



Project Inshore

Stage 3 - Strategic
Sustainability Review

Kent & Essex Inshore
Fisheries & Conservation
Authority

Report prepared by



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North Western IFCA
Southern IFCA
Sussex IFCA

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Glossary

ACOM	Advisory Committee (ICES)
ASCOBANS	Agreement on the Conservation of Small Cetaceans of the Baltic, North East Atlantic, Irish and North Seas
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
FIP	Fisheries Improvement Project
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 (See appendix 6 for further explanation of MSC terminology)
PO	Producer Organisation
PSA	Productivity Susceptibility Analysis



RAC	Regional Advisory Council
RBF	Risk based Framework
SAC	Special Areas of Conservation
SAGB	Shellfish Association of Great Britain
SG	Scoring Guidepost (See appendix 6 for further explanation of MSC terminology)
SI	Scoring Issue (See appendix 6 for further explanation of MSC terminology)
SICA	Scale Intensity Consequence Analysis
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

1. Project Inshore is an ambitious initiative led by Seafish, Marine Stewardship Council (MSC) and Shellfish Association of Great Britain (SAGB) launched in June 2012 which seeks to work towards an environmentally sustainable future for English inshore fisheries.
2. Project Inshore uses the Marine Stewardship Council Standard as a framework by which to review the performance of fisheries around the English coast. For some fisheries there may be market or other motivations for seeking MSC certification, however for other fisheries – perhaps particularly lower value, smaller fisheries – it may be less cost effective to pursue certification. Regardless of whether product certification is seen as an objective for the fishery, comparing the fishery against the MSC framework, is a useful exercise in reviewing the current status and management within a fishery.
3. This report provides Strategic Sustainability Reviews for Kent & Essex IFCA.
4. The results of the Project Inshore MSC pre-assessment process for English Inshore Fisheries indicates that some stocks fished by Kent & Essex inshore fishermen are already ‘well managed’ and likely to meet the Good Environmental Status Requirements, such as Maximum Sustainable Yield. These fisheries are identified as being in a position to proceed with full MSC assessment (at least when fished by certain gears).
5. Should there be an interest in pursuing MSC certification for these fisheries, the report outlines the steps needed in preparation for full assessment and the benefits of increasing the size of the client group (typically up to the spatial range of the stock) for any full assessment.
6. Most of these stocks which have been recommended for full MSC assessment are managed by means of EU quotas, set by means of a Long Term Management Plan, with regular and routine scientific advice provided by ICES (of which CEFAS scientists are actively involved in). The only other fishery in this group within Kent & Essex is the Thames cockle fishery where management responsibility is clearly devolved to Kent & Essex IFCA.
7. All other stocks are identified as having “gaps” meaning that the MSC pre-assessment has identified gaps.
8. Before seeking to advise on how to address those gaps, Stage 3 of Project Inshore first considers the critical question of where responsibility lies for addressing those gaps, and seeks to focus IFCA management attention of those fisheries which they are best placed to lead on management of. As scoping exercise has been carried out on the locally important fisheries of the district to identify those, where there are management gaps, where management is not being addressed at a higher jurisdiction (i.e. DEFRA / EU) and finally, but importantly where fishery patterns or life history characteristics support a rationale to justify inshore management.
9. The locally important fisheries which Kent & Essex IFCA are best placed to lead on stock management are Mussel, Whelk, Lobster and Native Oyster, as well as the aforementioned cockle.
10. IFCAs are facing increasing demands on their time and resources with the management of European Marine Sites (EMS). IFCA-led fisheries management is therefore only likely to occur for priority species.
11. The key gap to address in most of these fisheries relates to the need for fisheries specific stock management, featuring understanding of stock status to enable the development of adaptive stock management defined by management rules. From an MSC point of view this bridges the requirements of both P1 and P3.
12. In many of these fisheries that have received less management focus, stock definition is an important pre-requisite of management action. Definitive proof of stock discreteness would require studies such as tagging and genetic analysis. However the results may still prove inconclusive and the cost of the research on an individual fishery may not be justified. For this reason proof of genetic discreteness is not a requirement for MSC assessment – or good



management.

13. 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 and to guide management actions. Regular review and evaluation of the management of the fishery would be expected to examine the working hypothesis of stock definition as part of its remit.
14. The report provides Kent & Essex IFCA with guidance in the development of this type of adaptive stock management for those stocks or species identified above.
15. A key issue is the time and resources required to develop and agree a fishery management plan. This may not be realistic for IFCAs given their current and projected workload. Therefore an alternative approach to the development the necessary fisheries management is under a Fishery Improvement Project (FIP) that can be funded and supported by other parties, such as industry. The IFCA would act in an advisory capacity during the potentially lengthy analysis, development and consultative process. The management plan would likely require IFCA endorsement, which may require the adaptation of existing bylaws or adoption of new bylaws, and subsequent IFCA enforcement and operation.
16. Stage 4 of Project Inshore will continue until 2015. During this stage 4 the focus of the MSC English Fisheries Outreach team will be on providing support for those fisheries wishing to move into full MSC assessment, but may also facilitate the development of FIPs.
17. For all other stocks (including some locally important fisheries such as cod, sole, herring, mackerel, plaice and thornback ray) the Kent & Essex IFCA still play an important role as key stakeholder and a partner in management. The IFCA remains responsible for enforcement of relevant legislation on these fisheries within their jurisdiction. Additionally, the IFCA have the power to act to further safeguard the resource, should they wish, such as through the introduction of technical measures, however, though this may contribute to responsible stewardship of the resource, it should be recognised that the overall success of stock management – namely whether or not the stock is overexploited – is beyond the IFCAs control.



1. Introduction

1.1. Project Inshore background

Project Inshore is an ambitious initiative led by Seafish, in partnership with Marine Stewardship Council (MSC) and Shellfish Association of Great Britain (SAGB) launched in June 2012, which seeks to work towards an environmentally sustainable future for English inshore fisheries. The then 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 and used the results of these pre-assessments 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) undertook stages 1 & 2 of Project Inshore, which concluded with the publication of MSC pre-assessment findings. For the advisory work required for Stage 3 of Project Inshore, Acoura Ltd has assembled a team comprised of many of the team members from stages 1 & 2. The Stage 3 project team comprises of independent experts from Marine Institute (Ireland), PAH Medley, Nautilus Consultants, Poseidon Aquatic Resource Management Ltd and TD Southall.

1.2. Project Inshore Stages

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 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) to facilitate English inshore fisheries moving towards a level judged sustainable by the MSC standard.

The output of stage 1 was delivered in October 2012. The output of Stage 2 was delivered in June 2013. Both Stage 1 & 2 outputs are now publicly available on-line from the Seafish website¹.

1.3. Report Aims & Objectives

This report forms an output of Stage 3 of Project Inshore and provides a Strategic Sustainability Review for the Kent & Essex IFCA. The reporting outputs of stage 1 and stage 2 of Project Inshore provided national overview documents for English Inshore Fisheries. By contrast, this report is tailored to the requirements of a single IFCA (Kent & Essex). A further 8 such reports² are being



produced for other English IFCA districts as part of this third stage of Project Inshore.

This report therefore seeks to provide a Strategic Sustainability review for Kent & Essex IFCA. In doing so this seeks to:

- Recap the key characteristics of the IFCA district and the fisheries within the district.
- Provide a review of the findings of the MSC pre-assessment process for fisheries in the region that was carried out in stage 2 of Project Inshore.
- Highlight the process and next steps required for those fisheries identified as ready for full MSC assessment
- Provide a strategic structure to guide future management actions for those fisheries where the IFCA is responsible for stock management, to enable fisheries to move towards a level deemed sustainable by the MSC standard.
- Highlight those fisheries where stock management initiatives need to be taken at a greater scale of management jurisdiction.

This report is advisory only and is intended to provide a blueprint for developing local stock management initiatives and action where this is deemed appropriate.

¹ <http://www.seafish.org/industry-support/fishing/project-inshore>

² Similar work was undertaken for the Sussex district as part of the 'Navigating the Future' project and is therefore not covered by Project Inshore.

2. IFCA Profile

2.1. Governance structures

The Marine and Coastal Access Act (MCAA) 2009 establishes and sets out the responsibilities and powers for the Inshore for the Inshore Fisheries and Conservation Authorities. In terms of Governance, the Secretary of State retains oversight of all IFCA operations, including byelaw development and is charged with providing guidance on best practice that the IFCAs should follow.

The Kent & Essex IFCA was established under the ‘Kent & Essex Inshore Fisheries and Conservation Order 2010’. The IFCA took on its full statutory role from the 1st April 2011. The Order defines the landward and seaward extent of the district. The district covers a sea area of some 3,412 km², extending from Rye Bay in Kent to the River Stour in on the Northern boundary of Essex, taking the whole of the Thames Estuary and the rivers draining into the Thames such as the Medway, Blackwater, Crouch and Colne. As the 1983 baseline from which the seaward 6nm jurisdiction is measured takes in various drying sandbanks, the IFCA district extends in some cases out as far as 15nm offshore.

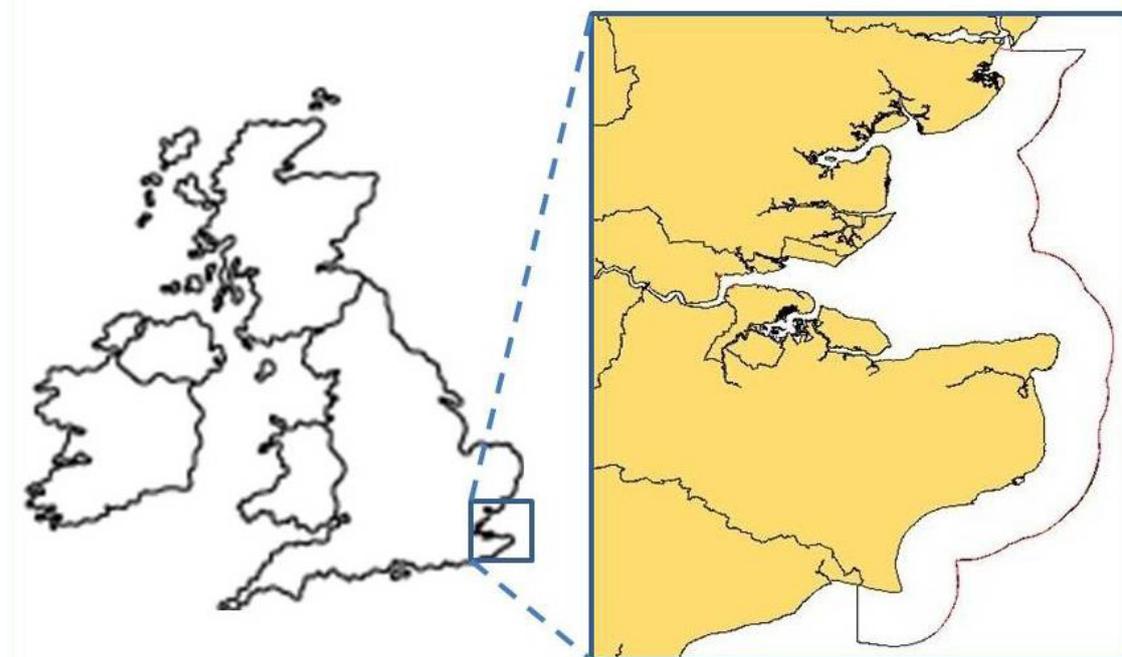


Figure 1:

Location of Kent & Essex IFCA and IFCA district Boundaries.

Source: IFCA boundary image from IFCA Boundary Limits³

2.1.1. The IFCA Committee

The IFCA committee is made up by representatives of both Kent and Essex County Councils and representatives from Southend, Thurrock and Medway Borough Councils. In addition the committee includes representatives of Natural England (NE), the Environment Agency (EA) and the UK Marine Management Organisation (MMO). The MMO also appoints a further 9 stakeholder representatives including commercial (various sectors) and recreational fishers. In addition, Kent County Council provides administrative support (such as legal, financial, HR and constitutional). The committee members' role is to decide and comment on overall strategy and direction and decide on budgets and staffing levels etc. Interestingly, in the context of Project Inshore, the IFCA annual plan also notes that it is the role of the committee members to decide on “stock management measures”. As will be seen in the context of later discussions, this clearly indicates a roll for the IFCA in ‘stock management’.

2.1.2. IFCA Staff

In terms of governance, it is the officers and administration staff, lead by the Chief IFC Officer, which implement the strategic decisions of the Authority (i.e. members) and report back to the committee on a quarterly basis on progress against those strategic goals. KEIFCA employs 12 full

³ http://www.kentandessex-ifca.gov.uk/index.php?option=com_content&view=article&id=84&Itemid=183



time staff, 3 part-time staff and a part time financial advisor. The areas of staff responsibility are set out in the Annual Plan, encompassing all aspects from enforcement, science and conservation to administration and PR. Additionally, the IFCA strategically seeks to ensure that staff members are able to perform secondary duties. Examples of the types of duties that may be added to a staff members remit alongside their primary role are enforcement, habitat mapping, data compilation and entry (GIS), communications and other research. In this way the capacity of the IFCA staff group is enhanced.

2.2. Strategic Objectives

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 to better ensure a co-ordinated approach to management. Inshore Fisheries and Conservation Authorities replaced the existing Sea Fisheries Committees from April 2011 and in doing so the remit was extended beyond simply managing inshore fisheries, to take on new marine conservation duties as set out in the Marine and Coastal Access Act (MCAA) 2009. The national vision for IFCAs, which forms the key strategic objective which all IFCAs share 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”.

Below this overarching vision there are seven nationally-agreed success criteria (with associated high-level objectives, outcomes and performance indicators) which have been agreed and are again applicable to all IFCAs:

1. IFCAs have sound governance and staff are motivated and respected
2. Evidence based, appropriate and timely byelaws are used to manage the sustainable exploitation of sea fisheries resources within the District
3. A fair, effective and proportionate enforcement regime is in place
4. IFCAs work in partnership and are engaged with their stakeholders
5. IFCAs make the best use of evidence to deliver their objectives
6. IFCAs support and promote the sustainable management of the marine environment
7. IFCAs are recognised and heard

The above criteria are set within a timeframe up to 2015. In addition, Article 153 of the Marine and Coastal Access Act (2009) sets out the duties for all IFCAs. These are restated in the Kent & Essex IFCA annual plan:

- 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.

The Kent & Essex IFCA annual plan sets out work priorities under each of the seven success criteria outlined above. This details how the high level objectives will be translated into local action. In addition, the IFCA has produced a booklet, available for download from the IFCA website which accessibly outlines in general terms the long term strategy and approach that the IFCA will take



over the next 5-8 years.

2.3. Capacities & funding

As indicated earlier, in relation to staff, the Kent & Essex IFCA has a wide and appropriate range of staff capacities. K&EIFCA rents 2 offices in Ramsgate, Kent (HQ) and a satellite office in Brightlingsea, Essex. The IFCA owns 2 road vehicles and 2 all terrain vehicles for shore based work, such as cockle surveys.

At sea, KEIFCA has 2 fishery patrol vessels. A 16m patrol vessel, the 'Ken Green' with auxiliary, ramp launched RIB. This is based in Ramsgate with a 4 man crew. One of the priorities set out in the 2013-2014 annual plan is the replacement of the 'Ken Green' and this process is intended to be completed in 2014. The second vessel 'Tamesis' is a 12m catamaran, based in at Brightlingsea, with a crew of two to three (augmented for certain enforcement of monitoring duties). 'Tamesis' also has a RIB for boarding at sea.

Details of the K&EIFCA budget are set out in the annual report. This information is publically available on the IFCA website. The most recent published accounts are for the year ending April 2012. These show an overall operating budget of just less than £873,300.

2.4. Existing activities, obligations & commitments

In the context of Project Inshore Stage 3, which looks at strategic future direction for IFCA fisheries management actions, it is important to first consider the existing commitments that currently shape much of the IFCA's working priorities and which are over and above the routine operation of enforcement, control, research and monitoring that is the core business of any fisheries management authority. The IFCA priorities are set out in the Annual Plan. These are detailed below:

2.4.1. European Marine Sites

Following a Ministerial review, all IFCA's have been tasked to make use of the powers invested by the Marine and Coastal Access Act 2009 to make byelaws that protect sensitive designated features (specifically in SACs and SPAs which form part of the Natura 2000 network) from activities that could impact these features as identified by the European Marine Sites Implementation Group. This requires the introduction of legislation to protect "High Risk" features by 2013, followed by consideration of the need to protect "medium and low risk" sites by 2016. In all cases this will need to be supported by consultation and impact assessment work. The Kent & Essex IFCA 2013-2014 Annual Plan makes the point that this significant work stream was unforeseen when establishing the current 4 year budget allocation and is not featured as an objective under the 7 success criteria in the DEFRA guidance to IFCA's. Kent & Essex IFCA has appointed a new part time Project Officer specifically to oversee this work.

2.4.2. Marine Conservation Zones (MCZs)

In addition to the Natura 2000 sites referred to above, four of the proposed MCZs announced by DEFRA are in the Kent & Essex District. Kent & Essex IFCA have responsibility for developing appropriate management measures for these sites and a duty under Section 154 of the Marine and Coastal Access Act, 2009 to further the conservation objectives and, where necessary, introduce byelaws regulating fishing activity. This involves a stepwise process, working with partners, such as Natural England, to (i) assess any immediate risk to the designated features of these sites, (ii) undertake a review of the protected features of the MCZ sites and of activities occurring in the vicinity of those sites and (iii) develop a management plan for each MCZ site and agree a timetable for implementation.

2.4.3. Byelaw Review Process

The other work stream for the current fishery planning period is the major task of carrying out a review of all byelaws in the district. This task is made both more pressing and more complex by the change of district boundaries that occurred in the transition from Sea Fisheries Committee to IFCA, meaning that Kent & Essex have adopted small areas in the North and South of the district with



different sets of byelaws adopted from either Southern or Eastern Sea Fisheries Committees.

It is hoped that some of the outputs of Project Inshore may be relevant to the byelaw review process, both in terms of considering priority areas and considering the needs for adaptive stock management.

2.4.4. Other Stated Priorities:

Other stated priorities in the Kent & Essex IFCA annual plan are:

- Delivering KEIFCA’s risk-based enforcement framework
- Establishing and building on the KEIFCA Communication Strategy
- Patrol Vessel ‘Ken Green’ replacement
- Implementing the KEIFCA angling strategy

Some of these could be seen as more routine operations, reflective of continuing efforts to improve internal systems and operations, but are none the less indicative of the significant workload that any IFCA is committed, even before additional considerations of introducing adaptive inshore stock management are discussed. Future proposals, timelines and funding discussions should be framed in the context of these existing commitments.

2.5. District Fisheries profile

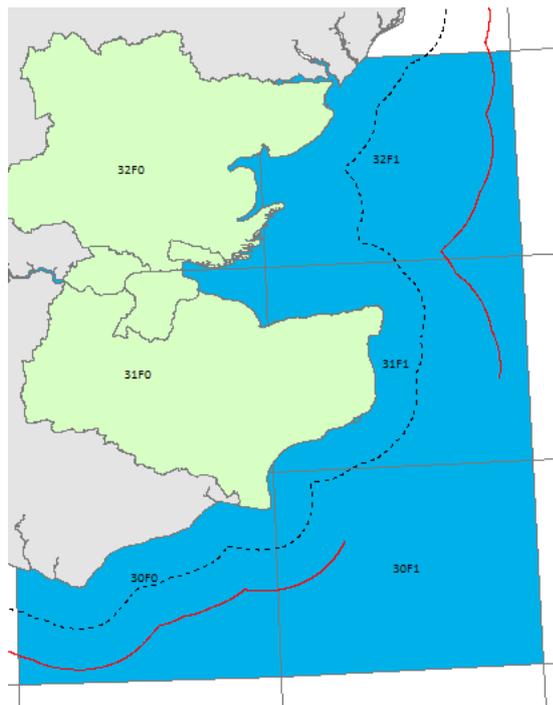
2.5.1. Key species

Stage 1 of Project Inshore presents a national overview of key fisheries statistics. This includes a section profiling the key fisheries of the Kent & Essex district. A section of the report (1.2.1 - Data Uncertainties and Information Constraints) points out there are a number of problems when seeking to interpret national data to obtain an accurate picture of inshore landings, within the IFCA boundary. This discusses the challenge of defining what is ‘inshore’ and the limitations in landings data for the inshore fleet in particular. The best initial estimate of inshore landings is then taken from the MMO national landings database of all landings caught within the overlapping ICES statistical rectangles – a much larger area than the IFCA area.

Figure 2:

Chart showing IFCA seaward limit and overlapping ICES statistical rectangles

Source: Project Inshore Stage 1 report



Even within this area there are problems with the data estimates, with some landings not being represented. Most notably in the context of Kent & Essex, the absence of any landings of cockles or mussels in the MMO statistics is surprising – as these are 2 of the key fisheries of the district with cockle landings representing the highest value of any species landed in the district. One possible reason for this anomaly is that landings from Regulating Order Fisheries are reported to DEFRA, rather than to MMO, but this still does not fully explain why these landings do not feature in the national database. The landings of cockle from the Thames Estuary alone (as reported to DEFRA in the Regulating Order returns) are far higher than the figure that is eventually reported in national statistics.

There are also problems with estimating landings for inshore vessels. Many under 10m vessels which are not required to fill in log books do submit monthly shellfish returns, but

this data in many cases does not seem to be reflected in the national database. Instead it is the



information from Registration of Buyers and Sellers (sales note returns) that is thought to form the main tool for estimating inshore landings. In some cases inshore landings do not get sold through these channels, often quite legitimately.

Part of the consideration for this Stage 3 of Project Inshore will be to consider how best to obtain the required information for inshore stock management. An accurate understanding of catches is an essential pillar of this along with effort and other time series data (see later in this report) and is therefore likely to be a key determinant of success of any future local stock management initiatives.

The data that is available shows that along with the aforementioned cockles, the mainstays of regional catches (by value) are scallops, sole, whelk, plaice, cod, bass, brown crab and thornback ray. Of course other species maybe more locally important to some communities in the district, which may not be reflected in the wider statistics. These include species such as native oyster and mussel.

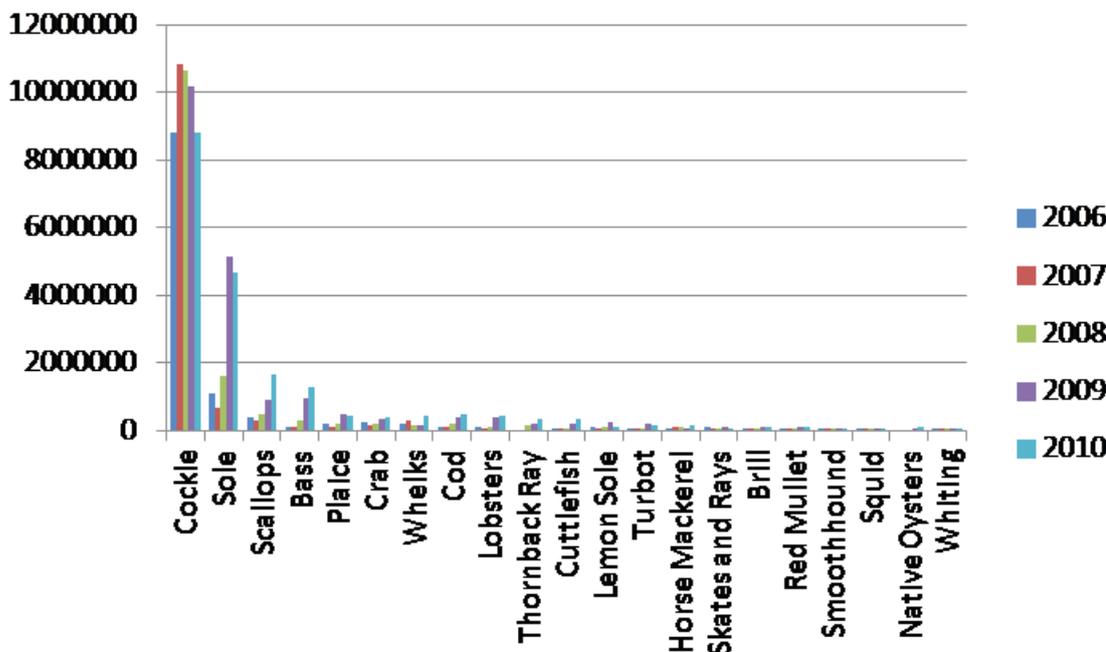


Figure 3:
Landing Value of catches from IFCA rectangles overlapping Kent & Essex IFCA district.

Data: MMO national Landing Statistics Database (cockle figure based on local information)

2.5.2. Fleet Characteristics

The data constraints highlighted above also apply when seeking to draw an empirical interpretation of the fleet operating in the Kent & Essex district. In particular it is likely that the statistics are distorted by the operation of larger vessels operating beyond the IFCA boundary, but which are none the less present in the statistics of vessel catches in the overlapping ICES rectangles.

The fleet fishing within the Kent & Essex IFCA district is made up of mainly under 10m boats, fishing single day trips largely within the IFCA district – although there is no restriction on fishing beyond the IFCA district and many do. IFCA byelaws restrict fishing within the district to vessels below 17m and 221 Kw⁴. According to the Kent & Essex IFCA's own estimates⁵, there are around 275 licensed fishing vessels in the district, providing full time employment for over 300 people fishing from the main fishing ports of Dungeness, Folkestone, Ramsgate,

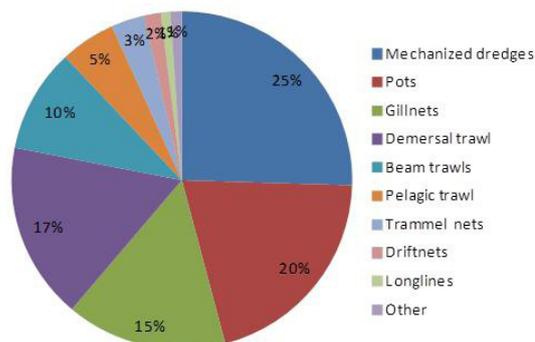


Figure 4:
Approximate proportion of fishing gears used in the Kent & Essex IFCA

Source: Project Inshore Stage 1 report (based MMO fisheries statistics database)



Whitstable, Leigh-on-Sea, West Mersea and Harwich. Although most vessels land to port with some form of harbour facilities, there remains a small number of beach launched vessels (Herne Bay, Deal, Hythe and Dungeness).

A range of static and mobile gears are used in Kent & Essex. Typically trawlers and netters land a range of finfish such as sole, plaice, dab, bass, cod, herring, sprat and thornback rays. A significant number of inshore vessels use pots to target whelks, lobster and, to a lesser extent, crab. Finally towed dredges are used to target scallops, oysters, cockle and mussel.

Although from its outset, Project Inshore has been focussed on fisheries for food, as opposed to fishmeal or recreation, it is important to note that the role of the IFCA does not draw this distinction and as such management and monitoring of recreational activities in particular forms an important element of the IFCA work load. In Kent & Essex recreational angling occurs from a wide range of locations (both on shore and at sea) and for a wide range of species. Key species of recreational angling importance in the area are bass, thornback ray, smooth hound, grey mullet, cod and whiting. These fisheries and the on-shore business and regional economic benefit that they provide, mean that they are rightly an important consideration for the IFCA.

2.6. District Ecosystem Profile

2.6.1. Ecosystem Overview

The marine ecosystem of the Kent & Essex IFCA district is rich and diverse. The ecosystem is dominated by the Thames Estuary and the tidal movements associated with such a large estuary. In addition there are many smaller but important tidal rivers, mud flats, sand flats, salt marshes and extensive areas of shingle. The estuaries of the Kent & Essex district provide spawning and nursery grounds for many commercial species such as bass, Dover sole and rays, playing an important role in supporting the offshore fisheries of the wider North Sea.

The mud flats which dominate much of the intertidal areas within the district are feeding grounds for a diverse range of internationally important migrant bird populations. This in turn has led to many of these areas being designated for special protection (see below). Additionally large marine mammals such as dolphins, porpoises and seals are either resident or seasonal visitors to the district. The district also contains a significant number of sandbanks – some of which are so significant that they have even contributed to the extension of the IFCA boundary. The sandbanks have a dynamic nature characterised by significant movements over time, meaning that they tend to be dominated by opportunistic species able to cope with the dynamic nature of the substrate, such as polychaete worms and amphipods. In less dynamic areas, including the lower slopes of the banks or troughs crustacea, molluscs and echinoderms are also found, which in turn support more mobile epifauna such as commercially important fish and shellfish species.

2.6.2. Local Designations

There are a large number of nature conservation designations in the Kent & Essex district. The majority of these are SPAs which support large populations of internationally important wading birds. Additionally, there are marine SACs which provide important habitats for a number of species.

It should also be noted that a number of candidate sites have been identified which may go on to formalised designation in the future, these include Outer Thames (cSPA) and Dungeness to Pett Level (cSAC).

⁴ Applies in the majority of the district (Area A) – some variation in segments to the north and south which were previously under the jurisdiction of Sussex and Eastern Sea Fisheries Committees, prior to the boundaries being redrawn under the Marine and Coastal Access Act (2009).

⁵ http://www.kentandessex-ifca.gov.uk/index.php?option=com_content&view=category&layout=blog&id=42&Itemid=43



Name	Designation	Features
Benfleet and Southend Marshes	SPA	A wetland of international importance with wading and migratory birds such as Dunlin <i>Calidris alpina alpina</i> , Ringed Plover <i>Charadrius hiaticula</i> , Oystercatcher <i>Haematopus ostralegus</i> etc.
Blackwater Estuary	SPA	A wetland of international importance with a range of migratory waterfowl such as Great Crested Grebe <i>Podiceps cristatus</i> , Golden Plover <i>Pluvialis apricaria</i> , Ruff <i>Philomachus pugnax</i>
Colne Estuary	SPA	A wetland of international importance with a range of migratory waterfowl such as Black-tailed Godwit <i>Limosa limosa islandica</i> , Dunlin <i>Calidris alpina alpina</i> , Lapwing <i>Vanellus vanellus</i>
Crouch and Roach Estuaries	SPA	Dark-bellied Brent Goose <i>Branta bernicla bernicla</i>
Dengie	SPA	A wetland of international importance with a range of migratory waterfowl such as Black-tailed Godwit <i>Limosa limosa islandica</i> , Dunlin <i>Calidris alpina alpina</i> , Lapwing <i>Vanellus vanellus</i>
Dungeness	SAC	Annual vegetation of drift lines, Perennial vegetation of stony banks
Essex Estuaries	SAC	Estuaries, Mudflats and sandflats not covered by seawater at low tide, Salicornia and other annuals colonizing mud and sand, Spartina swards (<i>Spartina maritima</i>), Atlantic salt meadows (<i>Glaucopuccinellietalia maritima</i>) Mediterranean and thermo-Atlantic halophilous scrubs (<i>Sarcocornetea fruticosi</i>)
Foulness	SPA	A wetland of international importance with a range of migratory waterfowl such as Redshank <i>Tringa totanus</i> , Curlew <i>Numenius arquata</i> , Black-tailed Godwit <i>Limosa limosa islandica</i> etc.
Hamford Water	SPA	A wetland of international importance with a range of migratory waterfowl such as Redshank <i>Tringa totanus</i> , Dunlin <i>Calidris alpina alpina</i> , Lapwing <i>Vanellus vanellus</i> etc.
Margate and Long Sands	SAC	Sandbanks which are slightly covered by sea water all the time
Medway Estuary and Marshes	SPA	A wetland of international importance with a range of wading and migratory birds such as Avocet <i>Recurvirostra avosetta</i> , Little Tern <i>Sterna albifrons</i> , plovers etc.
Thames Estuary and Marshes	SPA	A wetland of international importance with a range of wading and migratory birds such as Redshank <i>Tringa totanus</i> , Black-tailed Godwit <i>Limosa limosa islandica</i> , etc.
Thanet Coast and Sandwich Bay	SPA	Turnstone <i>Arenaria interpres</i> and migratory birds
The Swale	SPA	A wetland of international importance with a range of wading and migratory birds such as Avocet <i>Recurvirostra avosetta</i> , Bar-tailed Godwit <i>Limosa lapponica</i> , plovers etc.

Table 1:

Natura 2000 marine sites in the Kent & Essex IFCA district & qualifying features

In addition to the sites listed above a further 4 Marine Conservation Zones (MCZs) in the Kent & Essex district were announced in November 2013 designed to contribute to a network of Marine Protected Areas in English seas. This followed an extensive period of consultation, and regional recommendations. The Kent & Essex IFCA region fell within the Balanced Seas, regional consultation project⁶. The newly announced MCZs in Kent & Essex are:

- Blackwater, Crouch, Roach, and Colne Estuary
- Medway Estuary
- Thanet Coast
- Folkestone Pomerania
- (A decision on a fifth MCZ in Hythe Bay has been deferred until early 2014).

⁶ The balanced Sea's project Website has now been archived: <http://webarchive.nationalarchives.gov.uk/20120502155440/http://www.balancedseas.org/>



3. Stage II Pre-assessment Findings

3.1. Strategic Summary of Stage II findings

The following section (3.1) is a slightly adapted version (for a Kent & Essex IFCA context) of the summary findings presented in the Project Inshore Stage 2 report. This seeks to summarise the main messages and conclusions of the pre-assessment scoring exercise – but this does not go into recommendations:

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 the management of English inshore 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.

3.1.1. Principle 1

Many inshore resources targeted by fishermen in the Kent & Essex district have poorly defined stock boundaries. This undermines attempts to implement good management and leads to uncertainty over the most appropriate management jurisdiction. Where stocks are poorly defined, the management authority needs to adopt a working solution, which is both practical and 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, will be defined.

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. Many resources targeted in 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. How to incorporate improved levels of information into more empirical local stock assessment models will be explored later in this report.

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, so some understanding of stock status (standing stock) should be known to inform (and limit) exploitation (as is the case for Thames Estuary cockles).

3.1.2. Principle 2

It is important to highlight that much of the work currently being undertaken by IFCA's to assess the impact of fisheries on local designations should, once completed, reflect positively on scoring for Principle 2. Where management (either local or national) has identified main vulnerable species and habitats and has demonstrated that the impact of fishing of those has been evaluated and appropriate management action taken, then much of the management scores in P2 will



be improved. The pre-assessment scoring exercise carried out in early 2013 did not reflect this exercise, as this is still to be completed and a pre-assessment can only comment on the current situation. But in going forward this is an important point to bear in mind.

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 it 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 Kent & Essex district and beyond 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 fishery wishing to move forward with MSC certification would benefit by developing a fishery specific management policy for ETP species – this is something that could be coordinated at an IFCA level.

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. 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 (such as the case of the spatially restricted Thames cockle dredge fishery).

There is at least the potential for all fishing gears operating in Kent & Essex 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 the stage 2 pre-assessment results 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.

3.1.3. Principle 3

At the national and international level, there is a comprehensive governance and legal framework meaning that overall scores in these areas (the first 4 P3 performance indicators), for all fisheries,



are generally good. Although the commentary in relation to these applies to the EU and UK institutions and legislation, it is applicable to the local IFCA context.

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 the Maritime & Coastal Access Act (2009) now provides IFCA's with more effective tools to actively and adaptively manage inshore fisheries (compared with the previous legislation governing Sea Fisheries Committees), the ability to make informed 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 inshore fisheries in the Kent & Essex district 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 IFCA's. 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 always clear who will take a lead on management. There is a disincentive for local fishery management (IFCA's) 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 IFCA's and with MMO is required to determine an appropriate path for management. This will be discussed further in a separate reporting output of Project Inshore seeking to address more national questions of stock management for more widely distributed stocks.

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 IFCA's 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.

3.2. Kent & Essex Fisheries recommended for MSC assessment

According to the pre-assessment findings for Kent & Essex in stage 2 of Project Inshore – noting



the, in some cases, data limited and therefore precautionary nature of a pre-assessment - there are 3 stocks fished within the district which offer the prospect of almost immediate entry into the MSC full assessment. These are North Sea Sole, North Sea Plaice and Thames Estuary cockle (managed by Regulating Order). The pre-assessment exercise indicates that fisheries on these stocks are likely to pass both MSC Principle 1 (stock status and stock exploitation rules) and MSC Principle 3 (management structures and processes). How fisheries fare in relation to Principle 2 (impact of fisheries on the wider ecosystem) will depend on the gears that are included in the MSC assessment.

The pre-assessment scoring exercise indicates that fisheries for plaice and sole using static gears are likely to score best – in particular drift and trammel nets – indicating a likely pass at MSC full assessment. The indication from the pre-assessment is that gill net fisheries would score more poorly, but this result is mainly due to a lack of information, in particular in relation to catch profiles of other species. It is possible that an exercise to quantify the catch profiles of static gear nets could lead to increased scores. For trawl and beam trawl the level of supporting information to provide evidence that the gear does not pose a risk of serious or irreversible harm to both habitats and bycatch species is likely to be greater – but may still be possible to demonstrate in the longer term. Both plaice and sole are far more widely distributed than the Kent & Essex IFCA boundary, and the Kent & Essex IFCA is not the primary management authority for these species, however this in no way precludes local fishermen from pursuing MSC certification of these fisheries on these stocks. Due to the widely distributed nature of the stocks, there is the potential for a large scale Unit of Certification – for example, including all English Inshore static gear vessels fishing these North Sea stocks. This will be explored further in section 5 of this report.

For the Thames estuary cockle fishery which occurs under the Regulating Order, there is recognition of the stock management and control efforts (MSC Principle 1) and the overall clarity of management processes and decision making (MSC Principle 3). The pre-assessment does highlight some gaps which, if addressed would further enhance MSC scores.

The initial indication from the pre-assessment is that dredge fisheries for bivalves would have a challenge to pass MSC Principle P2, and this remains the default position, however in the case of this fishery, due to the spatial restriction of the fishery (within the Regulating Order) and the fact that it takes place within a designated conservation area and has therefore been subject to an appropriate assessment of environmental impact as part of the licencing process and finally the fact that the conservation features of the conservation designation are understood to be in a favourable status, it is likely that the dredge fishery for cockle within the regulating order may also be in a position to proceed to full MSC assessment.

It is perhaps worth drawing attention in this section to 2 further stocks of finfish which may occasionally feature in the local commercial catch; North Sea haddock and Northern Hake. However, according to MMO statistics the value of both haddock and hake landings in the ICES rectangles which overlap the Kent & Essex IFCA area is negligible (and in the case of Hake, UK vessels have access to only a very small share of the Area IV quota). None the less, aside from the 3 stocks mentioned above (sole, plaice and cockle) these are the only other stocks which are currently judged to be in a position to meet the requirements of Principle 1 & 3 of the MSC⁷. The reason that fisheries on these stocks are not concluded to be in a position for immediate full assessment is due to the perceived impact of those gears on either habitat or the other species caught. In many cases this has been due to a lack of information – in particular of catch profiling, so it may be possible to address some of the P2 issues (at the same time as addressing the P2 issues for sole and plaice). It is therefore certainly possible to envisage English Inshore vessels fishing in the North Sea to have their catches of sole, plaice and haddock being included in a

⁷ A pre-assessment is a snapshot in time (in this case early 2013) and it beyond the scope of the project to continually revisit and update scores to reflect ever changing policy decisions and / or scientific advice. However, in the context of considering the potential for a future inshore multi-species static gear assessment, it would be worthwhile reflecting on the potential to include North Sea cod in the assessment. The latest ICES advice (June 2013) reflected on an increased stock status and this is projected to have increased further by the time of the next advice (expected June 2014), which, may pave the way for its inclusion in any future full assessment.



successful full MSC assessment (although hake would also be possible to include, the value of UK Area IV catches is unlikely to warrant inclusion in an assessment).

Table 2:

Stocks where management clearly defined and currently meeting P1 & P3 and expected to meet P2 for certain gears (in some cases with provision of additional information).

	Species	Stock
Demersal finfish	Haddock	North Sea
	Hake	Northern
	Plaice	North Sea
	Sole	North Sea
Shellfish	Cockle	Thames

3.3. Kent & Essex Fisheries requiring additional action prior to full assessment

Aside from the 5 stocks referred to above, all other stocks and fisheries on those stocks have been identified as not currently meeting the requisite MSC unconditional pass park and are likely to therefore require further work in order to demonstrate an assurance of sustainable management – in particular should any fishery wish to proceed to MSC certification.

3.3.1. Addressing Principle 1 – EU quota species

There are a number of species governed by EU quota, where science is coordinated at an international level (via ICES) and primary responsibility rests firmly with the EU, and within England, DEFRA and the MMO for application of management decisions. A number of these do not currently meet the P1 requirements. In some cases these may also have some associated weaknesses in P3 – in particular in relation to objectives and decision making processes, where a long term management plan is missing. These include the most commercially important of the remaining stocks, including a large number of demersal finfish, all pelagic stocks and only a single shellfish:

Table 3:

Stocks of EU managed quota species, with gaps identified in either P1 or P3 (or both).

	Species	Stock
Demersal finfish	Brill	North Sea and Channel (IV+IIIa VIIId/e)
	Dab	North Sea (IV+IIIa)
	Flounder	North Sea (IV+IIIa)
	Lemon sole	North Sea and Eastern Channel (IV IIIa VIIId)
	Plaice	Eastern Channel (VIIId)
	Sole	Eastern Channel (VIIId)
	Turbot	North Sea (IV+IIIa)
	Cod	North Sea and Eastern Channel (IV IIIa VIIId)
	Ling	Southern (IIIa IVa VI VII VIII IX XII XIV)
	Monkfish / Angler	North Sea (IV IIIa VI)
	Monkfish / Angler	Western and Channel (VII b-k, VIII a/b/d)
	Rays	
	Whiting	North Sea and Eastern Channel (IV VIIId)
Pelagic Finfish	Horse mackerel	North Sea
	Mackerel	NEA Mackerel
	Sprat	Channel (VIIId,e)
	Sprat	North Sea (IV)
Shellfish	Scallop	

Addressing the gaps highlighted in the pre-assessment for these fisheries is likely to involve international coordination at an EU level and though local management measures may contribute to international efforts, in particular through enforcement and good stewardship, these alone are unlikely to safeguard the stocks. **There is therefore little sense in an IFCA seeking to take a lead in any stock management initiatives on these stocks.**

3.3.2. Addressing Principle 1 & 3 - Non-EU quota species

There are strong linkages between MSC Principles 1&3. Essentially, Principle 1 is an indicator of



how management is succeeding (in terms of stock status), by what measures and based on what information, whilst Principle 3 asks how decisions are taken, according to what objectives and by who. There is therefore often – but not always - a strong link between Principle 1 and Principle 3 pre-assessment findings and therefore a linkage in thinking how to address any gaps identified.

In considering the fisheries that fall into the non-EU quota species category it will be an important task of this stage 3 project to consider where management responsibility lies (or should lie) when addressing any gaps identified. This will be a topic that this report returns to in later sections, although it should be noted that though this project can give consideration and make informed and practically minded suggestions about where management responsibility lies, ultimately this would be expected to be clarified through management processes.

In the section above, in relation to the EU quota species, the presence of internationally coordinated scientific advice and an EU quota provides an indication that a stock is primarily managed at an EU level. Where these indicators are absent the precise definition of management responsibility is less clear. This lack of clarity results in a lower score for Principle 3 in the MSC pre-assessment as it typically associated with only implicit management objectives (the act of stating fishery specific management objectives, often clarifies where management responsibility lies) and unclear decision making processes.

The stock boundaries for species falling into this category may also be more poorly defined (or undefined) and whilst this still includes a number of demersal finfish, these tend to be the less commercially important or less heavily exploited in the past. Interestingly there are no pelagic fish in this category, but by contrast there are a large number of shellfish:

	Species	Stock	
Demersal finfish	Dab	Channel (VII d)	
	Flounder	Channel (VII d/e)	
	Turbot	Channel (VII d/e)	
	Bass	NE Atlantic	
	Black Seabream	North Sea and Channel (IV VII d/e)	
	Grey Gurnard	North Sea and Eastern Channel (IV IIIa VIId)	
	Red Gurnard	Western (VIId–k)	
	John dory	Western Approaches (VIIe-j VIII a,b)	
	Grey mullet	Channel and North Sea (IV VII d-f)	
	Red mullet	North Sea and Eastern Channel (IV IIIa VIId)	
	Pollack	North Sea (IV IIIa)	
	Pouting	Undefined	
	Smoothhound	NE Atlantic	
	Shellfish	Pacific oyster	Channel
		Cuttlefish	Channel
Brown crab		Eastern Channel	
Brown crab		Southern North Sea	
Velvet crab		Eastern Channel	
Native oyster		Channel	
Lobster		Southeast and Southern	
Lobster		Thames	
Whelk		Eastern Channel	
Periwinkle		Kent and Essex	

Table 4:
Stocks of non-quota species, with gaps identified in P1 and P3.

Addressing the gaps highlighted in the pre-assessment for these fisheries may still involve some international coordination, for example at an EU level, or it may involve national coordination (i.e. beyond the boundary of a single IFCA) or it may be possible to achieve stock level management (so addressing gaps in Principle 1 & 3) at a local IFCA level. It is the task of stage 3 report to further divide this list to focus IFCA management effort on the stocks which can, and arguably therefore should, be managed at an IFCA level.

4. Scoping IFCA Fisheries

4.1. Key Management Responsibility

In moving from the simple results phase of the England-wide MSC pre-assessment exercise that occurred in Stage 2 of Project Inshore toward an IFCA focused strategic management review that is the focus of Stage 3 of Project Inshore, it is useful to pass through a scoping stage where the fisheries in the district are prioritised and categorised to consider both their local importance and local management influence and priority in order to help strategically prioritise IFCA management action.

There are a number of different approaches to doing this. Indeed the Kent & Essex IFCA already identifies 16 priority species in the district, selected on the basis of commercial importance, recreational importance or development potential. These are indicated below:

Table 5:

Previously identified 'key' species for Kent & Essex IFCA

Source: Kent & Essex IFCA (2013). The Way Forward; Our long term approach to Fisheries and conservation management.

Cod	Sole	Herring	Mackerel	Smoothhound	Thornback Ray
Tope	Bass	Mullet	Plaice	Flounder	Native Oyster
Mussel	Crab	Whelk	Lobster	Cockle	Scallop

As part of the Project Inshore Stage 3, the team has undertaken a further simple scoping exercise of the fisheries that occur in the Kent & Essex areas, adding further parameters of importance to determining future management priorities. These do not at this point refer to the results of the MSC pre-assessment process (i.e. readiness for MSC is not one of the parameters used to determine management priority – although this will be introduced later in the planning process). The parameters used in the Management Scoping exercise were:

Table 6:

Scoping Parameter and scoring key for IFCA management prioritisation exercise

Scoping Parameter	1 - lesser local management priority	2	3 - higher local management priority
Value of landings	Graduated scale 1 = low value, 3 = high value		
Degree of EU Management	EU lead with defined quotas	EU / ICES involvement but no quotas	no fishery specific EU involvement
Stock boundary	Defined – widely distributed or migratory	Undefined & highly mobile	Undefined & sedentary
Local cultural & socio-economic importance	Occasional bycatch, no recreational catch	Commercial bycatch and occasional recreational catch	IFCA Priority Species (i.e. important commercial or recreational catch)

It is important to highlight what this management prioritisation exercise is and is not intended to do. This is focused solely on fish (both finfish and shellfish), and more specifically stocks, to help prioritise local stock management measures. It does not consider any site conservation or any gear impacts (at this point) and clearly the IFCA has many other important (and statutory) priorities which are outside of the remit of this scoping exercise. This exercise is simply to help focus in on the stocks which are locally important and which are best placed to warrant local stock management measures, led at an IFCA level.

The results of this scoping exercise are contained in Appendix 2 of this report and are discussed in the following sections below.

4.1.1. EU Quota Species

Using the local management ranking exercise described above to scope the fisheries of the Kent & Essex IFCA results in relatively low ranking scores for stocks which are already spatially defined by management, already subject to EU quota management and where science is already coordinated at an ICES level. This is not to say that these stocks do not necessarily warrant management attention – merely that it is unlikely to be the IFCA that is best placed to lead on that management. This is a logical conclusion as more widely distributed and commercially important stocks require a high level of both science and management, coordinated at an appropriate spatial scale of the resource; i.e. international.

Some of the previously identified Kent & Essex IFCA priority species, such as **cod, sole, herring,**



mackerel, plaice and thornback ray fall into this category. This means that though these species are locally important, overall responsibility for stock management is at a higher jurisdictional level. For these stocks the IFCA still clearly plays an important role both as a key stakeholder and as a partner in management. The IFCA remain responsible for enforcement of relevant legislation on these fisheries within their jurisdiction. In some cases there will be management measures, applied at a higher level, where the IFCA may even have primary responsibility for – such as protection of inshore nursery grounds. Additionally the IFCA have the power to act to further safeguard the resource, should they wish, such as through the introduction of technical measures (gear restrictions, minimum landing sizes, spatial or seasonal restrictions), however, though this is clearly good and responsible stewardship of the resource, it should be recognised that the overall success of stock management – namely whether or not the stock is overexploited – is beyond the IFCA's control. Local measures which apply disproportionately to local inshore vessels, which do not result in overall stock benefits, are likely to be unpopular and may even be counter-productive, in particular in reducing support for management measures on other stocks where the IFCA is best placed to lead on stock level management. As well as those previously identified IFCA priority species, other species landed in the district such as Lemon sole, turbot, brill and whiting fall into this category.

4.1.2. Species suited to local stock management

By contrast there are other stocks fished within the Kent & Essex IFCA district which are more suited to being managed at a smaller spatial scale such as an IFCA and which scored comparatively highly in the scoping exercise. Typically these will not already feature in any EU management, or any ICES science, other than in very general terms, such as general fleet technical measures, or general ecosystem science. As such the management is not dependent on the EU, so there is no barrier to IFCA's from engaging in stock management.

Of those stocks which are not managed in any meaningful fisheries specific way at an EU level, there are some which are suited to an IFCA stock management more than others and which therefore score more highly in the scoping / ranking exercise. In short, the more sedentary the species, the more suited they are to local stock management measures. Of course there are other factors that are also important in justifying the spatial scale of stock management, such as life history characteristics (migratory etc.), length of planktonic larval phases, or fishing patterns or even local bathymetry, and these will be discussed in more detail later, but as a simple proxy for scoping fisheries, it is the sedentary nature of the stocks which most lend themselves to local management.

Of the previously identified IFCA key species, those such as **Native oyster, mussel, whelk, lobster and cockle** fall into this category. These are stocks which are of local economic importance and which are not the subject to any fisheries specific either national or international stock management. It is interesting to note that crab and scallop are less likely to fall into this category. In the case of crab they are more likely to migrate over longer distances, there is a significant fishery beyond 6nm and there is already some degree of international scientific cooperation, so they are less immediately obvious candidates for inshore adaptive stock management. In the case of scallop, again there is an important offshore fishery, with coordinated scientific effort but in addition there is more fisheries specific management – both at a national level (led by DEFRA) and an international level (such as the EU effort regime).

As well as those previously identified IFCA priority species, other species landed in the district such as cuttlefish maybe suited to local management.

4.1.3. Stocks where primary management responsibility is unclear

Of the remaining previously identified IFCA priority species, it can be concluded that current management action is less obviously being led by either EU or national processes, or that the species or fishery characteristics mean that they are less obvious candidates for inshore stock management. These are more likely to be lower value finfish species. Of the previously identified IFCA priority species this category includes **smoothhound, tope, flounder, mullet and bass, plus**



the previously discussed crab and scallop. As well as those previously identified IFCA priority species, other species landed in the district such as John Dory, Black Seabream, gurnard and Pollack would fall into this category. **Discussions and guidance over most appropriate stock management measures for these species is best conducted at a larger jurisdictional scale (i.e. national or international).**



5. Preparations for immediate full assessment

It should initially be highlighted that the decision to proceed with MSC certification, for those fisheries in a position to do so, is entirely voluntary. For some sectors of the industry this may be an attractive commercial decision, for others the benefits may be less clear. It is the task of an MSC pre-assessment (as has been the function of Project Inshore) to identify the steps to take in preparation for full assessment and this may be helpful for those fisheries wishing to proceed with full MSC assessment. The following section therefore details these steps, but this should not imply that these actions are imperative; in particular should there be no interest in pursuing certification.

For any stocks, fisheries or Units of Certification being considered for full assessment, it will be important to review the conclusions of the Project Inshore Stage 2 pre-assessment – both the report and the scoring database. These contain a lot of useful information and insight into the scoring process. Clearly it will be important to address any ‘gaps’ identified to seek to further increase scores and so increase assurance of a successful assessment process, but equally it can often be useful to seek to increase scoring in some areas with no gaps – perhaps targeting scores of 100, in order to increase the overall average scores at the Principle level.

5.1. EU Quota stocks ready for full assessment

5.1.1. Proposed UoCs & Overlapping IFCA

The Project Inshore Stage 2 pre-assessment exercise reveals that some EU managed stocks landed in the Kent & Essex district are ready for full assessment. The initial conclusion of the pre-assessment was that sole caught by drift net and trammel net and plaice fished by trammel net were the only 3 Units of Certification⁸ ready for full assessment.

In providing advice as part of stage three, this list of just 3 Units of Certification has been added to in anticipation of improved P2 scores for certain static gears on the provision of increased information of catch profiles. This has enabled catches of the aforementioned sole and plaice by other static gears and finally static gear catches North Sea Haddock⁹ to also be considered in this cluster of Units of Certification as primary candidates for MSC certification in the Kent & Essex district.

Species	Stock	Gear
Haddock	North Sea	Gill net
Plaice	North Sea	Gill net
	North Sea	Trammel Net
Sole	North Sea	Gill net
	North Sea	Trammel Net

Table 7:

Proposed Units of Certification of EU managed stocks landed in Kent & Essex IFCA region, which are prime candidates for MSC certification.

This has resulted in an increase in the initial number of Units of Certification of EU managed fisheries in a favourable position to enter the MSC assessment process to 5. Should there be other static gear catch combinations of the above stocks (although these are not reflected in MMO statistics) then these could also likely be included as a primary candidate for MSC assessment.

5.1.2. Opportunities for Stakeholders

For the static gear fisheries on North Sea Sole, Plaice and Haddock, the Unit of Certification has the potential to be increased in size. The overwhelming advantage of increasing the size of the Unit of Certification is that the cost of assessment, surveillance and re-assessment is shared, effectively bringing individual costs down. A bigger Unit of Certification may also be able to exert greater leverage in order to achieve any conditions placed upon the fishery at the time of full

⁸ The MSC Guidelines to Certifiers specify that the unit of certification is “The fishery or fish stock (biologically distinct unit) combined with the fishing method / gear and practice (= vessel(s) and / or individuals pursuing the fish of that stock) and management framework”.

⁹ Although Northern Hake would technically also fall into this category, on the strength of MSC pre-assessment results, the limited UK quota in area IV means that the costs for inclusion into a combined assessment is unlikely to be warranted.



assessment.

It would be possible for all English registered inshore fishermen targeting those species in the North Sea to come together under a single assessment. As these stocks are not managed at an IFCA level and are also fished outside of 6nm there is no particular advantage to restricting the UoC to a single IFCA. The only exception to this would be if it was felt that there were particular advantages to scoring of P2 issues, such as reduced local habitat impacts or improved gear performance due to local byelaws, however for the static gear fisheries discussed here this sort of local improvement in scores is less likely.

So a single assessment could be used for all English Inshore Fishermen catching the 3 North Sea stocks, using static gears. This single assessment would contain multiple Units of Certification (1 UoC for each combination of stock and gear). By combining many units of certification under a single assessment, the costs are also reduced. This could bring together inshore fishermen of Kent & Essex with fishers in the Eastern, North Eastern and Northumberland IFCAs.

With a larger assessment, or Unit of Certification such as this, it is important to consider who the client would be of any future assessment and what is the ‘glue’ that binds the individuals within the client group. This is particularly important in order to demonstrate that any commitments made (such as codes of Practice) are effectively complied with and any conditions resulting from the full assessment are enacted across the certified fleet. As such it is likely that some form of fishermen’s association may be best placed to take a lead on first ascertaining the level of interest for any such assessment, and second on pulling together the funding and requirements to enable the full assessment process to begin.

At least for the static gear finfish fisheries discussed here, it is not anticipated that the IFCA would necessarily have any particular role to play, other than highlighting the potential opportunity to fishers targeting those resources within the district, and possibly in assisting with preparation for full assessment.

5.1.3. Stakeholders to consult with in full assessment

The following is a preliminary listing of those bodies and interested parties that will need to be contacted during the consultation phases of assessment on fisheries managed at an EU level:

- owners and management of member vessels - provision of operational data and other data collected by the client;
- skippers and mates of member vessels - provision of operational data;
- Fisheries managers – (MMO).
- various fishery research institutes involved with regional fisheries and regional marine management - (CEFAS)
- details of at-sea and port inspections, checks on recent fishing infringements, information on fishing practices and discards - coastguard and national inspection authorities;
- fishermen’s / producer organisations - details of licensing, quota management and uptake, log book records, fishing practices;
- Other environmental organisations and special interest groups. For static gear fisheries this could include RSPB. It is our experience that it is best to include all possible NGOs with an interest in the stakeholder list, so they are aware of the assessment processes and have the opportunity to comment if interested.

5.1.4. Collection of supporting evidence

Supporting evidence is a crucial aspect of a successful MSC assessment process. The onus is on the client fishery to demonstrate their sustainability. Any supporting evidence provided to the assessment team is likely to increase the likelihood of a successful outcome and speed up the assessment process (an important consideration as the MSC timeline conditions have been



tightened, so at worst a delay could lead to failure to complete the assessment in the requisite timeline).

For both Principle 1 and Principle 3 for stocks managed at an EU level with advice from ICES much of the requisite information is readily publically available. For P2 there is often more of a shortage of information which can lead to significantly reduced scores. It is therefore important to demonstrate:

- The catch profile of the gears under assessment, including the discard and ETP profile.
- The area of the fishery (ideally VMS or succorfish – or informed estimates if these are not available for inshore vessels) compared to the habitat types.
- Any fleet level management initiatives – such as gear modifications to reduce impact, Codes of conduct designed to minimise impact, reporting requirements to demonstrate reduced impact, reports from observers, membership of responsible fishing schemes etc.
- Any appropriate assessments of gear impacts in European marine sites, or any management plans for those sites indicating that the impacts of the gears under assessment are acceptable.

5.2. Locally managed fisheries ready for full assessment

5.2.1. Proposed UoCs & Overlapping IFCAs

Although the pre-assessment concluded that hand raked cockle from a Regulating Order was also in a position for full assessment this is not considered to be an important local fishery. However, with the provision of additional local information following on from pre-assessment (in particular that this fishery takes place within a European Marine Site and has been subject of Appropriate Assessment and the qualifying features for the site are shown to be in a favourable status) it can now be concluded that dredge caught cockle from within the Regulating Order does look to be in a position to proceed toward full MSC assessment. However steps should be taken to address some of the issues highlighted in the scoring exercise carried out in the MSC pre-assessment in Project Inshore Stage 2. Namely the need for more explicitly defined reference points and decision rules relating to those reference points.

Species	Stock	Gear
Cockle	Thames	Dredge

5.2.2. Opportunities for Stakeholders

For the cockle fishery, the proposed Unit of Certification for any full assessment would be spatially restricted and restricted to the licence holders in the Regulating Order Fishery. Catches of cockles from outside the Regulating Order would not be expected to pass an MSC assessment at this stage. As such, this fishery has a clear and restricted Unit of Certification which would be entirely within the IFCA district and no liaison with other IFCAs is required.

The most appropriate client and funding arrangements for any full assessment are more ambiguous and ultimately this is a commercial or management decision. Licence holders in the fishery or processors of the product may both have a commercial interest in taking the fishery into the assessment process, although this depends very much on the market – and is likely to change over time. By contrast managers (i.e. the IFCA) may have interest in being the client for the fishery assessment process (even if not the primary funders) in order to demonstrate good management. Either route is possible and both would be acceptable.

5.2.3. Stakeholders to consult with in full assessment

The following is a preliminary listing of those bodies and interested parties that will need to be contacted during the consultation phases of assessment on fisheries managed at an EU level:

- owners and management of member vessels - provision of operational data and other data

Table 8:

Proposed Units of Certification of locally managed stocks landed in Kent & Essex IFCA region, which are prime candidates for MSC certification.



collected by the client;

- skippers and mates of member vessels - provision of operational data;
- Fisheries managers – (K&E IFCA).
- various fishery research institutes involved with regional fisheries and regional marine management - (K&E IFCA)
- details of at-sea and port inspections, checks on recent fishing infringements, information on fishing practices and discards - coastguard and national inspection authorities;
- fishermen's / producer organisations - details of licensing, log book records, any additional requirements of the regulating order;
- Environmental organisations and special interest groups. For dredge fisheries this should include Natural England and RSPB. It is our experience that it is best to include all possible NGOs with an interest in the stakeholder list, so they are aware of the assessment processes and have the opportunity to comment if interested.

5.2.4. Collection of supporting evidence

Supporting evidence is a crucial aspect of a successful MSC assessment process. The onus is on the client fishery to demonstrate their sustainability. Any supporting evidence provided to the assessment team is likely to increase the likelihood of a successful outcome and speed up the assessment process (an important consideration as the MSC timeline conditions have been tightened, so at worst a delay could lead to failure to complete the assessment in the requisite timeline).

For locally managed stocks, such as cockle almost all information will need to be provided locally and as such is perhaps less likely to be readily publically available. For P1 the following information should be provided:

- Stock assessments & details of stock assessment methodologies
- Details of overall harvest strategy and harvest control rules
- Empirical basis for harvest control rules and reference points used to set exploitation rates (if these are not already defined this should be done)
- Details of additional studies on stock identity, sources and sinks
- Details of either internal or ideally external peer reviews undertaken on stock assessment and overarching harvest strategy and control rules

For P2 there is often more of a shortage of information which can lead to significantly reduced scores. Dredging can have a significant impact on the habitat (seabed substrate) by turning over the upper layers of the substrate, potentially altering the three dimensional structure of the seabed and killing large amounts of benthic infauna.

For these reasons dredge fisheries have a particular challenge in demonstrating that they meet the requirements of MSC P2 and without appropriate management and supporting information are unlikely to pass, a fact borne out by the relative paucity of dredge fisheries in the MSC program. Furthermore a lot of stakeholder scrutiny may well fall on this section of the assessment – perhaps above all others. So demonstrating good and appropriate management and information will be critical in order to construct a robust and scientifically sound argument. As a minimum it will be important to demonstrate:

- The catch profile of the gears under assessment, including the discard and ETP profile.
- The area of the fishery (ideally VMS or succorfish – or informed estimates if these are not available for inshore vessels) compared to the habitat types.
- Habitat impact studies and appropriate assessments



- Evidence of conservation status of any vulnerable habitat forming species
- Any additional management measures, in particular aimed at reducing or mitigating habitat impact.
- Any fleet level management initiatives – such as gear modifications to reduce impact, Codes of conduct designed to minimise impact, reporting requirements to demonstrate reduced impact, reports from observers, membership of responsible fishing schemes etc.

For Principle 3 almost all of the scoring in the second half of the scoring tree relates to ‘fisheries specific’ criteria. This means that local actions and information will be the key determinant of scores, so preparation should focus on these areas, in particular:

- A management plan for the fishery under assessment. This will comprise the Regulating Order itself. It is important that this sets out the overall objectives for the management and the processes by which management decisions are taken.
- Provide details of how management decisions are consulted on and how the results of consultations are addressed.
- Provide evidence of local enforcement and any issues of non-compliance
- Provide a fishery specific research plan, or highlight how research for the fishery is included in the wider IFCA management plan
- Provide details of any external reviews of the management process or any periodic evaluations. Reviews at the time of the renewal of a regulating Order are one such example of this.



6. Developing IFCA Stock Management

6.1. Candidate fisheries for improvement

6.1.1. Value, cultural importance, IFCA key species

The candidate fisheries for a Kent & Essex IFCA led approach to stock management are:

- Cockle
- Mussel
- Whelk
- Lobster
- Native Oyster

These species are all of a substantial local value, both in terms of first sale value, but also in creating both upstream and downstream economic benefits. They are also of cultural importance with many of the species having a local reputation and market and are an important element of the inshore fisheries regional livelihood. These species are not currently subject to any international coordinated science (through ICES) and little nationally coordinated national level science. Additionally these species are not subject to any fishery specific national or EU controls, other than more general gear specification and licencing and landing regulations, other than perhaps a stipulated minimum landing size. In short stock level management is not likely to be driven by an EU led approach, nor would such an approach be necessarily appropriate or necessary. If stock level management is to be applied it is most likely to be applied at a local level. As such these species are prime candidates for IFCA stock management.

Of these 5 stocks, only cockle has in place many of the attributes required for ‘good management’ and was identified in Project Inshore Stage 2 as a potential for MSC assessment in the short term. Therefore the guidance below is more geared toward the other 4 stocks, although even for cockle there are undoubtedly opportunities to further refine management practices (such as development of more empirical reference points and harvest control rules) in order to more assuredly meeting the MSC pass mark. Therefore even for cockle there may be merit in considering the guidance below.

6.2. Characteristics of successful management (The Theory)

Having identified that there are some species, for which stocks or more accurately management units can be defined within the IFCA jurisdiction, and which the IFCA wishes to lead on adaptive stock level management, the IFCA then has an almost blank sheet of paper upon which to design a management system – albeit within the confines of existing legislation. In the following section, the report discusses some of the characteristics of successful management. Many of these characteristics are directly linked to MSC performance criteria, and for simplicity they are set out in the order of the MSC Principles, but some others are less explicitly stated in the MSC model.

6.2.1. Principle 1

Principle 1 introduces the idea that successful adaptive stock management should seek to understand and manage all fishing mortality upon that stock, or management unit. This includes all catches from all fleets, any mortality of discard species, or any unreported landings. The following characteristics are of key importance:

Clear management units

It is essential for management to clearly identify what it is managing. Where are the boundaries to the stock or management unit that is being managed and what is the rationale or assumptions on which this management unit has been defined? By clearly stating the assumptions, these are not only openly acknowledged but they can also be tested over time with thorough review and evaluation.



Collection of appropriate information

Information is essential for adaptive stock management. This information should be tailored to the needs of any stock assessment or management analysis. Where fishers are involved in this collection of information, the reasons for the data collection should be explained and it should be demonstrated how this information is used. Data should be collected at an appropriate spatial scale – to correspond to the management jurisdiction and the conduit for information should be via the managers.

Understanding of stock status

Although understanding stock status may seem an obvious characteristic of good management, there remain many examples of fisheries management seeking to take measures without fully understanding either the need for those measures or the response of the stock to those measures. Small fortunes can be spent on getting a more a more precise understanding of stock status and this is entirely justified in large high value, commercially important fisheries. But for smaller scale, lower value fisheries it is also possible to make precautionary, informed and adaptive management based on simpler and less data hungry and expensive assessment models. Of course any loss of precision needs to be acknowledged and uncertainties identified and where necessary an increased level of precaution needs to be built into the management decision making process.

A pre-defined adaptive management response

In simple terms, a harvest control rule (HCR) simply states what stock level the fishery is targeting, what measures will be used to reach there, and what management actions will be taken and at what points (reference points) to ensure that management response to a declining stock status is appropriate and timely to prevent impairing the ability of the stock to recruit future generations. The MSC standard does provide more description and requirements about the exact characteristics of these rules, but the key principle is that they are both transparent and pre-determined. This means that negotiations over management response do not have to occur at times of reduced catches, as these decisions are effectively taken and evaluated before a need arises.

Engaging stakeholders in the process of determining the harvest control rules greatly enhances the likelihood that these rules will be adhered to and eases the process of their application. In some cases this may also allow economic considerations to be included in the decision making process – provided this is not seen to be anti-competitive and it can be demonstrated that management actions are taken before there is a biologic risk to the stock. Working with stakeholders to agree on decision rules also means those stakeholders, in particular fishers, have a better understanding for the reasons for management action.

Review & Evaluation

Periodically it is important that the performance of the management system is reviewed holistically; is the stock responding to management actions as expected; are the underlying assumptions appropriate; are the tools used to set the exploitation rate appropriate; is the stock assessment model appropriate or should others be tested. This can be done as an internal exercise but having an external review often provides the benefit of fresh perspective and consideration of alternative approaches. This is part of the ongoing process of management refinement and improvement.

6.2.2. Principle 2

Principle 2 considers the impacts of fishing gears on the ecosystem. In an MSC assessment this would be the particular gear that is under assessment (and defined in the UoC) however for a wider fishery management remit, as might be included in a fisheries management plan it may be more appropriate to consider the impact of all gears targeting the resource in the management area.

Key considerations for Principle 2 would be to identify vulnerable species and habitats, assess the status of those on an on-going basis, and implement appropriate management to ensure that impacts are either minimised or mitigate. Much of this has already taken place and continues



to take place. Recent work to identify sites for protection and undertake impact assessments of activities on those sites and ensure that high impacts are avoided counts toward being able to demonstrate good Principle 2 management. In addition, the following actions should be considered.

Data – discards, ETP interactions and ecosystem impacts

As with Principle 1, data is a critical element of good management. Appropriate data provides managers with a quantitative understanding the impacts of a fishery on an ecosystem. From an MSC assessment point of view, a lack of data on impact of fisheries or an over reliance of qualitative data will lead to more precautionary (lower) scores. In preparation for a full assessment, provision of appropriate data of gear impact (ideally independently verified, or in some cases based on risk assessment) will assist in the scoring process. Data enables managers to make changes where warranted, but equally it may provide support for managers not taking precautionary management action, where it can be demonstrated that it is not necessary.

Information of ecosystem characteristics / distribution

Information about the ecosystem in which the fishery takes place is also important and this can provide an understanding of changes over time. In many cases this information will already exist (for example through national habitat mapping projects), in which case it would not be necessary for managers to require any local primary research.

Understanding of spatial distribution of fleet (appropriate to scale of potential impact)

It is important for managers to understand where fishing takes place so that the relationship with the underlying ecology can be considered. However this understanding only need be appropriate to the scale and intensity of the fishery. Before requiring all vessels to have VMS or Succorfish, managers should be clear on what the reasons for that are. In collecting data for Principle 1, capturing a spatial element can be useful for understanding catch per unit effort patterns. This can also help identify changes in fleet patterns over time. Inshore fishers are themselves increasingly keen for their spatial patterns to be understood and recorded, both so they can demonstrate that certain vulnerable habitats may already be avoided or for highlighting commercially important fishing grounds in time of increasing competition for space with other marine industries.

Review mechanism to allow for management action in event of ecosystem impacts or risk caused by fishing (supported by decision rules where appropriate).

As with Principle 1, some form of review is an important pillar of management. This enables managers to review available information and be assured that the management in place is appropriate. If not management can propose an action either spatial, temporal or technical, as appropriate, and subsequently review the response to that management action.

Codes of Conduct – industry led

In a number of MSC certified fisheries some form of Code of Conduct has proved valuable. In some cases this simply sets out what is existing good practice, but it can be an opportunity to highlight that good practice. In other cases it is an opportunity for the fleet to think about actions in event of certain ecosystem impacts, and the appropriate response or mitigation to any such impact. In many cases these can include incident reporting forms. This information can be used by managers to demonstrate either that existing management is appropriate or that management response can be tightly tailored to address an identified issue of concern. Both data (referred to above) and meaningful codes of conduct can contribute to considerably increased Principle 2 scores in a full MSC assessment, but are also good practice in a well managed fishery regardless of any aspirations for certification.

A Code of Conduct provides a valuable opportunity for the fleet to set out how they ensure that both impacts and perceived impacts are indeed minimized. Where a Code of Conduct calls for action by the fleet, consideration should be given to how it can be verified that the fleet is indeed undertaking that action.



6.2.3. Principle 3

There is considerable cross over between Principle 1 and Principle 3. Principle 3 seeks to capture the apparatus and processes of management. There are some important characteristics of good management that are not contained in the MSC Principle 3, but which should none the less be part of the management consideration. In particular notions of capacity and profitability are not explicitly mentioned. Fisheries with excess capacity or fisheries that are not profitable are less likely to succeed and less likely to engender a sense of stewardship. The notion of profitability is not inviting excess, and is not limitless, but should rather be about ensuring that whilst seeking to maximise the number of fishers sustainably engaged in the fishery, this is not to the detriment of all. Other characteristics of successful management in principle 3 are:

Appropriate jurisdiction to stock management scale

This mirrors Principle 1. Simply put, it is about ensuring that management decisions are likely to produce the expected stock level response, by selecting an appropriate scale of management prior to commencing management action. This is why some stocks need coastal states engagement, some can be managed within the EU and some can be managed locally as an inshore resource. Seeking to manage cockles through international agreement would be futile and would fail to safeguard local populations, whilst seeking to manage mackerel within a single inshore jurisdiction would fail to address the majority of fishing mortality that occurs on the stock when it is not in the local area and would therefore also be similarly futile.

Limited entry / ring fencing / community ownership / stewardship of resource

The relationship between a common resource and private ownership is sometimes somewhat grey in fisheries management and has and will likely again be tested in the courts. Any new approach to management which seeks to limit access to the resource must be fair, non-discriminatory and equitable. Ideally this should also set out possible routes for new entrants to join the fishery. Should access to fisheries not be intended to be an ownership right, then this should be set out in management. Some form of limited access is likely to greatly increase the sense of stewardship in the resource which in turn may lead to increased support for sometimes unpalatable management actions, if it is known that those fishers taking the pain will also be the beneficiaries of any gain. The increased sense of stewardship can increase the role that informal approaches such as peer pressure can play in enforcement, stimulating good compliance and at best, reducing costs of enforcement. A key test here is what would happen to exploitation patterns (and how much control would managers have over that) if the price were to double. If it is concluded that many other boats not previously in the fishery would come and exploit the resource and the management system allows this, then the management is unlikely to succeed in meeting its objectives.

Stakeholder engagement in management process

For inshore fisheries, perhaps more so than offshore or cross jurisdiction fisheries (i.e. those managed at an EU level) there is an increased potential in engage fishers in the management process. This is not only about seeking to obtain appropriate and accurate data of fisheries performance but also in engaging them in the development of decision rules and critically in providing feedback of management performance. There are many examples where **annual fishery meetings** play an important role in engaging fishers in the process of management. This can be an opportunity to provide update on stock status, outline any changes to management rules and the reasons for any such changes and highlight any enforcement priorities. Of course it is also an opportunity for managers to listen to the concerns, ideas and information from the fleet. This addresses many of the MSC criteria relating to consultation, provision of explanations for how information is used, understanding of management processes etc. Above all this has the potential to give a real sense of stewardship in “our” fishery. Of course sometimes such engagement may be initially challenging, but should in time lead to a more inclusive and supported approach to management.



Define fishery specific objectives and decision-making processes

Stakeholder engagement in the management process can also be fruitful when it comes to setting out both the fishery specific management decision making processes and the objectives which will guide those management decision making processes. The act of explicitly setting out how management decisions will be taken is critically important to determining the overall success of management. Part of this will be about setting the Principle 1 harvest decision rules into a wider management context; how will the rules be applied, by whom, how often and when? However there may be many other management decisions which Principle 1 alone cannot address; how many permits should be issued; what gears should be permitted; what area or seasonal closures (if any) should apply; what technical conservation measures should be in place; what will the enforcement regime be; what are the sanctions for any infringements; what is the consultation and appeals process? These, and many more besides, are all important management questions so in describing the management framework in a **Fisheries Management Plan**, the process for reaching these decisions should be set out. Typically decisions are taken in the context of pre-stated objectives and the success of management decisions should be judged against how well those decisions deliver against objectives. So as well as setting out the decision making process, the management plan should clearly highlight what the objectives are.

Research and information collection tailored to the needs of management

It is important that a relationship exists between science and managers, to ensure that the needs of management can be best addressed by research, and so that the results of research can be best presented to management to enable a management response. In international fisheries this close relationship can sometimes be difficult to achieve however in smaller locally managed fisheries the relationship can and should be both clear and mutually beneficial.

Management & enforcement appropriate to the scale (and risk) of the fishery

Enforcement need only be appropriate to the scale of the fishery, but management will need to determine what that is. The MSC standard introduces the notion of informal approaches to enforcement, where the design of the management system engenders a collective sense of stewardship of the resource and incentivizes positive compliance with the management regime. Notions such as restricted access, along with open and transparent decision making processes and explanation of how fisheries information is used (all described above) all help engender that sense of stewardship. Of course such self policing stewardship is an aspiration, which may be difficult to achieve, especially initially. It is therefore important for the fisheries management plan to set out what the formal approaches to enforcement will be and what physical checks will be required to ensure compliance.

Review and Evaluation

Finally, as with both Principle 1 and Principle 2 there is a requirement for periodic review and evaluation of the performance of both the parts of the management system (for example, control & enforcement or data collection) and a holistic evaluation of how the constituent parts of the management system are working together to deliver the management objectives. Which of the objectives are being met, which are not and what are the reasons for the observed patterns in meeting those objectives.

6.3. Strategic approach to developing stock management

The following strategic Approach to developing local adaptive stock management is intended to guide the IFCA in the process, for those stocks that they are best placed, and wish to take a lead in adaptive stock management. These steps are ordered in a more chronological order, illustrative of the management process, as opposed the arrangement by MSC Principle in the previous section. This does not really discuss Principle 2. This is because Principle 2 is less critical to developing successful stock management (by definition P2 is about the impact on other things), so these considerations can be included elsewhere in the management process.

For each stock that the IFCA intends to lead on adaptive stock level management the IFCA



should produce a Fishery Management Plan. The approach set out below should be used in the development of the Fishery Management Plan.

6.3.1. Management unit

For English Inshore fisheries which are considered best candidates for inshore management (led by the IFCA) 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. Management will initially be faced with uncertainty about the range, distribution, life cycle and population dynamics of stock and may also be confronted by the fact that the perceived stock range does not exactly overlap with existing management jurisdictions.

Spatial genetic discreteness is unlikely to coincide with jurisdictional boundaries, so at some point managers must make pragmatic decisions to enable management to proceed. Seeking definite evidence based solutions from science will (and has) lead to delay and may result in scientifically accurate, but practically unmanageable conclusions, which are most likely to result in a lack of management action. By contrast, if IFCA managers state which important local fisheries they believe can be managed locally, within their jurisdiction and present the practically minded management rationale to support this, then it paves the way for precautionary stock level adaptive management to begin. By clearly identifying the working hypothesis about stock structure, or 'management units', the approach to management is open and transparent and clearly highlights uncertainties, enabling these to be periodically reviewed by management evaluations. Should these assumptions be shown by evaluation to be false, then the scale of the management unit can be adjusted.

The exercise of determining the rationale to support local stock management should be done by managers using the expertise within the IFCA team. For the species such as those selected in the scoping exercise – cockle, whelk, lobster, mussel, oyster, it could be argued that it is appropriate to manage as single management units within the Kent & Essex jurisdiction because (for example):

- The estuarine water flow and recirculation characteristics of the Thames Estuary means there are ecosystem characteristics which may support the rationale for managing certain species as an inshore management unit.
- Shellfish are more likely to be self recruiting.
- In their adult phase the species are either sessile or have a low range and are not migratory.
- For bivalves, international examples of best practise support geographic based management on beds.
- The species are all of significant importance to the inshore fishery and the level of fishing beyond the IFCA boundary is comparatively less.

The above examples of rationale should be examined more thoroughly as an initial step in a stock specific fishery management plan.

It should also be demonstrated how and why this management unit is precautionary. If the assumption is incorrect, management would respond to a declining stock status, but would fail to halt the overall decline, but critically this would still mean that management was taking the correct response in their jurisdiction. Bigger management units at multi jurisdictional levels are not in immediate prospect for lower value or more sedentary inshore resources.

It is also important to ensure that management is coordinated at appropriate scale to fishery and managers should consider the degree to which coordination with other IFCA is required and what should be the level of engagement with MMO. For fisheries that are a continuing resource along the coastline (as opposed to spatially restricted to beds), whilst it may be pragmatic to make the case for management units which mirror management jurisdictions, it remains important for engagement with neighbouring jurisdictions. This also enables the sharing of best practice, a testing of underlying assumptions and awareness of any issues arising in neighbouring management units. For lobster this kind of inter-IFCA engagement is likely to be particularly



important.

6.3.2. Information

Firstly, map what data is already available for use. What is the most recent landings data and is this appropriate to the scale of the chosen management unit? Does it capture inshore fishers' landings accurately and does it capture effort? What other useful information is available? Processors will often hold useful data, such as volumes landed, proportions of different size grades over time, length–weight ratios etc.

Secondly, management will need to tailor on-going data collection to the needs of management and use in HCR calculation (landings / effort / size) and / or other proxies. This should ensure that data is collected at the scale of the fishery management unit (jurisdiction) and that other fisheries mortality (recreational / discards) is either collected or estimated. For example, though overall responsibility for collection of landings data remains with the MMO, it is vitally important that IFCAs access the information that they need for management. Ideally data would be collected in computerised form, and, as will be seen later, any data that includes historic time series is also likely to be useful in informing assessments.

6.3.3. Develop Draft HCR

Appendix 3 of this report provides a detailed explanation of this step of the management process including case study examples which detail the process of developing an appropriate stock assessment for local inshore resources and using this to inform the selection of appropriate empirically justified reference points which are incorporated into a harvest control rule. This discusses the selection of appropriate indicators of stock status and understanding how these relate to stock size. How to in turn determine reference points for the selected indicator and what should inform this:

- Established fisheries science (yield per recruit, spawners per recruit etc.)
- empirical method (unexploited reference time or reference area) or;
- bio-economics of fishery operation or;

This also explores how techniques such as simulation testing may provide increased robustness.

Once the assessment and the reference points are established the next step is to define the management actions that will be taken at each of those points to ensure rate of exploitation is reduced appropriately. These tools or measures could include closed areas, seasons, temporal curfews, pot limits, effort restriction, quota, MLS or technical measures, provided in each case that these can be demonstrated to reduce fishing mortality as intended. In particular it is important to define the level of fishing effort below the limit reference point.

It is important that there is stakeholder review and engagement in the drafting of the HCR. One useful approach is to use simulations to help explanation of scenarios and increase stakeholder understanding by providing clear explanation of proposed management response. By secure stakeholder buy-in, the chances of successful implementation in the future are greatly enhanced.

The final element of the HCR development and testing process should be to define how often, how and by who the HCR should undergo testing and evaluation of performance.

6.3.4. Develop management framework

Once a stock assessment is in process and reference points and harvest control rules are in development or consultation it is important to place these tools into a wider fisheries management and legislative context. In many cases the development of a specific **Fisheries Management Plan** is the ideal vehicle for providing this wide context and setting out the overarching management policy and process, as well as detailing the more specific management measures.

A Fishery Management Plan should begin by stating the overarching (high level) objectives. These are likely to include the High Level Objectives, set out in either the Marine & Coastal Access



Act (2009) or the DEFRA guidance to IFCA, but local level management allows for more locally specific objectives to also be included. This should state both short term & long term objectives and state how these will be measured. This could include social and should include ecosystem objectives (MSC Principle 3 requires that management includes ecosystem objectives). It is also worth explicitly stating in the management framework what will be the approach to precaution, in particular where data is lacking.

The management framework needs to highlight any needs for linking with other jurisdictions. For most inshore resources, where stocks will be managed adaptively by IFCA, it is likely that the resource is also fished in the neighbouring IFCA. Though it may be practical, reasonable and precautionary to assume an IFCA jurisdiction is the management boundary, it is best practice to engage with the neighbouring jurisdiction so that each can be aware of management actions and stock status in the other jurisdiction.

As well as detailing the reference points and the harvest control rule, the management plan should also detail how the HCR will be applied – by whom. Sensibly, for locally managed stocks such as these this would be done within the IFCA, but if so this should be added to a job description. Should there be a named fishery officer for each stock that the IFCA is taking a lead on adaptive management?

The fishery management plan should also detail the management decision making process and cycle. Where does ultimate responsibility for decision making lie? What information will decisions be based on? How will decisions be informed by consultations? How will decision making process respond to information presented? One successful approach in a number of more locally managed fisheries is to develop a **fishery working group**. Even if this body does not have power in terms of decision making it can play a vital advisory capacity and be the recognised conduit for stakeholder engagement in the management process. Another important element of management is communication – how will decisions and the reasons for those decisions be widely communicated to interested parties? Again transparency is a key principle for such local stock management initiatives. Sensibly such a body would be engaged early on in the development of the Fishery Management Plan and perhaps coordinate wider stakeholder engagement in the various stages of HCR and management plan development.

6.3.5. Define management actions

The decision making entity should, through the decision making and consultation process give consideration to the requisite management measures. This is linked very much to the development of the harvest control rules, and the selection of measures which can be used to restrict fishing mortality in event of stock status falling below trigger reference points. However, other management measures may be included which are not directly linked to the harvest control rule. For example, these may be considered simply good and precautionary practice, or may already be successfully adopted bylaws, or may warrant inclusion in order to meet some of the wider fishery management objectives, such as reducing impacts on other ecosystem attributes, or reducing conflict with other users of marine resources.

A likely key consideration is whether there is a need for some form of permitting or limited entry. This is likely to be required for most fisheries, partly as the permitting process is a tool to introduce flexible (adaptive) conditions of entry in the fishery, for example reflecting management response to changes in outcome status. This also plays an important role in engendering the sense of stewardship, which is an important step toward successful inshore management. However, if such an approach is not required, then it should be stated why it is not required, by illustrating that management retains the capacity to appropriately respond to changing stock status (or P2 ecosystem conditions).

When selecting measures and tools to control participation in the fishery (permitted / restricted vessels, gear, seasons, area, technical measures, move on rules etc), best practice is to consider how selection of those measures may positively incentivise responsible fishing. A good management planning process will consider likely behavioural responses to management



measures and seek to avoid loopholes or perverse incentives. This is an explicit stage in the management planning process.

6.3.6. Determine Management Oversight

Management can only take an oversight of the success or otherwise of management actions with appropriate information feedback. This information feedback comes in many forms. Crucially, there is a requirement for routine monitoring of fishery performance to inform the on-going and timely calculation of the harvest control rule, so that restrictions can be applied as required. The Fishery Management Plan should define this process and data should be collected at an appropriate scale and in an appropriate form. Consider how best to engage stakeholders in the information collection process

Most fisheries require some form of enforcement of management rules. At best a system may be self policing when management design leads to strong stewardship or incentives reward compliance. However, it is likely that some more formal enforcement will be required. The Fishery management planning process should therefore consider the risk factors for non-compliance and demonstrate how the enforcement strategy is tailored to address these risks. The Management Plan should also set out the penalties, in order to demonstrate effective deterrence, but also stipulate the right of appeal.

If historically the enforcement of logbooks and landing declarations has been the role of DEFRA agencies (MFA or MMO), it is important that the IFCA give explicit consideration to how the verification of landing declarations will work for those local shellfish resources being managed locally as any additional landing requirements (resulting from local management) will be outside the remit of the MMO.

6.3.7. Institutional, capacity & funding requirements

The resource implications associated with proposed future management activities may be significant and have the potential to exceed the current capacity of Kent & Essex IFCA, especially given the existing on-going commitments described in section 2.4 of this report.

The fisheries management planning process should therefore consider what will be the costs of management and how will these costs be met? Are there the in house staffing capacities in order to undertake the additional management tasks? Is further training required in-house in order to undertake the tasks?

It may be important to therefore consider what if any external funding opportunities may be available for specific programmes and to what extent the requirements of management can be addressed within existing budgets. Of course, opportunistic funding though extremely beneficial is no substitute for secure core funding and in house capacity.

Stage 4 of Project Inshore will continue until 2015. During this stage 4 the focus of the follow up available from the MSC English Fisheries Outreach team will be focussed on providing support for those fisheries wishing to move into full MSC assessment. This has the potential to engage with those fisheries in a position to almost immediately enter the assessment process (section 3.2 of this report) and discussing how best to form client groups, how best to address any remaining issues in preparation for full assessment and importantly to explore possible funding options. In addition the outreach work of Stage 4 might include working with IFCA's for those fisheries where the IFCA's are embarking on the process of stock management and provide support both in that process and in interpreting the results of stage 2 and the advice of stage 3.

6.3.8. Reviewing & Improving Management Performance

As well as routine and on-going monitoring needs, designed to ensure oversight of the fishery, there may be additional research requirements. A research planning process can be an important part of the wider management planning process and is an opportunity to consider gaps in knowledge and the research needs of management. In the context of the IFCA's, it is vital that in developing fishery specific management plans for those management units which can and will



be managed locally that it is clearly understood at the outset what research capacity and funding is available. In particular it is important that it is clearly stipulated what scientific support is available from CEFAS and to what extent IFCA's will be charged for this. Clearly for some stocks, in some areas CEFAS take an active lead, but the management plan should clearly define where responsibility for research lies. This should help to identify any need for local capacity building in research, or budgets to be allocated to research as required, all as part of the management cycle.

Holistic Review and evaluation of management performance is also an important periodic task of any well run fishery. The process, timing and capacity needs for such evaluations should also be set out in the management plan. Valuable exercises in review and evaluation can be done 'in house' but valuable lessons can also be learned from inviting external review. One idea here might be for IFCA's to periodically review the performance of another IFCA's fishery specific management. This could be a useful tool to sharing best practice.

It is also important to engage stakeholders and in particular fishers in this process of management review, so that there is a wider understanding of how management is succeeding, or otherwise. An annual fishery stakeholder meeting has proved successful in many fisheries for this process.

6.3.9. Establish Management in Legislation

Once the above stages have been brought together into a Fishery Management Plan, the next stage of the process is to enshrine key aspects into legislation. Not everything will necessarily be required to be formally codified, but key technical aspects will be. Whether or not the actual fishery management plan would be referred to in legislation will be determined on a case by case basis and in some cases it may be simpler simply to define key aspects in legislation.

The byelaw making powers defined in the Marine & Coastal Access Act (2009) is likely to be the main process of making the management measures contained in the Fishery Management Plan legally binding. In some instances the Sea Fisheries (Shellfish) Act 1967 may be the appropriate vehicle in order to establish either a Regulating or Several Order, although this is a slower process, which may not be necessary if the byelaw making process allows sufficient scope for introducing adaptive permitting, or any other such measures deemed appropriate.

Section 155 of the Maritime and Coastal Access Act (2009) empowers IFCA's to make bylaws in order to carry out their duties, although these do not come into effect until confirmed by the Secretary of State¹⁰. Section 156 of the Act sets out the types of management measures that may be taken, which provides managers with an extensive range of possible measures which includes:

- restrictions on gears, vessels, seasons or areas,
- permits and the ability to both charge for and limit the number of permits
- ability to limit the amount taken by either individuals or vessels
- Ability to require certain data collection and monitoring measures

Section 157 of the Act introduces the possibility for byelaws to include different provisions for different cases or different circumstances, including (in particular):

1. different parts of an IFCA district;
2. different times of the year;
3. Different descriptions of sea fisheries resources.

Section 157 part c in particular indicates that the byelaw may include provision to adapt management measures in response to different stock status indicators. This appears to pave the way for introducing harvest control rules, relative to reference points, indicating what management measures would be taken in event of changes in stock status.

¹⁰ Although section 157 of the act does give the IFCA's powers to make emergency byelaws in event of urgent need or unforeseen circumstance, it is anticipated that this would be the appropriate route by which to introduce adaptive management measures for local stocks.



Use by IFCA of these increased powers, including this apparent scope for introducing adaptive fishery management measures, remains relatively untested since the act came into force in 2009. However, if efforts to introduce adaptive management of local stock management units are to be effective, and if required, that those also meet the Principles and criteria of the MSC, then it seems likely that it is these additional powers which will need to be taken advantage of.



7. Developing management for priority fisheries

7.1. Addressing Gaps Identified at Pre-assessment

The scoping exercise carried out as part of Project Inshore has identified 5 fisheries in the district which are locally important and where Kent & Essex IFCA are best placed to lead on the development of stock management. These are:

- Cockle
- Mussel
- Whelk
- Lobster
- Native Oyster

For 4 out of 5 of these (cockle being the exception), Project Inshore has identified gaps – both in terms of being able to proceed to MSC full assessment, or in being able to demonstrate that stocks status and management controls are assuredly at the level of good management. This is not to say that these stocks are poorly managed, or over-exploited, merely that the current systems do not provide that assurance, so there may be challenges in demonstrating that the stocks are sustainably managed, either for regulatory or certification purposes.

For these fisheries, it is worth recapping here the pre-assessment scores and against each PI scoring below 80 (i.e. a gap) and highlight the types of research or management action which would address the gap. By highlighting areas where improvements are possible to inshore fisheries it is intended that IFCAs are able to use the Project Inshore outcomes as a roadmap towards more sustainable inshore fisheries. This seeks to link the theoretical findings of the pre-assessment with practical management actions. This is not intended to dictate a certain management direction, or provide definitive management steps but instead provide industry and regulators with practical steps that could be undertaken to enhance management. In each case, more comprehensive explanation of each of the suggested actions is provided elsewhere in the report.

The fisheries are addressed in turn in order of value – which maybe an indication of management priority.

7.1.1. Whelk

The following scores and comments are based on the MSC pre-assessment scores awarded to a North Sea pot fishery for whelk. They are equally applicable to a more spatially restricted management unit – for example within the IFCA district.

MSC Performance Indicator	Score	Potential Remedial Work
P1 1.1.1 Stock Status	<60	Demonstrated to be High Risk during MSC risk based scoring exercise, therefore empirical assessment required to demonstrate stock status.
1.1.2 Reference Points	>80	Although the pre-assessment scored this PI at >80, this was due to default scoring triggered by the use of the MSC risk based framework to determine scores. Future management is likely to be based on a more empirical form of stock assessment; therefore this should include appropriate reference points.
1.2.1 Harvest Strategy	<60	Detail an overarching harvest strategy, including harvest control rule. This is likely to reflect existing measures, along with any additional measures deemed necessary (notably inclusion of an HCR).
1.2.2 HCR	<60	Develop, define and consult on appropriate harvest control rules, which reflect management targets (reference points). These should be implemented.
1.2.3 Info & Monitoring	<60	Collect and collate all relevant time series data. Ensure on-going data collection appropriate to needs of assessment, at an appropriate spatial scale and passes to management.



	1.2.4	Stock Assessment	>80	Although the pre-assessment scored this PI at >80, this was due to default scoring triggered by the use of the MSC risk based framework to determine scores. Future management is likely to require the development of an empirical stock assessment.
P2	2.3.1	ETP Status	60-80	A fishery wishing to proceed with MSC certification should identify which are the ETP species which potentially interact with the fishery. The status of each should be reviewed in the context of information on the fishery impact. Consider indirect impacts.
	2.3.2	ETP Mgmt	60-80	Develop strategy to manage fishery's impact on ETP species. Review the ETP species with possible interactions, define if and where management action is required. Link to fleet operations, ensuring that appropriate action is being taken and the efficacy of management is reviewed.
	2.3.3	ETP Info	60-80	Provide quantitative data on the interaction between ETP species and the fishery. Detail how this data will be updated on a periodically appropriate timescale.
	2.4.3	Habitat Info	60-80	A fishery wishing to proceed with MSC certification should provide fleet specific information on spatial and temporal interactions between fishing gear and habitats (in particular vulnerable habitats). Management should also have some information on spatial patterns of the fishery and their change over time (which may provide indications in changes in stock patterns).
P3	3.1.2	Mgmt Roles	60-80	Further definition of Management of stocks needed in MOU between MMO and IFCA's. A management plan should clearly define the limits of the fishery being managed, the underlying assumptions and where responsibility lies for management, science and enforcement.
	3.1.4	Incentives	60-80	Review whether open access (albeit permitted) provides a disincentive to sustainable operation. Consider linking access to resource status. Investigate whether positive incentives can be introduced in the fishery as part of new management proposals.
	3.2.1	Objectives	60-80	A management plan set short and long term objectives, referencing both local priorities and objectives in higher level policy. This should reflect both Principle 1 (target stock status) and Principle 2 (ecosystem) objectives. Where possible these should be well defined and measurable.
	3.2.2	Decision Making Process	60-80	Fully define management and processes in a management plan including consultative processes. How will key decisions be taken? What information will be used to inform these? How will stakeholders participate in the decision-making process?
	3.2.3	Compliance & Enforcement	60-80	Current practise may already meet the requisite SG80 level, however, a fishery specific management plan should review and demonstrate that enforcement is appropriate and effective and focused on risks of non-compliance. Consider potential to incentivise self-regulation in the fishery and system of cross-checks.
	3.2.4	Research Plan	60-80	The Management plan should define areas requiring further research to support management. Responsibility for research should be clearly defined (in particular with CEFAS).
	3.2.5	Monitoring & Evaluation	<60	The Management plan should specify a programme of monitoring and evaluation – both routine internal evaluation and periodic external evaluation.



7.1.2. Lobster

The following scores and comments are based on the MSC pre-assessment scores awarded to a Thames pot fishery for lobster.

MSC Performance Indicator	Score	Potential Remedial Work
P1 1.1.1 Stock Status	<60	Demonstrated to be High Risk during MSC risk based scoring exercise, therefore empirical assessment required to demonstrate stock status. There is a high risk that the stock is below the point where recruitment is impaired. Stock status is highly uncertain as there has been no recent assessment of this stock. The stock will not be eligible for MSC certification unless the stock size can be shown to be above its limit reference point.
1.1.2 Reference Points	>80	Although the pre-assessment scored this PI at >80, this was due to default scoring triggered by the use of the MSC risk based framework to determine scores. Future management is likely to be based on a more empirical form of stock assessment; therefore this should include appropriate reference points.
1.2.1 Harvest Strategy	<60	Detail an overarching harvest strategy, including harvest control rule. This is likely to reflect existing measures, along with any additional measures deemed necessary. A fishery management plan (FMP) is required which describes an adaptive management system, which is being implemented. The FMP would define an adaptive management system as a whole, explaining why the system should, subject to explicit assumptions, ensure that fishery is sustainable. The current harvest strategy depends upon technical measures and controls on exploitation levels and does not appear to be sufficient. The harvest strategy will need to be extended with a HCR (PI 1.2.2). The FMP should be a public document and open to consultation and be reviewed.
1.2.2 HCR	<60	Develop, define and consult on appropriate harvest control rules, which reflect management targets (reference points). The HCR directly links controls on exploitation to one or more indicators of stock status. The stock assessment should be used to show that the HCR will work, but the HCR need not directly depend on repeated formal stock assessments. The HCR should include a pre-agreed way to reduce exploitation levels when required as well as define target levels. The HCR will need to be agreed among stakeholders. See Appendix 5 for further detailed guidance.
1.2.3 Info & Monitoring	60-80	Collect and collate all relevant time series data, including size and sex composition, tagging information (if any), total catch, catch and effort. Data collection has reported to be inconsistent. Therefore a review of data collection protocols might be needed to make sure on-going data collection is consistent, at an appropriate spatial scale, and tailored to needs of assessment with timely receipt and analysis.
1.2.4 Stock Assessment	>80	Although the pre-assessment scored this PI at >80, this was due to default scoring triggered by the use of the MSC risk based framework to determine scores. Future management is likely to require the development of an empirical stock assessment which makes use of all available information. It should aim to provide the best scientific assessment that can be done subject to data limitations, which are severe. The assessment would need to address main uncertainties and undergo formal stakeholder review.
P2 2.1.1 Retained Outcome	<60	The pre-assessment scores are reduced by a potential bycatch of Southern North Sea Brown Crab (status indicated as being below safe limits). This can be addressed either by demonstrating that brown crab is not a main retained species (>5% of catch) in the lobster fishery, or by demonstrating that the pot fishery is not hindering the recovery of the crab. Efforts to rebuild the North Sea crab population should be supported and encouraged (although likely outside the IFCA's immediate sphere of influence).



	2.1.2	Retained Management	60-80	Develop steps to ensure that the lobster fishery does not hinder recovery of brown crab. If brown crab is shown to not be a main retained bycatch (see above) or the crab population recovers, then management is likely to score 80 without further steps.
	2.3.1	ETP Status	60-80	A fishery wishing to proceed with MSC certification should identify which are the ETP species which potentially interact with the fishery. The status of each should be reviewed in the context of information on the fishery impact. Consider indirect impacts.
	2.3.2	ETP Mgmt	60-80	Develop strategy to manage fishery's impact on ETP species. Review the ETP species with possible interactions, define if and where management action is required. Link to fleet operations, ensuring that appropriate action is being taken and the efficacy of management is reviewed.
	2.3.3	ETP Info	60-80	Provide quantitative data on the interaction between ETP species and the fishery. Detail how this data will be updated on a periodically appropriate timescale.
	2.4.3	Habitat Info	60-80	A fishery wishing to proceed with MSC certification should provide fleet specific information on spatial and temporal interactions between fishing gear and habitats (in particular vulnerable habitats). Management should also have some information on spatial patterns of the fishery and their change over time (which may provide indications in changes in stock patterns).
P3	3.1.2	Mgmt Roles	60-80	Further definition of Management of stocks needed in MOU between MMO and IFCA's. A management plan should clearly define the limits of the fishery being managed, the underlying assumptions and where responsibility lies for management, science and enforcement.
	3.1.4	Incentives	60-80	Review whether open access provides a disincentive to sustainable operation. Consider linking access and gear restrictions to resource status. Investigate whether positive incentives can be introduced in the fishery as part of new management proposals.
	3.2.1	Objectives	60-80	A management plan set short and long term objectives, referencing both local priorities and objectives in higher level policy. This should reflect both Principle 1 (target stock status) and Principle 2 (ecosystem) objectives. Where possible these should be well defined and measurable.
	3.2.2	Decision Making Process	60-80	Fully define management and processes in a management plan including consultative processes. How will key decisions be taken? What information will be used to inform these? How will stakeholders participate in the decision-making process?
	3.2.3	Compliance & Enforcement	60-80	Current practise may already meet the requisite SG80 level, however, a fishery specific management plan should review and demonstrate that enforcement is appropriate and effective and focused on risks of non-compliance. Consider potential to incentivise self-regulation in the fishery and system of cross-checks.
	3.2.4	Research Plan	>80	Although the pre-assessment scored this fishery at SG80 a new management plan should still define areas requiring further research to support management. Responsibility for research should be clearly defined. In the past CEFAS have led on much research – will this continue under a new definition of management unit?
	3.2.5	Monitoring & Evaluation	<60	The Management plan should specify a programme of monitoring and evaluation – both routine internal evaluation and periodic external evaluation.



7.1.3. Native Oyster

The following scores and comments are based on the pre-assessment scores provided during stage 2 of Project Inshore for the Kent & Essex Shellfish Dredge fishery for Native Oyster.

MSC Performance Indicator		Score	Potential Remedial Work
P1	1.1.1 Stock Status	60-80	Although survey work supports management, the pre-assessment scoring exercise was carried out against the MSC risk based framework and demonstrated to be Medium Risk. Future management should seek to demonstrate stock status empirically, relative to reference points as a basis for management.
	1.1.2 Reference Points	>80	Although the pre-assessment scored this PI at >80, this was due to default scoring triggered by the use of the MSC risk based framework to determine scores. Where management undertakes empirical survey work, where possible this should include appropriate reference points.
	1.2.1 Harvest Strategy	<60	Detail an overarching harvest strategy, including harvest control rule. This is likely to reflect existing measures, along with any additional measures deemed necessary.
	1.2.2 HCR	<60	Develop, define and consult on appropriate harvest control rules, which reflect management targets (reference points).
	1.2.3 Info & Monitoring	<60	Collect and collate all relevant time series data. Ensure on-going data collection is at an appropriate spatial scale, tailored to needs of assessment with timely receipt and analysis.
	1.2.4 Stock Assessment	>80	Although the pre-assessment scored this P1 at >80, this was due to default scoring triggered by the use of the MSC risk based framework to determine scores. Future management is likely to benefit from further empirical stock assessment.
P2	2.2.1 Bycatch Outcome	60-80	Detail catch profile for the gear in use – before sorting of catch. This will provide an estimate of the incidental bycatch of epifauna and infauna and provides an empirical baseline for future management consideration – plus informs any possible assessment. For any “main” bycatch (i.e. >5%) demonstrate either that the resource is not depleted or that the fishery is not hindering recovery. Most species are unlikely to be depleted.
	2.2.2 Bycatch Management	60-80	Develop steps to ensure that the fishery does not hinder recovery of any depleted main elements of bycatch.
	2.2.3 Bycatch Information	60-80	Local studies, as detailed above will lead to an improvement in information scores.
	2.3.1 ETP Status	60-80	A fishery wishing to proceed with MSC certification should identify which are the ETP species which potentially interact with the fishery. The status of each should be reviewed in the context of information on the fishery impact. Consider indirect impacts.
	2.3.2 ETP Mgmt	60-80	Develop strategy to manage fishery’s impact on ETP species. Review the ETP species with possible interactions, define if and where management action is required. Link to fleet operations, ensuring that appropriate action is being taken and the efficacy of management is reviewed.
	2.3.3 ETP Info	60-80	Provide quantitative data on the interaction between ETP species and the fishery. Detail how this data will be updated on a periodically appropriate timescale.
	2.4.1 Habitat Status	<60	Dredge fisheries have the potential to cause significant benthic impact. Whether this is serious or irreversible, as per the MSC definition depends on the wider efforts of management and requires good empirical evidence to support justification.
	Habitat Management	<60	Dredge fisheries have a greater need to demonstrate that potential habitat impacts are fully understood and where necessary mitigated by management and the actions of the fleet. This is particularly the case where a fishery wishes to pursue MSC certification.



	2.4.3	Habitat Info	60-80	A fishery wishing to proceed with MSC certification should provide fleet specific information on spatial and temporal interactions between fishing gear and habitats (in particular vulnerable habitats). Management should also have some information on spatial patterns of the fishery and their change over time (which may provide indications in changes in stock patterns).
P3	All		<80	The pre-assessment identified few issues in relation to the management of native oyster. Although the pre-assessment highlights compliance and enforcement as a possible area of weakness, this was more or a nationwide comment, and it is likely that the specific measures in place in Kent & Essex are appropriate to the needs of management. The overall good score in P3 may reflect an assumption that most native oyster beds are managed within a several order or a private fishery. Where this is not the case, in reviewing management it is likely that the issues highlighted for both lobster and whelk may also be worth reviewing in relation to this fishery.

7.1.4. Mussel

No fishery specific pre-assessment score was provided for the Kent & Essex mussel fishery, this was due to the comparatively low value of the fishery (at least when reflected in national statistics). It is understood that in most cases in the district this is a seed mussel fishery, fished in private lays (Several Fishery, Act of Parliament, Royal Charter etc), then relocated for on-growing. Private lays would not be the focus of IFCA led management. The IFCA byelaws do apply restrictions outside of these private lays, but it is understood that the fishery in these areas is fairly slow growing, due to sedimentation, or the resource cannot be fished as it is either in the intertidal zone or within an MPA. In this context it seems unlikely that this fishery will be a candidate for MSC certification in the short or medium term, or a priority for further development of management plans. The advice provided in the section above for whelk, lobster and native oyster, could provide a steer to the types of steps to take within this fishery, should further management efforts be prioritised in the future.

7.2. Potential timeline for development of management

It is difficult, and perhaps inappropriate, for an external project such as this to make recommendations about possible project timelines. This is particularly so in this case given the existing commitments already placed on IFCA's, referred to in section 2.4 of this report. Below we instead set out a chronology of the steps taken toward implementing adaptive stock management. This is set in a single fishery example so would need to be adapted where multiple fisheries are moving through the process at the same time. This length of this process will depend on available capacity, however the process should not be unduly rushed and time should be allowed for proper consultation, testing and establishing in law.



	Stage	1	2	3	4	5	6	7	8
Identify stocks to be locally managed & develop supporting rationale for local stock management unit	X								
Identify stakeholders and establish initial fishery 'Working Group'	X								
Collate and review available stock & time series data	X								
Define fishery objectives, decision-making processes, consultation mechanisms and communication methods.	X								
Undertake initial empirical assessments of available data and if possible make initial HCR and reference point proposals.	X	X							
Define the on-going stock monitoring data requirements and determine how management will meet these.		X							
Define management measures and restrictions – review existing byelaws and identify where additional measures required (in particular to allow adaptive exploitation rates)		X							
Define capacity and funding requirements		X							
Determine on-going scientific costs and capacity needs and how these will be met.		X							
Where required draw up additional MoUs with other fisheries sector bodies to clarify roles & responsibilities		X	X						
Draft Fisheries Management Plan. And comment process of ensuring binding requirements codified as byelaws.		X	X						
Consult of proposed stock management process and seek stakeholder 'buy-in' for management decisions.		X	X						
Commence operation of fishery under the terms of the Management Plan, with exploitation levels determined by reference to harvest control rule.			X						
Undertake on-going monitoring of stock status and application of HCR.			X	X	X	X	X	X	X
Undertake periodic evaluation & testing of stock assessment and harvest control rules				X					X
Undertake holistic evaluation of overall performance of the fishery management system.									X
Begin MSC assessment process (if required)			X	X					

Table 9:

Steps in the development of local adaptive stock management.

Stage 1-3	Proposed FIP Stage
Stage 3-4	Potential MSC Assessment Stage
Stage 3-8	Routine Evaluation of Fishery



Appendix 1 - References

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Appendix 2 - IFCA Stock Management Scoping

	Average annual £ (2006-2010)	Rank		Management Level	Stock / jurisdiction overlap	Local Socio-economic / cultural importance	Average score
		Value	Rescaled				
Cockle	9,848,946.80	1.00	3.00	3	3	3	3.0
Whelks	247,400.36	7.00	2.70	3	3	3	2.9
Lobsters	220,606.07	10.00	2.55	3	3	3	2.9
Native Oysters	60,420.43	16.00	2.25	3	3	3	2.8
Mussel	30,000.00	19.00	2.10	3	3	3	2.8
Crabs	253,442.10	6.00	2.75	3	2	3	2.7
Scallops	735,172.94	3.00	2.90	2	2	3	2.5
Bass	544,409.88	4.00	2.85	2	2	3	2.5
Cuttlefish	119,715.46	11.00	2.50	3	2	2	2.4
Red Mullet	45,171.65	18.00	2.15	3	2	2	2.3
Squid	25,713.00	21.00	2.00	3	2	2	2.3
Spider Crabs	1,518.51	43.00	0.90	3	3	2	2.2
Mullet - Other	9,821.16	28.00	1.65	2	2	3	2.2
Thornback Ray	226,925.25	9.00	2.60	1	2	3	2.2
Puting (Bib)	4,914.06	32.00	1.45	3	2	2	2.1
Sand Sole	3,685.28	33.00	1.40	3	2	2	2.1
Unidentified Dogfish	3,552.47	34.00	1.35	3	2	2	2.1
Smoothhound	29,807.89	20.00	2.05	2	1	3	2.0
Sole	2,624,108.73	2.00	2.95	1	1	3	2.0
Conger Eels	1,787.14	41.00	1.00	3	2	2	2.0
Tope	1,580.49	42.00	0.95	3	1	3	2.0
Plaice	286,913.38	5.00	2.80	1	1	3	2.0
Lesser Spotted Dog	11,107.26	26.00	1.75	3	1	2	1.9
Cod	242,146.97	8.00	2.65	1	1	3	1.9
Skates and Rays	69,126.50	15.00	2.30	1	2	2	1.8
John Dory	3,069.52	36.00	1.25	2	2	2	1.8
Black Seabream	2,633.59	39.00	1.10	2	2	2	1.8
Spurdog	3,216.47	35.00	1.30		2	2	1.8
Gurnard and Latchet	18,976.76	23.00	1.90	2	1	2	1.7
Mackerel	15,495.85	24.00	1.85	1	1	3	1.7
Flounder or Flukes	10,775.72	27.00	1.70	1	1	3	1.7
Greater Weever	261.38	46.00	0.75	3	2	1	1.7
Wrasses	162.06	47.00	0.70	3	2	1	1.7
Garfish	115.91	49.00	0.60	3	2	1	1.7
Herring	6,654.00	31.00	1.50	1	1	3	1.6
Lemon Sole	118,159.14	12.00	2.45	1	1	2	1.6
Turbot	95,229.15	13.00	2.40	1	1	2	1.6
Horse Mackerel	71,782.42	14.00	2.35	1	1	2	1.6
Triggerfish	67.10	53.00	0.40	3	2	1	1.6
Pollack	2,709.12	37.00	1.20	2	1	2	1.6
Gurnards - Red	19.20	56.00	0.25	3	2	1	1.6
Brill	53,566.52	17.00	2.20	1	1	2	1.6
Long-nosed Skate	2,634.00	38.00	1.15	2	1	2	1.5
Ballan Wrasse	7.22	57.00	0.20	3	2	1	1.6
Smelt (European)	4.32	58.00	0.15	3	2	1	1.5
Whiting	22,165.72	22.00	1.95	1	1	2	1.5
Blonde Ray	11,842.89	25.00	1.80	1	1	2	1.5
Monks or Anglers	7,298.71	29.00	1.60	1	1	2	1.4
Unid DS Squal Sharks & Dogfish	140.20	48.00	0.65	2	2	1	1.4
Dabs	7,189.43	30.00	1.55	1	1	2	1.4
Shad	105.41	50.00	0.55	2	2	1	1.4
Spotted Ray	2,620.66	40.00	1.05	1	1	2	1.3
Sprats	1,182.79	44.00	0.85	1	1	2	1.2
Small-eyed Ray	885.54	45.00	0.80	1	1	2	1.2
Eels	97.95	51.00	0.50	2	1	1	1.1
Haddock	51.27	54.00	0.35	1	1	2	1.1
Ling	88.11	52.00	0.45	1	1	1	0.9
Hake	28.21	55.00	0.30	1	1	1	0.8

Source:

Landings value based on MMO database of overlapping IFCA rectangles. For cockle the value figure is derived from local IFCA reporting and for mussels the value figure is based on a verbal estimate from K&E IFCA.



Appendix 3 - Further Stock Assessment examples

Stock assessment involves modelling of empirical data to examine the status of fish stocks and to provide advice on future catches; essentially how many fish are there, how many were there and how many are likely to remain if certain catches are taken. This is a specialist task which can involve significant data and highly technical mathematical modelling. Resources are unlikely to be available for regular stock assessments of small scale fisheries, but a stock assessment can be a useful tool for designing and simulation testing a harvest control rule.

Stock assessment of shellfish stocks is generally poorly developed in Europe. There are few standardised approaches and data supports are weak in many cases. The majority of species are not included in the EU Data Collection Framework (DCF).

The approach to stocks assessment should take account of the fishery, species biology, life history and data that are available. The stock assessment model will attempt to explain the data based on what is known of the fishery and biology of the stock. Where data are limited, several competing models may provide equally good explanations for observations. However, as long as the harvest control rule can be shown to achieve desirable results regardless of which model may be right, it can be shown to be robust to uncertainty and suitable for the fishery.

Some examples of off-the-shelf assessment models are provided in Table 4. Their complexity and data requirements vary. All software is freely available on the NOAA web site. In many cases, however, bespoke models may be more appropriate, making better use of the available data. In any case, careful interpretation of assessment results will be required and models will need to be tested to ensure that the fit is valid.



Feature	Model											
	1	1	1	1	1	2	2	3	3	3	3	4
Model Complexity												
Data / Observation Error	D C A C	S E I N E	A I M	A S P I C E	C S A	S C A L E	V P A	V P A 2 B O X	A M A K	S T A T C A M	A S A P	S S 3
Total catch (landings+discards)	X		X	X	X	X		X	X	X	X	X
Catch at age (CAA)							X	X	X	X	X	X
Catch at length (CAL)						X						X
Address variation in CAA or CAL		X							X	X	X	X
Age specific indices of abundance for tuning							X	X	X	X	X	X
Age-aggregated tuning indices			X	X	X	X	X	X	X	X	X	X
Tag-recapture								X				X
Process / Model Specification	D C A C	S E I N E	A I M	A S P I C E	C S A	S C A L E	V P A	V P A 2 B O X	A M A K	S T A T C A M	A S A P	S S 3
Stock recruitment function									X		X	X
Sexual dimorphism in growth rates						X		X				X
Spatial heterogeneity								X				X
Incorporate long term historical landings	X			X	X				X	X	X	X
Handle gaps in age or length information		X			X				X	X	X	X
Multiple fleets									X	X	X	X
Handle differences between sexes					X		X					X
Automatic retrospective analyses			X	X			X			X	X	
Independently est. temporal changes in catchability for surveys									X		X	X
Address variations in biological sampling intensity over time									X	X	X	X
Consider measurement error for individual time series observations									X		X	X
Uncertainty / Forecasting / BRPs	D C A C	S E I N E	A I M	A S P I C E	C S A	S C A L E	V P A	V P A 2 B O X	A M A K	S T A T C A M	A S A P	S S 3
MCMC									X	X	X	X
Bootstrap			X	X	X		X	X				X
Estimation of BRP for F			X	X					X	X	X	X
Estimation of BRP for SSB				X					X	X	X	X
Linkage to external/internal forecasting program			X	X			X				X	X

Table 10:

Examples of stock assessment models their relative complexity and data requirements (from <http://nft.nefsc.noaa.gov/>). Models can be downloaded from the NOAA web site. The models are all implemented in the NMFS stock assessment tool box.



Appendix 3 - Lobster Harvest Control Rule

Introduction

To meet all requirements under Principle 1, it should be possible to develop and implement a HCR. This determines stock status (PI 1.1.1-3), and can be built on appropriate data and assessment (PI 1.2.3-4) as well as play a central role in the harvest strategy (PI 1.2.1-2).

A generic solution to harvest control rules is presented in Appendix 3. A specific example of the strategy that might be adopted is described here for lobster. The process can be divided into four tasks:

1. Define management units
2. Define set of possible HCRs for each management unit
3. Develop stock assessment model to evaluate HCR
4. Conduct a stakeholder review to determine HCR to be implemented

The tasks above apply to all fisheries implementing HCRs, but applying the same management system to small scale fisheries (e.g. lobster) as used by large scale fisheries (e.g. North Sea autumn spawning herring) is not possible. There are insufficient financial and technical resources available to develop this sort of management, and therefore a more appropriate scale of management is required.

A more appropriate HCR for inshore fisheries would have the following attributes:

- Promote engagement with all stakeholders, particularly managers, scientists and fishers.
- Inexpensive to implement, and specifically can be administered within the financial and technical resources available to manage these fisheries.
- Makes the best use of all available information.

It is important to involve as wide a selection of stakeholders as possible in the inshore fisheries management processes. Although this is also good practice in large scale fisheries, it is almost a requirement in small scale fisheries. Apart from anything else, enforcement is made much easier if all stakeholders support the management controls that are being applied.

Generally, IFCA's have good systems to consult with stakeholders, and this should meet requirements under MSC Principle 3. For fisheries operating under regulating orders, the fishing community is fully engaged with the management process, including the stock assessment. This represents a good model to implement in other inshore fisheries. Therefore, IFCA's should seek to develop an appropriate management system that meets the same criteria as regulating orders, where regulating orders cannot be implemented. Central to the idea of engagement is to involve stakeholders in developing and agreeing an appropriate HCR.

Define Management Units

Clear management units (stocks) need to be defined. This should be based on stock biology, fishery units and jurisdiction. Adult lobsters are not thought to be migratory, although larvae are pelagic and could be more widely dispersed. The best approach is likely to be to define management units based primarily on jurisdiction, but with reference to adjoining IFCA's to coordinate management. However, it is most important to set up a working hypothesis for management units. This is precautionary. Although these hypotheses might be challenged, the onus should be disproving this hypothesis (that these units can be managed under the current system) rather than changing management units based on the balance of scientific evidence alone, which does not address management needs.

Although many issues might be resolved by extending the IFCA jurisdiction from 6 to 12 miles, it makes more sense to designate all stocks that can be managed locally as "inshore" and therefore the responsibility of the IFCA regardless of where they are caught (within or outside the 6 or 12 mile limit). Lobster should be made the responsibility of the relevant IFCA's.



The possible effect of any exchange with other stocks can be tested as part of the HCR evaluation. This can be done either as a sophisticated migration model, or running separate stock assessments with catches split or combined depending on the stock area, for example. It is likely that, as long as HCRs are harmonised across IFCAs, the harvest strategy is likely to be robust across a range of hypothetical management units.

Define the Set of Possible HCRs

Once a management unit is defined, possible HCRs can be developed. HCRs should be determined by the available data, effective management controls, costs of implementation and the need for stakeholder engagement.

Alternative indicators could be based on subsets of data (e.g. discards for a recruitment index) or different measures (e.g. mean size by sex). Several indicators could be used (e.g. a traffic lights system), but in this case the HCR might begin to become too complex, and stakeholder engagement will be lost. Alternative controls could include variable closed areas or closed seasons, alterations in the MLS and so on. Criteria for the controls are that it should be possible to adjust them at short notice and it should be possible to evaluate their effect. Controls should be divided between those used to achieve the target (i.e. permanent controls that are not adjusted) and those used to bring about a stock recovery (i.e. temporary controls that can be used to reduce fishing mortality over a few years). Of course, recovery controls may also be applied as a target control, but there should be an ability to further restrict fishing when necessary.

Possible indicators can be developed from compiling the available data and considering relationships that might exist between the reproductive potential of the stock and the indicators (Table A5.1). Effective controls can be identified from considering enforcement issues, likely compliance and whether the control will have the desired effect (i.e. reduce to sustainable levels catches).

In developing HCR, the likely stakeholder will need to be considered. Identifying the set of possible HCR will depend upon the available data and management resources, so engagement in early stages is not necessary, but will need to be considered. Engagement with stakeholders is promoted by:

- Using simple rules that are easy to understand and interpret, particularly so that stakeholders can understand the implications of different outcomes.
- Addressing uncertainties openly. What is not known is equally important to what is known and all management decisions must be taken under risk. By focusing on the decision-making rather than the science, management actions can be rational, timely and precautionary.
- Responding clearly and openly to constructive criticism and review from stakeholders. This is related to dealing with uncertainty. Stakeholders need to agree what is known, and address what is not known by precautionary decision-making and research. Developing a common knowledge base through better communication and using empiricism as the basis for solving disagreements will allow management to progress.



Table 11:
Some possible indicators and controls for use with lobster fisheries

Indicators	Positive	Negative
Catch-per-pot	Related to abundance Can be adjusted by selecting data for particular measures, such as only mature females or discarded undersize.	Catch-per-pot may suffer from hyperstability as an abundance index.
Mean size	Easy to measure	Not necessarily routine reported. Affected and invalidated by changes in selectivity
Target Controls	Positive	Negative
Pot escape hatches	Easily enforced	Changes gear selectivity which needs to be estimated.
Minimum landings size	Can be enforced at landing. Most discarded lobsters should survive.	Some damage possible, so unknown discard mortality.
Prohibition on landing berried females	Can be enforced at landing. Most discarded lobsters and eggs should survive.	Some damage possible, so unknown discard mortality.
Closed areas	May be used to protect vulnerable stock components and habitat	Evaluating the quantitative effect of closed areas is difficult
Recovery Controls	Positive	Negative
Pot limits	Direct control on fishing effort and maximising socio-economic potential of the fishery	Additional management and legislative tools may be needed to implement control Reaching an agreement on how pots are shared out may be difficult
Seasonal closure	Easy to enforce	Socio-economic implications are uncertain Fine adjustments are not possible because fisher response to closed seasons is not certain.

A simple proposal for a harvest control rule for lobster would be a stock size indicator as the mean catch-per-pot (numbers or weight per pot hauled) and the control would be the number of pots set. Pots hauled and the lobster catch are reported routinely, so the indicator is easy to calculate. However, it is not clear whether the number of pots can be controlled or how this might be enforced. Clearly this rule would have to apply to all pots catching lobster whether set inside or outside the 6 mile limit.

Therefore, there are a set of possible indicators that can be proposed based on the available data and a set of possible controls that can be applied based on likely compliance, effectiveness in limiting fishing mortality and cost. Reasonable combinations of indicators and controls are likely to define the set of HCR that might work. This leaves the choice of which particular indicators and controls might be applied, and the conditions when a reduction in fishing mortality might be required, how this might be achieved and by how much.

If MSY reference point is available from a stock assessment, reasonable and precautionary choices can be proposed for other reference points (Table A5.2). Other default and precautionary options can be proposed for HCRs to undergo testing. Clearly, these can be adjusted based on the stakeholder review and other information received during the review process. The main objective would be to get a management control in place, rather than a perfect HCR which will never need adjustment.

Some default options that might be used for configuring a HCR where other information, such as a stock recruit relationship, are unavailable. Default precautionary values can be drawn from MSC guidance, which is based on international “best practice”.



Configuration	Options
Target Reference Point	All default reference points and HCRs depend upon some estimate of MSY. MSY or a proxy can be estimated from stock assessment. An MSY proxy target often can be proposed, but needs to be justified.
Limit Reference Point	Without a stock-recruitment relationship, this can be set as equivalent to 50% SSB of the target.
Indicator calculation	The indicator variable should be smoothed to reduce noise. Simple smoothers can be used which are easy to understand (e.g. moving average). The amount of smoothing might be estimated from simulations, but results are likely to be robust to this.
Trigger placement	A reasonable choice is at the mid-point between target and limit, or based on an estimate of the residual noise in the indicator after smoothing. This can be tested by simulation, but results are likely to be robust to this. Note however, that a certified fishery may be considered as “rebuilding” by the certification body if the stock is below the trigger point. Therefore, it may be useful to declare an alternative “special measures” rebuilding point below this trigger but still well above the limit, to avoid unnecessary certification costs.
Type of control	<p>For small scale fisheries, controls on fish effort (e.g. days at sea, # traps) are desirable as they reduce the impact of fishing on all components of the ecosystem, reduce fishing costs and are more robust to error and natural fluctuations in stock size.</p> <p>Catch (e.g. kg landed) quotas work well where catches can be well measured and controlled and either the indicators are accurate in assessing stock status or catches can be set very low relative to the stock productivity (i.e. very precautionary).</p> <p>Non-static area closures are not recommended because, apart from any practical enforcement issues, they are difficult to evaluate and the effect is difficult to predict.</p> <p>Seasonal closures are valuable in that they will restrict fishing effort, although their impact will be less precise than managing effort directly.</p>
Minimum effort below limit	If the stock should be reduced below the limit reference point, fishing should be reduced as low as possible. The minimum catch or effort at this point should be determined. With recreational fisheries, other fisheries outside the management control, and a need to continue to collect stock monitoring information, this catch may not be reduced to zero. Under these circumstances, it will need to be verified that the stock can still rebuild.

Table 12:

Default options for HCR development

Develop Stock Assessment Model to Evaluate HCR

HCRs should be designed or selected by stakeholders. In order to make good decisions on HCRs, stakeholders must be given relevant information on the stock and fishery and the impact the HCR is likely to have. This is best carried out using agreed data sets with mathematical models describing what is known about the fishery to estimate how the stock will respond to different HCRs under different scenarios (Table A5.3).

Scientific advice for small scale fisheries is less about definitive science, although that has a role, than about trying to make the best decisions you can with the available information. Therefore measures and appreciation of uncertainty has to be incorporated into the scientific advice. Although including uncertainty in advice may make advice more difficult for stakeholders to understand, it is necessary that risks are understood for good decision-making.

Part of statutory responsibility for IFCA is to take account of the socio-economic impact of management decisions. Economic issues can be reported on as part of the risk assessment of this sort of modelling. Although previous assessments have produced precautionary advice, it is difficult to adapt them to account for stakeholder concerns, or address socio-economic impact from the decisions. This may explain the lack of management response to this stock assessment.



A more decision based approach would allow the assessment to consider not only the “best estimate”, but also the impact errors will have on outcomes, so that decisions can be adjusted accordingly. Furthermore, if the CEFAS assessment is correct, it is likely that overall yields as well as catch rates will increase with reduction in fishing effort. Management action requires that the industry believes this assessment result, and understands the socio-economic benefits for taking appropriate action. Once this is the case, the required trap reduction would be much easier to implement.

The model must be consistent with the available data and the model structure must explain the known biology and fishery relationships. This suggests that model development is best served by implementing it from the beginning in a flexible framework so that on-going investment in the development is possible.

Because the model is essentially a model of the data, the data available will have a considerable influence on the model structure. Not all data need necessarily be available for all fisheries, but some core data are likely required to fit any model. This primary data are likely to include catch, effort and size/sex composition.

It will also be worthwhile considering how to share information across stocks. For example, stocks with tagging information might be able to estimate growth, which could improve assessments for those stocks where growth cannot be estimated.

Table 13:
Components in
developing procedures
to evaluate HCR

Databases	Used to organise data as well as protect confidentiality and data integrity Queries will automatically produce the most up-to-date data set rapidly and consistently Queries can be embedded in other software Open source databases (PostgreSQL, SQLite, MySQL) should be appropriate, and generally all work through essentially the same Standard Query Language.
Spreadsheet	Queries can be embedded into spreadsheets, so updates can, to a large extent, be automated. Spreadsheets are useful to hold data for public review in a widely readable form Data can be combined from several sources, so all data components are in one file Simple graphs and models can be set up to check data Data can be formatted automatically on output to a text file for analysis
ADMB model	ADMB is available for Linux and Windows, and is open source, is very fast and is able to fit hundreds of model parameters. (see www.admb.org) Data are read in as custom text file. Model is in C source code and is compiled, so some knowledge of computer programming is required as well as knowledge of mathematical modelling. MCMC can map probabilities (MCMC) for use in evaluating HCRs through simulation. ADMB is very flexible and a useful repository for research outputs.
R output	R is freeware powerful tool for producing high quality graphics as well as allowing further statistical analyses and diagnostics (on MCMC output for example). R can read text and binary files output from the ADMB model. R code can be used to produce standard output formatted for presentation and for documents.

Recently there has been a lot of interest in “data poor” fisheries stock assessment (e.g. Honey et al 2010, Pilling et al 2008, ICES 2012b). Various techniques have been proposed and have their uses. Many try to emulate standard estimation methods applied to fisheries that are not data poor, and most try to simplify calculation methods. This can result in such methods ignoring data which



cannot be used, which is not satisfactory particularly in data poor situations, and having strict assumptions which reduce credibility in the results.

Many inshore fisheries, such as lobster, have significant data sets (Table A5.4). Others, which are of less interest, such as periwinkles, are genuinely data deficient. Nevertheless, data are usually limited in nature. Crustacean fisheries do not have age data, but rely on size which is an imperfect indicator of age. Furthermore, many crustaceans and other shellfish have life history characteristics, which make applying many standard stock assessment approaches inaccurate. Very simple methods do not necessarily measure uncertainty (they concentrate on robustness instead), and may be very restrictive and inflexible, discouraging engagement.

Using HCRs allows the use of methods which focus on the decision-making and management advice rather than attempting to estimate stock status exactly. This is consistent with the modern definition of MSY which takes into account risk. A general methodology already exists in decision theory to deal with data poor situations, and these methods are much more flexible and should make the best use of all available information.

Primary data, which is required and secondary data, which is desirable, for use in fitting the stock assessment model. Secondary data may not be absolutely necessary, but would be valuable where they are available.

Primary Data Component	Comments
Total annual catches	All catches (discards and landings) are required for as long a time period as possible. Specifically, the catch time series should extend back to the start of the fishery, so that reference points are estimated relative to the unexploited state. The model should be able to use annual data if monthly data are not available in the early part of the time series. Although the model should be robust to missing data, total annual catches are required for all years in the model.
Total catches by month	As much of the catch data as possible should be aggregated by month. Total catches do not need to be divided by fleet, size or sex (see size grading below), but should cover all catches, including recreational. Because the model fits to catches, if they are estimated, some sort of measurement error can also be provided.
Size and sex sampling	Any sampling of the landings should be aggregated by month, fleet (i.e. with separate selectivity).
Landings, discards and effort	The main abundance index, in the absence of a fishery independent survey, will depend on catch and effort data. This can be based on observations for each month and fleet, but need not be complete.
Secondary Data Component	
Tagging	Any tagging data will be useful for estimating growth and mortality. Outside the model, it may also be used to help define management units.
Size Grading	If landings are sorted into commercial size grades, these landings by size grade can be used as long as the grading is accurate and well-defined.

Table 14:
Data requirements for lobster HCR development

The current “best practice” in stock assessment is to use statistical dynamic age structured models, which can be made relatively flexible to represent local data and stock biology. The model links what is known about the biology to the available observations (Table A5.5). These models tend to be complex and have been difficult to fit to data, but new software and methods have addressed this to some degree. It is now possible not only to fit such models to data, but “map” the uncertainty of the fit, all on a standard desktop computer. Software to do this is free. The main problems are likely to be the potential complexity, skills required to develop and maintain such a model and agreement over what is included or excluded in the model.

The stock assessment model should consist of the population model, which tries to capture the most important attributes of the life history and biology, and the likelihood functions which link



the population model to the data. A simple but reasonably complete version of the model should be developed for stakeholder review. In particular, it should be possible to assemble the available data and build appropriate likelihood functions for the data. Stakeholder review is most likely to lead to changes in model structure, for example requiring that some fleets may be separated or combined based on assumed differences in selectivity.

Table 15:
Attributes that the stock assessment model is likely to need

Structure	Comments
Unit stocks	A working hypothesis of unit stocks is required. This will determine how data that the model is fitted to are divided up or combined. It may be possible to get some insight into appropriate stock definitions from fitting the model.
Monthly time step	Although seasonality makes modelling more complicated, using a month time step enables the software to use seasonal patterns to fit the model which with an annual time step would not be available.
Separate population models for each sex	The males and females grow differently, so the model should be sex differentiated.
Seasonal growth	The growth model is critical in crustaceans as it is used to convert from age to size. It will need to be resolved whether an explicit model of moulting is required.
Missing data	The model will not tolerate (or it would make the analysis much more difficult) missing catch data. Otherwise the model will need to be able to handle missing data and even some missing components where they are not available.
Code Design	In designing the model, some account should be taken of robustness, future development and accessibility. Design of the software should follow good programming practice and be well-documented. Functions should be organised so that they meet requirements for efficient calculation if the “random effects” module is used (i.e. define Separable Functions). It is quite likely that at some point in the future the recruitment will be best estimated as a “random effect” or that the model could develop into a state-space model because of the uncertainties over growth. The model should be made freely available. This will help check and improve the model without additional investment.
Other requirements	Input estimates (as probability priors or point values) of various parameters will be required. In many cases it is easier to fit sub-models outside the made model frame and provide estimates of parameters. This is likely to be a good approach for natural mortality, sex ratios, the maturity ogive, standardising effort and the growth models, at least in the first instance. The assessment should focus initially on estimating fishing mortalities, catchability, selectivity and recruitment.

ADMB is the best platform for developing a bespoke stock assessment model. This platform is technically demanding, but highly flexible and can fit stock assessment models most other approaches cannot. Data inputs and result outputs can be prepared so that they can be processed automatically to produce outputs for stakeholder review rapidly. Simple HCRs can be evaluated rapidly from Markov chain Monte Carlo (MCMC) outputs with ADMB, so the robustness of the HCR to uncertainties can be tested.

Developing a model is not a simple process, and would require some investment to get it underway. There is considerable free code available for other fisheries, so it would not be necessary to start from scratch. Model code can be adapted for the population and likelihood functions and then improved for the specific use in English lobster fisheries.

Developing the stock assessment model is a different process to evaluating the HCR, and these tasks should be separated. Evaluating the HCR should be done as part of the stakeholder review, whereas the stock assessment model can be developed and fitted by a smaller group of scientists and interested stakeholders. This is because developing and fitting the model is technical and difficult and will take considerable time. Once a satisfactory model has been fitted making the best



use of the available data and what is known about the stock, it can be used to evaluate the HCR.

Fitting the assessment model is not trivial. There is a too step process. Firstly, the “maximum posterior” point estimates are estimated. Over-parameterised models may not fit, and therefore it may not be possible to include some model structures even if stakeholders believe they are important (i.e. data is insufficient to support the desired model). Secondly, once a reasonable configuration for the model is found, and it fits the data, the Markov chain Monte Carlo (MCMC) simulation can be used to map the uncertainty. MCMC again can be difficult to apply, can take considerable time to run, and diagnostic evidence is required that it has worked. However, once it has been successful, the outputs can be used to evaluate the HCR very rapidly.

It would be best to start with as simple a model as possible, so that the review process might produce some increase in complexity but avoid the complexity becoming overwhelming. Fit diagnostics may identify changes in the model as well as further research that might be required.

The stock assessment model can also be a focus of research. It is highly likely that the model will identify important uncertainties which can be addressed by further data collection and research. The results from these activities can be included in the model, reducing uncertainty and changing scientific advice. Such research is more likely to have a significant impact on fishery management.

Conduct a Stakeholder Review

Stakeholder review is important to promote engagement in the management process, ensure that the model and HCR has no errors and to provide evidence that the HCR is likely to achieve management objectives. More generally, reviews are an important way to resolve scientific issues, plan progress and provide evidence that advice is credible. Reviews can be internal or external. Internal reviews are valuable, particularly where the issues are not contentious, but can often be challenge on the basis that the review is not fully independent. Where independence is necessary to resolve an issue, external review is better, but more expensive. Using IFCA staff to review each other’s management could be a cost effective way not only to provide independent review, but ensure IFCA’s are aware of what each one is doing.

Stakeholder review is likely to require one or more meetings to evaluate the stock assessment and decide on an appropriate robust harvest control rule. Technical review of the model should probably be carried out separately by scientist stakeholders, but any review should be kept as open as possible so that any stakeholder who wishes to attend can do so.

The review should ultimately aim to produce a single “current” assessment model and a HCR to implement which can be evaluated by the model and is demonstrated precautionary and appropriate for the fishery (e.g. is consistent with MSY). The review should also recommend research which can be used to update and improve the model in the longer term. Any meeting should have terms of reference to make their tasks clear.

Further independent review by external experts (e.g. from EU, USA or further afield) can be conducted if necessary. While desirable, this can be expensive, but should produce definitive evidence whether the HCR is appropriate and is likely to meet harvest strategy objectives.

The review process should constructive and inclusive. Stakeholders can be encouraged to suggest alternative models and data, which should if possible to included and tested in the current model. However, it should not be possible to reject a model without proposing some alternative in its place, as this can be counter-productive.

An important challenge is to ensure outputs from the stock assessment and HCR evaluation is in forms that all stakeholders can understand and assimilate. This communication of technical and scientific information may require some development, both in identify types of output that stakeholders can understand as well as teaching them how interpret types of output. A lack of understanding science is one of the most reasons for distrust and ignoring this source of information.

Once the HCR has been accepted and evidence provided that it should work, further frequent



assessments are not necessary. It would be good practice to monitor the HCR to ensure that it is functioning as expected and to evaluate the performance of the HCR infrequently so that it might be improved. Operating the HCR for between 5-10 years between assessments may well be sufficient, although some resources might be reserved for special evaluations should the need arise.



Appendix 5 - An introduction to the Marine Stewardship Council Standard

The MSC is dedicated to promoting “well-managed” and “sustainable” fisheries, and the MSC initiative focuses on identifying such fisheries through means of independent third-party assessments and certification. Once certified, fisheries are awarded the opportunity to utilise an MSC promoted eco-label and may gain economic advantages in the marketplace. Through certification and eco-labelling the MSC works to promote and encourage better management of world fisheries, many of which have been suggested to suffer from poor management.

There is no fixed prescription for meeting the MSC standard. It is up to the client to put together argument and evidence to demonstrate that stock condition, fisheries management and fisheries practices meet the appropriate standard. The essence of the standard is that the stock is harvested sustainably with low impact on the ecosystem, using a good management system that is likely to detect and respond to changing circumstances and problems as they occur. The client should achieve this through the presentation to the assessment team of objective and verifiable information, corroborated by independent means wherever possible.

The MSC certification process can be undertaken for any fishery with the exception of a fishery under controversial unilateral exemption to an international agreement or a fishery using poisons or explosives.

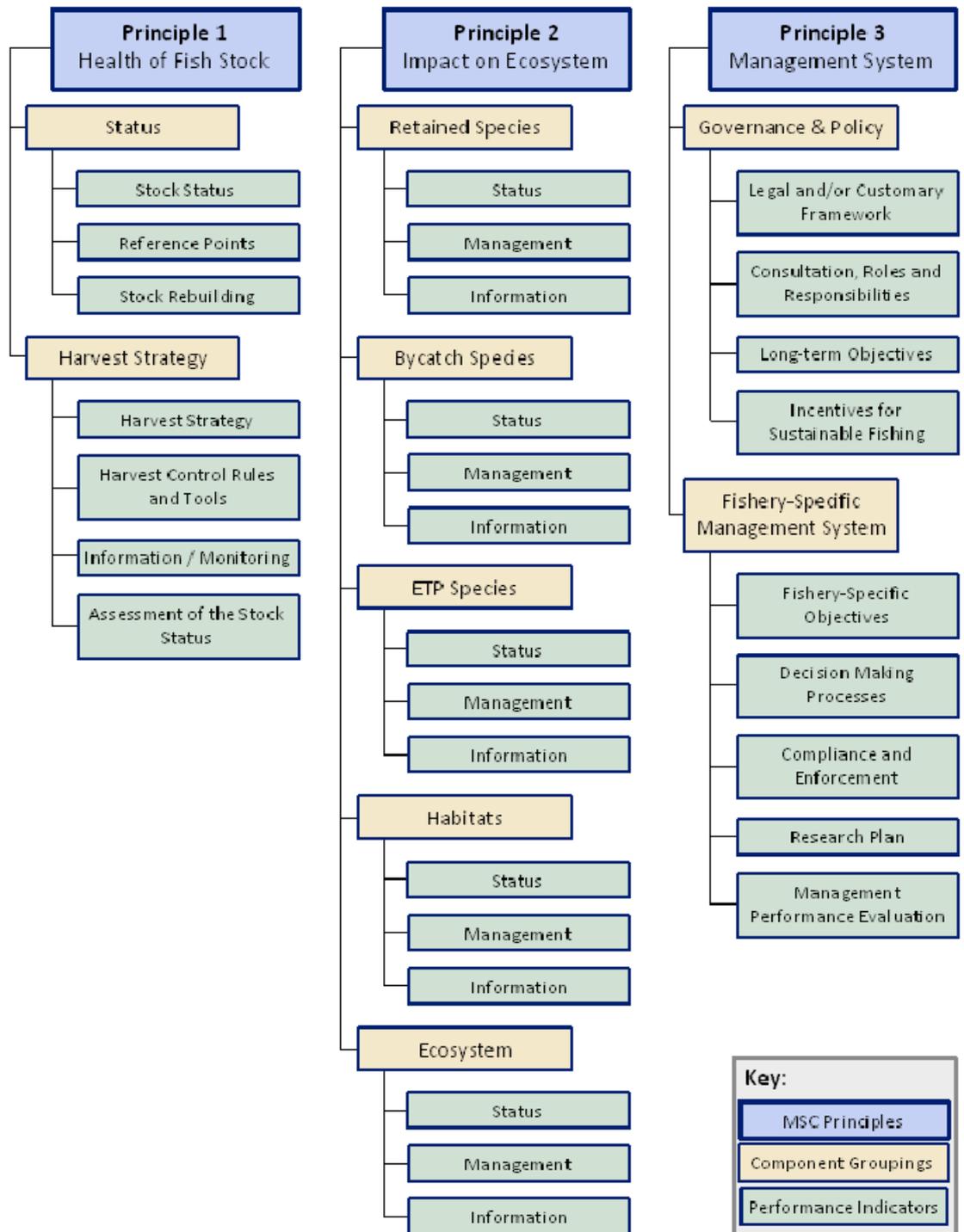
The MSC Standard & Scoring

The MSC standard is divided into three principles which cover the (i) that status and management of the target stock, (ii) the wider impacts of the fishery on the ecosystem and (iii) the overall management governance system. Details of the principles are provided in the following section.

Under each 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 (SI) are defined and the assessment team must decide and justify where scoring issues are met by the fishery under assessment, against a scoring guidepost (SG). Each performance indicator must score > 60 to achieve the minimum pass mark. Any performance indicator failing to meet the SG60 guidepost will result in automatic failure of the fishery. For any indicator scoring from > 60 to < 80 , the fishery client must agree to meet conditions to achieve specified outcomes over a defined period of time. To pass overall the fishery must achieve an average score for each Principle of 80.

The default assessment tree is presented below and outlines the components and PIs for each Principle. The scoring issues can be found in MSC certification requirements available for download from the MSC website at:

<http://www.msc.org/documents/scheme-documents/msc-scheme-requirements>





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. Below is a very simplified summary of some of the key points. For further detail refer to the link provided in the introduction to this appendix.

- 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. Below is a very simplified summary of some of the key points. For further detail refer to the link provided in the introduction to this appendix.

- Main species (either retained, discarded bycatch or ETP) are 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.
- 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. Below is a very simplified summary of some of the key points. For further detail refer to the link provided in the introduction to this appendix.

- 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.
- 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.
- The performance of the management system is regularly subject to review and evaluation.

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