,* 2006). Furthermore, no data exists for recovery rates across muddy or biogenic habitats.

Very few studies on the impacts of beam trawling have been carried out within habitats designated as Special Areas of Conservation (SAC) in the North Sea. However, Lengkeek and Bouma (2010) compare beam trawling impacts on species or communities with specific SAC/Natura 2000/ Habitats Directive goals.

For habitat types 'reefs' (1170) and 'sandbanks which are slightly covered by sea water all the time' (1110) a proposed conservation goal is improvement of the natural qualities of these areas with "quality" defined as the 'presence of long-lived benthic species'. Furthermore, both habitat types are characterised by a high benthic diversity, with characteristic species for 'good quality of sand banks' considered to be, amongst others, *Echinocardium cordatum* and *Spisula subtruncata*. Impacts of beam trawling on benthic communities have been scientifically demonstrated to have a negative impact on long-lived, slow-growing species, lead to loss of benthic biodiversity and have a high direct mortality rate of *E. cordatum* and *S. subtruncata*.

Clearly beam trawl activity within SACs designated for these habitat features would lead to serious or irreversible harm to habitat structure on a bioregional basis, and even regional basis given the scale of some offshore SACs.

Without a robust management plan including a network of closed areas and routine habitat monitoring, together with measures to restrict effort and accurately record spatial interaction, it is unlikely that beam trawling would reach the minimum pass requirements. This pre-assessment concludes that beam trawling would not meet SG60 for the habitats outcome status PI and therefore automatically fail the fishery at a Principle 2 level.

4.4.2.3 Dredge

The impact of dredging is well studied (Auster *et al*., 1996; Currie and Parry, 1996; Currie and Parry, 1999; Eleftheriou and Robertson, 1992; Jennings *et al*, 2001; Kaiser *et al.* 1996; Kaiser *et al.* 2006; Løkkeborg, 2004; Thrush *et al*., 2005). As presented in Stage 1 Report: Section 3.4.3 scallop and shellfish dredges operate differently than hydraulic dredges and are therefore considered separately below.

Scallop dredging

Kaiser *et al*. (2000) studied the impact of scallop dredging across areas of low, medium and high fishing effort in south England. They found that the habitat differences (depth, grain size, mass of stones and broken shells) had a more apparent effect on community structures (total number of individuals, number of species, diversity) than the level of fishing effort. As fishing disturbance increased there was a general decrease in less mobile, larger-bodied and fragile fauna and an increase in the more resilient, mobile fauna. It was also found that higher levels of impact to more

sensitive species occurred in the areas with low fishing intensity since these areas had a higher level of such species. It is logical that areas of high fishing effort are likely to be maintained in a permanently altered state, inhabited by fauna adapted to frequent physical disturbance. These effects will be most apparent for stable types of habitats that contain structural biogenic components.

Hall-Spencer and Moore (2000) examined the effects of fishing disturbance on maerl beds (which are composed of highly dichotomous calcareous algae that forms a complex substratum with a high degree of 3-dimensional complexity). The associated assemblages of such habitats have high diversity and many of the associated species are large-bodied and slow-growing. Hall-Spencer and Moore (2000) showed that four years after the occurrence of an initial scallop-dredging disturbance had occurred, certain fauna, such as the nest building bivalve *Limaria hians*, had still not re-colonized trawl tracks.

Kaiser *et al.* (2006) undertook a meta-analysis of 101 experimental fishing impact studies in order to identify the types of fishing gear that have the greatest impact on the seabed and on the groups of organisms that are most vulnerable to fishing activities. Scallop dredging was found to have the most severe ecological effects. Scallop dredging in biogenic habitats gave the greatest initial response of all fishing gear/habitat combinations, and the negative effects were predicted to last from 972 to 1175 d post-fishing.

Gravel habitats, which are relatively stable and tend to support communities with high levels of diversity and biomass, were negatively affected by scallop dredging both in the short and long-term although the initial impact was less pronounced than for other less stable habitats (i.e. biogenic). The mean times to -10% recovery for muddy sand and sand habitats were 88 d and 39 d respectively. Although sand habitats were found to return to -10% recovery the fastest, they showed very high extrapolation times for maximum recovery (extrapolated to > 8 yr) due to a lack of evidence of strong recovery during the time period of the study, reflecting the tendency of many studies to examine initial impacts only.

In summary the literature reviewed indicates that scallop dredging has a significant impact on habitats and biota. The level of impact varies depending on the habitats fished and how extensively these areas have been fished previously with the highest initial impact recorded for biogenic habitats, approaching 100% alteration.

Without a robust management plan including a network of closed areas and routine habitat monitoring, together with restrictions on the number and effort of dredgers within an area (as seen for the SSMO Shetland scallop fishery) it is unlikely that scallop or shellfish dredgers would reach the minimum pass requirements. This pre-assessment concludes that scallop dredging would not meet the SG60 habitats outcome status PI and therefore automatically fail the fishery at a Principle 2 level.

Hydraulic dredging

Surveillance data indicates that hydraulic suction dredging occurs at very few distinct locations throughout English inshore waters (see Stage 1 Report: Figure 3.14).

Hydraulic dredging uses water jets to penetrate and fluidise sediments down to depths of approximately 30cm allowing the dredge to scoop up the target species and transport onboard via a pipe. Habitat impacts of hydraulic dredging is well understood and well researched (Bell and Walker, 2005; Ens *et al*. 2004; Hall *et al*. 1990; Hall and Harding, 1997; Hauton *et al*, 2003; Hauton *et al*., 2003; Kaiser *et al*, 2006; Keus, 2009; Morello *et al*., 2005; Roston, 1995; Tuck *et al*. 2000). Hydraulic dredging is typically undertaken at slow speeds, to allow time for the sediment to become fluidised. A track along the area dredged is typical, in the form of a furrow or depression in the seabed, fringed by a build up of sediment on each side. A silt cloud can be created by the dredge, especially for finer sediments, which settles in the surrounding area and has been recorded to reach 21 m away (Meyer

et al, 1981, Hauton *et al*, 2003). Another study found that sediment plumes may settle to form layers 75 mm thick, with the potential for smothering the surrounding seabed.

Comparison between dredged and undredged areas have shown recovery times varying from 14-56 days (Hall and Harding, 1997). While Meyer *et* al (1981) showed little discerning difference between dredged and surrounding area after 24 hours, in mobile sand habitats. Kaiser *et al* (2006) explored intertidal dredging habitat recovery rates and found sandy habitats time to -20% recovery to vary from 71-127 days and time to -10% recovery 109-193 days. Recovery rates for sandy muddy habitats were significantly higher at up to 6 years to -20% recovery (Kaiser *et al*, 2006). Recovery rates for mud have not been researched in detail.

Based on the speed at which hydraulic dredging is undertaken the habitat impact is predominately localised, although sediment re-suspension and deposition may lead to smothering. Furthermore, given recovery rates in sandy muddy habitats, is likely to require substantial recovery times for muddy and/or sensitive habitats with the potential of causing serious harm to such habitats. It should be noted that only very few locations throughout English inshore waters are seen to be targeted by hydraulic suction dredging, based on surveillance data and such localised impact outside sensitive habitats may warrant an MSC score between 60-80. However the suction dredging activity recorded through surveillance data looks to overlap with areas designated as Special Areas of Conservation (SAC) and recommended Marine Conservation Zones (MCZ), including the Wash and Norfolk Coast SAC (in the Eastern IFCA), the Essex Estuaries SAC and Blackwater, Crouch, Roach and Colne Estuary MCZ (in the Kent and Essex IFCA) and the Solway Firth SAC (in the North Western IFCA).

It is therefore not possible to assess with confidence that serious harm is not being caused to vulnerable habitats. Furthermore the true extent of operation may not be accurately reflected within surveillance data due to missing data and uncertainties including temporal coverage of data. As such this pre-assessment concludes that hydraulic dredging would not meet the SG60 habitats outcome status PI and therefore automatically fail the fishery at a Principle 2 level.

4.4.2.4 Pelagic otter trawl

The MSC standard requires consideration of the impact of fishing on the 'biotic aspects of pelagic habitats', however it is understood that no MSC full assessment has attempted to quantify this, to date, or felt it necessary to raise any conditions.

Pelagic otter trawling gear does not intentionally come into contact with the seabed and therefore habitat interactions are very rare. Any potential impact is limited to lost gear which may become entangled, sink and drag along the seabed with tidal movements. However, such occurrences are considered rare. The low level of habitat interaction is reflected in outcome status scores for MSC certified pelagic trawl fisheries, with scores ranging from 90-100 (see Appendix F). A score of >80 is therefore appropriate for pelagic otter trawls in this this pre-assessment.

4.4.2.5 Set nets

Gill and entangle/trammel nets (known as set nets) are lightweight, with netting typically made of nylon filament mounted to a buoyant head rope and a ground rope that usually incorporates some weighted rope serving to keep the bottom of the net on the seabed. Nets are kept in position through the use of anchors, typically weighing less than 100 kg each, and which are located at either end of the net. Typically set nets are deployed in configurations or 'trains' where multiple nets are joined together. In such circumstances anchors may be deployed at intervals along the length of the net, perhaps every 200 meters or so, in addition to anchors at the start and end of trains. Anchors, once set do not move (in less strong currents are encountered which may cause dragging across a short distance) and are not associated with a significant footprint on the seabed.

The key feature of set nets in the context of seabed habitats is that they have a minimal impact on account of the very lightweight nature of the gear and the fact that the gear remains stationary throughout the fishing operation.

These nets can be bottom or pelagic set (depending on the target species) and are often set on hard rocky ground or over wrecks to take advantage of ground that cannot be fished by mobile bottom trawlers. If dragging occurs or nets get lost this may result in entanglement around rocks or indeed sensitive habitats. Furthermore nets which have torn free from one anchor are likely to become wrapped in a tight ball around the remaining anchorage point (Macfadyen *et al*., 2009). Anecdotal evidence indicates that losing gear is a relatively rare occurrence (although scuba divers do report some gill nets littering reefs); further, there is a clear economic incentive to prevent gear loss and to retrieve any lost nets.

The low level of habitat interaction is reflected in outcome status scores for MSC certified gill, trammel and ring net fisheries, with scores ranging from 80-100 (see appendix F). Based on this, together with the evidence above, a score of >80 is appropriate for set nets for this pre-assessment.

4.4.2.6 Drift nets

Drift nets have a lower level of habitat interaction than set nets, since they remain within the water column, generally fishing from the surface down. There is a higher potential for gear loss given that the net travels with the tide, however this is often mitigated by vessels remaining alongside nets as they drift.

The low level of habitat interaction is reflected in outcome status scores for MSC certified drift net fisheries, with the Cornish sardine fishery scored at 100 (see Appendix F). Based on this, together with the above, a score of >80 is appropriate for drift nets for this pre-assessment.

4.4.2.7 Hooks

Long lines, handlines and pole-lines have very limited habitat interactions. Of these gears long lines have the most potential for contact with the seabed on account of the anchors and weights used to set the gear. Long line hooks may also interact with sensitive biogenic habitats, however due to the risk of losing gear through entanglement with such habitats it is likely that these areas are avoided.

The potential for long line fishing activity to significantly impact upon benthic habitats is therefore generally regarded as being low (Rice et al, 2007). Indeed it has been found that shifting from trawling gear to long lines could significantly reduce habitat impacts (Jenkins and Garrison, 2009).

The low level of habitat interaction is reflected in outcome status scores for MSC certified long line, hand line and pole and line fisheries, with scores ranging from 85-100 (see Appendix F). Based on this, together with the evidence above, a score of >80 is appropriate for Hooks for this this pre-assessment.

4.4.2.8 Pots and traps

The potential habitat impacts of pots, parlour pots, whelk pots and cuttlefish/squid traps are considered to be similar. Most of the evidence available related to crab and lobster pots and is considered to be directly applicable to whelk pots and cuttlefish/squid traps.

In general, pots are often advocated on an environmental basis for having a lesser impact on habitat than mobile fishing gear such as trawls and dredges (Rogers *et al*., 1998; Hamilton, 2000; Barnette, 2001). Potting gear in general has smaller and more localised impacts.

Eno *et al.* (2001) examined the effects of fishing with crustacean pots on benthic species in Great Britain through qualitative and quantitative experiments. This study examined the effects of lobster and crab pots being hauled from rocky substrates in southern England, and found that the habitats

and their communities appeared relatively unaffected by potting. The slow-growing, long-lived, pink sea fan *Eunicella verrucosa* were frequently observed to flex under the weight of pots as they passed and then returned back to an upright position. Quantitative studies, undertaken in south England and west Wales, were based on surveys carried out along transect lines before and after a month of pot fishing for crabs and lobsters. The results suggest that four weeks of fairly intense fishing did not have immediate detrimental effects on the abundance of the species selected for study, although some individual ross coral colonies *Pentapora foliacea* were damaged.

The observations of pots being dropped and hauled show clearly that these fisheries have a very spatially restricted impact and have little or no immediate effect on several species that had previously been thought to be sensitive. Overall Eno *et al* (2001) found the short-term effects of crab and lobster potting on sensitive benthic species in west Wales and Lyme Bay not to be detrimental.

The Eno *et al.* (2001) report provides qualitative and quantitative evidence that the pot fisheries are highly unlikely to reduce habitat structure and function to a point where there would be serious or irreversible harm. A pre-assessment score of >80 is therefore appropriate for pots and traps.

4.4.2.9 Hand collection

Raking and digging

Kaiser *et al* (2006) reviewed 101 studies into recovery of habitats after fishing for a range of gears including 6 studies for hand raking, including bait digging (Cryer *et al*, 1987; Heiligenberg van, 1987; Kaiser *et al*, 2001; McLusky *et al*., 1983; Spencer *et al*, 1998; and Wynberg and Branch, 1994). Intertidal hand raking in sandy sediments was found to have a mean recovery rate of 44 days to -20% recovery and 127 days to -10% recovery.

Two studies on the effects of fishing within European Marine Sites conclude that cockle hand raking is overall of low concern.

Sewell and Hiscock (2005) conclude that hand gathering of shellfish (including use of rakes but not spades or forks) on open sediment shores or mixed substratum shores involves little substratum disturbance so that the main impact is on target species. Although it was also recognised that holes and tailing may be left on the intertidal visible for months in stable sediments and a tidal cycle for mobile sediments and that sediment layers may be altered causing erosion to cockle beds.

The low level of habitat interaction is reflected in outcome status scores for MSC certified hand gathered cockle and clam fisheries, with scores ranging from 85-100 (see Appendix F). Based on this, together with the evidence above, a score of >80 is appropriate for this pre-assessment for raking and digging fisheries.

Diving

Surface-supply and scuba diving fisheries for scallops are considered not to have direct impacts on benthic habitats (Beukers-Stewart and Beukers-Stewart, 2008). Divers typically use non-mechanical methods to collect scallops, such as tongs, a single long hook or gloved hand. Divers are somewhat restricted by the size of area they can fish, as well as depth (typically operating at <30 m). It is noted that support vessels may anchor at dive sites which would cause a local habitat impact, albeit on a very spatially restricted basis.

Commercial diving is assessed as having an overall low habitat impact and therefore a score of >80 is appropriate for this pre-assessment.

4.4.3 Habitats: Management (PI 2.4.2)

The Habitats Management Strategy PI ensures that there is a strategy in place (if necessary) that is designed to ensure the fishery does not pose a risk of serious or irreversible harm to habitat types.

To obtain an unconditional pass (>80) it must be demonstrated that there is a partial strategy in place (if necessary); and for a conditional pass (>60) there must be measures in place (if necessary). There are established definitions for what constitutes 'measures', 'partial strategy' and 'strategy' which are detailed within the MSC Certification Requirements and Guidelines. To provide context, a partial strategy may be a series of measures not specifically designed to manage habitats, but indirectly work to achieve this, for example an area closure to protect nursery grounds will also indirectly protect habitat impacts. The qualifier 'if necessary' is in place for those fisheries that are known not to impact habitat outcome status and therefore do not require management.

Furthermore to achieve an unconditional pass there must be an objective basis for confidence that the partial strategy will work and evidence that it is being implemented successfully. For a conditional pass it is only necessary for the measures to be considered likely to work based on plausible argument).

The fishing gears in use throughout the English inshore (and offshore) waters are subject to management at a national level, as well as specific local management implemented through IFCA Byelaws. Often the latter are not specifically designed for managing habitats but could be considered as a measure or a partial strategy depending on the nature and scale of the management. This presents a tiered approach to management and therefore the Habitats Management Strategy PI has been assessed at a national level and also an IFCA level where appropriate.

4.4.3.1 National level management

At a UK (and European) level the principle strategy for managing habitat impacts arising from all marine developments (projects/plans and policies) is through the designation of European Marine Sites (EMS) and subsequent protection of their qualifying features where appropriate. EMSs refer to marine areas designated as Special Areas of Conservation (SACs) and/or Special Protection Areas (SPAs), which are protected under the EC Habitats and Birds Directives respectively. The location of English SACs and SPAs are presented in Figure 4.4.2 at a national scale, and in Appendix F (Figures B.1-B.10) at an IFCA level.

Qualifying features of marine SACs include marine habitats and species, while marine SPAs cover bird species only (but include habitats that support birds, such as areas used for feeding or roosting). In relation to fishing gear interactions with marine habitats, SACs designated for habitat features are more pertinent for consideration.

There are 11 habitat interest feature types designated as SACs across 108 inshore English sites and nine offshore English sites, as summarized in Appendix F.

As a requirement under the Habitats Directive an Appropriate Assessment (AA) must be undertaken for any plans or projects that may affect the qualifying features of an SAC. The AA will define whether, to what extent or under what mitigation measures the plans or projects can be undertaken within the SAC to ensure that they will not adversely affect the integrity of the site. It is the responsibility of a competent authority (e.g. MMO, Local Authority and/or IFCA) to undertake an AA, and the responsibility of Natural England to assess the AA and authorize (or not) the activity.

With regard to commercial fishing there has been uncertainty as to whether such operations constitute a plan or project, and therefore whether AAs and subsequent management measures are

necessary. However, Defra recently (August 2012) announced a new approach to managing fishing activities within EMSs in order to bring fisheries in line with other marine activities.

This has seen a Fisheries in European Marine Sites Implementation Group set up to provide advice on the implementation of the new risk-prioritised approach to management of fisheries in EMSs. Priority will be given to sites that contain features where evidence suggests there is significant risk that certain types of fishing activity could prevent the achievement of conservation objectives. Following a phased implementation, sites with features identified as high risk are expected to have management measures identified and introduced by the end of 2013, and with those with moderate to low risk by 2016 (Defra, 2012).

The Fisheries in European Marine Sites Implementation Group have recently published a draft matrix to assess which gear types may pose high, moderate or low risks to marine qualifying features of SACs. This risk matrix is summarized in Appendix F for gears considered within this Project Inshore Stage 2 pre-assessment[39].

The risk matrix identifies a high risk for demersal otter trawl and beam trawl gears with subtidal sandbanks (specifically sea grass and maerl beds) and reef features; hand gathering (from vessels and from land) are also assessed as being high risk to sea grass features. Numerous moderate risk levels are assessed for all other gear types with respect to various habitat features. As expected most pelagic gears (pelagic trawl, pelagic drift nets, pelagic longline, handline etc) are thought to have no feasible interaction with most habitat features.

In addition to the EMSs, the Government intends to designate a network of national Marine Conservation Zones (MCZs) by 2013, using authority derived from the Marine and Coastal Access Act 2009. MCZs are presented, together with EMSs, in Figure 4.4.2 at a national scale, and in Appendix F (Figures B.1-B.10) at an IFCA level. Management scenarios have not yet been decided for MCZs and a recent impact assessment considered a range of five scenarios for commercial fishing from no intervention to the highest cost management scenario.

The system and structures in place for designating EMSs and MCZs, undertaking Appropriate Assessments and subsequent development of management measures are considered to be national management strategies. Credit is given at a national scale, rather than detailing whether designations are present within IFCAs or not. It is noted that IFCAs have been consulted on the process of designation, but will not specifically be responsible for determining appropriate management measures within the designated sites in all cases, although they will be involved in enforcement where sites are within 6 NM.

4.4.3.2 MSC Pre-assessment determination

The MSC standard for habitats PIs takes a wide geographic interpretation to assess the risk of gear interactions across the full extent of habitats i.e. the habitat throughout its range, not just the areas of habitat that overlap with the fishery. Furthermore, the standard does not necessarily require a higher degree of management for specific habitat features as identified by EMSs and MCZs. However, due regard has been given to these habitats features in recognition that the productivity and regenerative ability of certain biogenic habitats affects their resilience under fishing pressure i.e. they may be more vulnerable or susceptible to serious / irreversible harm.

Only a minimal level of management is thought to be necessary for gears that have a very low level of interaction with habitats, as described within Habitats Outcome Status. This applies to the following gear types: pelagic trawl, set and drift nets, hooks (including long lines, handlines, pole-

[39] Gears scoped out of Project Inshore include: purse seine, Danish seine, Scottish seine, push nets, fyke and stake nets, bait collection with forks, bait dragging and crab tiling. These gears or methods were not found to form significant English inshore fisheries during the Stage 1 assessment and were therefore not taken forward to Stage 2 assessment.

lines, hooks and lines and trolling lines), pots and traps and commercial scuba diving. This is consistent with the risk assessment undertaken for EMSs (Appendix F) where no high risk categories were identified for the interaction of these gear types with all EMS habitat features. A score of >80 for these gears is therefore appropriate for this pre-assessment, even where there is an overlap with an EMS with habitat features.

Hand collection by raking (from land or vessels) is also considered to have a low level of interaction with habitats and high recoverability, as described within Habitats Outcome Status. However, handwork has been assessed as a high risk fishing method in areas overlapping sea grass and has been identified for priority management where this feature occurs. The management to be introduced as a result of the work undertaken by the Fisheries in European Marine Sites Implementation Group is recognized as a strategy; however associated management measures have not yet been implemented and therefore the third scoring issue of SG80 is not met for instances where this fishing method may interact with the habitat feature identified. A conditional score of 60-80 for hand collection is therefore appropriate for this pre-assessment (which would require implementation as a condition at full assessment).

Demersal otter trawl is known to have a significant impact on habitat structure and therefore require some degree of management to ensure serious / irreversible harm does not occur. Demersal otter trawling generally targets mixed demersal species that are managed through a range of measures including: quota allocations, effort restrictions (on days at sea), size of catch and gear restrictions and real-time closures. These are considered as measures, rather than a partial strategy (i.e. they are considered to be individual tools, rather than a cohesive arrangement). As with hand collection above the EMS management measures to be introduced are considered a strategy for those identified features, although these measures are not yet implemented. Furthermore demersal otter trawling is considered to have more wide ranging impacts to general habitat structure, and therefore habitat management may be expected to be in place at a higher level than at the localized features identified within EMS matrix as high risk. A score of 60-80 for demersal otter trawl is therefore appropriate for this pre-assessment.

Beam trawl and dredge fisheries are known to have a significant impact on habitat structure and therefore require some degree of management to ensure serious / irreversible harm does not occur. The level of habitat interaction is considered higher risk for these gears, compared to demersal otter trawling, on account of the level of physical contact of the gear with the seabed and benthos. The higher level of risk warrants a more precautionary approach to the assessment. At a national level it is considered unlikely that these gears would meet the MSC conditional pass. This pre-assessment concludes that beam trawl and dredge fisheries not meet SG60 for the habitats management PI and therefore automatically fail the fishery at a Principle 2 level.

There may be scope for hydraulic dredge to be considered as a conditional pass (60-80) for specific fisheries / Units of Certification that demonstrate a limited area of interaction across less sensitive habitats (e.g. exclusion from EMS with habitat features). In such cases the UoC is unlikely to be at a national scale and verification of operational details would be required at full assessment stage.

4.4.3.3 IFCA level management

The IFCA Byelaws have been reviewed and these together with information obtained during the site visits, have informed the IFCA level assessment. Alternative scoring is presented only where IFCA management has made material difference to the pre-assessment score given at a national level. The IFCA Byelaws result in additional management over and above that assessed at a national scale, and therefore will only lead to an increase in scores compared to the national level management assessment.

As a result of IFCA level management the following changes have been assessed for 2.4.2 Habitat Management Component:

- Scallop dredge in Cornwall, Devon & Severn, Eastern and North Eastern IFCAs: pre-assessment score increased to 60-80
- Hand raking in Eastern, North Western and Southern IFCAs: pre-assessment score increased to >80

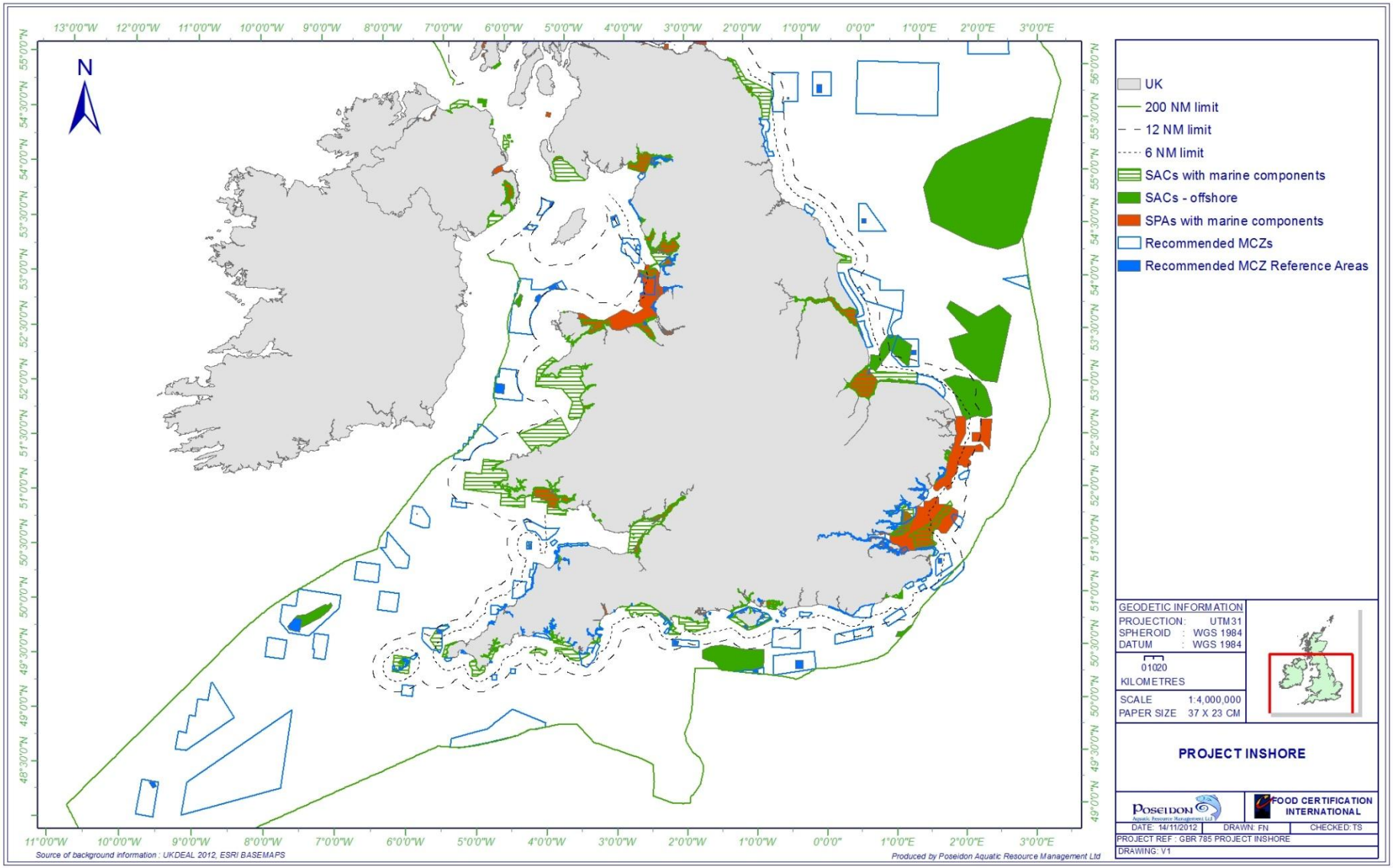


Figure 4.4.2: SACs, SPAs and recommended MCZs and MCZ reference areas within the English Exclusive Economic Zone

Table 4.4.3: Assessment of IFCA Byelaws that may impact pre-assessment score for habitat management

IFCA	Measures that directly or indirectly manage habitat interaction	Impact on pre-assessment score
Cornwall	Scallop dredge restrictions: must be spring loaded tooth bar; mouth ≤ 85 cm; bag rings >75 mm diameter or net min mesh 100 mm; max 12 dredges; max tow bar 5.18 m; no more than two tow bars at one time; curfew before 0700 and after 1900	These measures are considered to support an increase to a conditional pass (60-80 score) for scallop dredging. The seasonal closure for trawling may not provide an appropriate time for habitat recovery and does not change the score for beam trawling or demersal otter trawling
	Ban on scallop dredging in the Fal and Helford European Marine Sites in Cornwall district	
	Ban on trawling in 2 areas from 01 Jan to 31 Jul	
	Ban on mechanical removal within cockle beds	
Devon & Severn	Scallop dredge restrictions: must be spring loaded tooth bar; mouth ≤ 85 cm; bag rings >75 mm diameter or net min mesh 100 mm; max 12 dredges; max tow bar 5.18 m; no more than two tow bars at one time; curfew before 0700 and after 1900	These measures are considered to support an increase to a conditional pass (60-80 score) for scallop dredging. The trawling prohibitions further support the 60-80 score.
	Salcombe Bay: permits for scallop dredgers <7 m in length with restrictions: max dredge width is 1 m, max # of dredges is 2, no toothed dredges, dredges hauled by hand only, fishing only between 09:00-16:00 on weekdays and not public holidays	
	Dart Estuary: permits for scallop dredgers <7 m in length with restrictions: max dredge width is 1 m, max # of dredges is 1, fishing only between 09:00-18:00 on weekdays and not public holidays	
	Trawling prohibited in Start Bay and in Estuaries	
	Trawling, dredging and netting prohibited within Lundy MCZ	
	Lundy No Take Zone - ban on removal of any sea fish (including shellfish)	
	Potting prohibited in certain areas of Lundy MCZ	Supports >80 score for potting.
Eastern	Permit for cockle fishery in Humber Estuary including following requirements: monthly returns including date, location and quantities taken. Fishery open between 01 May to 31 Aug. Only hand raking permitted. Temporary closures if stocks depleted or for environmental protection/conservation	These measures are considered to support an increase to an unconditional pass (>80 score) for cockle hand raking
	Scallop dredging prohibited within 3 NM. Permitted outside 3 NM between 01 Oct to 30 Jun with following restrictions: must be spring loaded tooth bar; mouth ≤ 85 cm; bag rings >75 mm diameter or net min mesh 100 mm; max 10 dredges.	These measures are considered to support an increase to a conditional pass (60-80 score) for scallop dredging.
	Inshore trawling restrictions within 3 NM in specified area for vessels >15.24 m	The trawling prohibitions further support the 60-80 score. Higher scoring is not appropriate since no areas are completely closed and may be accessible by vessels <15.24 m
	Trawling prohibited in a specified area (in North Eastern district) unless permit held and vessel is <18.3 m with engine <400 kw and trawl net raised and cleared every 3 hours (except for those vessels <28 m with historical rights between 3-6 NM and on a 'sunset list')	

IFCA	Measures that directly or indirectly manage habitat interaction	Impact on pre-assessment score
Isles of Scilly	Scallop dredge restrictions within 4 NM: must be spring loaded tooth bar; mouth ≤ 85 cm; bag rings >75 mm diameter or net min mesh 100 mm; no attachments to the rear, top or inside the dredge, no diving plate or similar device; weight of complete dredge must not exceed 150 kg; max 4 dredges.	These measures still allow scallop dredging within 4 NM and therefore do not warrant any increase in score.
Kent and Essex	Temporary closure of bivalve mollusc beds (in Area A; to protect stocks if necessary)	The temporary closures may not provide an appropriate time for habitat recovery and do not change the pre-assessment score.
	Temporary cockle beds closure (in Area A; to protect stocks, if necessary)	
	Temporary closures of shellfish beds (in Area C; to protect stocks, if necessary)	
	When dredging for scallops no more than 12 dredges may be towed at any time. All dredges must be fitted with a functioning, operation and moveable spring loaded tooth bar and its frame must not exceed 85 cm in width in any part (in Area A)	These measures do not restrict the spatial coverage of scallop dredging and do not warrant a change in pre-assessment score.
	Ban on scallop dredging from 1st June to 31st October (in Area B; previously within Sussex SFC)	The seasonal closure for trawling and seasonal ban for scallop dredging may not provide an appropriate time for habitat recovery and does not change the score for beam trawling, demersal otter trawling or dredging.
	Trawling exclusion (in part of Area B; previously within Sussex SFC) from 1st May to 31st October to protect nursery grounds	
North Eastern	Temporary closures of shellfish beds (to protect stocks, if necessary)	The temporary closures may not provide an appropriate time for habitat recovery and do not change the pre-assessment score.
	Temporary cockle beds closure (to protect stocks, if necessary)	
	Ban on dredging within 3 NM limit	These measures are considered to support an increase to a conditional pass (60-80 score) for dredging fisheries.
	Ban on dredging from 3-6 NM, except between the dates 1st October and 30th June inclusive. When in use, all dredges must be fitted with an operational spring loaded toothbar and have a mouth which does not exceed 85 cm overall width.	
	Some restrictions to trawling within Flamborough Head SAC including ban on beam trawling and multi-rig trawling	These measures support the trawling and dredging assessment. They may not be sufficient to manage the overall beam trawling effect and therefore the score for beam trawling remains unchanged
	No Take Zone within part of Flamborough Head SAC	
Northumberland	Dredges - mouth must not exceed 75 cm width and total number of dredges limited to 10	These measures do not restrict the spatial coverage of dredging and do not warrant a change in pre-assessment score.
	Ban on beam trawling	While this provides the highest level of management for beam trawling, this fishery obviously does not exist within the Northumberland IFCA and is therefore not scored
	Pot limitations - 800 pots per permit	Supports >80 score for potting.

IFCA	Measures that directly or indirectly manage habitat interaction	Impact on pre-assessment score
North Western	Temporary closures of cockle and mussel beds (to protect stocks, if necessary)	The temporary closures may not provide an appropriate time for habitat recovery and do not change the pre-assessment score.
	Appropriate Assessments undertaken to define routes into and out of hand raking areas, thereby limiting impact on identified sensitive features within EMSs	These measures support an increase to an unconditional pass (>80 score) for hand raking fisheries.
Southern	Area closed to trawling - 1 NM between Golden Cap and Chesil Beach from 1st May to 31st August	The temporary closures may not provide an appropriate time for habitat recovery and do not change the pre-assessment score.
	Closed prawn season from 1st January to 31st July in Poole Harbour	
	Closed cockle season from 1st February to 30th April	
	Closed periwinkle season from 15 May to 15 September	
	Closed oyster season from 1st march to 31st October, with exceptions for certain areas where oysters are taken for purpose of cultivation	
	Temporary closures of shellfish beds (to protect stocks, if necessary)	
	Restrictions on use of shellfish dredge and hand raking within areas of Poole Harbour	These measures support an increase to an unconditional pass (>80 score) for hand raking fisheries.
	Area closure within Portsmouth Harbour SPA to protect eelgrass beds	
	Scallop dredging restrictions: must be spring loaded tooth bar; mouth ≤ 85 cm; max 12 dredges; max tow bar 5.18 m; no more than two tow bars at one time; curfew before 0700 and after 1900	These measures do not restrict the spatial coverage of dredging and do not warrant a change in pre-assessment score.

4.4.4 Habitats: Information / Monitoring (PI 2.4.3)

There is a very high degree of knowledge in relation to habitat distribution within English inshore and offshore waters which is evidenced by the UK seabed landscape mapping (to European Nature Information System, EUNIS, classification) and OSPAR priority habitat mapping, both of which are presented within the Stage 1 report (Figure 4.6 and 4.7).

Furthermore, the extent and distribution of important, sensitive or vulnerable habitat features are known and mapped through the network of EMSs and MCZs (as shown in Figure 4.4.2 and Appendix F).

Information is available on the extent of spatial and temporal interaction of specific gear types, as presented in VMS data for vessels >15 m in length for mobile and static gear (Stage 1 Report, Figures 3.10 and 3.11), and surveillance data for all vessel lengths presented by individual gear type (Stage 1 Report, Figures 3.12 to 3.18).

The surveillance data allow the best presentation of spatial extent of gear interaction across habitat type. However uncertainties exist and the complete level of interaction may not be represented within this dataset (see Stage 1 Report, Section 1.2.1 for a list of key uncertainties surrounding surveillance data). The second scoring issue at SG80 is therefore not met and a score of 60-80 for all gears (except those pelagic gear listed below) is therefore appropriate for this pre-assessment.

For Principle 2 the MSC standard allows for the information requirements to be scored relative to what is appropriate given the scale and intensity of the fishery. Pelagic gear, including pelagic otter trawl, handlines and pole-lines, hooks and lines and trolling lines, does not intentionally come into contact with the seabed is therefore considered to be of such low risk that a score >80 is warranted for this pre-assessment.

No differences between Habitat Information scores at a national level and an IFCA level are considered to apply. However, vessels that can provide accurate details of spatial and temporal interaction may achieve an unconditional pass, for example vessels with VMS (where data specific to that group of vessels can be provided) or vessels with another form of positional monitoring system, such as Succorfish.

4.5 Ecosystem

The Ecosystem Approach to fisheries has been much discussed in recent years, and now serves as a major focus for fisheries policy at international level (FAO 2003) and at European level (CEC 2008a,c) and it lies at the heart of the Marine Strategy Framework Directive (CEC 2008b). In 2009 ICES produced a comprehensive report on the Ecosystem Effects of Fishing Activities (WGECO 2009) which sought to clarify the meaning of the approach and its implementation in practice. They recommend the definition set down in the HELCOM/OSPAR Joint Statement on the Ecosystem Approach to the Management of Human Activities:

> *"the comprehensive integrated management of human activities based on the best available scientific knowledge about the ecosystem and its dynamics, in order to identify and take action on influences which are critical to the health of marine ecosystems, thereby achieving sustainable use of ecosystem goods and services and maintenance of ecosystem integrity."*

The MSC framework includes a PI specifically dedicated to the ecosystem effects of fishing. This addresses:

- possible impacts on or disruption of key elements underlying ecosystem structure and function to a point where there would be a serious or irreversible harm;
- the existence of measures or a strategy to address possible impacts of the fishery on the above and the extent to which these are likely to work;
- the adequacy of information to identify and understand the *key elements* of the ecosystem and the functions of target species, bycatch, retained and ETP species, and affected habitats in the ecosystem, and to assess risks and consequences and support strategies

Broadly speaking the "key elements" referred to above are defined by the MSC as including:

- *trophic structure and function*
- *community composition*
- *productivity pattern*
- *biodiversity*

Summary: Ecosystem Pre-Assessment Scores

The MSC pre-assessment scores for ecosystem component PIs are presented by gear type in Table 4.5.1. Justifications for these scores are provided below, based on the broader evidence from national and international research, from the syntheses and assessments offered by ICES, and supplemented with more specific data on English fisheries provided in the Project Inshore Stage 1 report and field visits to English IFCAs.

Scoring has taken into account the likely cumulative effects of similar or related fisheries, since independent assessment of a specified fishery makes little sense when considering wider ecosystem impacts.

The approach to the ecosystem component has been to assess the Unit of Certification taken here as gear type based on operation at a national (English) level, therefore the assessment is applicable to UK vessels operating within both inshore and offshore English waters (i.e. inside and outside 6 NM). Therefore, unless otherwise stated, the scores presented in Table 4.5.1 are applicable at an English national level and within all IFCAs. An assessment has also been undertaken based on IFCA byelaws in place which may improve the ecosystem management PI score. Where scores are different for

certain IFCAs, these have been provided as a separate row (with justifications presented in the Ecosystem Management PI section).

Table 4.5.1: Ecosystem Component pre-assessment scoring

Gear		Ecosystems Component		
		2.5.1: Status	**2.5.2: Management**	**2.5.3: Information**
Demersal trawl	Demersal otter trawl	60-80	60-80	>80
	Fly-shooting	>80	60-80	>80
Beam trawl	Beam trawl	60-80	60-80	>80
Dredge	Scallop dredge	60-80	60-80	>80
	Scallop dredge in Cornwall, Devon & Severn, Eastern and North Eastern IFCAs	>80	>80	>80
	Shellfish dredge	60-80	>80	>80
	Hydaulic dredge	60-80	>80	>80
Pelagic trawl	Pelagic otter trawl	>80	>80	>80
Set and drift nets	Set trammel nets	>80	>80	>80
	Set gill nets (70-90 mm)	>80	>80	>80
	Encircling gillnets	>80	>80	>80
	Drift nets (P & D)	>80	>80	>80
Hooks	Long line	>80	>80	>80
	Rod & line	>80	60-80	>80
	Hooks and lines	>80	>80	>80
	Trolling lines	>80	>80	>80
Pots and traps	Pot/parlour	>80	>80	>80
	Whelk pots	>80	>80	>80
	Cuttle/squid traps	>80	>80	>80
Hand collection	Hand raking	>80	>80	>80
	Hand raking in Eastern, North Western and Southern IFCAs	>80	>80	>80
	Scuba diving	60-80	>80	>80

The following sections offer a rationale for the scoring, based on an assessment of the generic effects of fishing on the ecosystem (which is relatively well researched), the broader management regime in place, and the quality of the information to support it. These assessments are followed by a more specific analysis relating to each of the more common gears and fishing methods. It should be emphasised that the quality of research and evidence available relating to the specific effects of individual fisheries on the wider ecosystem is extremely limited.

4.5.1 Ecosystem Outcome status (P2.5.1)

Assessing impacts of fishing (and in particular small scale inshore fishing) on the higher level structure and function of the marine ecosystems is difficult in itself, and the task is made more difficult by the dynamic changes in major ecosystem characteristics associated with climate, ocean circulation and the natural dynamic evolving interactions between species. Without agreed standards or reference points assessment and scoring becomes highly subjective. This problem is widely recognized, and guidance and some standards are beginning to emerge from work under the Marine Strategy Framework Directive, ICES and OSPAR but we remain some way off consistency and consensus.

The purpose of the ecosystem Outcome Status PI is to ensure that the fishery does not cause *serious or irreversible harm* to the key elements of ecosystem structure and function. To obtain an unconditional pass (>80) the assessment must conclude that the fishery is highly unlikely (i.e. no more than 30% probability) to disrupt the key elements underlying ecosystem structure and *function to a point where there would be serious or irreversible harm*; to obtain a conditional pass (>60) the assessment must conclude that this is unlikely (i.e. no more than 40% probability) to occur; and a fishery that does not meet this criterion will automatically fail (<60).

The effects of particular inshore fisheries will depend on the gear, how it is deployed, and the interactions with specific elements of the wider ecosystem. The final scoring system used here is therefore based on gear, although this is sub-divided where necessary to take account of spatial differences in ecosystem impact, and/or differences related to the particular fish stocks being targeted. In practice many types of gear and specific fishing metier have rather similar overall effects on ecosystem structure and function and this is reflected in the structure of the analysis below and the scores assigned.

4.5.1.1 Risk based framework (RBF) for assessing ecosystem outcome status

The amount of information available for English inshore waters, including research on fishing-ecosystem interactions is considerable, and allows ecosystem PIs within this pre-assessment to be assessed using the standard MSC methodology. However, such information is limited with respect to the interaction of specific gears with the wider ecosystem, and it is useful therefore to apply the MSC Risk Based Framework (RBF). This has been provided as part of MSC methodology within the ecosystem Scale Intensity Consequence Analysis (SICA) for PI 2.5.1 (Table 4.5.2).

Table 4.5.2: Principle 2 SICA Consequence Table for PI 2.5.1, Ecosystem

	Consequence Category		
Subcomponent	**1**	**2**	**3**
Species composition	Interactions may be occurring which affect the internal dynamics of communities leading to change in species composition not detectable against natural variation.	Impacted species do not play a keystone role (including trophic cascade impact) – only minor changes in relative abundance of other constituents. Changes of species composition up to 5%. Time to recover from impact up to five years.	Detectable changes to the community species composition without a major change in function (no loss of function). Changes to species composition up to 10%. Time to recover from impact on the scale of several to twenty years.
Functional group composition	Interactions that affect the internal dynamics of communities leading to change in functional group composition not detectable against natural variation.	Minor changes in relative abundance of community constituents up to 5%.	Changes in relative abundance of community constituents, up to 10% chance of flipping to an alternate state/ trophic cascade.
Distribution of the community	Interactions that affect the distribution of communities unlikely to be detectable against natural variation.	Possible detectable change in geographic range of communities but minimal impact on community dynamics change in geographic range up to 5 % of original.	Detectable change in geographic range of communities with some impact on community dynamics Change in geographic range up to 10 % of original. Time to recover from impact on the scale of several to twenty years.
Trophic/size structure	Changes that affect the internal dynamics unlikely to be detectable against natural variation.	Change in mean trophic level, biomass/ number in each size class up to 5%.	Changes in mean trophic level, biomass/ number in each size class up to 10%... Time to recover from impact on the scale of several to twenty years.

The analysis seeks to address both short and longer term impacts on key ecosystem characteristics as listed in the SICA analysis, i.e.:

- *Species composition* (taken to mean overall species richness and composition within the areas fished, and possible knock on effects outwith these areas);
- *Functional group* composition (e.g. shifts from communities of benthic detritivores to benthic scavengers; changes in plankton composition; changes in predator-prey and competitive interactions; changes in the structure of marine food webs)
- *Distribution and dynamics of communities* (e.g. distribution of benthic sponge or reef communities; shifts in range or spawning behavior)
- Shifts in *trophic structure* (mean size of species; changes in average trophic level; changes in ratio of different trophic level)

Unfortunately, these categories do not correspond exactly with the “key elements” of ecosystems as referred to above (trophic structure and function, community composition, productivity pattern and

biodiversity). In the assessment below we have therefore sought to include all these elements, with the explicit inclusion of productivity and resilience.

4.5.1.2 State of the marine ecosystem and the effects of fishing

ICES has undertaken substantial work in recent years on the effects of fishing on ecosystem structure and function (ICES Working Group on Ecosystem Effects of Fishing Activities; Working Group for Regional Ecosystem Description; Working Group on Fish Ecology; specific reports in response to requests from e.g. OSPAR and EC). ICES also provides frequent assessment of the status of major fish stocks and communities. Substantial efforts have also been made to develop predictive ecosystem models (e.g. Aruaujo *et al* 2005; Mackinson and Daskalov 2007). A multi-species virtual population analysis (MSVPA) for the North Sea provides some quantitative information on ecosystem relations and impacts. The model serves as a reasonable tool for predicting trends in stock levels.

The following are some of the key points that arise from these studies and syntheses.

Functional groups

Key functional groups of organisms that together make up the marine ecosystem include the following:

- Plankton (phytoplankton and zooplankton)
- Macroalgae/sea grass/maerl
- Fish & Shellfish Communities
- Benthos (predators, scavengers, filter feeders, detritivores, microbial communities)
- Marine mammals and seabirds (mainly predators)

In addition there are spatial-functional elements to ecosystems, the most important of which are probably *spawning and nursery areas.*

In the normal course of events and taking account of bioenergetics, one would expect total biomass of the main functional groups to reflect their trophic level, with a smaller biomass of large predators feeding on larger biomass of pelagic fish or benthos, and a still larger biomass of plankton. However these relations are not simple and vary substantially through time and space. This is particularly the case in respect of fish communities in which many “predators” may themselves be preyed on during their early life stages, and where recruitment is highly variable and dependent on plankton composition, temperature, salinity and patterns of water circulation – as well as spawning stock biomass. Predator species such as hake, megrim, monkfish, whiting, cod, saithe are generalist feeders which exhibit size-dependent, temporal and spatial prey-switching behaviour (Pinnegar *et al*., 2003, Trenkel *et al*., 2005).

The impact of fishing itself on species composition or trophic structure, and the balance between different functional groups is therefore difficult to assess and disaggregate from these other factors. ICES (2008) illustrate this graphically showing that although fishing pressure was highly correlated with demersal and pelagic fish stocks and seabirds during the period 1983-1993, the relationship weakened significantly during the period 1993-2003, during which time environmental factors (temperature; circulation; salinity) became far more important. Furthermore, these ecosystems are themselves evolving and dynamic, and in some cases may be considered as “immature” (Araujo *et al* 2005). It is therefore extremely difficult to define the baseline and isolate the effects of fishing pressure – especially at the smaller scales associated with inshore fisheries.

Despite these difficulties, CEFAS is currently engaged in research to develop a monitoring and assessment framework. This will involve piloting indicators such as vulnerable species (such as skates

and rays), vulnerable habitats, and the fish community. They will then seek to link these to indices of fishing pressure.

The following sections briefly review what is known of the status and trends for each of the functional groups referred to above, and how this may relate to pressure from fisheries, and inshore fisheries in particular.

4.5.1.3 Plankton

The composition and productivity of the plankton around English coasts varies substantially through time and space. Phytoplankton production is typically much higher in estuaries, coastal areas, and frontal zones (which also vary through time in location and intensity). Plankton productivity is also much higher in the spring and summer. The length of the productive season has increased in recent years, although total phytoplankton and zooplankton production has decreased in many areas (ICES 2008).

The species composition of the plankton may be very important for commercial fish species. The abundance of Copepods in particular has declined, and of these *Calanus finmarchius* has shown the most severe decline, though partially replaced by *Calanus helgolandicus.* These changes are thought to be associated with generally higher temperatures and changes in oceanic currents. Temperatures have been as much as 3^{o}C above long term averages in some areas in recent years. This has almost certainly been to the detriment of many commercial species, especially in terms of recruitment.

The indirect impact of fishing on plankton communities and productivity – primarily through direct or indirect effects on planktivorous fish – is extremely difficult to assess (though some ecosystem models attempt this) but is probably far less important than climatic and oceanographic considerations.

Indicators and reference points

Data on the abundance of *Calanus* species and plankton composition more generally is routinely collected and monitored, but we lack specific reference points relating to the health status of plankton communities; and relating such reference points to the pressure from fisheries would be extremely difficult.

Ecosystem characteristics	*Effect of inshore fisheries on plankton*
species composition/biodiversity	Other factors (temperature, circulation) probably more significant
functional group composition	High exploitation of a wide range of low trophic species could possibly have an indirect effect …but overall inshore fisheries highly unlikely to significantly affect functional group composition
distribution and dynamics of communities	As above
trophic structure and function	As above
productivity	Fisheries are highly unlikely to affect overall primary productivity which is driven by sunlight and nutrients, or indeed zooplankton productivity

Not unlikely	unlikely to highly unlikely	highly unlikely with evidence

4.5.1.4 Seagrass, macroalgae, maerl

These communities are all benthic photic communities with high biodiversity value, and are probably functionally important in wider inshore marine ecosystems.

Seagrass beds provide several important ecosystem services including:

- Food for wildfowl;
- Nutrients for seabed communities;
- Sediment entrapment and erosion resistance
- Habitat for juvenile fish and shellfish and particular species such as seahorse and pipefish

Seagrass is a UKBAP priority habitat and listed by OSPAR as threatened and/or declining (declining in Region II – North Sea and Region III Celtic Sea). In England it is mainly found in sheltered bays in S Devon and Cornwall.

Historically sea grass was much more widespread but large areas were wiped out by disease in the 1930s and have failed to recover in most places. At the NE Atlantic scale OSPAR (2009) concludes that decline has halted in recent years.

According to Natural England[40] "Seagrass beds are also affected by physical disturbance such as trampling, dredging, anchoring, and the use of mobile bottom-fishing gear" and…" areas affected by disturbance are slow to recover".

Given their rather limited current extent, their overall importance in the wider marine ecosystem may be viewed as limited and is in any case dealt with under ETP and habitats.

The status of **macro-algae** (seaweed populations) around UK coasts appears relatively healthy and no specific concerns have been raised about the effects of fishing on these communities.

Maerl is regarded as ecologically important (keystone species) because of its 3-dimensional structure. It comprises a fragile and easily disturbed habitat for a rich assemblage of seaweeds and invertebrates, and is particularly important for larger slower growing species. There is evidence that maerl beds function as nursery beds for fish and shellfish including scallops, though their importance with respect to commercially important fisheries is subject to debate[41].

Indicators and reference points

There are no generally agreed indicators/reference points relating to the overall extent and status of macro-algae/seagraa/maerl. For those sea grass and maerl beds which have protected status there are reference points related to conservation status based largely on historic condition. The effects of dredging and trawling on maerl and sea grass beds is subject to monitoring and assessment on a site by site basis. There is no overall measure of fisheries impacts in relation to any reference points.

Ecosystem characteristics	*Effect of inshore fisheries on seagrass/macro-algae/maerl*
species composition/biodiversity	Localized effects from dredging and trawling
functional group composition	Localized effects from dredging and trawling
distribution and dynamics of communities	Localized effects from dredging and trawling. Where these beds are important nursery or spawning areas the wider effect may be significant. In most cases such beds are already protected or are likely to be so under the new MCZ framework.
trophic structure and function	As above
productivity	As above

4.5.1.5 Fish and shellfish communities

There have been significant changes in the fish communities of English waters over the last few decades. These may be related to a complex of factors including:

[40] http://www.naturalengland.org.uk/ourwork/marine/mpa/mcz/features/habitats/seagrassbeds.aspx
[41] http://www.ukmarinesac.org.uk/communities/maerl/m3_2.htm

- Overall increases in temperature associated with climate change
- The North Atlantic Oscillation (NAO). A positive NAO index is associated with stronger inflow of Atlantic water to the North Sea, and increases in *Calanus finmarchicus*, salmon, basking shark, sandeels, seabirds etc
- Runoff and salinity in the southern North Sea
- Changing circulation and frontal patterns
- Natural cycles associated with the dynamic interactions between different species (predator-prey; competition etc.) interacting in turn with environmental factors
- Fisheries pressure

According to ICES 2008a, fishing has been shown to affect the dynamics of target species, non-target species and community structure in all OSPAR regions.

Species composition and biodiversity

Overall the diversity of species is increasing in English Coastal waters, primarily as a result of warming, although there is evidence for some local reductions in heavily fished parts of the N Sea (ICES 2008). Several more southerly species are increasing in abundance, including bass, red mullet, blue fin tuna, some sharks, sting rays, turtles and seahorses. There has recently been a significant increase in the numbers of snake pipefish in the Irish Sea. Species diversity tends to be highest in areas of soft sediment and wide variation in temperature and salinity (Vaz *et al*., 2007). There is no evidence that fisheries are having a negative impact on overall biodiversity.

Community/functional group composition

Species composition, trends and food web structure vary through space and time (Heath 2005). Fishing may affect community composition in many ways. By its very nature it is selective, seeking to maximise the catch of more valuable species and minimize less valuable. However, there are significant differences around the coast. Catch composition in the channel for example tends to be more diverse, probably reflecting greater diversity of habitat, though possibly also the nature of fishermen and markets. Around 100 species are routinely caught in the channel, with about 40 species making up 90% of the landed biomass (including whitefish, pelagic fish, crustaceans, elasmobranchs, shellfish cephalopods etc.). This number of species is relatively high by fishery standards.

The fish community in the channel appears to be shifting towards species rich coastal assemblages well adapted to changing temperature and salinity conditions, and dominated by flatfish, whiting, sprat and dragonet. Warm water species such as red mullet and common squid are increasing.

More than 170 fish species have been recorded from the Irish Sea. Stock assessment for most is very limited but there is evidence that some species have been severely depleted probably as a result of fishing. While several non-commercial species such as Dab, solenette and scaldfish have increased, hake, dragonets and pogge have decreased (ICES 2008).

Skates and rays are usually non-target species but are slow growing and late maturing, and have shown significant long term declines. Effects vary from region to region. Thus the Celtic Sea is a particularly important area for common skate (*D. batis*), electric ray (*Torpedo nobiliana*), and shagreen ray (*Leucoraja fullonica*) whereas the English Channel is important for undulate ray (*Raja undulata*) and stingray (*Dasyatis pastinaca*) (ICES, 2006c).

In general all populations of elasmobranchs have declined, and fisheries is the most likely factor. Spurdog shark for example is estimated to be at 5% of its unimpacted level, and both porbeagle and tope are now rare. *D batis* has effectively disappeared from North Sea and channel. Ray landings have also declined rapidly in the Celtic seas since mid 90s (ICES/OSPAR 2008). The area of

distribution has also declined for many species. Thus *Raja clavata* is now present in only 44% of its range (area occupied) in the '80s and is restricted to the SW North Sea. Although fisheries pressure is almost certainly partly to blame, some of this decline may be related to changes in both regulation and consumption (ICES, 2007).

However, the most recent ICES assessment of elasmobranchs suggests that many skate/ray species are stable or increasing (ICES 2012b) and there is some suggestion that while the range of many species has been greatly reduced, abundance remains high in some areas. However there are some positive recent trends (ICES 2012)

The overall conclusion in Charting Progress (2) is that there have been recent improvements in some fish communities in most regions, and that this is probably linked to reduced fishing pressure.

Spatial patterns

There has been a significant increase in the western and northern distribution area of adult mackerel. There has also been a steady northerly shift of several warmer water species such as sea bass and red mullet. There is no evidence that these changes are linked to fishing pressure. The reduced distribution of elasmobranch species has been noted above and is almost certainly related to fisheries pressure.

Trophic structure and function

There have been substantial shifts in overall community structure in the last half century, including the "gadoid outburst" in the 60s; the collapse of herring in the 70s and its recent rebuilding; the on-going decline of North Sea mackerel; a recent increase in blue whiting and herring coupled with a decline in *Calanus* and cod recruitment. Fishing pressure has undoubtedly played a role in some of these changes, but mediated through complex interactions with the other factors listed above.

The production of predatory fish such as cod, whiting, saithe and hake has more than halved since the 1970s as a result of both fishing and environmental change (FRS 2006). Cod spawning biomass is still at or below safe limits in the eastern Channel and North Sea, although there are signs of improvement. Plaice remains at risk of reduced reproductive capacity.

Plankton eating fish and benthic organisms have therefore enjoyed reduced predation pressure from other fish. In practice this has not led to an increase in plankton eating fish, probably because of limitations associated with available plankton food, and increased predation by marine mammals and seabirds. Indeed landings of Norway pout in 2003 were the lowest of the past two decades and spawning biomass of sandeel in 2004 was at the lowest level observed. Although there are signs of recent increase, this overall decline of major fish species may have severe implications for the whole North Sea ecosystem.

There has also been a marked decline in mean trophic level of the fish community over time (Pinnegar *et al*., 2002) associated with a decline in cod and hake and an increase in smaller lower trophic species. This may be attributable to fisheries pressure, but may also be related to changes in plankton composition and availability and natural cycles as noted above.

There is now strong evidence that the average size of fish – both within and across species – has declined in the North Sea, Irish Sea and other intensively fished areas (Blanchard *et al*., 2005; Trenkel et al., 2004, Daan *et al* 2005), reflecting overall selection by fisheries of larger fish and larger species, and removal of large predators. This is regarded as an important indicator of fishing pressure and ecosystem impacts by ICES and OSPAR. Large fish (16-66kg) are 99% less abundant than they would be without fishing, and there is also evidence that both plaice and cod grow more slowly, mature at a younger age, and are less (individually) fecund. Analytical studies suggest that fishing has had a stronger effect on size-structure than changes in temperature. However.there is some recent evidence of a bottoming out and perhaps some increase in overall fish size.

Genetic change can occur at different levels. Fishing may lead to the extinction of genetically distinct local stocks, and/or reduce the genetic variability within populations and individuals (inbreeding) (ICES 2008a). The effect of fisheries has almost certainly resulted in evolutionary effects for a number of fish stocks in the OSPAR region, such as early onset of sexual maturity. North Sea cod, haddock and plaice all show indications of fishing-induced effects on reproductive traits (ICES 2008a). Some of these changes may be reversible within reasonable time scales; others, such as genetic effects or the possible switch from fish dominated to shellfish dominated communities would take decades or centuries to reverse.

While it is arguable that individual inshore fisheries have made a relatively small contribution to these ecosystem level changes, cumulative impacts have to be considered and may be regarded as significant.

Productivity

Overall marine productivity appears to have declined somewhat in recent years driven in large part by the reduction/changed composition of plankton. This is not thought to be caused by fishing pressure. However, productivity of the major commercial fish stocks has undoubtedly been affected for more than half a century, although since the 90s there has been significant improvement in terms of reduced fishing pressure on major fin-fish stocks.

In 2009, 38% of the 8 fish species and 16 stocks assessed around the UK were at full reproductive capacity and harvested sustainably. The percentage of the 16 stocks harvested sustainably (i.e. acceptable fishing mortality) has increased from around 20% in the 1990s to 63% in 2009. The proportion at full reproductive capacity has increased from 27% in 1999 to 55% in 2009 (Cefas 2011).

The status of e.g. Eastern Channel plaice, Irish Sea and Celtic Sea whiting and many elasmobranch stocks is generally poor with apparently low or declining stocks.

Overall it is arguable that all of the fisheries for predatory fish (primarily trawl fisheries but also some gill and trammel net fisheries) have had significant effects on productivity of fish and shellfish communities, although this impact is being lessened as stocks recover. Fisheries for pelagic species may also have substantial knock on effects on predators (by reducing prey availability) but in practice these populations tend to be governed more by environment, plankton composition and natural variations in recruitment than by fishing pressure.

Indicators and reference points

Various indicators have been proposed relating to the impacts of fisheries on fisheries ecosystems, including average size (within and across species), age at maturity, trophic ratio though there are as yet no agreed standards or reference points.

Ecosystem characteristics	Effect of inshore fisheries on fish & shellfish Communities
species composition/biodiversity	Overall… biodiversity is increasing in most areas, primarily related to warming.
functional group composition	There have been widespread shifts in fish and shellfish community composition with decreases in abundance of larger target species and slow growing/maturing non-target species. This has taken place in parallel with community changes associated with climate change, NAO, and circulation patterns.
distribution and dynamics of communities	Mackerel distribution patterns have changed significantly but probably unrelated to fishing. Elasmobranch distribution has changed probably in response to fishing pressure
trophic structure and function	Fisheries in general have had significant effects on trophic structure and function, though the contribution of inshore fisheries is arguably limited.
productivity	Fisheries has had significant negative impacts on productivity of target species, especially predators, but probably insignificant impact overall. Again the contribution of inshore fisheries may be viewed as relatively minor.

Note. *This analysis suggests that most fisheries targeting pressure stocks (including small scale inshore) and/or those engaged in fishing for benthic species would not meet SG60. In practice this has not happened in past assessments primarily because fisheries have been assessed from the perspective of their individual contribution to fishing pressure, rather than taking into account of cumulative impacts of all fisheries. Although the former appears to be fair (especially so for small scale fisheries) it may also be regarded as inappropriate as a tool for addressing ecosystem level impacts; and the rationale for undertaking ecosystem level assessments in relation to individual fisheries is brought into question.*

4.5.1.6 Benthos

Benthos is a "vital component of the marine food web providing habitat and food for other marine species, recycling nutrients and degrading wastes" (DEFRA 2005). According to *Charting Progress 2*, mobile fishing gear has adversely affected large areas of the seabed.

Large-scale discarding of macrobenthos species occurs in mixed demersal trawl fisheries, especially the beam-trawl fishery for sole and plaice and the otter-trawl fishery for Norway lobsters. These fisheries alter the biomass, production, size structure and diversity of benthic communities, with the intensity and spatial patterns of exploitation determining the aggregate impacts (ICES, 2008). It is notable that historically there have substantial and irreversible changes. For example, in the 19th century there were vast oyster beds over large parts of the southern North Sea.

Biodiversity

Species diversity is normally highest in areas of soft sediment and where there is wide variation in temperature and salinity (Vaz et al., 2007). Overall, species diversity over the entire region appears to have increased over the last two decades (Vaz et al., 2007).

Community composition and distribution

Several distinct community types have been identified that are determined by environmental factors such as depth, salinity, water temperature, seabed shear stress, sediment type and trawling intensity (ICES 2008). Inshore fisheries will typically impact the distinct communities found primarily in the 0-50m inshore photic zone.

Large tidal currents and the associated increased seabed stresses give rise to coarse seabed sediment conditions with associated characteristic sessile epifauna. In inlets and bays, where the tidal stresses are weaker fine sediments accumulate giving rise to dominant infauna communities (Castel *et al*., 1997).

Rees *et al* (1999) provide a description of the benthic infauna around the British Isles. Sparse infauna is associated with sandy sediments in the eastern English channel, southern North Sea, and the Bristol Channel, while higher diversities are found off the NE and SW English coast, and especially coastal waters off Morecambe Bay. Within the North Sea itself both the infauna and epifauna are more diverse in the northern part, while in the channel greater diversity is to be found in the east. Epifaunal communities are dominated by free living species in the south and sessile species in the North. Although there is limited data on trends in spatial distribution of macrofaunal communities, these were reported as little changed between 1986 and in 2000 (ICES 2007, 2008).

Vulnerable biogenic reefs of horse mussels *Modiolus modiolus*, maerl and serpulid worms occur in the Irish Sea and West coast of Scotland, but overall trends for these species are unclear (these are dealt with in more detail in the habitats section). Recovery rates for these habitats are very slow.

It has been shown by several authors that the impacts of trawling and dredging is significantly greater, and recovery times much longer, on less dynamic (long term established) muddy sediments than on more sandy and gravel sediments typical of more dynamic hydrographic conditions (e.g. Jennings and Kaiser 1998).

There have been no large-scale (1000s km^2) studies of the aggregate effects of bottom fishing activity in the Irish and Celtic Sea. However, studies by Hinz *et al* (2009) showed that otter trawl had only minor effects on benthic biota while both new and traditional dredge showed negative effects. More generally it has been shown that intensive dredging and trawling have significant effects on benthic community composition. These effects are discussed in the sections below on trophic structure and productivity and in the section on habitat impacts of fishing.

The spatial distribution of the macrofaunal communities as described using multivariate methods that focus on species identity and distribution was largely unchanged between 1986 and 2000 (Hiddink *et al* 2006).

It may be concluded that while bottom trawls and dredges are likely to affect community composition, effects on community distribution may be less significant.

Trophic structure and function

The benthos is a key element in the ecosystem at all spatial scales, and is a complex system in its own right. Energy and nutrients from the upper photic zones find their way to the bottom and are recycled through the activities of benthic organisms and chemical processes, and through benthic organisms as prey for fish, birds and marine mammals.

Studies on *Nephrops* trawling have shown that in heavily fished areas low value opportunistic carnivorous species may become dominant (Blanchard *et al* 2004). In the case of otter and beam trawls, larger and longer lived epifauna (such as crustaceans, sponges, bivalves etc) are significantly and differentially impacted, while smaller shorter lived infauna (such as polychaetes) are less impacted and recover rapidly, in some cases becoming more abundant (Kaiser *et al* 2006). This may actually improve the fishery for some target species such as flat fish which feed on these organisms. However, the associated loss of structure and change in species composition may adversely affect other species. The effects of beam trawling and inter-tidal dredging appear to be the most severe. Recovery times may vary from a few days to several years, and one can reasonably speculate that if large areas are maintained under heavy pressure for long periods, the overall “reservoir” of recruits to recolonize will be reduced, recovery times significantly increased and the likelihood of significant and irreversible change increased.

Inshore fisheries of England take place primarily in water depths of less than 50m and therefore in the photic zone. Biotic communities are distinct in this zone and therefore worthy of targeted management.

The changes in species composition described above and under P2.4 correspond to a shift in functional group – with a reduction in benthic macrofauna and an increase in smaller burrowing infauna such as polychaetes. Furthermore, otter trawls target primarily carnivorous and higher trophic level species, and in isolation may therefore reduce the relative abundance of species at this trophic level.

Productivity

Recent research suggests that beam trawling in the southern and central North Sea may remove 39% of standing-crop biomass on an annual basis, and reduce benthic production by 15% relative to the un-fished state (Greenstreet *et al*., in press). The impacts of trawling have been shown to be greatest in areas with low levels of natural disturbance. In parts of the N Sea beam trawl fishing is reported to have reduced total benthic biomass and production by 56% and 21%, respectively. In 2003, the biomass of benthic invertebrates was less than 90% of predicted *biomass* (in the absence of fishing) over 56% of the area of the southern and central North Sea, and *production* was less than 90% of predicted rates in over 27% of the area.

It should be noted however that fishing effort is rarely homogenous with effort often strongly concentrated in preferred historic fishing grounds.

Furthermore, overall production of benthic animals such as crustacean, molluscs and echinoderms appears to have increased, probably in response to decreased predation pressure, and is evidenced by steady growth in the North Sea shellfish sector over the last 20 years (FRS 2006). Recent data on benthic productivity is limited, although Heath (2005) reported a significant overall increase in productivity (by 0.8 g C m^2y) in the North Sea between 1973 and 1999.

The evidence on benthic productivity overall is therefore mixed, though it would appear that local impacts are highly significant.

Fishing pressure

International beam and otter trawl effort in the North Sea, expressed as hours fished, declined by 31% and 44% respectively from 1997 to 2004 (Greenstreet *et al*., 2007); however, otter trawl effort directed at *Nephrops* increased by 65%. Given that Nephrops are restricted to a narrow range of seabeds the total spatial footprint of bottom fishing activity in the North Sea is expected to have declined since 1997 (ICES/OSPAR 2008a)

Indicators and reference points

Current suggestions for the development of indicators of ecosystem health relating to the benthos include the proportion of the seabed trawled and the degree of aggregation or concentration of trawling. However, there are no agreed reference points or standards relating to these indicators.

VMS data relating to the activity of larger offshore trawlers suggests that fishing activity is relatively concentrated with large areas in the North Sea trawled less than once every 7 years, and smaller areas trawled as much as 10 times per year (DEFRA 2005). The implications for this in ecosystem terms are however unclear:

- Fishing may target areas which are the most productive and have particular value in terms of ecosystem function;
- Fishing may enhance production of food for target species (such as flatfish) and reinforce its own success in these areas;
- Tradition and convenience may play a significant role in fishing intensity

Because most inshore vessels lack VMS and surveillance is relatively limited, data for this indicator is not available (or rather is not reliable) and extension of VMS to inshore vessels, and synthesis/analysis of track data will be required in future if this issue is to be addressed. Even if this problem is addressed agreement on appropriate reference points for these indicators will be hard to agree.

Nonetheless there are significant concerns. In 2005 the environment agency estimated that as much as 12% of estuaries and 19% of coastal waters may be at risk from the effects of commercial fishing and shellfish harvesting.

Ecosystem characteristics	Effect of inshore fisheries on benthos
species composition/biodiversity	There is no clear evidence that fishing has reduced benthic biodiversity overall; however its destructive impacts on biogenic reefs and epifauna in general suggest potential for overall impacts
functional group composition	Benthic trawling and dredging tends to favour opportunistic carnivores and scavengers and smaller infauna at the expense of more vulnerable epifauna.
distribution and dynamics of communities	Evidence limited and unclear
trophic structure and function	Beam trawling, otter trawling and dredging have all been shown to have significant effects on benthic tropic structure and function over significant areas
productivity	Beam trawling, otter trawling and dredging have all been shown to have significant

	effects on benthic productivity, locally but at a broader scale overall benthic productivity seems to be increasing

4.5.1.7 Marine mammals

Along with some seabirds, marine mammals are top predators in English coastal waters. Direct impacts of fishing gears on seabirds and cetaceans (entrapment, disturbance etc) is dealt with under PI2.3. There may however been indirect ecosystem impacts, through competition and/or synergy.

Dominant cetacean species in the N Sea are minke whales (7300), harbour porpoises (about 340 000) and whitebeaked dolphins (7900). Preliminary abundance estimates from a survey conducted in 2005 indicate status quo for all these species. Harbour porpoises, however, have shifted their focal distribution from the northern part of the North Sea to the southern part. Grey and harbour seals are increasing in many areas though harbour seal is decreasing in Scotland for unknown reasons.

In terms of biomass, the minke whale is the most important marine mammal occurring and consumes small fish such as sandeel. Harbour porpoise is the second most important from a biomass perspective, and the North Sea may represent the most important habitat for this species on the planet. Porpoise density was highest in the south central North Sea and coastal waters of northwest Denmark (~0.6 animals/km2). The main concentration is now N and NE of N Norfolk.

Biodiversity and community composition

It is possible that those species that have been better able to exploit fishery waste have benefitted, and those vulnerable to capture in nets have suffered. However, in terms of total numbers and composition there is no direct evidence for this.

Distribution and productivity

To date the main direct impacts of fisheries on marine mammals has been bycatch of dolphins in pelagic trawls, mainly in the Channel, bycatch of harbour porpoise in gillnet fisheries, and entanglement of seals in trammel and gill nets as discussed under ETP.

Indirect effects may include both competition for food and supply of food. Porpoises are relatively flexible in their diet. In European waters they may eat herring, mackerel, sand-eel, gobies and a wide range of gadoid fish such as cod, saithe, pollack, and whiting. It is clear therefore that small scale inshore fishermen taking a mixed catch (especially small scale trawl for whitefish and for nephrops) may be in direct competition, although porpoises tend to take smaller fishes than those targeted by fisheries. Equally, discarded fish and shellfish may be a source of food (as it is for Killer whales) though there is no direct evidence of this (Santos and Pearce 2003, Rockman *et al* 2011).

Studies of grey seal diet in the western Irish Sea suggest that the main prey species (Norway pout, bib, poor cod, whiting, plaice) are not the principle target species for commercial fisheries (Kiely *et al*., 2000). However, grey seals are an important predator for cod, herring and sandeels . Fishermen may therefore be in direct competition with seals, and certainly many fishermen are of this view. In 2002 grey seals in the North Sea consumed mainly sandeel (69 000 t), cod (8300 t), haddock (6500 t) and plaice (5200 t), but also commercial species such as whiting, saithe, ling and herring were taken (ICES 2008).

Overall there is no evidence to suggest that either of these direct or indirect impacts have affected biodiversity, community composition, or productivity.

Trophic structure and function

Marine mammals and fishers occupy similar trophic/ecological roles and there is potential for competition and substitution. In recent years there may have been a swing in favour of marine mammals given the protection afforded.

Ecosystem characteristics	Effect of inshore fisheries on marine mammals
species composition/biodiversity	There is no evidence that direct or indirect effects of fishing are altering the overall balance between marine mammal species
functional group composition	NA
distribution and dynamics of communities	Evidence limited and unclear
trophic structure and function	Although there is probably some substitution of the trophic roles of fishers and marine mammals, there is no evidence that such substitution is fundamentally affecting overall trophic structure and function
productivity	There is no evidence that productivity of marine mammals is in decline

4.5.1.8 Seabirds

Over the past decade, 12 out of 28 seabird species in the OSPAR region have increased, 4 others including the northern fulmar and black-legged kittiwake have decreased, while another 4 species show little change (ICES/OSPAR 2008a)

Some of this increase may be attributable to fishing activity. Fishing involves a removal of food from the sea bed to the sea surface, creating opportunities for opportunistic marine birds and mammals, especially where discards are plentiful. These effects are very variable and difficult to disaggregate (Jennings and Kaiser 1998). However, Fulmars appear to have benefited directly from the expansion in fishing, and skuas may have profited from the increase in population size of seabirds in general.

However, environmental factors are also extremely important. The breeding success of some seabird populations in the Celtic Sea has been linked to climatic fluctuations in the North Atlantic, such as the North Atlantic Oscillation (NAO). This influence may be mediated through changes in phyto- and zooplankton, which will affect fishes such as sandeel and Norway pout on which many seabirds feed. Sand eel stocks have been relatively low over the last decade though some recovery has been observed since 2008. Recruitment of sandeel is highly variable, and the short life cycle implies that large variations in biomass are to be expected – although it is likely that fishing has exacerbated some of the population dips.

These issues have a strong local dimension. During the breeding season, some seabird species depend on feeding conditions within tens of km around their colony, while others may cover several hundreds of km during their foraging trips. Local depletion of sandeel aggregations at a distance less than 100 km from seabird colonies probably has greatest impact on birds such as black-legged kittiwake and terns, whereas the more mobile marine mammals and fish may be less vulnerable.

Sandeel and other forage fish are rarely targeted by inshore fisheries (except possibly sardine and sprat in critical locations) and the effects of inshore fisheries are likely to be relatively limited.

Some diving seabirds and ducks may be entrapped in drift and tangle nets, but overall effect on biodiversity, community composition, trophic structure and function and productivity attributable to inshore fisheries is likely to be limited.

Ecosystem characteristics	Effect of inshore fisheries on seabirds
species composition/biodiversity	No evidence for significant decline in biodiversity
functional group composition	Species dependent on small pelagics may decline while opportunistic scavengers may increase
distribution and dynamics of communities	Intensive fisheries for small pelagics may affect local seabird colonies and may reinforce natural downturns

trophic structure and function	Some possible substitution/displacement effects possible but limited
productivity	Significant direct and indirect effects unlikely

4.5.1.9 Spawning and nursery areas

Juveniles of a very wide range of species are found in shallow waters (<10m). Unfortunately most surveys operate in waters >20 m deep, and data for estuarine and transitional waters limited.

Estuaries and shallow coastal areas tend to be of particular importance as nursery areas for young fish and other biota, and this is associated with the high levels of primary production, productive, shallow and sheltered waters. Thornback/spotted/undulate rays, herring; cod, whiting, sandeel, plaice and sole all use shallow coastal and estuarine areas as nursery grounds (and in some cases – for example herring) as spawning grounds.

Inshore fisheries therefore have the potential to seriously impact both spawning adults and juveniles. This is partially addressed both through generic regulations (such as mesh sizes, closed seasons) and local bye laws (such as closed areas and closed seasons) which vary widely between fisheries and areas.

Impacts on spawning and nursery areas may affect all of the key ecosystem elements:

Ecosystem characteristics	Effect of inshore fisheries on spawning and nursery areas
species composition/biodiversity	Possible effects, highly locally dependent
functional group composition	Possible effects, highly locally dependent
distribution and dynamics of communities	Possible effects, highly locally dependent
trophic structure and function	Possible effects, highly locally dependent
productivity	Possible effects, highly locally dependent

4.5.1.10 Summary of the overall effects of fishing on marine ecosystems adjacent to the English coast

The above analysis suggests that although the key drivers in the marine ecosystem are probably temperature, ocean circulation, salinity and nutrient runoff (all of which have a profound impact on plankton composition and productivity) fishing has an important additional effect which may at times become critical. In particular, fishing in general may have a significant effect on the following function groups of the ecosystem:

- **Fish and shellfish communities**: composition of communities (broadly speaking a loss of larger, long lived slow to mature species in favour of smaller, quick maturing and shorter lived species);
- **Benthic habitats:** varied but widespread effects on the structure and functioning of benthic habitats, including impacts on trophic structure, productivity, nutrient recycling, community composition and biodiversity;
- **Seabirds**: Both positive and negative effects including:
    - Periodic/occasional entrapment in set nets and drift nets
    - loss of locally important food resources such as sandeel or sprat populations
    - increases in some species such as fulmar associated with abundant discards.

- **Marine mammals:** possible competition for food resources (but no evidence that this is affecting status). Some issues with localized capture of porpoises and dolphins in pelagic trawls, and porpoises in drift and fixed gill nets. Effect on overall status probably limited.
- **Spawning and nursery areas:** potentially significant but largely unknown effects on both commercial and non-commercial species. This is a specific concern for inshore fisheries since the juveniles of many species utilize shallow estuarine and coastal waters.

According to Charting Progress (2005) "widespread commercial fishing practices threaten many fish stocks by over-exploitation and damage sea floor areas", and "damage to the seabed and to seabed communities is widespread which will adversely affect other species, including fish, dependent on these habitats and communities".

However, fishing pressure appears to have declined significantly in recent years, and protection for many marine species and habitats which underpin ecosystem structure and function has increased substantially. The situation with regard to many of the issues noted above is therefore likely to be improving. Fishing effort in the Channel (measured as kW days at sea) has declined by approximately 28% since 1999 (ICES 2008). However, there are large differences between gear types. Beam trawl, otter trawl (fish) and seine gear effort declined by 31%, 44%, and 62% respectively, while otter trawl effort directed at Nephrops increased by 65% (Greenstreet *et al*., in press). In the channel fishing activity is largely dominated by French Vessels less than 12m operating mainly in coastal waters giving rise to relatively intensive trawling pressure.

Nonetheless the ecosystem effects of fishing remain substantial, and however small they may be inshore fisheries contribute to the overall pressure in a particularly important part of the marine environment. Given the above analysis it is clear that bottom trawl and dredge fisheries in particular will struggle to meet this PI (i.e. score < 60) without an exceptional local management regime or code of conduct, as will any fisheries which are relatively non-selective.

4.5.2 Ecosystem information and management (PI 2.5.2/3)

The Ecosystem Management Strategy PI requires that there is a strategy in place (if necessary) that is designed to ensure the fishery does not pose a risk of serious or irreversible harm to the ecosystem.

To obtain an unconditional pass (>80) it must be demonstrated that there is a partial strategy in place (if necessary); and for a conditional pass (>60) there must be measures in place (if necessary). There are established definitions for what constitutes 'measures', 'partial strategy' and 'strategy' which are detailed within the MSC Certification Requirements and Guidelines.

Furthermore to achieve an unconditional pass there must be an objective basis for confidence that the partial strategy will work and evidence that it is being implemented successfully. For a conditional pass it is only necessary for the measures to be considered likely to work based on plausible argument).

4.5.2.1 Existing measures and strategies

A variety of initiatives, agreements and regulations are aimed at promoting an ecosystem approach to fisheries, and to protecting and managing coastal marine ecosystems more generally. However, there is as yet no coherent management system for coastal ecosystems comprising objectives, targets, management measures and monitoring and response mechanisms.

UK is home to one of the earliest attempts at long term ecosystem monitoring through the "continuous plankton recorder" (CPR) survey which has been collecting data from the North Atlantic and the North Sea on the ecology and biogeography of plankton since 1931. It is now coordinated by the Sir Alister Hardy Foundation for Ocean Science in Plymouth and continues to provide fundamental ecological information to support the ecosystem assessments made by ICES, CEFAS and other bodies.

UK waters (and especially the North Sea) have also been subject to several ambitious attempts at ecosystem modelling (e.g. Aruaujo *et al* 2005; Mackinson and Daskalov 2007; MSVPA) and the North Sea ecosystem is one of the most heavily researched marine ecosystems in the world, especially in relation to fishing pressure.

Based on this information, ICES provides periodic regional assessments of the state of marine ecosystems within its jurisdiction and the role of fishing pressure. It is also currently seeking to develop a standard set of indicators of ecosystem health that might be used in fisheries management and in support of the implementation of the EU 2008 Marine Strategy Directive (WGECO 2009) and the ecosystem approach to fisheries more generally.

OSPAR has also been increasingly active in promoting the protection of major ecosystem features, in part in response to FAOs guidance on the protection and management of vulnerable marine ecosystems (VMEs).

At UK level the Government has undertaken two broad assessments of the marine environment, Charting Progress (2005) and Charting Progress 2 (2010). However, these are of limited value in terms of tracking pressures on the marine ecosystem from fishing and isolating the effects of fisheries from those caused by other human activities, climate change, or natural dynamic cycles. However CEFAS is now engaged in research to develop a monitoring and assessment framework, involving piloting indicators such as vulnerable species (such as skates and rays), vulnerable habitats, and the fish community. They will then seek to link these to indices of fishing pressure.

The nearshore inshore environment also comes within the scope of the Water Framework Directive. The requirement to maintain "good ecological status" may be regarded as contributing strongly to

the notion of ecosystem health, and the monitoring associated with GES is likely to contribute to assessments of ecosystem health more generally.

Special Areas of Conservation (SACs) and/or Special Protection Areas (SPAs), are protected under the EC Habitats and Birds Directives respectively and are described under P2.4. These provide the beginnings of a system of protected areas that might ultimately address some dimensions of ecosystem structure and function, though at present the emphasis is on specific habitats. Fishing in EMS will now be assessed under a risk prioritized approach to establish whether additional management measures are required to protect the features of EMS, and this again should contribute to wider ecosystem health.

The Government is also in process of designating a network of national Marine Conservation Zones (MCZs) under the Marine and Coastal Access Act 2009. These are described in more detail under PI 2.4. Although these also have a strong habitat protection rationale they are meant to provide a "coherent network" of "representative habitats" and may therefore be considered to be a key mechanism for the protection of the wider ecosystem. It is likely that the overall coverage of these designations, and the legal requirements to maintain certain ecological features, will necessarily serve to safeguard wider ecosystem functioning as it relates to the mosaic of habitats in English inshore waters. It is notable that an increasing proportion of the staff time of IFCAs is taken up in dealing with appropriate assessments in relation to European Marine Sites and negotiation over the designation of MCZs.

IFCAs also establish by-laws to protect spawning and nursery grounds, many of which have been mapped by CEFAS (Ellis *et al* 2012). As yet there is no specific management regime in place to address the issues of trophic structure, shifts in size or age at maturity.

Overall, information relating to ecosystem health and the impacts of fisheries may be regarded as relatively good (given the complexity of the issues), allowing for a score of more than 80 for most fisheries. Management is rather bitty and *ad-hoc*, but can nonetheless be described as a "partial strategy" and again can be scored at over 80 for most fisheries.

4.5.3 Ecosystem Assessment by gear type

The following builds on the general assessment above to offer a more specific assessment and pre-assessment score for each gear and in some cases specific fisheries. Impacts on the wider ecosystem deriving from impacts associated with specific fisheries are by their nature difficult to gauge and cumulative in nature – in other words unlikely to be significant in relation to a particular inshore fishery, but significant when considered in relation to fisheries generally. This dilemma is not fully addressed by the MSC system and needs to be addressed at higher (EU/national/IFCA) levels.

4.5.3.1 Demersal otter trawl

Status: Substantial research has shown that otter trawls cause significant change to benthic species composition, functional group composition, community distribution and trophic size/structure. Although these changes are normally reversible over a reasonable time period, prolonged impacts over large areas are likely to lead to longer term changes, especially in muddier habitats. These impacts are of particular concern in inshore waters which are important as nursery areas for many commercial and non-commercial species, including some vulnerable species. Several otter trawl fisheries have passed MSC certification including the Hastings Dover Sole trawl and gill net fishery. The rationale for passing this fishery against P2.4/5 was given as: "fishery-related impacts on the benthic habitat are considered minor and affected habitats and species are able to recover rapidly in this dynamic inshore environment".

Other trawl fisheries have also been passed in other parts of the UK and Europe, but these have been mainly relatively selective, operating in deeper water away from critical benthic habitats, and with less chance of catching or damaging a wide range of species or impacting nursery areas. In many cases certification has been subject to specific conditions relating to benthic impacts.

If it is accepted that status of bottom habitats affected by trawling is low (given the various significant changes noted above and the sensitivity of inshore habitats), then the operative P2 assessment issue is whether or not the fishery is hindering recovery (MSC Guidance GCB3.2). It would be difficult to argue that a trawl fishery was not hindering recovery of potentially important benthic habitats, unless it was highly restricted in terms of spatial distribution and/or intensity of impact. Even in this case, if the status is low because of the cumulative impact of many similar fisheries, it would be difficult to argue that the fishery was not hindering recovery, notwithstanding the limited "marginal contribution to status or recovery". It is worth noting that many countries impose a complete ban on trawling in inshore waters.

There is therefore a rationale for scoring most inshore trawl fisheries at <60; equally the precedent from previous full assessments is for a score of at least 60-80 or even above 80. For the purposes of this exercise we therefore score 60-80, but emphasise that in full assessment there is the potential that a rigorous assessor could fail many such fisheries on this PI – although this would trigger a harmonisation exercise with other such fisheries. To support scoring at a higher level it is therefore important to demonstrate key factors in support of the judgement, such as the nature of the various local bylaws and protected areas, and the extent to which, taken together, they effectively limit benthic and related impacts to an agreed acceptable level.

Management: All the provisions relating to technical measures to increase gear selectivity; spatial restrictions relating to marine protected areas and MCZs; various IFCA level regulations and restrictions; and the broader measures designed for the protection and management of pressure stocks contribute to ecosystem level management. However there remain significant gaps. There is no overall ecosystem level plan, reference points or targets. For example there is no guidance on total proportion of seabed to be trawled; nor are there higher level indicators and reference points for benthic and fish communities, trophic structure (such as fish size, trophic ratios etc). There is a

lack of inshore VMS to better understand the distribution and intensity of effort. *Ecosystem management score: 60-80*

Information relating to the marine ecosystems of the North Sea, Channel and Celtic Seas is good by international standards with impressive information relating to climatic and oceanographic factors, plankton composition, seabirds and marine mammal populations. Information is also good relating to the impacts of trawling on benthic habitats and communities. Trend Information is more limited in relation to fish and benthic communities and vulnerable species. *Information Score >80*

Conditions for certification:

To allow an English inshore trawl fishery to qualify for MSC certification would require a more effective code of conduct and/or management system to address the damaging effects of intensive bottom trawling in inshore waters. This would probably include some combination of:

- Highly selective gear taking particular account of the need to safeguard juveniles of all species in inshore waters and vulnerable benthos;
- Agreed and implementable limits on bycatch of commercial and non commercial species coupled with a discard ban and full catch/bycatch recording (including non-commercial organisms);
- Technical measures to reduce the weight of the trawl gear and direct damage to benthic organisms;
- VMS on inshore vessels;
- Agreed standards and reference points for the area/proportion of seabed (possibly subdivided by major habitat categories) which can be trawled. In effect this would require designation of a comprehensive network of representative MCZ and/or accepted trawl fishing zones in which trawling was the favoured priority activity.
- Long term monitoring of benthic habitats, communities and physical/chemical status

4.5.3.2 Fly shooting

This activity is more targeted, more selective and far more restricted in extent than otter trawling, with correspondingly more limited impact on status. It is therefore likely to score >80 on status, and similar scores on management (60-80) and information (>80).

4.5.3.3 Beam trawl

Status: Substantial research reviewed under P2.4 and previously in this section has shown that beam trawls cause significant change to benthic species composition and biodiversity, functional group composition, community distribution, trophic size/structure and productivity. These effects tend be somewhat more severe than those associated with otter trawls. Effects on mud and gravel areas tend to be greater than effects on more dynamic sandy areas. Although these changes are normally reversible over a reasonable time period (months to years – Kaiser 2006), prolonged impacts over large areas are likely to lead to longer term changes. These impacts are of particular concern in inshore waters which are important as nursery areas for many commercial and non-commercial species, including some vulnerable species.

The arguments presented above relating to demersal otter trawl are relevant here: there is a rationale for scoring <60; but there are precedents for scoring 60-80 for individual fisheries, at least in pre-assessment. For the purposes of this exercise we therefore score 60-80, but emphasise that in full assessment there is the potential that a rigorous assessor could fail many such fisheries on this PI – although this would trigger a harmonisation exercise with other such fisheries. Key factors to be taken into account in making this this judgement would include the nature of the various local

bylaws and protected areas, and the extent to which, taken together, they effectively limit benthic and related impacts to an agreed acceptable level.

Management: All the provisions relating to technical measures to increase gear selectivity, spatial restrictions relating to marine protected areas, and the measures designed for the protection and management of pressure stocks contribute to ecosystem level management. However there remain significant gaps, including for example lack of any guidance on total proportion of seabed to be trawled; nor are there higher level indicators and reference points for benthic and fish communities, trophic structure (functional group ratios, trophic ratios etc). The introduction of effectively managed MCZs over relatively wide areas and covering all representative habitats should allow for higher scoring against this criterion. *Management Score 60-80.*

Information relating to the marine ecosystems of the North Sea, Channel and Celtic Seas is good by international standards with impressive information relating to climatic and oceanographic factors, plankton composition, seabirds and marine mammal populations. Information is also good relating to the impacts of trawling on benthic habitats and communities. Trend Information is more limited in relation to fish and benthic communities and vulnerable species. *Information Score >80.*

Conditions

To allow an English inshore beam trawl fishery to qualify for MSC certification would require clear regulations and/or code of conduct to address the damaging effects of intensive bottom trawling in inshore waters. This would probably include some combination of:

- Highly selective gear taking particular account of the need to safeguard juveniles of all species in inshore waters and vulnerable benthos;
- Agreed and implementable limits on bycatch of commercial and non commercial species coupled with a discard ban and full catch/bycatch recording (including non-commercial organisms);
- Technical measures to reduce the weight of the beam gear and grid and reduce direct damage to benthic organisms;
- VMS on inshore vessels;
- Agreed standards and reference points for the area/proportion of seabed (possibly subdivided by major habitat categories) which can be trawled. In effect this would require designation of a comprehensive network of representative MCZ and/or accepted trawl fishing zones in which trawling was the favoured priority activity.
- Long term monitoring of benthic habitats, communities and physical/chemical status

4.5.3.4 Pelagic trawl

Pelagic trawls are widely regarded as both more selective and less destructive than bottom trawls. Their impact on ecosystems is therefore primarily through impacts on target species which could lead to shifts in trophic ratios and/or changes in size/maturation rates of the target species. In practice target species are under relatively tight ICES/CFP monitoring and management regimes, although there are as yet no agreed targets or reference points for trophic ratios or genetic impacts.

Pelagic trawls have been implicated in the capture of or injury to cetaceans, and in particular dolphins in the English Channel as discussed in the section on ETP species. There is no good evidence that these negative interactions are shifting the overall trophic structure or functioning of marine ecosystems.

Given the more limited ecosystem effects and the strength of the management/monitoring regime relating to target species these fisheries are likely to score >80 for status, management and information.

4.5.3.5 Scallop dredge (general)

Status: The environmental effects of scallop dredging have been reviewed in general terms above in this section and in the PI.4 habitats assessment. The literature indicates that scallop dredging has a significant impact on habitats and biota. The level of impact varies depending on the habitats fished and how extensively these areas have been fished previously, with the highest initial impact recorded for biogenic habitats, approaching 100% alteration. However, scallop dredges probably have a somewhat lesser impact on the wider ecosystem than bottom trawls because they target a specific habitat, and although destructive of benthic habitat are somewhat more selective in terms of species caught. *Status Score 60-80.*

Management: All the provisions relating to technical measures to increase gear selectivity; spatial restrictions relating to marine protected areas and MCZs; various IFCA level regulations and restrictions; and the broader measures designed for the protection and management of pressure stocks contribute to ecosystem level management. However there remain significant gaps. There is no overall ecosystem level plan, reference points or targets. For example there is no guidance on total proportion of seabed to be trawled; nor are there higher level indicators and reference points for benthic and fish communities, trophic structure (such as fish size, trophic ratios etc). There is a lack of inshore VMS to better understand the distribution and intensity of effort. *Management Score 60-80.*

Information relating to the marine ecosystems of the North Sea, Channel and Celtic Seas is good by international standards with impressive information relating to climatic and oceanographic factors, plankton composition, seabirds and marine mammal populations. Information is also good relating to the impacts of trawling and dredging on benthic habitats and communities. Trend Information is more limited in relation to fish and benthic communities and vulnerable species. *Information Score >80.*

Conditions

To allow an English inshore scallop dredge fishery to qualify for MSC certification would require clear regulations and/or code of conduct to address the damaging effects on benthic habitats. This would probably include some combination of:

- Agreed and implementable limits on bycatch of commercial and non commercial species coupled with a discard ban and full catch/bycatch recording (including non-commercial organisms);
- Technical measures to increase selectivity and if possible reduce the weight of the gear and reduce direct damage to benthic organisms;
- VMS on inshore vessels;
- Agreed standards and reference points for the area/proportion of seabed (scallop habitat) which can be dredged. In effect this would require designation of a comprehensive network of representative MCZ and/or accepted scallop fishing zones in which scallop dredging was the favoured priority activity.
- Long term monitoring of benthic habitats, communities and physical/chemical status

Scallop dredge in Cornwall, Devon & Severn, Eastern and North Eastern IFCAs

Because of the more rigorous local management regime described under the PI2.4 assessment (which may be regarded as a partial strategy) and knowledge about stocks, score in the above areas are likely to be superior to those in the generic assessment above. A score in excess of 80 for status, management and information is likely in these areas.

4.5.3.6 Hydraulic dredge

Status: The environmental effects of hydraulic dredging have been reviewed in general terms above and in the PI.4 habitats assessment. Hydraulic dredging is highly destructive of benthic habitats, and the effects (from deposition of re-suspended particles) may spread many meters either side of a dredge track. However, hydraulic dredging is localised and limited in terms of the total area impacted, and is regulated to a greater or lesser degree in most IFCAs. The wider effects on the ecosystem are therefore likely to be relatively limited, assuming that habitats of particular importance to the wider ecosystem (such as sea grass) are protected from this activity. *Status Score 60-80.*

Management: All the provisions relating to technical measures to increase gear selectivity; spatial restrictions relating to marine protected areas and MCZs; various IFCA level regulations and restrictions; and the broader measures designed for the protection and management of pressure stocks contribute to ecosystem level management. However there remain significant gaps. There is no overall ecosystem level plan, reference points or targets. For example there is no guidance on total proportion of seabed to be trawled; nor are there higher level indicators and reference points for benthic and fish communities, trophic structure (such as fish size, trophic ratios etc). There is a lack of inshore VMS to better understand the distribution and intensity of effort. *Management Score 60-80.*

Information relating to the marine ecosystems of the North Sea, Channel and Celtic Seas is good by international standards with impressive information relating to climatic and oceanographic factors, plankton composition, seabirds and marine mammal populations. Information is also good relating to the impacts of trawling and dredging on benthic habitats and communities. Trend Information is more limited in relation to fish and benthic communities and vulnerable species. Information Score >80.

Conditions

To allow an English inshore hydraulic dredge fishery to qualify for MSC certification would require clear regulations and/or code of conduct to address the damaging effects on benthic habitats. This would probably include some combination of:

- Agreed and implementable limits on bycatch of commercial and non commercial species coupled with a discard ban and full catch/bycatch recording (including non-commercial organisms);
- Technical measures to increase selectivity and decrease damage to unwanted bycatch;
- VMS on inshore vessels;
- Agreed standards and reference points for the area/proportion of seabed (shellfish beds) which can be dredged. In effect this would require designation of a comprehensive network of representative MCZ and/or accepted fishing zones in which hydraulic dredging was the favoured priority activity.
- Long term monitoring of benthic habitats, communities and physical/chemical status

4.5.3.7 Set nets

These have been described elsewhere in this report. These nets have little impact on benthic habitats; their effects on the wider ecosystem are therefore mediated primarily through species caught, which has been dealt with under P2.1, P2.2, and P2.3. These nets are highly variable in terms of selectivity, and wider ecosystem effects would need to be examined on a case by case basis.. Ghost fishing from lost nets is also occasionally reported as a problem, but at a scale unlikely to affect overall ecosystem functioning

Most such fisheries are subject to technical measures (mesh size; area/seasonal closures) and catch monitoring which may be interpreted as a partial strategy.

For most such fisheries scores in excess of 80 are likely for status, management and information. This has been achieved where several such fisheries have been put forward for MSC assessment in the past.

4.5.3.8 Drift nets

Drift nets have a lower level of habitat interaction than set nets, since they remain within the water column, generally fishing from the surface down, and are usually set for a relatively short period. They are used mainly for pelagic species (such as sardine and herring) and can be highly selective. In these cases impacts on the wider ecosystem are likely to be limited and in most cases are managed through the ICES/CFP management system. Mesh size is normally subject to regulation. There may also be drift net fishery for bass, but again this is likely to be relatively selective and stock impacts have been dealt with elsewhere. Gear loss is probably less of an issue than with set nets since the drifting nets are normally accompanied by a fishing vessel.

The low level of habitat interaction and the high species selectivity is reflected in high outcome status scores for MSC certified drift net fisheries, such as the Cornish sardine fishery. Based on this, together with the above, a score of >80 for status, management and information is appropriate for this pre-assessment.

4.5.3.9 Hooks

Long lines, handlines and pole-lines have very limited habitat interactions. Their main effects on wider ecosystem issues are therefore related to species caught. Long lines predominately target cod and ray species, as well as bass. Pole and line and hand line are used for mackerel, with modest quantities of pollack, pilchard, bass and whiting also caught. Hook and line are used primarily for bass and pollack with a wide range of other species caught occasionally.

Given the limited intensity of activity and the relatively small catch (around 1% of landings from ICES “inshore” rectangles) these fisheries are not regarded as a significant threat to stock status, ETP, habitat or fish communities – and therefore to the wider ecosystem. Loss of long-line gear and ghost fishing is also a possibility, but the likely scale of associated impacts on wider ecosystem status and functions is considered to be insignificant.

The low probability of significant effects from these fisheries on the wider ecosystem is reflected in outcome status scores for MSC certified long line, hand line and pole and line fisheries, with scores ranging from 85-100. Based on this, together with the evidence above, a score of >80 is appropriate for this pre-assessment. However, the management regime, and to some degree also information is rather limited for “recreational” rod and line, and we have therefore scored only 60-80 for management for this fishery , and this low pre-assessment score might also be extended to the information PI.

4.5.3.10 Pots and traps

In general, pots are often advocated on an environmental basis for having a lesser impact on habitat than mobile fishing gear such as trawls and dredges (Rogers *et al*., 1998; Hamilton, 2000; Barnette, 2001). Overall Eno *et al* (2001) found the short-term effects of crab and lobster potting on sensitive benthic species in west Wales and Lyme Bay not to be detrimental.

They are also more selective, and discarded organisms are more likely to be returned to the sea alive. Although pots and traps tend to target benthic scavenger species there is very little probability of altering the ratios of different tropic or functional groups. Size restrictions are typically applied to target species. Overall, pots are regarded as having little detrimental effect on the wider ecosystem.

The main weakness at the present time relates to the information management system: the shellfisheries provide catch and effort returns which could serve as a valuable source of information on benthic community composition and trends. At the present time the information is collected but not routinely analysed and assessed. Despite this weakness it should be possible to score most pot fisheries at >80 on all three ecosystem PIs.

4.5.3.11 Hand collection

Raking and digging

Studies have been undertaken to assess the effects of hand raking and digging for shellfish and are reviewed under the habitats PI. Overall the conclusion is that these fisheries pose little overall threat to habitats. Species selectivity is very high, meaning that any wider concerns are likely to relate to the status of the target species, and other species associated with them. In most cases these fisheries are subject to a range of regulations based on regular stock or yield assessments, most of which make provision for the needs of dependent birds.

The low likelihood of wider ecosystem impacts is reflected in outcome status scores for MSC certified hand gathered cockle and clam fisheries, with scores ranging from 85-100. Based on this, together with the evidence above, a score of >80 is appropriate for this pre-assessment.

Diving

Diving (mainly for scallops and occasionally for lobster) probably has the least impact on benthic habitat and is mostly highly selective. Significant impacts on the wider ecosystem are considered to be highly unlikely except where a rare or endangered species was being specifically targeted. To our knowledge this is not taking place, and most dive based fisheries are likely to score more than 80 on all ecosystem PIs.

5 Scoping of P3 issues

The approach to scoring Principle 3 has been to consider the management frameworks that will influence scoring against the MSC principle 3 criteria. This is based on experience of previous assessments and an understanding of the influence of certain characteristics on scores.

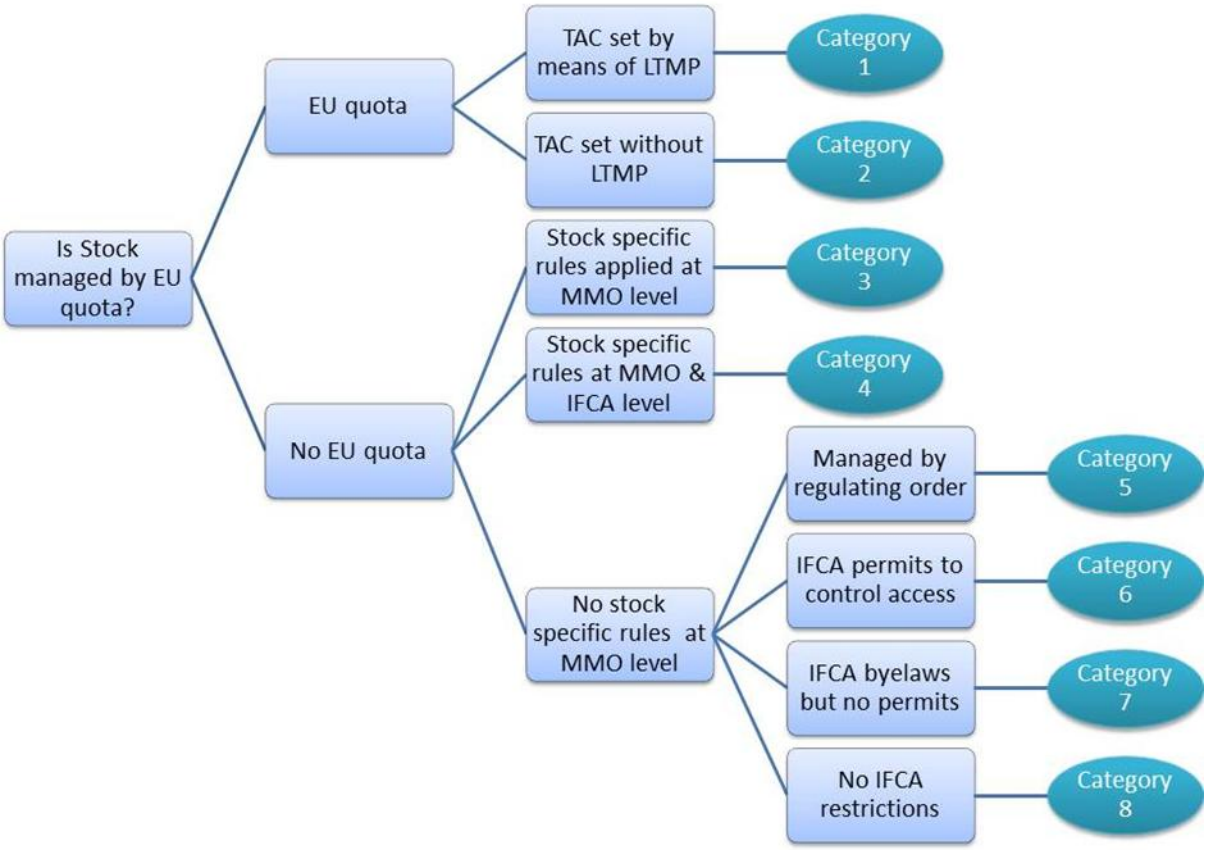
A decision tree (fig 5.1) was developed to define the fishery management categories used in principle 3. All fisheries being put through the assessment are categorized according to the management applied to those fisheries. This distinguishes fisheries:

- where fishery specific management decisions are primarily taken at an **EU** (or even coastal states) level,
- those where the lead in fishery specific management decisions appears to be taken by the national fisheries administration (i.e. **DEFRA / MMO**),
- those where fishery specific decisions are taken and applied at a more local (**IFCA** or Regulating Order grantee level)
- and those where no fishery specific management decisions have been taken.

Within these categories there are further subdivisions depending on what management decisions are taken, and according to what objectives or what level of information. These categories also seek to capture how access to the fishery is determined, for example through quotas, permits or licences.

Of course dividing all fisheries in the English Inshore zone into just 8 management categories masks more subtle variations between fisheries and is therefore only suitable for this macro level analysis. Even within these categories there is some variation between fisheries, which could lead to differences in MSC principle 3 scoring. For this reason, the approach of the assessors has been to first score the 8 management categories in a non-fisheries specific, or theoretical way. This score is then used as the *basis* for scoring each of the stocks identified in Principle 1 in more detailed fashion.

Figure 5.1: Decision Tree illustrating management categories for p3 scoring



For each stock the assessors then reviewed the available information to determine if there is any justification for deviating from the generic scoring. Issues that would cause scores to differ from the generic management categories include:

- for EU quota managed species which are not subject to a long term management plan, whether or not the advice is comprehensive and identifies reference points (which could be interpreted as objectives),
- whether or not stocks managed by EU quota are subject to the regular review and scrutiny afforded by a dedicated ICES working group,
- whether or not management appears to respond to advice and other serious issues,
- or whether or not some strategic research is undertaken to justify cases where there is little or no fisheries specific management.

In the following section of the report, each principle 3 performance indicator is taken in turn, highlighting the key findings and providing an indication of the likely score. The first 4 performance indicators are in relation to overall governance and policy and the second 5 performance indicators are fishery specific. As a result the findings for many of the Governance and Policy indicators are similar across all fisheries, which under the fishery specific indicators there is a greater degree of variation.

5.1 Governance & Policy (Non Fisheries Specific)

5.1.1 Legal and or customary framework (PI 3.1.1)

Score (3.1.1)	Fisheries / UoCs
< 60	None
60 – 80	None
> 80	All English fisheries.

As the UK is a member of the European Union, English fisheries are managed under the Common Fisheries Policy (CFP) via a hierarchy of management institutions, with DEFRA and the Marine Management Organisation (MMO) at a national level (headquarters in Newcastle) with Inshore Fisheries and Conservation Agencies (IFCAs) and MMO port-based offices at a regional level.

The Common Fisheries Policy (CFP) provides the main framework for decisions concerning the management of fisheries in EU waters, including UK waters. The main regulations on how a vessel should fish (technical measures[42]), how much it can fish (effort) and how much it can catch (quota) are at a European level. Technical measures may be general or specific to certain fisheries or sea areas and include:

1. Minimum **landing** sizes
2. Minimum **mesh sizes** for nets
3. Closed **areas** and **seasons**
4. Limits on **by-catches** (catches of unwanted or non-target species)
5. Requirement to use **more selective fishing gear** to reduce unwanted by-catch)
6. Measures to prevent **damage to the marine environment**.

Annex 1 of Council Regulation 850/98 provides a list of species and the towed gear types/mesh sizes permitted to target those species, along with minimum percentage catches of target species. Annex VI provides the same in relation to fixed gear, while Annex XII provides minimum landing sizes for species (provided as Annex 1 in this report). Quota regulations (set annually to define fishing opportunities) apply to fisheries specific sea areas. The species with a Total Allowable Catch (TAC) and quota allocated per Member State are all finfish species other than the prawns *Nephrops norvegicus* and *Pandalus borealis*.

Effort regulations (mainly EC 1342/2008) apply to vessels over 10m in length operating in a given sea area and can be specific to certain gear types. From an English perspective the main effort regimes are associated with the cod recovery plan in the North Sea and the Irish Sea. A certain number of fishing days per vessel are allocated with fewer allocated to those gears most likely to catch cod. Vessels under 10m in length and/or those with gears unlikely to catch cod (such as potters and dredgers) receive a derogation and are not impacted by effort restrictions.

Although fisheries management is a devolved matter within the United Kingdom, the allocation of fishing opportunities (quota) and the licensing of vessels effectively remains at a UK level. The 2012 concordat[43] contains a framework for enabling the four UK Fisheries Administrations to be given a

42Reg 579/2011 extended the transitional temporary measures of 1288/2009 and those of 850/98 until a full amendment under CFP reform in 2013. Com (2012) 298 and others listed at: http://ec.europa.eu/fisheries/cfp/fishing_rules/technical_measures/index_en.htm

43 A Subject Specific Concordat between The Department for Environment, Food and Rural Affairs, Marine Scotland, The Welsh Government and The Department of Agriculture and Rural Development (Northern

greater degree of control over the management of their own commercial fishing fleets, within this UK wide quota and effort management and licensing system. The arrangements will be subject to formal annual review between the Administrations as well as in the light of any changes arising from changes to the CFP rules and regulations.

For England the MMO is the responsible fisheries management authority. The MMO was established under the Marine and Coastal Access (MCA) Act 2009 as a statutory Executive Non-Departmental Public Body (NDPB) to manage the marine area in accordance with the duties and obligations stipulated in the Act with the objective of contributing towards the achievement of sustainable development.

Inshore Fisheries and Conservation Authorities (IFCAs) replaced the Sea Fisheries Committees in April 2011. As well as managing inshore fisheries, they took on new conservation duties as set out in the Marine and Coastal Act (MCA) 2009. The specific articles of the MCA detailing IFCA establishment are provided in Annex III. The national vision for IFCAs is:

> *"To lead, champion and manage a sustainable marine environment and inshore fisheries, by successfully securing the right balance between social, environmental and economic benefits to ensure healthy seas, sustainable fisheries and a viable industry"*

Management of English 'inshore' fisheries is a shared responsibility of the MMO and IFCAs. Both have a duty to deliver all EU fisheries regulations under the CFP with the opportunity to apply more restrictive measures. A memorandum of understanding (MoU) exists between the two organisations[44] to better ensure a co-ordinated approach to management.

With more movement by finfish between the 'inshore' and 'offshore' zones and many key species are under quota, the MMO is considered the lead management body on finfish. The IFCAs have a greater focus on management of shellfish within their boundaries as these are the target for the majority of 'inshore vessels' and most are not subject to quota. There is also the potential for inshore shellfish stocks to be managed under regulating or several orders. However this distinction between finfish and shellfish is an informal one and both the MMO and IFCAs have a responsibility for managing all sea fisheries occurring within their geographic remits, which overlap in the 0-6 mile zone.

The first scoring issue for PI 3.1.1 at SG80 requires an "effective national legal system and organised and effective cooperation with other parties, where necessary, to deliver management outcomes consistent with MSC Principles 1 and 2." The relatively recent establishment of the MMO and IFCAs under the MCA Act 2009 has presented some challenges, but the consolidation of roles under a single marine agency (the MMO) and the inclusion of conservation responsibilities in IFCA remits illustrate the greater integration between fisheries and marine environmental management. These developments have increased the potential to deliver management outcomes consistent with MSC Principles 1 and 2 SG80 is achieved. Currently 'binding procedures' are being developed to address shared responsibilities between MMO and IFCAs and SG100 could be met when these are implemented.

There is regular evidence in the media of fishing disputes that have been resolved in the courts where punishment (generally the level of fine) is decided by the judge appropriate to the scale of the offence. The MCA Act specifies that a fine in relation to fishery offences under the act should not exceed £50,000, in recognition of the scale of inshore operators. Legal action is only embarked upon should warnings and confiscation of gear prove ineffective deterrents to operators. The second

Ireland) ("the Administrations") On Management Arrangements for Fishing Opportunities and Fishing Vessel Licensing In the United Kingdom.

[44] Available at: http://www.marinemanagement.org.uk/about/documents/mou/ifcas.pdf [Annex 2 of the MOU describes the overarching areas of collaboration.]

scoring issue at SG80 requiring that "the management system incorporates or is subject by law to a **transparent mechanism** for the resolution of legal disputes which is **considered to be effective** in dealing with most issues and that is appropriate to the context of the fishery" is therefore met.

The third scoring issue at SG80 is that "The management system has a mechanism to **observe** the legal rights created explicitly or established by custom of people dependent on fishing for food or livelihood in a manner consistent with the objectives of MSC Principles 1 and 2." Article 153 of the MCA Act 2009 establishing IFCAs states that: "In performing its duty under subsection (1), the authority for an IFC district must—

a) seek to ensure that the exploitation of sea fisheries resources is carried out in a sustainable way,

b) seek to balance the social and economic benefits of exploiting the sea fisheries resources of the district with the need to protect the marine environment from, or promote its recovery from, the effects of such exploitation,

c) take any other steps which in the authority's opinion are necessary or expedient for the purpose of making a contribution to the achievement of sustainable development, and

d) seek to balance the different needs of persons engaged in the exploitation of sea fisheries resources in the district.

These requirements illustrate the commitment to observing the legal and customary rights of people dependent on fishing and therefore SG80 for this final scoring guidepost under 3.1.1 is met.

5.1.2 Consultation, Roles and responsibilities (PI 3.1.2).

	Projected Pre-assessment score		
	< 60	**60 – 80**	**> 80**
Demersal finfish	None	All other demersal finfish	All demersal stocks managed by EU quota
Pelagic Finfish	None	All other pelagic finfish	All pelagic stocks managed by EU quota
Shellfish	None	All other shellfish	Fisheries with Regulating Orders Shellfish species managed by EU quota (Nephrops)

A feature of English inshore fisheries is that management jurisdictions overlap between the EU, UK (MMO) and local management (IFCA). As a result, this pre-assessment gives consideration to the management jurisdiction where decisions about the fishery *are most likely to be taken* to inform the scoring of Roles and Responsibilities. The main differences in the scoring of Roles and Responsibilities relate to whether decisions are taken at an EU level or at a UK level.

The first scoring issue in this performance indicator asks what the clarity of definition and understanding is of the roles and responsibilities of organisations and individuals involved in the management process.

5.1.2.1 EU level Fisheries Management and Administration

The roles of the key EU institutions (DG Mare, European Commission and European Parliament) are explicitly defined and sufficiently well understood (SG80). At the heart of the European Union legislative / decision-making process is the European Commission; the politically independent, civil service. The Directorate-General for Maritime Affairs and Fisheries (DG Mare) is the administrative department of the Commission with responsibility for fisheries. Following the Lisbon Treaty, The Commission proposes new regulations, which are signed into law by elected national representatives of The Council of the European Union, after full review and approval by The European Parliament.

5.1.2.2 UK Level Fisheries Management & Administration

European legislation is enacted at the national level through relevant primary and secondary legislation. A Member State may also take non-discriminatory measures that are more restrictive than the CFP measures to those fisheries operating within their 0-12 nautical mile zones in respect of national fleets and, with the approval of the Commission and affected Member States, to other EU vessels subject to where historic fisheries rights exist in the 6-12 nautical mile zone. In practice this also means that member states may take a lead in management measures for fish stocks which have received little attention at an EU level, such as non-quota finfish or shellfish (with the exception of *Nephrops*). The UK Government's Department of Environment, Food and Rural Affairs (DEFRA) is the main fisheries management body in UK and is the representative at fishery negotiations at an EU level.

Following the Marine and Coastal Access Act 2009, the UK government set up The Marine Management Organisation (MMO) as an executive non-departmental public body (NDPB) with responsibility for marine planning, licencing and regulation. From a fisheries perspective, this includes managing UK fishing fleet capacity and UK fisheries quotas as well as collecting fisheries information and ensuring compliance.

The MMO shares responsibility for management of English 'inshore' fisheries with Inshore Fisheries and Conservation Authorities (IFCAs) which replaced the existing Sea Fisheries Committees from

April 2011. As well as sharing the management responsibility for inshore fisheries, IFCAs took on new conservation duties as set out in the Marine and Coastal Act (MCA) 2009. Both IFCAs and the MMO have a duty to deliver all EU fisheries regulations under the CFP with the opportunity to apply more restrictive measures. A memorandum of understanding (MoU) exists between the two organisations to better ensure a co-ordinated approach to management.

As finfish are more likely to move between the 'inshore' and 'offshore' zones and many finfish species are under quota, the MMO is generally understood to be the lead management body on finfish. The IFCAs has a greater focus on management of shellfish within its boundary as these are the target for the majority of 'inshore vessels' and most are not subject to quota. However this distinction between finfish and shellfish is an informal one and both the MMO and IFCAs have a responsibility for managing all sea fisheries occurring within their geographic remits, which overlap in the 0-6 mile zone.

For species which are considered more inshore resources – either because they are non-pressure finfish which have not yet been subject to EU quota, or because they are shellfish which are considered to be more inshore, the definition of functions roles and responsibilities are generally understood (SG 60) rather than explicitly defined and well understood. For example, for most shellfish and many finfish which are not subject to EU quota it is likely that their distribution may cross the 6 mile and even the 12 mile boundary. In these cases it is unclear who will take primary responsibility for management action and the definition of "shared responsibility" between the MMO and IFCAs has the potential to lead to confusion and inaction. A full assessment of any such inshore resources would therefore likely trigger a condition.

5.1.2.3 Scientific Advice

Scientific advice for EU managed pressure stocks is the provided by the ICES Advisory Committee (ACOM) which draws on the on-going work of international scientists from relevant research laboratories and institutions on the stock biology and marine science. Fisheries stock assessments are carried out by ICES working groups – typically addressing a group of similar fisheries. The assessment reports generated by the working group are reviewed and evaluated by the ICES Advisory Committee which then provides advice on the status of target and non-target stocks to the European Commission. In England, CEFAS is the main scientific body working in the area of fisheries science. Their scientists are closely involved in the stock assessment and egg survey work of ICES so will be represented on all relevant ICES working groups.

The scientific advice from ICES is passed to the European commission, which then reviews this information (The Scientific and Technical Committee for Fisheries (STECF)), comparing it to other obligations and high level objectives to ensure that advice given to the Council of Ministers is compatible and appropriate. For EU pressure stocks, the roles and responsibility for the provision of scientific advice to support management is explicitly defined and well understood (SG80).

By contrast the stocks of non-pressure, or non-quota fin fish or shellfish are not subject to the same system for generating annual scientific advice. For these in some cases CEFAS will undertake either regular or *ad hoc* pieces of work to determine stock status, in some cases local academic institutions will undertake stock assessment work on behalf of the IFCAs and in some case IFCA scientific staff will undertake stock assessments. Exactly how it is determined what science to be done, who will undertake the science and critically who will pay for the science is unclear. Again, it can be argued that the roles are generally understood (SG60) with IFCAs taking the lead on necessary science for shellfish and science on finfish being undertaken at a nation level (by CEFAS), but this is far from clear. For example, CEFAS do undertake specific pieces for work for some shellfish stocks / species in some areas, but not others. For example, there has been recent work carried out by CEFAS in relation to crab and lobster stock definition and assessment and CEFAS are also currently undertaking work in relation to whelks – a fishery where management is carried out almost

exclusively at an IFCA level. There appears to be a potential for confusion over who is responsible for undertaking scientific assessments to inform management advice in English inshore waters – at least for some stocks. As such it is likely that some fisheries will receive little or no attention. It could be argued that those fisheries that receive little or no attention are low risk, either due to poor market demand or biological resilience, but this does not seem to have been strategically determined by management, therefore leaving the impression that these stocks have simply not received consideration. Given the recent commitments to ensuring all fisheries are exploited at Maximum Sustainable Yield, it is unclear exactly who will be responsible for defining the point of MSY for which stocks.

5.1.2.4 Control & Enforcement

The Member States' obligation to control and enforce the CFP is set out in some detail as part of the CFP itself. Control and enforcement has been widely seen as one of the weakest elements of the current CFP. The system has therefore been reformed in recent years by the creation in 2005 of a Community Fisheries Control Agency (CFCA) and the adoption in 2009 of a comprehensive Community Control System. The CFCA is established to organise operational coordination of fisheries control and inspection activities by the Member States and to assist them to cooperate. The Council Regulation establishing the Community control system came into force from 1 January 2010.

In England, The Marine Management Organisation co-ordinates marine fisheries enforcement activity, which includes monitoring, control and surveillance of all sea fishing activity within British fishery limits around the coast of England, and UK vessels operating outside those waters. This includes inspections of markets, processors and ports and the MMO has uniformed shore based enforcement personnel based at port offices around the country for this purpose. Aerial surveillance conducted under contract by Directflight Ltd and at sea surveillance is carried out by the Royal Navy's Fishery Protection Squadron (FPS). In both cases this surveillance remit extends from 0 – 200nm, or to the limits of the UK's Economic Exclusion Zone. MMO enforcement (including that carried out by the Royal Navy or Directflight ltd is all coordinated at fisheries monitoring centre in Newcastle. The focus of MMO enforcement is on EU and national level legislation such as:

- foreign fishing vessels access to British fishery limits
- total allowable catches and quotas for applicable fish stocks
- technical conservation measures, such as minimum landing sizes and mesh sizes or nationally defined closed areas
- logbooks and landing declarations
- effort limitation measures limiting the days at sea.

In addition, the IFCAs undertake control and enforcement activity in their 0-6nm jurisdiction. All IFCAs (and before them the Sea Fisheries Committees) have excellent control and enforcement experience and assets, including some well-equipped patrol vessels able to operate in shallower waters than the vessels of the Royal Nay's Fishery Protection Squadron. IFCA enforcement also has the advantage of being able to act on local information. IFCA enforcement generally focuses on the enforcement of IFCA byelaws, including any local technical conservation measures. Although IFCA patrol vessels would check vessel licencing etc. to ensure that the vessels were eligible to fish in their waters, they would not focus their enforcement effort on logbooks, or quota uptake or effort limitation, unless this derived from a local byelaw.

In spite of the overlapping jurisdictions of the MMO and the IFCA, there appears to be less potential for confusion in roles and responsibilities within control & enforcement as exists in the provision of both management and scientific advice. Put simply, there is less confusion over the management boundaries or the species involved. Although perhaps surprising that the IFCAs do not have the powers or remit to undertake either log book or landing declaration inspections, or even the policing

of buyers and sellers within their jurisdiction (these powers are reserved by MMO), it does seem that the division of roles and responsibilities is well understood – although there still be an argument that it is not explicitly defined. On balance this particular element (area of responsibility) is likely to score at SG 80.

The effectiveness of the control and enforcement system is scored in a later (fishery-specific) performance indicator.

5.1.2.5 Industry Representation

The creation of Regional Advisory Councils (RACs) was one of the pillars of the 2002 reform of the Common Fisheries Policy in response to the EU and stakeholders' desire to increase the latter's participation in the CFP process. The RACs are made up of representatives of the fisheries sector and other groups affected by the CFP while scientists are invited to participate in the meetings of the RACs as experts. The Commission and regional and national representatives of Member States may be present at the meetings as observers. A Decision establishing a framework for Regional Advisory Councils (RAC) was adopted in 2004. RACs consist of a General Assembly and an Executive Committee. As a rule the General Assembly and Executive Committee meetings are public. Industry makes up two thirds of the Executive Committee, with the remaining third made up of 'other interest groups'. This may include environmental interests, recreational fishermen or consumer representatives. The RACs are consulted by the Commission on the annual TAC proposals as well as other fisheries regulation. It is also notable that the RACs play an important role in stakeholder / science and industry liaison and have enabled environmental charities (NGOs) to become a little more engaged in debates over the future direction of fisheries management. The RACs typically set up a number of working groups, and beneath these focus groups to address particular issues of concern for the industry. The Regional Advisory Groups most relevant to English inshore fisheries are the North Sea RAC (Area IV) and the North Western Waters RAC (Area VII – which includes working groups on The English Channel and the Irish Sea).

Another important player in relation to representation and consultation are the Producer Organisations. Producer Organisations operate under Council Regulation (EC) No 104/2000 of 17 December 1999 on the common organisation of the markets (COM) in fishery and aquaculture products. A key idea of the COM is to enable industry to resolve some market related problems, by coordinating measures for the rational management of resources, focused on maximising the value of landings and stabilising market demand. The legislation enables POs to take collective measures to ensure catches correspond to market demand. As a first step to achieving this, POs must draw up and implement operational programmes for the fishing year, stating how catches will be matched to market demands. The legislation also provides scope for POs to withdraw fish from the market when it falls below a minimum price, either to carry over to another market or withdraw from the market. In many countries POs play an important role in holding quota for member vessels, or arranging quota swaps and POs may also implement an internal penalty system to ensure members comply. POs also play an important role in representing their members and providing a conduit for consultation between the regulators and fishermen.

Although not exclusively so, both RACs and POs tend to have a more offshore focus with an emphasis being on the management of quota stocks, and larger vessels that are more likely to have significant track record (or fixed quota allocations) in quota species. It is understood that at present there are no particular inshore focus groups, either in the North Sea RAC or the North Western Waters RAC.

In addition there are various organisations, associations and federations representing fishermen around the coast. Chief among these perhaps is the National Federation of Fishermen's Organisations (NFFO), which uses membership subscriptions from fishermen to provide them with an effective voice during decision-making processes which may affect their livelihoods. In February

2013 Greenpeace stated that the NFFO membership was dominated by larger, and in many cases foreign owned or controlled interests, but this received a strong rebuttal from the NFFO who reiterated that many of their members are under 10m vessels and pointed to a number of initiatives that the NFFO have undertaken to support and represent the interests of English inshore vessels.

In recent years, a New Under Ten's Fishermen's Association (NUTFA) has also been established with the stated aim of representing the interests of under 10m vessels at Regional Advisory Council (RAC), European Commission and Parliament meetings whilst pressing for increased recognition from DEFRA and the MMO. NUTFA represents all under ten sectors, quota and non quota, trawlers and netters, liners, shellfishermen and all other licensed fishermen.

In addition to these national organisations and associations there are many, many local representative bodies for fishermen, some of which may be members of larger federations (such as NFFO) and some of which will be independent. The nature of these local organisations is that although many are long established with large membership and an effective track record of membership, many others last of a shorter period of time, or evolve into new organisations. Often the evolution of these inshore organisations may be driven by anything from changes perceived membership value for money considerations to personal differences or a disagreement with a particular decision.

The role that the IFCAs plays in representing industry is slightly ambiguous. Technically this is not part of their role, but in practice there is a clear sense from many IFCAs that it is part of their role to support their local industry. Whilst some IFCAs have stated that they are not considered a statutory consultee in marine planning applications within their jurisdiction, with this role being retained by the MMO and carried out at a national level, other IFCAs state they are treated as statutory consultees on Marine Licence Applications and for planning applications made under Town & Country Planning Act.

Overall the element of the scoring for industry representation role in English Inshore fisheries is likely to meet the SG 80 guidepost of explicitly defined and well understood.

5.1.2.6 Consultation

The second and third scoring issues for PI 3.1.2 relates to consultation processes and the degree to which these process facilitate engagement. At an EU level, which is more focused on pressure stocks there are clear consultation processes which regularly seek and accept relevant information.

The annual decision on quota allocations for the forthcoming fishing season provides an indication of how the European decision-making process includes a consultation process. The ICES working groups with responsibility of stock assessment, submit annual assessments to ICES ACOM, who in turn review and disseminate to the European Commission (DG Mare). The advice will be reviewed by STECF before preparing recommendation for the commissioners. In doing so, every effort is made to consider and assess the implications of decisions in view of pragmatic solutions at stakeholder (Catching Sector) level. This process is facilitated by the RAC structure. Of course with the advent on Long term management plans for pressure stocks, annual fishing allocations are increasingly determined by reference to the agreed harvest control rule. This provides less opportunity for discussion (and therefore consultation) on the question of annual allocation, but the focus of consultation therefore shifts to the development of the harvest control rule. The RACs have played a vital role in recent years, not only by being consulted on the drafting of harvest control rules, but in actually driving forward the development and implementation of these rules.

Additionally, when drafting legislative proposals DG Mare consults widely, including with, relevant groups, third countries and regional fisheries organizations including advisory committees – notably the Scientific, Technical and Economic Committee on Fisheries (STECF). The recent review of the Common Fisheries Policy provides a clear indication of how EU level fisheries management decisions

are consulted upon. This process began in 2009 with the publication of the widely publicised Green Paper and consultation period. This prompted a response of some 382 contributions from across the EU, including a wide spectrum of individuals and organisations from England, such as government (the UK Government, individual MPs, House of Lords, SEAFISH Sea fisheries committees, Regional Development Agencies, Environment Agencies, English Heritage, Local Government Associations) non-governmental organisations and charities (Marine Conservation Society, MSC, Angling Trust), scientific institutions (University of the West of England, University of York, NERC laboratories) and industry representatives (POs, SEAFISH, NUTFA). These submissions to the consultation process are publically available on line as well as a European Commission synthesis of the consultation responses (SEC(2010)428 final). As a result of this consultation the Commission produced a reform proposal in 2011 (COM(2011) 425 final) which then underwent a full Impact Assessment Process which includes consultation with statutory consultees and further opportunities for interested parties to comment (SEC(2011) 891).

Overall, it is likely to be concluded that the EU level management system does include processes to regularly seek and accept relevant information etc. and that the process provides an opportunity for all to be involved (SG80).

At a local level there is also a requirement for the consultation on national (MMO) and local (IFCA) management proposals, such as the development of byelaws. DEFRA provides the IFCAs with clear guidance on the need for evidence based management decisions and requires that byelaw proposals be subject to Impact Assessment (if appropriate), undergo a formal consultation process and be widely publicised and notified of in advance. If necessary the secretary of state also has the power to hold a public inquiry before authorising a byelaw. Perhaps in order to avoid situations where a public inquiry may be required, DEFRA guidance requires that IFCAs proactively engage with the following stakeholders at an early stage in the byelaw making process in the following circumstances:

- Those likely to be affected by the proposed controls, e.g., fishermen (both commercial and recreational), coastal businesses, recreational groups, environmental groups;
- Statutory Nature Conservation Bodies, primarily Natural England, in relation to MCZs and European Marine Sites (EMSs).
- The MMO, for advice on procedural aspects.
- Local Authorities where there may be interference with coastal access;
- Environment Agency – where there could be impacts on freshwater or migratory fish;
- Maritime and Coastguard Agency or Harbour Authorities - where movement of vessels may be affected;
- Any other public body that regulates/authorises or licenses activities which maybe affected by the byelaw (e.g. English Heritage in relation to wrecks and other marine heritage sites or Department of Energy and Climate Change (DECC) in relation to interaction with current and future renewable energy installations.

The recent process to develop a network of Marine Conservation Zones (MCZs) around the English coast has also involved considerable consultation through regional groups (Net Gain, Balanced Seas and Finding Sanctuary – see Principle 2 sections of this report for further details) which sought to collate all relevant information and views to shape proposals. Natural England and JNCC, provided advice to the Government, based on these regional projects and DEFRA have now launched a consultation on the resulting proposals, where all interested parties have the opportunity to submit views.

Overall it is likely that the scoring issues in relation to consultation processes and the participation in those consultation processes are likely to meet the SG80 requirement. This applies both to

fisheries primarily subject to UK level policy and governance (inshore, shellfish or non-quota stocks) and those fisheries which are primarily managed at an EU level of governance and policy.

5.1.3 Long Term Objectives (PI 3.1.3)

Score (3.1.3)	Fisheries / UoCs
< 60	None
60 – 80	None
> 80	All English fisheries.

The single scoring issue at SG80 for 3.1.3 is that "**Clear** long term objectives that guide decision-making, consistent with MSC Principles and Criteria and the precautionary approach, are **explicit** within management policy."

MSC suggests that 'management policy' be interpreted to mean outside the specific fishery under assessment (i.e. at a higher level or within a broader context than the fishery-specific management system). For English fisheries, long term objectives are evident under the Common Fisheries Policy:

The objective of the current CFP is to "ensure exploitation of living aquatic resources that provides sustainable economic, environmental and social conditions"[45]. The current Basic Regulation adds that the CFP shall "apply the precautionary approach", "aim at progressive implementation of an ecosystem-based approach to fisheries management" and provide "a fair standard of living" for fishers and associated industries.

The Commission's proposal for the replacement Basic Regulation (to be approved in 2013), includes a new General Objective:

> *The Common Fisheries Policy […] shall aim to ensure, by 2015, that exploitation of living marine biological resources restores and maintains populations of harvested species above levels which can produce the maximum sustainable yield.*[46].

The CFP will form part of an Integrated Maritime Policy (IMP) that helps to deliver the Marine Strategy Framework Directive (MSFD) with a long term objective of marine environment achieving good environmental status (GES) by 2020. At a national level the UK Government committed to achieving these MSFD targets through the implementation of the Marine Strategy Regulations 2010.

The MCA Act recognizing these long term objectives, stating that the MMO must operate in accordance with the Government's principles of sustainable development "'Securing the Future – UK Government sustainable development strategy', published in 2005. The UK Government in 2009 published a set of High Level Marine Objectives within "Our Seas: A Shared Resource":

- Achieving a sustainable marine economy
- Ensuring a strong healthy and just society
- Living within environmental limits
- Promoting Good Governance
- Using Sound Science Responsibly

The UK Marine Policy statement in 2011 sets out how the UK Government and the devolved administrations intended to achieve the high level objectives outlined above.

[45] Council Regulation EC No 2371/2002 on the conservation and sustainable exploitation of fisheries resources under the Common Fisheries Policy,20 December 2002, Article 2 (1)
[46] COM(2011) 425

Overall therefore SG80 is likely to be met and the additional stipulation at SG 100 that long term objectives are 'required by management policy' is now also likely to be met.

5.1.4 Incentives (PI 3.1.4)

	Projected Pre-assessment score		
	< 60	60 – 80	> 80
Demersal finfish	None	All other demersal finfish Ray species, where quota does not incentives sustainable practice.	All demersal stocks managed by EU quota
Pelagic Finfish	None	All other pelagic finfish	All pelagic stocks managed by EU quota
Shellfish	None	All other shellfish	Fisheries with Regulating Orders Shellfish species managed by EU quota (Nephrops)

The scoring of performance indicator 3.1.4 contains just a single scoring issue. This means that scores will typically be scored wholly at 60, 80 or 100. The exception to this is if the assessment team can justify the need for partial scoring, either on the grounds that a scoring issue is partly met, or more typically that some elements which make up the score meet one scoring guideposts, whilst others elements meet a different scoring guidepost.

Generally, EU managed fisheries score reasonably – typically meeting the SG 80- guidepost. However, again for this performance indicator the assessors ask what is the level of the management hierarchy (or jurisdiction) at which fishery specific decisions are (most likely to be) taken. So for this performance indicator, the scoring commentary again divides fisheries where management decisions are most likely to be taken at an EU level, and those which are more likely to be taken at a national level.

5.1.4.1 Incentives within EU fisheries Management

The 2002 revision of the CFP was designed to bring an end to subsidies that contribute to unsustainable EU fisheries, in particular to remove support to increase fleet capacity, or to compensate for low catches. Although there remain some minor forms of subsidy, in the opinion of many past MSC assessment teams these have not been considered to contribute to unsustainable fishing. For example:

- The cost of management & science is covered by the state (although this is funded through taxation).
- A preferential tax system is applied to diesel across all EU primary production sectors.
- The EC's structural funding mechanisms to the fishery sector –the European Fisheries Fund (EFF) – continues to provides targeted financial support to the sector, but funding restrictions have been significantly tightened (focus on improvements in safety and environmental impact).

In spite of this, the 2009 Green Paper on the latest revision of the common fisheries policy continues to point to problems which the 2002 CFP reform failed to adequately address such as inadequate reduction in fleet capacity to offset technological progress in fishing efficiency (estimated at 2 to 3 % a year), meaning that the imbalance between the fleet size and available fish remains. In addition the Green paper notes that the fishing industry has not been incentivised to behave responsibly or be accountable for the sustainable use of a public resource. The paper even goes on to state:

> *"Unlike other industries, fishing also benefits from free access to the natural resource it exploits and does not have to contribute to the public management costs associated with its*

activities e.g. control and safety at sea. In several Member States, it has been estimated that the cost of fishing to the public budgets exceeds the total value of the catches. In simple terms, this means that European citizens almost pay for their fish twice: once at the shop and once again through their taxes".

The resulting reform proposal states that financial assistance both for member states and fishers will be conditional on compliance with the rules. The proposal also introduces a mandatory system of transferable fishing concessions (on EU pressure stocks) as from 2014 for all vessels with the exception of vessels under 12 meters with passive gear, designed to provide an economic incentive for capacity reduction.

In addition the proposal states that when a Member state is allocating transferable fishing concessions they may provide incentives to fishing vessels deploying selective fishing gear. Article VII of the reform proposal specifically states that management should take measures for the conservation of marine biological resources including establishing incentives, to promote more selective or low impact fishing. The reform proposals also focus on the question of results-based management where there is a reversal of the burden of proof: requiring the industry to demonstrate that it operates responsibly in return for access to fishing. This includes initiatives such as the MMOs own trial on catch quota schemes (or fully documented fisheries), which specifically focused on reducing discards of North Sea Cod and Western Channel sole. Other similar schemes have been successful in Scotland and Denmark. Where proven successful and implemented, such schemes are likely to lead to scoring well above the SG80 threshold. The successful introduction of a system of transferable fishing concessions where designed to incentivise strategy reduction is also likely to lead to scoring well above the SG80 threshold (for EU pressure stocks).

Below the high level policy, it should also be recognised that it is national fleet policy which determines how national quota allocations for EU pressure stocks should be divided up within the national fleet. As a result, there is scope at the level of the member state, through policy decisions, to influence how national allocations are distributed, recognising that this can have a profound effect on the extent to which fishermen feel incentivised to fish sustainably and take a stewardship interest in the resource they exploit.

In past MSC assessments, conditions have sometimes arisen where the management scheme fails to engender any sense of stewardship of the resource, where there is no incentive to act responsibly where there is a sense that other fishers can come in and benefit from the good practice and restraint of some. In particular this arises in fisheries which are seen as 'open access', where there are a lack of controls (other than overall national fleet licencing) to stop fishers serially moving between fisheries. Generally speaking, some form of restrictive licencing combined with a quota, even where the quota remains pooled, provides some safeguard against this risk associated with open access fisheries. For stocks managed by means of EU quota by vessels in the UK registry (where licence specifies scallop dredge, beam trawl fishing or shellfish with pots and/or fixed nets) it is therefore likely that this performance indicator will be scored at SG80. With no associated conditions.

5.1.4.2 Incentives within English Inshore fisheries management

For non-pressure stocks which are not managed by means of EU quota the same positive incentives associated with a partially ring fenced fishery or restricted allocations are harder to argue. However, for some inshore fisheries a clear system of ring fencing does exist which engenders a sense of stewardship of the resource and removes the incentive to act irresponsibly. The strongest of these is a fishery in a regulating, several or hybrid order. For each of these there is a clear requirement to licence the fishery and this is routinely used to limit access (albeit in a non-discriminatory way which recognises grandfather rights and existing track records). Once established, the licensing regime of a Regulating Order can both be used as a means of cost recovery (although this can be relatively minor

– but still none the less symbolic) but more particularly as a form of ring fencing to safeguard the resource, and greatly incentivising the responsible behaviour of those licenced vessels. Fisheries managed by regulating orders are therefore likely to meet the SG80 scoring guidepost for this PI (3.1.4).

To a lesser extent (for reasons outlined below) the introduction of IFCA permit schemes may also be viewed positively in relation to incentives, or more accurately offer the potentially to be viewed positively. Article 156 of the Marine & Coastal Access Bill 2009 gives IFCAs the powers to issue permits and in so doing, charge fees, attach conditions and critically, limit the number of permits. These powers to not only introduce permits, but to limit the numbers issued, introduces the opportunity for more adaptive local management regimes where the IFCA can more actively manage a particular fishery or fisheries.

Most IFCAs are already operating some form of permit schemes (typically for commercial shellfish, or more specifically for cockle, mussel, whelk and lobster fisheries). Although these permit schemes often restrict the size of vessel that can operate and in some cases also introduce pot limits, these do not yet limit the overall number of permits or the amount that can be removed from the fishery (with the exception of some cockle & mussel gathering permits that do set an overall limit largely for health & safety and enforcement purposes).

The power to limit the number of permits, and in so doing effectively ring-fencing the fishery and properly incentivising the responsible operation of those within the fishery, is yet to be exercised in almost all cases. This is primarily due to a lack of clear evidential base – or agreed harvest decision rules – to justify any restriction. In most cases IFCAs lack data to provide clear evidence of either local stock depletion or local fleet overcapacity. In spite of this, the presence of the permit scheme is likely to attract slightly improved scores in relation to incentives, in comparison to fisheries which have no such scheme – perhaps achieving an SG80, although if these are really perceived as remaining more or less 'open access' a condition may be triggered.

For the remaining English Inshore fisheries on non-pressure stocks, for which there are no quota restrictions, no regulating order and no permit schemes assessors in any full assessment are likely to question the potential effectiveness of local management regimes, due to a weakness of incentives. This is not to say that local management measures (notably byelaws) cannot be effective, but their effectiveness is always likely to be undermined by the prospect of increases in numbers of vessels entering the fishery to profit from local efforts to improve conditions within the fishery. It is not simply the arrival of increased numbers of vessels that undermines the effectiveness of management but also the belief amoung the local fleet that others will profit from their hard work and stewardship of the resource, meaning that enthusiasm and commitment to local management – particularly where it is seen to penalise the local fleet without securing a benefit - will be unpopular, hard to enforce, and worse of all, of potentially little benefit to the resource. This often means there is no incentive for management action. The same also applies for management action by the MMO outside of the 6nm limit, in the knowledge that this would not apply to vessels of other member states. For these fisheries (even where some local byelaws are in place) it is likely that scores will be below SG80, triggering a condition.

5.2 Fisheries Specific Management

From the perspective of a future MSC assessment it is important to note that the MSC Guidelines to Certifiers specify that the unit of certification (UoC) is "The fishery or fish stock (biologically distinct unit) combined with the fishing method / gear and practice (= vessel(s) and / or individuals pursuing the fish of that stock) and management framework".

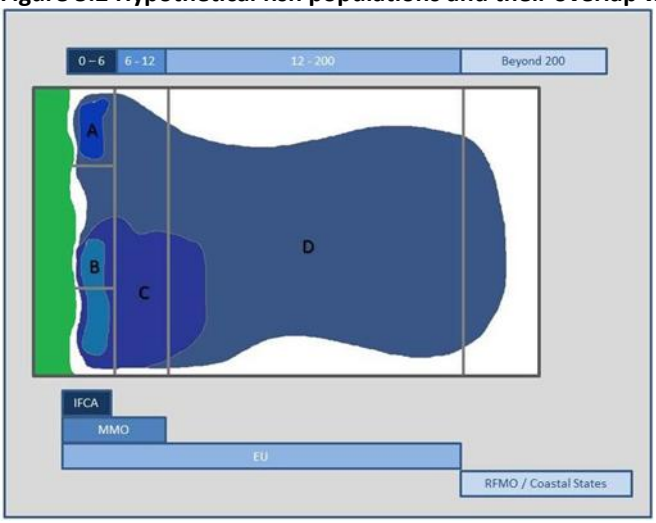
In scoring the five 'fishery specific' performance indicators under principle 3, assessors are therefore scoring the management framework for the given stock and in so doing look to see that management measures are taken at an appropriate scale to result in intended changes within the stock. If the management jurisdiction does not relate to the biological range of the stock then there is an immediate weakness in the fisheries specific management which presents a risk that management actions will not lead to intended results.

For many English Inshore fisheries there is an immediate question to define the extent of the stock, or more accurately determining the working hypothesis to underpin the determination of the stock. Once the stock has been defined, the second vital question when considering fishery specific management is to determine the most appropriate scale of management jurisdiction at which to manage the stock? In practise these two critical management questions rarely, if ever, throw up simple answers, for one of two reasons:

- Uncertainty about the range, distribution, life cycle and population dynamics of stocks
- Lack of clear overlap between the stock range and the existing management jurisdictions.

In spite of these challenges in setting the very foundation for future management action, the success of fisheries specific management will be greatly influenced by their appropriate consideration and consistent resolution as the first step toward an evidence-based, precautionary approach to management.

Figure 5.2 Hypothetical fish populations and their overlap with existing management jurisdictions



To illustrate the point it is useful to consider some hypothetical fish populations and their overlap with existing management jurisdictions in English Inshore waters (fig 5.2). The first point to note in relation to the populations A, B, C, D in figure x is that they all appear to have a defined stock boundary, which suggests that there may be some information or rationale (from hard science to common sense interpretation of available information) to support the definition of the stock boundary, which as discussed earlier is not always the case. But supposing stock boundaries can be defined there are a few management scenarios:

- In the case of stock A, it is simple to see that management should be carried out by the IFCA within which the entire stock is located. This may be the case for some more sedentary shellfish species, (such as cockles, mussels, clams etc.) in particular where there are physical barriers to the stock range – such as deeper water, natural embayments or recirculating gyres meaning that planktonic life stages create effectively self recruiting populations).

- A common scenario is that of stock B, where a stock may cross one or more IFCA boundaries, but be limited in its seaward extent by water depth (or habitat type), thus preventing an overlap with the MMO jurisdiction. Again this is likely to apply to several shellfish species. This opens the door to a management unit combined over several IFCAs.

- Stock C represents the situation for many important inshore species – extending through IFCA jurisdiction and beyond the 6nm limit into the MMO jurisdiction. This will include shellfish species such as crab, lobster and scallop as well as some non-highly migratory finfish. In many cases this might overlap with the jurisdictions of another member state (such as France in the channel fisheries or Ireland in the Irish Sea fisheries). For stocks such as these, MMO might be expected to take the lead - assuming they are non-pressure stocks, or EU / ICES for pressure stocks.

- Many finfish species are more migratory still and may pass beyond the limits of EU waters – stock D in fig x. For these stocks management action is required at an EU level and applied at a coastal states level, or with management applied by the Regional Fisheries Management Organisation (RFFO), which in the case of UK fisheries will be the North East Atlantic Fisheries Commission (NEAFC).

In many cases, in particular for non-pressure stocks, which are not subject to any form of ICES working group scrutiny, the stock boundary may not be determined and so management may not have determined the appropriate management scale. This limits effective management and from an MSC assessment point of view would result in lower scores in fisheries-specific management performance indicators. By contrast those where the question of stock boundaries and appropriate scales of management have received proper consideration are more likely to score well.

5.2.1 Fishery Specific Objectives (PI 3.2.1)

	Projected Pre-assessment score		
	< 60	60 – 80	> 80
Demersal finfish		All other demersal finfish	Demersal Stocks with agreed long term management plans
Pelagic Finfish		All other pelagic finfish	Pelagic stocks with agreed long term management plans
Shellfish	Fisheries with no byelaws	All other shellfish	Fisheries with Regulating Orders

For **EU pressure stocks with long term management plans (Category 1)**, fishery specific objectives are explicit within the management plan. The EU has 5 multi-annual fishery management plans which apply to stocks covered by Project Inshore. These are:

(i) Recovery plan for cod (ICES III, IV, VIa, VIIa and VIId),

(ii) Recovery plan for Northern hake,

(iii) Multi-annual plan for sole (Western Channel),

(iv) Multi-annual plan for North Sea flatfish (sole and plaice) and

(v) Long-term plan for West of Scotland herring.

These management plans apply to EU waters only and are enacted through European Council Regulations. These pieces of binding legislation set out the objectives for the fishery. Typically the focus is on stock management objectives (principle 1), but they also often set down a range of measures such as closed areas and include language which indicates wider objectives such as reference to ecosystem considerations. For fisheries managed by an EU multi-annual management plan, fishery specific objectives will meet the SG 80 requirement. For principle 2 objectives these are often not well designed or measurable and so the SG100 is not met.

For highly migratory stocks, or stocks which are caught in significant quantities outside EU waters, the EU implements a number of long term management plans, or agreements, based on negotiation and agreement either bilaterally (typically with Norway in the case of shared stocks) or through the RFMO (NEAFC) or through coastal states talks, which include countries such as Iceland, Faeroes and Russia, depending on the stock being targeted.

Stock	Area	Contracting parties
Haddock	IV & IIIa	EU & Norway

In these non EU (but EU implemented) long term management plans, there is no fishery specific EC Council regulation to enshrine the agreement in European law. Instead, the agreement includes harvest control rules, which stipulate that agreed reference points (target, trigger, limit etc.), the resulting exploitation rate and in most cases some limit on multi-annual variation. There is typically less focus on the wider P2 objectives of the ecosystem, and the lack of regulation means that the introductory language of the legislation does not provide these wider objectives. In spite of this lack of explicit inclusion of P2 objectives in the fishery specific management plan, fisheries in this group, which includes many pelagic fisheries, have typically been scored at SG80, in some cases with a recommendation that future international agreements should place the agreed management plan in a the context of a set of wider ecosystem objectives.

For **EU pressure stocks which are not subject to a long term management plan (category 2)**, details of fishery specific management are less obvious as there is no fishery specific management plan. As a result it is harder to determine the fishery specific objectives for the fishery, and the extent to

which these meet the MSC scoring guideposts. However, as these are pressure stocks, some objectives can be inferred, not least by looking at the stock assessment advice or relevant working group reports produced by ICES, which do provide fishery specific consideration, including giving consideration of fishery specific ecosystem interactions. In addition the determination of TAC can be seen as a short term objective – in order to reach a longer term objective, such as MSY. The most recent communication from the Commission to the Council on Fishing Opportunities for 2013 (COM (2012) 278 final) states simply that the objective of setting TACs is to phase out overfishing in line with the European Commission and Member States' commitment to reach the objective of MSY by 2015. In doing so, it is stated that certain principle 2 objectives should also be met:

> "*Impacts of fishing on sea bottoms will be less, by-catches of vulnerable organisms including porpoises, dolphins and other marine mammals will decrease, because the overall intensity of fishing will be less. Against a background of high fuel prices, fuel consumption should decrease significantly because it takes less fishing time to catch a tonne of fish from an abundant stock than from a scarce one. This will reduce carbon emissions as well as the fuel expenditure of vessel owners*".

Although the arguments presented above could be used to present an argument for EU pressure stocks (which lack a management plan) to receive a score of 80 for fishery specific objectives, it is more likely that assessors will conclude that these arguments present an 'implicit statement of fishery specific objectives, resulting in a score of 60. As there is only a single scoring issue partial scoring is possible (enabling a mid range score between 60 and 80) there is no compelling evidence for this.

For finfish species which are not subject to EU quota, it is likely that these do not receive annual management advice, although some species such as bass and gurnard do receive some attention and review by the ICES working group WGNEW. As such the objectives which define their management are generic and therefore not fisheries specific. For stocks which are not yet confirmed as 'EU pressure stocks' there is perhaps greater scope for a member state to take a lead in management and implement fishery specific objectives, particularly given that this is unlikely to be a priority for either an ICES working group or STECF. In order for this to happen a member state would need to present a stock rational or hypothesis which justifies the decision to implement management measures within its jurisdiction, however this has not happened for any fin fish species. Therefore for all finfish which are not subject to EU quota, objectives can only be regarded as implicit (SG60).

For shellfish fisheries the situation is similarly defined by the extent to which fishery-specific management exists. The most well defined in terms of short and long term objectives are contained within Regulating Order management plans. Therefore cockle and mussel fisheries under Regulating Orders have explicit fishery-specific objectives and SG 80 is met. For some of these fisheries under R.O. the SG100 of well defined and measurable objectives may also be met. For Nephrops, the only shellfish species covered by this assessment subject to an EU quota, the situation is as described above for EU pressure stocks which are not subject to a long term management plan, namely that although there are arguably some fishery specific objectives, these are more implicit – particularly in relation to principle 2 objectives, therefore SG60 is met.

There is a lack of fishery-specific management for other shellfish fisheries (crab, lobster, scallop, etc.) and therefore short and long-term objectives are implicit within the wider management system and therefore the SG60 is met. Such objectives are clearly evident within MMO and IFCA byelaws (which all required to be consistent with the UK's Marine High Level Objectives).

Some shellfish fisheries lack MMO or IFCA byelaws as well as any evidence of fishery-specific management (razorshell, squid, cuttlefish and some manila clam and periwinkle fisheries) and here it is difficult to determine that objectives are even implicit in the management of these fisheries and SG60 in not met.

5.2.2 Decision making Processes (PI 3.2.2)

	Projected Pre-assessment score		
	< 60	**60 – 80**	**> 80**
Demersal finfish	Those stocks, such as rays where decisions do not respond to management advice.	All other demersal stocks	Stocks with an agreed long term management plan
Pelagic Finfish	None	All other pelagic stocks, plus any pelagic stocks with a long term management plan which is not functioning (i.e. mackerel).	Stocks with an agreed long term management plan
Shellfish	None.	All other shellfish	Stocks managed by means of regulating orders

For EU pressure stocks with long term management plans (Category 1) the decision making process is well-defined. For stocks managed by EU long-term management plans, annual decisions should be based upon the ICES advice for the stock issued some months previously. The maximum level of annual variation in TAC and effort is defined by the plan, assisting the decision-making process.

The division of the agreed TAC between the member states is also predictable, following the principle of relative stability. Should the annual advice highlight a serious or other important issue that management should address, it is likely that this would be responded to within the limits set within the plan. All EU long term management plans have been evaluated by ICES as precautionary. All EU pressure stocks management by means of a multi annual management plan are therefore likely to meet the SG80 requirement.

For cross boundary or highly migratory stocks where the EU signs long term management agreements with third parties (i.e. Norway, Iceland or Faroes) which enshrines a harvest control rule that has been evaluated by ICES as precautionary, the decision making process should also be relatively clear. In past assessments, such as for UK and Irish pelagic fisheries (including inshore handline fisheries for those stocks) this performance indicator has typically met the unconditional SG80 scoring guidepost. Decisions are taken at a Coastal states level according to the agreed long term management plan, and again this is periodically evaluated to take account of serious issues raised in the advice, and the management plan has also been evaluated by ICES as precautionary. Assuming the coastal states agreement is operating as intended and resulting in overall catches in line with the TAC determined by the HCR, then these fisheries are also likely to meet the SG 80 requirement.

However in recent years – in particular in the case of some pelagic fisheries managed at a coastal states level (such as mackerel and Altlanto scandian / Norwegian Spring Spawning herring) there are signs of weaknesses in the coastal states agreement process, in particular over the division of the agreed TAC between parties. For mackerel this has resulted in a reduction in the score for this PI to SG60 for already certified fisheries and the imposition of a condition, reflecting the fact that the agreed decision making process is not functioning as intended. In January 2012, 2 years after the condition was set, all mackerel fisheries were suspended from the MSC programme due to failure to meet the condition. This approach was harmonised across all certified fisheries and CABs, so would also apply to any new English inshore mackerel fishery wishing to achieve MSC certification – at least until such time as the coastal states can agree on a division of the TAC in accordance with the management advice and HCR. Any fisheries which have an agreed management plan at a coastal states level, but for which the agreement is failing to achieve catches at a level set by the HCR a score SG60 will be awarded with a resulting condition.

For EU pressure stocks which are not subject to a long term management plan (category 2), details of the decision making process are less clear, and more subject to political intervention at the time of the December Council meeting. That said, the clarity of the decision making processes are improving with recent EU directives guiding the process of TAC setting for all fisheries, depending on the level of advice and content of advice, and by commitments to adhering to MSY. In spite of this there remains scope for decisions to deviate from scientific advice. Overall however, it is concluded that for most EU pressure stocks managed by quota, but not subject to long term management plan, a score of SG60 is likely, requiring a condition to more tightly define stabled fishery specific decision making processes.

The only exception to this for EU quota managed stocks (not subject to long term management plans) is when there is **clear evidence of management not following scientific advice** in a timely and adaptive manner. A clear example of this is for skates and rays where ICES have been unequivocal in their advice that the current multi-species TAC is unlikely to be the most effective management approach to regulate fishing mortality, especially given that in many cases these are taken mostly as a bycatch in mixed demersal fisheries. ICES clearly advise that a different suite of management tools is needed, relevant to the mixed fisheries context, to include measures such as the closure of spawning and/or nursery grounds, and measures to protect the spawning component of the population such as maximum landing size, or in some case species specific TACs. In cases such as this where ICES advice is clearly not being followed, then assessors are likely to conclude that the decision-making process is not responding to serious issues in a timely and adaptive manner and therefore falls below the minimum SG60 requirement.

For finfish species which are not subject to EU quota there is a less well established decision-making process. As a first consideration it is evident that there is no annual decision making process, as there is for quota species at the December Council meeting. Additionally there is no annual provision of advice to decision makers, again as there is for species managed by quotas through the ICES ACOM and STECF advisory process. Indeed in some cases it is even unclear where key decisions in relation to the fishery are taken – whether this be primarily at an EU level (advised by ICES / STECF), or by the member state (MMO advised by CEFAS) or locally (IFCA advised by local scientific work). In spite of this apparent lack of an established process and the underlying uncertainty, it is clear that there are some decision making processes in place which do result in required measures being taken. Obvious examples of this are fisheries with either MMO of IFCA byelaws. Clearly these have been subject to a decision making process which is able to respond to serious issues. The new guidance provided to IFCAs by DEFRA, for example on the requirements for Byelaw making and the new requirement for IFCAs to undertake a byelaw review do greatly improve the decision-making process and clarify the need for transparency and precaution. However, there is not the clear linkage between decision making processes and fishery specific objectives, nor is there the feedback stream of fishery specific data, providing decision-makers with the ability to respond in a properly adaptive manner. As a result, finfish species which are not managed by means of EU quota will currently score at SG 60 for the decision-making processes performance indicator, triggering a condition to require adaptive fisheries specific decision-making processes to become more established and more closely linked to fishery specific objectives and that these processes should be timely to the life history of the stock to ensure management can be both timely and precautionary.

For shellfish species under quota, i.e. Nephrops, there is a clear decision-making process at an EU level implemented by national agencies. As per the argumentation above, the fishery should achieve SG80 if the process is transparent and reactive to issues, which can be considered the case for Nephrops. However ICES advises that the fisheries should be managed on the basis of functional units rather than the wider ICES sub-areas. As a result it could be argued that decision-making in Nephrops fisheries is hindered as the management system cannot react to issues in specific functional units and therefore it is suggested that a score of 60 is likely and a condition raised.

For cockle and mussel fisheries under a regulating order, and for fisheries under a several order, the decision-making processes are well defined and presented in the management plan. Therefore for shellfish fisheries under a regulating order, SG 80 is met.

For all other shellfish fisheries the lack of fishery-specific management makes the decision-making process unclear, particularly as most species' range extend beyond the 6-mile limit into MMO jurisdiction. As section 8.3.1 explains, it is difficult to spatially define a fishery and therefore the competent authority throughout its range. This is evident both between the MMO and IFCAs and between different IFCAs where different bylaws may exist in adjacent areas. Without a primary management body or clear co-management arrangements, decision-making becomes unclear. This is a challenge recognized in the MoU between the MMO and IFCAs, with work ongoing to define responsibilities and joint-working arrangements. When these issues are well-defined and understood by stakeholders, and where necessary consistent joint management is agreed across a fisheries range it is expected that SG80 would be met. Until that point, the likely score is SG60, triggering a fishery-specific condition to better define decision-making (within a management plan).

5.2.3 Compliance and enforcement (PI 3.2.3)

	Projected Pre-assessment score		
	< 60	60 – 80	> 80
Demersal finfish	None	All other demersal species, plus ray species.	All EU pressure stocks (i.e. stocks managed by EU quota)
Pelagic Finfish	None	All other pelagic stocks	Pelagic stocks restricted by quota
Shellfish	Bivalve fisheries with known issues with compliance	All other shellfish fisheries	Inshore shellfish stocks with dedicated MCS programmes with proven success.

A summary of the compliance and enforcement system has been provided above under Roles & Responsibilities (3.1.2). Because of the surveillance mechanisms in place and the sanctions in place across all fisheries in England, it is likely that all possible UoCs are likely to meet at least the minimum SG60 requirement. The only exceptions to this would be if fishers were not "generally thought to comply" (although strangely, "evidence of systematic non-compliance" is only a barrier to a score of SG80). In terms of overall approach to assessment scores, it is therefore likely that any fisheries with occasional issues of compliance and enforcement would score at the SG60 level and all others would score at least at the SG80 level. Following on from the site visits, although some concerns of compliance and enforcement were occasionally expressed, in general these were not thought to undermine the management of the fishery and would therefore most likely be addressed by a condition in any full assessment. Below we discuss in more detail likely scoring for the main groups of English fisheries.

All fisheries and all EU vessels are governed by the requirements of 2 overarching EC regulations governing IUU fisheries and Control and enforcement (The IUU Regulation (EC) No 1005/2008 and the Control Regulation (EC) No 1224). These lay down requirements and minimum standards of operation for member states and enshrine new approaches such as enforcement throughout the entire chain of production, sales and marketing and the cross checking of landing declarations and sales notes. Although many of the more specific requirements relate to vessels over 10m (logbooks) or 12m (VMS) and more of the focus is on fisheries managed by EU quota or effort restriction, inshore under 10m vessels targeting non pressure stocks are also technically within the scope of these regulations – even if in terms of overall approach and licencing requirements.

For EU pressure stocks with long term management plans (Category 1), or multi-annual management plans as they are sometimes called, the regulation which enshrines the plan (and harvest control rule) typically includes a requirement for additional enforcement, over and above those detailed in either the IUU regulation or the Control Regulation. This is particularly the case for management plans that began their evolution as so called rebuilding or recovery plans where additional control measures such as weighing prior to sale, banning of transhipment, prior notification and restriction of landings above certain quantities to designated ports and a ban on mixing of species in boxes destined for market (e.g. Council Regulation (EC) No 1342/2008). For these stocks and even fisheries with a significant risk of bycatch of these stocks – such as mixed demersal fisheries, control and enforcement is likely to be scored at SG80.

For EU pressure stocks which lack long term management plans, although there is less targeted control and enforcement than those with long term management plans, there is none the less detailed enforcement requirements laid down in both the control regulation and the IUU regulation. Furthermore the very presence of quotas, which meaningfully restrict fishers opportunity to land marketable product, means that there is a potential economic benefit for those not wishing to comply with regulations and restrictions. In these cases there would potentially also be clear evidence of infringement. Both of these factors combine to firstly indicate that quota stocks are

more high risk in terms of enforcement and secondly that there may be a clear benefit (and cost effectiveness) to targeted enforcement. For this reason, the level of enforcement on EU quota fisheries is also high. The majority of quota species are also more likely to be landed by larger vessels (over 10m), who would typically be members of a Producer Organisation (PO). Often the PO is also able to undertake some in-house enforcement in the form of penalties for minor infringements. Enforcement of EU quota and effort controls is typically carried out in English Inshore waters by the MMO (in association with the Royal Navy for inspections at sea). In addition they would undertake a certain level of 'sampling' inspections in the under 10m inshore sector and evaluate the results of these to determine the risk of infringement. Therefore although under 10m vessels may be subject to less inspection, in relation to quota species, this is none the less proportional to the perceived risk, and the perceived ability to impact on the stocks. For these stocks, in spite of the level of control and enforcement being perhaps less comprehensive than those subject to a long term management plan, there is still sufficient to score this performance indicator at SG80.

For finfish species which are not subject to EU quota or effort restriction there is a less explicit requirement for enforcement contained in EU regulations – in particular where these are caught by under 10m vessels which are not subject to additional logbook requirements. Consequently, although these fisheries remain within the scope of the EC control and IUU regulations, in practice these are less likely to be the focus of MMO or DEFRA level enforcement, or inspection by other member states in vessels pass beyond the median line (for example in the Channel or Irish Sea). There is also less to inspect, simply because there are fewer restrictions or regulations that apply. Where inspections occur they would primary look at the species mix, and assuming the fishery is only catching non quota finfish, then there are only gear and licence checks required and where applicable minimum landing sizes. These inspections in inshore waters are more likely to be carried out by the IFCA enforcement personnel. For these stocks it is likely to be concluded that monitoring control and surveillance mechanisms exist which have a reasonable expectation of efficacy, as opposed to a system with a demonstrated effectiveness. This would equate to a score in the SG60s. That said, there may also be a case for arguing that the system of enforcement for quota species, inevitably overlaps (due to probable bycatch) and that any comparatively lower levels of enforcement are only a reflection of the lower perceived risks and are therefore equally appropriate. If a strong argument is presented for effective local enforcement then scores may well be supported at SG80.

The levels of compliance and enforcement are variable across shellfish fisheries and regions.

There are isolated reports of illegal fishing for some species (such as manila clam) off the South coast indicate there is some systematic non-compliance and consultation has indicated that there are other examples of non-compliance around the English coast. For these specific fisheries with clear evidence of illegal practices SG60 may not be met.

Overall compliance is reported by IFCAs and industry to be good with occasional incidents requiring intervention. It could be argued that this is partly due to the risk-based approach to Monitoring Control and Surveillance (MCS). Inshore fisheries are generally smaller in scale and therefore a lower risk in terms of over-exploitation than larger vessels operating offshore. Consequently the level of regulation, while increasing, is less compared to the fisheries outside six miles. For example there is no requirement for logbooks on vessels under 10m and there is still no requirement to fit VMS to vessels below 12m in length (recently reduced from 15m to 12m).

A requirement of holding a shellfish licence is completion and submission of a landings declaration in the form of a monthly shellfish return (as opposed to daily logbook submissions by vessels >10m). While most do eventually complete this form, the level of compliance and completeness varies across the industry. IFCA officers spend considerable effort chasing up these returns.

For vessels fishing quota species including Nephrops, compliance is more closely monitored as a monthly allocation is given to inshore vessels. For these fisheries it is likely that SG80 is met.

There has been a noticeable increase in control and enforcement of scallop fisheries, partly at the request of other fishermen who report non-compliance of mobile operators. Vessel size byelaws can be difficult to enforce with vessels fishing along the line. In some regions these are isolated incidents, in others where non-compliance is more regular SG60 would be scored and a condition set to provide evidence of effective enforcement.

5.2.4 Research Plan (PI 3.2.4)

	Projected Pre-assessment score		
	< 60	60 – 80	> 80
Demersal finfish	Non pressure finfish stocks that have not been subject to ICES WG scrutiny and which have not been subject to IFCA specific or national (CEFAS) level research.	EU pressure stocks where advice is based on incomplete data and low level of working group scrutiny. Non-quota species subject to scrutiny by WG NEW.	EU pressure stocks subject to full ICES working group scrutiny, receiving comprehensive annual advice.
Pelagic Finfish	None	EU pressure stocks where advice is based on incomplete data and low level of working group scrutiny. Non-quota species subject to scrutiny by ICES WG.	EU pressure stocks subject to full ICES working group scrutiny, receiving comprehensive annual advice.
Shellfish	Shellfish stocks which do not feature on CEFAS or IFCA research plans and where there is no evidence of research being undertaken, either at ICES, CEFAS or IFCA level.	Crustacean and molluscs subject to more ad hoc research, but where some research has none the less been undertaken.	EU pressure stocks (Nephrops) Shellfish stocks managed by Regulating Order. Bivalve fisheries subject to regular survey work and featuring in IFCA research plans. Crustacean fisheries subject to dedicated CEFAS or IFCA research.

For EU pressure stocks – both those with a Long term management plan, and those without, but where the EU sets quota – strategic research is undertaken by ICES. Scientists from CEFAS in Lowestoft are integral players in this research community, contributing significant resources and expertise to relevant research, in particular for those stocks of greatest commercial importance to England. ICES strategically establishes study groups, comprising representatives from member states according to the information requirements for management as identified by national delegates, including through industrial representations. These study groups do not solely focus on stock assessment, with a wide range of relevant areas of research being covered by ICES Working Groups focused on such elements as climate change, plankton, bird and marine mammal bycatch and ecosystem based approaches to fisheries management. All review research, identify research requirements and undertake appropriate work. There is good communication between Working Groups (via ACOM), and between researchers through their specialist interests. The annual meetings of the ICES Council ensure that members' research programmes are coordinated to

WGNEW

The ICES Working Group on Assessment of New MoU Species [WGNEW] first met in 2005 to review knowledge on stock structure, review existing data and monitoring programmes and consider possibilities (and develop strategies) for future fish stock assessments for the following species: sea bass, flounder, common dab, lemon sole, brill, turbot, gurnards, red gurnards, and red mullet. John Dory has also since been added. In many cases the focus has narrowed onto particular stocks of the species listed above. From an MSC scoring perspective, scrutiny by WGNEW can be considered under both 'research' and 'monitoring & management performance evaluation', but this would typically be scored at the SG60 level.

meet strategic aims of robust and relevant stock assessments.

Research / investigation are also undertaken in relation to specific requirements, which generally come from the recommendations of the Stock Assessment Working Group. Where specific need arises, the ICES Working Group will also highlight recommendations for research, and there is evidence that this is followed up on by research institutions and reported back to ICES.

For EU pressure stocks, both the research undertaken by CEFAS in England and that undertaken at an ICES working group level (that the CEFAS work feeds into) is designed to provide managers with appropriate, timely reliable information. It can be seen by looking back of past research that the provision of this information is also appropriate and largely strategic. However it must also be recognised that different member states may have different research priorities, differing budgets and differing expertise. As such there is not one overarching strategic research plan as such – and particularly not one that is fisheries specific.

The MSC methodology requires a written fishery specific research plan. However, in previously certified MSC assessments for EU pressures stocks, or Norwegian and Russian stocks for which ICES is the main scientific forum, scores of at least SG 80 have generally been awarded, and in many cases higher scores than that are awarded. This reflects that the current situation of provision of scientific input by member states into the international scientific forum of ICES represents 'good practice' which does not require either a condition or a recommendation. In short it has been concluded that the system works to support management, so assessment teams have typically sought to interpret the intent of the performance indicator and make a reasonable compromise between the constraints of the methodology and the practicalities of the real world. It is therefore probable that all EU pressure stocks, which receive comprehensive annual ICES advice will be scored at SG80 for Research Plan.

That said, it should be cautioned that there is at least a theoretic technical potential to conclude that the requisite actual fisheries specific research planning document is not present and therefore score the fishery down, thus triggering a condition[47]. Of the EU pressure stocks, those most likely to be concluded to not meet the SG80 are those for which the ICES advice that is issued, to inform quota decisions, is limited or data poor. For example the advice for Pollack (Celtic Sea & West of Scotland) clearly states that the information is insufficient to evaluate exploitation. In a number of other cases advice is given biennially, which it may be argued is not 'timely' for management purposes. These include the advice for those brill, dab, flounder, turbot and which stocks for which advice is given. Therefore for EU pressure stocks, where a TAC is set on the basis of limited information and where ICES advice highlights weaknesses on the data on which the advice is based, scoring would be at SG60.

For non EU pressure stocks the scoring of the research plan performance indicator varies from fishery to fishery. If a stock is not a pressure stock and no TAC has been set, but nonetheless it has received scrutiny by ICES WGNEW (see box), then it could be argued that some research is undertaken and results are available – which would be sufficient to meet the SG60 scoring guidepost. Additionally, if a stock features in CEFAS or even IFCA level research, then again it can be argued that some research is undertaken and results are available. However for fin fish species (which are not already subject to ICES level scrutiny) and where there is little evidence of national or local level research it will be difficult to point to research which would justify meeting the minimum SG60 requirement. Notable examples of this include halibut.

Evidence of research plans across English shellfish fisheries is again highly variable. The greatest research effort and planning is attributed to Nephrops, including comprehensive stock assessment system that informs the ICES advice with additional ad-hoc research work to further inform

[47] It is quite possible that the MSC may provide further guidance on the scoring of this PI in future iterations of the certification requirements.

management of the fisheries (SG80 met). Similarly, research and regular survey are key components of management plans for cockles and mussels under Regulating Order where again SG80 is met.

For the key shellfish fisheries of brown crab and lobster, CEFAS has recently published stock assessment reports as part of ongoing survey and research efforts in the North Sea. While these have been subject to some criticism, this is a very positive step and results in SG80 being met. In other regions there remains a reliance on the broader work of ICES working group WGCRAB and ad hoc work within European projects such as the UK and Ireland Crab Working Group and currently the Atlantic Crab Resource Users Network (ACRUNET).

The establishment of IFCAs has formalized the reporting of research efforts within multi-annual research strategies and annual research plans that set out survey and other scientific work to be conducted by the IFCA. This development supports the SG60 scores allocated. However for some species in some regions (periwinkle, velvet crab, spider crab, cuttlefish and squid) there is no regular research mentioned and SG60 is not met.

For most sedentary shellfish (cockles, mussels, scallops, clams, etc.) there is some form of annual survey conducted by the IFCAs for resources with district boundaries. IFCA establishment has resulted in a growth in scientific officer numbers and research is extending to cover principle 2 aspects, habitat and ecosystem. Therefore SG80 is met or would be close to being met for cockles, mussels, scallops and clams.

Overall the amount of research effort applied across the inshore shellfish fisheries has greatly improved and therefore many could and some do achieve SG80. The key shortcoming is that these do not formally inform management decision-making within fishery-specific management. The regular surveying of many stocks is therefore on an observational basis and does not result in management response.

5.2.5 Monitoring and Management Performance evaluation (PI 3.2.5)

	Projected Pre-assessment score		
	< 60	60 – 80	> 80
Demersal finfish	Non quota species, not subject to ICES WG or STECF scrutiny, or any review at a national or local level.	EU pressure stocks without long term management plan. Non pressure stocks which are subject to scrutiny by WG NEW.	Stocks with long term management plan, where harvest control role and other fishery management tools are subject to regular review.
Pelagic Finfish	None	Stocks without long term management plans or where long term management plan is not functioning (i.e. mackerel) and cannot therefore be evaluated.	Stocks with long term management plan, where harvest control role and other fishery management tools are subject to regular review.
Shellfish			Shellfish stocks managed by regulating orders. Scallops which have been subject to recent national review (scallop order).

To meet the SG80 scoring guidepost it is necessary for (i) key parts of the management system to be evaluated and (ii) for the fishery specific management system to be subject to regular internal and occasional external review. Therefore in order to meet the unconditional SG80 scoring guidepost, it is necessary for there to be a fishery specific management system and for this to be subject to evaluation and review. Without a management plan in place for the target stock it is unlikely that SG80 will be met.

To meet the lower SG60 scoring guidepost it is necessary for (i) some parts of the management system to be evaluated and (ii) for the fishery specific management system to be subject to occasional internal review. In all cases for English inshore fisheries it can be argued that 'some parts' of the management system are evaluated from time to time, so meeting the first scoring requirement. For example, this could include the reform of the CFP itself, which serves as some sort of a review and evaluation, or reviews of the performance of monitoring, control and surveillance carried out by the European Fisheries Control Agency (EFCA) in Vigo, or national reviews of government fisheries policy such as The Prime Minister's Strategy Unit 2005 review of the sector 'Net Benefits', or attempts to evaluate progress against objectives for the State of UK Seas, such as the DEFRAs 'Charting Progress' and 'Charting Progress II'. However, even at SG60 there is still a requirement for fisheries specific management to be reviewed. Taking a more loose interpretation of 'fisheries specific management' (perhaps appropriate when scoring at the SG60 level), it could be argued that any species specific management *measures*, such as quotas or even byelaws do qualify as fisheries specific management. However, for those stocks which lack any species or stock specific management measures (other than fleet licensing) then it is harder to argue that there is any fisheries specific management in place.

For EU pressure stocks with long term management plans (Category 1), or multi-annual management plans as they are sometimes called, the regulation which enshrines the plan (and harvest control rule) typically specifies a review date, or a frequency for review. These are carried out by STECF. These stocks are also subject to greatest regular internal review as part of the annual ICES working group deliberations, which consider all aspects of the fishery (not just stock assessment). Additionally, periodic benchmarking assessments on these stocks, typically bring in external evaluators (from outside the EU / ICES) to scrutinise the assessments. Therefore any fishery

with a Long term management plan will meet the SG80 requirement for monitoring and management performance evaluation.

For EU pressure stocks which are managed by TAC or other technical measures such as gear restrictions, minimum landing sizes, or effort restrictions, but which are not subject to a long term management plan, it can be concluded that the process of reviewing management measures, for example through annual ICES working group and STECF deliberations, meets the intent of the SG60 guidepost. However, due to the lack of a cohesive fisheries specific management plan and the lack of a regulation that specifies the requirement for regular evaluation, the intent of the SG80 guidepost is not met. The same also applies for stocks which are non-pressure stocks and therefore not subject to any EU level fisheries specific regulation, but which are instead managed locally either by MMO or the IFCAs (through byelaws). Again the presence of any management measures can be loosely interpreted as being sufficient for an SG60 interpretation of 'fisheries specific management'. The very act of implementing management measures implies that some evaluation of the performance of the fishery has taken place, in order to trigger the introduction of the management measure. In the case of byelaws, many of these are ancient. However, the current requirement for all IFCAs to undertake a review of all byelaws (as part of the transition process from Sea Fisheries Committees) certainly counts as some form of evaluation. Therefore all fisheries, which do not have fisheries specific long term management plans, but which do have some fisheries specific management measures (either at an EU, national, or IFCA level) will meet the SG60 guidepost, but would trigger a condition requiring a cohesive evaluation of the performance of the fishery specific management system to be regularised.

For a small number of finfish stocks, there do not appear to be any fishery specific management measures. For example, there are no quotas, not effort restrictions, no minimum landing sizes and no byelaws (either MMO or IFCA). The only management measures governing the fishery are therefore generic, such as fleet licensing regulations or gear restrictions. For stocks with no fishery specific management measures it is not possible to argue that the 'fisheries specific management system is subject to occasional internal review' therefore SG60 is not met.

For many shellfish species there is no evidence of fishery-specific management and no evidence that this situation is regularly reviewed. Therefore for species such as whelk, spider crab, velvet crab, squid and periwinkle the SG60 is not currently met.

ICES, oversees fishery-specific monitoring and evaluation of Nephrops fisheries, including a consideration of fishing mortality. This is externally reviewed by STECF to inform broader management under the CFP and therefore for Nephrops the SG80 is likely to be met.

Also at a European level, crab management is evaluated at WGCRAB and shrimp management at WGCRAN, suggesting some consideration of overall species management in Europe, but could not be seen as a fishery-specific management review. A similar situation occurs at a national level with CEFAS reviewing management of crab and lobster as part of its assessment, but this does not equate to fishery-specific management evaluation. This results in SG60 score and a condition requiring fishery-specific management that is subject to monitoring and evaluation for crab, lobster and shrimp fisheries.

For species with IFCA byelaws or managed under regulating orders, the management system is regularly reviewed. This is on an annual basis by the IFCA and in the case of IFCA activities reported to Defra in an annual report. There is also a more in-depth external review of IFCA performance every four years resulting in SG80 being met for clams, cockles, mussels and oysters.

6 Summary of Project Inshore pre-assessment findings

6.1 Cross-cutting

A significant issue for English Inshore fisheries is the lack of accurate fisheries information – both of effort and landings. Although this to some extent undermines scoring of the information performance indicators, it will likely prove to be of even greater critical importance when seeking to address the management weaknesses identified for English Inshore fisheries. Many of the problems identified in this pre-assessment of English fisheries stems from this lack of information. In some instances (informing P2 and P3) this could be rectified relatively quickly. Other aspects such as stock information may require time-series data and therefore require a long-term plan to develop an information base before the MSC standard can be met.

There is no centralised data management for inshore fisheries, accessible to all relevant agencies, which undermines effort at management.

6.2 Principle 1

Many English inshore stocks are poorly defined. This undermines attempts to implement good management and leads to uncertainty over management jurisdiction. Where stocks are poorly defined, the management authority needs to adopt a working solution, which is precautionary. This is part of the decision-making process more than a scientific process in most instances. Careful consideration is required to determine how the functional stock management boundaries of those English Inshore stocks where stock boundaries have not already been defined. It is likely that the exercise in stock boundary definition should be led at a national level and used to determine the appropriate management jurisdictions for stock management.

For EU pressure stocks, subject to full annual ICES working group scrutiny with a long term management plan in place and functioning as intended, there are likely to be relatively few obstacles to certification (under P1). The only exception to this is where stock status is below the limit reference point.

For stocks where it is not possible to determine status relative to reference points from the available information it is necessary to use the MSC risk based framework. The majority of English Inshore fisheries fall into this category, simply as a result of the fact that stock boundaries have not been defined and stock assessments are not carried out at the scale of the stock. However, most stocks which are commercially exploited but where stock status is uncertain are likely to score at high risk under the risk based framework. This does not mean that those stocks are overexploited or depleted, but merely that the risk of over-exploitation is such that good management can only be assured if based on more fishery specific information.

Even for highly productive species (typically bivalve) where it can be demonstrated that a risk from even of a targeted fishery is low, it can still be difficult to demonstrate that the risk to future productivity of the stock will always remain low without management safeguards. Bivalve stocks can be extirpated completely in unmanaged situations (mussels beds can be removed, razor clam beds have been depleted and oyster stocks are listed by OSPAR), so some understanding of stock status (standing stock) should be known to inform (and limit) exploitation.

6.3 Principle 2

Principle 2 requires that the status of the particular fishery under assessment is scored against five different criteria. This is only possible with good fishery specific information on the fisheries and associated habitat and ecosystem.

In the absence of fishery specific data, expert judgment, qualitative information and analogous information can be drawn upon, but only at a lower level of scoring. To achieve scores of 80 or over for many principle 2 performance indicators quantitative fishery specific data is required. It is therefore routine for pre-assessments to recommend that a fishery wishing to proceed to full assessment should undertake some independent and scientifically robust quantitative assessment of the fisheries ecosystem impacts. Fisheries which have supporting information based upon observer work which is able to detail catch profiles – including discard and ETP profiles - are therefore likely to score higher.

More detailed information on catch profiles will also help determine what are considered 'main' retained and bycatch species. If a fishery is able to quantitatively demonstrate that is does not have any 'main' retained or bycatch species, then scores of 80 are automatically achieved for these performance indicators.

The nature of mixed fisheries in the English Inshore waters means that many fisheries have the potential to retain a number of other species. In the scoring exercise the status of all the other species likely to be retained by the same gear in the same area are used to inform the status of retained species for a given fishery. This highlights that there are a relatively small number of stocks which would lead to detrimental scoring (<60) when retained by a particular gear.

By addressing all commercial species as potentially retained, only non-commercial bycatch species are treated as discards. The scoring indicates that no single non-commercial discard species is likely to cause a fishery to score at less than SG60 but that there are some species which could be vulnerable to certain gears and where there is a clear need for more information (in particular in relation to catch profiles) to support scoring at full assessment. The same applies in the case of Endangered, threatened and protected (ETP) species. It should also be noted however that the requirements for management are greater for ETP species than for other P2 criteria (requiring a 'strategy' rather than a 'partial strategy' at SG80) therefore any English fishery wishing to move forward with MSC certification would benefit by developing a fishery specific management policy for ETP species.

For habitats and ecosystem, scores are generally lower for mobile demersal gears, such as trawl, beam trawl and dredges. There are scale issues which have a significant bearing on some of the gears under principle 2 (see section2.2.3 of this report for an explanation of scale issues). The scoring is generally based on the impact of the full range of the gear, this often means that local inshore management measures are only credited where it can be shown that the fishery is spatially restricted.

There is at least the potential for all fishing gears operating in English Inshore fisheries to pass MSC certification and in most cases examples of certified gear already exists somewhere. However for more impacting gears, the level of information and precautionary management required is likely to be considerably greater in order to demonstrate that management can ensure that impacts are not serious or irreversible. For these more impacting gears, such as dredges and demersal towed gear the low scores presented in this pre-assessment do not necessarily present a definitive barrier to certification but they do indicate that further work appears to be required before they can confidently enter the full assessment process.

6.4 Principle 3

There is a comprehensive governance and legal framework meaning that overall scores in these areas are generally good.

Where management is carried out at an international level through ICES / EU channels, and where there is full annual ICES working group scrutiny and a long term management plan is in place, then a

fishery is likely to pass P3 (the only exception being where the international agreement has broken down, such as the current case with mackerel).

Where fisheries are effectively managed locally by local managers with the tools to limit exploitation, the information on which to base that decision, and the necessary fishery specific structures of management are in place (such as consultation, transparent decision making, research and review) then fisheries also have the strong potential to pass P3. The most obvious examples of local fisheries with the requisite tools, information and management structures are those fisheries managed by Regulating Orders. In these cases it has been possible to score well under the fishery specific elements of principle 3 (in particular those PIs relating to fishery specific objectives, decision making and monitoring & evaluation) because there is clear evidence of active and holistic management focused on the performance of a specific fishery under the clear remit of a single primary management authority.

Although IFCAs now have more effective tools to actively and adaptively manage inshore fisheries, the ability to make use of these is often undermined by lack of information (and in some cases the lack of available resources or management priority) to actively manage fisheries. For many English Inshore fisheries there is a lack of clarity about the precise division of roles and responsibilities, both between the EU and the UK, but perhaps more significantly between the MMO and IFCAs. This lack of clarity about roles is mirrored in the division of responsibility for providing management with scientific advice and information.

There are many finfish stocks which do not receive annual ICES advice and which do not have an EU TAC. For these stocks it is not clear who will take a lead on management. There is a disincentive for local fishery management (IFCAs) to take management action on these stocks which also pass well beyond their jurisdiction meaning any impact of more restrictive management measures would only be felt by local inshore vessels for an uncertain stock benefit. A key determining factor of management success or failure is the 'reliability' of the stock response. Trying to manage the unmanageable (a stock which may be mainly outside of the management area) is futile and undermines the relationship between managers and local industry, who feel they are being unfairly restricted. For these cross jurisdictional stocks a clearer understanding of management responsibility and stronger (institutional) links between IFCAs and with MMO is required to determine an appropriate path for management.

For stocks (in particular shellfish) which do not receive annual ICES advice and which do not have an EU TAC, but which are more geographically restricted there is likely to be a greater overlap between the stock boundaries and the IFCA boundaries. In these cases management by IFCAs can be based on sound local information, is more likely to receive the support of local industry and critically, is more likely to bring about the intended response. However it is important to consider how best to incentivize fishing activities within this area. Any system of licencing, or permits or even allocations (either of quota or effort) do go some way toward ensuring that the fleet with access to the resource are likely to derive a future benefit from any management measures. By contrast, where a fishery is perceived as ‘open access’, without the tools to limit access (other than to vessels on the national fleet register), support for local management measures may be less and therefore less likely to succeed.

7 Recommendations for P1, P2 and P3 (Gap Analysis)

7.1 Determining an appropriate size for a UoC

IFCA level initiatives are most likely to improve scores in relation principle 2 – although in order for these scores to be realized the UoC would need to be spatially restricted to show that the majority of fishing effort took place in the area where the management initiatives applied. By contrast IFCA initiatives in relation to Principle 1 will only benefit scoring if management at IFCA level corresponds to the biogeographic range of the stock (i.e. there is a biological reason for assuming that IFCA level stock controls will work as intended). As such some stocks – notably shellfish – are more suited to holistic adaptive management at an IFCA level than others.

The only reason to restrict a proposed UoC for full certification to a single IFCA is therefore if management of a local stock is carried out at an IFCA level (P1) or management of fleet impacts within the IFCA jurisdiction would lead to substantially increased scores under P2 compared with the fleet activity beyond the IFCA boundary. In the excel summary matrix of results that has been produced as part of Stage 2 of Project Inshore, it is possible for IFCAs to see the other IFCAs that also have overlapping fisheries (stock & gear), in these cases it is likely to always be cost effective to increase the size of UoC to include all IFCAs. The only exception would be if management measures (particularly in relation to P2) would lead to 1 IFCA scoring significantly differently to another.

In most cases the proposed UoC for full assessment should therefore be as big as possible – to include all fishing within a stock boundary using a specified gear. As such, in most cases IFCAs (or local fishery clients) which share a stock would benefit from pursuing MSC certification (or indeed pursuing management initiates) collectively. It is also worth noting that although different gears must be treated as different UoCs, these can be combined into a single assessment report – thus saving costs on site visits and surveillance. This is most common where different gears target the same stock (therefore mainly P2 scores will vary between UoCs).

7.2 UoCs to carry forward to full assessment

7.2.1 Proposed UoCs for full certification in the short term

Table 7.2.1 presents those stocks and gear combinations that have been estimated by the pre-assessment process to be scored at above SG80 if scored today. This does not mean that these UoCs would be free from conditions at the time of full assessment, nor does it mean that there is not some work required in preparation for full assessment.

Table 7.2.1 UoCs estimated to meet SG80 across all MSC principles.

	Species	Stock / Area	Gear
Demersal	Cod	Celtic Sea (VII e-k)	Drift net
			Trammel net
			Long line
	Plaice	Irish Sea (VIIa)	Trammel net
		North Sea (IV)	Trammel net
	Saithe	North Sea and West of Scotland (IV IIIa VI)	Handline and pole-line
	Sole	Celtic Sea (VII f/g)	Drift net
			Trammel net
		Western Channel (VIIe)	Drift net
			Trammel net
		North Sea (IV)	Trammel net
			Drift net
Pelagic	Herring	Irish Sea (VIIaN)	Drift net
			Pelagic trawl
			Encircling net
		North Sea Autumn Spawners	Pelagic trawl
			Encircling net
			Drift net
Shellfish	Cockle	Wash	Hand raking

Table 7.2.2 presents those species gear combinations that are currently estimated to pass at Principle 1 and Principle 3 but where some additional information may be required to support increased scores at Principle 2.

Table 7.2.2 UoCs estimated to meet SG80 for MSC Principle 1 & 3, but between SG 60 -80 for Principle 2

	Species	Stock / Area	Gear
Demersal	Cod	Celtic Sea (VII e-k)	Gill net
	Haddock	North Sea (IV IIIa)	Gill net
		Western and Channel (VII b-k)	Gill net
	Hake	Northern Stock (IIIa IV VI VII VIII a/b/d)	Gill net
	Plaice	Irish Sea (VIIa)	Gill net
		North Sea (IV)	Gill net
	Saithe	North Sea and West of Scotland (IV IIIa VI)	Gill net
	Sole	Celtic Sea (VII f/g)	Gill net
		North Sea (IV)	Gill net
		Western Channel (VIIe)	Gill net
	Whiting	Western (VIIe–k)	Gill net
Pelagics	Herring	Irish Sea (VIIaN)	Gill net
		North Sea Autumn Spawners	Gill net

The fishery (species / gear combinations) represented in tables 7.2.1 and 7.2.2 represent the best opportunity for MSC certification in the short term. In all cases, but particularly in the case of those fisheries in 7.2.2 principle 2 scoring would likely be augmented by provision of additional fishery specific information about the ecosystem interactions of the gear, such as independent observer studies on catch profiles, to enable quantitative estimates of retained, bycatch and ETP interactions to be provided.

In all of the demersal and pelagic fisheries noted above, there is the potential for large UoCs to be taken forward to full assessment, inclusive of all fishers fishing the stock, with the specified gear within the jurisdiction (UK licensing). It is only in the case of the geographically restricted cockle fisheries where there is no potential for a larger UoC.

The conclusion of the pre-assessment is currently that where the stocks listed above in table 7.2.1 and 7.2.2 are fished by demersal towed gear (trawl, beam trawl or dredge) that SG80 is not met for Principle 2, indeed some of the P2 criteria (for habitats or retained) may not meet SG60 – particularly in an inshore context. That said, it should be noted that there are cases where some of these stocks have passed MSC using mobile gears (north Sea Sole, Saithe, Plaice & haddock). There is therefore some requirement to harmonise with these findings but this does not necessarily provide an assurance of passing – particularly where the gear is being used in a more inshore area (unlike those which have already passed). In undertaking the scoring for Principle 2 the assessors have rightly taken an accurate and literal interpretation of the most recent version of the standard. This interpretation does not always match with precedent of previous assessments.

7.2.2 Proposed UoCs for certification in the medium term

Table 7.2.3 presents those fisheries (stock / gear combinations) which scored at least a conditional pass across all 3 MSC principles, but which do not meet the unconditional requirements for Principle 1 (and possibly also P2 and P3). Given that these are currently not predicted to meet the SG 80 for principle 1, it implies that resolution of the identified weaknesses must be addressed at a stock level by the appropriate management regime. As such these management or stock short comings may take longer to resolve and be less within the power of a single fishery client, or even IFCA (in the case of more widely distributed stocks) to resolve in the short term, in addition, simple provision of more information is unlikely to address the short comings in scoring. None the less, these are the fisheries which do still appear to be closer to meeting the requisite MSC standard than many exploited by English Inshore fisheries. Table 7.2.3 also includes a column indicating the MSC principles which are currently estimated at being less than an assured principle level score of 80 (where P2 is indicated, this can most likely be addressed by provision of fishery specific information about gear impacts).

Table 7.2.3 UoCs estimated to score between SG60 - 80 for MSC Principle 1 (and in some cases P2 & P3)

	Species	Stock / Area	Gear	<80 Principles
Demersal	Ling	Southern (IIIa IVa VI VII VIII IX XII XIV)	Gill net	P1 & P2
	Megrim	Celtic Sea & West of Scotland (VIIb–k & VIIIa,b,d)	Gill net	P1 & P2
	Monkfish / Angler	Western and Channel (VII b-k, VIII a/b/d)	Gill net	P1 & P2
	Plaice	Eastern Channel (VIId)	Trammel net	P1
		Eastern Channel (VIId)	Gill net	P1 & P2
	Red mullet	North Sea and Eastern Channel (IV IIIa VIId)	Gill net	P1, P2, P3
	Sole	Eastern Channel (VIId)	Drift net	P1
		Eastern Channel (VIId)	Trammel net	P1
		Eastern Channel (VIId)	Gill net	P1 & P2
	Whiting	North Sea and Eastern Channel (IV VIId)	Gill net	P1 & P2
Pelagics	Horse mackerel	Western Stock	Handline / pole-line	P1
		Western Stock	Pelagic trawl	P1
		Western Stock	Gill net	P1 & P2
	Pilchard	Bay of Biscay	Drift net	P1
		Bay of Biscay	Handline / pole-line	P1
		Bay of Biscay	Encircling net	P1
		Bay of Biscay	Gill net	P1 & P2
	Sprat	Channel (VIId,e)	Pelagic trawl	P1
		North Sea (IV)	Pelagic trawl	P1
Shellfish	Brown crab	Western Channel	Gill net	P1, P2, P3
	Cockle	Cumbria	Hand raking	P1 & P3

		Morecombe Bay (7)	Hand raking	P1
		Ribble	Hand raking	P1 & P3
		Wirral	Hand raking	P1 & P3

The only other stock perhaps worthy of consideration under those UoCs estimated to be candidates for full assessment in the medium term is North Sea cod. North Sea cod is not been included in the table above (7.2.3) on account of the fact that principle 1 currently scores at below SG60. However, a closer look reveals that most of the principle 1 criteria score above SG80, with the exception of stock status which is currently below B_{lim}. Principle 3 also scores highly and principle 2 scores well for certain static gears. Once the stock status increases above B_{lim} then scoring would increase and enable a conditional pass under principle 1, thus opening the door to full certification.

7.2.3 UoCs requiring a longer term programme of improvement before full assessment

In total some 56 UoCs have been included in the tables above relating to short and medium term opportunities. In addition the above 2 sections include discussion of the potential for other demersal gears and North Sea cod to perhaps make the case for assessment in the medium term. That suggests that for the majority of remaining English Inshore fisheries (some 400 species / gear combinations) considered in this pre-assessment the implementation of management sufficient to demonstrate the sustainability required of an MSC assessment requires a more long term programme of work. This will be explored in more detail in Stage 3 of Project Inshore.

Appendix A: References

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Appendix B. Stakeholder Meetings

The following list of named individuals met with members of the Project Inshore assessment team during site visits.

Name	Role	Organisation
Rob Forster	Team Leader, Applied Fisheries Science & Technology	CEFAS Penzance
Andy Wheeler	Chief Executives	Cornish Fish Producers Organization
Eddie Derriman	Chief Fishery Officer	Cornwall IFCA
Sam Davies	Deputy Chief Fishery Officer	
Sue Sayer		Cornwall Seal Group
Matt Mander	Deputy Chief Fishery Officer	Devon and Severn IFCA
Sarah Clark	Environmental Fisheries Officer	Devon and Severn IFCA
Dominic Flint	Sustainable Fisheries Officer	Devon Wildlife Trust
Emma Rance	Marine Conservation Officer	Dorset Wildlife trust
Eden Hannam	Head of Env & research	Eastern IFCA
Phil Haslam	Chief Officer	
Hilary Thompson	Deputy Chair and Local Councilor	
Gary Redshaw		Holderness Coast Fishing Industry Group
Mike Cohen		
Geoff Huelin	Potter in Ilfracombe, North Devon	Independent
Jan Hart (gillnetter), Rob Adams (potter) & 3 other unnamed fishermen	Fishermen in Brixham, South Devon	Independent
Kevin Jonas	Processor	Jonas Seafoods
Dominic Bailey	Senior Scientific and Conservation Officer	Kent & Essex IFCA
Joss Wiggins	Chief Officer	
Will Wright	Deputy Chief Officer	
Callum Gough	Senior Marine Officer	MMO
Neil Robinson		
Nick Wright	Area manager	
Sean Douglas		
John Butterwith	Chief Executive	N. Devon Fisherman's Association
Fiona Tibbit		Natural England
Heidi Pardoe	Marine Advisor	
Helen Stevens	Senior Fisheries Specialist	
David McCandless	Chief Officer	North Eastern IFCA
James Wood		
Terri Young		
Billy Gaff	Shellfish fisherman	North Norfolk Fishermen's Society
Ian Groves	Animator	North Norfolk FLAG
Juliet Allen	Administrator	
Nigel Tomkins	Project Manager	
Alasdair Lindop		North West IFCA
Cath Dobson		
Hugh Thinnesen		
Mandy Knott		
Alec Taylor	National Marine Policy Officer	RSPB
Paul St. Pierre	Conservation Officer for Cornwall & The Isles of Scilly	

Gus Caslake	Project Manager	Seafish
Jim Portus	Chair	South West Fish Producers Organization
Ian Carrier	Chief Officer	Southern IFCA
Ian Davies	Fisherman & IFCA chair	
Neil Richardson	Deputy Chief	
Simon Pengelly	Environment Officer	
John Nichols	Chairman	Thanet Fishermen's Association
Kat Sanders	Living Seas Research & Development Officer	Yorkshire Wildlife Trust

In addition to these named individuals met at formal meetings a large number of fishermen were also met with at quaysides at fishing ports around the coast including: Bridlington, Brightlingsea, Brixham, Caister, Cromer, Ilfracombe, Kings Lynn, Mevagissy, Mudeford, North Shields, Newlyn, Padstow, Poole, Ramsgate, Southwold, West Mersea and Whitstable.

Appendix C. MSC Principles and Criteria

Below is a much-simplified summary of the MSC Principles and Criteria, to be used for over-view purposes only. A comprehensive description of the MSC Principles and Criteria can be obtained from the MSC website (www.msc.org) and guidance documents.

MSC Principles and Criteria

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.

Intent:

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.

Status

» The stock is at a level that maintains high productivity and has a low probability of recruitment overfishing.

» Limit and target reference points are appropriate for the stock (or some measure or surrogate with similar intent or outcome).

» Where the stock is depleted, there is evidence of stock rebuilding and rebuilding strategies are in place with reasonable expectation that they will succeed.

Harvest strategy / management

» There is a robust and precautionary harvest strategy in place, which is responsive to the state of the stock and is designed to achieve stock management objectives.

» There are well defined and effective harvest control rules in place that endeavour to maintain stocks at target levels.

» Sufficient relevant information related to stock structure, stock productivity, fleet composition and other data is available to support the harvest strategy.

» The stock assessment is appropriate for the stock and for the harvest control rule, takes into account uncertainty, and is evaluating stock status relative to reference points.

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

Intent:

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.

Retained species / Bycatch / ETP species

» Main species are highly likely to be within biologically based limits or if outside the limits there is a full strategy of demonstrably effective management measures.

» There is a strategy in place for managing these species that is designed to ensure the fishery does not pose a risk of serious or irreversible harm to retained species.

» Information is sufficient to quantitatively estimate outcome status and support a full strategy to manage main retained / bycatch and ETP species.

Habitat & Ecosystem

» The fishery does not cause serious or irreversible harm to habitat or ecosystem structure and function, considered on a regional or bioregional basis.

» There is a strategy and measures in place that is designed to ensure the fishery does not pose a risk of serious or irreversible harm to habitat types.

» The nature, distribution and vulnerability of all main habitat types and ecosystem functions in the fishery area are known at a level of detail relevant to the scale and intensity of the fishery and there is reliable information on the spatial extent, timing and location of use of the fishing gear.

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.

Intent:

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.

Governance and policy

» The management system exists within an appropriate and effective legal and/or customary framework that is capable of delivering sustainable fisheries and observes the legal & customary rights of people and incorporates an appropriate dispute resolution framework.

» Functions, roles and responsibilities of organisations and individuals involved in the management process are explicitly defined and well understood. The management system includes consultation processes.

» The management policy has clear long-term objectives, incorporates the precautionary approach and does not operate with subsidies that contribute to unsustainable fishing.

Fishery specific management system

» Short and long term objectives are explicit within the fishery's management system.

» Decision-making processes respond to relevant research, monitoring, evaluation and consultation, in a transparent, timely and adaptive manner.

» A monitoring, control and surveillance system has been implemented. Sanctions to deal with non-compliance exist and there is no evidence of systematic non- compliance.

» A research plan provides the management system with reliable and timely information and results are disseminated to all interested parties in a timely fashion.

Appendix D: Application of MSC Risk Based Framework

The Risk-Based framework is designed for use in association with the Marine Stewardship Council Default Assessment Tree in data deficient situations. The risk assessment framework is designed to assess components of the ecological system, including the target species (principle 1) and on species identified as retained catch, by-catch, on habitats, and on ecosystems (in Principle 2).

Two main assessment methods are distinguished, the scale, intensity, and consequence analysis (SICA) and the productivity susceptibility analysis (PSA). SICA is a qualitative method of assessing impact and is based in expert judgment. PSA can be defined as a semi-quantitative analysis to assess potential risk of impact. In the MSC risk assessment methodology these methods form part of a hierarchy, progressing from SICA to PSA. The MSC scoring procedure is a qualitative process. Scores are given in the scale to 60 to 100 and a score of 80 is required to ensure that the fishery meet the principles and criteria of the standard. If the SICA score is 80 or above, then this score is the score given for the relevant PI. If the score is below 80 (or for 1.1.1 in any case), a second type of assessment is carried out: a Productivity-Susceptibility Analysis (PSA).

Application of the RBF in Principle 1

The Risk-Based framework is designed for use in association with the Marine Stewardship Council Default Assessment Tree in data-deficient situation. For stocks where it is not possible to determine status relative to reference points from the available information it is necessary to use the MSC risk based framework. The majority of English Inshore fisheries fall into this category (See Section 1.3).

The risk that fishing poses on the species productivity was assessed using the Productivity Susceptibility Analysis (PSA) for stocks with unknown stock status. The PSA approach is based on the assumption that the risk to a species depends on two characteristics: (1) the extent of the impact due to the fishing activity, which will be determined by the susceptibility to the fishing activities (Susceptibility) and (2) the productivity of the species (Productivity), which will determine the rate at which recovery can occur after potential depletion or damage by fishing.

Productivity analysis

The productivity of all species covered by this pre-assessment was calculated using the MSC risk based methodology. In practice no species with analytical assessment would be tested through the risk based approach, but the analysis of their productivity has been included for comparative interest.

Productivity is determined according to species growth and maturity characteristics, trophic level and fecundity[48]. Generally speaking quicker growing, fast maturing, low trophic level smaller species are more productive than slower growing species with large maximum size and age, which are typically high trophic level, are deemed to be low productivity.

Low productivity species are potentially easier to over exploit so fisheries on these stocks (all other things being equal) are higher risk. However in order to finally determine the level of risk productivity scores must be combined with information about the susceptibility to capture.

Although this is not a definitive rule, there is also a general pattern that low productivity species tend to be of higher commercial value – further exacerbating the risk that merely results from their productivity characteristics. However there are notable exceptions to this rule. For example, bivalve species (e.g. cockles) are also of high value, but are also highly productive.

[48] This information can be found for most finfish (not shellfish) species from the FAO's 'Fishbase' on-line database.

In the English fisheries assessed the most productive species were small fast growing species such as the small pelagic (e.g. pilchard), bivalves (e.g. cockles and oysters), and smaller demersal fish species (e.g. mullet, sole). The least productive species included large demersal flat fish (e.g. Plaice) and demersal roundfish (e.g. hake, cod and haddock) (figure 3.4.1).

Susceptibility analysis

The scores for productivity are combined with susceptibility scores which are calculated according to the overlap of the fishing area compared with the species range (geographical spread and depth / habitat overlap), the probability of capture if the fishing gear is encountered (e.g. species size v mesh size) and the likelihood of post capture survival. When considering the risk based scores as target species (i.e. under P1) it is important to recognise that the area overlap considerations are for all fishing activity on the stock, not just the vessels belonging to the unit of certification. It is also the case when considering the likelihood of post capture survival this is only really of any relevance to discarded species. Retained species obviously do not survive post capture.

The susceptibility scoring has fewer parameters than the productivity scoring and does not have the objective rigour provided by the hard biological information available for productivity parameters. As such it is more open to subjective argumentation.

Taking a precautionary, but arguably sensible and balanced approach, it is reasonable (and certainly possible) to argue that all commercially exploited target species are high risk for all susceptibility parameters. In short, where the target species is targeted everywhere within its range, with gear designed for efficient capture then there is a high risk that the fishery could become over-exploited. This does not mean the fishery is over-exploited, simply that on the information available the evident risk means that the fishery warrants a more thorough assessment. This of course vindicates the need for stock assessment on commercially exploited species.

Productivity-Susceptibility Analysis Results – Status 1.1.1

The findings of the PSA analysis was only carried forward for use in the final determination of pre-assessment scores, for those species that were eligible according to the risk based methodology flow chart presented in the MSC certification requirements. As a simple rule, these were the species which lacked stock assessment or anything of equivalent detail and stock status was defined as unknown.

These PSA scores are divided into low risk (i.e. <60), medium risk (i.e. 60-80) and high risk (i.e. >80). The PSA methodology for calculating the risk score is described in Appendix C.

Generally all fisheries assessed using the RBF obtained a medium to high risk score, except in a few instances where an argument could be put forward for a lower susceptibility score. If any of these arguments were to be used in a full assessment they would need rigorous examination and supporting justification in order to support what might otherwise be regarded as a subjective decision. Table D.2 shows stocks that could obtain low risk scores and rationale for it.

Figure D.1 Productivity comparison for all species (least productive at the top, most productive at the bottom)

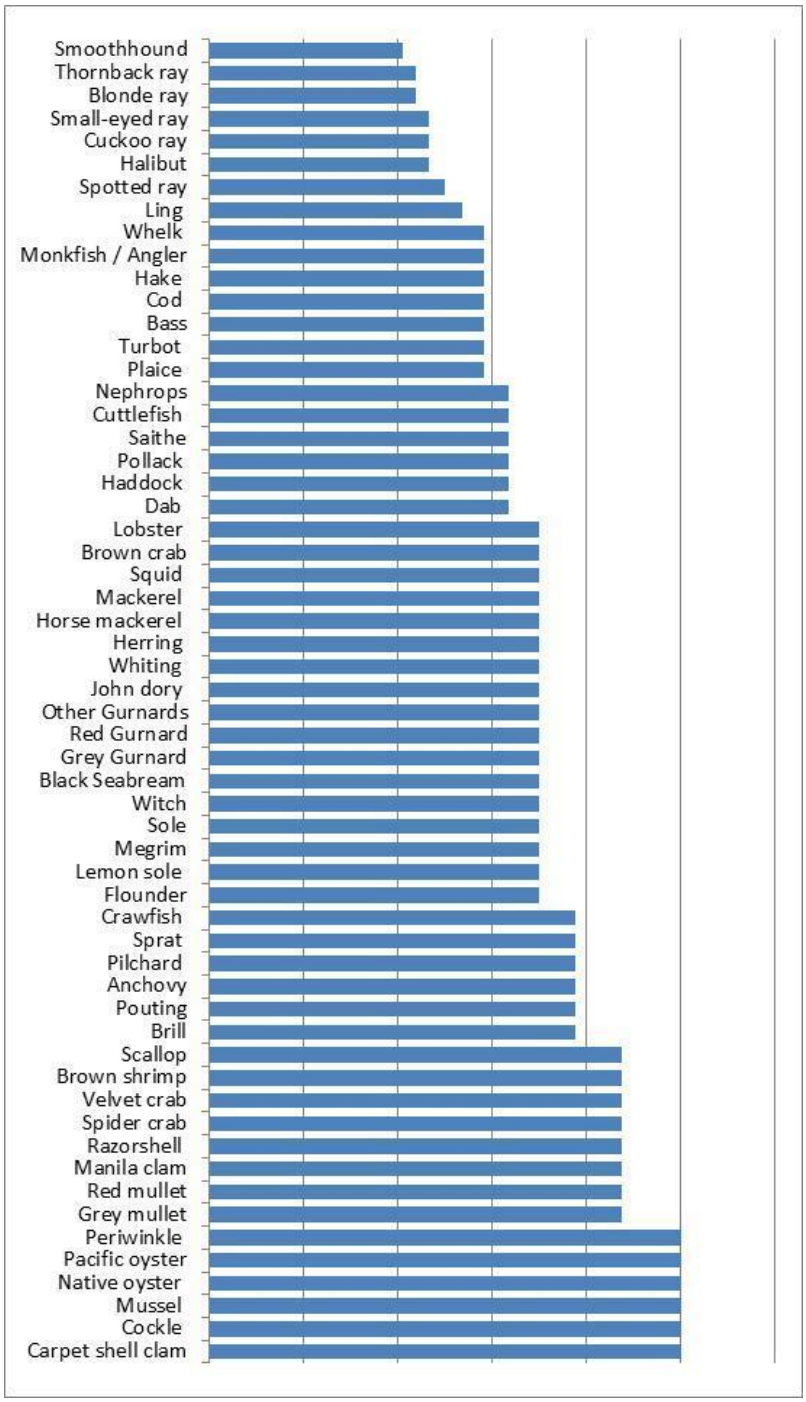

Table D.1 Species with medium to low risk score.

Species	Stock Unit	Rationale
Pilchard	Bay of Biscay	Short seasonal nature of the fishery, high productivity and dispersive nature of the stock and the low to medium intensity of activity. PSA value estimated at 79.6 (i.e. conditional pass). Stock assessment procedures need to be implemented unless the harvest strategy decreases the susceptibility risk.
Sprat	Channel (VIId,e)	Short seasonal nature of the fishery, high productivity and dispersive nature of the stock

		and the low to medium intensity of activity. PSA value estimated at 79.6 (i.e. conditional pass) Stock assessment procedures need to be implemented unless the harvest strategy decreases the susceptibility risk.
Cockle	Thames Estuary	High productivity and a precautionary harvest strategy in place ensuring that fishing does not target all spawners resulting in a low risk score
Cockle	Wash	
Mussel	Fenham Flat	

Table D.2. Estimated PSA risk Score for species with stock status unknown.

Species	Latin	Area	PSA Risk Score
Brill	*Scopthalmus rhombus*	North Sea and Channel (IV+IIIa VIId/e)	High
Dab	*Limanda limanda*	North Sea (IV+IIIa)	High
		Western (II, V, VI, VII (excl. d), VIII, IX, X, XII, XIV)	High
		Channel (VII d)	High
Flounder	*Platichthys flesus*	North Sea (IV+IIIa)	High
		Irish Sea (VII a/f)	High
		Channel (VII d/e)	High
Halibut	*Hippoglossus hippoglossus*	North Atlantic	High
Lemon sole	*Microstomus kitt*	North Sea and Eastern Channel (IV IIIa VIId)	High
		Western Channel (VII f/e)	High
Megrim	*Lepidorhombus whiffiagonis*	Western approaches VIIb–k and VIIIa,b,d	High
Plaice	*Pleuronectes platessa*	Irish Sea (VIIa)	High
		Eastern Channel (VIId)	High
		Celtic Sea (VII f/g)	High
Turbot	*Scophthalmus maximus*	Channel (VII d/e)	High
		Irish Sea (VIIa)	High
Witch	*Glyptocephalus cynoglossus*	North Sea (IV IIIa VIId)	High
		Irish Sea (VIIa)	High
		Western approaches (VII f/e)	High
Bass	*Dicentrarchus labrax*	NE Atlantic	High
Black Seabream	*Spondyliosoma cantharus*	North Sea and Channel (IV VII d/e)	High
Grey Gurnard	*Eutrigla gurnardus*	North Sea and Eastern Channel (IV IIIa VIId)	High
		Celtic Sea and West of Scotland (VI VII a-c, e-k)	High
Red Gurnard	*Aspitrigla cuculus*	Western (VIId–k)	High
Other Gurnards	*Triglidae spp*	NE Atlantic	High
John dory	*Zeus faber*	Western and Channel (IV VII d-f)	High
Ling	*Molva molva*	Southern (IIIa IVa VI VII VIII IX XII XIV)	High
Monkfish / Angler	*Lophius piscatorius / L. budegassa*	North Sea (IV IIIa VI)	High
		Western and Channel (VII b-k, VIII a/b/d)	High
Grey mullet	*Liza ramada / Liza aurata / Chelon labrosus*	Channel and North Sea (IV VII d-f)	High
Red mullet	*Mullus surmuletus*	North Sea and Eastern Channel (IV	High

		IIIa VIId)	
		Celtic Sea and Western Channel (VII e-g)	High
Pollack	*Pollachius pollachius*	North Sea (IV IIIa)	High
		Celtic Sea and West of Scotland (VI VII a-c, e-k)	High
Pouting	*Trisopterus luscus*	Undefined	High
Blonde ray	*Raja brachyuran*	North Sea and Channel (IVa VII d/e)	High
		Irish and Celtic Sea (VII a/f/g)	High
Cuckoo ray	*Leucoraja naevus*	North Sea and Channel (IVa IIIa VIId)	High
		Irish and Celtic Sea (VII a/f/g)	High
Small-eyed ray	*Raja microocellata*	Channel (VII d/e)	High
		Celtic Sea (VII f/g)	High
Spotted ray	*Raja montagui*	North Sea and Eastern Channel (IV VIId)	High
		Irish and Celtic Sea (VII a/f/g)	High
Thornback ray	*Raja clavata*	North Sea and Channel (IVa IIIa VII d/e)	High
		Irish and Celtic Sea (VII a/f/g)	High
Smoothhound	*Mustelus spp.*	NE Atlantic	High
Horse mackerel	*Trachurus trachurus*	Northwest	High
Anchovy	*Engraulis encrasicolus*	Southwest	Medium
Pilchard	*Sardina pilchardus*	Bay of Biscay	Medium
Sprat	*Sprattus sprattus*	Channel (VIId,e)	Medium
		North Sea (IV)	Medium
Carpet shell clam	*Venerupis decussate or Tapes decussate*	Poole Harbour	Medium
Manila clam	*Tapes philippinarum*	Poole Harbour	High
Cockle	*Cerastoderma edule*	Cumbria	Medium
		Morecombe Bay (7)	Medium
		Ribble	Medium
		Wirral	Medium
		Thames Estuary	Medium
		Exe Estuary	Medium
		Avon Estuary	Medium
		Teign Estuary	Medium
		Dart Estuary	Medium
		Humber	Medium
		Poole Harbour	Medium
		Solent	Medium

		Portsmouth	Medium
		Thames	Low
		Wash	Low
Mussel	*Mytilus edulis*	Exe Estuary	Medium
		Wash	Medium
		Dart Estuary	Medium
		Yealm Estuary	Medium
		Teign Estuary	Medium
		Plymouth Sound	Medium
		Taw-Torridge Estuary	Medium
		Northeast	Medium
		Dee	Medium
		Heysham Flat	Medium
		Morecombe Bay	Medium
		Wirral	Medium
		Fenham Flat	Low
Native oyster	*Ostrea edulis*	Kent Essex	Medium
		Southern	Medium
		Eastern	Medium
Pacific Oyster	*Crassostrea gigas*	Channel	Medium
Razorshell	*Ensis directus*	Wash	High
Cuttlefish	*Sepia officinalis*	Channel	High
Squid	*Loligo forbesi*	Western Approaches	High
	Loligo vulgari	Western Approaches	High
Squid	*Loligo forbesi*	North Sea	High
	Loligo vulgari	North Sea	High
Brown crab	*Cancer pagurus*	North Irish Sea	Medium
		Celtic Sea	Medium
		South East (Scotland)	Medium
Spider crab	*Maia squinado*	South West	High
		Southern	High
Velvet crab	*Liocarcinus puber*	North Sea	High
		Eastern Channel	High
		South West	High
Crawfish	*Palinurus elephas*	Southwest	Medium
Lobster	*Homarus gammarus*	East	High
		Thames	High
Brown shrimp	*Crangon crangon*	Wash	High
		Humber	High

		Northwest	High
		Bristol Channel	High
Whelk	*Buccinum undatum*	Bristol Channel	High
		Western Channel	High
		Eastern Channel	High
		North Sea	High
Periwinkle	*Littorina littorea*	Northumberland	Medium
		Northeast	Medium
		Eastern	Medium
		Kent and Essex	Medium
		Sussex	Medium
		Southern	Medium
		Devon & Severn	Medium
		Cornwall	Medium
		Scilly	Medium
		Northwest	Medium
Scallop	*Pecten maximus*	Eastern Channel	High
		Western Channel	High
		Liverpool Bay	High
		Bristol Channel	High

Appendix F: Habitat-related information

A. Habitat Scores for other MSC certified fisheries

* Indicates where scores are considered to be outliers; further details on the assessment for these PIs are provided in the text below the table.

Gear category		MSC Fishery	Year certified	2.4.1	2.4.2	2.4.3
Demersal otter trawl		Hastings fleet Dover sole trawl and gill-net	2009	80	80	90
		Isle of Man queen scallop trawl	2011	70	65	80
		Scottish Fisheries Sustainable Accreditation Group (SFSAG) North Sea haddock	2010	80	80	95
		Stornoway nephrops trawl[1]	Suspended	85	85	80
		UK Fisheries/DFFU/Doggerbank Northeast Arctic cod, haddock and saithe	2012	70	80	80
		UK Fisheries/DFFU/Doggerbank Group saithe	2011	90*	60	85
		Barents Sea cod and Barents Sea haddock	2010	60	75	80
		Canada northern and striped shrimp	2011	60	70	70
		DFPO Denmark Eastern Baltic cod	2011	75	80	85
		DFPO Denmark North Sea & Skagerrak haddock	2012	70	75	85
		DFPO Denmark North Sea & Skagerrak saithe	2011	60	75	80
		DFPO Denmark North Sea plaice	2011	75	75	80
		DFPO Denmark North Sea sole	2012	75	75	80
		Ekofish Group-North Sea twin rigged otter trawl plaice [2]	2009	75	85	75
		Euronor saithe	2010	80	90	85
		Germany Eastern Baltic cod	2011	75	80	85
		Germany North Sea saithe trawl[2]	2008	85	80	90
		Norway North Sea saithe[2]	2008	80	75	90
Dredge	Mussel dredge	North Menai Strait mussel	2010	95*	100*	80
		Royal Frysk Jutland blue shell mussel dredge	2012	80	85	80
		VMI East Jutland blue shell mussel dredge	2012	80	85	80

Gear category		MSC Fishery	Year certified	2.4.1	2.4.2	2.4.3
	Scallop dredge	Isle of Man queen scallop trawl [dredge = failed P2 average]	2011	70	70	80
		SSMO Shetland inshore brown & velvet crab and scallop fishery	2012	60	60	95
		Eastern Canada offshore scallop fishery[1]	2010	75	85	80
Pelagic trawl		Scottish Pelagic Sustainability Group Ltd (SPSG) North Sea herring [3]	2008	90	100	80
		Scottish Pelagic Sustainability Group Ltd Atlanto Scandian herring	2010	95	95	90
		SPSG West of Scotland herring Pelagic Trawl	2012	100	95	95
		Pelagic Freezer-Trawler Association North Sea herring	2006 & 2011	90	90	95
		North East Atlantic mackerel pelagic trawl, purse-seine and handline[3]	2009	95	85	90
Drift nets		Cornwall sardine, UK	2010	100	100	85
Set nets	Gill	Hastings fleet Dover sole trawl and gill-net	2009	100	80	90
		Dutch Fisheries Organisation (DFO) gill net sole	2009	95	80	85
		Norway North Sea saithe[2]	2008	80	75	85
	Ring	Cornwall sardine, UK	2010	100	100	85
	Set: not specified	DFPO Denmark Eastern Baltic cod	2011	80	80	85
		DFPO Denmark North Sea & Skagerrak haddock	2012	90	85	85
		DFPO Denmark North Sea & Skagerrak saithe	2011	90	80	80
		DFPO Denmark North Sea plaice	2011	90	85	85
		DFPO Denmark North Sea sole	2012	90	85	85
	Trammel	Hastings fleet Dover sole (trammel net)	2009	100	80	90
Pots	Creel	SSMO Shetland inshore brown & velvet crab and scallop fishery	2012	90	80	95
	Pots	Normandy and Jersey lobster	2011	80	80	80
	Trap	Scotian shelf snow crab trap	2012	80	95	95

Gear category		MSC Fishery	Year certified	2.4.1	2.4.2	2.4.3
		Eastern Canada offshore lobster[1]	2010	80	75	80
		Atlantic deep sea red crab	2009	95	90	90
		Louisiana blue crab	2012	95	80	90
Hooks	Handline	North East Atlantic mackerel pelagic trawl, purse-seine and handline[3]	2009	95	85	90
		Norway North Sea saithe[2]	2008	90	75	95
	Rod&line	Dutch rod and line fishery for sea bass	2011	95	80	80
	Long line	DFPO Denmark Eastern Baltic cod	2011	90	80	85
		DFPO Denmark North Sea & Skagerrak haddock	2012	90	95	85
		South Georgia Patagonian toothfish longline[2]	2004 & 2009	85	95	80
Hand gathering		Dee Estuary cockle	2012	100*	100	100
		Vietnam Ben Tre clam hand gathered[1]	2009	85	85	90
		Burry Inlet cockles[1]	2001 & 2007	90	85	95

Performance Indicators are mapped where assessments were undertaken pre introduction of the MSC Fisheries Assessment Methodology standard default assessment tree, as follows:

[1] Performance indicators 2.4.1, 2.4.2 and 2.4.3 mapped from 2.1.4.3; 2.1.4.5 and 2.1.3.1 respectively.

[2] Performance indicators 2.4.1, 2.4.2 and 2.4.3 mapped from 2.1.5.3; 2.1.4.1 and 2.1.3.1 respectively.

[3] Performance indicators 2.4.1, 2.4.2 and 2.4.3 mapped from 2.1.5.4; 2.1.4.1 and 2.1.3.1 respectively.

Further details for outlier scores:

UK Fisheries/DFFU/Doggerbank Group saithe: 2.4.1 (score: 90) – Individual scores were determined for sensitive habitat types as follows: deep-sea sponges (80), *Lophelia* reefs (80), *Modiolus* reefs (100) and seapens and burrowing megafauna (100). No assessment was undertaken of 'non-sensitive' habitats. The individual scores were combined to give an overall score of 90 for habitat outcome status.

The individual scores for each sensitive habitat were predominately defined by assessing the likely overlap of the fishery based on geographical and depth distribution of the sensitive habitats. An overlap of 5-10% was determined for deep sea sponges and *Lophelia* reefs, while overlap with *Modiolus* reef and seapens and burrowing megafauna was considered highly unlikely. No further reasoning for scores were provided.

North Menai Strait mussel: 2.4.1 (score: 95) – Score awarded based on very small footprint of the fishery; resilience of the habitat and associated benthic fauna to direct physical disturbance; short period of harvesting followed by no fishing for one year which is considered an adequate recovery period given

the life history characteristics and low diversity of the natural community. Ecological impacts are considered negligible at a larger scale, but detectable locally, hence 100 is not awarded in full, but 95 is considered appropriate by the team assessing this fishery.

North Menai Strait mussel: 2.4.2 (score: 100) – Score awarded due to spatial restrictions in the habitat (of seed) and lease limitations (for on-growing), together with management implemented vis Appropriate Assessment as a result of operating within a SAC. The team considered that "since the fishery conducts most of its operations within SACs, which have been designated for habitat attributes, and which are managed under management plans which focus on habitats, a strategy for habitats is in place as far as this fishery was concerned, even if this strategy was not put in place by the fishery itself. The Caernarfon Bar seed mussel bed lies just outside the Menai Strait and Conwy Bay SAC, but fishing here is always subject to consultation with CCW."

Dee Estuary cockle: 2.4.1 (score: 100) – The justification table for this fishery states that "Studies of the effects of cockle harvesting have demonstrated that the fishery would not reduce habitat structure and function to a point where there would be serious or irreversible harm". The evidence cited is Kaiser et al (2001) which found effects on infaunal communities up to 1 year post disturbance. However the assessment team state that "effects on the structure and function of the habitat itself will be of much shorter duration than this (days to weeks; pers. Obs., EAW meeting)".

B. Habitat Scores for other MSC certified fisheries

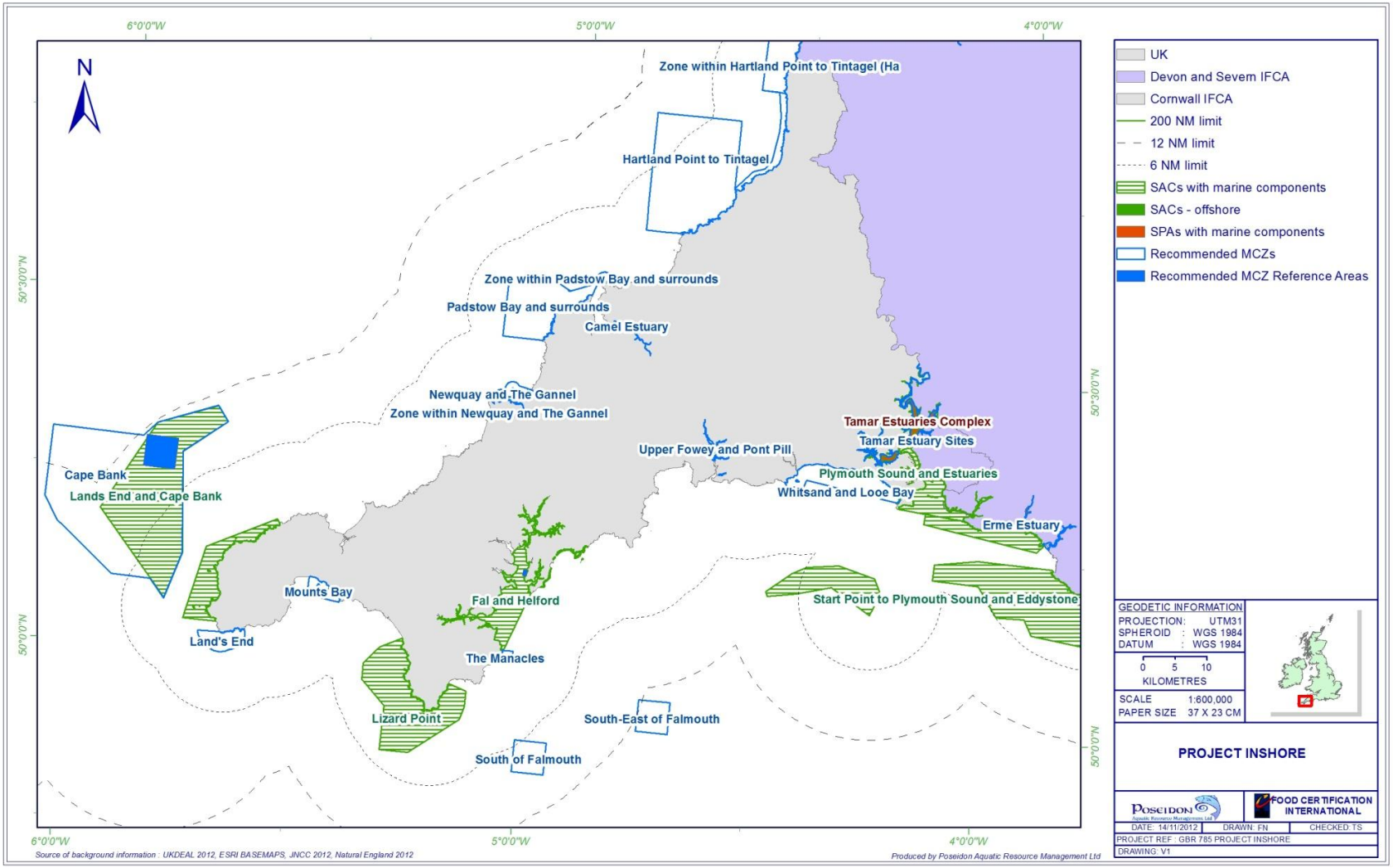

Figure B.1: SACs, SPAs and recommended MCZs within the Cornwall IFCA

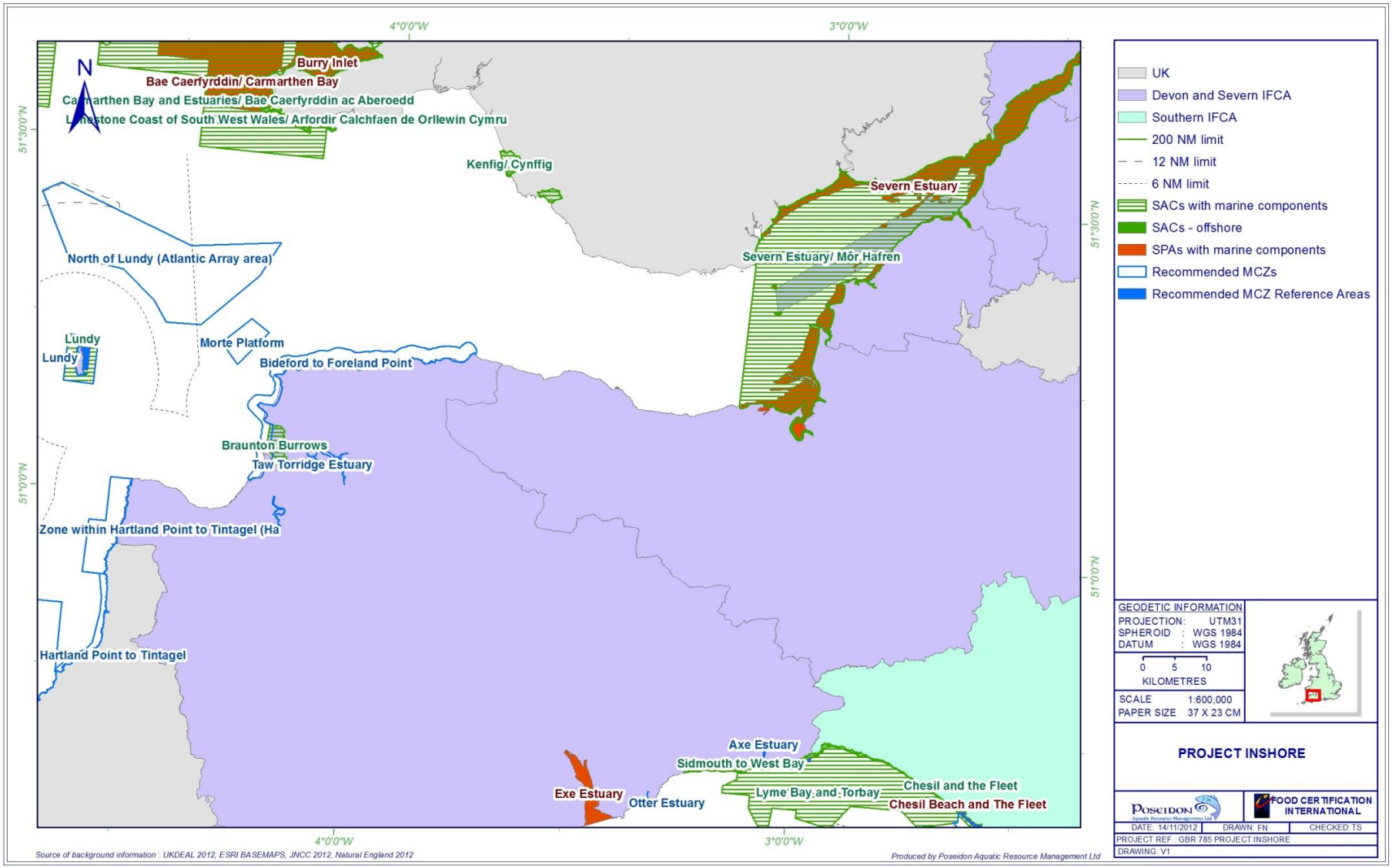

Figure B.2: SACs, SPAs and recommended MCZs within the Devon and Severn IFCA (north area only)

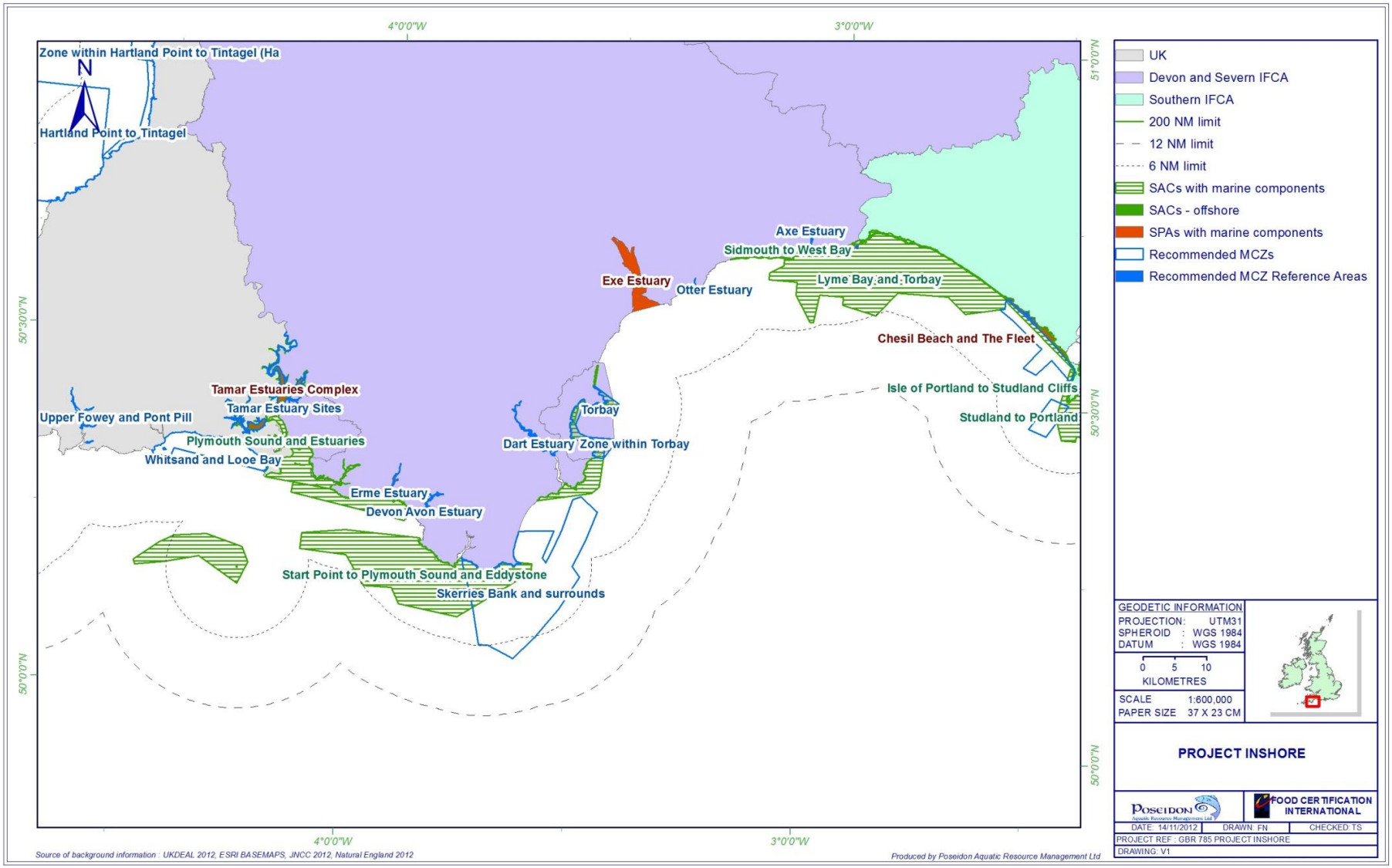

Figure B.3: SACs, SPAs and recommended MCZs within the Devon and Severn IFCA (south area only)

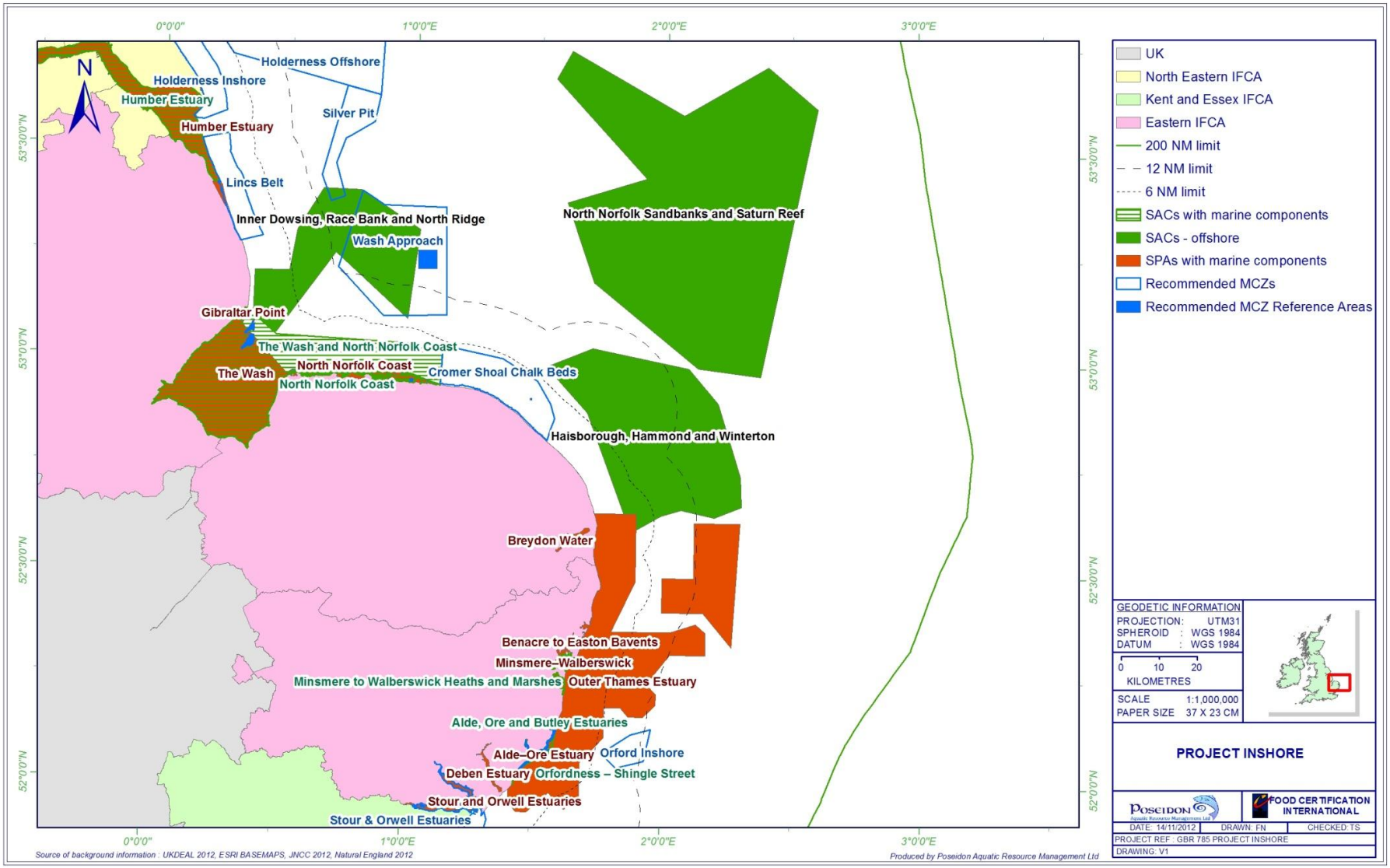

Figure B.4: SACs, SPAs and recommended MCZs within the Eastern IFCA

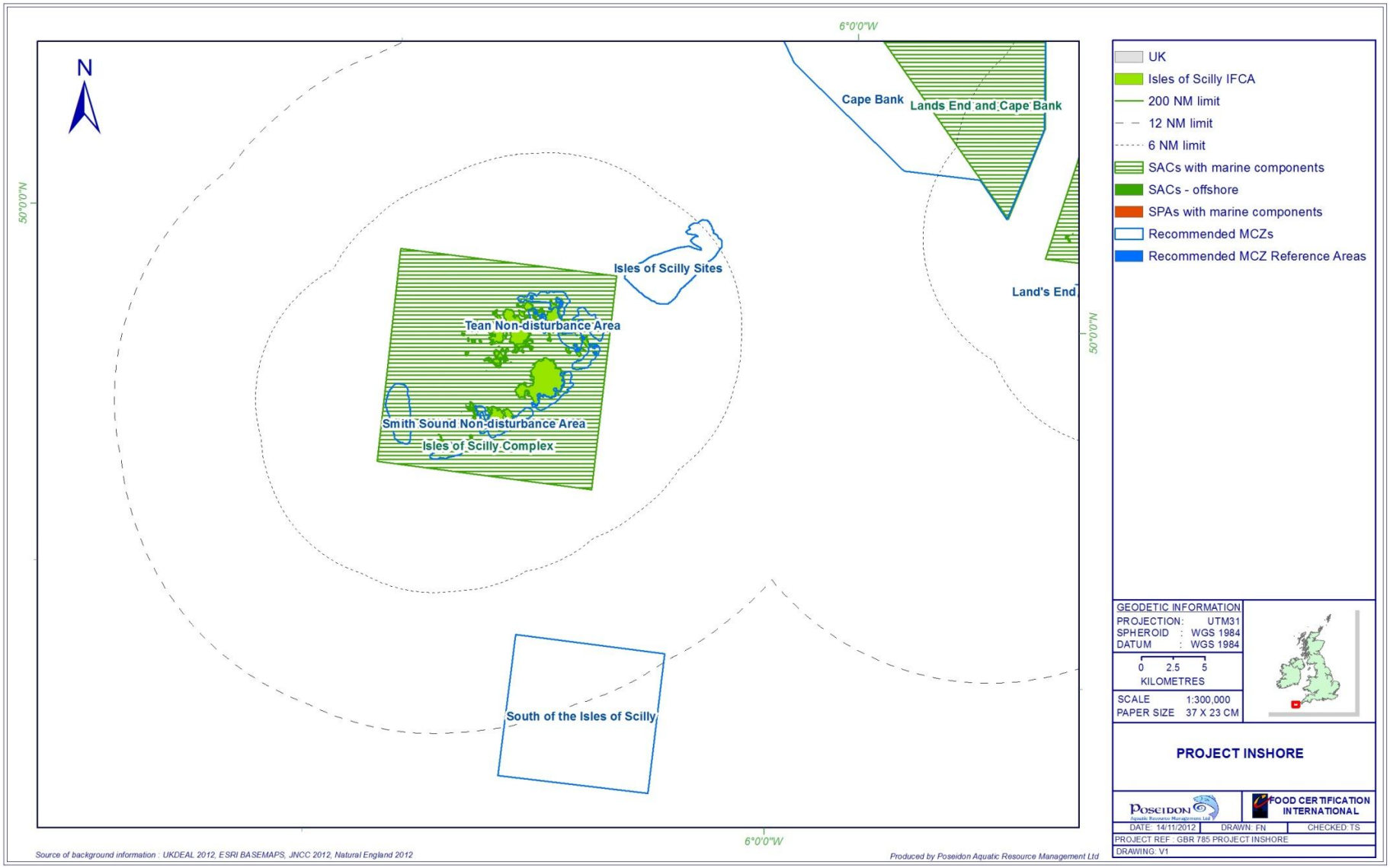

Figure B.5: SACs, SPAs and recommended MCZs within the Isles of Scilly IFCA

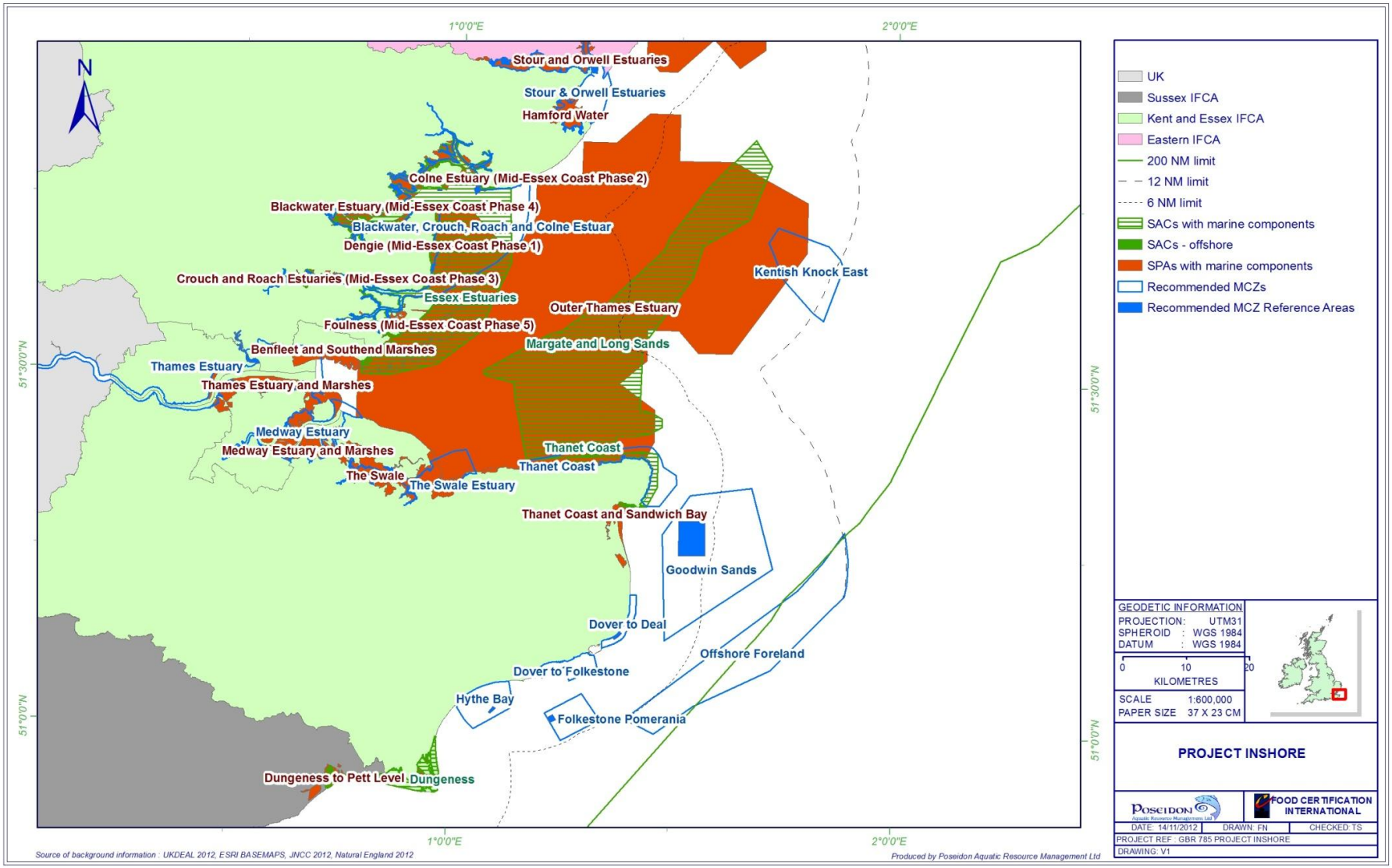

Figure B.6: SACs, SPAs and recommended MCZs within the Kent and Essex IFCA

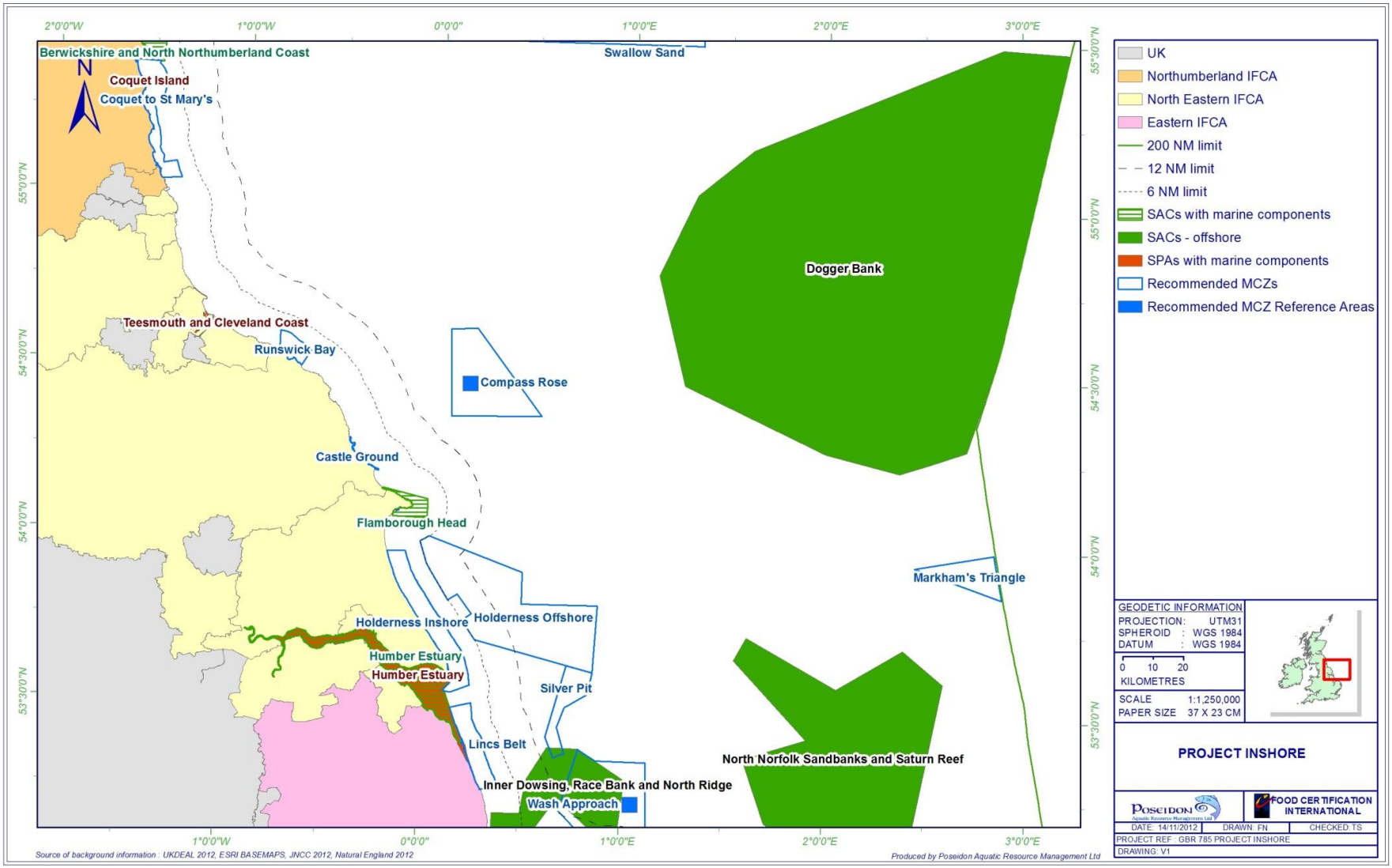

Figure B.7: SACs, SPAs and recommended MCZs within the North Eastern IFCA

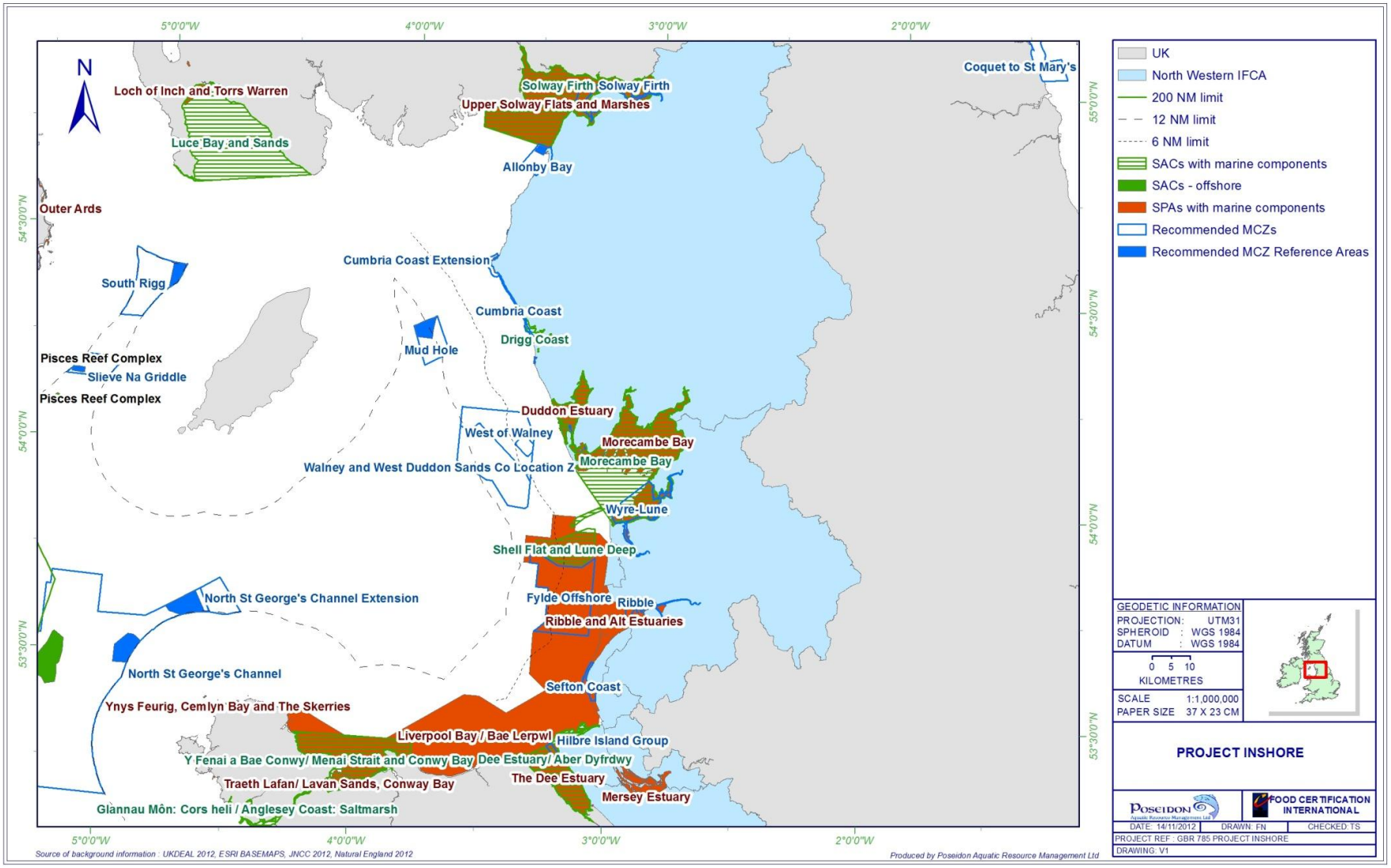

Figure B.8: SACs, SPAs and recommended MCZs within the North Western IFCA

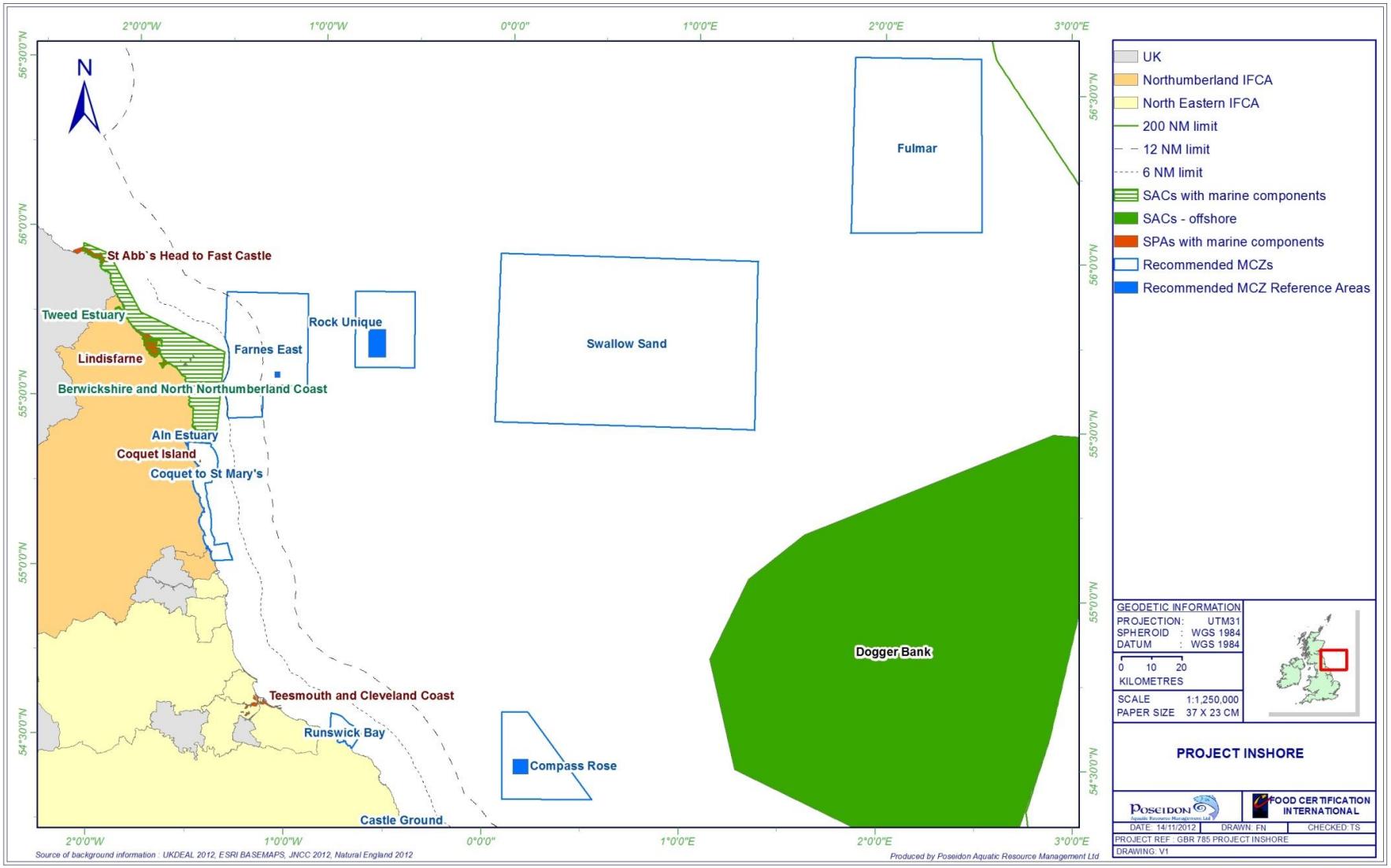

Figure B.9: SACs, SPAs and recommended MCZs within the Northumberland IFCA

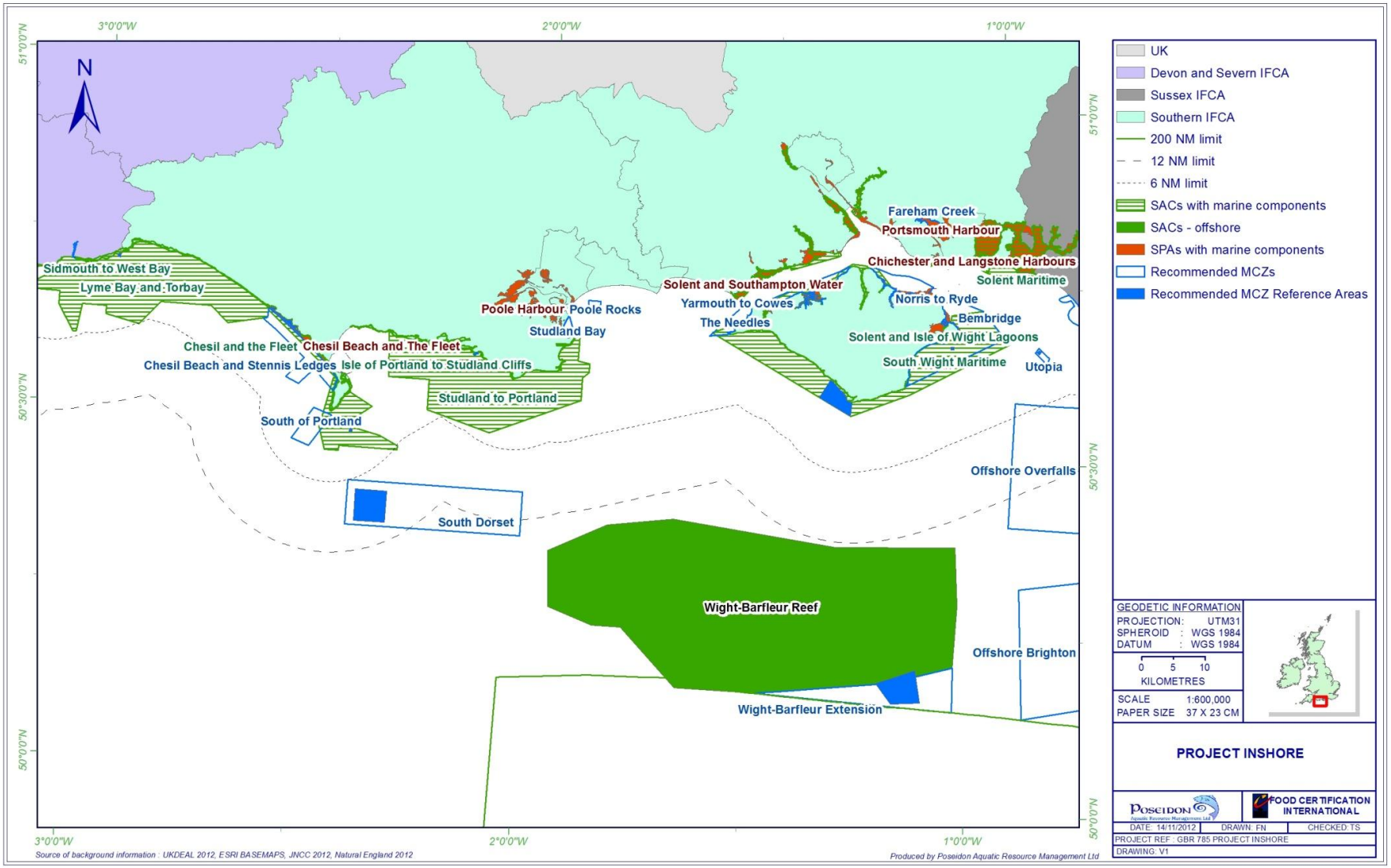

Figure B.10: SACs, SPAs and recommended MCZs within the Southern IFCA

C. Qualifying features and site names for English inshore and offshore SACs designated for habitat features (Source: JNCC, 2012)

Marine habitat interest feature	#	Site name
English Inshore SACs		
Reefs	20	Berwickshire & North Northumberland Coast; Fal & Helford; Flamborough Head; Haisborough, Hammond & Winterton; Inner Dowsing, Race Bank & North Ridge ; Isles of Scilly Complex; Lands End & Cape Bank; Lizard Point; Lundy; Lyme Bay & Torbay; Morecambe Bay; Plymouth Sound & Estuaries; Severn Estuary/ Môr Hafren; Shell Flat & Lune Deep; Solway Firth; South Wight Maritime; Start Point to Plymouth Sound & Eddystone; Studland to Portland; Thanet Coast; The Wash & North Norfolk Coast
Mudflats & sandflats not covered by seawater at low tide	17	Alde, Ore & Butley Estuaries; Berwickshire & North Northumberland Coast; Braunton Burrows; Dee Estuary/ Aber Dyfrdwy; Drigg Coast; Essex Estuaries; Fal & Helford; Humber Estuary; Isles of Scilly Complex; Margate & Long Sands; Morecambe Bay; Plymouth Sound & Estuaries; Severn Estuary/ Môr Hafren; Solent Maritime; Solway Firth; The Wash & North Norfolk Coast; Tweed Estuary
Sandbanks which are slightly covered by sea water all the time	15	Essex Estuaries; Fal & Helford; Haisborough, Hammond & Winterton; Humber Estuary; Inner Dowsing, Race Bank & North Ridge; Isles of Scilly Complex; Lundy; Margate & Long Sands; Morecambe Bay; Plymouth Sound & Estuaries; Severn Estuary/ Môr Hafren; Shell Flat & Lune Deep; Solent Maritime; Solway Firth; The Wash & North Norfolk Coast
Atlantic salt meadows	13	Alde, Ore & Butley Estuaries; Chesil & the Fleet; Dee Estuary/ Aber Dyfrdwy; Drigg Coast; Essex Estuaries; Fal & Helford; Humber Estuary; Morecambe Bay; Plymouth Sound & Estuaries; Severn Estuary/ Môr Hafren; Solent Maritime; Solway Firth; The Wash & North Norfolk Coast
Estuaries	12	Alde, Ore & Butley Estuaries, Dee Estuary/ Aber Dyfrdwy; Drigg Coast; Essex Estuaries; Fal & Helford; Humber Estuary; Morecambe Bay; Plymouth Sound & Estuaries; Severn Estuary/ Môr Hafren; Solent Maritime; Solway Firth; Tweed Estuary
Annual vegetation of drift lines	8	Chesil & the Fleet; Dee Estuary/ Aber Dyfrdwy; Dungeness; Isle of Portland to Studland Cliffs; Minsmere to Walberswick Heaths & Marshes; Orfordness – Shingle Street; Sidmouth to West Bay; Solent Maritime
Submerged or partially submerged sea caves	6	Berwickshire & North Northumberland Coast; Flamborough Head; Lundy; Lyme Bay & Torbay; South Wight Maritime; Thanet Coast
Large shallow inlets & bays	5	Berwickshire & North Northumberland Coast; Fal & Helford; Morecambe Bay; Plymouth Sound & Estuaries; The Wash & North Norfolk Coast
Coastal lagoons	4	Chesil & the Fleet; Morecambe Bay; Solent & Isle of Wight Lagoons; Solent Maritime
Mediterranean & thermo-Atlantic halophilous scrubs	4	Chesil & the Fleet; Essex Estuaries; North Norfolk Coast; The Wash & North Norfolk Coast
English Offshore SACs (out to 200NM)		
Reefs	6	Haig Fras; Haisborough, Hammond & Winterton; Inner Dowsing, Race Bank & North Ridge; North Norfolk Sandbanks & Saturn Reef; Pisces Reef Complex; Wight-Barfleur Reef
Sandbanks which are slightly covered by sea water all the time	5	Bassurelle Sandbank; Dogger Bank;,Haisborough, Hammond & Winterton; Inner Dowsing, Race Bank & North Ridge ; North Norfolk Sandbanks & Saturn Reef
Submarine structures made by leaking gases	1	Croker Carbonate Slabs

D. Risk Matrix developed by the Fisheries in European Marine Sites Implementation Group presenting risk categories for fishing gears and marine habitat features (MMO, 2012)

Key	
	Where it is clear that the conservation objectives for a feature (or sub-feature) will not be achieved because of its vulnerability to a type of fishing, - irrespective of feature condition, level of pressure, or background environmental conditions in all EMSs where that feature occurs - suitable management measures will be identified and introduced as a priority to protect those features from that fishing activity or activities
	Where there is doubt as to whether conservation objectives for a feature (or sub-feature) will be achieved because of its vulnerability to a type of fishing, in all EMSs where that feature occurs, the effect of that activity or activities on such features will need to be assessed in detail at a site specific level. Appropriate management action should then be taken based on that assessment.
	Where it is clear that the achievement of the conservation objectives for a feature is highly unlikely to be affected by a type of fishing activity or activities, in all EMSs where that feature occurs, further action is not likely to be required, unless there is the potential for in combination effects .
	For gear types where there can be no feasible interaction between the gear types and habitat features, a fourth categorisation of blue is used, and no management action should be necessary

EMS feature		Fishing gear																		
					Dredges				Intertidal handwork				Drift nets		Seine nets	Lines				
Feature	Sub-feature	Demersal otter trawl	Beam trawl	Pelagic trawl	Scallops	Other shellfish	Suction	Tractor	From vessel	From land	Pots / traps	Fixed nets	Demersal	Pelagic	Beach seines / ring nets	Longlines - demersal	Longlines - Pelagicp	Handlines/ jigging/trol ling	Commercial diving
Subtidal sandbanks	Sand (high energy)																		
	Subtidal gravel and sand																		
	Subtidal muddy sand																		
	Seagrass																		
	Maerl																		
Estuaries	Mussel bed on boulder and cobble skears																		

EMS feature		Fishing gear																		
					Dredges				Intertidal handwork				Drift nets		Seine nets	Lines				
Feature	Sub-feature	Demersal otter trawl	Beam trawl	Pelagic trawl	Scallops	Other shellfish	Suction	Tractor	From vessel	From land	Pots / traps	Fixed nets	Demersal	Pelagic	Beach seines / ring nets	Longlines - demersal	Longlines - Pelagicp	Handlines/ jigging/trolling	Commercial diving
	Estuarine rock (boulder, cobble and bedrock)																		
	Estuarine fish community																		
	Subtidal mud																		
Mudflats and sandflats not covered by sea at low tide.	Intertidal mud																		
	Intertidal mud and sand																		
	Intertidal gravel and sand																		
	Intertidal sand (high energy)																		
	Mussel beds on mixed and sandy sediments																		
Large shallow inlets and bays	Intertidal mixed sediments																		
	Subtidal mixed sediments																		
	Brittlestar beds																		
Lagoons	Coastal lagoons																		
	Subtidal coarse sediment (high energy)																		
	Tideswept communities																		
Reef	Intertidal bedrock reef																		

EMS feature		Fishing gear																		
					Dredges				Intertidal handwork				Drift nets		Seine nets	Lines				
Feature	Sub-feature	Demersal otter trawl	Beam trawl	Pelagic trawl	Scallops	Other shellfish	Suction	Tractor	From vessel	From land	Pots / traps	Fixed nets	Demersal	Pelagic	Beach seines / ring nets	Longlines - demersal	Longlines - Pelagicp	Handlines/ jigging/trolling	Commercial diving
	Intertidal boulder and cobble reef																		
	Intertidal chalk reef																		
	Subtidal bedrock (including chalk) reef																		
	Subtidal boulder and cobble reef																		
	Sabellaria spp reef																		
	Subtidal mussel bed on rock																		
	Kelp forest communities																		
Atlantic saltmeadows	Saltmarsh spp, Salicornia and Seablite																		
Annual vegetation of driftlines	Annual vegetation of driftlines																		
Submerged or partially submerged sea caves	Intertidal sea caves																		
	Subtidal sea caves																		