Fishing Focus Group – 2nd Meeting 2012
31 May 2012 - Conference Room 7/8 – Victoria Quay, Edinburgh, EH66QQ
1230 hours – Lunch will be available
1300 hours – Meeting Start

AGENDA

1. Welcome, Introductions, Apologies and opening remarks

2. Minutes of the last meeting

3. Marine Planning and Strategy

   Marine plan
   Marine regions
   MSFD
   Marine Licensing consultations

4. Marine Renewables

   Scotmap – Item 4 papers 1 & 1a
   Sectoral Marine Planning Process – Item 4 paper 2
   Relationships between fishing industry and developers

5. Marine Nature Conservation

   Overview of Workshop 4 and Workshop 5 aims
   MPAs and fisheries management – Habitats advice Item 5 paper 1
   Levels of evidence for MPA designation – Item 5 paper 2
   Progress on Natura

6. AOB

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Attendees

Marine Scotland : Linda Rosborough (chair), David Palmer, Mike Palmer, Phil Gilmour, David Mallon, Eamon Murphy, Michael McLeod, Phil Alcock

SFF : Patrick Stewart, Malcolm Morrison, Archie MacFarlane
WIFA : Duncan MacInnes
FAL: Roddy MacColl
SNH : David Donnan

1. Welcome, Introductions, Apologies and opening remarks

Apologies : Billy Hughes, June & Andrew Lochhead, Kenny Coull, Mark Tasker, Tom Blasdale, Anna Donald, and Mike Park

The chair welcomed the new attendees to the meeting, noting that all papers had been circulated in good time, and confirmed acceptance of the late additions to the agenda received from SFF.

It was agreed that draft minutes should be circulated earlier as well as a draft agenda for the next meeting.

2. Minutes of the last meeting

SFF requested that their comment on the effects of renewables subsidies needed to be considered in the Socio-economic impact assessments.

Descriptor 11 paper circulated as part of the national consultation.

ACTION : Paper on subsidies to be circulated. (David Palmer)

3. Marine Planning and Strategy

Marine plan

Drafting of the plan is ongoing with a view to consultation starting in September.

SFF : Concern that renewables plans have been published ahead of the Marine plan.

Marine regions

11 regions are proposed. The number of map points made the Order difficult to frame initially. 12 week consultation on the Order likely to start in the summer.

SFF has helped with comments on early drafts and the draft order will be circulated when ready.

Concerns over splitting the Sound of Mull into two regions have been noted

ACTION : Circulate the map of the regions as they stand (David Palmer)

MSFD

3 consultation events have taken place - Main, Fisheries, and Scottish. MS happy to have further discussion.

The consultation ends on 18 June, with the report due in August, and subject to Ministerial agreement proposals will be submitted to the European Commission in October.

SFF : It is important that the initial assessment is correct. We would like further discussions on descriptors 1,3,4,6. CFP draft has a maximum level of effort and MSY. Descriptor 3 will be controlled through CFP according to DEFRA. Fishing will be treated with a precautionary approach until MSY is achieved.

ACTION : Arrange discussions on the above. Clarify point on species in / out of the CFP (Anna Donald).

Marine Licensing consultations

SFF : Draft Bill (for the Marine (Scotland) Act) - Fishermen made the point that they had no defence against marine licensing. This point was taken on board but nothing was implemented. We were offered pre-application consultation instead. We just want to minimise impact on fishermen. For a year we have been pressing for this and what we have been told is that it will be a meeting in a public hall.

MS : The regulations are meant to provide all marine stakeholders with the opportunity for engagement with developers before they go into the costly application and survey process. If you do not think it goes far enough then please respond to the consultation accordingly and we will consider.

SFF : It is important to separate community and industry consultation. A tidal developer has gone out of its way to avoid contact with the fishing industry on a Kintyre project by doing all their advertising in an Edinburgh paper. They felt that a public meeting in Campbeltown hall was sufficient discussion with industry.

MS acted to resolve this as soon as they became aware of this issue. Licensing manual will give more precise guidance on stakeholder engagement. This document will be put out to consultation over the summer

WIFA : We have had extensive discussion with WaveGen outside of public meetings. There have been flaws in the way developers have accepted the possible impacts on fishing. You have to remember that impacts nationally are sometimes low but can have a huge impact on small communities.

MS Lot has appointed a fisheries liaison officer to deal with any specific issues that arise between fishing and developers.

4. Marine Renewables

ScotMap – Item 4 papers 1 & 1a

The ScotMap process has been piloted in Pentland Firth and Orkney waters. SFF has participated in the steering group. Draft report has been sent to the steering group.

MS intend to roll out the ScotMap process to the remainder of Scottish waters, data collection will be undertaken via interview, Marine Scotland Fishery officers will undertake approximately 59% of interviews, MS Planning & Policy are investigating how to meet the additional 49% of interview shortfall and hope to have a system in place by late June. Approximately 1500 vessels have been identified for inclusion in the roll out. It was noted that data collection has commenced on Islay, with a very good participation from local fishermen, the CFA were very helpful in facilitating this.

The data collection will take place between now and November 2012. Data collected will be analysed by MS Science and a draft report will be available for review in January / February 2013. The roll out of ScotMap is expected to be complete in March 2013.

Marine Scotland Planning & Policy requested views on
1. potential methods to facilitate communication with industry on progress; and
2. whether there should be a suite of local steering groups in the Fishery office regions or one overarching national steering group.

MS Planning & Policy also advised that once the issue of additional data collectors had been resolved that there is an intention to communicate the results of the Pentland Firth pilot project and the commencement of the national roll out via a media release which will be issued to local and national media to raise awareness of the project.

SFF: The associations have a key role to play in preparing fishermen for the process. As the data is only being collected over a 5 year period other historical fishing grounds of importance could be lost through this.

MS are happy to discuss this matter further to see how it could be addressed.

SFF : from our experience of the PFOW you will have to go with a national steering group as setting multiple groups will be impossible on the time scales indicated.

FAL : There have been a number of new associations of smaller vessels which should be able to help with this process.

Sectoral Marine Planning Process – Item 4 paper 2

Fundamentally this demonstrates our processes going forward towards Regional Locational Guidance. There will be sectoral workshops with the fishing industry around the country to ensure fishing industry input.

FAL : What arrangements have been made to deal with possible damage to fishing gear from renewables infrastructure

MS has began a trilateral process in an effort to reach agreements. We will look at how other sectors and countries have achieved this. We are in the process of ensuring that the membership of the group covers relevant industry sectors.

5. Marine Nature Conservation

Overview of Workshop 4 and Workshop 5 aims

Grateful for the fishing sector input at the 4th workshop. Report will be published by the end of the week. 5th Workshop will bring together all the search locations into a prototype network for discussion, along with management case studies.

ACTION : Look for more opportunities with local fishing interests.

MPAs and fisheries management – Habitats advice Item 5 paper 1

Our latest thinking and we would welcome comments

Levels of evidence for MPA designation – Item 5 paper 2

Outlines the principles for discussing evidence.

FAL : Socio-economic impacts should be considered in the evidence process.

Progress on Natura

Awaiting Sound of Barra pSAC consultation report and working on a draft management plan in conjunction with local interests.

Offshore pSACs: consultation closed last Friday with 11 responses.

Expecting advice from SNH on possible SPA proposals by the end of 2012.

6. Relationships between fishing industry and developers

SFF : Paper prepared by SFF is more appropriate for this group rather than at MSF. The fishing industry is being subjected to this process. Our concerns are being recognised but not being addressed because renewables are the main priority.

There is a legal process to be followed but it does not help fishing industry because of Marine Scotland's policies on other legitimate uses of the sea. The plans for renewables give no indication of weight of views. The fishing industry wants to be co-operative and discuss issues with developers. Right of navigation includes active fishing and is not being protected properly. Minister have to prevent interference with legitimate uses of the sea.

MS is trying to ensure engagement throughout the consenting process. Ministers rejected a number of the Crown Estate's original package of 10 locations due to concerns. We want the right developments in the right places. We encourage further dialogue through the tri-partite process that is being put in place.

Renewables plans went through a significant sustainability appraisal. We are working to ensure that all plans being brought forward contain all the relevant information. The license manual will help ensure that discussions take place between the right developers and sectors during the licence process. This will result in mitigation being put in place.

SFF: There is no protection for significant fishing grounds which could be wrecked by development.

MS stated that no right of appeal under FEPA, Marine Act or section 36. There are downsides in having a third party right of appeal. Legitimate use of the sea includes navigation. If there is an objection to a licence on the basis of an area being a prime fishing ground (with evidence) then this would need to be resolved, (or the objection brought to Ministers attention).

ACTION : PG to reflect in discussion paper

7. AOB

Next meeting Thursday 11th October 2012

Fishing Focus Meeting: 31 May 2012

Mapping Sea Fishing Activity in Scottish Waters: Roll out of the ScotMap Project Update

Introduction

1. The use of ScotMap to map fishing activity has recently been piloted within the Pentland Firth and Orkney Waters region. The pilot study collected information on areas fished, gross vessel earnings, species targeted, gears used and seasonal fishing patterns; and based on these aggregated data has produced a series of usage and value maps.

2. It is now proposed to roll out ScotMap across Scottish waters (apart from Shetland – where NAFC have already collected data under the SSMEI pilot). The successful and timely completion of the work is crucial for the assessment of the socio-economic impact of proposed renewables developments so that a view can be taken on the suitability or otherwise of sites as part of the planning and licensing processes.

Project Aims

3. In the first instance the aim of the national ScotMap project is to provide spatially resolved, detailed information on all fishing activities for vessels under 15m in Scottish Waters. It is worth noting that as the project progresses collection of data for vessels over 15 m will be explored, i.e. whether an analysis of VMS data will provide the necessary outputs. The objective of the ScotMap project is to provide the following information:

- Spatial definition (in the form of fine scale grid maps) of the areas fished by vessels operating within Scottish waters;
- The months of the year that these areas are fished;
- The target species fished for in each area;
- The gear types used in each area;
- The contribution made by each area to the gross vessel's earnings; (where this is the proportion of the gross vessel's earnings averaged for the past five years derived from fishing), and;
- The usage of each area – number of vessels, and number of crew fishing in each area.

Data Consents and data sharing amongst organisations

4. For the purposes of taking forward the pilot study in the Pentland Firth a data consent form was agreed with the Scottish Fishermen's Federation (SFF). The purpose of the form was to ensure that participants in the study knew how their data would be handled. The form set out the obligations that the data collectors and the organisations were under to ensure that the data relating to individuals was not disclosed unnecessarily and that commercial confidentiality was maintained.

5. In addition to the data consent form, a data protocol has been drawn by Marine Scotland which specifies who will have access to which elements of the data

and as with the data consent form sets out the obligations that the organisations are under to ensure that commercial confidentiality will be maintained.

Data Collection

6. The process for collecting the information will be through face-to-face interviews, during which fishermen will be asked about their fishing activity and will be asked to indicate on a chart the areas where they fish. These will be recorded electronically, together with associated details on economic value, species fished and gears used. Initially, the people carrying out the interviews will be our staff from local fishery offices. We also plan to contract personnel with local fisheries connections i.e. those previously employed as IFG co-ordinators or industry approved representatives, to carry out part of the data collection.

7. After individual fishermen have contributed, each will be given a copy of the information they have provided on their own activities. Individuals' information will be anonymised and aggregated, and used to construct new maps of fishing activity. Thereafter, aggregated maps may be made public e.g. as part of the sectoral marine planning process. Care will be taken to ensure that the activity of individuals is not identified in the aggregated map.

Project Milestones

8. Reporting Milestones:

➢ Internal Set Up Complete	Mid April 2012
➢ Data Gathering	May 2012 – Nov 2012
➢ Production of Maps	Jan 2013
➢ Draft Report	Feb 2013
➢ Final Report	31 Mar 2013

For discussion

The fishing sector will continue to be closely involved in the project as it progresses. It is proposed to set up at least one steering group to oversee the project and we welcome your views on whether one national group should be set up, or alternatively steering groups to cover different regions.

We also need to consider how to communicate progress to the fishing sector as a whole. So far, we have used official channels to send out letters informing about the roll-out of ScotMap, We would like to consider using other appropriate means of communication.

Marine Renewables and Offshore Wind Team
May 2012

Fishing focus meeting: 31 May 2012

Information paper on mapping of fisheries data

Introduction

Marine Scotland are planning to use ScotMap to map activities of under 15m vessels to ascertain for the first time the spatial distribution and associated economic value of fishing by these vessels. This data will need to be combined with other sources of data to provide a comprehensive picture of fishing resources and exploitation in Scottish waters. A companion discussion paper sets out our plans for the rollout of ScotMap.

It is estimated that it will take nearly a year (March 2013) to complete the roll out of ScotMap and in the meantime an analysis of existing data for smaller vessels is needed.

This information paper sets out;

a) a description of the analysis that is currently being carried out on under 15m vessels in advance of ScotMap being completed, and;
b) a summary of how different data will be combined to provide this required comprehensive picture of fishing resources and exploitation.

Background

The application of marine planning approaches in the development of Scoping Studies and Regional Locational Guidance for marine renewables requires that Marine Scotland take account of the range of current activities in Scottish waters. A companion paper on the Sectoral Marine Planning process sets out an update on this process. Marine fisheries are an important use of the sea, and therefore must be included in marine planning. In more local terms, individual licence applications also need to include assessments of the potential impacts of the proposed development on other users of the sea, including fishing.

Fisheries in marine planning for renewables:

Fisheries have been included in the Industry models of uses of Scottish waters that have been developed by Marine Scotland Science using The Crown Estates Marine Resource System (MaRS) spatial planning tool.

The primary source of information for vessels >15m is VMS records, which have been linked to information on landings from the FIN database. The landings data have been separated into mobile and static gears, and gridded maps created for input to MaRS.

Until ScotMap is completed, information for non-VMS vessels is more difficult to obtain, and a new procedure has been developed, and presented to SFF in November 2011. The details of the data analysis method are given in Annex 1. The outputs are relatively coarse maps of the value by Km^2 of landings from mobile and static gears by <15m vessels.

The spatial modelling process in MaRS also takes account of the likely degree of interaction between mobile and static gear, small and larger vessels, arising from developments of wave, tidal or wind power. It currently seems unlikely that fishing will be possible between wave or tidal devices, as the typically small separation distances, cables and moorings will make it practically difficult. The interaction between wave and tidal developments and fishing was therefore heavily weighted. In contrast, it may be possible that static gear may not be incompatible with wind farms. Therefore, interactions of wind farms with mobile gear was more heavily weighted than interactions with static gear.

The weighted layers for fishing were therefore put together with other commercial uses of the sea (shipping, aquaculture, etc) in Industry models. These were subsequently linked with Environment and Socio-cultural models to provide overall combined models from which preliminary identification of areas for exploration through Regional Locational Guidance was made.

Fisheries consideration in licensing of renewables:

All applications for marine licences for renewable energy developments must take account of interactions with fisheries in the application documents. This will require developers to present information on the use of the development area, and the immediately surrounding sea area for fisheries. Typically, developers or their consultants will approach Marine Scotland Science for this information. Developers will then be provided with maps describing the fisheries, at a level of detail that preserves the necessary anonymity of the underlying data.

Combination of different sources of fisheries data

When ScotMap is completed in 2013, it will be used to map all <15m vessels' activities. This will be combined with an analysis of VMS data for >15m vessels as set out above, to provide maps of fishing activity and associated economic value for all vessels.

Data from ScotMap can be 'groundtruthed' on coarser spatial scales through the existing analysis of FIN landings data for <15m vessels.

Future work mapping spawning and nursery grounds will be combined with the maps of fishing activity and associated economic value to provide a comparison of available resources and exploitation, which will inform future planning and other policy development.

Marine Scotland
May 2012

Treatment of non VMS data. A brief description.

Context:
Smaller boats < 15 m do not have VMS so do not generate position and activity data. Other methods must be used. FIN data contains a distance from the shore element for all landings of under 15 m vessels. This distance banding was used to calculate a relative value of landings per area.

Method:
Non VMS data in this context is data extracted from the 2009 FIN landings data for vessels under 15 metres.

The same procedure was done for mobile and for static gears.

A set of polygons based on the distance bands available from the FIN landings data were created. These are called zone codes and extend from 0-6 nm (zone code 61), 6-12 nm (zone code 62), 12 nm to median (zone code 63). There are also two separate zone codes for the Clyde (zone code 21) and for the Minches (zone code 11).
The landings value (£) data were applied to these different distance bandings and joined to the corresponding polygons created in each stat rectangle. Using the landings value a relative value per area was calculated. This was done by dividing the monetary value of the catch assigned to a polygon by the area in Km^2 of that polygon.

The process in summary:

Distance banding in stat rect → landings value → unite with polygon in stat rect at that distance banding → divide value in that polygon by polygon area (Km^2) = relative value per area, illustrated in figure 1.

Static gears selected:

DRH	Hand dredge
FPO	Covered pots (creels)
GN	Gill nets
SFH	Shell fishing by hand

Mobile gears selected:

DRB	Boat dredge
HMD	Mechanized dredge
LHM	Handlines and poleline (mechanised)
LHP	Handlines and poleline (hand operated)
LL	long lines (not specified)
OTB	B trawls otter (side/ stern not specified)
OTM	Mid trawls otter (side/ stern not specified)

OTT	Twin trawls Otter twin multi trawls
PTB	B trawls pair trawls (two vessels)
TX	Other trawls (not specified)

Zone codes(included ones in red):

Code	Description
0	International waters
4	Other country to med
11	Minch, (UK) 0-6
21	Clyde, (UK) 0-6
34	Norway, to median
44	Faroes, to median
54	Spitzbergen, to med
61	EC, UK 0-6 miles
62	EC, UK 6-12 miles
63	EC, UK 12-median
64	EC, other to median
1	S Internat to median
2	N Internat to median
3	Area 1 waters
5	Iceland to median
6	Greenland Waters
35	S.Norway to median
36	Mid Norway to median
37	N.Norway to median
38	Jan Mayen to median
45	N.Faroes to median

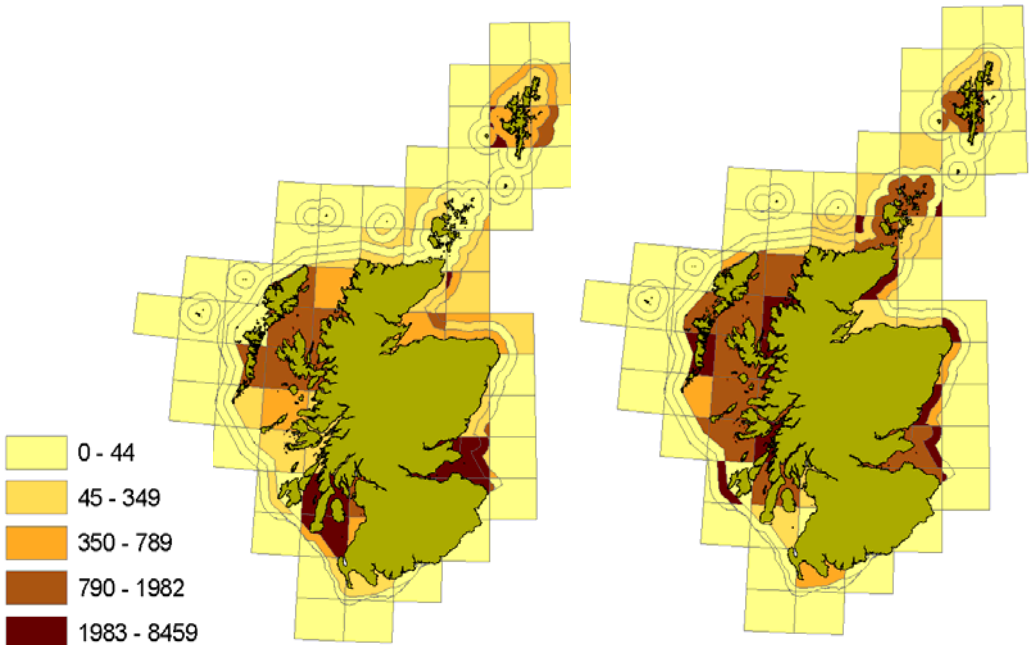


Fig. 1 Value (£) per area (Km^2) for mobile fishing gear (left) and static fishing gear (right)

Fishing Focus Meeting: 31 May 2012

Project Update and Timeline
Sectoral Marine Planning Process 2012-13 – Offshore Renewable Energy

Current Stage – Regional Locational Guidance Update

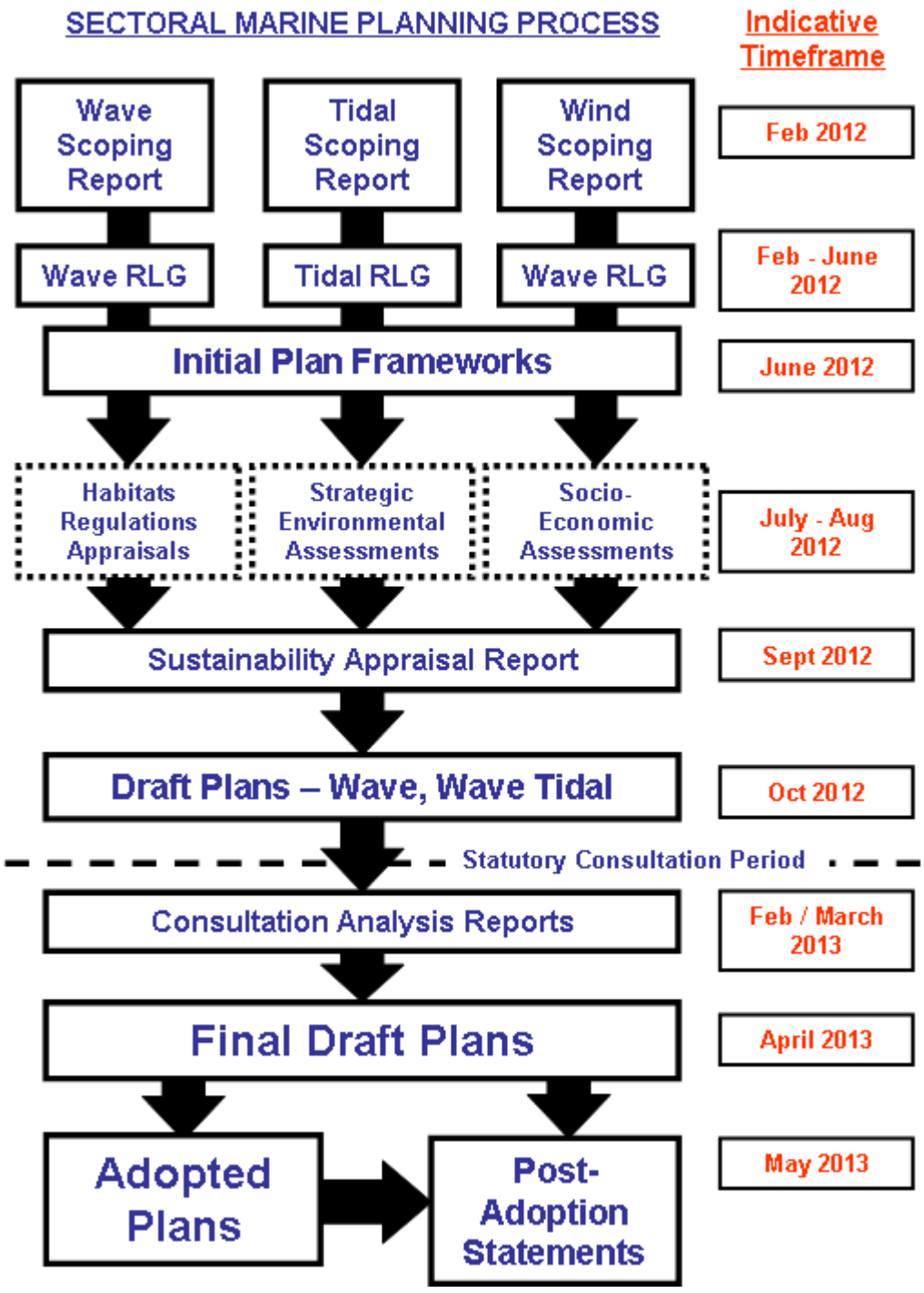
Marine Scotland wrote to statutory, industry and other relevant bodies to draw their attention to the Offshore Wind Scoping Report. This is a technical report which analyses the data layers in the Crown Estate's MaRS model. It aims to identify areas of resource while avoiding major constraints and minimising conflict with other marine sectors. It does not include qualitative data such as policies and views. Marine Scotland targeted the relevant planning authorities, industry representative bodies (i.e. SFF, SRF, SSPO, The Chamber of Shipping etc), key individual companies (i.e. Forth Ports, Grid Providers etc.) statutory bodies (SNH, JNCC, DECC, MMO etc.) and other relevant bodies (i.e. SE Link etc.) to ascertain this data.

Marine Scotland are currently in the process of the compiling the data from the consultation exercise. This will enable us to produce Regional Locational Guidance and identify Plan Options for the Sectoral Marine Plan Review.

Marine Scotland intend to work closely with and fully involve the fishing sector throughout the process of developing regional locational guidance. It is the intention to hold 3 Regional Workshops with appropriate Association Representatives where we will discuss and ascertain the key issues and views of the fishing sector. The outputs of the Offshore Wind Scoping Report as well as the forthcoming Wave and Tidal Energy Scoping Reports will form the basis of this dialogue. Colleagues from Marine Scotland Fisheries Division will also be involved in this process.

Marine Scotland Offshore Renewable Energy Planning and the SFF are currently working together to establish dates for the Workshops to take place. This will likely be in June 2012. The information collected at these workshops will be used to populate the Regional Locational Guidance and inform the definition of Plan Options to be contained in the Initial Plan Frameworks.

The Diagram below provides the project structure and indicative timeframe for the delivery of Sectoral Marine Plans for Offshore Wind Wave and Tidal Energy over the 2012-13 period.



Sectoral Marine Planning Process

This process involves the following stages:

Firstly, is Scoping – using the Crown Estate Marine Resource System (MaRS), Marine Scotland Science undertake a technical and scientific exercise to identify areas of constraint and opportunity. The output of this stage is the identification of strategic search areas where development could take place.

Building upon the Scoping study, the next of the process is the development of Regional Locational Guidance. At this point, we give consideration to more detailed environmental, technical and socio-economic issues in relation to the strategic search areas identified in the scoping study. This information is published in the form of locational guidance and is used to refine the search areas in to options to be taken forward with a plan.

The Plan options are then contained within an Initial Plan Framework. This early stage document outlines the potential options and alternatives and the process for developing the plan involving sustainability appraisal. This comprises of strategic environmental assessment (SEA), habitats regulations appraisal (HRA), socio-economic assessment.

Once the Sustainability Appraisal has been undertaken, the outcomes inform the development of a draft Plan. The draft Plan and Sustainability Appraisal Report are the subject to consultation with both statutory consultees and the public. Following the consultation, a Consultation Analysis Report is produced which documents all consultation responses as well as providing an analysis of the key issues arising.

The issues and responses arising from the consultation on both the Plan and Sustainability Appraisal Report are then used to inform the Final Sectoral Marine Plan, which is then put before Scottish Ministers for adoption. If the Plan is adopted, a Post-Adoption Statement is then produced which provides an account of the Plan development process and audit of consultation exercise.

Marine Renewables and Offshore Wind Team
May 2012

Draft Advice Scottish MPAs and fisheries INTRODUCTORY TEXT	
Document version control	
Version 0 (Date)	Tom Blasdale 09/05/2012 Reviewed by David Donnan and Megan Linwood 09/05/2012
Version 1	Tom Blasdale 10/05/2012 Reviewed by David Mallon and David Donnan 10/05/2012

INTRODUCTION

Marine (Scotland) Act 2010 outlines powers and duties relating to designation, protection, management and enforcement of MPAs for biodiversity and geodiversity in Scottish territorial waters. The UK Marine & Coastal Access Act 2009 outlines equivalent powers and duties for MPAs in the Scottish offshore region.

Under the relevant Act, Scottish Natural Heritage and JNCC may provide advice and guidance on (but not restricted to):

- matters which are capable of damaging or otherwise affecting any protected feature of a MPA or any ecological or geomorphological process upon which the conservation of the feature of a MPA depends;
- how any stated conservation objectives for a MPA may be furthered, or how the achievement of any such objectives or purpose may be hindered;
- how the effect of any activity or activities on a MPA may be mitigated

This document is intended to provide draft advice on:

1) the impact that various fishing activities may have on each of the habitats identified as MPA search features in Scottish inshore and offshore waters;

2) the possible known management options for these habitats in relation to fishing activities and an assessment of the likelihood of that option to mitigate any of the identified impacts and, depending on the conservation objectives for features, help maintain the features in favourable condition or recover them to that state.

It is intended that this advice will:

1) provide the fishing industry with early information on whether and how each main type of activity might be affected by potential management of future MPAs which may contain these search features;

2) indicate at this stage fishing gear/feature combinations which may require additional management in MPAs in order to maintain the features in favourable condition, or to provide for their recovery should that be relevant;

3) identify at this stage fishing gear/feature combinations for which further site-specific evidence gathering and discussion with stakeholders are likely to be required to determine the appropriate management measures;

4) help to inform the discussions with fisheries stakeholders regarding management of individual sites;

It forms one element of current work to develop general management guidelines for MPAs designated under the Marine Acts in Scottish marine area , and we have endeavoured to make these assessments as evidence-based and fit for purpose as possible.

Due to the high degree of variability within some habitat categories, the large numbers of fishing gears under consideration and local variation in fishing practices, it is inevitable that the advice is general at this stage. Where possible the review has been based on evidence from peer-reviewed scientific journals.

However, it should be noted that gear impact studies for many species and habitats are not covered in the primary literature. In such instances grey literature (such as Government agency reports), expert judgement and the use of proxies for habitats, species and gears were applied to inform our assessments.

We acknowledge that whilst this advice is not an exhaustive review of all the available evidence, it should provide a scientifically-robust starting point for discussions about the specific management requirements of individual MPAs and must be used alongside site specific information, local discussions and local practical environmental knowledge.

In advance of MPA proposals it may be useful for stakeholders to consider this advice in the context of MPA search features. At present it is our aim to extend this approach to all features for which MPAs will be designated.

Comments on this draft advice are invited. Please contact Michael McLeod at Marine Scotland [MarineConservation@scotland.gsi.gov.uk] if you would like to discuss the draft advice.

Explanation of the Advice

This advice is organised by habitat feature and gear type. Fishing gears or activities are grouped to combine those with broadly similar impacts, but where there is likely to be variation within a group (e.g. for high and low energy sands), this has been taken into account.

Currently, the available evidence base does not permit division of the impacts and advice into anything other than broad categories, and it is appreciated that this may prove unsatisfactory to some stakeholders. This issue may be resolved at individual site level with more detailed site-specific information to hand (on both the habitat and the fishing activities taking place). If a gear is unlikely to be used in a particular habitat no advice is provided.

Pelagic gears do not generally have direct impact on any of the benthic features considered here and so have not been considered. For each habitat and gear category, a brief summary of knowledge of the likely impacts is provided, in conjunction with supporting evidence.

Impacts

Each feature will display a range of sensitivities to fishing activities covered by this draft advice. The sensitivity at the site level may depend on the specific benthic community characterising the feature at the site or local natural environmental conditions, but will also reflect differing impacts of different gears. Where relevant, the advice elaborates the conditions under which a feature may be more or less sensitive, so that stakeholders and fisheries managers can take this into consideration.

This advice does not consider the impacts of fishing activities on target and non-target mobile species and impacts occurring through potential changes to food webs, for example the effects on prey species by removing their predators and the subsequent changes in the food chain. These effects are considered too complex to predict with any degree of confidence with the current evidence base. Where there is evidence of such a link (and that it is having an adverse effect on feature condition at the site level), this should be taken into account when setting conservation objectives and when considering management options.

Advice

The advice on fisheries management falls into three broad categories;

- gear/feature combinations that are unlikely to cause unacceptable impacts (except possibly at very high levels of effort) and so no additional management is likely to be required;
- combinations that are likely to cause unacceptable impacts and for which no possible mitigation measures could be identified at this stage other than closure to that gear;
- combinations that are likely to cause some degree of impacts but for which management may be possible to mitigate the effects (eg modification or restriction of certain gears, partial or temporary area closures, effort limitation etc).

In the last type of cases in particular, further site-specific evidence gathering and discussion with stakeholders will be required to determine the appropriate management measures.

Evidence

This is a summary of the evidence used to describe the impacts and support the advice. All literature used is cited along with a brief description of its relevance to the specific feature in the Scottish waters, any assumptions made and an indication of the quality of the evidence used as follows:

- Directly relevant peer-reviewed studies;
- Directly relevant 'grey literature' studies;
- Inference from peer-reviewed or grey literature relating to a comparable feature, gear or geographical area;
- Expert judgement.

Cumulative effects

Users of this advice should bear in mind that a feature may be prevented from achieving its target condition by multiple pressures resulting from more than one human activity (also known as cumulative effects). In these situations it is likely that a combination of more than one management measure may be required to ensure the feature meets its target condition. The advice in this document is presented without the consideration of cumulative effects. However, when considering management options for sites, stakeholders should be mindful to the potential for cumulative effects of activities.

Draft Advice Scottish MPAs and fisheries BURROWED MUD, INSHORE DEEP MUD WITH BURROWING HEART URCHINS and OFFSHORE DEEP SEA MUDS	
Document version control	
Version 0	Date prepared 06/01/2012 Tom Blasdale (JNCC)
Version 0.1	T Blasdale 19/01/2012 Substantial revision and re-format Reviewed by Sophie Elliott (JNCC) 15/02/2012
Version 1.0	T Blasdale 25/02/2012 Reviewed by David Donnan (SNH) 18/04/2012
Version 1.1	S Elliott 26/04/2012 Reviewed by T Blasdale 26/04/2012
Version 1.2	S Elliott 27/04/2012

BURROWED MUD HABITATS

This advice covers burrowed muds, inshore deep mud with burrowing heart urchins and offshore deep sea mud. Muddy sediments develop in low-energy environments and species found in such habitats are adapted to life in relatively low-oxygen environments[1] Deep sea mud support communities of burrowing animals such as Nephrops, polychaete worms, bivalve molluscs, brittlestars and foraminifera[2].

Impacts

Demersal towed gears (including beam trawl, demersal otter trawl, seine net and scallop dredge)

Studies in the Irish Sea and in a Scottish sea loch have shown that fished areas support a modified biological community with lower diversity, reduction or loss of long-lived filter-feeding species and increased abundance of opportunistic scavengers[3,4]. This effect was greatest in the more heavily fished offshore areas suggesting that impact is related to the intensity of fishing[2]. Modelling studies suggest that the greatest impact is produced by the first pass of a trawl with subsequent exposure having less effect[5]. The sea pen *Virgularia mirabilis* does not appear to be negatively affected by trawling at low levels, possibly as a result of its ability to withdraw into the sediment[4], however *Funiculina quadrangularis* has no such ability and its distribution in Scottish waters may have been reduced as a result of Nephrops trawling[6]. *Nephrops* may be an important component of the benthic community so fisheries that greatly alter its abundance or size composition may be seen to have a negative impact. Further, damage to sea pen species is likely to take place as a result of greater sediment disturbance as a result of towed demersal gear[10].

Demersal static gears (including pots, traps, lines and nets)

Studies on the impacts of pots on seapens have shown limited adverse effect on seapens from a 'single' fishing operation[7,8,9]. Research has shown that certain species of sea pen are caught during the recovery of creels or damaged from heavier gear, although the extent of damage and the impacts of repeated exposure to these types of fishing gear at high levels of fishing activity are less well understood[8,10].

If fishing activity is low, direct impact on habitat is likely to be minimal and seabed structure is likely to be maintained in a slightly modified state[10]. *Nephrops* may be an important component of the benthic community so fisheries that greatly alter its abundance or size composition may be seen to have a negative impact.

JNCC/SNH fisheries management Advice

Demersal towed gears - If habitats have been impacted by fishing, reduction in effort may be required to allow recovery to favourable condition. However, the degree of reduction that will be required is unknown and further studies will be required to establish this. There is risk that cumulative effects of ongoing fishing may result in increasing degrees of modification. Consideration should be given to spatial and/or temporal measures as a mechanism to manage fishing intensity.

Demersal static gears - On the basis of current knowledge it would be reasonable to assume that management action to maintain a creel fishery within sustainable limits would be likely to similarly maintain a population of epibenthic species. Fisheries should be managed to ensure that Nephrops stocks are maintained within sustainable limits.

Confidence in advice

Demersal towed and static gears – Medium certainty. The conclusions are supported by good quality, directly relevant scientific information. Some assumptions have been made regarding impacts to offshore mud habitats.

Evidence

[1]Dernie *et al.,* 2003; [2]Baxter *et al.,* 2011; [3]Ball *et al.,* 2000; [4] Tuck *et al.,* 2000; [5]Hiddink *et al.,* 2006; [6]Hughes, 1998; [7] Eno *et al.,* 1996; [8]Eno *et al.,* 2001; [9]Kinnear *et al.,* 1996, [10]Adey, 2007.							
There is abundant evidence for the effects of trawling on muddy habitats including seapen and burrowing megafauna. The evidence is from UK and Irish waters and so is considered to be directly applicable to Scottish MPAs. There is some evidence for the impacts of potting on this habitat. The evidence is from UK waters so can be regarded as directly applicable to Scottish waters. There is no direct evidence for the impacts of netting or longlining so the assessment is based on the assumption of similar effects to potting.							
Directly relevant peer reviewed literature	✔	Directly relevant grey literature	✔	Inference from studies on comparable habitats, gears or geographical areas.	✔	Expert judgement	✔

Draft Advice Scottish MPAs and fisheries BLUE MUSSEL (*Mytilus edulis*) BEDS	
Document version control	
Version 0	Date prepared 09/01/2012 Tom Blasdale (JNCC)
Version 0.1	Date prepared 14/02/2012 Sophie Elliott (JNCC) Substantial revision and re-format Revised with tracked changes by T Blasdale 25/02/2012
Version 1	Date prepared 14/02/2012 Revised by David Donnan 18/04/2012
Version 1.1	S Elliott 23/04/2012

BLUE MUSSEL (*Mytilus edulis*) BEDS

Blue mussels (*Mytilus edulis*) can form beds or reefs in intertidal or subtidal regions, composed of a single or multi-layered framework, held together by byssus threads. The bed stabilises sediment and creates a habitat for a diverse community of animals, living on, within, or in the underlying sediment[1]

This advice covers blue mussel (*Mytilus edulis*) beds in both intertidal and subtidal environments. Mussel beds can be of two distinct types; ephemeral beds consisting of only young mussels which last only for relatively short periods, and persistent beds which establish and may persist for many years[2]. This advice assumes that any mussel beds identified as MPA features will only be of the latter type.

Impacts

Mussel Dredging

Mytilid mussels enhance biodiversity of sedimentary coastal systems by increasing habitat heterogeneity[3]. Direct removal of blue mussels through dredging and trawling activities results in loss of biogenic reef habitat and species richness of benthic invertebrate communities[4,5]. Dredging may increase the vulnerability of mussel beds to storm damage resulting in reduction in extent or even complete loss of beds[2]. Over-exploitation may reduce subsequent recruitment although this relationship is poorly understood[6,7]. Recovery potential will therefore be variable.

Other demersal towed gear (including scallop dredges and otter and beam trawls)

No direct evidence of the effects of these gears on blue mussel beds was found, most likely because there is relatively low likelihood of use of other towed gears. Mussel beds are assessed as moderately sensitive to the effects of towed gears (surface and shallow abrasion)[8]. It is likely that a proportion of mussel patches and their associate species will be removed. Recoverability is likely to be high[8].

Demersal static gears (including pots, traps, lines and nets)

No direct evidence of the effects of static gears on blue mussel beds was found. On the assumption that levels of abrasion are likely to be lower than experienced with mobile gears, mussel beds are assessed as of low sensitivity to the effects of static gears (surface and shallow abrasion)[8,]. Recoverability is likely to be high[8]

Bait collection, hand collection and raking

Mussels may be exploited by hand in formal fisheries or informally – for example the collection of bait by recreational anglers. When exploited by hand at moderate levels using manual methods the biogenic reefs are likely to retain most of their intrinsic biodiversity. However, as above, natural mussel beds are vulnerable high levels of exploitation or disturbance[6,8,9,10], when the effect of trampling combined with mussel collection may reduce mussel cover and create mussel free gaps[10].

JNCC/SNH advice

Mussel Dredge - Management should aim to limit levels of exploitation to a point which allow beds to persist over the long-term and maintain associated biodiversity. Where historic exploitation has reduced the extent of beds, management of effort may be necessary in order to allow recovery.

Other demersal towed gear - If mussel habitats have been adversely impacted by mobile fishing gears, management of effort may be required to allow recovery to favourable

condition. However, there are no previous studies to draw upon and research may be required to inform best practice where this occurs.

Demersal static gears - It is not expected that static gears will require any additional management in this habitat unless in circumstances where fishing intensity is very high. In which case further site-specific research may be required to inform the management response.

Bait, hand and rake collection - The extent of impact is linked to intensity with similar considerations to the gears mentioned above. However, where exploitation is informal there may be a requirement for the use of relevant byelaws, developing codes of best practice and awareness raising.

Confidence in advice

Mussel Dredging - High certainty. The conclusions are supported by good quality, directly relevant scientific information (habitats from similar environments in Northern Europe and experience of existing fisheries in UK).

Demersal towed gears - Low certainty. Conclusions have been based on sensitivity assessments which may rely on significant assumptions or generalisations. It has not been possible to validate these assumptions.

Demersal static gears - Low certainty. Conclusions have been based on sensitivity assessments which may rely on significant assumptions or generalisations. It has not been possible to validate these assumptions.

Bait, hand and rake collection - Medium certainty. There is directly relevant scientific information to support the conclusion but it comes from UK grey literature sources. Evidence has also been sourced from areas outside the UK.

Evidence

[1]Baxter *et al.,* 2001; [2]Anon, 2010; [3]Buschbaum *et al.,* 2009;[4]Dolmer *et al.,* 2001; [5]Herlyn & Millat, 2000; [6]Holt *et al.,* 1998; [7]Tyler-Walters, 2008; [8]Tillin *et al*., 2010; [9]Roberts *et al.,* 2010; [10]Smith *et al.,* 2005;							
There is good evidence for the impacts of mussel dredging on intertidal and subtidal blue mussel beds however much of this evidence is from other areas (Denmark, Germany) or refers to ephemeral mussel beds so may not be directly applicable to the type of beds likely to be designated as Scottish MPAs. No study has been found that directly addresses the impact of other towed gears or demersal static gears on blue mussel beds. Our advice is therefore based on our interpretation of sensitivity assessments[9]. Evidence has also been captured from UK grey literature and scientific literature found on blue mussel beds from the USA.							
Directly relevant peer reviewed literature	✔	Directly relevant grey literature	✔	Inference from studies on comparable habitats, gears or geographical areas.	✔	Expert judgement or anecdotal evidence	✔

Draft Advice Scottish MPAs and fisheries CARBONATE MOUNDS	
Document version control	
Version 0	Date prepared 09/01/2012 Tom Blasdale (JNCC)
Version 0.1	T Blasdale 19/01/2012 Substantial revision and re-format Reviewed by Sophie Elliott (JNCC) 15/02/2012
Version 1.0	T Blasdale 17/02/2012 Reviewed by David Donnan (SNH) 18/04/2012
Version 1.1	S Elliott 23/04/2012

CARBONATE MOUNDS

Carbonate mounds are distinct elevations of various shapes, which may be up to 350m high and two kilometres wide at their base. They occur offshore in water depths of 500-1100m. Carbonate mounds may have a sediment veneer, typically composed of carbonate sands, muds and silts. The cold-water reef-building corals *Lophelia pertusa* and *Madrepora oculata*, as well as echiuran worms are characteristic fauna of carbonate mounds. Where cold-water corals (such as *Lophelia*) are present on the mound summit, coral debris may form a significant component of the overlying substratum[1].

Impacts

All demersal towed gears (including otter trawl, beam trawl)

The characteristic fauna of carbonate mounds include the cold-water reef-building corals *Lophelia pertusa* and *Madrepora oculata,* which are known to be highly sensitive to physical disturbance[7]. The resulting impacts can have long-lasting consequences as a result of the low recovery potential of the structurally and biologically diverse coral communities ([2,3,4,7]). Biomass and diversity of associated communities are reduced in areas impacted by trawling[2,4]. Recovery from such damage is estimated to be measured in decades, depending on the environmental conditions[4,6].

Demersal static gears (including gillnets, trammel nets, longlines, pots and traps)

Impacts can arise from hooks, lines, nets and ropes becoming entangled with corals and other fragile erect species, including 'plucking' them from the seabed during hauling[5,4]. The individual impact of a single fishing operation may be slight but cumulative damage can be significant[4]. Given the slow growth rate of cold water corals, structurally and biologically diverse coral communities may take centuries to recover[2,4] from damage, if at all.

JNCC/SNH fisheries management Advice

Given the nature of sensitivity to physical disturbance the options for suitable management options to mitigate the effects of fishing are limited. JNCC and SNH therefore advise that the use of demersal bottom contacting gears (static and mobile) should be avoided at locations where vulnerable seabed communities/features are located.

Confidence in advice

Demersal towed gears - High certainty. The conclusions are supported by good quality, directly relevant scientific information.

Demersal static gears - High certainty. The conclusions are supported by good quality, directly relevant scientific information.

Evidence

[1]Ospar, 2008 [2]Fossså *et al*., 2000 & 2002; [3]Hall-Spencer *et al*., 2002; [4]ICES advice, 2005 – 2010; [5]Grehan *et al.,* 2004; [6]Clark *et al.,* 2010 ; [7]Soffker *et al.,* 2011
No direct evidence has been found that specifically addresses the long-term impact of towed gears on carbonate mounds however, there is abundant evidence for the effects of trawling on cold water coral reefs which are considered biologically similar. The evidence relates mainly to Norwegian and Irish waters but this is considered to be sufficiently similar to Scottish waters for the quality of the evidence

to be considered high. No direct evidence has been found that specifically addresses the long-term impact of static gears on carbonate mounds however, there is abundant evidence for the effects of nets and lines on cold water coral reefs, which are considered biologically similar. The evidence relates mainly to Norwegian and Irish waters but this is considered to be sufficiently similar to Scottish waters for the quality of the evidence to be considered high. There is no direct evidence of impacts from pots on this habitat.							
Directly relevant peer reviewed literature	✔	Directly relevant grey literature	✔	Inference from studies on comparable habitats, gears or geographical areas.	✔	Expert judgement or anecdotal evidence	

Draft Advice Scottish MPAs and fisheries SEAMOUNT COMMUNITIES	
Document version control	
Version 0	Date prepared 02/02/2012 Sophie Elliott (JNCC) Reviewed by Tom Blasdale (JNCC) 07/02/2012
Version 0.1	S Elliott 10/02/2012
Version 1.0	T Blasdale 26/02/2012 Reviewed by David Donnan (SNH) 05/04/2012
Version 1.1	S Elliott 23/04/2012

SEAMOUNT COMMUNITIES

Seamounts are undersea mountains, usually of volcanic origin that can rise up to 1000m from the seabed[1]. Seamounts support rich communities of animals, particularly on their steep sides and surrounding parasitic cones (high rising, erect, conical features which can exist around the seamount made from volcanic material[3]). These diverse communities include various species of corals (both hard and soft), sponges, hydroids and sea squirts. A variety of fish are found on seamounts including various commercial species such as orange roughy[1,2,3]. Three seamounts can be found in Scottish waters: Anton Dorhn, Rosemary Banks and Hebrides Terrace. Biotopes found on these seamounts are similar to those found elsewhere in deep water and include deep-sea sponge aggregations, coral gardens and cold water coral reefs[11].

Impacts

All demersal towed gears (including otter trawl, beam trawl)

The animal communities found on seamounts tend to be composed of erect and fragile species that are sensitive to physical disturbance, particularly deep-sea stony corals, gorgonians and black corals, sea anemones, hydroids and sponges[2,3,4]. Trawling can cause mortality to species by disturbance on the seabed or by bringing them to the surface resulting in a reduction in abundance[2,5,6,7]. Recovery from such damage is estimated to be measured in decades, depending on the environmental conditions[4,7].

All demersal static gears (including gillnets, trammel nets, longlines, pots and traps)

No studies providing evidence of the effects of static gears on Scottish seamounts were found, however impacts occurring on analogous vulnerable habitats and species, such as sponges and corals in Scottish waters are applicable[8]. Impacts can arise from hooks, lines, nets and ropes becoming entangled with corals and other fragile species, including 'plucking' them from the seabed during hauling[7,8,9,10]. While the degree of damage from individual fishing operations is likely to be lower than for trawling, cumulative damage may be significant[7,8].

JNCC/SNH Advice

Given the nature of sensitivity to physical disturbance the options for suitable management options to mitigate the effects of fishing are limited. JNCC and SNH therefore advise that the use of demersal bottom contacting gears (static and mobile) should be avoided at locations on seamounts where these vulnerable seabed communities/features are located. The precision with which boundaries for management restrictions can be set will depend on the quality and resolution of mapping available for the feature.

Confidence in advice

Demersal towed gears - High certainty. The conclusions are supported by good quality, directly relevant scientific information from Scottish waters.

Demersal static gears - High certainty. There is no evidence relating directly to seamounts in the Scottish sea area, but based evidence from analogous features found within Scottish waters is relevant.

Evidence

[1]Baxter *et al.,* 2011; [2]Clark & Tittensor, 2010; [3]Long *et al.,* (unpublished); [4]Clark *et al.,* 2010; [5]Kaiser *et al.,* 1996; [6]Jennings *et al.,* 2008; [7]ICES, 2010; [8]Muñoz *et al.,* 2010; [9]OSPAR, 2010 ; [10]Mortensen et al., 2005; [11]Howell *et al.,* 2010.							
There is good evidence for the impacts of trawling on Seamounts and their associated habitats and species. Evidence has been found from recent surveys from Anton Dohrn in addition to other scientific litterature from Scottish waters. The quality of the evidence to be considered high. No direct evidence was found for the impacts of static gears on the biota of seamount communities however there is good quality, highly relevant scientific information to directly support the conclusion based on the same habitats found elsewhere.							
Directly relevant peer reviewed literature	✔	Directly relevant grey literature	✔	Inference from studies on comparable habitats, gears or geographical areas.	✔	Expert judgement or anecdotal evidence	✔

Draft Advice Scottish MPAs and fisheries DEEP SEA SPONGE AGGREGATIONS	
Document version control	
Version 0.1	Date prepared 06/01/2012 Tom Blasdale (JNCC)
Version 0.2	19/01/2012 Substantial revision and new format T Blasdale (JNCC) Reviewed by Sophie Elliott (JNCC) 16/02/2012
Version 1.0	T Blasdale 26/02/2012 Reviewed by David Donnan 18/04/2012
Version 1.1	S Elliott 24/04/2012

DEEP SEA SPONGE AGGREGATIONS

Deep sea sponge aggregations are found on both hard and soft substrates at depths of between 250 – 1300m. They are composed of principally glass sponges (Hexactinellida) and the giant sponges (Desmospongia)[1,2]. They are thought to support diverse biological communities[3], with the sponges increasing habitat complexity and influencing the occurrence of other species[3].

Impacts

Demersal towed gears (including otter trawl, beam trawl)

Trawling damages, displaces and removes sponges through the direct physical impact as well as from disturbed sediment resettling and causing smothering beyond the path of the trawl itself[2,3,4]. Deep sea sponges have some capacity for recovery from mild damage but significant disturbance, damage or smothering are unlikely to survive[3,4]. While the growth of individual sponges to full size is thought to take decades[2] there is relatively little known about the time the associated communities take to reach their former diversity[4].

Demersal static gears (including gillnets, trammel nets, longlines, pots and traps)

Sponges may become caught or entangled in static gears and damaged on the seabed or brought to the surface. Such bycatch by longliners of hexactinellid and demospongid sponges has been documented within the north-east Atlantic[5,6] and in the Antarctic Bowden[6]. While the extent of damage caused by individual static gear fishing events is likely to be lower than that for trawling, the effect of cumulative damage may be significant [4,5]

JNCC/SNH Advice

Given the nature of sensitivity to physical disturbance the options for suitable management options to mitigate the effects of fishing are limited. JNCC and SNH therefore advise that the use of demersal bottom contacting gears (static and mobile) should be avoided at locations where this vulnerable feature is located.

Confidence in advice

Demersal towed gears - High certainty. The conclusions are supported by good quality, directly relevant scientific information.

Demersal static gears - Medium certainty. There is some direct evidence but it has been necessary to make assumptions regarding the cumulative effects of repeated exposure.

Evidence

[1]Baxter *et al.,* 2011 ; [2]OSPAR, 2010; [3]ICES, 2007; [4]ICES 2010; [5]Muñoz *et al.,* 2011; [6]Bowden, 2010							
There is good evidence for the impacts of trawling on deep sea sponge comunities. The evidence is from Scottish offshore waters, Alaska and the Faroes; all considered to be sufficiently relavant for the quality of the evidence to be considered high. Some relevant scientific information evidence was found for the impacts of static gears on deep sea sponges. Some assumptions were made on the effects of static gear other than that of longlines regarding the likely affect of ropes or anchors on erect epifauna.							
Directly relevant	✔	Directly relevant	✔	Inference from	✔	Expert	✔

peer reviewed literature	grey literature	studies on comparable habitats, gears or geographical areas.	judgement or anecdotal evidence

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Draft Advice Scottish MPAs and fisheries OFFSHORE SUBTIDAL SANDS AND GRAVELS	
Document version control	
Version 0	Date prepared 09/02/2012 Tom Blasdale (JNCC) Reviewed by Sophie Elliott (JNCC) 16/02/2012
Version 1.0	T Blasdale 26/02/2012 Reviewed by David Donnan (SNH) 18/04/2012
Version 1.1	S Elliott 24/04/2012

OFFSHORE SUBTIDAL SANDS AND GRAVELS

In offshore waters, subtidal sand and gravel sediments are the most common seabed habitats in UK waters. The sands and gravels found to the west of the UK are largely shell derived, whereas those from the North Sea are largely formed from rock material. The composition of the sediment and the surface features (such as waves or ripples) depends on the prevailing wave and current conditions, and the communities of associated animals varies accordingly. This habitat can be found at depths from 80-3000m[1].

Impacts

Demersal towed gears (including dredges, beam trawl, otter trawl and seine net)

The extent to which mobile gear impacts on sand and gravel sediments can vary considerably, according to the type of gear, the intensity of fishing and the sediment composition. In high energy locations (i.e. of wave and/or tide) the associated fauna tend to be well adapted to disturbance and as a result are more tolerant of fishing-related disturbance[5,6]. In lower energy locations, such as muddy sands and sand in deep water, sediments tend to be muddier and more stable and their associated fauna less tolerant of disturbance[4,6]. Stable gravels often support a 'turf' of fragile species which are easily damaged by trawling and recover slowly[7,8].

In general, the impact of towed gear on sand and gravel sediments is relatively well understood. Trawling and dredging tends to cause increased mortality of fragile and long lived species and favour opportunistic, disturbance-tolerant species[2,3]. Some particularly sensitive species may disappear entirely[2]. The net result is benthic communities modified to varying degrees relative to the un-impacted state[2,4].

Demersal static gears (including gillnets, trammel nets, longlines, pots and traps)

This habitat is not considered to be sensitive to the level of abrasion caused by static demersal gears[9,10,11]. The extent of direct impact on the faunal community is expected to be minimal and seabed structure will be maintained.

JNCC/SNH fisheries management Advice

Demersal towed gears - The variability in the sensitivity of sand and gravel sediments to fishing disturbance is such that site by site consideration of management options is likely to be the best approach. However, there are general points that can be applied. The requirement for management of fishing is more likely in lower energy sites with muddy sands and deepwater sands and gravels. Gears that penetrate deeply into the sediment (>5cm) would generally be of more concern than those with only surface impacts (e.g. light trawls, seines). In most cases, good information on the distribution and intensity of fishing activity and good knowledge of the current condition of features relative to their potential recovered condition will be required to inform management options.

Demersal static gears - It is not expected that static gears will require any additional management in this habitat.

Confidence in advice

Demersal towed gears - Medium certainty. The conclusions are supported by good quality, directly relevant scientific information. Some assumptions have been made regarding recovery potential.

Demersal static gears - Low certainty. Conclusions have been based on sensitivity assessments which may rely on significant assumptions or generalisations. It has not been possible to validate these assumptions.

Evidence

[1]UKBAP, 2010. [2]Bergman and Van Santbrink, 2000; [3]Eleftheriou and Robertson, 1992; [4]Kaiser *et al*., 2006; [5]Dernie *et al*., 2003; [6]Hiddink *et al.,* 2006 [7]Collie *et al*., 2005; [8]Foden *et al.,* 2010; [9]Hall *et al*., 2008; [10]Tillin *et al.,* 2010; [11]Tyler-Walters *et al.,* 2009.
There is abundant evidence for the impacts of trawling and dredging on subtidal sand and gravels. Much of this evidence comes from the UK and northern Europe so can be regarded as directly applicable to Scottish waters. However, due to the heterogeneous nature of the habitat type, the limited number of studies available may not be directly applicable to all component biotopes. No study has been found that directly addresses the impact of demersal static gears on subtidal sands and gravels. The advice is therefore based on interpretation of sensitivity assessments.

Directly relevant peer reviewed literature	✔	Directly relevant grey literature	✔	Inference from studies on comparable habitats, gears or geographical areas.	✔	Expert judgement or anecdotal evidence	✔

Draft Advice Scottish MPAs and fisheries CORAL GARDENS	
Document version control	
Version 0.1	Date prepared 06/01/2012 Tom Blasdale (JNCC)
Version 0.2	T Blasdale 19/01/2012 New format Review by Sophie Elliott 16/02/12
Version 1.0	T Blasdale 26/02/2012 Reviewed By David Donnan (SNH) 18/04/2012
Version 1.1	S Elliott 26/04/2012

CORAL GARDENS

The main characteristic of a coral garden is a relatively dense aggregation of colonies or individuals of one or more coral species. Coral gardens can occur on a wide range of soft and hard seabed substrata[1]. The biological diversity of coral garden communities is typically high and often contains several species of coral belonging to different taxonomic groups, such as leather corals (*Alcyonacea*), gorgonians (*Gorgonacea*), sea pens (*Pennatulacea*), black corals (*Antipatharia*) and hard corals (*Scleractinia*)[2].

Impacts

Demersal towed gears (including otter trawl, beam trawl)

Coral gardens are highly sensitive to physical disturbance. Mobile benthic gears can result in significant damage and mortality[2,7] and over time, the structural and biological diversity of the habitat will be reduced. Coral gardens on soft bottoms within fishing depths are particularly vulnerable, however, where they occur on low relief hard substrate coral gardens may be accessible to rockhopper gears[2]. Re-establishment of individual specimens of corals is likely to occur within 50 to 100 years but the time taken for complex coral garden habitat to develop is likely to be longer[3].

Demersal static gears (including gillnets, trammel nets, longlines, pots and traps)

Demersal static fishing gears also have the potential to impact on coral garden habitats, usually where corals entangled in ropes/lines or nets can be plucked off the seabed during hauling [2,3,4,5]. Bottom longlining may pose the highest risk to large erect species such as gorgonians, cup corals, soft corals, black corals and lace corals ([2,6]). Where static gears do cause mortality or damage to coral garden habitats, the recovery and re-establishment characteristics are the same as those above (for mobile gears above).

JNCC/SNH fisheries management Advice

The sensitivity of coral gardens to impact from bottom-contact fishing gears is such that their use is incompatible in achieving any possible conservation objectives for the habitat. Consequently, there is no reasonable alternative to advice that no fishing should be allowed on this habitat. Secondary management considerations, such as the extent of buffer zones around coral gardens may also be required but may vary according to site-specific aspects such as depth and gear being used.

Confidence in advice

Demersal towed and static gears - High certainty. The conclusions are supported by good quality, directly relevant scientific information.

Evidence

[1]ICES, 2007 ; [2]OSPAR, 2010; [3]ICES, 2010 [4]Mortensen *et al.*, 2005; [5]Bowden, 2010; [6]Muñoz *et al.,* 2010; [7]Muñoz *et al.,* 2011.
There is little direct evidence of trawling impacts on coral gardens in the North-east Atlantic. There is annecdotal evidence that coral gardens in Icelandic waters have been negatively impacted by trawling[1]. Similar changes have been reported in Canada and Alaska (OSPAR 2010). There is direct evidence of damage to coral gardens from longlining from the North East Atlantic in Scottish offshore waters[6], Canada, and the Azores[1]. This was supported by evidence of effects on

similar species in the Antarctic[5].							
Directly relevant peer reviewed literature	✔	Directly relevant grey literature	✔	Inference from studies on comparable habitats, gears or geographical areas.	✔	Expert judgement or anecdotal evidence	✔

Draft Advice Scottish MPAs and fisheries FLAME SHELL (*Limaria hians)* BEDS	
Document version control	
Version 0	Date prepared 13/02/2012 Sophie Elliott (JNCC) Reviewed by Tom Blasdale (JNCC) 14/02/2012
Version 0.1	S Elliott 20/02/2012
Version 1.0	T Blasdale 26/02/2012 Reviewed by David Donnan (SNH) 18/04/2012
Version 1.1	S Elliott 26/04/2012

FLAME SHELL (*Limaria hians)* BEDS

The flame or gaping file shell *Limaria hians* creates nests by weaving together tough threads (byssus) with surrounding material such as seaweed, maerl and shells. Adjoining nests coalesce to form larger structures with multiple flame shells which, in some locations where conditions allow, carpet the bed for several hectares. The carpets create a unique habitat that stabilises the sediment and provides an attachment surface for many organisms including hydroids, bryozoans, ascidians and seaweeds. These organisms in turn add to the habitat complexity and provide shelter for other species such as cod and saithe. A rich diversity of fauna is also found within and below the flame shell bed.

Impacts

Demersal towed gear (including scallop dredges, otter trawl and beam trawls)

The mechanical impacts from demersal towed gear can affect flame shell beds in two main ways. Firstly, direct mortality from damage to the shells and secondly, breaking up the carpet of byssus threads where it occurs[1,2,3]. Mobile gear (predominantly dredging) is considered to be the likely cause of the decline in extent of former beds in the Clyde[3]. Full recovery is not certain[1] There are no studies directly addressing the effects of other towed gears on this habitat however it is assessed as highly sensitive to the type of pressure caused by trawling (shallow abrasion)[4].

Demersal static gears (including pots, traps, lines and nets)

No direct evidence of the effects of static gears on flame shell beds was found; however given the delicate nature of their shells[1] and the nests, unregulated fishing with heavier static gear (pots) could have damaging effects. Further research will be required to determine the level of fishing that would produce an unacceptable impact.

JNCC/SNH Advice

Demersal towed gear - Given the characteristics of flame shell beds and the potential for impact even from low levels of activity, SNH and JNCC advise that use of demersal bottom contacting gears should be avoided on this feature.

Demersal static gear – The potential for adverse impact from static gear is likely to be directly related to fishing intensity. Fishing activity at low levels is not expected to adversely impact the feature, however further research will be required to determine the level of fishing that would be compatible with the feature.

Confidence in advice

Demersal towed gears - High certainty. The conclusions relating to dredging are supported by good quality, directly relevant scientific information. However, conclusions regarding trawling are based on sensitivity analysis and can be considered low certainty.

Demersal static gears - Moderate certainty. There is no direct published evidence specifically for static gear impacts on this feature, analogy with other habitats for which evidence does exist has been used to determine advice. Evidence to support this assumption is limited.

Evidence

[1]Trigg *et al.,* 2009; [2]Hall-Spencer *et al.,* 2003; [3]Hall-Spencer and Moore*,* 2000; [4]Tillin *et al.,* 2010.							
There is both experimental and observed evidence for the impacts of dredging on flame shell beds derived from the west coast of Scotland which is directly applicable to the type of beds likely to be designated as Scottish MPAs. There is no direct evidence for the effects of static gearsConclusions were based upon analogies with other habitats. Evidence supporting this assumption is limited.							
Directly relevant peer reviewed literature	✔	Directly relevant grey literature	✔	Inference from studies on comparable habitats, gears or geographical areas.	✔	Expert judgement or anecdotal evidence	✔

Draft Advice Scottish MPAs and fisheries HORSE MUSSEL (*Modiolus modiolus*) BEDS	
Document version control	
Version 0	Date prepared 09/01/2012 Tom Blasdale (JNCC)
Version 0.1	T Blasdale 19/01/2012 Substantial revision and re-format Reviewed by Sophie Elliott (JNCC) 21/02/12
Version 1.0	T Blasdale 23/02/2012 Reviewed by David Donnan (SNH) 18/04/2012
Version 1.1	S Elliott 26/04/2012

HORSE MUSSEL (*Modiolus modiolus*) BEDS

The horse mussel *Modiolus modiolus* forms scattered clumps, thin layers or dense raised beds several metres in height and length. Raised beds are formed of horse mussels, bound together by a matrix of byssus threads which accumulate sediment of silt, organically rich faeces and shells, further increasing the bed height. They significantly modify sedimentary habitats and provide hard substratum, refuge and ecological niches for a wide variety of organisms[8,2].

Impacts

Demersal towed gear (including scallop dredges and otter trawls)

The characteristics of horse mussel beds are such that sensitivity to physical disturbance is high. Demersal towed gears have the potential to cause damage to individual mussels, to the structural integrity of the clumps and to epifauna, as documented in Strangford Lough[3,4,5] and implicated in loss of beds off the south east of the Isle of Man[6]. The potential for recovery is limited by slow growth and sporadic recruitment[1]

Demersal static gears (including pots, traps, lines and nets)

Sensitivity of horse mussel beds to static gears is lower than for mobile. However, depending on type of epifauna present this may increase if sustaining high fishing intensity[7]. Further research would be required to determine the level of fishing effort that would be compatible with the feature.

JNCC/SNH fisheries management Advice

Demersal towed gear - Given the characteristics of horse mussel beds and the potential for impact even from low levels of activity, JNCC and SNH advise that use of demersal towed gear should be avoided on this feature.

Demersal static gears - The potential for adverse impact from static gear is likely to be directly related to fishing intensity. Fishing activity at low levels is not expected to adversely impact the feature, however further research will be required to determine the level of fishing that would be compatible with the feature.

Confidence in advice

Demersal towed gears - High certainty. The conclusions are supported by good quality, directly relevant scientific information.

Demersal static gears - Low certainty. There is no published evidence specifically for static gear impacts on this feature, analogy with other habitats for which evidence does exist has been used to determine advice. Evidence to support this assumption is limited.

Evidence

[1]Holt *et al*. 1998; [2]Jones *et al*. 2000; [3]Magorrian and Service 1998; [4]Roberts *et al*. 2004; [5]Brown 1989; [6]Jones 1951; [7]Tillin *et al.* 2010; [8]Lieberknecht et al. 2004
The evidence for towed gears is from dredging and trawling for scallops in UK waters and the Isle of Man and so is considered to be directly applicable. No study has been found that addresses directly the impact of static gears on horse mussel beds. Our

advice is therefore based on our interpretation of sensitivity assessments.							
Directly relevant peer reviewed literature	✔	Directly relevant grey literature	✔	Inference from peer reviewed or grey literature relating to a comparable habitat, gear or geographical area.	✔	Expert judgement	✔

Draft Advice Scottish MPAs and fisheries MAËRL BEDS	
Document version control	
Version 0	Date prepared 09/01/2012 Tom Blasdale (JNCC)
Version 0.1	Sophie Elliott (JNCC) 13/02/2012 Substantial revision and re-format Reviewed by T. Blasdale 14/02/2012
Version 1.0	T. Blasdale 26/02/2012 Reviewed by David Donnan (SNH) 18/04/2012
Version 1.1	S Elliott 26/04/2012

MAËRL BEDS

Maërl beds are found along the entire west coast of Britain but the vast majority are in Scotland where they are widespread along the west coast, the Hebrides and the Northern Isles and together represent about 30% of all maërl beds in north-west Europe. Maërl is extremely slow growing and some of the extensive beds may be over 1000 years old. Maërl beds create a complex, open structure that supports diverse associated communities of red seaweeds and animals such as sea firs, scallops, brittlestars, sea cucumbers and tube dwelling sea anemones and including the juvenile stages of a range of commercially important species[1].

Impacts

Demersal towed gears (including scallop dredge, hydraulic dredge, beam trawl, otter trawl etc).

Demersal towed gears have the potential for significant negative impacts on maërl beds. This is because of high sensitivity to physical disturbance and low rates of recovery, which is estimated to be in the order of 10 - 40 years[2,3], due largely to the slow growth and accumulation of maërl nodules[3,4]. Studies have shown that maërl is crushed and buried (up to 8cm) with one pass of a scallop dredge, whilst the impacts from smothering have been also experimentally demonstrated[5]. Research from the Firth of Clyde have shown that associated species, including flame shell *Limaria hians* 'nests', were significantly reduced and after 5 months >70% of maërl was dead and there was no evidence of recovery four years later[4]. Similar impacts on the structure and integrity of maërl have been recorded in relation to hydraulic dredging [6].

Demersal static gears (including pots, traps, lines and nets)

No direct evidence of the effects of static gear on Maërl beds was found; however given the fragility of maërl and long time to recover[2,3], unregulated fishing with heavier static gear (pots) could have damaging effects. Further research will be required to determine the level of fishing that would produce an unacceptable impact.

JNCC/SNH advice

Demersal towed gear - No suitable management options could be identified that would mitigate the effects of fishing on this feature. JNCC and SNH advise that no demersal bottom contacting gears should be allowed on this feature.

Demersal static gear – There is insufficient information to recommend management for this feature. Fishing activity at low levels is not expected to adversely impact the feature, however the effects of fishing should be investigated and if there is evidence of damage, measures should be introduced to reduce it.

Confidence in advice

Demersal towed gears - High certainty. The conclusions are supported by good quality, directly relevant scientific information.

Demersal static gears - Low certainty. There is no published evidence specifically for static gear impacts on this feature, analogy with other habitats for which evidence does exist has been used to determine advice. Evidence to support this assumption is limited.

Evidence

[1]Baxter *et al.,* 2011; [2]OSPAR, 2006; [3]Hall-Spencer, 2000; [4]Hall-Spencer and Moore, 2000; [5]Wilson *et al.*, 2004; [6]Hauton *et al.,* 2003; [7]Bárbara *et al.,* 2003.							
There is direct evidence of the effects of dredging on maërl beds from Scotland and UK waters. Evidence on the effects of otter trawls comes from the Mediterranean[6]. No direct evidence of static gears on maërl beds was found. Conclusions were based upon the sensitivity of the habitat from scientific and grey litterature.							
Directly relevant peer reviewed literature	✔	Directly relevant grey literature	✔	Inference from studies on comparable habitats, gears or geographical areas.	✔	Expert judgement	✔

Draft Advice Scottish MPAs and fisheries Northern sea fan *Swiftia pallida* and sponge communities	
Document version control	
Version 0	Date prepared 13/02/2012 Sophie Elliott (JNCC) Revised by Tom Blasdale (JNCC) 17/02/2012
Version 1	S Elliott 20/02/12 Revised by David Donnan (SNH) 18/04/2012
Version 1.1	S Elliott 26/04/2012

Northern sea fan and sponge communities

Northern sea fan and sponge communities are found on hard substrates ranging from bedrock to boulder, characterised by aggregations of the sea fan *Swiftia pallida* and the cup coral *Caryophyllia smithii* living on the on upper and vertical surfaces. With increasing water depth (35-120m+), and in areas of low tidal flow, erect branching sponges replace sea fans. Rock is colonised by sea firs, soft corals (e.g. dead man's fingers) and large sea squirts, with crevices providing shelter for sea cucumbers, squat lobsters and wrasse[1].

Impacts

Demersal towed gears (including dredges, beam trawl, demersal otter trawl, scallop dredge, etc.)

This feature is likely to be avoided by towed gear fishermen due to the nature of the terrain. However where rocks or boulders are of low relief it is feasible that these areas may be fishable with rockhopper gear. Where mobile demersal fishing gears come into contact with these communities the slow-growing fragile epifauna is liable to suffer high mortality[2] from direct impact and from disturbance of their substrate (e.g. overturning of boulders)[3]. Re-colonisation of these delicate, long-lived and slow growing suspension feeders is variable depending on intensity and frequency of disturbance, and size of towed gear used[4,5].

Static gears (including pots, traps, lines and nets)

Mechanical abrasion arising from static gear when being deployed or recovered has the potential to cause mortality of the fragile epifauna. There is some evidence from studies of pots and creels on similar rocky substrates which indicates that this impact may be limited and will be dependent on intensity of fishing[6,7]. Recovery may be slow due to slow growth of some species[5].

JNCC/SNH advice

Demersal towed gear - Given the characteristics of this feature and the potential for impact even from low levels of activity, JNCC and SNH advise that use of demersal towed gear should be avoided on this feature.

Demersal static gear - The potential for adverse impact from static gear is likely to be directly related to fishing intensity. Fishing activity at low levels is not expected to adversely impact the feature, however further research will be required to determine the level of fishing that would be compatible with the feature.

Confidence in advice

Demersal towed gears - Medium certainty. There is no direct evidence and it has been necessary to make assumptions based on knowledge of similar habitats or comparable pressures. There is good reason to believe that the assumptions are justified (eg. occurrence of species with similar characteristics).

Demersal static gears - Medium certainty. The feature may encompass a number of sub-types which vary in their sensitivity to fishing pressure. The available evidence does not cover the full range of the variation so some cases may not be well supported by evidence.

Evidence

[1]Baxter *et al.,* 2011; [2]Løkkeborg, 2005; [3]Freese *et al.,* 1999; [4]Jennings *et al.,* 2008; [5]MacDonald *et al.,* 1996 ; [6]Bowden, 2010, [7]Eno *et al.,* 2001							
There is no direct evidence relating to impacts of towed gears on this habitat. The assessment is therefore based on knowledge of impacts of towed gear on other habitats with similar characteristics (Hard substrate and fragile, erect epifauna) in the UK and elsewhere. These are considered to be sufficiently similar for the quality of the evidence to be considered medium. There is good evidence of impacts of static gears in similar habitats (rocky substrate with fragile, erect organisms) in the UK but it is not clear whether it refers to this specific habitat.							
Directly relevant peer reviewed literature	✔	Directly relevant grey literature	✔	Inference from studies on comparable habitats, gears or geographical areas.	✔	Expert judgement or anecdotal evidence	✔

Draft Advice Scottish MPAs and fisheries SHALLOW TIDE-SWEPT COARSE SANDS WITH BURROWING BIVALVES	
Document version control	
Version 0	Date prepared 05/02/2012 Sophie Elliott (JNCC) Reviewed by Tom Blasdale (JNCC) 09/02/2012
Version 0.1	S Elliott 10/02/2012 Reviewed by T Blasdale 22/02/2012
Version 0.2	S Elliott 23/02/12
Version 1.0	T Blasdale 26/02/2012 Reviewed by David Donnan (SNH) 18/04/2012
Version 1.1	S Elliott 26/04/2012

SHALLOW TIDE-SWEPT COARSE SANDS WITH BURROWING BIVALVES

Tide swept coarse and gravelly sands in the shallow subtidal support an abundance of burrowing bivalves, particularly *Tellina* spp and polychaete worms. In some areas, this habitat supports surf clams (*Spisula solida*). Suspension feeding bivalves dominate and are abundant in the coarse sediment. Infaunal species also include polychaete worms, tanaids (shrimp-like crustaceans) and sand hoppers. Bivalves may be preyed upon by starfish, snails and flatfish. This MPA search feature has a very limited distribution with most records from Shetland and a few from Orkney, the west coast of Scotland and Outer Hebrides[1,2].

Impacts

All demersal towed gears (including including beam trawl, otter trawl, and scallop dredge)

There is evidence that communities on or in mobile and coarse sands are expected to have higher resilience and recovery to high frequency disturbance[3,4,5,6]. However, intensive fishing activities such as scallop dredging and hydraulic dredging can modify habitats, slowing down recovery of associated fauna beyond the natural capacity[7,8]. Scallop dredging in sandy habitats has been shown to cause modification of bottom deposits, mortality of fauna and leaving significant amounts of dead organic matter[9]. Sessile long-lived bivalves are among the most severally affected bivalve fauna[10]. Even where bivalves remain relatively intact following disturbance by fishing, certain species cannot retract their siphons within the shell. Loss of the siphons is likely to lead to their death[11].

The net result of ongoing fishing is the habitat may be maintained in a modified condition with reduced abundance (or possibly loss) of sensitive bivalve and epibenthic species. The degree of modification is likely to be dependent on the intensity of fishing[12,13] and the gear type, size and weight, as well as depth of penetration into the sediment[14].

All demersal static gears (including gillnets, trammel nets, longlines, pots and traps)

Due to the nature of sandy habitats, demersal static gear tends to have a minimal effect on epifauna[15,16]. Areas closed to towed demersal fishing yet enabling static gear to continue have shown recovery[17].

JNCC/SNH Advice

Demersal towed gear -. The impact of towed mobile gears can be variable and as a result the appropriate management options will vary from site to site. Determining appropriate management options will require knowledge of fishing activity and intensity in relation to the local features of this habitat (distribution, associated fauna and surface characteristics). Gears that penetrate deeply into the sediment (>5cm) would generally be of more concern than those with only surface impacts (e.g. light trawls, seines).

Demersal static gear - It is not expected that static gears will require any additional management in this habitat.

Confidence in advice

Demersal towed - Medium certainty. There is no direct evidence on shallow tide-swept coarse sands with burrowing bivalves. It has been necessary to make a comparison with other analogous habitats for which evidence exists. It is reasonable to believe that the analogy is justified (eg. occurrence of species with similar characteristics) however the

feature may encompass a number of sub-types which vary in their sensitivity to fishing pressure. The available evidence does not cover the full range of the variation so some cases may not be well supported by evidence.

Demersal static gears - Medium certainty. Conclusions have been based on sensitivity assessments which may rely on significant assumptions or generalisations. It has not been possible to validate these assumptions.

Evidence

[1]Baxter *et al.,* 2004; [2]UK BAP, 2008; [3]MacDonald *et al.,* 1996; [4]Dernie *et al.,* 2003; [5]Hall-Spencer, 1999; [6]Hinz *et al.,* 2011; [7]Hauton *et al.,* 2003; [8]Collie *et al.,* 2001; [9]Eleftheriou *et al.,* 1992; [10]Kaiser *et al.,* 2000; [11]Hauton *et al.,* 2003; [12]Bergman and Van Santbrink, 2000; [13]Kaiser *et al.*, 2006 ; [14] MacDonald *et al.,* 1996; [15]Hinz *et al.,* 2011; [16]Eno *et al.,* 2001; [17] Blythe *et al.,* 2004							
There is no direct evidence for this feature however scientific litterature on the effects of burrowing bivalves on course sands has been found within Scottish water and from other areas within the the UK.							
Directly relevant peer reviewed literature		Directly relevant grey literature	✔	Inference from studies on comparable habitats, gears or geographical areas.	✔	Expert judgement or anecdotal evidence	✔

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Outlining the principles on evidence used to support the development of Nature Conservation MPAs in Scotland's seas

Purpose of this paper

This paper discusses the type of evidence used during the different stages of NC MPA identification and implementation, and sets out a series of principles to guide the way in which evidence is considered as part of the Scottish MPA Project.

Background

The principle of using the best available evidence underpins the analyses and assessments being carried out as part of the Scottish MPA Project. At the first national MPA stakeholder workshop in March 2011 a number of stakeholders enquired as to the types of data that would be used and confidence that the Project partners and stakeholders have in these types of data.

The recent independent review of the evidence process for selecting marine special areas of conservation[1] made a number of recommendations on the use of scientific evidence. The principles outlined within this paper take note of those recommendations and set out how these will be recognised within the Scottish MPA project. This overview should also provide a response to the questions raised by stakeholders regarding the evidence used in our assessment SMPA search locations and the potential contribution they could make to an SMPA network.

Application of these principles in the formulation of our advice to Scottish Government will help to:

- Evaluate the scientific confidence in the evidence used to make recommendations for NC MPAs and the proposed conservation objectives for the MPAs.
- Prioritise potential Nature Conservation (NC) MPAs for further evidence collection as part of the building the evidence base programme and/or monitoring and surveillance programme over the coming years

Principles

The following principles are proposed as a framework for guiding the use of evidence as part of the Scottish MPA Project.

Principle 1: the project will use the best available scientific information

The selection of Nature Conservation MPAs will be based primarily on scientific evidence, drawing upon the best available evidence on Scotland's marine biodiversity and geodiversity. What constitutes 'best available data' will vary by Scottish MPA search location, and is likely to be more detailed for areas closer to the coast than for offshore areas.

Gathering supporting evidence to support the identification of search locations is a key task in the Scottish MPA project. The priority for gathering improved search feature evidence through data mining and new survey work has focused on Scottish MPA features where our data requirements were greatest. The features were either threatened and/or declining, or the data available was patchy or unverified. A geodatabase (The Geodatabase of Marine features in Scotland's waters - GeMs) developed for the project enables spatial representation of Scottish MPA search feature data records collated through data mining and survey over the course of the project.

[1] http://www.defra.gov.uk/publications/2011/07/21/pb13598-graham-bryce-independent-review-marine-sacs/

In addition to GeMs, the range of data and tools available to the project includes:

- Acoustic/ remote sensing data
- Modelled data, e.g. UKSeaMap 2010
- Physical and biological ground truthing, e.g. search feature survey data points
- Habitat maps produced from survey (acoustic + ground truthed data)
- Feature sensitivity matrices
- Pressure maps
- Mapped activity data

Principle 2: Decisions will take account of the quality of, and scientific confidence in, relevant data.

Although we using the best available evidence to advise Scottish Ministers on the options for a network of Nature Conservation MPAs in Scotland, the selection guidelines acknowledge that the type and quality of data available between search locations and features are likely to vary. Our scientific certainty in the assessments we are able to make with respect to feature presence, extent and condition will vary dependent upon the types of evidence we have available.

When providing our advice to Scottish ministers we will acknowledge uncertainties in our knowledge and confidence in the evidence used to support the recommendations. Evidence used to support the Nature Conservation MPA recommendations will be assessed to evaluate the scientific certainty in the presence and extent of the features for which the MPA is recommended. In turn, the level of confidence we have in the presence and extent of the features will influence the level of certainty we have of our assessment of feature condition.

Confidence in the evidence used will be driven by the amount and type of information available for each of the features and the quality of the datasets used. For example the age of the data, techniques for data collection and the confidence of habitat maps will influence how sure we are in the assessment of feature presence and extent.

Principle 3: The requirement for detailed evidence delivered to support potential NC MPAs may increase through the area identification, designation and management process.

The type of evidence used may change as we move from potential NC MPA identification through to determining potential management measures that may be required to meet the conservation objectives for a NC MPA. Increasingly detailed evidence may be applied to support the assessment depending on the stage of the process being considered. The evidence requirements can vary at stages in search location assessment as well as in the later stages of the process of NC MPA designation and determination of management measures.

Different types of data may be used at different stages in the NC MPA *selection* process, depending on the purpose of the assessment. For example, Stage 1 of the Scottish MPA selection guidelines[2] requires consideration of presence or absence of features, this could be confirmed through survey verification of previous records of features in a location. Assessment of the Stage 2 consideration of the qualities of those features including levels of diversity and functional links between features would require a more detailed understanding of the features than presence data alone provides.

As we move through the process the nature of evidence required changes with respect to scale (e.g. mapping resolution), accuracy (e.g. data sources and verification) and type of

[2] Marine Scotland (2011) Guidelines on the selection of MPAs and development of the MPA network

data (e.g. ecological and socio-economic). The level of scientific certainty we have in these assessments will vary depending upon the evidence available. To take a NC MPA through the designation process to the point of being 'well managed' the following characteristics inherently require an increasing level of detailed understanding:

- Presence of the feature
- Feature extent
- Feature condition

With respect to feature condition, there are currently few monitoring or surveillance programmes that are comprehensive enough to provide the required information to assess feature condition. Consequently for the purpose of recommending Nature Conservation MPAs to Scottish Ministers for designation it may be necessary to use information on feature sensitivity and their exposure to pressures from human activities to assess likely feature condition for some areas. Assessments of this kind will be supported by discussions with stakeholders with an interest in the locations. Verification of feature condition through the implementation of the monitoring and surveillance strategy would substantiate any requirements for management measures.

A risk based approach is recommended for prioritising the verification of evidence used for NC MPA designation. For example if evidence with less scientific certainty (e.g. predicted mapping compared with ground truthed habitat maps) is used to assess feature presence and extent, and it is likely that the feature of interest is exposed to pressures to which it is sensitive, verification of evidence for this potential NC MPA will be a high priority.

Principle 4: The level of evidence required to progress search locations through the process will vary depending on the nature of the search location and the features it supports.
Some potential areas may be situated in locations considered least damaged more natural, and would therefore be exposed to a lower level of risk of damage from anthropogenic impacts. Lower levels of scientific certainty in the evidence used in the assessment of feature presence, extent and condition may be acceptable when progressing these search locations through the process compared with features in locations that overlap with other marine uses.

Management measures may be recommended for potential NC MPA when the assessment of scientific evidence identifies that achievement of the conservation objectives for the feature(s) in the location is unlikely without additional management. Where this is the case greater scientific certainty is generally required for the evidence on feature extent, condition, and exposure to pressures used to support the assessment. An exception would be where an activity poses a risk of significant or irrevocable damage to a feature.

Principle 5: Detailed data will be required for those features being used to delineate the boundary of a MPA.
Where a potential NC MPA is proposed for multiple features, the boundary will be drawn to ensure that the area meets the detailed ecological guidance requirements for each feature. Robust scientific evidence will be required for the features used to delineate the boundary of the site. This will be considered during the preparation of proposed boundaries before potential NC MPAs go out for public consultation.

Principle 6: The achievement of conservation objectives for features on the NC MPAs will be assessed through the implementation of the monitoring and surveillance strategy

Post designation of NC MPAs, the monitoring and surveillance surveys can be used to increase scientific certainty with respect to the assessments of feature condition and extent for NC MPAs undertaken prior to designation. All NC MPAs will be monitored to confirm achievement of maintain/recover conservation objectives, and assess the appropriateness of any management measures judged necessary to achieve the objectives. Figure 1 outlines how monitoring and surveillance can also be used to verify indicative NC MPA boundary, conservation objectives and any management requirements for NC MPAs already designated.

Summary

The approach outlined above follows the principle outlined in the Selection Guidelines and reinforced through the Marine Strategy Forum that when selecting NC MPAs we will use the best available science without entailing excessive cost. Where possible we are relying upon existing data but in order to do this we need to transparent in our reporting of the scientific confidence we have in the assessments on the basis of the available evidence. The generation of additional data through surveying has been targeted at MPA search features for which we have lower scientific confidence in the feature presence and extent to support identification and/or where there will be a higher demand for evidence to support a NC MPA due to on-going economic activity.

Preparation of paper

This paper has been prepared by Megan Linwood with input from Katie Gillham, Cristina Vina-Herbon, Jon Davies

16 April 2012

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