

# Project Inshore

Stage 3 - Strategic  
Sustainability Review

Northumberland Inshore  
Fisheries & Conservation  
Authority

*Border Queen*

**BH 155**

Report prepared by



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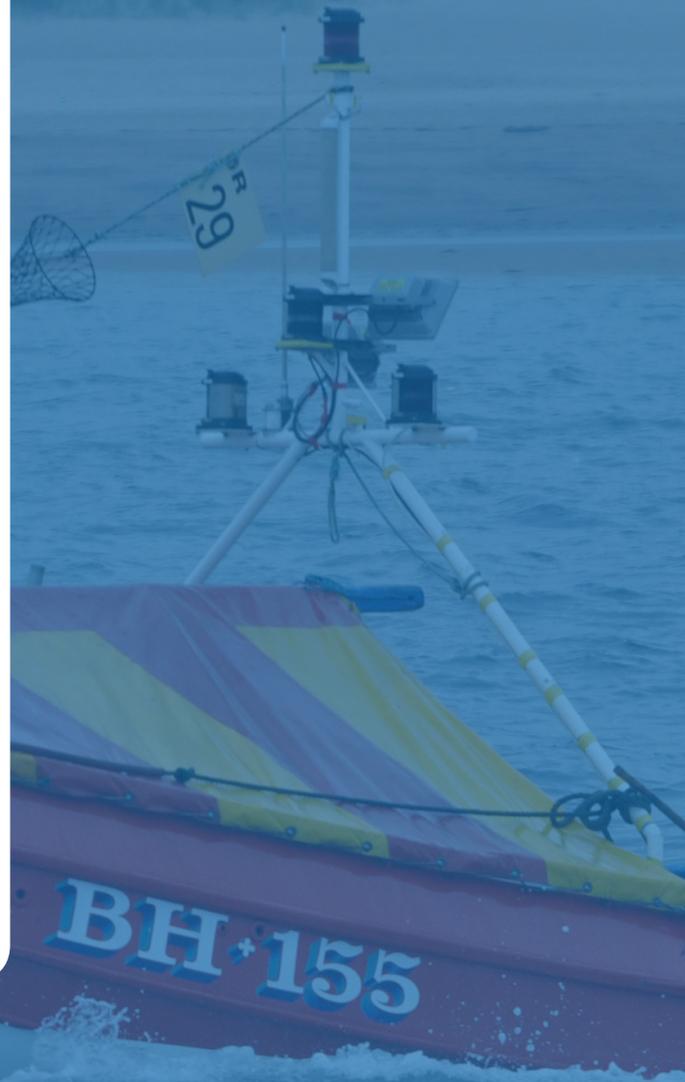
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Fishermen's Association (NUTFA); WWF



## 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
FCI	Food Certification International
HCR	Harvest Control Rule
ICES	International Council for the Exploration of the Sea
IFCA	Inshore Fisheries and Conservation Authorities
IUCN	International Union for Conservation of Nature
IUU	Illegal, unreported and unregulated
JNCC	Joint Nature Conservation Committee
OSPAR	Oslo and Paris Conventions
MCS	Monitoring, Control & Surveillance
MCZ	Marine Conservation Zone
MMO	Marine Management Organisation
MoU	Memorandum of Understanding
MPA	Marine Protected Area
MSC	Marine Stewardship Council
NEAFC	North East Atlantic Fisheries Commission
NFFO	National Federation of Fishermen's Organisations
NGO	Non-governmental Organisation
NUTFA	New Under Ten's Fishermen's Association
Nm	Nautical mile
PI	Performance Indicator
PO	Producer Organisation
PSA	Productivity Susceptibility Analysis
RAC	Regional Advisory Council
RBF	Risk based Framework



SAC	Special Areas of Conservation
SAGB	Shellfish Association of Great Britain
SG	Scoring Guidepost
SI	Scoring Issue
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, the Marine Stewardship Council (MSC) and the Shellfish Association of Great Britain (SAGB). Launched in June 2012 it seeks to work towards an environmentally sustainable future for English inshore fisheries.
2. Stage 3 of Project Inshore delivers a bespoke Strategic Sustainability Review for each English Inshore Fisheries and Conservation Authority (IFCA) to facilitate movement of the management of English inshore fisheries to a level judged sustainable by the MSC standard<sup>1</sup>.
3. This report covers the area falling within the jurisdiction of the Northumberland IFCA (NIFCA), an area of water extending out to six nautical miles from just north of the mouth of the Tweed river on the English / Scottish border south to the mouth of the Tyne at North Shields.
4. The NIFCA area is unusual amongst IFCAs in that over half of it is the subject of one or more forms of conservation designation aimed at protecting a variety of natural features, habitats, species and ecosystems. Such designations require at least some limitations on what activities can be undertaken in these areas – including some limitations on fishing activities.
5. Lobster and crab pot fisheries are of major importance across the whole of the NIFCA area, but particularly so in its northern part where the coastal population is sparse, settlements widely spaced, and employment opportunities limited. A key impact of conservation designations is that there is little deployment of mobile fishing gears in this northern half to two-thirds of the IFCA area – areas that are coincident with a predominantly rocky substrate, providing a habitat particularly suited to lobster and brown crab. Accordingly, the local importance of the predominant pot fisheries is accentuated.
6. At a regional level nephrops<sup>2</sup> trawling is the most valuable of the local fisheries, but this is mainly undertaken outside the 6 miles jurisdiction of the NIFCA – though there is some limited trawl activity within the southern part of the NIFCA area. Whilst its regional economic impact is considerable, its relevance in terms of management of inshore fisheries is secondary to that for the pot fisheries.
7. In terms of fishery value, the most recent (2012) catch and landings figures for the NIFCA area suggest lobster landings to local ports are valued at £2.4M, and crab landings of a little under £0.8M – the larger proportion of this ascribed to catches from within the NIFCA area. For the nephrops fisheries, total landings to the local ports are valued at £8.4M, of which £1.2M is from the under 10m fleet segment. It is thought that something in the order of £0.8M of these landings may be ascribed to catches from within the NIFCA area.
8. A number of the fish species harvested within the NIFCA area form parts of North Sea stocks that are more appropriately managed at a larger scale. In some instances fisheries exploiting these stocks have already been successfully certified as conforming to the MSC standard, and some others are the subject of on-going assessments. For all these stocks, management is most appropriately vested in the MMO at the UK level, and in the EU at the international level. Some element of the fisheries for cod, haddock, whiting, plaice, sole and herring takes place within and adjacent to the NIFCA area, and fall into one or both of these categories. The scale and nature of these fisheries is such that it would be inappropriate for the NIFCA to seek to do anything more than uphold management measures established at the UK or international levels.
9. The North Sea fisheries for nephrops extends from just south of Northumberland northwards to John O'Groats, and out to some tens of miles from the coast. This fishery can be sub-

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<sup>1</sup> The Marine Stewardship Council standard for sustainable fisheries is based upon the FAO Code of Conduct for Responsible Fisheries. The MSC standard therefore provides both a useful indicator of where a fishery stands in relation to the FAO code of conduct, but also provides a structure by which to guide the development of future management action. Ultimately this should lead to a fishery which is well managed. Whether a fishery chooses to pursue MSC certification will be a commercial decision based on market and other factors.

<sup>2</sup> Referred to locally as “prawns”, but otherwise known as Norwegian lobster, scampi and Dublin Bay prawn.



divided into five discrete areas of abundance and activity, and fishery science is applied at the level of these sub-components. The stock sub-component relevant to the Northumberland coast is that known as the Farne Deep. A key feature of the nephrops fishery is that vessels, regardless of where they are based, typically exploit more than one stock sub-component, including shifting seasonally to fisheries on the West Coast of Scotland and in the Irish Sea. Some vessels from these western fisheries also seasonally relocate to the east coast. All in all, management of these nephrops fisheries is most appropriately undertaken at a western North Sea level, and at a west coast level. The most appropriate basis of jurisdiction is the UK and Ireland, including the UK regional administrations of England, Scotland and Northern Ireland.

10. For the NIFCA pot fisheries for lobster and crab, the outputs of Project Inshore Stages 1 & 2 indicate that current management practice falls far short of the minimum standards for sustainable management of these fisheries. As a consequence, considerable additional work will need to be done to bring management practice up to a base level of good practice.
11. This is not to say that these fisheries are currently badly managed, or that the stocks are in any imminent danger of collapse – but simply that they could be better managed, and that such better management would present benefits in terms of the underlying environment that sustains these stocks, more consistent future harvests (including lower costs and more predictable income), and greater stock and economic resilience.
12. The core areas of shortfall relate to the current management focus on steady-state technical measures, whereas best practice suggests an adaptive regime as more sustainable – where fishing activity is varied in response to changes in stock abundance as a means of keeping the overall stock in peak condition. Many of the elements needed to institute such an adaptive regime for both lobster and crab pot fisheries are already in place. Crucially, these fisheries are already subject to active management, including the collection of a wide range of management information.
13. To bring the current systems up to the level of best practice, the core elements that need to be brought together are:
  - a stock assessment undertaken, utilising a dynamic stock modelling approach
  - a slight increase in the level of data capture, and a substantial increase in the manipulation and analysis of the data gathered, as a key contributing input to stock modelling
  - identification of a means by which fishing activity can be varied in response to changes in stock status that has a demonstrably high probability of returning the stock to optimal condition – most likely a change in “pot days” per management area (requires demonstration through simulation that such a means can be expected to achieve the intended outcome, and demonstration that such a means can be applied in practice)
  - development of a Harvest Control Rule (HCR) that clearly links a type and scale of management response to changes in identified stock status (that a change in stock status of  $x$  automatically requires a change in some element of fishing activity of  $y$ )
  - further development of a system of incentives and disincentives that support compliance with the HCR, and a monitoring system that can demonstrate such compliance.
14. The NIFCA is currently part-way through significant restructuring following its transition from a Sea Fisheries Committee to an IFCA. This has also required the taking on of a wider environmental remit. In addition, the NIFCA has also recently relocated to larger premises. As part of its increased environmental responsibilities, it is having to substantially increase the range of survey work undertaken, acquire additional equipment, and develop a wide range of new skills – primarily associated with a new legal requirement to put in place management systems for a range of protected features and habitats against a tight timeframe based on assessment of environmental risk. Some additional funding has been provided by central



government to cover these “new burdens”, but this is not considered sufficient to cover the costs of moving from a steady-state management regime to an adaptive management regime. Thus funding and staffing remain critical considerations in progressing moves to a more sustainable management regime.

15. The bottom line is that the NIFCA can substantially strengthen delivery of its commitment to sustainable management of the fisheries within its jurisdiction by developing and applying an adaptive management regime for the local lobster pot fisheries. Implementation of such a regime will also significantly enhance management of the related brown crab pot fisheries. In embracing such a development trajectory, there is much to recommend joint enterprise with its neighbouring IFCA, the North East IFCA, in extending such a management system as far south as Scarborough – the southern extent of the management unit used by Cefas in its monitoring of lobster and crab stocks and fisheries.
16. There are other stocks and fisheries that are exploited within the NIFCA area where the type and scale of activity is unlikely to be sufficient to warrant significant changes in management or management approach – but nevertheless where some improvements are still possible. The MSC assessment methodology provides an approach to highlighting weaknesses in existing management, and helping identify where and how simple improvements to the management of these fisheries can be achieved.
17. The appendices to this report provide further detail on the MSC environmental standard for well managed fisheries, and on the fisheries of the NIFCA area. The three annexes to this report provide further guidance on what constitutes adaptive management, and how to specifically improve management of the NIFCA lobster fishery.



# 1. Introduction

## 1.1. Project Inshore background

Project Inshore is an ambitious initiative led by Seafish, Marine Stewardship Council (MSC) and Shellfish Association of Great Britain (SAGB) and launched in June 2012. Project Inshore is about working towards an environmentally sustainable future for English inshore fisheries. The UK Fisheries Minister, Richard Benyon, noted at the time that Project Inshore “...should help to ensure that our inshore fleet can continue to flourish, that fish stocks are managed sustainably and our marine environment is given the protection it needs”. In this work the MSC process is being used as a benchmarking tool for fisheries, identifying those areas where improvements need to be made. The objective is to highlight areas for investment rather than simply to move fisheries towards MSC assessment and certification [though moving fisheries towards MSC certification is a positive outcome, entry into assessment is entirely voluntary and at the sole discretion of fishery interests].

The MSC standard is described in Appendix 2 to this report. 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, the 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 MSC pre-assessment findings. For the advisory work required for Stage 3 of Project Inshore, the work is being undertaken by Acoura Ltd, which has assembled a team comprised of many of the team members from stages 1 & 2. The Stage 3 project team comprises independent experts from the Marine Institute (Ireland), PAH Medley, Nautilus Consultants Ltd, 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 publically available on-line from the Seafish website.

### **1.3. Report Aims & Objectives**

This report forms an output of Stage 3 of Project Inshore and provides a Strategic Sustainability Review for the Northumberland 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 - Northumberland. A further 8 such reports<sup>3</sup> are being produced for other English IFCAs as part of this third stage of Project Inshore.

This report provides a Strategic Sustainability review for Northumberland IFCA. In doing so this:

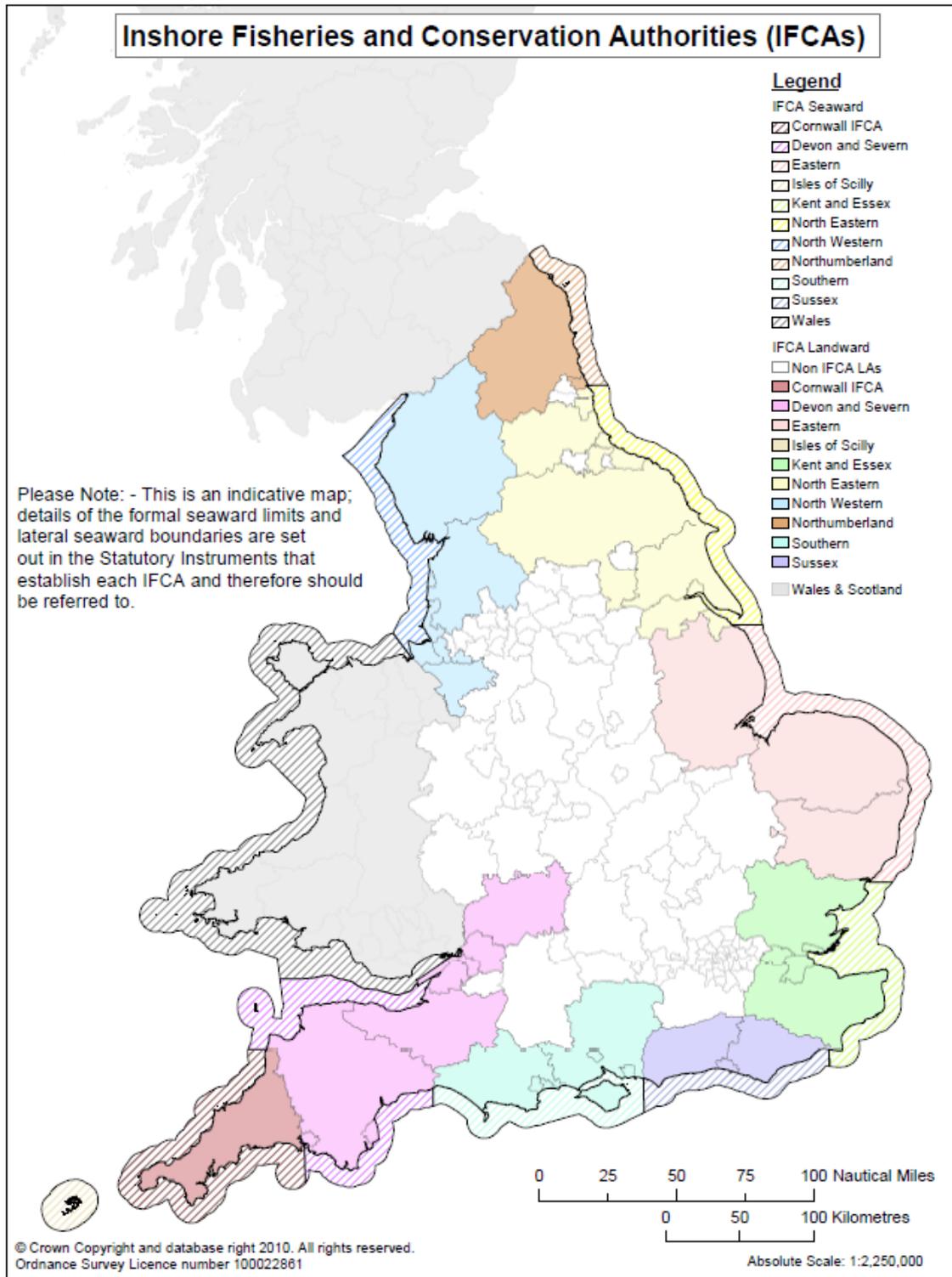
- Recaps the key characteristics of the IFCA district and the fisheries within the district.
- Provides a review of the findings of the MSC pre-assessment process for fisheries in the region that was carried out in Stage 2 of Project Inshore.
- Highlights the process and next steps required for those fisheries identified as ready for full MSC assessment
- Provides a strategic structure to guide future management actions for those fisheries where the IFCA is responsible for stock management to show how they can move towards a level deemed sustainable by the MSC standard.
- Highlights 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.

This report addresses the requirements of the Northumberland IFCA.

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<sup>3</sup> Similar work was undertaken for the Sussex district as part of the 'Navigating the Future' project and is therefore not covered by Project Inshore.



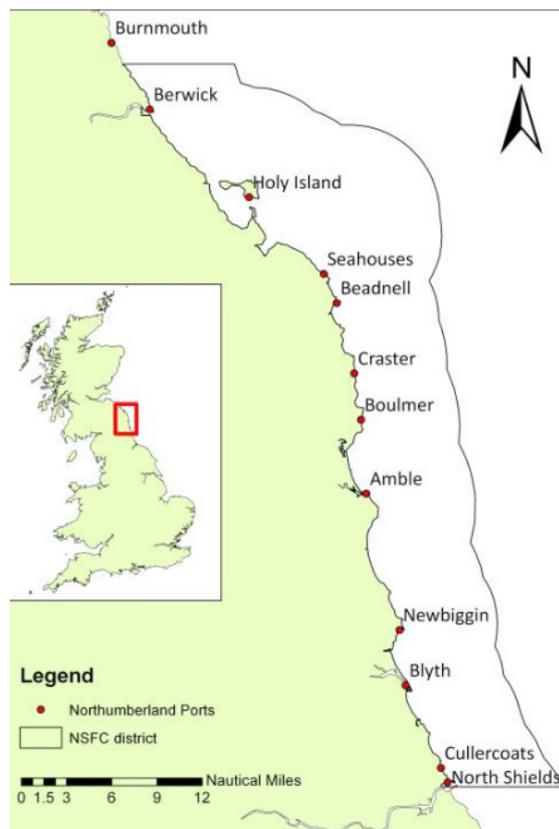
**Figure 1:**  
Location of English  
Inshore Fisheries and  
Conservation Authority  
(IFCA) districts (Defra  
2011)

CREATOR: Data Sharing Programme, Defra  
PUBLISHER: Data Sharing Programme, Defra

DATE CREATED: 9 March 2011  
SOURCES: EA, OS, MMO



## 2. IFCA Profile



**Figure 2:**  
Fishing ports of the  
NIFCA district

The Northumberland Inshore Fisheries and Conservation Authority (NIFCA) extends from the Scottish / English border (just north of the mouth of the River Tweed) south to the mouth of the River Tyne – a coastline stretching some 61 miles. Its main fishing centres are North Shields, Blyth, Amble, and Seahouses, interspersed with a range of small traditional fishing settlements. The northern half of the NIFCA area supports fewer settlements and lower population, and much of the inshore zone is designated a European Marine Site (EMS)<sup>4</sup>, and as such is subject to a more restrictive fishery regime.

Relative to its size, the area covered by the NIFCA is subject to low levels of fishing effort. This reflects the predominantly rocky substrate of the area (particularly so in the northern part of the area), the designation of the northern area as an EMS, and the low population density along most of the length of the zone. In contrast to this, however, there is substantially greater fishing effort applied in the 6 to 12nm zone, focused particularly on nephrops trawling and prosecuted by both local and mainly Scottish vessels (see Fig 8 for further detail).

NIFCA exists 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 in the NIFCA District. The NIFCA District comprises the sea within the national waters of the United Kingdom adjacent to the County of Northumberland and the Metropolitan Borough of North Tyneside out to 6 nautical miles from baselines. It also covers all of the land in the County and the Metropolitan Borough and all rivers and estuaries within the District up to the tidal limits.

### 2.1. Governance structures

As of April 2011 the Inshore Fisheries and Conservation Authorities (IFCAs) replaced the long-standing Sea Fisheries Committees (SFCs). As well as managing inshore fisheries, they took on new conservation duties as set out in the Marine and Coastal Access Act (MCAA) 2009.

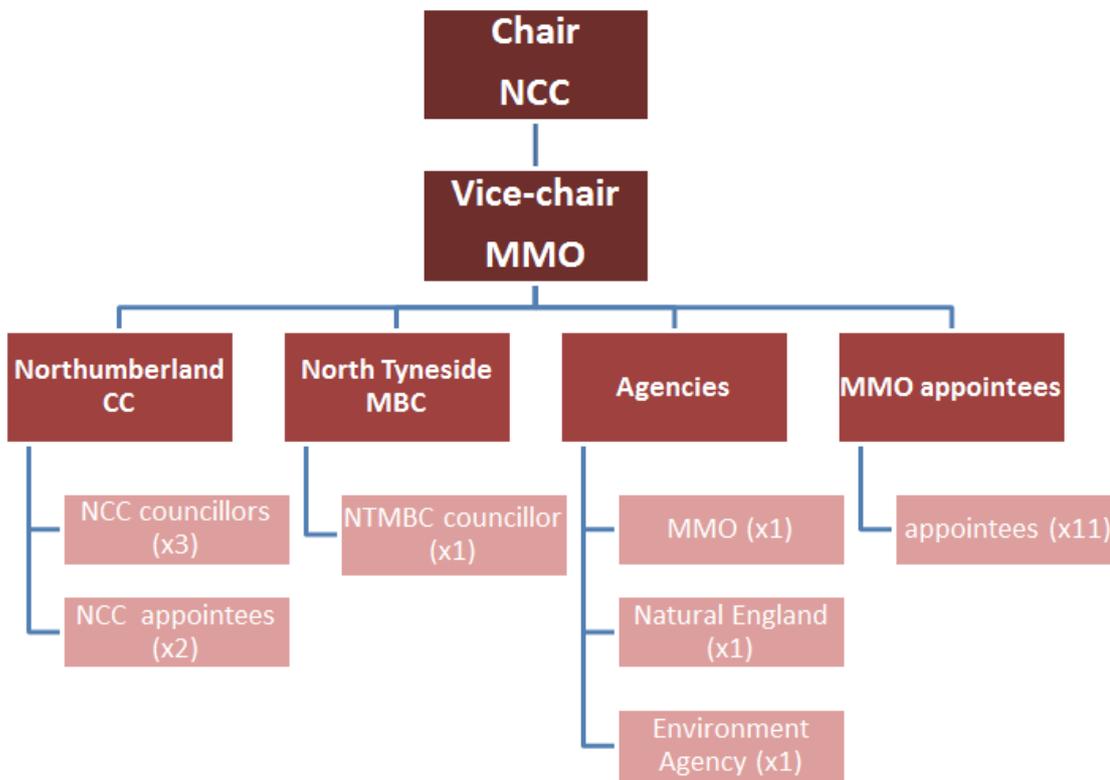
The NIFCA is funded by two constituent authorities – Northumberland County Council (NCC) and North Tyneside Municipal Borough Council (NTMBC). These appoint 6 members and 1 member respectively. In addition there are 11 Marine Management Organisation (MMO) appointed members and 1 representative from each of the government agencies of Environment Agency (EA), Natural England (NE) and MMO (staff member). This composition is illustrated below.

<sup>4</sup> The term 'European Marine Sites' (EMS) collectively describes Special Areas of Conservation (SACs) and Special Protection Areas (SPAs) that are covered by tidal waters and protect important marine and coastal habitats and species of European importance.

SACs contain animals, plants and habitats that are considered rare, special or threatened within Europe, while SPAs protect important bird species. These sites are designated under the EU Habitats and Birds Directives respectively, and form part of the European-wide Natura 2000 network of internationally important sites.



**Figure 3:**  
Composition of the  
NIFCA Board



The NIFCA is governed by a system of quarterly meetings of its members. Governance is regulated by the NIFCA Constitution, Standing Orders and Code of Conduct for Members. The Standing Orders provide a procedure to arrange extraordinary meetings if required.

NIFCA has two standing committees that are convened before each quarterly meeting, and which report to the main NIFCA Committee. The **Watch Committee** deals with issues relating to the patrol vessel, enforcement and staff matters, and the **Finance Committee** considers the Authority budget and is reported to by the Finance Officer and Chief Executive.

Subcommittees are established when necessary to look at specific issues and report to the main committee – for example in relation to byelaw review. There are currently nine subcommittees in operation:

- Scientific and Technical
- Management
- Prosecution
- Promotion and Communications
- Premises.
- Patrol Boat
- CFP Reform
- Defra and other consultations
- Inshore Shellfishery

## 2.2. Strategic Objectives

The national vision for IFCAs is:

*“To lead, champion and manage a sustainable marine environment and inshore*



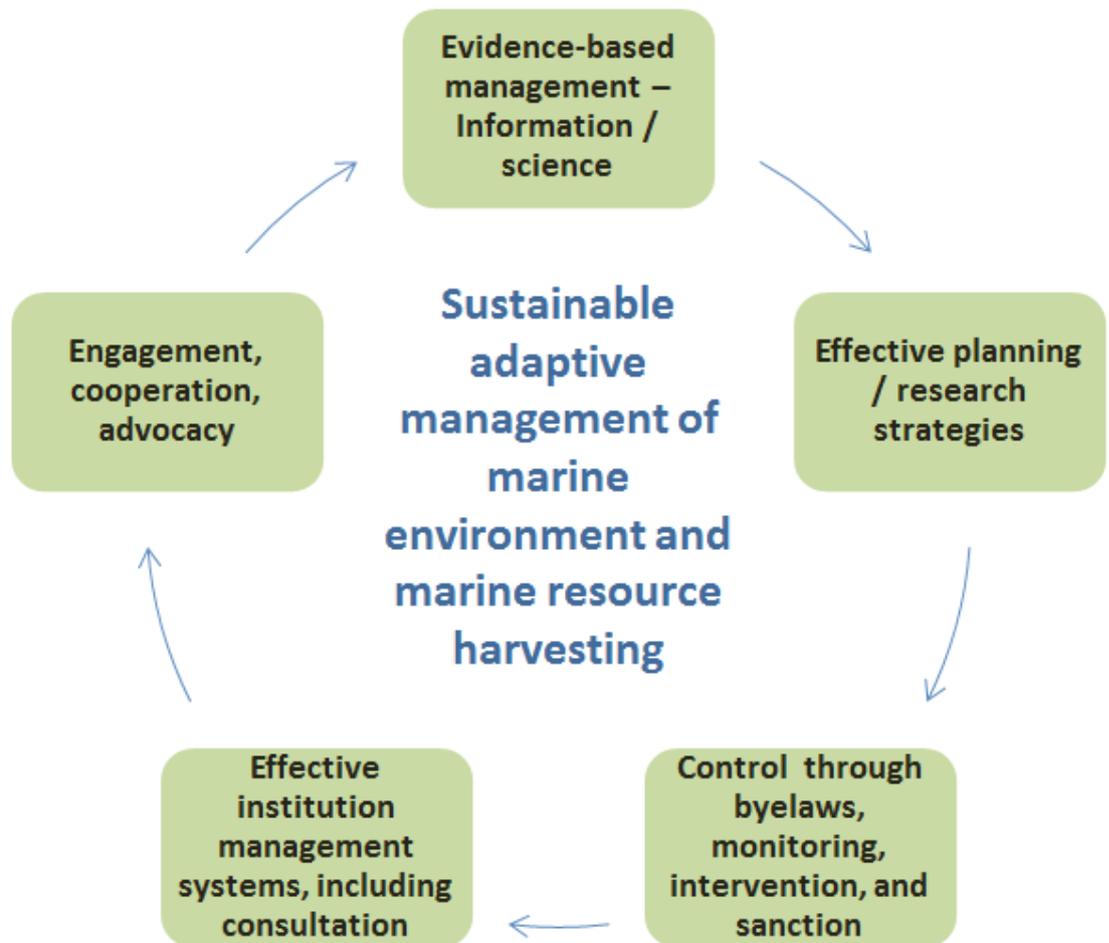
*fisheries, by successfully securing the right balance between social, environmental and economic benefits to ensure healthy seas, sustainable fisheries and a viable industry”.*

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 IFCA:

1. IFCA 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. IFCA work in partnership and are engaged with their stakeholders
5. IFCA make the best use of evidence to deliver their objectives
6. IFCA support and promote the sustainable management of the marine environment
7. IFCA are recognised and heard

This can be summarised as follows:

**Figure 4:**  
System diagram of  
NIFCA management  
processes



Management and enforcement in inshore fisheries may be characterised as formerly having been of a “light touch” relative to offshore fisheries, as the impact of inshore fleet activity on stocks and the environment had been judged to be significantly less than for the offshore fleet. But with greatly increased activity in the inshore zone, and greater recognition of fishery / environment interactions, this argument is no longer tenable. This is all the more so given the wider



environmental conservation remit of IFCA and a requirement on them to apply the precautionary approach; a new set of circumstances that NIFCA is seeking to respond to.

In part its response to these circumstances encompasses greater emphasis on an evidence-based approach to marine management – meaning application of the system of “define the issues”; “develop and appraise options”; “implement chosen options”; “evaluate and adapt”. This is not new, but standardisation and re-affirmation of this approach across management processes is.

As outlined in its statements of strategic and forward planning, the strategic objectives of the NIFCA are mainly to do with the effective management of the institution that is the NIFCA, as measured against a set of performance targets and success criteria set at the national (England) level. From a resource and fishery management perspective, the two most relevant objectives are:

- the sustainable exploitation of sea fisheries resources within the District
- the sustainable management of the marine environment.

But it is noteworthy that there is nothing specifically stated as to how this should or could be measured at this strategic objective level. Some definitions are presented in the CFP and its emerging revision, and these are also incorporated into national primary and secondary legislation. But they are not presented as a primary focus of NIFCA work; rather they appear more relevant to larger scale and offshore fisheries. By contrast, much greater precision is presented in respect of the management of Natura 2000 sites, and compliance with these requirements is, at least temporarily, dictating the work and focus of the NIFCA as it seeks to embrace its new environmental responsibilities and legal obligations.

In the context of the above, the main tool at the disposal of the NIFCA in the management of its regime is the setting and policing of Byelaws. As currently constructed these focus on the definition and quantification of technical measures, which are used to support an essentially steady-state regime. Whilst temporary measures can be put in place to respond to unusual and short-term circumstances, this regime is not currently designed as an adaptive regime (for example to design and apply harvest control rules that respond to changes in resource abundance) – something that is at the heart of the definition of a sustainably managed fishery as encapsulated in the MSC assessment methodology.

### 2.3. Capacities & funding

The staffing structure and complement of the NIFCA is illustrated in the graphic below.

The NIFCA divides functionally into two – Administration and Operations. The Chief Executive has overall control. He also heads up the administrative branch, with the Chief Inshore Fisheries and Conservation Officer (IFCO) (Operations) taking the lead on operational aspects. Reporting to the latter are Deputy Chief IFCOs for Operations and for Environmental. Some of the IFCOs (Operations) help out with survey work under the Environmental programme (particularly for those works associated with management of the European Marine / Natura 2000 Site). The number of IFCOs on staff varies to a degree according to the workload of the IFCA.

The authority has only very recently (October 2013) relocated from rather cramped facilities (office and garage / workshop) at Cramlington to substantially larger premises at Blyth. The NIFCA has three major capital assets – the 21m Patrol Vessel, the St Oswald<sup>5</sup> (which is moored at the marina at Royal Quays on the Tyne) and its RIB<sup>6</sup> tender (Delta 1), a larger RIB (Bravo 1) and trailer capable of launch from the beach, and a high specification Land Rover to tow the RIB (both of which are housed at the garage / workshop). NIFCA also has secure storage facilities at its new Blyth premises for any lobster pots and other gear that has been seized as part of enforcement activity, and also for equipment used by officers in their duties. It has also recently acquired a range of environmental equipment suitable for environmental sampling and sub-surface (video) inspection.

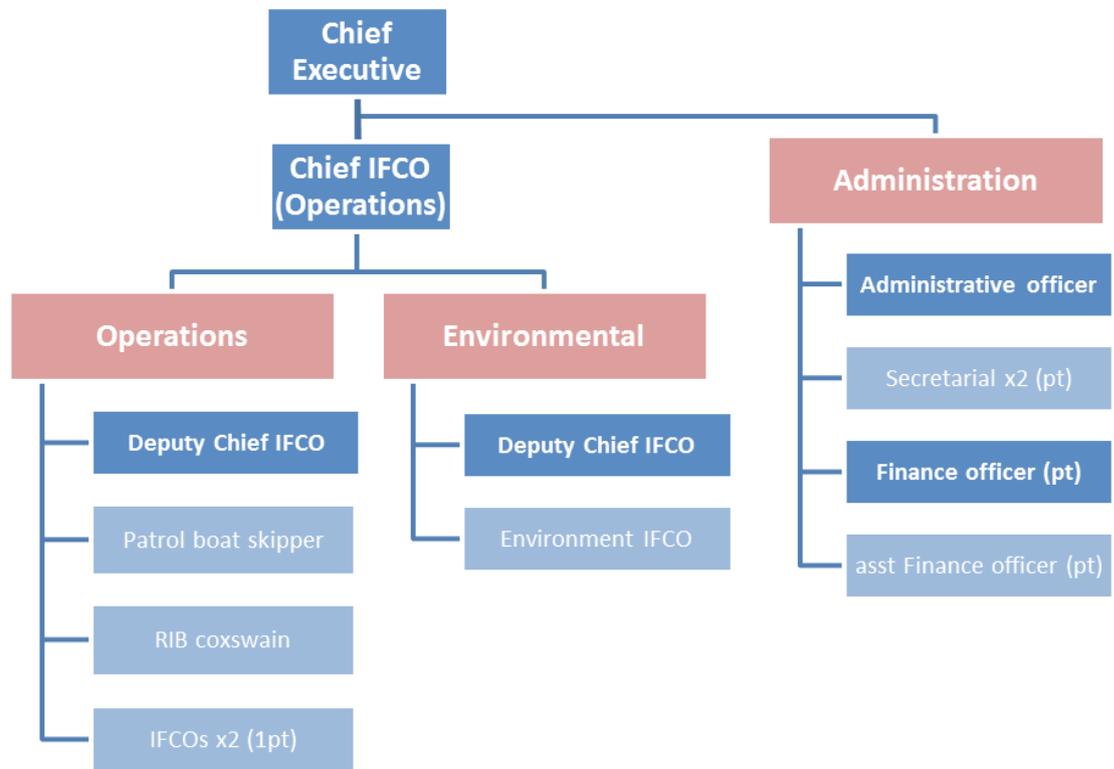
<sup>5</sup> It's replacement is currently under order

<sup>6</sup> RIB - Rigid Inflatable Boat

**Table 1:**  
**Description of European Marine Site features in Cornwall District**



**Figure 5:**  
Staff composition of NIFCA



Office relocation has provided greater space provision for the technical staff – desk space, library / archive space, and workshop space. It has also allowed for installation of a fully integrated computer network and internet system – which was only available to the administrative staff at the previous location.

NIFCA funding for 2013/14 remains as in previous years at £773,284, inclusive of “new burden” funding. These monies are allocated to the NIFCA by its constituent local Authorities, Northumberland County Council and North Tyneside Metropolitan Borough Council, in the proportions 83.37% and 16.63%. Included in this amount is “new burden” funding allocated by Defra to the two Councils at the level of £128,922.53 and £25,716.47 respectively. This additional funding will be continued through to the end of the financial year 2015-16.

#### 2.4. Existing activities, obligations & commitments

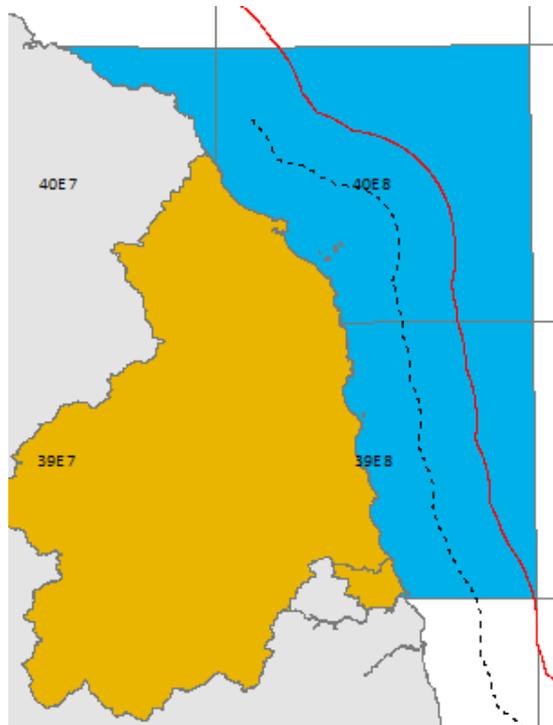
The transition from Sea Fisheries Committee (SFC) to Inshore Fisheries and Conservation Authority (IFCA) has brought with it some additional responsibilities (New Burdens), notably in respect of monitoring Sea Angling activity, identification of potential Marine Conservation Zones, and support to the assessment by Cefas of shellfish stocks in inshore English waters. The revised approach to fisheries management in European Marine Sites (EMS) is another new burden that will continue through and beyond the current financial year. In addition, the proposals from the EU on Reform of the Common Fisheries Policy are due to be rolled out as from 2014 and, along with the Marine Strategy Framework Directive (MSFD), will, it is anticipated, create extra work and burdens for the Authority. The NIFCA is also reviewing all the Byelaws it inherited from the SFC, consolidating and reformulating them to better address the current and future needs of the Authority, reducing their numbers from the current 15 to 6. All relevant Byelaws will need to be re-established under the NIFCA by the end of 2014/15.

Existing programmes of work include:

- Vessel permitting for trawlers and potters
- Issuing and monitoring of numbered pot tags



- At-sea patrols, including MMO chartering of the patrol vessel St. Oswald
- Shore-side monitoring of fishing activity
- At-sea and on-shore inspections
- Management of lobster V-notching scheme
- Collation and analysis of monthly shellfish returns
- Survey of Holy Island mussel beds
- Transitional fish survey of the Aln Estuary twice a year
- Provision of support to Cefas scientists in their work
- Provision of support to the Navy and Fisheries Patrol Service in their work
- Assessment, revision and adjustment of legacy Byelaws and their reformulation as NIFCA Byelaws.



**Figure 6:**  
Location of the NIFCA,  
and associated ICES  
squares

New work includes:

- Monitoring of sea angling activity
- Monitoring of bait digging activity
- Assessment of the location and extent of sea grass beds
- Ground-truthing of habitat maps to formally distinguish between high risk areas protected as a part of EMS management, and low risk areas that can remain open to mobile gear.

The NIFCA currently has a set of byelaws that governs fishing activities in the District. These byelaws are currently undergoing review.

Byelaw Title
1. Revocation of Existing Byelaws
2. Application and Saving for Scientific Purposes
3. Trawling and Size of Vessels
4. Fixed Engines
5. Purse Seine Net
6. Protection of 'V' Notched Lobsters
7. Berried (Egg Bearing) or Soft Shelled Crab ( <i>Cancer pagurus</i> ) or Lobster ( <i>Homarus gammarus</i> )
8. Parts of Shellfish
9. Prohibition on Use of Edible Crab ( <i>Cancer pagurus</i> ) for Bait
10. Redepositing of Shellfish
11. Marking of Fishing Gear and Keep Boxes
12. Dredges
13. Permit to Fish for and Sell Lobsters, Crabs, Velvet Crabs, Whelks and Prawns
14. Multi-rigging, Pair Trawling and Pair Seining
15. Pot Limitations

**Table 2:**  
NIFCA Byelaws



## 2.5. District Fisheries profile

### 2.5.1. Key species

The major and minor species landed to the area from the inshore sector are:

Major species:

- Lobsters – pots
- Brown crab – pots
- Nephrops – pots & trawl

Minor species include:

- Various fin-fish – set nets, & trawl bycatch
- Salmon – gill nets
- Velvet crab – pots
- Oysters – farming

### 2.5.2. Fishing methods

The dominant fishing method across the region is potting. On the outer edges of, and seaward of, the NIFCA area, the dominant fishing method is nephrops trawling.

In terms of economic importance, the two most significant fisheries are the creel fishery for lobster and crab, and the trawl fishery for nephrops. The most recent (2012) catch and landings figures for the NIFCA area suggest lobster landings to local ports valued at £2.4M, and crab landings of a little under £0.8M – the larger proportion of this ascribed to catches from within the NIFCA area. For the nephrops fisheries, most of which take place outside the NIFCA area, and mainly in the southern part of the region (see Fig 8 for more detail), total landings to the local ports are £8.4M, of which £1.2M is from vessels under 10m in length. It is thought that something like £0.8M of these landings may be ascribed to catches from within the NIFCA area.

Bearing in mind that most of the nephrops trawl fishery is prosecuted outside the NIFCA area, combined with significant reductions in nephrops effort, including the impacts of the Cod Recovery Programme on this fishery, management of the nephrops fishery is rather more of an issue for MMO than for the NIFCA. By contrast, the creel fishery takes place almost totally within the NIFCA area, and almost exclusively by fishermen based and operating from coastal communities within the NIFCA area.

### 2.5.3. Fleet Characteristics

As of 2012 there were 112 registered potting vessels, 12 drift net licences, 27 beach net licences and 44 trawlers (of these 44 trawlers most purely trawl, but a few alternate between trawl and dredge or between trawl, dredge and pot) (all figures are total figures including active and inactive licences). Moreover, there are 65 local and visiting boats with permits to trawl within the 3 mile limit, plus three scallop dredgers. In addition, over 500 hobby fishermen are registered with the authority (active and inactive) under its pot limitation byelaw scheme.

**Northern sector** – Berwick to Amble

The Northern Sector covers approximately 41 miles of coastline starting at Berwick upon Tweed, which is the most northerly port before the English/Scottish Border. To its south are Holy Island, Seahouses, Beadnell, Low Newton, Craster, Boulmer, the small village of

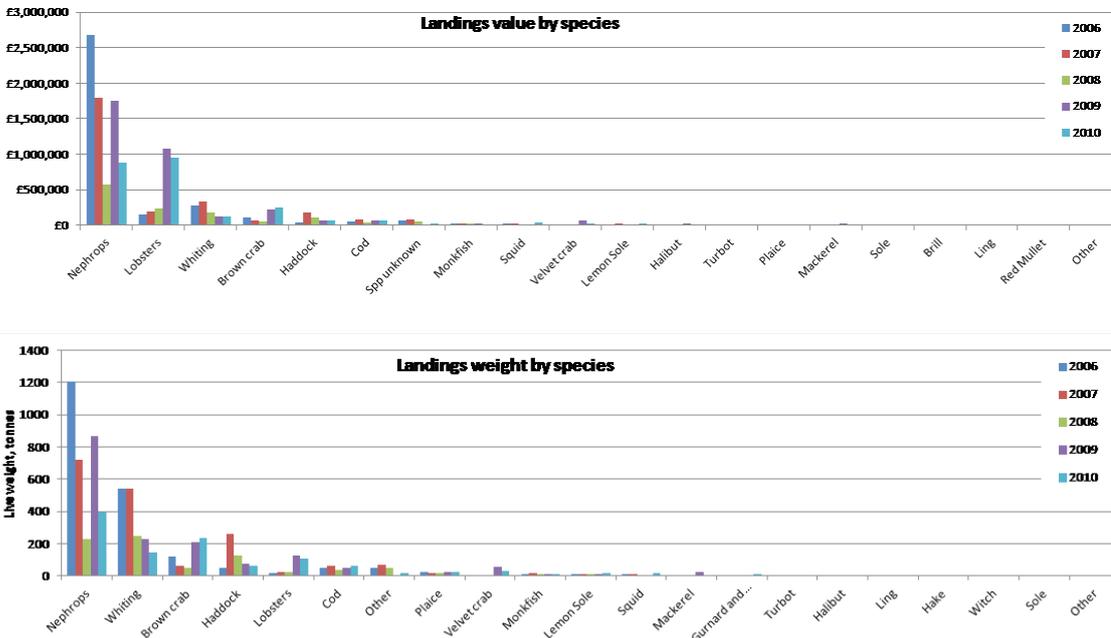


Figure 7: Landings to NIFCA ports by value and volume; 2006-2010

Notes: The figures present landings from the ICES statistical rectangles that overlap the Northumberland IFCA district. For the two most relevant rectangles, two-thirds of the area lies outside the NIFCA boundary.

Key species landed from this area include nephrops, lobster, brown crab, whiting, haddock and cod. Landings in 2010 were dominated by nephrops (with approximately half landed by over 15m vessels), including retained bycatch of whiting, haddock and cod. Brown crab and lobster are almost entirely caught from within the NIFCA area, and mainly by under 10m vessels.

Surveillance data, 2007-2011 (MMO, 2012)

VMS effort for all UK mobile vessels ≥15m, 2010 (MMO, 2012)

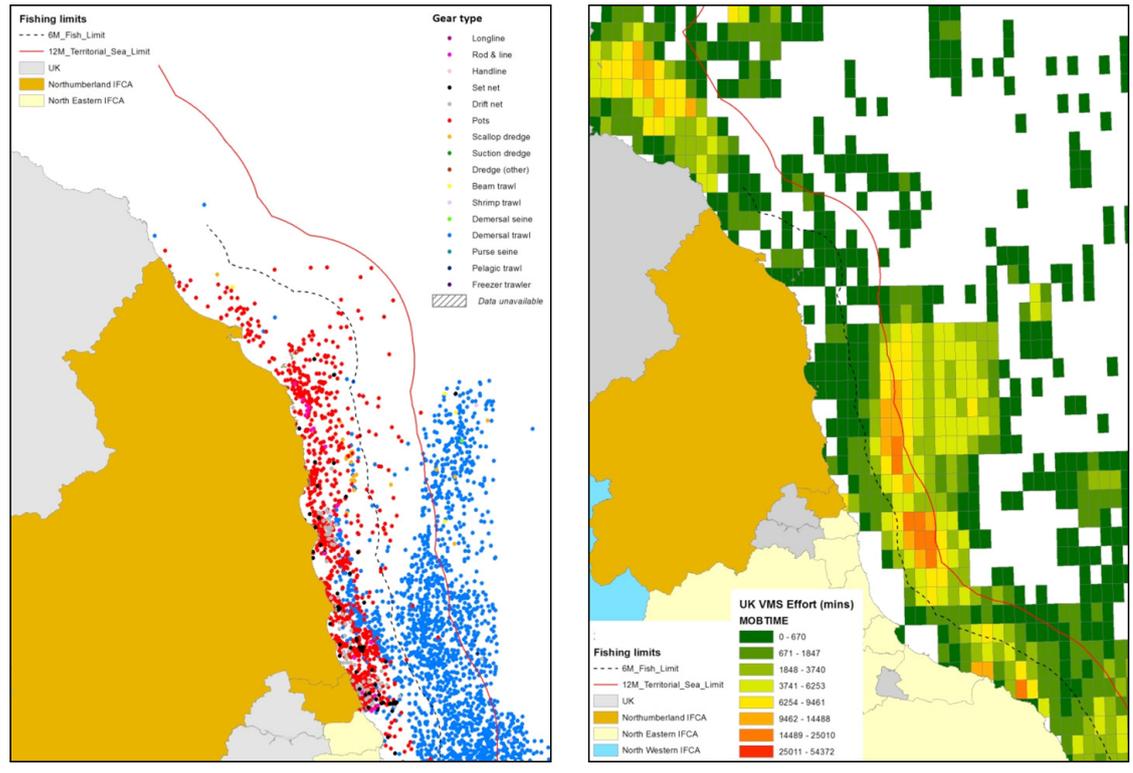


Figure 8: Illustrations of relative fishing effort



Alnmouth (which only has recreational boats), and then Amble, a busy port for both trawlers and potting boats all year round. There are also a number of Scottish boats that are worked out of two Scottish ports, Burnmouth and Eyemouth, situated just over the border, and which fish within the Northumberland District.

Commercial fishing methods are mostly potting, netting, trawling and dredging.

Fleet composition:

- 14 Boats Trawling
- 56 Boats Potting
- 8 Salmon Boats
- Approximate number of fishermen employed – 130.

**Southern sector** – just south of Amble to North Shields

The Southern Sector covers approximately 20 miles of coastline, most of which is made up of a number of sandy bays with rocky outcrops in-between. Starting at the south of Druridge Bay with the small village of Cresswell, it progresses to Newbiggin by the Sea, Wansbeck, and Blyth harbour, Seaton Sluice, Cullercoats and finally North Shields, the most southerly port in the entire district.

Commercial fishing methods are mostly potting, netting and trawling.

Fleet composition:

- 28 Boats Trawling
- 27 Boats Potting
- 11 Salmon Boats
- Approximate number of fishermen employed – 140

As well as all the local trawlers, in the winter months a number of visiting trawlers arrive at North Shields and Blyth to target the winter prawn fishery. In the past there have been up to 130 visiting trawlers (the majority twin rigging and some triple rigging), normally based in Northern Ireland, and along the West and East Coasts of Scotland.

### **Fishing activity**

The fishing industry has declined over the years, but a wide range of fishing activity does take place within the District, as follows:

- most fishing effort is directed towards potting for crab and lobster;
- trawling on non-rocky substrate for Nephrops and demersal fish also takes place in the District;
- a small amount of salmon and sea trout netting (licenced, but not regulated, by the NIFCA) still occurs within the District, though this is also in decline;
- bait digging, mostly for lugworm and ragworm, is a relatively common practice along the coast – commonly carried out by amateur anglers, but there is also some small-scale commercial digging;
- collection of periwinkles takes place on rocky shores for human consumption and occurs all year round, with peak effort coinciding with the Christmas period, although most of this production is now exported to France, Belgium and Spain.

## **2.6. District Ecosystem Profile**

### **2.6.1. Ecosystem Overview**



The dominant physical feature of the NIFCA inshore marine zone is its predominantly rocky substrate interspersed with areas of fine to coarse sediment. Into this environment flow the large rivers of the Tweed on the northern edge and the Tyne on the southern edge of the district. Other smaller rivers are located between these two major rivers, including, north to south, the Aln, Coquet, Wansbeck and Blyth.

This area is biodiversity rich and characterised by its underwater reefs, submerged or partly submerged sea caves, and vegetated cliffs, supporting a diverse range of marine species including cetaceans, birds, fish and a myriad of invertebrates, including commercial and non-commercial species. The seabed substrate throughout the north east coast, both inshore and offshore, provides a good matrix of 'hard' and 'soft' ground, supporting diverse ecosystems and a wide range of marine species, including commercially valuable shellfish and whitefish species.

With much of the UK's coastlines designated under either conservation objectives or specific landscape designations, any development within the coastal zone will need to be in keeping with the scale and nature of the surrounding countryside and seascape. Within the NIFCA district there is the Berwickshire and North Northumberland European Marine Site. Working with partner organisations the NIFCA has a legal duty to ensure that all fisheries-related activities occurring within the boundaries of the above site in English waters are managed sustainably and do not adversely affect associated protected features.

During 2012, Defra commenced a process of revising the national approach to managing fishing activities within European Sites. This process categorised fishing activities as red, amber, green and blue depending on the level of risk they presented to certain types of habitat or species. For fishing activities designated as red, within sites, there is a requirement that regulators will develop and publish formal management systems by December 2013.

The reefs and eel grass which are designated as part of the Berwickshire and North Northumberland Coast SAC have been classified as red (at risk from fishing activity) and will require management measures to be implemented for certain gear types by the end of 2013. In this context a ban on mobile gear within the EMS was put in place as from 1st January 2014, and the NIFCA is awaiting confirmation of its new eelgrass byelaw<sup>7</sup>.

Fishing activities that interact with all the remaining features of this SAC, plus the features of the remaining sites mentioned above, have been classified as either amber, green or blue. No further work is required for blue areas, but further environmental assessment will be required to determine the impacts for amber and green activities. Any management measures required as a result of these assessments will need to be in place by 2015.

### **2.6.2. Local Designations**

The Northumberland Coast AONB and Berwickshire and North Northumberland Coast EMS are two facets of the NIFCA District coastline:

- The Northumberland Coast is designated as an Area of Outstanding Natural Beauty (AONB). It covers an area of 138 square km along 64km of coastline from Berwick to the Coquet estuary. The AONB embraces a variety of features of natural and historical interest.
- The Berwickshire and North Northumberland Coast (BNNC) extends from north of St Abbs on the Scottish coast south to the Coquet. It includes the St Abbs and Eyemouth Voluntary Marine Reserve (VMR), which has a special assemblage of marine life that is fished by local fishermen using traditional lobster pots to catch shellfish. It was established in 1984, the first of its kind in the UK. The VMR is not within the NIFCA district but the EMS (which the VMR sits within) is a cross-border site that is partly within the NIFCA district. It should be noted that the NIFCA has no statutory cross-border powers.

The primary purpose of the AONB and EMS designations is to conserve and enhance the beauty and the special and qualifying features of the natural environment. The coastline is characterised

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<sup>7</sup> As of October 2014, the Seagrass byelaw is now in place and restricts hand gathering and bait collection within Seagrass areas in the English section of the Berwickshire and North Northumberland Coast SAC.



by long sand beaches, high rock cliffs and extensive reefs, clustered settlements, heritage sites (such as castles), extensive sea and inland views, abundant wild bird populations, grasslands and many other elements, all of which contribute to the visual amenity of the coast. Combinations of these elements result in land and seascapes with an individual, local character.

There are several sensitive areas in the NIFCA District that have been afforded international protection. These areas include:

**Tweed Estuary Special Area of Conservation (SAC)** – is designated to protect key estuary, intertidal and sub-tidal mudflat and sandflat habitats, and the sea and river lamprey, the populations of both of which are considered threatened.

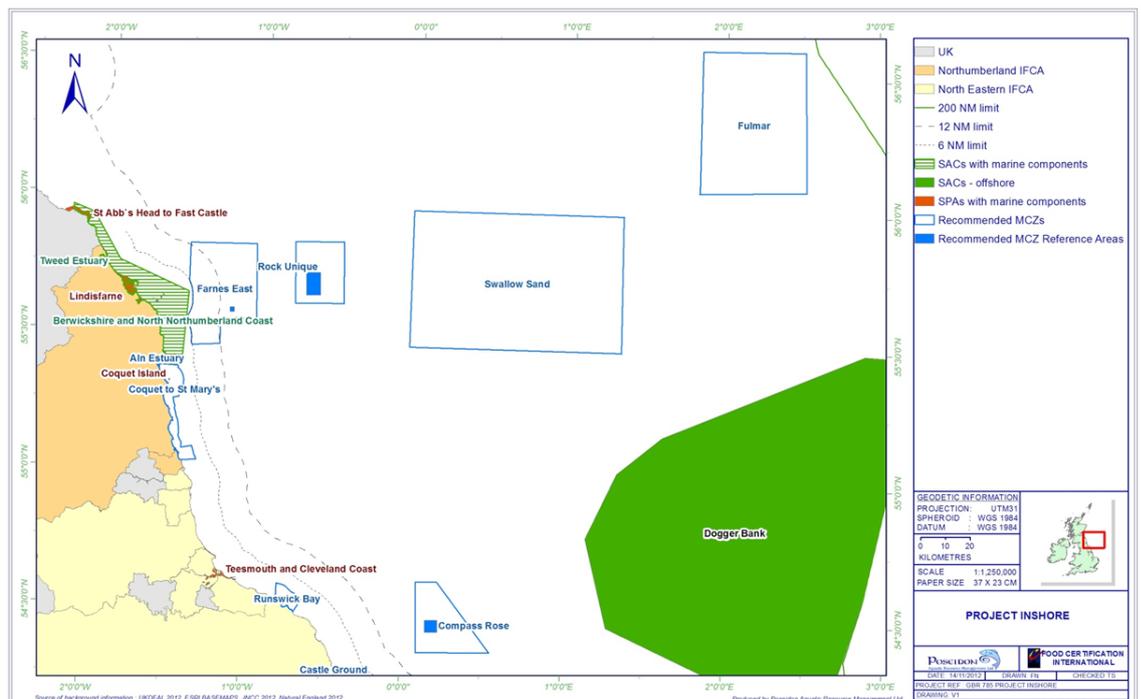
**Berwickshire and North Northumberland Coast (BNNC) Special Area of Conservation (SAC), OSPAR Marine Protected Area (MPA) and European Marine Site (EMS)** – contributes towards the important European network of Annex I habitats and Annex II species listed in the 1992 EU Habitats Directive. Special features of the SAC include reefs, caves, mudflats, large shallow inlets and bays and grey seals. It should be noted that the BNNC EMS also includes the bird interest features and intertidal area of the Lindisfarne Special Protection Area (SPA) (as described below).

**Lindisfarne Special Protected Area (SPA) and Ramsar Site** – supports an internationally important assemblage of waterfowl, high numbers of migratory species (e.g. greylag goose) and internationally important populations of rare birds as identified in Annex I of the 1979 EC Birds Directive (e.g. golden plover, whooper swan). The Lindisfarne SPA is also designated under the Ramsar Convention as a wetland of international importance.

**Coquet Island SPA** – providing protection to breeding colonies of sandwich, roseate, common and arctic terns, and to Atlantic puffins.

**Northumbria Coast SPA and Ramsar Site** – includes much of the coastline between the Tweed and Tees Estuaries in North-East England. In summer, the site supports important numbers of breeding Little Tern *Sterna albifrons*, whilst in winter the mixture of rocky and sandy shore supports large number of Turnstone and Purple Sandpiper.

**Figure 9:**  
Location of designated /  
protected areas





**North Northumberland Dunes SAC** – qualifying features include embryonic shifting dunes, shifting dunes along the shoreline with *Ammophila arenaria* (white dunes), shifting dunes with marram, fixed dunes with herbaceous vegetation (grey dunes), dune grassland, dunes with creeping willow, humid dune slacks and petalwort.

**Farne Islands SPA** – a group of low-lying islands between 2-6 km off the coast of Northumberland. The islands are important as nesting areas for sea birds, especially terns, gulls and auks.

Since October 2013 the Aln Estuary MCZ has been designated:

**Aln Estuary MCZ** – predominantly coastal saltmarsh and saline reedbed with sheltered muddy gravels and estuarine rocky habitats, all of which are UK Biodiversity Action Plan priority habitats. The inner part of the Aln Estuary at Coquet supports sprat and flounder nurseries. Juvenile migratory species including plaice, flounder, brown trout, Atlantic salmon, European eel and sand eel have been found close to the estuary.

In addition, there are a number of other proposed designations in the NIFCA District, including:

**Coquet to St Mary's recommended Marine Conservation Zones (rMCZ)** – intertidal and subtidal rock and sediment features, including diverse intertidal under-boulder communities of conservation importance.

Within the site there are the following nine Sites of Special Scientific Interest (SSSIs):

- Alnmouth Saltmarsh and Dunes;
- Coquet Island;
- Cresswell and Newbiggin Shores;
- Cresswell Ponds;
- Hadston Links;
- Low Hauxley Shore;
- Northumberland Shore;
- Tynemouth to Seaton Sluice; and
- Warkworth Dunes and Saltmarsh.

**Farnes East rMCZ** – The mud within this site is an important fishing ground for nephrops. This area also has a high level of pelagic ecological importance, and supports diverse marine life communities. With burrowing mega fauna proliferating, a variety of worms, sea snails and paired-shelled bivalves are present.



## 3. Stage II Pre-assessment Findings

### 3.1. Strategic Summary of Stage II findings

In practical terms there are a limited number of fisheries that have relevance to fishermen exploiting resources within the NIFCA district.

The main static fisheries are:

- creeling for nephrops, lobster, brown crab, and velvet crab;
- farming of Pacific oyster;
- hand-collecting of winkles;
- digging of lugworm and ragworm for angler bait.

Trawling for nephrops is the most valuable fishery along this coastline, but most of this activity takes place outside the seaward boundary of the NIFCA. Further, nephrops trawling is prohibited within the EMS, which rules out access for this fishery to most of the northern part of the NIFCA district. But, even in the southern part of the district, relatively more nephrops trawling effort is located outside the 6 miles limit (mostly in the 6 to 12 mile zone). It is of note that whiting is a commercial bycatch of nephrops trawling.

Whiting and cod can also be exploited using gill or trammel nets – though in this case quotas for cod are small, greatly limiting the commercial feasibility of such a fishery.

There are limited commercial fisheries for salmon and sea trout. There is a small hand-line fishery for mackerel for human consumption, but quantities are low due to quota restrictions. Some hand-lining is also prosecuted for a range of finfish species as a means of providing bait for the creel fishery; as this is not landed as such, these catches are not counted against quota, where relevant. A wide variety of other finfish are caught within the NIFCA area, but in very small quantities, with little commercial significance. Bass is present in the NIFCA area, but is not the basis of a targeted fishery.

To put this in context, the NIFCA creel fishery is considered to yield lobster and crab to a value of around £3M, whilst of the regionally significant nephrops trawl fishery only some ten per cent of landings originate from within the NIFCA area, with a value of some £0.8M.

### 3.2. Fisheries in a position to proceed to full assessment

There are a number of North Sea quota fisheries that impinge on the management area of the NIFCA which could proceed to MSC assessment. These are gill net and trammel net fisheries for haddock, plaice and sole. For these fisheries, the stocks are clearly defined, and currently meet P1 & P3 requirements, and are expected to be able to meet P2 requirements for these gears. There are also opportunities to proceed with fisheries for North Sea herring and saithe – which are or have previously been the subject of MSC certifications.

For those of more specific economic interest to fishermen operating in the NIFCA district – for example nephrops, lobster and crab – none are currently in a position to proceed to assessment without consideration further work and preparation.

### 3.3. Fisheries requiring additional action prior to full assessment

The one fishery with a local connection where current standing is above the MSC minimum is the trawl fishery for whiting. This is the only fishery relevant to NIFCA that is pre-assessed as currently scoring above the minimum of 60 under each of the three MSC Principles (though as noted above, this fishery tends not to be a targeted fishery, but rather a bycatch of the nephrops trawl fishery).

All the other relevant fisheries require work – mainly under Principles 1 (stock management) and 2 (environmental impact) – to bring them up to the point where they could be expected to score 80 or above in an MSC assessment.



	<b>Species</b>	<b>Stock</b>
Demersal flatfish	Brill	North Sea and Channel (IV+IIIa VIId/e)
	Dab	North Sea (IV+IIIa)
	Flounder	North Sea (IV+IIIa)
	Lemon sole	North Sea and Eastern Channel (IV IIIa VIId)
	Turbot	North Sea (IV+IIIa)
Demersal roundfish	Cod	North Sea and Eastern Channel (IV IIIa VIId)
	Ling	Southern (IIIa IVa VI VII VIII IX XII XIV)
	Monkfish / Angler	North Sea (IV IIIa VI)
	Rays	
	Whiting	North Sea and Eastern Channel (IV VIId)
Pelagic	Horse mackerel	North Sea
	Mackerel	NEA Mackerel
	Sprat	North Sea (IV)
Shellfish	Nephrops	Farn Deeps (FU6; IVb; 38-40 E8-E9 37 E9)
	Nephrops	Firth of Forth (FU8; IVb; 40-41 E7; 41 E6)

**Table 3:**

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

For most fisheries, stock status is either unknown or poor, and management practices fall short of MSC minimum requirements. The main issues relate to the fact that there is no clearly defined stock boundary and/or stock status is not routinely monitored (most commonly because species are not subject to quota and not managed on a European (international) basis).

Species for which no specific stock boundary has been established, and which are not EU managed quota species but which have the potential for MSC certification, include lobster and brown crab, the two fisheries of particular relevance and significance to NIFCA. It should be noted that should work be undertaken to strengthen management of these fisheries, both Cefas and Marine Scotland already regularly monitor these fisheries and stocks, and background work has already been undertaken by Newcastle University post-graduate students as part of academic theses – though such data does not provide, in itself, a sufficient a basis for assessment of stock structure and status, or for the development of harvest control rules.



## 4. Scoping IFCA Fisheries

### 4.1. Key Management Responsibility

#### 4.1.1. EU Quota species

The NIFCA is responsible for enforcing regulations with respect to EU quota species such as nephrops and whiting, but is not responsible for management of these fisheries. This is an area of responsibility for the MMO.

#### 4.1.2. Species suited to local stock management

Lobster and brown crab are the only resources of any local significance, where the fishery takes place almost entirely within the area managed by the NIFCA, by fishermen that are predominantly based along the Northumberland coast and, crucially, where management of these fisheries would be reasonably expected to impact on the local abundance of these species on the ground.

For the rest, either the scale of the local fishery is very low (and thus of limited economic interest to local operators and the NIFCA), or the stock is more suited to management at a larger national or international scale – for example the nephrops resource and fishery.

There may be merit in seeking to manage lobster and crab exploitation through cooperation with inshore management bodies on the coasts north and south of Northumberland, though this is unlikely to be a simple process within the current institutional regime.

Whilst of rather minor economic significance, there are other local fisheries where improvements in management could nonetheless be achieved. Just because it may not be entirely appropriate or practical to manage a local fishery as a management unit for stock management purposes, it may nevertheless be possible to improve local management of these fisheries, including incorporation of a degree of adaptive management in such systems.

#### 4.1.3. Stocks where primary management responsibility is unclear.

Within the NIFCA district there are no stocks where primary management responsibility is unclear – largely because the scale of exploitation of any species other than lobster, crab and nephrops is so limited.



## 5. Preparations for immediate full assessment

### 5.1. EU Quota stocks ready for full assessment

#### 5.1.1. Proposed UoCs & Overlapping IFCAs

North Sea sole, plaice and haddock stocks are subject to management by EU quota, and there have been examples where such fisheries have been successfully entered for MSC assessment and certification.

There are no other EU quota stocks of relevance to the NIFCA district where immediate movement towards full assessment is possible or warranted.

#### 5.1.2. Opportunities for Stakeholders

There are fleets operating out of North Shields, Blyth, Amble and Eyemouth that exploit resources outside the 6 mile limit of the NIFCA that might have an interest in participating in the assessment of certain fisheries – for example, haddock – where pre-assessment suggests a good likelihood of conformity with the MSC standard. Despite this, the small scale and low economic contribution of such fisheries at the local level does not warrant progress to full assessment, though interest in joining a larger grouping might have merit. Of note, for example, recent drops in available finfish quota have meant that local vessels have cut back effort targeting these species, and instead many have elected to shift to nephrops trawling. This situation may, however, change over time.

#### 5.1.3. Stakeholders to consult with in full assessment

No further action required at this stage.

#### 5.1.3. Collection of supporting evidence

No further action required at this stage.

### 5.2. Locally managed fisheries ready for full assessment

#### 5.2.1. Proposed UoCs & Overlapping IFCAs

There are no locally managed fisheries that are ready for full assessment at this time.

#### 5.2.2. Opportunities for Stakeholders

No action appropriate at this stage.

#### 5.2.3. Stakeholders to consult with in full assessment

No action appropriate at this stage.

#### 5.2.4. Collection of supporting evidence

No action appropriate at this stage.



## 6. Developing IFCA Stock Management

### 6.1. Candidate fisheries for improvement

The candidate fisheries for a Northumberland IFCA led approach to stock management are:

- Lobster
- Brown crab.

Both these stocks have the attributes required for ‘good management’, and were identified in Project Inshore Stage 2 as offering potential for MSC assessment in the medium term.

#### 6.1.1. Value, cultural importance, IFCA key species

These species are 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 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 limited nationally coordinated science. Additionally these species are not subject to any fishery specific national or EU controls, beyond more general gear specification and licencing and landing regulations, and minimum landing sizes. 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 (or regional sea) level. Where most of a local fishery takes place inshore of an IFCA boundary then these species are prime candidates for IFCA stock management.

The NIFCA lobster fishery is the most valuable of the fisheries prosecuted within the NIFCA district – currently yielding in the order of £2.4M of product a year at first hand value. Brown crab is both a bycatch of this more valuable fishery and a target fishery in its own right. The same design of pots can also be used to catch velvet crab on a seasonal basis. Together these two other species contribute another £800,000 annually to local earnings. Despite the lower unit value of brown crab – and thus that there is likely to be less enthusiasm for certification of this fishery – systems put in place to manage the lobster fishery are also likely to be relevant to management of the brown crab fishery, and could be implemented at relatively little additional cost.

It is felt that the lobster fishery could be brought under a level of adaptive management that would allow it to comply with the MSC standard. This would indeed require higher levels of information collation and analysis<sup>8</sup>, and some changes to the way the fishery is managed, but these are likely to enhance rather than reduce the overall economic scale and benefits arising from this locally important fishery. This said, under current market conditions it is far from clear

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<sup>8</sup> As of October 2014, NIFCA has advanced its data collection programme with respect to the local lobster fisheries. Additional data collection systems are being or have been put in place, as follows:

#### Enhanced data-sets

- establishing exploitation rates including changes in quantities of pots being fished; this will be achieved via the NIFCA permit returns
- catch per unit of effort via the NIFCA permit returns and survey data
- total quantities of lobsters landed via permit returns.

#### Additional surveys

- randomised sampling at point of landing and at wholesalers – with the intention of sampling all permitted vessels at least once during the course of each year
- surveys during RIB patrols are also being undertaken, during which the entire catch of lobsters from one fleet of pots (usually 30 pots) is measured; this includes all lobster above and below minimum sizes – providing an indication of the overall health of the lobster population and potential recruitment to the fishery.
- an observer programme, where a NIFCA officer goes to sea on 4 commercial vessels, one day per vessel, per month, during which he or she will survey the entire catch of lobsters.

The additional data generated will be incorporated into updated / revised stock models using dynamic modelling software



that MSC certification would lead to any significant increase in the prices paid for lobster, or any improvement in access to market (unless the NIFCA district lobster fishery were to gain MSC certification where other UK lobster fisheries could not).

Against this backdrop, bringing about changes in management of this fishery is more likely to be a result of an aspiration (on the part of NIFCA and of the local fishermen) to implement best practice than the achievement of any particular market advantage. In taking improved management of the lobster fishery forward, it would be useful to refer to documentation associated with the successful MSC certification of the Jersey lobster fishery, and that associated with the subsequently withdrawn North East Sea Fisheries Committee lobster fishery – all of which can be downloaded from the MSC website.

### **6.1.2. Rationale to support local stock management**

It is proposed that both the local brown crab and lobster fisheries could be managed on the basis of local management units. This is in part on the basis that, whilst the full life cycles of these organisms extend beyond the area managed by NIFCA, it is considered that management measures taken at the level of NIFCA would be likely to impact on the future availability of crab and lobster within the NIFCA area. The particular rationale for this is that upwards of eighty per cent of the Northumberland coastal fishery for these species takes place within the NIFCA district, and involves fishermen that live and operate from within the area.

The rationale for extension of the Unit of Certification to adjacent management jurisdictions also exists – though this presents some additional complications:

- For the brown crab fishery, it is evident that there is broad industry support for improved management of these fisheries at the level of the British Isles, but the industry's preference for how this might be achieved differs between areas (primarily to do with arguments over the respective roles of technical measures, effort controls and output controls in the management of these fisheries, and how these might best be matched to different circumstances / industry structures). The Northumberland brown crab fishery has the distinct advantage of taking place predominantly within the area controlled by the NIFCA. Similar circumstances apply along the northern part of the North Eastern IFCA area (say as far south as Scarborough), but beyond this the fishery extends up to fifty miles out into the North Sea – well beyond the jurisdiction of the NEIFCA. Thus the opportunity for possible collaboration only realistically relates to the northern area of the NEIFCA. But it should also be noted that for stock assessment purposes (information collated primarily by Cefas) data is currently collected by sea area (demarcated along ICES statistical rectangle boundaries), and the NIFCA and northern NEIFCA areas fit into the Western Central North Sea (W) area – i.e. there is good correspondence between fishing activity and data collection areas.
- For the lobster fishery, the NEIFCA entered its lobster fishery into the MSC assessment process back in May 2010, but eventually withdrew this fishery from the assessment process in October 2012, based primarily on the high cost of providing a strong evidential basis to its chosen management system. This was not necessarily an indication that there was anything wrong with its current or proposed management of this fishery, but rather that the MSC assessment process requires a high level of evidence that there is a high probability that a particular management action will result in the expected change in resource strength. It is also challenging that much of the local fishery in the southern part of the NEIFCA area actually takes place well outside the area under the legal jurisdiction of the NEIFCA. To provide such evidential support to the management system would have required several years' additional research work, and application of considerable additional financial resources. But the NIFCA already has quite a well-developed historical dataset concerning this fishery (though further data and research information would be required to inform any improved management regime – though advances in this area are already underway, as indicated in footnote 8). Accordingly there may be merit in taking these joint lobster fisheries towards full assessment (or at least the northern component of the NEIFCA fishery), though this will require changes / additions in the way that fishery and stock information is collected, recorded and analysed – which



impacts on the adequacy of available funding and resource allocations (the main reason for the earlier assessment being withdrawn). There may, however, also be merit in addressing this issue at a larger, national, scale – albeit with management effected at the scale of local management units.

## 6.2. Focus on Lobster

### 6.2.1. Management issues

Guidelines on how to move such an improvement process forward are presented in **Annex 1** (Appropriate Management) and **Annex 2** (Stock Assessment and Harvest Control Rule) to this report, identifying:

- an appropriate scale of Management Unit for this fishery,
- moving on to undertaking stock assessment,
- identifying a suitable Harvest Control Rule, and
- finishing with the drafting of a suitable Fishery Management Plan.

These annexes provide largely generic guidelines, with illustrations drawn from actual fisheries, with a particular focus on crustacea (though this also broadly applies to finfish) and bivalves.

The key element lacking in the management of the Northumberland lobster fishery is, as currently constituted, that it does not routinely monitor stock abundance, and does not have mechanisms in place to alter fishing activity in response to changes in lobster abundance. In some respects the current system could be criticized as not being precautionary – allowing fishermen to increase effort at a time when lobster abundance is down in order that they might maintain landings level and income, when the precautionary response would be to reduce effort to allow the stock to rebuild.

This same situation applies to all fisheries currently managed by the IFCA, and reflects the dominant focus of the IFCAs in general on managing by predominantly static Byelaw, and control and enforcement against those Byelaws (and such other regulations as are applied at the EU, national and regional levels). The current IFCA mediated management systems do not incorporate an automatic adaptive component.

This said, the existing suite of management measures provides the necessary foundation for an adaptive management regime, and a range of very positive management components that are already in place.

The main elements of the current lobster management regime are:

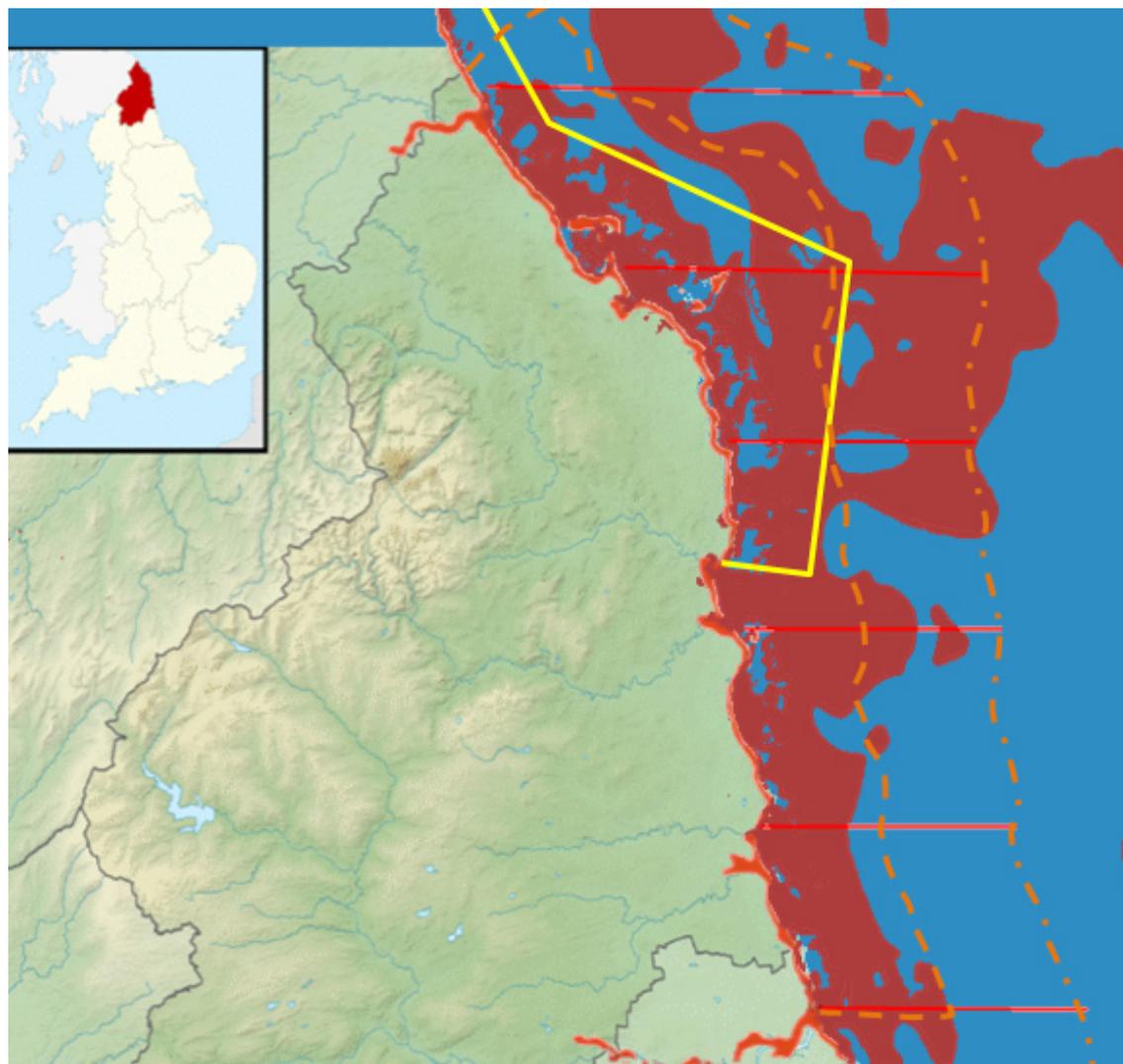
- Valid fishing license (issued by UK authorities)
- Valid shellfish fishing entitlement (issued by UK authorities)
- Valid shellfish fishing permit (issued by the NIFCA), requiring commitment to complete and submit monthly catch returns
- Area restrictions based on vessel size
- All pots must be marked with a unique pot label issued by the NIFCA (max of 800 labels issued per commercial fishing vessel – covering all pots – crab, lobster, nephrops, whelks, etc.)
- Compliance with V-notching Byelaw
- Compliance with UK/EU minimum size legislation 850/98 (enforced by the NIFCA).

The NIFCA district is divided into seven fishing zones (plus “outside the district”) for data collection purposes (illustrated in **Fig 10**).

As currently arranged, this is an open access fishery. The NIFCA does not have the basis to refuse a fishing permit as part of the management regime. Likewise the NIFCA does not have the basis



to refuse pot labels (and those owners wanting to fish more pots have been known to simply purchase and license a supplementary vessel and request an additional 800 pot labels). So whilst the NIFCA requires all pots to be marked, and actively checks that pots are appropriately marked, it does not control how many pots are deployed within the NIFCA area, and does not have the mechanism to vary the number of pots deployed. Indeed the administrative burden linked to the need to issue new uniquely numbered and coloured pot labels has encouraged the NIFCA to consider issuing new labels once every three years (rather than every other year as currently applied).



**Figure 10:**  
**Illustration of seven NIFCA data zones**  
 Notes:  
 - Rocky substrate shown as areas of solid brown  
 - 6 and 12 nm territorial limits shown as dotted lines  
 - EMS boundary shown in yellow  
 - Data zones demarcated by red horizontal lines

The NIFCA manages a V-notching scheme – now in its 14th year of operation – whereby two or three times a year berried lobsters are purchased from traders (about 1200 a year at a cost of £9k), V-notched, and returned to the sea at release points in each of the data zones. The relevant byelaw makes it illegal to land or sell V-notched lobsters, and it takes about two years for the notch to grow-out, essentially protecting a V-notched lobster from capture for a two year period. In principle this protection enables these females to release two broods of eggs that might not otherwise have been released.

An indicator of effort and area fished can be assessed through the normal monitoring activities of the NIFCA patrol vessels, where all sightings of fishing vessels are routinely recorded.

Landings are recorded through the monthly shellfish returns made by vessel owners. NIFCA receives MMO shellfish returns and landings data generated as a result of the Buyers and Seller



Regulation. But from the beginning of 2011 NIFCA byelaw requires fishermen to also complete a NIFCA monthly data return which is entered on the NIFCA database. The NIFCA monthly return more accurately represents catch from the NIFCA district and can be split into a variety of data sets. In addition, the NIFCA officers also undertake random catch surveys of lobsters at landing ports and wholesalers – monitoring the composition of a vessel’s entire daily catch. Officers also implement a programme of catch composition monitoring where officers board individual vessels and haul a full fleet of pots and record details of all animals caught in the pots.

Using all of the above data, the NIFCA has the wherewithal to identify catch and effort by vessel, by data zone, by month. It can also independently seek data on purchases from the main shellfish traders, which could also reveal additional data on size composition. In addition, the at-sea inspection of creel catches reveals further information on catch composition and bycatch. Reports on this fishery are prepared periodically, but not as a matter of course, nor at fixed time intervals. Such reports are not used as an active management tool, but rather as a much coarser tool in checking the overall progress and health of the fishery.

In addition, more in-depth reports have been prepared as research theses by undergraduate and post-graduate students associated with the University of Newcastle<sup>9</sup>. Such studies appear to be ad hoc in nature, and driven more by the efforts of the academic institution than by the NIFCA. Rather more could be done by the NIFCA to signal to academic institutions what sorts of work would help it in implementing its management responsibilities, whilst also meeting the rigour and other academic criteria dictated by the academic institutions.

What remains missing is the wherewithal to monitor stock condition (composition and abundance of the stock on the grounds), the availability of evidence that changes in fishing effort can impact on stock condition, the ability to control fishing effort, and a predictable mechanism linking stock status and fishing effort (an appropriate harvest control rule). It is the team’s view that novel approaches to probability and simulation-based assessments of stock structure and condition can be used to remedy these shortfalls – and could do so based largely on data already collected for this fishery, and for relatively little additional cost. **Annex 2** to this report gives some indication as to how this might be achieved.

### **6.2.2. Moving towards improved management**

The key issues constraining improved management of the lobster fishery (and by association the brown crab fishery) are:

- A current focus on management by technical measures, rather than an adaptive regime responding to fishery status
- Limitations in knowledge and understanding of locally relevant stock dynamics and current stock status
- No currently enforceable means of monitoring / controlling / limiting fishing effort per data zone (primarily relates to pot days fished, but links back to permits issued, pot tags issued, actual soak days – plus absence of a mechanism for increasing / decreasing total effort)
- Possible limitations to the historic catch and landings record
- Possible limitations in the capacity to manipulate / analyse data sets, and to undertake risk based / probability modelling / simulations
- Limitations to the resources available to step-up data collection and analysis, commission / undertake further research, and develop Harvest Control Rules (HCRs).

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<sup>9</sup> The 2009 report by Turner et al – “Defining the Northumberland Lobster Fishery” provides the first summary description of the lobster pot fishery in the NIFCA district. The study maps potting distribution and density, analyses recent lobster landings, and collates data on size composition of catches.

A more recent study – Spencer A (2013) “An assessment of the Northumberland edible crab *Cancer pagurus* and velvet crab *Necora puber* fisheries” extends the analysis to these other species caught in the same or closely related pot fisheries - MPhil Thesis, Newcastle University



Aside from the NIFCA’s existing programme of work, and its work to corroborate / justify proposed responses to heightened focus on environmental management, the IFCA needs to shift management of the fisheries under its management from steady state systems governed almost solely through technical measures to more adaptive regimes. A priority focus of such work should be the local lobster pot fishery.

To mobilise the above remedial work, additional resources will be needed to undertake / commission development and testing of a suitable stock assessment model.

In addition to this, some work will need to be undertaken to establish a practical means by which effort can be varied by data area in response to a proxy for changes in stock status.

Once the stock model has been developed, and the means by which effort can be varies has been established, work should then focus on the development of a Harvest Control Rule for the fishery.

These three pieces of work are substantial, and will require considerable application of time, effort and resources. The scale of these tasks should not be under-estimated.

These are, to an extent, reflected in the pre-assessment scoring of the NIFCA lobster fishery – show below, with guides for remedial work.

North East Pot			Potential remedial work	
P1	1.1.1.	<60	Stock Status	Currently determined on relatively crude indicators of CPUE, without the support of formal stock assessment or modelling. A more robust system of assessment needs to be in place – but also recognising that most of the data requirements for such an assessment are already available.
	1.1.3.	<60	Rebuilding	The NIFCA lobster stock is thought to be stable, given that CPUE has not declined in light of increased effort in recent years. But this deduction has not been subject to more rigorous modelling – which should be undertaken as a matter of some urgency. By contract, the stock in the adjacent management area (NEIFCA) is considered to have been over-fished.
	1.2.1.	<60	Harvest Strategy	As yet there is no coherent management strategy or plan for this stock. It is important that a stock assessment is undertaken as a matter of some urgency.
	1.2.2.	<60	HCR	No HCR has been developed for this fishery. Any HCR is likely to be effort based – but at present there is no practical means by which effort can either be effectively monitored or constrained. Effort needs to be focused on taking a dynamic modelling of the stock forward to explore a range of management and fishery options, and starting to explore practical mechanisms for varying pot days per data zone according to indicators of stock status.
	1.2.3.	60-80	Info & Monitoring	New systems have been developed and are in place to capture and assess fishery data. These need to be double-checked in the context of the information requirements needed for effective stock modelling, but also focusing on more accurate assessment of fishing effort (pot-days per period per zone).
	1.2.4.	60-80	Assessment of Stock Status	Currently un-determined; dynamic modelling of the stock needs to be undertaken. A stock assessment was recently completed for NEIFCA; Project Inshore review of this assessment suggests that the methodology used could be improved upon – and guidelines as to how this might be achieved are provided in the NEIFCA report. These guidelines should be picked up and acted upon by NIFCA. The main elements are that the model should focus on use of dynamic modelling techniques (rather than use of an equilibrium model), should facilitate incorporation of the full range of data that is already collected in the NEIFCA and NIFCA fisheries, and should enable simulation using a wider range of management hypotheses as a means of identifying best management strategies.



P2	2.1.1.	<60	Retained Outcome (Brown Crab)	Significantly more needs to be done with the data that is already routinely collected by NIFCA officers to more actively management both the lobster and brown crab fisheries. Regime needs to move from a static to an adaptive system of management.
	2.1.2.	60-80	Retained Mgmt (Brown Crab)	There is limited exploration of management options beyond the use of steady-state technical measures. There is the option (given good data availability) to also undertake modelling of the brown crab stock – which would allow introduction of more responsive management systems and measures.
	2.3.1.	60-80	ETP Outcome	This is considered a low-key / low risk fishery interaction. Improved reporting on current status (based on existing data capture systems, and requiring little additional effort) would allow for formulation of a management strategy, which would then allow for assessment of management effectiveness.
	2.3.2.	60-80	ETP Mgmt	This is considered a low-key / low risk fishery interaction. Improved reporting on current status (based on existing data capture systems, and requiring little additional effort) would allow for formulation of a management strategy, which would then allow for assessment of management effectiveness.
	2.3.3.	60-80	ETP Info	This is considered a low-key / low risk consideration, but given the existing at-sea catch sampling system, it would take little to tighten up reporting, and thus significantly raise the score on this element.
	2.4.3.	60-80	Habitat Info	Alongside the work being undertaken to support management of the various protected areas within the NIFCA area, there is substantial improvement in the amount and quality of information available on the disposition of the marine habitat across the area. Improved write-up of this information – and monitoring of any changes in habitat status – as it pertains to rocky substrate will improve scoring on this element.
P3	3.1.2.	60-80	Mgmt Roles	Once the NIFCA has developed and implemented a coherent and operable management plan for the lobster fishery, scoring against this element will be automatically raised.
	3.1.4.	60-80	Incentives	One of the key weaknesses in the current pots regime is the ease with which vessel owners can acquire tags for up to 800 pots per vessel, whether or not they are needed by that vessel. This in itself is not a major problem, but becomes one when total fishing effort cannot be effectively monitored or controlled. This requires further attention – linked to introduction of a workable HCR.
	3.2.1.	60-80	Objectives	Alongside the development of a coherent lobster fishery management plan and a stock assessment will come a clearer statement of the management objective for this fishery.
	3.2.2.	60-80	Decision making process	Once a stock assessment model has been developed, and an appropriate HCR developed and introduced, it is self-evident that there will have been a strengthening in the nature and quality of decision-making processes with regard to this fishery.
	3.2.3.	60-80	Compliance & Enforcement	Current systems of compliance and enforcement are reasonable and appropriate to the nature and size of the fishery; they do not, however, adequately met the requirements of an adaptive fishery management regime where limits to, or variation of, fishing effort is likely to figure prominently. Some modification to the system will be required.
	2.2.5.	60-80	Monitoring & Evaluation	In association with the formulation and implementation of an appropriate lobster fishery management plan, there needs to be a system of performance assessment – initially conducted internally, but at some future date to include a assessment and review by an outside independent authority.

## 7. Potential timeline for development of management

### 7.2. Potential timeline for development of management

Below we set out a theoretical timeline for sequential 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 timeline could be either shortened or lengthened depending 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
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 7:

Potential timeline for 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



\*Reminder

Since the original pre-assessments in 2013, on which these reports are based, the Northumberland IFCA has carried out a number of actions. These include:

- An improved database introduced in 2014, upon which landings and catch per unit of effort can be readily accessed and assessed.
- Improved and increased lobster surveys were commenced in 2014, ground truthing work is also being undertaken.
- Working with Newcastle University on several shellfish projects
- Prioritising consideration of the dynamic stock modelling approach
- Increased joint working/planning of research with North East IFCA and Eastern IFCA. All 3 IFCA's meet regularly with a view to manage stocks and research in a complimentary way to ensure where possible the management of the fishery is the same in each of the districts.
- Particular work has been carried out on a Strategic Environmental Assessment which may have an impact on original scores.



## Appendix 1 - References

**Dapling T.M., Clark R.W.E., & Vause B.J., Medley, P., C.R.C. Carleton. (2010)** “Navigating the Future”. Developing Sustainable Inshore Fisheries. The UK Inshore Fisheries Sustainability Project.

**Mott Macdonald (2013)** Northumberland IFCA Strategic Environmental Assessment: Scoping Report

**NIFCA (2010)** An Insight into the Fisheries throughout the District of the Authority’s predecessor body Northumberland Sea Fisheries Committee in 2010

**NIFCA (2011)** Lobster V-notching report 2011

**NIFCA (2012)** NIFCA Annual Plan 2013-2014

**Turner R.A., Hardy M.H., Green J., and Polunin N.V.C. (2009)** Defining the Northumberland Lobster Fishery: report to the Marine and Fisheries Agency, London; Newcastle University

**Spencer A (2013)** An assessment of the Northumberland edible crab *Cancer pagurus* and velvet crab *Necora puber* fisheries; MPhil Candidate, Newcastle University

NIFCA – Mussel surveys 2007-2012

NIFCA – Lobster V-Notching Reports 2008-2011

Northumberland Biodiversity Action Plan

Northumberland IFCA Environment Risk Register

Coastal Birds Species Action Plan

Northumberland IFCA Byelaws

Northumberland IFCA Annual Plan 2012-13

Joint Working Arrangement for Northumberland IFCA, Natural England, Marine Management Organisation and the Environment Agency 2011-12

Northumberland IFCA Enforcement Risk Register, 2011

**Turner et al (2009)** “Defining the Northumberland Lobster Fishery” – thesis, University of Newcastle

**Spencer A (2013)** “An assessment of the Northumberland edible crab *Cancer pagurus* and velvet crab *Necora puber* fisheries”; MPhil Thesis, University of Newcastle



## Appendix 2 - MSC Principles & Criteria for Sustainable Fishing

At the centre of the MSC is a set of Principles and Criteria for Sustainable Fishing which are used as a standard in a third party, independent and voluntary certification programme. These were developed by means of an extensive, international consultative process through which the views of stakeholders in fisheries were gathered.

These Principles reflect a recognition that a sustainable fishery should be based upon:

- The maintenance and re-establishment of healthy populations of targeted species;
- The maintenance of the integrity of ecosystems;
- The development and maintenance of effective fisheries management systems, taking into account all relevant biological, technological, economic, social, environmental and commercial aspects; and
- Compliance with relevant local and national local laws and standards and international understandings and agreements.

The Principles and Criteria are further designed to recognise and emphasise that management efforts are most likely to be successful in accomplishing the goals of conservation and sustainable use of marine resources when there is full co-operation among the full range of fisheries stakeholders, including those who are dependent on fishing for their food and livelihood.

On a voluntary basis, fisheries which conform to these Principles and Criteria will be eligible for certification by independent MSC-accredited certifiers. Fish processors, traders and retailers will be encouraged to make public commitments to purchase fish products only from certified sources. This will allow consumers to select fish products with the confidence that they come from sustainable, well managed sources. It will also benefit the fishers and the fishing industry who depend on the abundance of fish stocks, by providing market incentives to work towards sustainable practices. Fish processors, traders and retailers who buy from certified sustainable sources will in turn benefit from the assurance of continuity of future supply and hence sustainability of their own businesses.

The MSC promotes equal access to its certification programme irrespective of the scale of the fishing operation. The implications of the size, scale, type, location and intensity of the fishery, the uniqueness of the resources and the effects on other ecosystems will be considered in every certification.

The MSC further recognises the need to observe and respect the long-term interests of people dependent on fishing for food and livelihood to the extent that it is consistent with ecological sustainability, and also the importance of fisheries management and operations being conducted in a manner consistent with established local, national, and international rules and standards as well as in compliance with the MSC Principles and Criteria.

### Preamble

The following Principles & Criteria are intended to guide the efforts of the Marine Stewardship Council towards the development of sustainable fisheries on a global basis. They were developed assuming that a sustainable fishery is defined, for the purposes of MSC certification, as one that is conducted in such a way that:

- it can be continued indefinitely at a reasonable level;
- it maintains and seeks to maximise, ecological health and abundance,
- it maintains the diversity, structure and function of the ecosystem on which it depends as well as the quality of its habitat, minimising the adverse effects that it causes;
- it is managed and operated in a responsible manner, in conformity with local, national and international laws and regulations;
- it maintains present and future economic and social options and benefits;



- it is conducted in a socially and economically fair and responsible manner.

The Principles represent the overarching philosophical basis for this initiative in stewardship of marine resources: the use of market forces to promote behaviour which helps achieve the goal of sustainable fisheries. They form the basis for detailed Criteria which will be used to evaluate each fishery seeking certification under the MSC programme. Although the primary focus is the ecological integrity of world fisheries, the principles also embrace the human and social elements of fisheries. Their successful implementation depends upon a system which is open, fair, based upon the best information available and which incorporates all relevant legal obligations. The certification programme in which these principles will be applied is intended to give any fishery the opportunity to demonstrate its commitment to sustainable fishing and ultimately benefit from this commitment in the market place.

### **Scope**

The scope of the MSC Principles and Criteria relates to marine fisheries activities up to but not beyond the point at which the fish are landed. However, MSC-accredited certifiers may be informed of serious concerns associated with post-landing practices.

The MSC Principles and Criteria apply at this stage only to wild capture fisheries (including, but not limited to shellfish, crustaceans and cephalopods). Aquaculture and the harvest of other species are not currently included.

Issues involving allocation of quotas and access to marine resources are considered to be beyond the scope of these Principles and Criteria.

### **PRINCIPLE 1**

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

#### **Intent:**

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

#### **Criteria:**

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

### **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.

**Criteria:**

1. The fishery is conducted in a way that maintains natural functional relationships among species and should not lead to trophic cascades or ecosystem state changes.
2. The fishery is conducted in a manner that does not threaten biological diversity at the genetic, species or population levels and avoids or minimises mortality of, or injuries to endangered, threatened or protected species.
3. Where exploited populations are depleted, the fishery will be executed such that recovery and rebuilding is allowed to occur to a specified level within specified time frames, consistent with the precautionary approach and considering the ability of the population to produce long-term potential yields.

**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.

**A. Management System Criteria:**

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

The management system shall:

2. demonstrate clear long-term objectives consistent with MSC Principles and Criteria and contain a consultative process that is transparent and involves all interested and affected parties so as to consider all relevant information, including local knowledge. The impact of fishery management decisions on all those who depend on the fishery for their livelihoods, including, but not confined to subsistence, artisanal, and fishing-dependent communities shall be addressed as part of this process;
3. be appropriate to the cultural context, scale and intensity of the fishery –reflecting specific objectives, incorporating operational criteria, containing procedures for implementation and a process for monitoring and evaluating performance and acting on findings;
4. observe the legal and customary rights and long term interests of people dependent on fishing for food and livelihood, in a manner consistent with ecological sustainability;
5. incorporates an appropriate mechanism for the resolution of disputes arising within the system;
6. provide economic and social incentives that contribute to sustainable fishing and shall not operate with subsidies that contribute to unsustainable fishing;
7. act in a timely and adaptive fashion on the basis of the best available information using a precautionary approach particularly when dealing with scientific uncertainty;
8. incorporate a research plan – appropriate to the scale and intensity of the fishery – that addresses the information needs of management and provides for the dissemination of research results to all interested parties in a timely fashion;
9. require that assessments of the biological status of the resource and impacts of the fishery have been and are periodically conducted;



10. specify measures and strategies that demonstrably control the degree of exploitation of the resource, including, but not limited to:
  - setting catch levels that will maintain the target population and ecological community's high productivity relative to its potential productivity, and account for the non-target species (or size, age, sex) captured and landed in association with, or as a consequence of, fishing for target species;
  - identifying appropriate fishing methods that minimise adverse impacts on habitat, especially in critical or sensitive zones such as spawning and nursery areas;
  - providing for the recovery and rebuilding of depleted fish populations to specified levels within specified time frames;
  - mechanisms in place to limit or close fisheries when designated catch limits are reached;
  - establishing no-take zones where appropriate;
11. contains appropriate procedures for effective compliance, monitoring, control, surveillance and enforcement which ensure that established limits to exploitation are not exceeded and specifies corrective actions to be taken in the event that they are.

#### **B. Operational Criteria**

Fishing operation shall:

1. make use of fishing gear and practices designed to avoid the capture of non-target species (and non-target size, age, and/or sex of the target species); minimise mortality of this catch where it cannot be avoided, and reduce discards of what cannot be released alive;
2. implement appropriate fishing methods designed to minimise adverse impacts on habitat, especially in critical or sensitive zones such as spawning and nursery areas;
3. not use destructive fishing practices such as fishing with poisons or explosives;
4. minimise operational waste such as lost fishing gear, oil spills, on-board spoilage of catch, etc.;
5. be conducted in compliance with the fishery management system and all legal and administrative requirements; and
6. assist and co-operate with management authorities in the collection of catch, discard, and other information of importance to effective management of the resources and the fishery.

## Appendix 3 - NIFCA members

	Name	Affiliation
<b>Councillors and council appointees</b>		
	Councillor GR Arckless (Chairman)	Northumberland County Council
	Councillor B Burdis	North Tyneside Metropolitan Borough Council
	Councillor Mrs J Fearon	Northumberland County Council
	Councillor D Ledger	Northumberland County Council
	Councillor Mrs E Simpson	Northumberland County Council
	Councillor RJD Watkin	Northumberland County Council appointee
	Councillor J Woodman	Northumberland County Council appointee
<b>Marine Management Organisation appointees</b>		
	L Weller (Vice Chairman)	Marine Management Organisation appointee
	MD Bould	Marine Management Organisation appointee
	Mrs C Hedley	Marine Management Organisation appointee
	D Herriott	Marine Management Organisation appointee
	Dr Martin Kitching	Marine Management Organisation appointee
	GW. O'Connell	Marine Management Organisation appointee
	Professor N Polunin	Marine Management Organisation appointee
	AB Ritchie	Marine Management Organisation appointee
	J Stephenson	Marine Management Organisation appointee
	IE Thomas	Marine Management Organisation appointee
	J Walton	Marine Management Organisation appointee
<b>Agencies</b>		
	Mrs J Lee	Environment Agency representative
	Dr C Scott	Natural England representative
	N. Robinson	Marine Management Organisation representative



## Appendix 4 - Strategic objectives

### Summary of Strategic Objectives

Key elements of its strategic approach are:

1. Management by results – identification of expected outcomes and success criteria
2. Maintain an effective management and enforcement regime in the district
3. Continue with the processes of Strategic Environmental Assessment of the district (commenced in 2012 – 2013) and the assessment of sustainable management of local fisheries through “Project Inshore”
4. Continue the lobster v-notching programme
5. Continue the annual mussel survey at Holy Island
6. Maintain operational links with government agencies and other stakeholders groups – through the MoU with MMO, NE, EA and the Tweed Commission, and links with Cefas, hobby fishermen and anglers, the Marine Science School at Newcastle University, the police, and such other stakeholders as may be appropriate
7. Review and evaluation of all NSFC Byelaws – reduction and replacement of legacy byelaws, addition of new byelaws responding to the Revised Approach to European Marine Site Fisheries Management
8. Completion of the review of NIFCA data collection, handling and storage systems in support of effective NIFCA decision-making
9. Maintain and enhance staff management practices and protocols
10. To undertake requirements in respect of Marine Conservation Zones in the NIFCA district in accordance with inter alia the IFCA vision (Success Criteria 2, 3, 4, 5 and 6).
11. To continue with adherence to the principles laid down in the Defra Guidance to IFCAs and as resources permit on:
  - The common enforcement framework (refer to Success Criterion 3);
  - Evidence based Marine Management (refer to Success Criterion 5);
  - Monitoring and Evaluation and Measuring Performance (refer to Success Criterion 5);
  - Contributing to the Achievement of Sustainable Development (refer to Success Criterion 6);
  - Annual Planning and Report (refer to Success Criterion 1);
  - Byelaw Making Powers under the Marine and Coastal Access Act (refer to Success Criterion 2).
- NIFCA will also publicise as required all of the IFCA policies arising from that Guidance and keep each Guidance document and actions required thereunder under regular review.
12. Sea Angling – to build as resources permit upon the Cefas Sea Angling Project 2012 which NIFCA carried out in the district of the Authority and develop the NIFCA Sea Angling Strategy undergoing preparation at the end of March 2013 (refer to Success Criterion 5).
13. Berwick and North Northumberland Coast European Marine Site – The Northumberland Inshore Fisheries and Conservation Authority is a competent and relevant Authority in relation to the EMS under the Habitat Regulations and has a duty to fulfil conservation objectives to ensure that qualifying features are maintained in a favourable condition. To that end NIFCA will continue to play an active role in ensuring that the objectives and aims of the management plan for the B&NNC EMS are met and enhanced. This will be achieved by NIFCA officers sitting on the management and steering groups of the EMS and attending relevant meetings. During regular work at sea IFCOs also undertake extensive monitoring of commercial fishing activity occurring within the site and have been assisting Natural England with sea floor mapping of



survey areas within the site<sup>10</sup>. In addition and in particular NIFCA will fulfil its remit in relation to the Defra revised approach to management of fisheries in the EMS and everything which that entails (refer to Success Criterion 4 and 6).

14. NIFCA projects – NIFCA will continue with research projects particularly with Newcastle University in relation to crab and lobster stocks and in respect of litter as a problem in relation to fishing, all of which projects are on -going from 2012 – 2013. NIFCA will also continue to keep under review as in 2012 – 2013 its role in relation to the marine historic environment. Although due to resource limitations full development of this area of work has not been possible in 2012 – 2013 NIFCA will continue to have regard to the need for preservation of any features of archaeological or historic interest whenever or wherever that is possible in the district (refer to Success Criterion 4, 5 and 6).

Each of the targets/priorities will be reviewed at the NIFCA quarterly meetings so that planning to tackle any gaps can be formulated and the implementation of findings can also commence. Measurement of attaining objectives set by these targets and priorities can also take place at these meetings by reference to the relevant Outcome and Performance Indicators in the NIFCA Success Criterion with re-setting of any targets and priorities which may be required and planning for their future attainment. For further details see Annex II Local Targets and Priorities Delivery Plan.

#### **National success criteria**

1. IFCAs have sound governance and members of 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 IFCAs work in partnership and are engaged with their stakeholders.
4. IFCAs make the best use of evidence to deliver their objectives.
5. IFCAs support and promote the sustainable management of the marine environment.
6. IFCAs are recognised and heard.

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<sup>10</sup> During 2013 NIFCA officers also, with the assistance of local fishermen, undertook additional survey work within the B&NNC EMS including underwater photography and additional sea floor mapping.



## Appendix 5 - Further notes on the seasonality of local fisheries

Throughout the District potting is the main fishing method from the static fleet. Pots, creels, traps and cages (these are fundamentally the same gear but a wide variety of styles) are used to fish for lobsters, brown crabs, velvet crabs, and some for nephrops at various times of the year. The lobster season normally starts in June and is at its peak in August and September. In the summer when the fishermen have their pots very close inshore they are also able to catch large numbers of velvet crabs. By October lobsters start to become scarce and due to the unsettled weather most fishermen start to either reduce or take all their pots out of the water. The fishermen who continue to pot usually move their pots offshore to target brown crabs throughout the winter and into spring. In the last 5 years there has been an increase in the number of fishermen who have invested in prawn pots which they tend to work further offshore, just on the edge of the hard ground, where they can catch very good quality large nephrops which are kept alive by putting them into individual tubes; this is to stop them harming each other as high quality Nephrops are more profitable.

The trawl fleet has become ever more reliant on the local prawn (nephrops) fishery, which is now the wider fleet's principal fishery. The local fishery takes place between 0-25 miles offshore with best catches being seen during the autumn and winter months. When the fishery is at its height it also attracts a large number of visiting trawlers from Scotland, Northern Ireland and other English ports. The majority of the visiting trawlers are larger and more powerful than the local boats and most also use more than one net (multi rigged), and these combined factors enable them to work further offshore in most weather conditions and, because they are towing 2-3 nets, they can potentially catch more prawns, which can be an issue between the locals and visitors. Byelaw 14 was introduced by Northumberland Sea Fisheries Committee (NSFC) to restrict any fishing boat from "multi rigging, pair trawling and pair seining" inside the NIFCA District (6 mile limit).

In the summer months a number of smaller under 10 metre boats from North Shields, Blyth and Amble move up to the Firth of Forth to target the summer prawns, normally working daylight and darkness throughout the week and coming home at weekends. The remaining under 10 metre boats and the larger local trawlers tend to work further offshore in the summer when the weather is usually finer, targeting both white fish and prawns. Mesh sizes for Nephrops are approximately 80-100mm, and for whitefish over 100mm.

The Authority also restricts the size of trawlers which can fish within its District, e.g. between 0-3 miles, vessels allowed to trawl must be below 11.59 metres and have a trawling permit. No vessels over 24 metres are allowed to trawl within any part of the District, and at the present time there are approximately 115 local and visiting boats with permits to trawl within the 3 mile limit. No vessel can Purse Seine Net or Ring Net within the Authority's District and any vessels dredging within the Authority's District are restricted to no more than 10 dredges in total (5 aside).

## Appendix 6 - Ranking of locally important fisheries

	landed value - 2006-2010 - NIFCA relevant ICES squares	Rank	Management Level	Stock / jurisdiction overlap	Local Socio- economic / cultural Importance	Average score
Nephrops (Norway Lobster)	7,687,502	3.0	3	3	3	3.0
Lobsters	2,615,016	2.9	3	3	3	3.0
Crabs (C.P.Mixed Sexes)	701,512	2.8	3	3	3	3.0
Crabs - Velvet (Swim)	96,491	2.3	3	3	3	3.0
Bass	2,439	1.3	3	3	2	2.7
Ling	9,073	1.7	3	3	1	2.3
Red Mullet	7,776	1.7	3	3	1	2.3
Gurnard and Latchet	6,913	1.5	3	3	1	2.3
Catfish	398	0.9	3	3	1	2.3
Shad	395	0.8	3	3	1	2.3
Cuckoo Ray	294	0.7	3	3	1	2.3
John Dory	250	0.6	3	3	1	2.3
Spurdog	185	0.5	3	3	1	2.3
Blonde Ray	137	0.5	3	3	1	2.3
Spotted Ray	137	0.4	3	3	1	2.3
Tope	106	0.3	3	3	1	2.3
Thornback Ray	53	0.2	3	3	1	2.3
Squid	104,011	2.4	3	2	1	2.0
Pollack	900	1.2	3	2	1	2.0
Skates and Rays	867	1.1	1	3	1	1.7
Redfishes	48	0.1	3	1	1	1.7
Whiting	1,027,287	2.9	1	1	2	1.3
Haddock	455,344	2.7	1	1	2	1.3
Cod	317,353	2.6	1	1	2	1.3
Lemon Sole	92,934	2.3	1	1	2	1.3
Halibut	85,308	2.2	2	1	1	1.3
Plaice	64,337	2.0	1	1	2	1.3
Mackerel	28,058	2.0	1	1	2	1.3
Sole	21,622	1.9	1	1	2	1.3
Monks or Anglers	115,666	2.5	1	1	1	1.0
Turbot	77,282	2.1	1	1	1	1.0
Brill	14,865	1.8	1	1	1	1.0
Hake	5,742	1.4	1	1	1	1.0
Witch	5,461	1.4	1	1	1	1.0
Herring	768	1.1	1	1	1	1.0
Saithe	389	0.8	1	1	1	1.0
Horse Mackerel	92	0.2	1	1	1	1.0
Other	240,098	2.6	0	0	0	-
Other or mixed Demersal	7,532	1.6	0	0	0	-
Roes	576	1.0	0	0	0	-

### Scoring Key

#### Management Level

1 = ICES / EU Quota

2 = ICES / no quota

3 = Little EU level management involvement



<u>Stock / Jurisdictional Overlap</u>
1 = Defined - Migratory / widely distributed
2 = Undefined and highly mobile
3 = Local or Undefined and Sedentary
<u>Local Socio-economic Importance</u>
1 = Occasional bycatch, no recreational catch
2 = Commercial bycatch and occasional recreational catch
3 = IFCA Priority Species (i.e. important commercial or recreational catch).



## Annex 1 - Pathway to sustainable management

### Characteristics of successful management (The Theory)

The NIFCA lobster and crab fisheries are already subject to well-established forms of management. What this management lacks, however, is the flexibility to require fishing activity to be varied according to the status of the relevant stocks, and it is this facility that forms the main focus of the following arguments. 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.

#### 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 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 of 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.

### **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 Unit of Certification (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 mitigated. 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 of 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 blue or black<sup>11</sup> boxes, 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

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<sup>11</sup> Blue box refers to a satellite transceiver – mandatory for all fishing vessels of twelve metres or over; a black box refers to a simpler and lower cost data logger more suited to smaller inshore vessels, where data can be transmitted in real time using VHF or mobile phone telephony, or on demand using a mobile phone or memory stick



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 from 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 or 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 members of a 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.

**Principle 3**

There is considerable crossover 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 nonetheless 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. For example, 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 to 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 on 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 process. 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; but 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.

### **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 to manage, and wish to take a lead in said adaptive stock management. These steps are ordered in a more chronological order, illustrative of the management process, as opposed the arrangement by MSC principle used 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.

#### **Management unit**

For English Inshore fisheries which are considered best candidates for inshore management (led by the IFCAs) an immediate question that arises is to define the extent of the stock, or more accurately to determine 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 through 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 – lobster and brown crab – it could be argued that it is appropriate to manage them as single management units within the Northumberland IFCA jurisdiction because:

- the extent the local fishery is largely limited to the area controlled by the NIFCA;



- those exploiting the fishery are mainly based within the NIFCA area;
- even though the life-cycle of lobster and brown crab involves elements that take place outside the NIFCA area, there is a high likelihood that actions that impact on stock abundance within the NIFCA area will impact on future stock abundance within the area;
- in their adult phase lobster, and to a lesser extent crab, do not move over large areas, and are not migratory;
- lobster and brown crab are of significant economic 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 though it would fail to halt the overall decline, critically actions taken would still mean that management was taking the correct response in the relevant jurisdiction. Bigger management units at multi-jurisdictional levels are not an immediate prospect for lower value or more sedentary inshore resources (such as brown crab).

It is also important to ensure that management is coordinated at the appropriate scale in relation to the fishery, and managers should consider the degree to which coordination with other IFCA is required and at what level to engagement with the MMO. For fisheries that are evenly distributed 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 the underlying assumptions to management, and ensuring awareness of issues arising in neighbouring management units. For lobster this kind of inter-IFCA engagement is likely to be particularly important.

### **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 IFCA 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.

### **Develop Draft HCR (Harvest Control Rule)**

**Annex 2** 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 the rate of exploitation is varied to accommodate perceived changes in stock. 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 that would be triggered should the limit reference point be reached.

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 different management scenarios and increase stakeholder understanding by providing clear explanation of proposed management response. By securing 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.

### **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 IFCAs, but local level management allows for more locally specific objectives to also be included. This should state both short term and 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 IFCAs, 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 – and by whom. Sensibly, for locally managed stocks such as lobster and crab, 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 the 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** (a group incorporating fishers, managers and other stakeholders). Even if this body does not have power in terms of decision-making it can play a vital role in an 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.

### **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 the 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.

### **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 fish and/or shellfish resources being managed locally as any additional landing requirements (resulting from local management) will be outside the remit of the MMO.

### **Institutional, capacity & funding requirements**

The resource implications associated with proposed future management activities maybe significant and have the potential to exceed the current capacity of the NIFCA.

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 exiting 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.

### **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.

### **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 more straightforward to simply 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 the IFCA to make bylaws in order to carry out their duties, although these do not come into effect until confirmed by the Secretary of State<sup>12</sup>. 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 the event of changes in stock status.

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 it is 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.

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<sup>12</sup> Although section 157 of the act does give the IFCA powers to make emergency byelaws in event of urgent need or unforeseen circumstance, it is not anticipated that this would be the appropriate route by which to introduce adaptive management measures for local stocks.



## Annex 2 - Stock Assessment & HCR development - Lobster specific<sup>13</sup>

### Introduction

In furthering the introduction of a more adaptive management regime for NEIFCA lobster fisheries, the following specific recommendations, if implemented, should help fisheries meet the MSC Principles and Criteria, but may not be the only way to do this. Any approach will need to be within IFCA institutional capabilities and resources.

The most recent lobster stock assessment for Yorkshire indicated that the stock is overfished (fishing mortality is above the limit reference point). There are two options available to deal with this. Either fishing effort and catches are reduced so that fishing mortality is reduced to the target level or urgent further work is undertaken to test the stock assessment's robustness to uncertainties (and, in theory, under the precautionary approach a reduction in fishing effort is required while this work might be undertaken). If neither of these options is taken, the fishery (or other lobster fisheries) cannot meet the MSC certification standard.

Separate to the stock assessment, the current stock status monitoring methodology uses several indicators to monitor how the stock may be changing over time, which are updated annually. Indicators cover the quantity, size composition, recruitment and derived indicators such as fishing mortality. They suggest that the stock is stable. These can be used to provide management advice, but it may be difficult to provide a definitive stock status or link them to harvest controls in a decision rule. Currently no well-defined harvest control rule is in place and it is not clear when or how management intervention might occur.

It is important to note that the current assessment is precautionary and a new assessment may confirm the results and implied management advice as the best available, taking into account the precautionary approach. However, a new assessment as that outlined below may be used to test alternative hypotheses and, it is hoped, generate results which stakeholders will believe and agree to act upon. For example, the assessment might be used to generate a stepwise reduction in effort which would be more acceptable to fishers and would test assumptions as the recovery programme was implemented.

### Lobster Harvest Control Rule

To meet all requirements under Principle 1, it should be possible to develop and implement a Harvest Control Rule (HCR) framework. 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 lobster 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 IFCA's, 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 14). 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 8:**  
Some possible indicators and controls for use with lobster fisheries

<b>Indicators</b>	<b>Positive</b>	<b>Negative</b>
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
<b>Target Controls</b>	<b>Positive</b>	<b>Negative</b>
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
<b>Recovery Controls</b>	<b>Positive</b>	<b>Negative</b>
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 15). 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.

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 9:**  
**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 9).

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 (CEFAS 2011), 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 10:**  
**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	<p>ADMB is available for Linux and Windows, and is open source, is very fast and is able to fit hundreds of model parameters. (see <a href="http://www.admb.org">www.admb.org</a>)</p> <p>Data are read in as custom text file.</p> <p>Model is in C source code and is compiled, so some knowledge of computer programming is required as well as knowledge of mathematical modelling.</p> <p>MCMC can map probabilities (MCMC) for use in evaluating HCRs through simulation.</p> <p>ADMB is very flexible and a useful repository for research outputs.</p>
R output	<p>R is freeware powerful tool for producing high quality graphics as well as allowing further statistical analyses and diagnostics (on MCMC output for example).</p> <p>R can read text and binary files output from the ADMB model.</p> <p>R code can be used to produce standard output formatted for presentation and for documents.</p>

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 17). 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 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.

**Table 11:**  
**Data requirements for lobster HCR development**



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.

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 18). 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 12:**  
**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.
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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 two 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 be constructive and inclusive. Stakeholders can be encouraged to suggest alternative models and data, which should if possible be 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 are in forms that all stakeholders can understand and assimilate. This communication of technical and scientific information may require some development, both in identifying types of output that stakeholders can understand as well as teaching them how to interpret types of output. A lack of understanding of 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.

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