



Marine Management Organisation

**Scoping the
opportunities and
challenges
to using a ‘core
fishing grounds’
approach
to develop a spatial
marine plan policy
for fishing**

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Scoping the opportunities and challenges to using a 'core fishing grounds' approach to develop a spatial marine plan policy for fishing

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List of Acronyms

APC	Areas of Particular Concern
BPNS	Belgian Part of the North Sea
CFG	Core Fishing Ground
CHARM	Channel Integrated Approach for Marine Resource Management
CO ₂	Carbon dioxide
CFP	Common Fisheries Policy
DMF	Division of Marine Fisheries (Massachusetts, USA)
EEA	Executive Office of Energy and Environmental Affairs (Massachusetts, USA)
EEZ	Exclusive Economic Zone
EFH	Essential Fish Habitat
EMS	European Marine Site
FMP	Fisheries Management Plan
FPSHFE	Federal Public Service Health, Food Chain Safety and Environment (Belgium)
GBR	Great Barrier Reef
GVA	Gross Value Added
GVP	Gross Value of Production
hp	Horsepower
ICES	International Council for the Exploration of the Sea
IDON	Interdepartementaal Directeurenoverleg Noordzee (the Netherlands)
IFCA	Inshore Fisheries and Conservation Authority
IPA	Inshore Potting Agreement
iVMS	Inshore Vessel Monitoring System
MCA	Mid Channel Agreement
MCZ	Marine Conservation Zone
MLMA	Marine Life Management Act (USA)
MMO	Marine Management Organisation
MPA	Marine Protected Area
MPS	Marine Policy Statement
MSP	Marine Spatial Plan
NFFO	National Federation of Fishermen's Organisations
NMFS	National Marine Fisheries Service (USA)
NWP	National Water Policy (the Netherlands)

NUTFA	New Under Ten Fishermen's Association
OSPAR	Oslo-Paris Convention
REZ	Renewable Energy Zone
SAC	Special Area of Conservation
SAMP	Special Area Management Plan (USA)
SFF	Scottish Fishermen's Federation
SMSP	Shetland Islands' Marine Spatial Plan
SPA	Special Protection Area
SSU	Special, Sensitive or Unique area (Massachusetts, USA)
TAC	Total Allowable Catch
TDMA	Time division multiple access
UNESCO	United Nations Educational, Scientific and Cultural Organization
VMS	Vessel Monitoring System

Executive Summary

Fisheries data and evidence is currently used in the marine licensing process on a case by case basis. Marine planning allows fisheries evidence to be used in a more strategic way to promote compatibility and reduce conflict among different and potential competing sectors. Marine spatial plans (in the UK, Europe and internationally) to date have generally not implemented spatially explicit policies for fisheries through the wide scale identification and defining of important 'core fishing grounds' in a region or plan area. Some spatial plans provide support to the fisheries sector through robust but non-spatially-explicit policies that aim to ensure that the fishing industry is taken into account in licensing decisions. Spatially explicit policies are one of a number of ways marine planning can support sectors.

This report explores the opportunities and challenges of using a core fishing grounds approach¹ to develop spatially-explicit marine plan policies for fishing. A review of marine spatial plans and relevant academic research was complemented by a project workshop to discuss the pros and cons of such an approach and explore whether there is a need and/or support for it to be taken forward in marine planning.

A review of relevant academic research on methodologies for defining core fishing grounds found that methodologies for analysing satellite-based Vessel Monitoring System (VMS) data, differentiated by gear type, are well established. There are participatory methodologies for non-VMS vessels, but these could be onerous to keep up-to-date on a regular basis. The inshore Vessel Monitoring System (iVMS) provides a promising option for the smaller vessels not currently covered under existing VMS requirements, but is not yet available across the whole inshore fleet.

This study concludes that further consideration of the use of a core grounds approach for fisheries in marine spatial plans in England is warranted, based on the case study reviews and the inputs received from stakeholders through the project workshop. Stakeholders indicated significant support for such an approach, although there are a number of issues that require further exploration and development for a core fishing grounds approach to be able to be implemented in marine planning. For some fleet segments or fisheries (e.g. exhibiting significant year-to-year variability in fishing patterns or with particularly widespread activity), a core fishing grounds approach may not be appropriate.

Core fishing grounds could be developed through the marine planning process on a region-by-region (or plan-by-plan) basis based on the best available evidence if stakeholders in a plan area are interested in taking forward the approach. However, fisheries can occur across marine planning regions and across different countries' jurisdictions and administrations. In these cases, alignment and coordination should take place where possible and appropriate. Such a spatially explicit marine plan

¹ The phrase 'core fishing grounds' can have various meanings and workshop participants proposed alternative more specific phrases such as, 'important' or 'key fishing areas', as outlined on page 25 of this report. However, due to the project being carried out in response to stakeholder comments using the phrase, it has been kept in this report. Any related future work is likely to use alternative phrasing. The phrase is used here to indicate those areas of sea that are of greatest importance to the fishing industry and which the industry may wish to be reflected through marine plans.

policy would need to work within the framework of national and international fishing legislation.

For implementing a core fishing grounds approach, key considerations are:

- Various metrics should be used to identify core grounds — economic (e.g. value of landings, volume of landings, level of fishing effort, Gross Value Added (GVA)), social (e.g. number of people employed, cultural significance, dependency) and biological/environmental (e.g. nursery and spawning grounds, feeding grounds) — and different metrics may be appropriate for different fleet segments and different areas.
- Long time-series of data should be used, where available, to identify core fishing grounds in order to take into account year-to-year variations in fishing patterns; this is currently possible for VMS data for over 15m vessels but the implementation of VMS on over 12m vessels has been delayed, and only snapshots exist for non-VMS inshore vessels.
- Core fishing grounds should be identified by gear type and/or by target species and differentiated by fleet segment. More detailed stratification (e.g. by *métier*) may be appropriate in some cases and should be explored, but would result in increasing complexity and in core grounds being defined for progressively fewer vessels.
- Core fishing grounds could be updated during the lifetime of the marine plan, or at least at the six-year update of the plan, to enable them to be adapted to reflect changing fishing patterns.
- A 'traffic light', zoned or contoured approach to the definition of core fishing grounds could be adopted, with clearly defined boundaries, rather than using a simple 'in' versus 'out' approach.
- A general displacement policy should be maintained in areas outside core fishing grounds (i.e. that potential impact of developments on fisheries and impacts of the displacement of fishing activity should be considered in licensing decisions).
- The policy would need to interact with the general policy for co-existence (including co-location in the same space) of activities, in order to promote compatibility and reduce conflict (between activities), and manage the use of space within the marine environment in an efficient and effective manner.
- Processed and quality-assured datasets should be developed and made available, accompanied by associated metadata, that provides consistent and reliable sources of information on fishing activity to support consideration of fisheries in marine spatial planning.
- The involvement and buy-in of the fishing industry and other stakeholders is crucial to the reliable mapping and definition of core fishing grounds. A core fishing grounds approach should support the fishing industry and their future activity similarly to how marine planning supports other marine industries. The industry will need to collaborate with planning authorities to ensure that necessary data for identifying and updating core grounds are made available.

The availability of fishing activity data in the inshore waters has been and will continue to be a significant factor for fishers, in being able to demonstrate the importance of different fishing grounds, and for developers, in being able to understand the constraints to development or other activities in different areas. The

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report highlights the importance of data and the potential for iVMS to support planning and management. In the interim, sightings data and fisher interview data should help to fill in gaps where existing VMS data are not available. However, the difficulty and cost of collecting such data mean that it is unlikely that core fishing grounds could be identified and updated with sufficient regularity to reliably reflect contemporary fishing patterns.

Further investigation is needed to explore

- Potential metrics and their spatial representation for identifying core fishing grounds,
- Variability of fishing patterns by different fleet segments over time to identify the segments for which a core fishing grounds approach might be appropriate,
- The update frequency required, and
- Thresholds for different metrics for identifying core fishing grounds.

A regional pilot could be implemented to explore the identification and application of a core fishing grounds approach. This should be in an area where there is support for the approach, includes the inshore sector, and enables lessons to be drawn for plan-scale implementation.

Regardless of whether a core fishing grounds approach is adopted or not, a data strategy for fisheries in marine spatial planning is needed by MMO to address the data gaps for fisheries for marine spatial planning. It should set out: what data on the fisheries sector are required to support marine planning; how those data are to be collected, processed, stored and used, including issues of data stewardship, update frequency and dissemination to others.

Standardised datasets that include data from an agreed range of sources, collected and processed to agreed quality standards, would provide a good evidence base for marine planning, improving the consideration of fisheries in licensing decisions, and would support the possible development of a spatial policy using a core fishing grounds approach.

1. Introduction and Background

Historically and currently, fishing occurs where resources are available and regulations allow. However, increased use of the marine environment by other industries and users creates potential for conflict through reduction of access. Increased economic development in English inshore and offshore waters and the designation of Marine Protected Areas (MPAs) is reducing access to marine space for commercial fishing. These changes add to the many existing pressures on the fishing industry and pose significant challenges in seeking to maintain the viability of the industry.

1.1 Marine planning

Marine planning seeks to contribute to sustainable development through integrated planning of all activities in the marine area and by working to support integration between terrestrial and marine planning. It will inform and guide regulation, management, use and protection of the marine plan areas.

Spatial marine plan policies can be used to manage the use of marine space by different industries. Marine planning therefore has a potential role in identifying solutions to current and future pressures brought about by the increasing use of the marine area. Marine planning should facilitate sustainable development by highlighting areas of current or future interest for all sectors. This will enable marine users to plan strategically, allowing potential conflicts to be identified and avoided or minimised at an early stage of the licensing process through project design and location. Marine plans are developed with a 20-year vision of what stakeholders want to achieve, and so it should reflect aspirations for the future for all industries. Every three years MMO is required to report on how effective the plans are, and every 6 years plans may be revised if needed. This provides scope for updating certain details within the timeframe of an existing plan.

The effective management that marine planning aims to achieve has the potential to provide the fishing industry with improved stability and confidence in its ability to undertake its activities into the future, by providing confidence in the use of space. As such, the approach must take into account the spatial requirements of other marine industries and work within existing institutional responsibilities and regulatory requirements.

The first marine plans for England — the East Inshore and Offshore Marine Plans — were published for public consultation in July 2013 (MMO, 2013a). These draft plans contained a non-spatial blanket policy to protect areas of fishing activity, FISH1: 'Within areas of fishing activity, proposals should demonstrate in order of preference: a) that they will not prevent fishing activities on, or access to, fishing grounds; b) how, if there are impacts on the ability to undertake fishing activities and access to fishing grounds, they will minimise or mitigate these; c) the case for proceeding with their proposal if it is not possible to minimise or mitigate the impacts'. The policy applies to the entire plan areas rather than distinguishing fishing grounds of greater or lesser value or importance. This is in contrast to the policies that provide greater levels of protection for an activity within defined spatial areas, such as those for ports

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and shipping and offshore wind renewable energy infrastructure, where proposals should not be authorised unless they clearly demonstrate they will not compromise the activity, or exceptional circumstances apply.

The evidence base for fisheries in English waters does not cover the whole fishing fleet at a spatial resolution that provides sufficient information for marine spatial planning. Data for offshore areas are better than for inshore areas (MMO, 2013b), but it is feasible that the data currently available could be used in more ways. An improved evidence base for fishing is therefore needed, both to support the fishing industry and to facilitate the licensing process for other sectors. A core fishing grounds approach is one way of addressing this.

1.2 What is a 'core fishing grounds' approach?

In responding to the draft East Inshore and Offshore Marine Plans consultation, some fisheries stakeholders stated their preference for a spatial marine plan policy for fishing that identifies those grounds that are of most value to fishers. These areas were referred to as 'core fishing grounds' in which fishing might be given priority consideration over other activities. Such an approach would simultaneously provide greater support to the fishing industry within areas that are most important to it, as well as providing clarity for other marine industries on potential obstacles to the licensing process related to fisheries at an early stage.

However, for such an approach to be feasible a number of issues need further consideration, namely:

- On what basis the importance of areas should be defined for different fishing industry sectors.
- The scale at which core fishing grounds would be usefully identified.
- both geographically and in terms of fleet segments.
- How core fishing grounds might be identified and how they might be represented in marine plans.
- How to address the data requirements for implementing this approach.
- How the areas might be adapted and adjusted over time.
- What marine plan policies would apply within these areas.
- What policies would apply outside these areas.

There are also other options for supporting fisheries within marine planning policies — rather than spatially defining core fishing grounds — and consideration needs to be given to whether a core fishing grounds or an alternative approach might be the most appropriate way to support fisheries. Generally, the wording of any marine plan policy (both spatial and non-spatial) is important in determining the level of support provided.

Any spatial approach in marine planning should support decision making to achieve sustainable development of the marine area, minimising conflicts between sectors and enabling industries to plan for the future with confidence.

1.3 Fisheries management and spatial measures

Commercial fisheries have been subject to increasing regulation over the past fifty years to seek to protect fish stocks and, more recently, to protect the marine environment. These regulations stem from European, national and local legislation reflecting the complex management responsibilities for fisheries in UK waters and include spatial management measures (where fishers can and cannot fish), controls on fishing methods, minimum landing sizes, and controls on landings of the majority of commercial fish species through quota systems. European fisheries have an important international dimension as many fish stocks straddle national boundaries and historically many fisheries have been open access. This adds to the complexity of European fisheries management, which is governed by the European Common Fisheries Policy (CFP).

Stock management under the EU CFP involves the spatial allocation of Total Allowable Catches (TACs) within International Convention for the Exploration of the Sea (ICES) areas. This restricts the areas in which fishing for certain target species can take place, in line with the areas for which the vessels involved have quota available to fish against. Any spatial policy for fisheries under marine planning would have to take into consideration these spatial and stock-based management approaches for fisheries under the CFP. It cannot modify measures for fisheries management, but would seek to recognise fisheries interests in marine planning.

In general, spatial management measures provide priority access to some users by restricting access to other users. Spatial management measures have been used in fisheries for a long time to confer rights on fishers (e.g. 'Territorial Use Rights in Fisheries' (TURFs) (MRAG *et al.*, 2009) and Several Orders and Regulating Orders in the UK (Defra, 2013)). Spatial management measures have also been used to restrict or prohibit access to fishers for resource management (e.g. closed areas for stock recovery and management) or nature conservation purposes (e.g. bye-laws to restrict fishing activities where necessary to support the achievement of site conservation objectives in marine Special Protection Areas (SPAs) and Special Areas of Conservation (SACs) in inshore waters around England). However, consideration of spatial restrictions on fishery access for resource management or nature conservation purposes is not within the scope of this report.

Core fishing grounds would be a spatial planning approach that might confer priority access for fishers to particular areas. While spatial approaches are used extensively in marine management, the establishment of a core fishing grounds approach in marine planning, where fishing is prioritised, has yet to be taken forward in a systematic way under any national planning regime. However, with increasing competition for space in European waters, and with marine planning now being carried out in English waters, it is appropriate to explore the opportunities and challenges of using a core fishing grounds approach in marine spatial planning.

1.4 Aims and objectives

The aim of this project was to explore the opportunities and challenges of using a core fishing grounds approach to develop spatially-explicit marine plan policies for

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fishing, by discussing the implementation and potential outcomes of such a policy with the industry, managers and relevant experts.

The objectives of this project were:

- To review the approach to fishing activities taken in existing statutory and non-statutory marine spatial plans
- To explore the practical implementation of a marine plan spatial policy based on core fishing grounds with the fishing industry and relevant stakeholders to provide an understanding of opportunities and challenges of using such an approach
- To provide an understanding of the benefits and limitations of including a spatial policy based on core fishing grounds in marine plans
- To provide recommendations for developing fisheries policies in marine plans for England.

An assessment of the opportunities and challenges of using such an approach will provide clarity as to how future marine plans and plan revisions may be best used to protect valuable areas of fishing activity. This report focuses on its application to commercial fisheries, but such an approach could also be used to incorporate spatial information from other sectors, for example the recreational sector.

The conclusions will contribute to developing marine plan policies that support and benefit both the fishing industry and other users of the marine area, as well as ensuring sustainable management of the marine environment.

1.5 Methodology and approach

A review of existing marine spatial plans was carried out, to identify the extent to which formal spatial policies for fisheries had been incorporated globally and whether a core fishing grounds-type approach had been adopted. Examples of spatial management of fisheries were also reviewed that might provide useful lessons for developing a core fishing grounds approach for English waters (Annex 2).

An introductory letter was sent out to fisheries stakeholders including industry and agency representatives by MMO on 4th February 2014, to inform them of the project, invite their participation in a workshop, and invite comment on the suggested stakeholder list. The letter to stakeholders and stakeholder list are provided in Annex 1. A press release was prepared, which resulted in articles in Fishing News, World Fishing (World Fishing & Aquaculture, 2014) and Fish News EU (Fishnewseu.com, 2014).

The project workshop was held on 24th February 2014 in London, England, to discuss the pros and cons of a core fishing grounds approach and issues for its implementation. A draft report based on the review of current practice and research and workshop considerations was prepared and shared with workshop participants and other stakeholders for review. This final report incorporates updates in light of comments and feedback received.

2. Review of Case Studies and Academic Research

2.1 Case studies

The case studies reviewed were marine spatial plans in the UK, Europe and worldwide. Conservation-based approaches such as MPAs, resulting in the spatial restriction of fishing activities (Section 2), were not included in the review. Spatial approaches to management of fisheries, where they confer access or use rights to certain fishing groups over others, were included in the review to demonstrate the feasibility of identifying key fishing areas for certain fisheries.

The case studies reviewed were:

- Draft East Inshore and Offshore Marine Plans
- Scotland Draft National Marine Plan
- Shetland Islands' Marine Spatial Plan (SMSP)
- Draft Maritime Spatial Plan for the Belgian part of the North Sea
- Marine Spatial Plan for the German Exclusive Economic Zone in the North and Baltic Seas — Draft
- The Netherlands National Water Plan (NWP)
- Norwegian Sea Integrated Management Plan
- C-SCOPE Dorset Coastal Plan
- US Rhode Island Ocean Special Area Management Plan (SAMP)
- US Massachusetts Ocean Management Plan
- South Devon Inshore Potting Agreement (IPA)
- Mid-Channel Agreement (MCA)
- Several and Regulating Orders.

Key points from these case studies are summarised in Table 1. A description of each case study is provided in Annex 2.

Marine spatial plans to date have generally not implemented spatial policies for fisheries in defined core fishing grounds. This is due to data limitations and difficulties in identifying particular areas, how temporal change in fishing areas can be addressed, concerns over how such an approach would work with CFP-related spatial restrictions on fishing effort (spatial allocation of quota), and the adoption of non-spatial policy approaches that aim to protect fishing interests in licensing decisions on a case-by-case basis.

The SMSP has taken the concept of spatially-defining core fishing grounds furthest. Some plans still provide robust protection of the fisheries sector through other means. For example, the Norwegian Sea Integrated Management Plan and Scotland's Draft National Marine Plan both contain a range of provisions to ensure that the needs of the fishing industry are taken into account in licensing decisions.

2.2 Academic literature review on methods

A review of relevant academic research on methodologies for defining core fishing grounds was also carried out and is provided in Table 2.

Methodologies for analysing VMS data, differentiated by gear type, are well established (e.g. Fock, 2008; Jennings & Lee, 2011; Jennings *et al.*, 2012; Kafas *et al.*, 2012; Campbell *et al.*, 2014) and a number of these explore individual vessel's, regional and national fleets' spatial extent of fishing activity and the year-to-year variability in fishing grounds. These studies demonstrate that it is possible to use VMS data to define core fishing grounds, identifying distinct areas of more intense fishing activity, and more extensive margins that are fished less frequently. Gear-specific analysis is important to avoid patterns being dominated by the most common fishing method. Year-to-year variation in spatial fishing patterns differed between studies (Jennings & Lee, 2011, Jennings *et al.*, 2012) and differed between gears (Campbell *et al.*, 2014). Fishing areas for UK and non-UK fleets using the same gear type (beam trawl) were different (Jennings *et al.*, 2012).

There is less information available on fishing patterns of non-VMS vessels. Approaches such as Fishermap (des Clers *et al.*, 2008; des Clers, no date) (also ScotMap in Scotland and Fishmap Mon in Wales) have used participatory mapping methods to spatially identify fishing grounds. Linking this to information on percentage of annual earnings can generate spatial maps representing economic value. However, participatory methods such as FisherMap provide a snapshot and ensuring validity of the data over time could be resource-intensive. Additionally, these methods are non-empirical and more subjective than analyses based on VMS-generated data, so their validity and representativeness could be questioned especially where there are conflicting claims over areas. Data on vessel sightings in the 0–6nm area (collected by Sea Fisheries Authorities, now Inshore Fisheries and Conservation Authorities (IFCAs), and enforcement agencies) have been standardised and developed into fishing activity data layers. However, they are only indicative of the location of activity as monitoring is not continuous and the patrol effort is optimised for enforcement purposes, not collection of sightings data (Vanstaen & Silva, 2010). Significant knowledge on fishing grounds for inshore vessels is also held by local experts (e.g. fisheries groups, IFCAs, etc.) and fishing communities, but is difficult to standardise and quantify.

Table 1: Summary of case studies.

Case Study	Use of spatial policies for fisheries	Definition of core fishing grounds	Data used (inc. resolution)	Involvement of fishing industry	Future-proofing	Key considerations
Draft East Inshore and Offshore Marine Plans	<p>Whole plan area defined as fishing area. Policy FISH1 specifies that proposals (for other licensable activities) should demonstrate (in order of preference):</p> <ul style="list-style-type: none"> • They will not prevent fishing; • If there are impacts how these will be minimised or mitigated; • Why the proposal should proceed if impacts cannot be minimised or mitigated. 	Core Fishing Grounds (CFGs) not defined.	<p>Maps provided that show an indication of fishing grounds/ fishing intensity for:</p> <ul style="list-style-type: none"> • VMS (>15m vessels) (time spent in hours, demersal mobile gears, 2007–2010, 1/200th ICES rectangle); • Marine Conservation Zone (MCZ) Fisherman combined gear fishing intensity (low-high, 1/200th ICES rectangle) (but does not cover entire <15m fleet); • Total fishing effort 2011 (from fisheries activity database, based on reported landings, ICES rectangle). 	Involvement of stakeholders through workshops, meetings, drop-in sessions. Opportunity to comment on draft.	The Plan must adopt an 'adaptive management' approach, so that it can be modified in future in response to information (e.g. on impacts on ecosystems, effectiveness of management or policies) collected from monitoring. Plans are formally reviewed every 6 years. There is scope for revision if new evidence comes to light through deviation to the plan.	<ul style="list-style-type: none"> • CFG not defined; • Fisheries addressed in general terms due to difficulties of identifying CFG; • Fisheries sector treated differently from some other marine sectors, which have greater protection in defined areas; • Spatial resolution of data not adequate to define CFG; • Spatial information on <15m vessels not complete (does not cover all vessels); • Stakeholder input indicated interest in defining CFG.
Scotland Draft National Marine Plan	<p>Fishing takes place in all Scottish sea areas. No spatial policies for fishing grounds.</p> <p>Developments must take account of fishing and consult local interests where appropriate.</p> <p>Developments that may impact on fisheries should take into account various factors (see</p>	CFGs are not defined, but general policies to prevent and minimise/mitigate impacts on fisheries are well described.	<p>Average effort (kW days) in Scotland's seas by all UK vessels (all lengths; 2005-2011) (ICES rectangles);</p> <p>Average value of landings from Scotland's seas, 2005-</p>	<p>Not described in consultation document.</p> <p>Inshore Fisheries Groups will provide input for spatial management for the inshore sector.</p>	<p>Not stated how frequently the Plan will be reviewed or how long valid for.</p> <p>Not clear if or when Scotmap data will be revised.</p>	<ul style="list-style-type: none"> • CFG not defined; • Fisheries sector protected through well-described but non-spatially-explicit policies; • Data presented in plan not of sufficient resolution to determine CFGs;

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Case Study	Use of spatial policies for fisheries	Definition of core fishing grounds	Data used (inc. resolution)	Involvement of fishing industry	Future-proofing	Key considerations
	detailed text below). With regard to the inshore sector, spatial management in future years will become part of regional marine planning, for which Inshore Fisheries Groups will provide fisheries management input.		2011) (ICES rectangles). Scotmap data (for <15m vessels) not presented in plan.			<ul style="list-style-type: none"> Fishing industry concerned about potential impacts of other developments on their activities.
Shetland Islands Marine Spatial Plan	<p>The whole plan area is indicated as a fishing area, and fisheries provided greater protection in 'important fishing grounds'. Developments will only be permitted where it can be demonstrated that:</p> <p>a) there will be no significant damage² or permanent obstruction to an important³ fishing area;</p> <p>b) there will be no damage to a known/designated spawning or nursery area for commercially exploited species of fish;</p> <p>c) it will not cause an unsafe navigational hazard for commercial fishermen; or</p> <p>d) there is no reasonable alternative and any such adverse</p>	<p>Important fishing grounds are described as fishing areas that may be important in relation to the species caught, gear(s) used, the size or type of fishing vessels that operate in the area, and/or the communities where those vessels are based.</p> <p>Important fishing grounds are not statutorily spatially defined.</p> <p>Maps of important fishing grounds are indicative, and developers must consult with the</p>	<p>Maps provided (2006–2011) showing:</p> <ul style="list-style-type: none"> Indicative demersal fishing effort based on VMS data (low-high) – noted that fishing ground mapping being updated through consultation with industry (high resolution, 500m). Importance calculated on log scale, benchmarking in consultation with industry; Indicative important shellfish dredging grounds (based on interviews with local fishermen); 	<p>Commercial fisheries stakeholders were invited members of the Shetland Marine Spatial Plan Advisory Group, the Policy Development Industry sub-group and the Spatial Analysis Working Group.</p>	<p>This is the fourth edition of the SMSP which will be updated (through monitoring and review) to reflect changes that occur and ensure it is kept up to date and remains relevant.</p> <p>Pending legislation for Regional Marine Plans is expected to provide guidelines on conducting regular reviews and reporting on progress of Regional Marine Plans.</p>	<ul style="list-style-type: none"> Most developed spatial policy for fisheries; Fishing grounds not permanently defined due to data deficiencies (VMS misclassification, patches of underreporting) and potential for change; Small number of whitefish boats (26) facilitated consultation and agreement; Shellfish grounds harder to map, due to no VMS, more fishers involved (and part-time); If grounds were specified in the plan, they would be difficult to update regularly;

² Damage may include the disturbance or removal of sediment, the deposition of sediment or other materials, changes to sea-bed topography (including the creation of trenches, mounds, pits, etc., or the exposure of boulders), or other changes to the characteristics of the sea-bed that may affect the distribution or abundance of commercially important species of fish and/or hinder commercial fishing operations.

³ Fishing areas may be 'important' in relation to the species caught, gear(s) used, the size or type of fishing vessels that operate in the area, and/or the communities where those vessels are based.

Case Study	Use of spatial policies for fisheries	Definition of core fishing grounds	Data used (inc. resolution)	Involvement of fishing industry	Future-proofing	Key considerations
	effects are clearly outweighed by social, environmental or economic benefits of national importance.	industry regarding important grounds, particularly as important grounds may change over time.	<ul style="list-style-type: none"> Indicative important shellfish creeling grounds (based on interviews with local fishermen and modelled habitat distributions); 			<ul style="list-style-type: none"> Fishing effort used as metric, as it is correlated with value/profitability; Need to use long time-series of data as current fishing patterns may be restricted by days at sea and quota regulations; Building a good relationship and trust with fishing industry is important.
Draft Maritime Spatial Plan for the Belgian part of the North Sea (BNS)	<p>Fisheries were not included in the original Master Plan for the Belgian Part of the North Sea (BPNS).</p> <p>The spatial policy options summarised in the draft (revised) Marine Spatial Plan are:</p> <ul style="list-style-type: none"> Preservation of current fishing grounds, except for the renewable energy zone (navigation prohibition) and for infrastructure development for coastal defence, energy storage and energy transport; Preservation of access to the Belgian fishing ports; Stimulate alternative, sustainable fishery in parts of the 'Vlaamse Banken' SAC. <p>Federal State has competency for nature conservation; Flemish Region has competency for fisheries.</p>	<p>Core fishing grounds are not defined. In the 'existing situation' fisheries description the Plan states that "Based upon research (counts, control flights, qualitative research...), a picture can be formed of the important fishery areas in the BNS". The plan states that "Rich, unpolluted fish areas are necessary for a good, large and healthy catch. However, there is little objective data available about the presence of fish in so-called fish-rich or fish-poor areas".</p>	Map of fishing activities of the Belgian fishing vessels on the BNS (EC trawl dragnets with capacity under and over 300hp)	Revisions to the Plan included formal and informal consultation with all stakeholders	The Plan will undergo a complete evaluation and possible amendment every six years.	<ul style="list-style-type: none"> CFG not defined, and no specific policy to protect fishing grounds; Maps of fishing activity are provided but are indicative; Split competencies for fisheries between regional (Flemish) and federal level complicate policy development.

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Case Study	Use of spatial policies for fisheries	Definition of core fishing grounds	Data used (inc. resolution)	Involvement of fishing industry	Future-proofing	Key considerations
Marine Spatial Plan for the German Exclusive Economic Zone in the North and Baltic Seas — Draft	<p>No spatial policies for fisheries are provided in the plan.</p> <p>However, fisheries is referred to in the exploitation of non-living resources and energy production facilities:</p> <ul style="list-style-type: none"> • The needs of fisheries shall be taken into account when exploring for and exploiting non-living resources. • The interests of fisheries and military defence shall be taken into account during planning, operation and construction of energy production facilities. 	<p>Core fishing grounds are not defined. The Plan states that 'area designations for fisheries are not possible because of the regulatory competence of the EU and because fishing grounds cannot be spatially delineated'.</p> <p>This is despite prior research carried out by the Institute for Sea Fisheries that indicated principal areas for fisheries could be defined through use of VMS data.</p>	<p>No description or maps of the spatial extent of fisheries are presented in the plan.</p>	<p>Stakeholder participation comprised mostly consultations with other federal Agencies (aside from the leading agency) and public review of Plan documents (information from UNESCO, 2013 not the Plan document).</p>	<p>No information regarding Plan revision (UNESCO, 2013).</p>	<ul style="list-style-type: none"> • CFG not defined; the plan states that fisheries regulation is EU competence and it is not possible to spatially delineate fishing grounds.
The Netherlands National Water Plan (NWP)	<p>Fishing is described as applicable for the entire Exclusive Economic Zone (EEZ) if compatible with activities of national importance (sand extraction and replenishment, renewable (wind) energy, oil and gas recovery, CO₂ storage, sea shipping and defence areas). In areas that have been designated for activities of national importance, other activities must not hinder this use.</p>	<p>Core fishing grounds not defined.</p>	<p>Outer limits of plaice box shown in current use spatialisation map (Map 24, NWP, 2009);</p>	<p>Consultation with the Dutch fishing sector is referred to with regards to working towards the sustainability of fishing in the North Sea.</p>	<p>The plan will be revised every 5 years (UNESCO, 2013).</p>	<ul style="list-style-type: none"> • CFG not defined • Other sectors 'of national importance' given preference over fisheries
Norwegian Sea Integrated Management Plan	<p>Spatial measures relate to restriction of fishing (protected areas, trawl-free zones, etc).</p>	<p>Core fishing grounds are not defined.</p>	<p>Maps showing number of fishing vessel movements (1–5knots)</p>	<p>Stakeholder involvement throughout plan</p>	<p>Present plan will be updated at regular intervals up to 2025</p>	<ul style="list-style-type: none"> • Protection to fisheries provided through non-spatial measures

Case Study	Use of spatial policies for fisheries	Definition of core fishing grounds	Data used (inc. resolution)	Involvement of fishing industry	Future-proofing	Key considerations
	<p>Restriction of Oil & Gas (O&G) activities to protect important spawning areas/periods. O&G licensing requirements – must take ‘special account of fisheries activities and the presence of marine organisms at critical stages in their life cycles’ – there are restrictions on timing of seismic surveys.</p> <p>‘The authorities can introduce spatial planning processes to ensure that energy production [renewables] takes place in areas where the potential for conflict with fisheries and maritime transport is low enough to be acceptable.’</p>		and number of position reports.	development. Consultations and open conferences held during the development stages of the plan.	<p>with a view to an overall revision in 2025 for the subsequent period.</p> <p>Fishing grounds are not spatially defined, therefore provides flexibility in application over time.</p>	<p>(restriction of O&G activities to minimise impact on spawning periods, larvae)</p> <ul style="list-style-type: none"> • Spatial measures may be adopted to minimise conflict between fisheries and renewables.
C-SCOPE Dorset Coastal Plan	<p>Does not contain specific spatial policies for the benefit of commercial fisheries.</p> <p>General (non-spatial) policy to benefit fisheries:</p> <p>SME2: Development in the marine and coastal environment should be tested for its contribution to, and impact on, the criteria presented in Box A of the Dorset Coastal Plan (which includes the activity commercial inshore fishing).</p> <p>SME3: Development which would have an adverse impact, directly, indirectly or cumulatively on the criteria laid out in Box A.</p>	Core fishing grounds are not defined.	Commercial inshore fishing activity (number of boats).	Commercial fisheries stakeholders involved in the C-Scope marine planning process and some stakeholders were also on the Marine Spatial Planning Task and Finish Group which met eight times over three years. Interviews were also undertaken with additional fisheries stakeholders to	It is proposed that the C-Scope Plan will be reviewed on no more than a five year cycle and that the opportunity will be taken to synchronise reviews with Local Plans and national statutory Marine Plans where possible.	<ul style="list-style-type: none"> • CFG not defined.

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Case Study	Use of spatial policies for fisheries	Definition of core fishing grounds	Data used (inc. resolution)	Involvement of fishing industry	Future-proofing	Key considerations
				complete an interactions matrix as part of the marine plan evidence base.		
US Rhode Island Ocean Special Area Management Plan (SAMP)	Fishing areas are distributed throughout the whole Plan area (e.g. see gear activity distribution maps in Chapter 5 of the Plan). As a general policy the Plan states that the Council will ensure that proposed activities shall be designed to avoid impacts to sensitive habitats (spawning and nursery areas) and where unavoidable impacts may occur those impacts shall be minimised and mitigated. In addition, the Council will give consideration to habitat used by species of concern as defined by the NMFS Office of Protected Resources.	Core fishing grounds are not defined. 'Areas of Particular Concern' (APC) can be identified to protect areas of human use value (e.g. areas of high fishing activity), but had not yet been designated as APCs. The importance of 'Essential Fish Habitat' and spawning and nursery grounds are recognised.	Historic trawling areas, qualitative input on fishing grounds from fishers, fishing intensity based on Vessel Trip Reports, by gear (to produce 'number of trips per cell', (one minute grid spacing, 1/1800 th ICES rectangle), 1998–2008.	Fisheries stakeholders (regulatory agencies and fishers) were involved/ consulted on the process.	The Plan can be continually amended through an administration process and will undergo a major review every five years.	<ul style="list-style-type: none"> • 'Essential Fish Habitat' (nursery areas, spawning grounds) are identified and protected (or impacts minimised/ mitigated) • Plan provides scope to protect CFG through APC.
Massachusetts Ocean Management Plan (USA)	Fishing activity is an allowed use in the 'multi-use' area of the plan and is managed by the Division of Marine Fisheries (DMF). The DMF has sole authority for opening or closing areas for fishing of all or any fish species. Assessments of the compatibility of specific types of development with fishing activities informed by understanding of high value commercial fishing activity and recreational activity.	Core fishing grounds not defined although fishing effort is ranked low-high and areas of high resources and high fishing effort/value are identified (maps in Appendix of the plan). Important fish resource areas identified as a Special, Sensitive or Unique area (SSU).	DMF collected data regarding commercial fisheries activity, fisheries resources and qualitative information from fishermen. Fishing effort and landings value from catch reports. VMS data from 2007-2008 digitised. Ranked fishing activity	Fisheries stakeholders (local fishers and fishing management bodies) were consulted	The Oceans Act requires that EEA review and update the plan at least once every five years, and in January 2013, EEA initiated this review. Performance indicators for plan e.g. economic value of fisheries; change in total fish/mollusc biomass or	<ul style="list-style-type: none"> • Important fish resource areas identified as SSU • High-value fishing areas identified • CFG not defined although DMF has authority to open/close areas to some or all fishing.

Case Study	Use of spatial policies for fisheries	Definition of core fishing grounds	Data used (inc. resolution)	Involvement of fishing industry	Future-proofing	Key considerations
			by combined fishing effort and total landings value. 'High commercial fishing' areas shown on map.		abundance.	
South Devon Inshore Potting Agreement (IPA)	<p>The Inshore Potting Agreement (IPA) is a fisheries-specific spatial management measure. It was established in 1978 as a voluntary agreement and has since undergone revision and adaptation, and is now enshrined in national legislation.</p> <p>Exclusive areas are established for fixed gears (pots). Mobile gears (trawls) are allowed access to certain areas either on a permanent or seasonal basis.</p>	<p>Core fishing grounds are not defined. However, potting effort within the static gear areas of the IPA is intensive, and the boundaries of the system effectively denote the core areas for potting.</p> <p>Scallop dredging, beam trawling and otter trawling can be intensive within seasonal areas of the IPA and outside the system's boundaries.</p>	<p>The areas were initially established based on historical use patterns. Most of the static gear vessels fishing within the IPA are less than 12m Length Overall (LOA), and so are not required to carry VMS. Most mobile gear vessels operating within and around the edge of the IPA are equipped with VMS.</p>	<p>Fishers were solely responsible for developing the IPA originally. Fishers' representatives from different sectors still meet annually to discuss amendments to the boundaries or seasonal elements of the system as needed.</p> <p>Two fishers' associations represent all of the static-gear fishers and most of the towed-gear fishers operating in the IPA.</p>	<p>The IPA is protected by national legislation, but modifications to extent of the system and/or to the dates of opening and closing different areas can be made through discussions at annual meetings, with proposals for changes going to Defra for confirmation.</p>	<ul style="list-style-type: none"> • IPA has been successful because all fisheries uses and users were involved in its creation. • It is easier to manage and maintain stable systems than temporally changing approaches. Reallocating seasonal territories has the potential to create conflict within and between sectors. • Conflict avoidance and regulatory compliance is more likely if management negotiations can be conducted by bodies that represent fishers en masse.
Mid-Channel Agreement (MCA)	<p>The Mid-Channel Agreement (MCA) was established as a voluntary agreement in the late 1970s. It establishes areas for static gears (pots), and corridors in between where mobile gears (trawls) are allowed. These areas are seasonal.</p> <p>An annual meeting on the shape</p>	<p>Core fishing grounds are not defined. However, potting effort within the static gear areas of the MCA is intensive, and the boundaries of the system effectively denote the priority</p>	<p>Most of the static gear vessels fishing within the MCA are over 12m LOA, and so are required to carry VMS. Most mobile gear vessels operating within and around the edge of the MCA are</p>	<p>Fishers were solely responsible for developing the MCA originally. Fishers' representatives from different sectors still meet annually to discuss</p>	<p>The MCA remains a voluntary, non-statutory agreement between fishers. Transgressions of the system are reportedly common, but there</p>	<ul style="list-style-type: none"> • The absence of statutory protection for the MCA has led to a continuing level of transgression, with loss of gear and time for both static and mobile gear fishers. • Despite some problems, the MCA works in

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Case Study	Use of spatial policies for fisheries	Definition of core fishing grounds	Data used (inc. resolution)	Involvement of fishing industry	Future-proofing	Key considerations
	<p>and operation of the MCA is held between fishers' representatives, culminating in new MCA charts being drawn up and issued.</p>	<p>areas for potting. Scallop dredging, beam trawling and otter trawling can be intensive within seasonal areas of the MCA and outside the system's boundaries.</p>	<p>equipped with VMS.</p>	<p>amendments to the boundaries or seasonal elements of the system as needed.</p>	<p>is no formal penalty system and censure can occur only through peers or representative organisations. The MCA has endured despite being voluntary. Modifications to extent of the system and/or to the dates of opening and closing different areas can be made through discussions at annual meetings.</p>	<p>general because the alternative of having no arrangements for managing static and mobile gear conflict in the mid-Channel would be debilitating for both sectors.</p>
<p>Several and Regulating Orders (UK)</p>	<p>Allows certain rights to the Order's grantee within a defined area. Several Orders allow grantees to deposit, propagate, dredge, fish or take named species within an area and time. May also restrict fishing practices within specified area to protect shellfish stock.</p> <p>Regulating Order allows grantee to harvest a named species within a specified area and time.</p> <p>Orders can cover any portion of the seabed, shore or estuary/tidal waters.</p>	<p>Several and Regulating Orders define the areas in which the Orders are applicable.</p>	<p>A range of spatial data sources collated by the Scottish Fisheries Co-ordination Centre</p>	<p>Fisher's must follow formal procedure when applying for an Order and follow conditions of authorisation.</p>	<p>Formal applications must include a 5-year management plan.</p>	<ul style="list-style-type: none"> • No CFG although Orders are granted for a specific area in sea or tidal waters in Great Britain for shellfish cultivation/harvest. • May be granted for up to 60 years although 10 to 30 is more common.

Table 2: Summary of relevant research.

Research paper	Relevance to spatial policies for fisheries	Definition of core grounds	Data used (inc. resolution)	Involvement of fishing industry	Future-proofing	Key considerations
Fock (2008)	Research to define principal areas for fisheries in the German EEZ using VMS data.	Principal areas for fisheries defined as areas in which 75% of the effort of either year is carried out.	VMS data from 2005 to 2006 to determine vessel-based fishing effort. German vessels only. 5 fisheries with highest effort levels analysed (gill netting, pelagic trawling, demersal otter board trawling, beam trawling >300hp and <300hp).	n/a	Comparison with historical effort for demersal otter board trawling shows relative stability of spatial utilisation patterns.	<ul style="list-style-type: none"> Research demonstrated that definition of core grounds is possible with VMS, yet the German MSP did not adopt the approach, stating that it was not possible to spatially delineate fishing grounds.
Jennings & Lee (2011)	Research on methods for defining fishing grounds using VMS. Investigated individual vessels, fleet at regional (South-west) level, and national level.	Fishing grounds had extensive margins where fishing activity was low. Excluding the most lightly fished 10%, 20% or 30% of area results in a marked decrease in area.	Gridded VMS data at 0.05° grid resolution. 2006–2009 data used. Vessels classified into fleet segments based on gear type. Activity of vessels <15m and non-UK vessels were not included (data not available). VMS data limitations – records may be misclassified as ‘fishing’; use of point data in lieu of fishing tracks underestimates the area fished.	n/a	n/a	<ul style="list-style-type: none"> For all gear and scales of time and space considered, the full extent of areas fished consisted of relatively small, intensively fished core areas, and relatively large, infrequently fished margins. 90% of activity tends to take place in <50% of the total area fished. Year-to-year variation was limited.
Jennings <i>et al.</i> (2012)	Assessment of fishing activity of UK and non-UK vessels in the southern and central North Sea where MPAs are proposed, in order to inform spatial planning.	Identified most intensively-trawled grounds by both UK and non-UK trawlers as areas accounting	VMS vessel identity, position and speed data from 2006-2010 obtained from MFA/MMO. Speed rule used to identify	n/a	n/a	<ul style="list-style-type: none"> Spatial differences identified between fishing grounds used by UK and non-UK beam trawlers.

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Research paper	Relevance to spatial policies for fisheries	Definition of core grounds	Data used (inc. resolution)	Involvement of fishing industry	Future-proofing	Key considerations
	Quantified habitats interactions and seabed impacts of fishing activity.	for 70%, 80%, 90% and 100% of fishing effort. Defined boundaries for trawled areas and the proportion of total fishing effort/value by calculating cumulative effort/value. Done by summing effort/value by grid cell in rank order from high to low (3x3km grid cell resolution). Calculated total fishing effort and interannual variation in fishing effort.	fishing activity. Each period of fishing activity assigned to a vessel and gear type by linking VMS data to national logbook data. Landings weight and landings value data obtained from MMO. Estimated by using allocated vessels to ICES rectangles.			<ul style="list-style-type: none"> • Total footprint of fishing varied between years. • Total fishing footprint included core areas that accounted for the majority of effort and extensive margins that accounted for much less. • Large and lightly fished grounds contribute more to habitat impacts. Restricting fishing to core areas would reduce environmental impacts.
Kafas <i>et al.</i> (2012)	Methodology for analysing VMS data to assess fishing activity, landings weight and value.	n/a	Anonymised VMS for >15m UK vessels landing into UK ports, 2007–2011, combined with landings information. Speed rule used to identify fishing activity. Weights and values allocated to VMS pings using ICES rectangles divisions and weights on points according to time. Non-parametric density analysis used, contour maps produced showing activity, and weighted by landings and value.	n/a	n/a	<ul style="list-style-type: none"> • Representation of marine fisheries in Scottish waters using this method was better than using gridded data.
Campbell <i>et al.</i>	Investigation into gear-specific	Distinct areas of	VMS data at 0.05° grid	n/a	n/a	<ul style="list-style-type: none"> • Linking VMS records

Research paper	Relevance to spatial policies for fisheries	Definition of core grounds	Data used (inc. resolution)	Involvement of fishing industry	Future-proofing	Key considerations
(2014)	spatial patterns of fishing using VMS data, south-west England.	intense fishing could be identified for all gear types. Intensely-fished areas vary between gear types. Static gears focussed in fewer areas; mobile gears more widely distributed. Year-to-year patterns were consistent for mobile and static gears, but longlining showed a slight shift in spatial distribution between years.	resolution, ICES divisions VIIe–h. 2005–2008 data used. >15m UK vessels only. Vessels classified by gear type.			<p>to gear type is important; this is difficult for non-UK vessels.</p> <ul style="list-style-type: none"> • Gear-specific analysis is important to avoid patterns being dominated by the most common fishing method. • Distinct areas of intense fishing could be identified for all gear types. • Fishing areas for mobile gears were most widely distributed. • Year-to-year variation differs between gears.
Toonen & Mol (2013)	Use of spatial approaches to fisheries management in the Dutch North Sea plaice fishery (no-take zones) enabled the fishery to obtain MSC certification.	n/a				<ul style="list-style-type: none"> • Spatial approaches can be used effectively in fisheries management.
Jentoft & Knol (2014)	Discussion paper on marine spatial planning and fisheries in the North Sea.	MSP can help protect against intrusion of other user groups, but core grounds are not defined.	n/a	Fishers find themselves in situations where they need to negotiate spatial claims with other user groups. Often lack power compared to other	Fishers fear that their much-needed mobility will be reduced as they might become bound by their own maps in the future.	<ul style="list-style-type: none"> • Less powerful groups risk being marginalised through MSP if they are poorly represented or unable to back up their claims. • Need for improved

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Research paper	Relevance to spatial policies for fisheries	Definition of core grounds	Data used (inc. resolution)	Involvement of fishing industry	Future-proofing	Key considerations
				powerful industries (e.g. oil and gas, renewables). Fishers are increasingly engaging with MSP.		coordination of MSP efforts at all scales and across sectors in the North Sea.
des Clers <i>et al.</i> (2008)	FisherMap used a participatory approach to map the nature and extent of fishing activities and fishermen's knowledge of marine ecosystems in connection with the 'Finding Sanctuary' project to identify Marine Conservation Zones around the coasts and seas of Devon and Dorset in 2007 and 2008.	Spatial representation of the areas used by different fishermen, by gear type and vessel length. Density maps showing the number of vessels by area represent important grounds for different fleet segments.	Maps (high resolution but resolution not specified – as precise as the interviewees can indicate on the chart provided, and for the previous 5 years) showing footprints of areas used, and relative density of vessels, based on information from fishermen. No economic or value data were used.	Involvement of fishermen fundamental to the participatory approach. Fishermen were interviewed and drew the areas that they use on maps. This was digitised in GIS and linked to fishing methods and gear type, species targeted, and the months when activity takes place. Aggregated data by home port were validated through meetings.	FisherMap provides a snapshot. Updating it could require significant time and resources.	<ul style="list-style-type: none"> Participatory mapping approach was a valuable way to obtain information on fishing activities and gear types, seasonal use and local ecological knowledge. The approach requires significant commitment of time and resources and requires trust to be built up with the fishermen.
des Clers (no date)	Revision of FisherMap methodology in des Clers <i>et al.</i> (2008) (peer review initiated by Seafish) to incorporate percentage contribution to livelihood (percentage gross earnings), and bring gear categories in line with those used by the then Marine and Fisheries Agency (now MMO).		Protocol enables individual fishing grounds to be linked to data from the Seafish annual fisheries economic survey by fleet segment to provide a spatial representation of economic value.	Participation of fishermen is fundamental to the approach, as in des Clers <i>et al.</i> (2008).	A revised FisherMap would provide a snapshot. Updating it could require significant time and resources.	<ul style="list-style-type: none"> Fishermap provides data that are not available elsewhere – on spatial fishing grounds for vessels under 15m fishing beyond 6nm.

3. Exploring the Practicalities of Implementing a Core Fishing Grounds Approach

This section discusses the key issues related to the practicalities of implementing a core fishing grounds approach in marine planning. It covers:

- How to define 'core grounds' and their functioning
- Data
- Implementation.

It is based on input from stakeholders gathered through the project workshop held in London on 24th February 2014. Full workshop outputs are provided in Annex 3. The workshop participants showed a preference for a core fishing grounds approach with defined boundaries (rather than a core fishing grounds approach without set boundaries; an approach where 'everything is important'; or 'something else').

The **potential benefits** of a core fishing grounds approach, identified at the start of the workshop by participants, were:

- **Improved access to data** – potential to provide information that is currently hard to access, supporting policy development; provide a baseline for planning.
- **Clarity and security** – importance of protecting vital fishing grounds from other sectors; enable fisheries to spatially define their activities vis-à-vis other sectors, provide clarity for other sectors' development proposals.
- **Recognition of fisheries** – Raise the profile of 'important' grounds through the marine planning system, provide official recognition of fishermen's interests.
- **Support decision-making** – improve decision-making (industry and managers) in the marine area where several activities overlap; help marine planning applications; ensure consistent understanding amongst stakeholders and reduce uncertainty from fishing industry perspective.
- **Reduce conflict** – reduce the potential for conflict through improved decision-making, identify win-wins (e.g. areas suitable for renewables where fishing will be not be impacted).
- **Other issues** – allow consideration of fishing activity in cumulative impact assessments; give parity of treatment of fisheries sector with other 'zoned' sectors; include fishing in the planning debate and planning process.

The **key limitations** with the approach, identified at the start of the workshop by participants, concerned:

- **Lack of data** – its availability (or lack of) for some fleet sectors and areas, and the resulting erroneous conclusion that some areas are not important; the dynamic nature of fishing and variability in fishing grounds may require resource-intensive management and updating of spatial information.

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- **Variability and flexibility** – how can seasonality be reflected; what happens outside core grounds; need to retain flexibility to be responsive to changing fish distribution and changing importance of fishing grounds.
- **Defining importance of areas** – core grounds will vary depending on how 'value' is defined; different sub-sectors may not agree on level of importance.
- **'Boxed in'** – perception of fishing being boxed in to core areas and non-core areas regarded as non-fishing areas; may intensify effort into core areas.
- **CFP** – how does the approach fit with the CFP; need to include UK and other Member States' fishing activity.
- **Other issues** – concern over how to reconcile a data-driven vs a consultative approach; concern that policies will not have any 'teeth' to protect fishing grounds in practice.

Other issues and **potential alternatives** identified at the start of the workshop by participants were varied and wide-ranging, and included:

- **Protection of alternative areas** – protection of areas for essential life history stage habitat protection (breeding, spawning, nursery grounds); an approach not linked to economics; identify areas where fisheries would have less impact (based on habitat sensitivity); other policies or approaches to support the fishing industry and improve industry sustainability.
- **Evidence base** – a more transparent evidence base could support decision making and licensing, with improved indicative maps of fishing activity, rather than a specific spatial policy based on core fishing grounds.
- **Ad-hoc approach** – Promote dialogue on a case-by-case basis, involving regional stakeholders, to ensure support of the fishing industry in plan-led management.

3.1 Implementation aspects

The implementation of a core fishing grounds approach should provide added value from marine planning to both the fishing industry and to other marine sectors. Having a **centralised, strategic approach to the definition of core fishing grounds and the associated policies** would provide clarity for all users and greater certainty in the licensing process.

The benefits of such an approach compared to using a case-by-case approach to licensing decisions that impact on fisheries (as is currently the case) are that the available data and information on fishing activity and the importance of different areas for fisheries would be clear to all users and more consistent across areas, and would enable developers to identify areas of low conflict with fisheries when scoping areas for potential developments. This is in contrast to the current situation, where fisheries activity data are obtained and analysed on a case-by-case basis, not using a consistent methodology, and often at a relatively late stage in the licensing procedure (i.e. after the location has already been determined).

For the fishing industry, such an approach would provide greater security that important fishing grounds would be afforded a greater level of protection, and cumulative impacts on the fishing industry of new developments could be better assessed.

A common, strategic approach to defining core fishing grounds could still be used together with a **plan-by-plan determination** of whether a core grounds approach would be used in the plan area or for certain fleet segments, and which metrics would be used for different fleet segments to define core grounds (section 3.2).

Data availability is a key requirement for a core fishing grounds approach to be operable (see section 3.3). As such, the fishing industry needs to be supportive of the approach and provide the data, or access to it, to be able to implement it. While the fishing industry has in the past been protective over information that identifies fishing areas, this attitude is changing, as fishers recognise their need to provide evidence of their fishing grounds in order to protect them against other developments. Gaining the support and buy-in of the representative fishermen's associations and industry organisations would be important in the success of such an approach.

The responsibility of different agencies in developing and implementing a core fishing grounds approach would need to be defined. As the agency responsible for developing marine plans and taking licensing decisions, MMO would have a role to play. Other agencies and organisations would also need to contribute to the development of the approach, such as through developing datasets, developing alternative metrics (e.g. social), particularly for the inshore fleet, and thresholds (the value of a metric that indicates a 'core' ground). The development of economic metrics (e.g. value of landings) should follow the guidance on economic impact assessments of spatial interventions on commercial fishing developed by Seafish and the UK Fisheries Economics Network (Seafish & UKFEN, 2013).

Using a diversity of metrics may create challenges in defining core fishing grounds. The use of a matrix could help when scoping for project locations and for decision-makers when taking licensing decisions where there may be potential conflicts. A weighting and ranking system could be used to help determine which areas are 'core' fishing grounds taking into account a number of different metrics.

Alternatively, different metrics could be used to identify core fishing grounds for different fleet segments (with the appropriate metric(s) determined by each fleet segment), with these areas being subsumed into a single definition of a 'core' area. Disaggregation of fleet segments would need to be maintained (e.g. in the presentation of maps of core fishing grounds) to account for different co-location/co-existence policies depending on gear type.

3.2 Core grounds' definition and functioning

The definition of what a 'core fishing ground' is, the way in which core grounds are identified, and the policies in place within core grounds as they relate to other sectors, are of primary importance in determining the feasibility of the approach and how it would work in practice.

A key consideration is that a core fishing grounds approach should support decision making within marine planning, enabling licensing decisions to be made that take into account the importance of areas to different industries, and balance socio-

economic considerations. A core fishing grounds approach could both benefit the fishing industry through greater support to their activities within the areas of most importance to them, and provide clarity regarding areas where potential constraints to development or other activities are minimised, facilitating the licensing or designation process.

Alternative names for the approach could be considered, as a result of the suggestion to use various metrics in the definition of core grounds (see section 3.2.10), and the need for core grounds to be flexibly defined (see section 3.2.2). The workshop participants felt that 'core fishing grounds' sounded too fixed, and its interpretation too narrow. Alternative possible names, that reflect the range of metrics on which such areas might be defined, include:

- Important fishing grounds
- Fishing interest areas
- Fishery interest areas
- Key fishery interest areas
- Areas of primary fishing importance.

Nevertheless, for the sake of consistency in this report, the term 'core fishing grounds' is used throughout.

The remainder of this section discusses a variety of issues relating to the definition of core grounds and how they would function, namely: different indicators and metrics that might be used to define core fishing grounds; how flexibility can be incorporated into core fishing grounds so that they can be adapted to changing fishing patterns over time; how to define the boundaries for core fishing grounds and whether these should be 'in' vs 'out' or if there should be different zones; how the approach might apply to different fleet segments, the scale of analysis, and considerations for the inshore sector; and how the approach would fit with marine spatial planning for other marine industries.

3.2.1 Indicators and metrics to define core fishing grounds

Core fishing grounds could be based on a variety of metrics, depending on the judgement of what is important, which itself is subjective and depends on economic, social and biological/environmental criteria that may be different for different individual fishers, fishing communities or industry sectors. The metric or combination of metrics used will influence the spatial areas that are identified as 'core'.

Possible metrics that could be used to define core grounds include:

- Economic:
 - Value of landings
 - Volume of landings
 - Level of fishing effort (e.g. number of fishing pings from VMS)
 - Gross Value Added (GVA)
 - Areas of strategic importance to fishermen, e.g. trawl tows that avoid objects and fasteners (particularly in inshore waters) or areas for shellfish keep boxes/nets (sheltered and of good water quality).
- Social:

- Number of people employed (e.g. linking VMS pings to information on number of crew on a vessel)
- Number of indirect employees
- Cultural significance (e.g. for tourism in coastal locations, precise metric or derivation not currently defined)
- Fishing ground dependency (e.g. the proportion of vessels' income dependent on a particular location, or a measure of the (in)ability of fishers to adapt or diversify if the fishing area were to become disrupted or unusable, or vulnerability to displacement).
- Biological and Environmental:
 - Nursery grounds
 - Spawning grounds
 - Feeding grounds
 - Migratory routes for migratory fish
 - Areas to provide resilience to fish stocks in the face of climate change (to allow stock distributions to shift)
 - Habitats that are less sensitive to damage from certain types of fishing.

Different metrics may be appropriate for different fleet segments. For example, for larger vessels fishing further offshore, economic-based metrics such as the value of landings or GVA may be important; whereas for inshore under 10m vessels, metrics that are more focussed on social aspects such as number of jobs protected and cultural significance, may be more appropriate. For example, work undertaken under MMO1060 (Social Impacts and Interactions) has highlighted the greater importance of these social aspects for the inshore fleet (MMO, 2014). MMO project 1035 highlighted that marine plans need to consider the local context (MMO, 2013c), and the appropriate metrics for core fishing grounds in each case will depend on what the local priorities are. The fleet composition by port would provide an indicator of the type of vessels and therefore the metrics that may be appropriate.

There may be different priorities (and therefore different metrics) for different areas. For example, one coastal area may want to protect fishing grounds that contribute the most to GVA and associated onshore processing jobs, whereas another coastal area may want to protect fishing grounds that are important for maintaining the local inshore fleet's viability.

Core fishing grounds should be identified on the basis of various metrics; they should not be defined on the basis of a single indicator. Economic, social and biological metrics all contribute to the overall picture of which areas are important for fisheries.

Core fishing grounds should be aimed at identifying areas that are important to the fishing industry, rather than strategic areas that fishing should take place in to promote other objectives. The reason is that this can be taken forward spatially through conservation policies such as the establishment of protected areas with associated restrictions on fishing activity.

Data availability varies for different metrics and for a single metric across fleet segments. As a result, it may be possible to move forward with the use of some metrics in the near future (e.g. economic metrics for VMS vessels), but other metrics

may require longer to develop and for the required data to be made available (e.g. social metrics, and metrics for non-VMS vessels). This is discussed further in section 3.3.1.

A qualitative approach is possible in some cases, and qualitative approaches can be combined with quantitative approaches. Information on important areas can be derived from participatory approaches, if 'importance' is clearly defined. However, data collection for such approaches requires considerable resources and updating the data at regular intervals to keep it relevant could be onerous.

3.2.2 Flexibility and future-proofing

Fishing is a dynamic activity dependent on environmental, ecological and climate conditions. There are seasonal variations, year-to-year and medium-term variations, as fish distributions change in response to various environmental factors, and longer-term changes brought about by climate change. In addition, there are economic and market factors at play; market demand and prices for different species change, and fishing patterns and the species that are targeted shift to respond to this demand. Furthermore, quota allocation by spatial area under the EU CFP means the fishing industry needs to be able to access those areas where they have quota available to them. Historically, fishing patterns change over time, and areas that were important historically (or in recent years) may not be the areas that will be important in the future.

Despite this variability, **key fishing areas exist** and there is potential to identify these areas, to ensure their availability for use by the fishing industry. In an analysis of the fishing areas used by beam trawlers, dredgers, netters, otter trawlers and potters using VMS data from 2006–2009, Jennings and Lee (2011) found that 70% of fishing activity took place in less than 25% of the area, and 90% of fishing activity took place in less than 50% of the area. The fishing areas included core grounds where most of the effort took place and extensive margins where fishing activity was low. Stelzenmüller *et al.* (2008) found that whilst spatial patterns of fishing pressure varied by region, patches of high fishing pressure within regions remained centred at the same locations.

The identification of core fishing grounds should be based on long time-series data to take into account year-to-year variations in fishing patterns. The total footprint of fishing activity varies between years (Jennings *et al.*, 2012) and year-to-year variation differs between gears (Campbell *et al.*, 2014), with some gears exhibiting more consistency in fishing areas between years than others (which may depend on target species). Analysis of time-series data should explore how many years would need to be analysed to provide a reliable indication of core fishing grounds, whether there were any periods of time that were particularly consistent or inconsistent, and whether there were particular spatial areas (by gear type) that were more consistent than others. For example, fishing areas for sandeel are relatively fixed year-to-year because they are determined by habitat type; whereas fishing areas for plaice are more variable because their distribution varies with temperature and the Atlantic Decadal Oscillation index (Engelhard *et al.*, 2011) and is influenced by seabed sediment type (Lauria *et al.*, 2011). As such, a core fishing grounds approach may be appropriate for some fisheries with definable fishing areas but may

not be appropriate for other fisheries, such as those which exhibit strong year-to-year variability in fishing patterns or with widespread fishing activity.

The time period that can be analysed will in many cases be determined by the available data; however, as more years of data become available these should be combined with the existing data rather than replacing earlier years' data. Core fishing grounds based on effort could be identified as those which show high levels of effort in any one year, and those which show high levels of effort when all years are combined. Such an approach should avoid the risk of identifying core fishing grounds based on a snapshot from a limited time period that does not reflect the true extent of fishing grounds, although it is recognised that historic data are limited.

A core fishing grounds approach should not restrict the potential for the fishing industry to adapt to future changes in conditions, or the ability to exploit new areas in the future. Data on fishing patterns are only available for past fishing patterns — they are not easily available for current fishing patterns and cannot show what future fishing patterns might be. Nevertheless, data on recent fishing activity are the only robust data that core fishing grounds could be based on. This may result in a preservation of the status quo rather than identifying future fishing areas in a more strategic fashion. Whilst fishing areas may be predictable for some fisheries with a strong species-habitat association such as lobster or crab potting on reefs, other fisheries are less predictable. Due to the numerous variables involved (biological, environmental, economic, policy) in determining fishing location, and potential for switching between different fisheries or development of new fisheries, predicting future important fishing grounds in some cases is likely to be an impossible task.

Core fishing grounds would have to be updated to enable them to be adapted as fishing patterns change and areas of importance shift. This would enable a core fishing grounds approach to be flexible and the plans to be dynamic. The frequency with which core fishing grounds should be updated may vary by fleet segment and/or target species, depending on how variable the important fishing areas are on a year-to-year basis. The workshop participants indicated that update periodicity could be annual (as a new full year of data become available), but for some fleet segments less frequent updates may be sufficient (e.g. static gear fisheries such as the IPA and MCA). Marine plans are prepared for six-year periods and their implementation progress is reported on after three years. Therefore a three-year cycle of updating the core fishing grounds could be adopted. If more regular updating was required for certain fleet segments, this would have to be done through maps that are associated with the marine plans, but not an integral part of them.

Marine plans should maintain a general displacement policy outside core grounds for fisheries, so that potential impacts on fisheries are considered in all marine areas, and developers should still consult with the fishing industry in the licensing process. The plea from the industry at the project workshop was 'don't box us in' to core fishing grounds, nor 'lock us out' from other areas. The Marine Policy Statement (HM Government, 2011) emphasises the importance of decision-making authorities having regard to the impacts of displacement of fishing activity and the potential impacts of that displacement (para 3.8.10).

3.2.3 Inside vs outside core grounds

If particular core fishing grounds have a spatial plan policy, this may introduce a two-tier approach to the consideration of fishing activity in marine planning. Those that usually fish in areas outside the core fishing grounds would not enjoy the same *a priori* support for their fishing grounds.

Core fishing grounds could be defined with fixed boundaries (e.g. defined in the marine spatial plan) or with undefined boundaries but through maps that indicate the importance of areas to fisheries or the intensity of fishing effort (as in the Shetland Islands' Marine Spatial Plan, see Figure 4 in Annex 2). The latter would be easier to update and replace with new maps during the lifetime of the plan, as new data become available. Fixed boundaries for core fishing grounds, defined statutorily in a plan would be difficult to update to provide the flexibility required. However, workshop participants felt that having a clear definition of the boundaries of core fishing grounds was necessary to provide clarity, otherwise the question of where a core fishing ground begins and ends is left open to interpretation.

The policy wording and how it is applied will influence the effects felt both inside and outside core grounds for both the fishing industry and other marine sectors. Maintaining a general displacement policy outside core grounds (see section 3.2.3) provides some support to the fishing industry in those areas.

Rather than 'in' or 'out', a more nuanced approach is possible, through the use of, for example buffer zones around core fishing grounds; the use of contours showing areas that encompass 70%, 80%, 90% and 100% of fishing effort (for example) or a traffic light system with red, amber and green zones. The participants at the project workshop showed support for such an approach rather than a binary 'core' vs 'non-core' approach.

The thresholds for the various zones for different metrics need to be determined. This should be done in consultation with the fishing industry and other marine industries, and should be based on visualisations of the available data to determine the appropriate benchmark, or value, of each metric that indicates a core fishing ground. The thresholds may differ for the same metric across different fleet segments (e.g. the level of fishing effort that constitutes a 'core' ground for the inshore fleet is likely to be lower than that for larger trawl vessels), and may differ between regions or marine plan areas. Some areas may encompass a change in intensity over a significant distance, and there may be significant year-to-year variation in fishing activity in the margins of intensively-fished areas (Stelzenmüller *et al.*, 2008). In the Shetland Islands' Marine Spatial Plan, a log scale was used for fishing effort data to reduce the dominance of a few, heavily-fished areas, and enable other important, but less heavily-fished, areas to be identified in the maps.

Different levels of protection and mitigation would be required in the different zones or contours in the traffic light and contour approaches. For example, the red zone (e.g. the 70% contour) would indicate the most important core fishing grounds where fishing enjoys the greatest protection and other activities would not be authorised unless they can clearly demonstrate they are compatible with fishing activities or there are exceptional circumstances, amber zone (e.g. 80%, 90% and 100% contours) where fishing is important and enjoys protection but some impacts

may be expected, if appropriately mitigated or minimised, and a green zone (e.g. outside the 100% contour) which is of less importance to fishing and there would be fewer constraints on developers (in relation to fisheries), although impacts on fisheries would still have to be considered under a general displacement policy. An exploratory analysis would be needed to determine the appropriate contours to be used, and the associated wording of policies. The more restrictive a policy is (in relation to the activities of other marine industries in a core fishing ground), the smaller the ground would need to be, as it would not be feasible to have a highly restrictive policy applying to a large proportion of the marine area.

By considering economic, social and biological or environmental factors as different data layers, one suggestion from the workshop was that the areas where all three overlap could be considered to be the 'core' grounds. However, this could result in important fishing areas that need support from a spatial plan policy not being identified as core grounds, because the three factors do not overlap. For example, a nursery or spawning ground is essential to the future viability of the fishery, but may not necessarily also be the area where fishing effort is directed, and therefore may not be an important area under the social or economic factors. It is preferable, therefore, to identify areas based on economic or social or biological/environmental factors, depending on which factors are appropriate for the specific fleet segment or issue being addressed.

3.2.4 Different fleet segments and scale

The level of disaggregation at which the analysis should be carried out requires careful consideration. Analysing the metrics by all fishing activity combined will result in the most numerous or profitable fleet segment dominating the results. The fishing fleet could be disaggregated by vessel size, such as under 10m and over 10m, or a different length split such as under-15m and over 15m (i.e. based on the availability of several years' of VMS data for the analysis).

The **inshore sector needs special consideration**. Metrics based on social and cultural factors may be appropriate for defining core fishing grounds for the inshore fleet, such as employment, importance for coastal communities and links to tourism from a thriving local fishing industry (see also section 3.2.1). Such metrics would need further development to be usable but should be explored. Safety is a key issue for the inshore sector, and the proximity of fishing grounds to ports is important. Core grounds for individual fishers in the inshore area are likely to be smaller, but the larger number of inshore vessels mean that core grounds for the inshore fleet in some regions may cover wider areas. The influence of this on the identification and definition of core grounds would need to be explored through pilots using actual data and information from the inshore sector, and may vary by region depending on the number of inshore vessels in each region. Whilst some workshop participants suggested that the whole 0–6nm area should be designated a core ground for the inshore sector, this is not appropriate as not all areas are vital and co-location would be necessary for some activities or industries, such as for cables and pipelines, which must occur in the 0–6nm zone (e.g. ports, and cables or pipelines for landfall). There are also data limitations for the inshore sector, which are discussed in section 3.3.1.

The fleet should be disaggregated by gear type, and/or by target species. Whilst there might be some merit in defining core grounds by target species — for example, for groundfish fisheries, pelagic fisheries, shellfish fisheries — in practice the data formats available and the ability for vessels to switch target species, mean that analysing the data in this way might be difficult. However, disaggregating at least by broad gear category (e.g. whitefish trawls, nephrops trawls, seines, dredges, pots, lines, nets) would enable important fishing areas for less common gear types to be identified and not subsumed by other more numerous gear types or by gear types with significantly higher volume or value of landings. In this way, the activity of all fleet segments would be supported.

The scale at which the analysis should be carried out (e.g. nationally, by plan area, or at a more local level) may also affect the results obtained, depending on the metric used. For example, if a threshold of 'x VMS pings per year' (standardised to take into account different intervals between pings) is used to identify core grounds, there should be no change in the areas identified at different scales; however, if core grounds are identified by 'x% of VMS pings in the area analysed' then the spatial scale of the analysis will affect the results, with more areas identified at smaller spatial scales. Similarly, if core fishing grounds were to be identified at national level, then intensive fishing activity in one plan area may result in extensive core fishing grounds being identified there, with no or few core fishing grounds being identified in another plan area. Marine planning needs to consider both the national picture and coordinate among plan areas (to understand the relative importance of a plan area for fishing), and at the plan-level scale (to understand important areas for fishing at the local or regional level).

Non-UK fishing vessels also fish in English waters, in offshore waters under the CFP, and in 6–12nm waters based on historical fishing rights. These vessels and their fishing patterns would need to be taken into account in the establishment of core fishing grounds, however data on their fishing patterns are harder to access in the UK than data for UK vessels (with the exception of vessels from the Netherlands, which have a data use agreement for research purposes). Consultation with relevant non-UK fishers is important and coordination with the authorities in those countries would be necessary in order to obtain the relevant data. While VMS data can usually be obtained from non-UK fisheries authorities, these data need to be linked to gear type (obtained from vessel registers or logbooks) in order to carry out gear-specific analyses. Usually the only gear information available for non-UK vessels is that held in the EU Fleet Register, where the 'gear' fields are sometimes blank, and vessels switch gears frequently, so these data are not necessarily accurate on a trip-by-trip basis. There are a number of ongoing initiatives to try to address this issue, including an OSPAR data call on human activities via ICES under the Data Collection Framework which intends to produce combined maps for all EU Member States.

3.2.5 Interaction with other sectors

A core fishing grounds approach will have **interactions with and implications for other sectors' use of the marine environment**. It should support other industries' plans in the marine environment by providing a better starting point for developers when identifying potential sites. By enabling developers early on in the licensing process to identify which areas are likely to present a constraint to their plans in

relation to fisheries, potential conflicts, complex licensing processes and mitigation measures can be avoided at an early stage in project development.

The policy would need to interact with the general policy for co-existence (including co-location in the same space) of activities. The Draft East Marine Plans include the governance policy GOV2 that ‘opportunities for co-existence should be maximised wherever possible’ in order to promote compatibility and reduce conflict (between activities) in order to manage the use of space within the marine environment in an efficient and effective manner. Core fishing grounds should not be a complete no-go area for other activities.

Co-existence opportunities should be identified for different gear types by other marine activity or industry. There would be potential for co-existence in all core fishing ground ‘zones’, depending on the fishing gear that the core ground is defined for, and the other activity or industry. For example, if properly mitigated, laying cables on pelagic or potting fishing grounds would be possible, and could also be possible for demersal gears if adequately buried.

Trade-offs between conflicting activities would have to be considered where co-location is not possible. This would need to link to MMO’s decision-making framework for marine planning, to address how winners and losers would be determined in conflict areas.

There should also be **alignment with neighbouring countries and administrations where possible** and appropriate. As such, proposals for core fishing grounds should be communicated with neighbouring devolved administrations, Member States and with interest groups such as the fishing Advisory Councils.

3.3 Data needs and issues

A core fishing grounds approach will need evidence on which the identification of core fishing grounds can be based. This section explores the issues surrounding data needs — the availability of data for different metrics and fleet segments, issues of scale and spatial resolution for data to identify core fishing grounds, and data quality and data management requirements to maintain the evidence base up-to-date. Data confidentiality is also discussed (which affects data availability).

3.3.1 Data availability and scale

Data availability differs among metrics and among fleet segments. Currently, data for the economic metrics are more readily available than for social metrics (MMO, 2014; Bloomfield *et al.*, 2011). Fisheries data are more readily available for over 15m vessels (i.e. those with VMS) at an appropriate spatial resolution (1/200th of an ICES rectangle) than for under 15m vessels. Over 12m vessels will soon also be operating VMS, although its adoption has been delayed. For example, data on fishing activity by over 15m vessels by 1/200th of an ICES rectangle were presented as maps in the Draft East Inshore and Offshore Plans. There is some information available on biological metrics (spawning grounds, nursery grounds). Ellis *et al.* (2012) provide maps of spawning and nursery grounds of selected fish species in UK waters, but these are often at the scale of ICES rectangles and not at sufficient

resolution to be of use in marine planning; MMO has developed more detailed maps of Essential Fish Habitat (EFH) for the South Plan areas (MMO, 2013d); and the Channel Integrated Approach for Marine Resource Management (CHARM) project has modelled spawning and nursery areas in the south plan areas (CHARM, 2014).

The spatial resolution of processed VMS data is usually a 0.05° grid ($1/200^{\text{th}}$ of an ICES rectangle, approximately 19km^2 at the south coast of England). This may be sufficient for identification of core fishing grounds in offshore areas for some fleet segments, but a finer spatial resolution may be necessary for some areas or fleet segments, such as for tow trawl tracks in the inshore area. For the Shetland Islands' Marine Spatial Plan, VMS data were analysed at a resolution of 500m. This was done in consultation with fishers and with their express consent that their individual VMS data could be analysed and presented, and was facilitated by the small number of vessels involved. The appropriate resolution will depend on the use of the data and the level of detail required by fleet segment.

Data on fishing activity together with detailed spatial information on the location of catches for the inshore sector are lacking (and therefore also of the spatial area from which landings volume and value arise). Under 15m vessels are not adequately represented by VMS so additional data sources will be required to identify fishing grounds for the fleet segment. Activity data for under 15m vessels which do not have VMS are only available at the scale of ICES rectangles (0.5° by 1° longitude, approximately 3840 km^2 at the south coast of England). This is far too coarse to be of any use in identifying core fishing grounds. Fishermap, a participatory dataset of fishing areas by gear type for the inshore sector that was developed through the Marine Conservation Zone (MCZ) identification process, provides a finer spatial resolution, however this is a snapshot and may be very labour- and resource-intensive to update.

The increasing development, use of and interest in 'inshore VMS' (iVMS) provides a potential future source of data on fishing patterns of the inshore fleet. iVMS refers to a low-cost (both for capital and running costs) VMS system that is able to report vessel position using mobile phone technology (MMO, no date), although systems using VHF Time Division Multiple Access (TDMA) technology are also available (Caslake, 2009). iVMS has the potential to provide useful information on fishing patterns for non-VMS vessels, but for this to be comprehensive, it would need to be installed on all non-VMS vessels and there are cost implications for this, and (in the absence of a statutory requirement for all non-VMS vessels to use iVMS) a need to obtain buy-in to the approach from a significant portion of the fleet. IFCAs have information on vessel sightings, and some Automatic Identification System-B (AIS-B) data (information about a vessel's location, heading and speed, transmitted to aid in collision avoidance) are also available, but these are not sufficient for reliable mapping. For the latter, the transmissions may be periodically turned off and few small vessels use AIS. The Crown Estate's UK Fishermen's Information Mapping (UKFIM) project is developing a dataset that combines VMS, iVMS and plotter data (den Rooijen, 2012).

Better information on fishing activities and fishing areas is needed for marine planning, independent of whether or not a core fishing grounds approach is adopted. For some areas and some fleet segments, a concern is that a lack of data

could lead to the impression being given that fishing activity is not important in those areas, whereas in fact it is — the absence of evidence is not evidence of absence. Improving the evidence base for fishing would allow stronger policies to be developed.

An improved evidence base and easier access to the data would also support other sectors, simplifying negotiations between them and the fishing industry. This would improve the licensing process for other sectors and minimise potential conflicts with fisheries by allowing important fishing areas to be taken into consideration at an earlier stage.

A data gap analysis is needed in the context of the requirements for implementing a core fishing grounds policy in marine planning, taking into account issues of scale, to identify the metrics for which good data are available and those for which data are lacking. This should be broken down by fleet segment (vessel length and gear type) as data availability is not uniform across the fleet. This could be complemented by work to develop potential metrics that could be appropriate for defining core fishing grounds (see section 3.2.1) and develop approaches for their spatialisation.

3.3.2 Data quality and data management

Data underpinning marine spatial plans need to be transparent, reliable, timely, appropriate for their intended use, and there should be confidence in the data.

Marine plans should have a set of agreed, consistent data sources on fisheries, representing a range of indicators and that are informative for planning and the policy approach adopted for fisheries. Consistent methods against agreed standards are required, to ensure data accuracy. The provision of a common evidence base available to all users would facilitate understanding across all marine industries and users of what the data represent and how they should be interpreted.

There needs to be **a strategic approach to data collection and processing to provide appropriate information for spatial management and marine planning**. Datasets linked to marine plans need a 'stamp of approval' for users to have confidence in their accuracy and reliability. As such, issues concerning data management, storage and updating need to be addressed for the implementation of a core fishing grounds approach. Some form of central coordination is likely to be required (for processing and maintenance). These issues could be addressed through the development of a data strategy for fisheries.

The fishing industry would have a key role to play in the development of appropriate data products for marine planning and for the implementation of a core grounds approach, by providing access to VMS data for analysis, by helping to generate the required data for those fleet segments for which data are currently lacking (e.g. through participatory approaches or the installation of iVMS and access to its outputs), and by providing guidance for the analysis of data and review and support to the interpretation of the results.

3.3.3 Data confidentiality

The fishing industry should be a main beneficiary of a core fishing grounds approach, and as the stakeholders with the knowledge of where fishing takes place,

Using a 'core fishing grounds' approach to develop a spatial marine plan policy

therefore have a key role in providing the data (or access to it) and information needed that would underlie such an approach by allowing core fishing grounds to be identified and defined.

Data confidentiality issues hinder the analysis and use of VMS data. In the UK, the application of data confidentiality legal requirements means that any data that represent five fishers or fewer cannot be disseminated or displayed, or used by external parties outside the regulatory agencies, due to the potential that individual fishers could be identified from the data. Therefore, the finer the spatial resolution used, and the more the fleet is disaggregated (for example into vessel length and gear categories) for analysis, the more of a problem this will cause.

To overcome this, agreement would have to be sought from individual vessel owners or skippers that their data can be used and disseminated. The Dutch fleet, as a requirement of their licence conditions, sign a data use agreement that automatically provides access to individual VMS data for research purposes, without the need to obtain individual agreement every time the data are to be used and displayed.

4. Conclusions

4.1 Use of a core grounds approach in marine spatial plans

The marine spatial plans reviewed have generally not implemented spatial policies for fisheries in defined core fishing grounds. This appears to be due to the difficulties in identifying particular areas as core grounds because of data limitations, issues associated with defining 'value' for different fishing industry sectors and addressing temporal change in fishing grounds, and the complexity of integrating many varied fishing activities and metrics into an effective planning policy.

The SMSP has taken the concept of spatially-defining core fishing grounds furthest. Maps for demersal fishing effort (based on VMS data), shellfish dredging grounds (based on fishermen's knowledge) and shellfish creeling grounds (based on fishermen's knowledge and modelled habitat distribution) are provided in the SMSP, showing the areas that are most important for fishing (and where developments will only be permitted where it can be demonstrated that there will be no significant damage or permanent obstruction); however, the SMSP maps are only indicative and the plan requires that consultation is carried out with industry representatives to take account of the potential for changes in the distribution of fishing activity. The indicative nature of the maps allows the maps to be updated at regular intervals to take account of the most up-to-date data available.

Despite core fishing grounds not being identified in marine spatial plans, some plans still provide robust protection of the fisheries sector through other means. For example, the Norwegian Sea Integrated Management Plan enables authorities to ensure that renewables development takes place in areas where conflict with fisheries is low enough to be acceptable, and specific fisheries requirements are drawn up for each new oil and gas development block. Likewise, Scotland's Draft National Marine Plan states that any development in the marine environment should take account of potential impacts on fisheries, in particular: the economic importance of fishing; potential impacts on fish and shellfish stocks; environmental impact on fishing grounds, target species, habitats and species; and the potential effect of displacement on fish stocks, the wider environment, use of fuel, and socio-economic costs to fishers.

4.2 Taking forward a core grounds approach

Further consideration of the use of a core grounds approach for fisheries in marine spatial plans in England is justified, based on the findings of this study and the inputs received from stakeholders through the project workshop. Stakeholders indicated significant support for such an approach, which would support the fishing industry through marine planning as well as providing greater clarity for other marine industries developing proposals for licensable activities. There are a number of issues that require further exploration; these include the development of a data strategy to address data availability issues, development of metrics, wording of policies for core and non-core areas (and buffer zones, traffic light zones, contours, etc., if appropriate), definition of which agencies would be responsible for taking

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forward and implementing the different aspects of such a policy, and the staffing and resource implications of this.

Currently, there are a number of data gaps for fully implementing a core fishing grounds approach, in particular for the under 15m inshore (non-VMS) fleet, and for evidence that represents some of the more intangible aspects of the social importance of fishing (such as social cohesion and cultural importance (MMO, 2014)), rather than the more established economic and socio-economic aspects (including fishing activity, the economic value of landings, volume of landings, GVA, income and employment). Data on fishing patterns would necessarily be based on current and past fishing activity, which may result in the preservation of the *status quo* without incorporating more useful aspirations to work towards.

Availability of standardised, approved datasets is important to provide a robust evidence base to underpin a core fishing grounds approach. There needs to be transparency and clarity over what the data represent, to enable its interpretation — fishers, relevant bodies and other stakeholders need to know what they are looking at, and have confidence in the datasets. This needs to be driven by a data strategy that sets out what data MMO need for fisheries in marine spatial planning, and how those data are to be collected, processed, stored and used. Improving the evidence base on fisheries would benefit marine planning (both the fisheries sector and other marine sectors) whether or not a core fishing grounds approach is adopted.

5. Recommendations

5.1 Contribute to a sustainable fishing industry through marine planning

Marine planning will contribute to sustainable fisheries management and thereby provide support to the fishing industry through establishing an agreed vision for the future to develop objectives and policies in plan areas. A core fishing grounds approach is one of a number of measures that could be implemented through the planning process to achieve this. The strength of the policy will be related to the government's overall aims for the industry and the information available on spatial extent of fishing activity, which should be updated periodically to maintain its relevance. Whilst this report focuses on its application to commercial fisheries, a core fishing grounds approach could also incorporate the recreational sector.

5.2 Develop a data strategy for fisheries

An MMO data strategy for fisheries could potentially address the current lack of adequate data and information on fisheries for marine spatial planning. This would improve the consideration of fisheries in licensing decisions and would be a good evidence base for marine planning and would support the possible development of a spatial policy using a core fishing grounds approach. It should set out the data needs for fisheries, how those data would contribute to marine planning, and a plan for implementation that covers how those data would be collected, processed, stored and disseminated. Data stewardship, update frequency and dissemination to others should all be addressed.

Compiling standardised datasets that include data from an agreed range of sources, collected and processed to agreed quality standards, is important. This ensures that everyone understands what the data or maps represent and their significance, and have confidence in the dataset. For this, some form of centralised data management will be required. MEDIN/INSPIRE data and metadata standards should be complied with.

Access to VMS data for over 15m (and in the future, over 12m) vessels should be facilitated, and agreement from vessel owners sought to enable a disaggregated analysis to be carried out by fleet segment. Data handling protocols could be developed to protect data confidentiality whilst enabling analysis of data and production of aggregated evidence for dissemination in the public domain. The development of data products should explore ways of presenting the core fishing grounds without infringing confidentiality rules.

The availability of fishing activity data for the inshore sector has been and will continue to be a significant factor for fishers in being able to demonstrate the importance of different fishing grounds, and for developers in being able to understand the constraints to development or other activities in different areas. Information on fishing patterns and fishing activity of the inshore fleet is needed to be able to use a core grounds approach to support the inshore fleet. iVMS provides a

potential means of obtaining such data. An alternative in the short-term would be to use participatory techniques to update the Fisherman datasets, but regular updating of core fishing grounds based on a participatory dataset would require significant resources, and the qualitative (rather than empirical) nature of the dataset results in lower confidence.

As part of the development of a data strategy, a data gap analysis is required, in the context of data needs for implementing a core fishing grounds approach, taking into account issues of scale, to identify the metrics for which good data are available and those for which data are lacking. This should be broken down by fleet segment (vessel length and gear type) as data availability is not uniform across the fleet.

This should also identify the metrics for which good information is available (to be able to use them in a core fishing grounds approach), and which metrics need further work to develop them. The latter are likely to include the social metrics that will be particularly relevant for the inshore sector, such as to reflect the cultural importance of, and dependency on, fishing. A separate study could explore and develop possible metrics and their spatial representation for use in a core fishing grounds approach. An exploratory analysis of time-series data for different fleet segments should also be carried out to investigate the fleet segments for which a core fishing grounds approach might be more appropriate (i.e. greater temporal stability in spatial patterns of fishing effort) and those for which it might not be appropriate (i.e. widely dispersed fishing effort and/or significant year-to-year variation in fishing patterns). This analysis should also explore the frequency with which core grounds should be updated for different fleet segments.

5.3 Take forward a core fishing grounds approach through the marine planning process

A core fishing grounds approach could be implemented through the marine planning process on a region-by-region (or plan-by-plan) basis. If fishers in a plan area are interested in taking forward the approach, based on the best available evidence, then that should be considered an opportunity for implementation. However, whilst the identification of core fishing grounds would only apply to English waters (under this scoping process), fisheries can occur across marine planning regions and across different countries' jurisdictions. This should be taken into account and coordination with other jurisdictions should take place where possible.

In the short term, in the absence of improved datasets to contribute to the identification of core grounds, a 'data sufficiency' approach could be used. For example, if there was no disagreement (among sectors and stakeholders) over the designation of a particular area as a core fishing ground, then the data needs may be quite low. In contrast, if there are conflicting uses and interests in a potential core fishing ground, then there would be a need for more robust data on fishing activities.

It should be possible to start implementing a core fishing grounds approach based on the data currently available, and informed by the data gap analysis, rather than waiting to start until all desirable data are available. Identifying core fishing grounds for the offshore area and over 15m vessels, based on economic metrics, could be the first step, as these areas, fleet segments and metrics have most data available

currently. An iterative approach could be taken, with the first iteration being quite 'high level' and indicative. More detail could be added in the future as data gaps are filled, information sources improved, new metrics developed, and spatial resolution of the evidence improves.

5.4 How a core fishing grounds approach could be implemented

The project workshop and Section 3 of this report discussed **ways in which a core fishing grounds approach could be implemented**. In summary:

- The identification of core fishing grounds should use various metrics (economic, social, biological/environmental) to identify core grounds. Different metrics may be appropriate for different fleet segments, and the judgement of what metrics to use (based on what the priorities are) should be taken at a local or plan level. For some fleet segments or fisheries (e.g. exhibiting significant year-to-year variability in fishing patterns, or with particularly widespread activity), a core fishing grounds approach may not be appropriate.
- Metrics should be based on a narrowed down list of possible metrics, which need to be identified and scoped to ensure they would provide useful information, and be based on agreed and standardised methodologies. The list of available metrics may expand with time, as data availability and the evidence base increases.
- The identification of core fishing grounds should be based on long time-series of data where possible, to take into account year-to-year variations in fishing patterns. This is currently possible for VMS data for over 15m vessels, but the implementation of VMS on over 12m vessels has been delayed, and only snapshots exist for non-VMS inshore vessels.
- Core fishing grounds should be identified by gear type, and/or by target species, and differentiated by fleet segment, to avoid the most numerous or most profitable fleet segment(s) dominating the results. More detailed stratification (e.g. by *métier*) may be appropriate in some circumstances and should be explored, but would result in increasing complexity, and in core grounds being defined for progressively fewer vessels.
- Core fishing grounds should be updated during the lifetime of the marine plan, or at least at the six-year update of the plan, to enable them to be adapted to reflect changing fishing patterns and areas of importance. The frequency of update required will vary by fleet segment (gear type) according to the year-to-year variability in spatial fishing patterns.
- A 'traffic light', zoned or contoured approach to the definition of core fishing grounds should be adopted, rather than 'in' or 'out'. Different levels of protection and mitigation requirements would apply to the different zones.
- A general displacement policy should be maintained in areas outside core fishing grounds (i.e. that potential impacts of developments on fisheries and impacts of the displacement of fishing activity should be considered in licensing decisions), for fishers whose grounds are not encompassed in the core fishing grounds.
- The policy would need to interact with the general policy for co-existence (including co-location in the same space) of activities in order to promote compatibility and reduce conflict (between activities) to manage the use of space within the marine environment in an efficient and effective manner.

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- Processed and quality-assured evidence sources should be developed and made available, accompanied by associated metadata, that provide consistent and reliable sources of information on fishing activity to support consideration of fisheries in marine spatial planning.
- The involvement and buy-in of the fishing industry is crucial to the reliable mapping and definition of core fishing grounds; a core fishing grounds approach should support the fishing industry and their future activity, and the industry will need to collaborate with planning authorities to ensure the necessary data for identifying and updating core grounds is made available.

5.5 Policies need to be carefully drafted

The wording of the policies that will apply in core and non-core areas (and the various buffer or traffic light zones or contours in between, if adopted) **is crucial** in ensuring that a core fishing grounds approach has the desired effect of supporting fishing activity in the most important fishing areas. There should be sufficient protection for fishing interests in the most critical core grounds to make sure the policy is effective for fisheries, but with sufficient flexibility and potential for co-location of activities not to cause a disproportionate constraint to other industries or interests.

Further work is required to assess the potential for co-location of different activities in the different zones of core fishing grounds. This may differ according to the fleet segment for which a core fishing ground is identified (e.g. co-location of some activities may be more feasible with static gear fisheries than with trawl fisheries).

As data are analysed and provisional core fishing grounds are identified, consideration is needed of other activities and their data layers in order to identify where spatial co-existence is possible and so as not to cause an unnecessary constraint to other industries or interests where there is little potential conflict.

5.6 Implement a regional pilot to explore its application

A regional pilot could be implemented to explore the identification of core fishing grounds and the options for application of such an approach. This would have to target an area where there is support for the approach and could include the inshore sector to explore the use of data sources such as iVMS for identifying core fishing grounds. The pilot area would likely need to be smaller than a marine plan area for practical reasons to facilitate its implementation, but should enable lessons to be drawn for plan-scale implementation.

The pilot should involve creating the evidence base such as developing metrics, gathering the data required (e.g. through the use of iVMS on inshore vessels), exploring potential thresholds for defining core grounds (and associated zones), and creating maps showing core fishing grounds. This could be done for one fleet segment, and for several fleet segments (to explore if and how core grounds from several fleet segments can be combined and to determine whether a core fishing grounds approach is appropriate for all fleet segments). The maps created can then be used to assess the interactions between fishing and other industries for decision making purposes.

The pilot can also be used to promote the approach to the wider fishing industry. Buy-in of fishers is necessary for the approach's success and agreement to use their data will be very helpful, particularly inshore where VMS data are not yet available. Therefore, it is necessary to work with the industry to explore how their data can be used as evidence in defining core fishing grounds, and how identifying core fishing grounds in marine plans can support the future viability of their industry. The use of novel approaches and online media could be an effective means of communicating these messages.

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Annex 1: Letter to Stakeholders and Stakeholder List

A1.1 Letter to stakeholders

Good Afternoon,

MMO marine planning project - Scoping 'core fishing grounds' approach for developing marine plan policies in England

The Marine Management Organisation (MMO) is currently scoping the potential of using a 'core fishing grounds' approach to developing fishing policies in marine plans for English waters. The approach could highlight the most important fishing grounds in English waters and potentially develop a specific marine plan policy to recognise them.

This approach has been suggested by a number of stakeholders and we would like to explore any impacts of the approach with you and other relevant organisations. This should ensure that we are agreed on the benefits and issues of using the approach, as well as highlighting any challenges. The project will run between the beginning of February and the end of March 2014 and will be carried out by ABPmer.

The project has three objectives;

1. To review how spatial fisheries policies may already be used in spatial plans internationally and any suggested but not yet implemented spatial fisheries policies.
2. To hold a workshop to discuss the positive and negative aspects of the approach, and challenges and opportunities with exploring the approach further. (Scheduled for 24th February in London, England)
3. To provide recommendations to the MMO on whether or not to progress development of spatial fisheries policies aligned to core fishing grounds for marine plans.

We would like to invite you to provide your input to this project if you feel it would be relevant and appropriate for you. We would be happy to share by email any documents relating to the project for comment and to welcome you to the workshop in London on Monday 24th February to discuss this approach if you wish. We will hold a review of the outcomes of the workshop via email and ensure that the recommendations from the project are agreed with all those involved. A list of potential organisations is attached. Please feel free to make suggestions or provide specific names to be added to the list.

We would be grateful if you could let us know if you will be able to participate and if you hope to attend the workshop, or if you would like us to contact a colleague in your organisation. Further details can then be sent on to you. Following this scoping

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work there will be further opportunity to provide feedback on this topic through the marine planning process.

Please do not hesitate to get in touch with any queries or suggestions via evidence@marinemanagement.org.uk or the number below.

Kind regards,

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Enabling sustainable growth in the marine area.

A1.2 Attachment to letter: Potential Consultees

Organisations		
Bangor University	International Fisheries Representatives	Open Hydro
Cefas	JNCC	Renewable-UK
CEMARE	Marine Scotland	Seafish
DCLG	MMO	Shellfish Association of Great Britain
DECC	MoD	Subsea Cables
Defra	Natural England	Tegen Mor Fisheries Consultants
Dong	Natural Resources Wales	The Crown Estate
DOENI	NFFO	TÜV SÜD PMSS
Holderness Coast Fishing Industry Group	North Sea Regional Advisory Council	University of Newcastle
IFCA (All)	NUTFA	Welsh Government

A1.3 Attachment to letter: Potential international stakeholders table

International organisations		
Belgian Federal Public Service for Mobility and Transport	European Commission	Marine Institute - Ireland
Center for Marine Assessment and Planning (CMAP) - USA	Federal Environment Agency (UBA) - Germany	Ministry of Infrastructure and the Environment - Netherlands
Comité National des Pêches Maritimes et des Elevages Marins - France	Fisheries representative, beam trawling - Netherlands	Ministry of Infrastructure and the Environment - Netherlands
Coastal Resources Management Council, Rhode Island - USA	German Maritime and Hydrographic Agency	Ministry of Rural Affairs - Sweden
Crown Dependency - Jersey	Helmholtz-Zentrum Geesthacht, Centre for Materials and Coastal Research	Rijkswaterstaat Waterdienst - Netherlands
Danish Ministry of the Environment - Nature Agency	Head of European Spatial Development inc European coord on MNSP- Germany	The Flanders Marine Institute (VLIZ) - Belgium
Delft University - Netherlands	Institute for Agricultural and Fisheries Research, Animal Sciences Fisheries - Belgium	The Management Unit of the North Sea Mathematical Models (MUMM) - Belgium
Departement Mobiliteit en Openbare Werken - Belgium	Institute of Marine Research - Norway	The Swedish Agency for Marine and Water Management
Department for the Marine Environment - Belgium	Irish Marine Federation	University of Copenhagen
Department of Environment, Community and Local Government - Ireland	La Préfecture Maritime de la Manche et de la Mer du Nord - France	VisNed - Netherlands
Directorate-General for Maritime Affairs and Fisheries (DG Mare)	Le Ministère de l'Écologie, du Développement durable, des Transports et du Logement -France	West Vlaanderen - Belgium

Annex 2: Fisheries Policies in Marine Spatial Plans — Review of Case Studies

A2.1 Draft East Inshore and Offshore Marine Plans

The East Inshore Marine Plan Area includes the coastline stretching from Flamborough Head to Felixstowe and extends from the mean high water springs mark out to 12 nautical miles (including inland areas such as The Broads and other waters subject to tidal influence). The East Offshore Marine Plan Area extends from 12 nautical miles out to the Renewable Energy Zone (REZ) and maritime borders with the Netherlands, Belgium and France. The Marine Plans, together with the Marine Policy Statement (MPS), underpin the new planning system for English Seas established under the Marine and Coastal Access Act 2009.

The Marine Plan (MMO, 2013a) provides a spatial approach to the resources within the Plan Areas and the activities and interactions that take place within them, to help ensure sustainable development of the marine area. Marine Management Organisation (MMO) is the responsible agency for the development of the Plans. Development plans for the East Inshore and Offshore Areas started in 2011 and the draft plans went out to public consultation in 2013. The Plans will come into effect when they are adopted by the Secretary of State, but are already a material consideration for developers applying for a licence in the marine area.

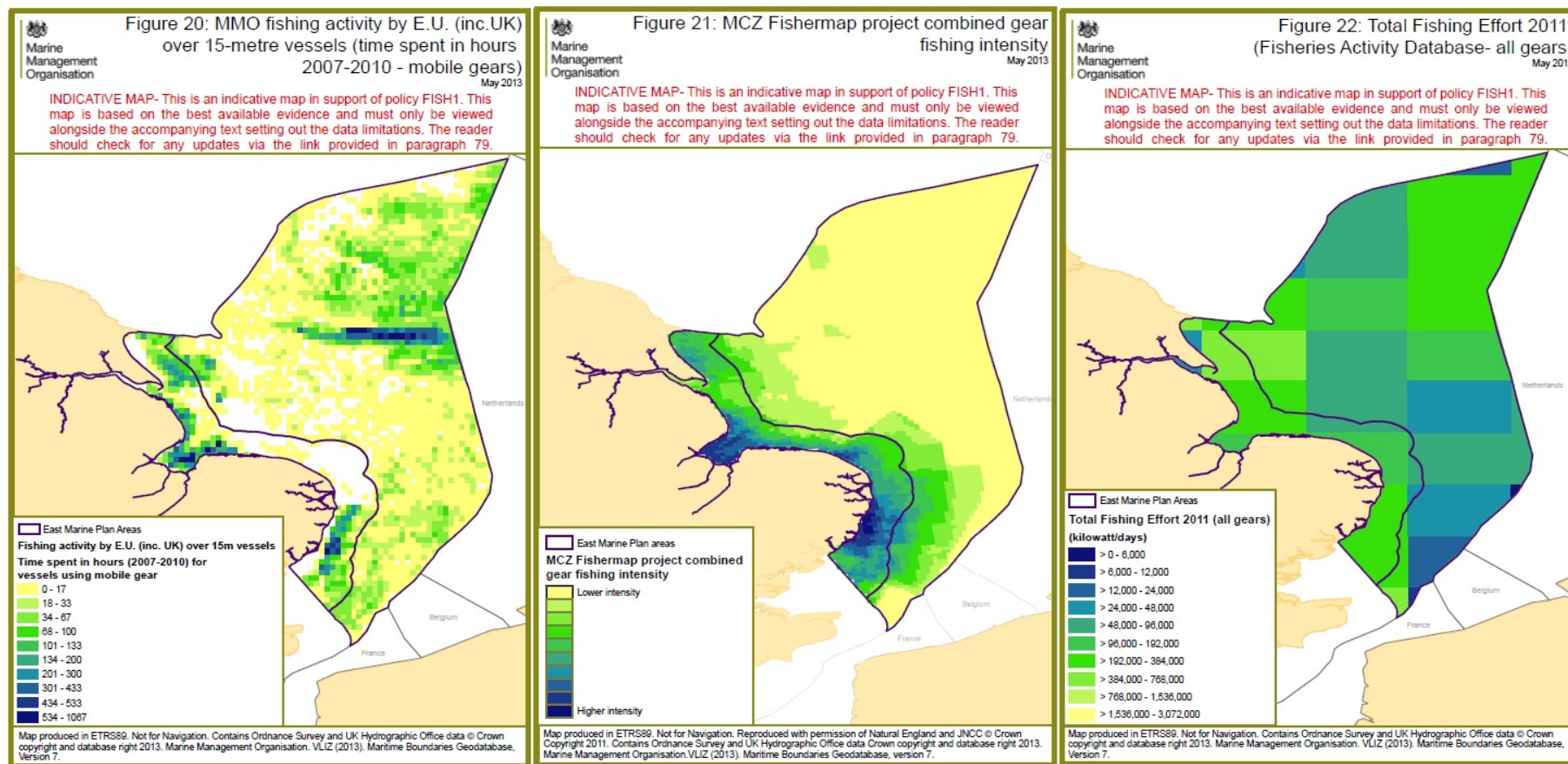
The fisheries policy, FISH1, specifies that 'within areas of fishing activity, proposals should demonstrate in order of preference:

- a) That they will not prevent fishing activities on, or access to, fishing grounds
- b) How, if there are impacts on the ability to undertake fishing activities and access to fishing grounds, they will minimise or mitigate these
- c) 'The case for proceeding with their proposal if it is not possible to minimise or mitigate the impacts.'

The entire inshore and offshore plan areas are specified as areas of fishing activity. Although maps indicate areas of high activity for over 15m vessels (from VMS) and under 15m vessels (from Fisherman) (Figure 1), there are data limitations for VMS (possible mis-classification of VMS pings, underestimation of fishing area due to use of point data rather than fishing tracks), and Fisherman data, which only represent those fishers that participated in the process. The map of total fishing effort includes all vessels, but the spatial resolution is too coarse to be of use. Furthermore, the variation in fishing activity, seasonality and technologies deployed mean that the maps cannot provide a complete illustration of all fishing activity at all times. Therefore developers must liaise with the fishing sector at local level to assess potential impacts on the sector.

In contrast, the shipping sector has a policy that provides stronger protection in specific areas that are particularly important for shipping and navigation. A map identifies areas where over one thousand ship movements per year are recorded. This benchmark was agreed with the industry to delineate important navigation routes, after reviewing the data. Policy PS2 requires any proposal that encroaches on these areas should not be authorised unless there are exceptional circumstances.

Figure 1: Maps of fishing activity from the Draft East Inshore and Offshore Plans.



Source: MMO, 2013a.

A2.2 Scotland's National Marine Plan: Consultation Draft

The National Marine Plan (Marine Scotland, 2013) covers both Scottish inshore waters (out to 12 nautical miles) and offshore waters (12 to 200 nautical miles) and applies to the exercise of both reserved and devolved functions. The Plan sets out strategic policies for the sustainable use of Scotland's marine resources and conforms with the overarching direction provided by the MPS. Whilst the Plan is referred to as the 'National Marine Plan', it is recognised that it comprises two plans made under two separate pieces of legislation: the Marine (Scotland) Act 2010 relating to Scottish Inshore waters and the Marine and Coastal Access Act 2009 relating to the offshore region. Unless otherwise stated, policies within the National Marine Plan apply to both inshore and offshore waters.

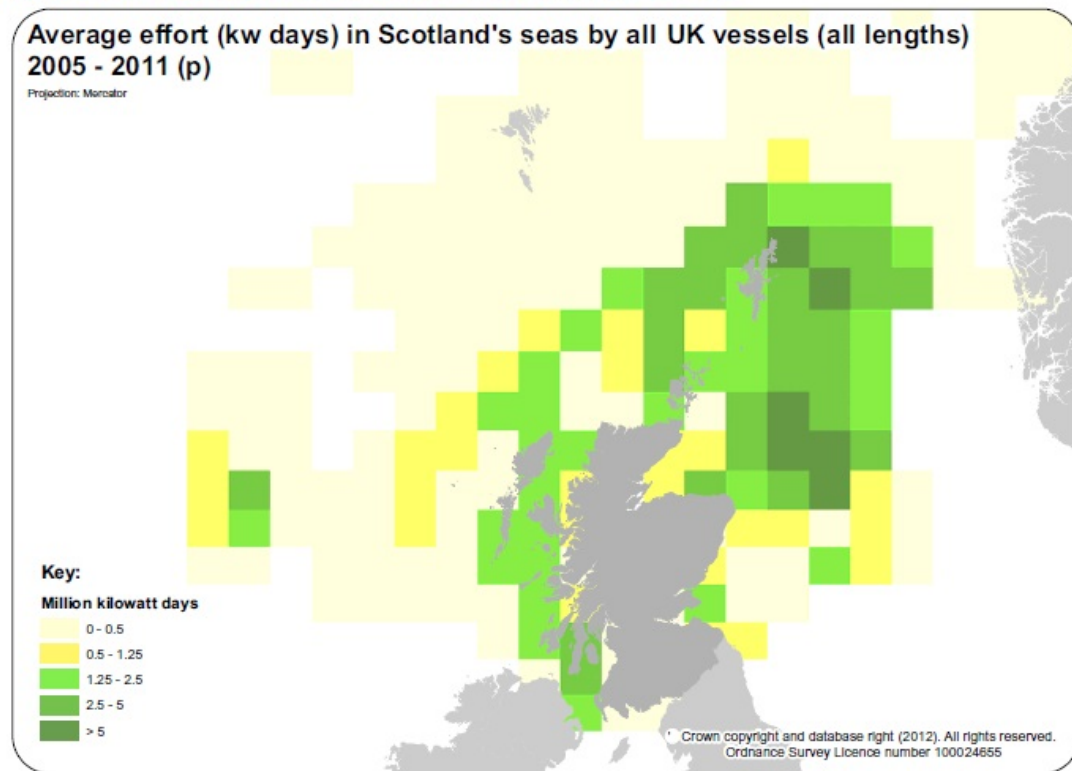
Marine planning will be implemented at a local level within Scottish Marine Regions sea area extending out to 12 nautical miles. Within these regions, Regional Marine Plans will be developed by Marine Planning Partnerships to take account of local circumstances and smaller ecosystem units (e.g. see Shetland Marine Spatial Plan below).

The process to create the National Marine Plan started in 2010. The timetable (subject to change) states that the draft National Marine Plan (further to revisions following the consultation between July to November 2013) is to be put before Parliament for their consideration in the summer of 2014, with the final considerations, adoption and publication of the National Marine Plan at the end of 2014. Marine Scotland is the lead agency in the development of the National Marine Plan.

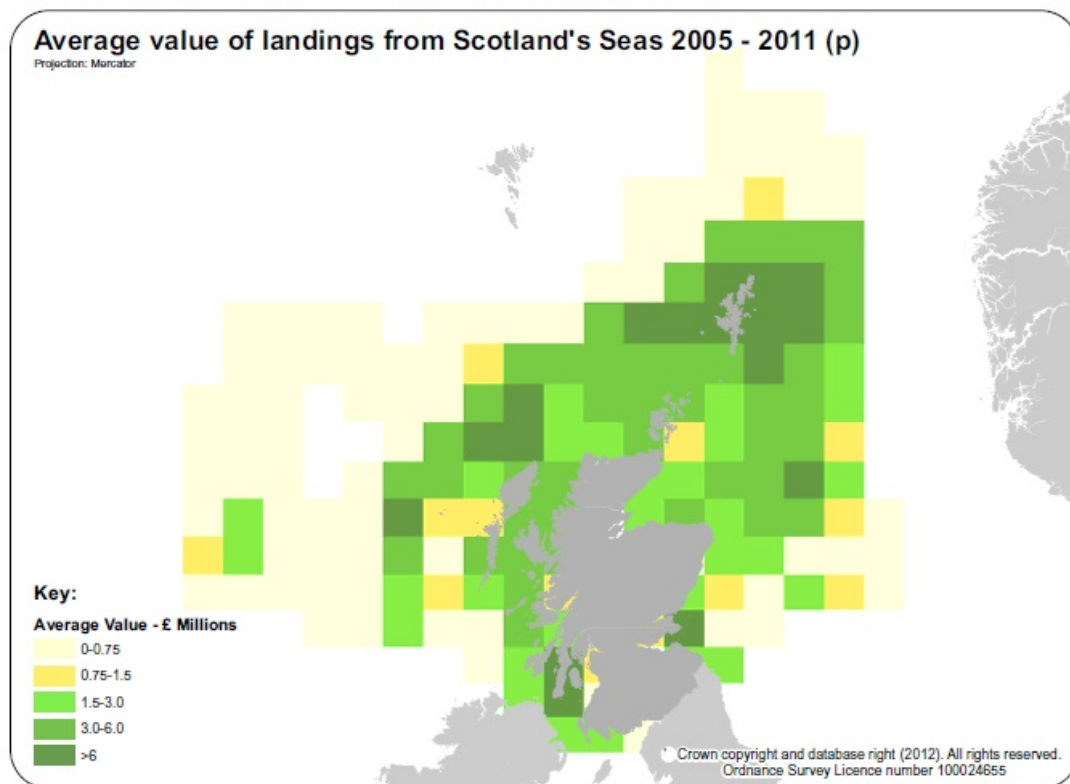
Maps of fishing activity are provided in terms of average effort and average value of landings from 2005–2011, at the scale of ICES rectangles (Figure 2).

Figure 2: Maps of fishing activity in Scotland's Draft NMP.

MAP 5: Average effort in Scotland's seas by all UK vessels



MAP 6: Average value of landings from Scotland's seas

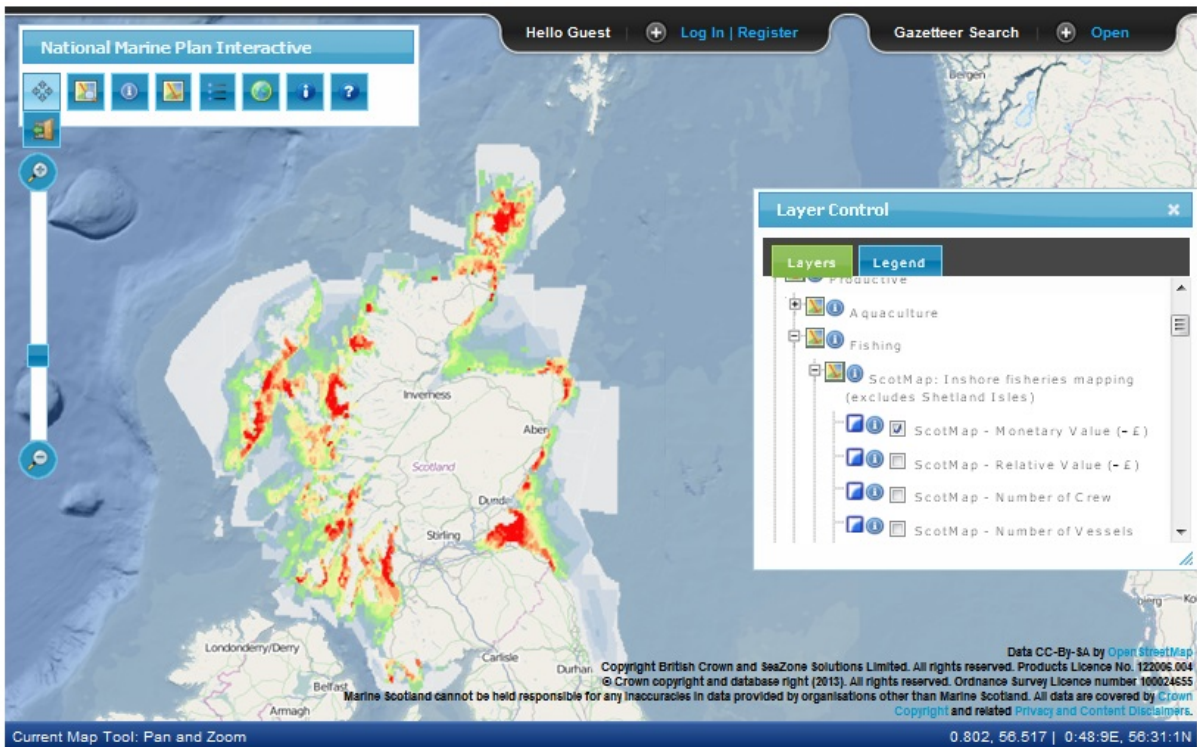
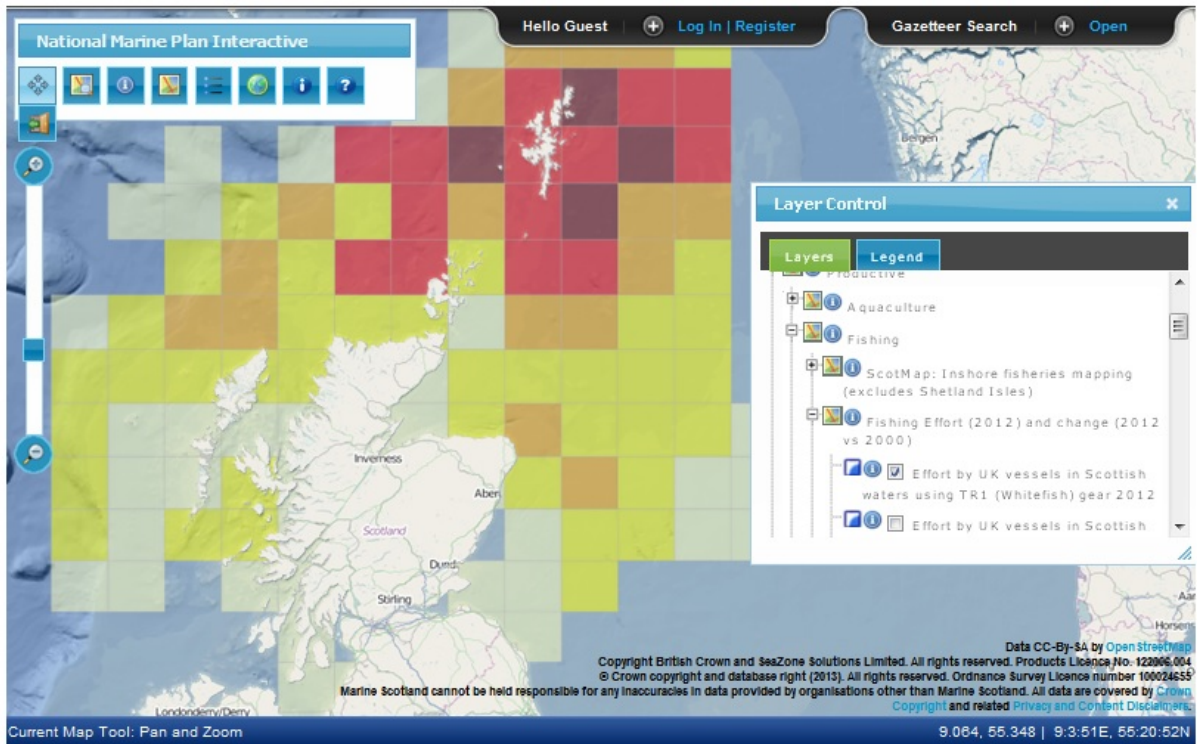


Source: Marine Scotland, 2013.

Using a 'core fishing grounds' approach to develop a spatial marine plan policy

A supporting interactive website (NMP Interactive) provides access to further data-layers in the GIS viewer, including fishing effort (2012) and change in fishing effort (2012 vs 2000), fishing tonnage, and average value at the scale of ICES rectangles; and Scotmap data, at the scale of 1/800th of an ICES rectangle (Figure 3).

Figure 3: Examples of maps of fishing activity on NMP interactive.



In general, the importance of considering impacts on fisheries, and in particular on fish and shellfish nursery and spawning areas, land-side facilities (ports) on which fishing fleets depend, and vulnerable coastal communities which depend on fisheries are highlighted. For example:

- Take account of fishing in consideration of any development in the marine environment. Local fishing interests should be consulted where appropriate.
- Key factors to be taken into account when deciding on uses of the marine environment and the potential impact on fishing are:
 - The economic importance of fishing, in particular to vulnerable coastal communities
 - The potential impact (positive and negative) of marine developments on the sustainability of fish and shellfish stocks and resultant opportunities for exploitation of new fishing opportunities in any given area
 - The environmental impact on fishing grounds (such as nursery, spawning areas), commercially fished species, habitats and species more generally
 - The potential effect of displacement on fish stocks, the wider environment, use of fuel, socio-economic costs to fishers and their communities, and other marine users.
- Where an impact on existing fishing activity may occur, a fisheries management plan should be prepared by the developer involving full engagement with local fishing interests. All efforts should be made to agree the plan with those interests and it should include:
 - An assessment of the potential impact of the development or use on the affected fishery or fisheries, both in socio-economic and environmental terms
 - A recognition that fishermen should be able to catch their fish quota
 - Reasonable measures to mitigate any constraints which the proposed development or use may place on existing or planned fishing activity
 - Reasonable measures to mitigate any potential impacts on sustainability of fish stocks (e.g. impacts on spawning grounds or areas of fish or shellfish abundance) and any socio-economic impacts.
- Ports should seek to engage with fishing stakeholders at an early stage to discuss any changes in infrastructure that may affect them. Any port developments should take account of the needs of the dependent fishing fleets with a view to avoiding commercial harm where possible. Where a port has reached a minimum level of infrastructure required to support a viable fishing fleet there should be a presumption in favour of maintaining this infrastructure, provided there is an ongoing requirement for it to remain in place and that it continues to be fit for purpose.

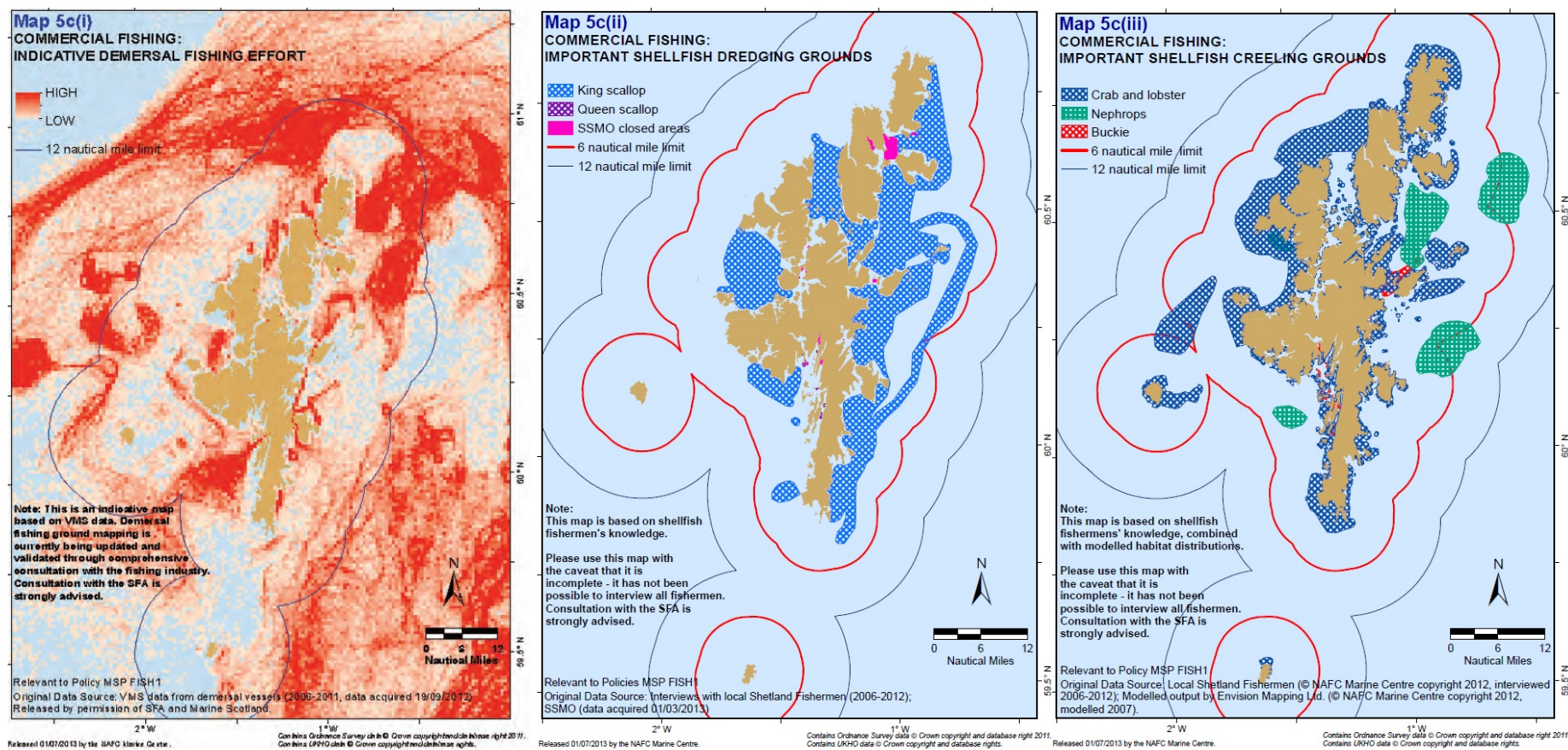
A2.3 Shetland Islands MSP: Shetland Islands' Marine Spatial Plan (SMSP) (Fourth Edition)

The Shetland Islands' Marine Spatial Plan (SMSP; Shetland Islands Council and NAFC Marine Centre, 2013) sets out a spatial strategy and policy framework to guide marine developments in the coastal waters around Shetland (the planning area includes all territorial waters seaward of the mean high water of the spring tide (MHWS), out to 12 nautical miles, but also includes terrestrial and coastal habitats/ecological processes that are clearly affected by marine use). The SMSP identifies the constraints developers are required to consider when contemplating development in the coastal area and incorporates authoritative spatial data on the marine environment, its various uses (including fishing, aquaculture, oil and gas, marine renewables, transportation and shipping, culture and heritage, sport and recreation, and education) and assets.

Collation of data for the SMSP started in 2006 and was subject to substantial stakeholder consultation, and evolved through provision of local representations and expert advice. The SMSP was continuously reviewed, through regular monitoring and reporting of the SMSP outcomes and outputs. Where deemed necessary, this informed periodic amendments and revisions. Through the Scottish Marine Regions Order 2013, expected to come into force in late 2013 or early 2014, it is envisaged that Shetland will become a statutory Scottish Marine Region. In the interim, the SMSP, in conjunction with the Shetland Local Development Plan, sets out the policies and criteria against which planning applications and work licences for marine-related development submitted in Shetland will be considered. The SMSP was developed by the Marine Spatial Planning Team at the NAFC Marine Centre (University of the Highlands and Islands) under the guidance of the Local Advisory Group.

The SMSP includes maps showing 'important' fishing areas for demersal whitefish, shellfish dredging and shellfish potting areas (Figure 4). The demersal whitefish map is based on individual vessels' VMS data, processed to remove non-fishing pings, and logged to reduce the importance of a few areas with very high intensity of pings; the shellfish dredging map is based on interviews with fishermen; and the shellfish potting map is based on a combination of interviews with fishermen and modelled habitat distributions.

Figure 4: Maps of important fishing areas in the SMSP.



Source: Shetland Islands Council and NAFC Marine Centre, 2013.

A2.4 The Belgian MSP: Draft Maritime Spatial Plan for the Belgian Part of the North Sea (BPNS)

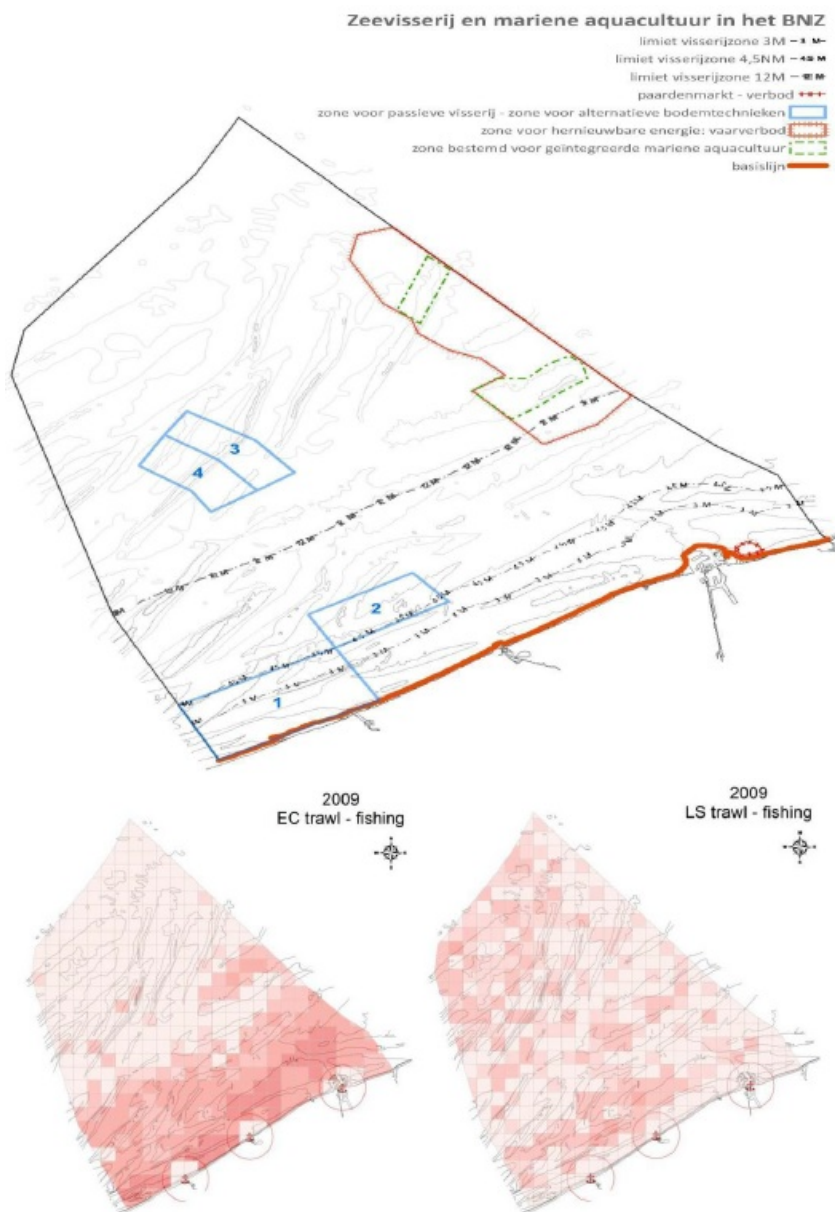
The Draft Maritime Spatial Plan for the BPNS (FPSHFE, undated) is based on a long-term vision of clean, healthy, safe, productive and biologically diverse seas, transposed into concrete objectives for the period 2013-2019. The lead agency is the Federal Public Service Health, Food Chain Safety and Environment (FPSHFE) and the draft plan went out to public consultation from 2 July to 29 September 2013 (FPSHFE, 2014). The MSP will be adopted by Royal Decree, establishing the coordinates of the zones delimited within the MSP as well as regulations for their implementation. The establishment of zones will allocate marine space for specific maritime uses. The marine spatial plan aims to coordinate decisions which have a spatial impact on sea areas and ensure that all stakeholders are involved in the process.

The original Master Plan was developed by the Ministry of the North Sea and implemented in two phases (phase I for the assignment of main industry zones; phase II for the designation of MPAs) but not all sectors were included (e.g. fisheries) as the Minister for the North sea had no authority on Flemish competencies which include fisheries policy.

Plan revisions in 2012 were led by the Ministry of Environment (Federal Public Service for Health, Food Chain Safety and Environment, undated) and included formal and informal consultations with all stakeholders. Once the revised draft Plan has been through a succession of procedural steps, it will be legally embedded by means of formal adoption such that sufficient legal certainty is created for the various (marine) users. The Plan will undergo a complete evaluation and possible amendment every six years.

Fisheries are not given any preferential areas. Maps relating to fisheries in the MSP show different use and exclusion areas (e.g. zones for passive/alternative fishing techniques (i.e. trawl exclusion areas), zone for integrated aquaculture, exclusion from renewable energy zones), and indicative trawl effort (Figure 5).

Figure 5: Maps relating to fisheries in the Belgian MSP.



Source: FPSHFE, undated.

For the fishery and marine aquaculture sector, the current draft Plan states '[t]his vision assumes the maximum preservation of rich fishing grounds as a function of the sustainability of the Belgian fishing sector. Complementary, sustainable forms of fisheries and marine integrated aquaculture are stimulated'. The spatial policy options relevant to fisheries are summarised as:

- Preservation of current fishing grounds, except for the renewable energy zone (navigation prohibition) and for infrastructural constructions for coastal defence, energy storage and energy transport
- Preservation of access to the Belgian fishing ports
- Stimulate alternative, sustainable fishery in parts of the designated habitat directive "Vlaamse Banken" (Flemish Banks).

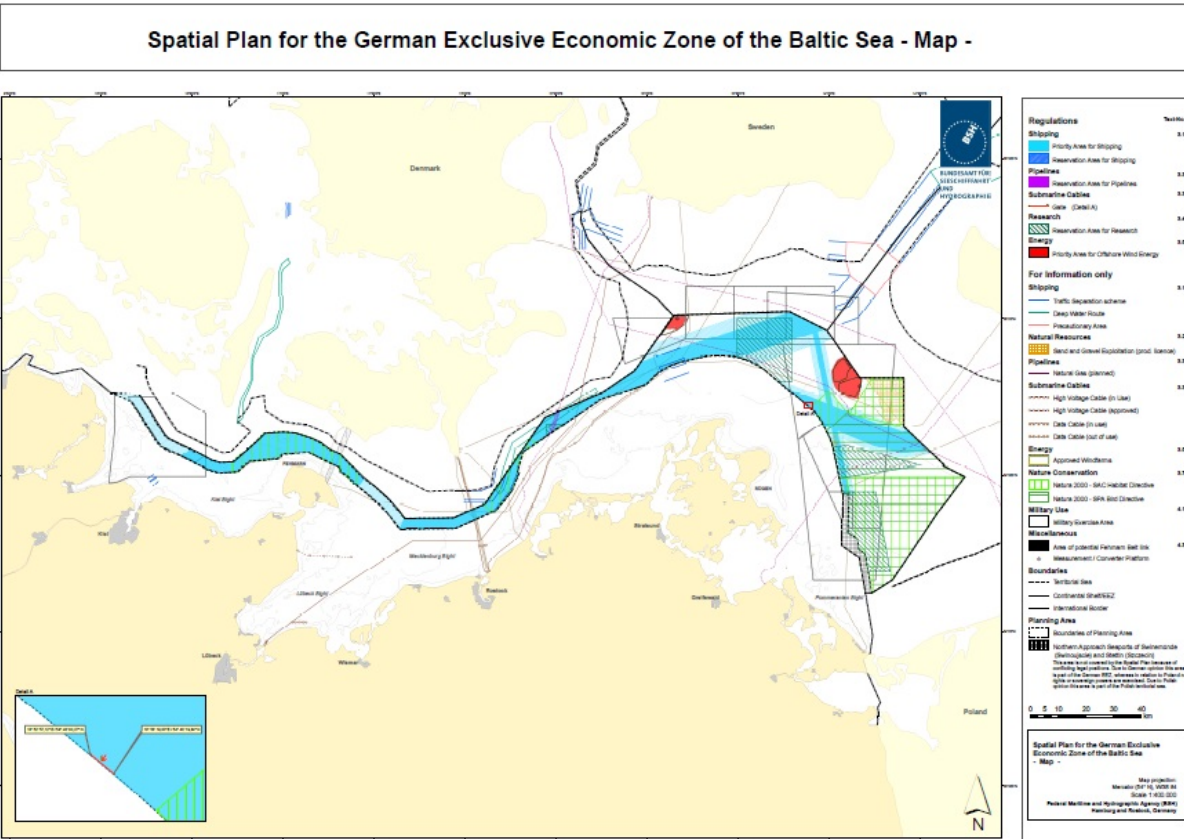
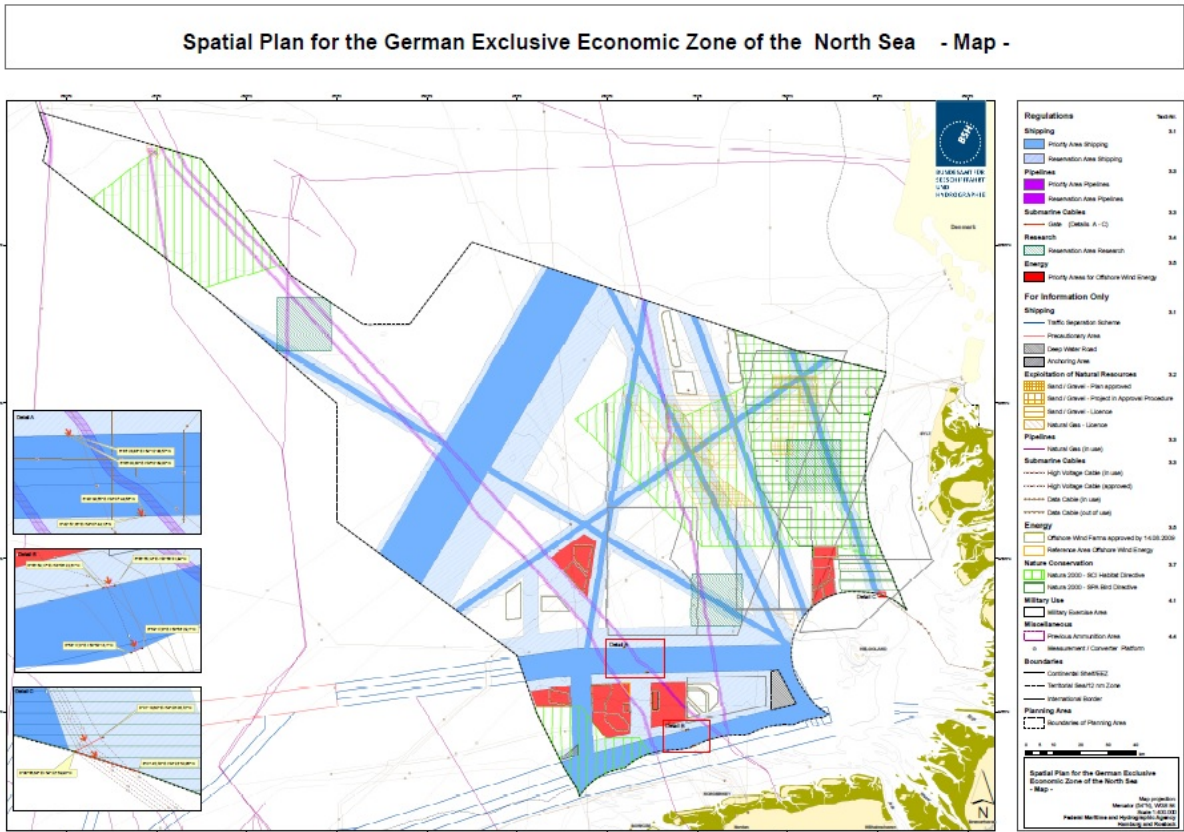
A2.5 German MSP: A Marine Spatial Plan for the German EEZ in the North and Baltic Seas

The German Marine Spatial Plan (Bundesamt für Seeschifffahrt und Hydrographie, 2008) is a statutory ordinance containing provisions to co-ordinate the individual uses and functions of shipping, exploitation of raw materials, pipelines and submarine cables, scientific marine research, wind energy production, fisheries and mariculture, as well as protection of the marine environment. The plan includes the determination of priority areas for shipping, pipeline and submarine cable laying, and wind energy production, where other uses are prohibited unless they are compatible with these priority uses.

The plan states that area designations for fisheries are not possible because of the regulatory competence of the EU and because fishing grounds cannot be spatially delineated. As such, additional regulations taking into account the interests of fisheries are established as part of the regulations for the uses of resource exploitation, pipelines and submarine cables as well as the generation of power (e.g. consideration should be given to fisheries interests when routing cables and pipelines, during planning operation and construction of energy production facilities, etc.). Of note, a preclusion regulation, which prevents the installation of offshore wind turbines outside priority areas for wind energy ensures that large areas of the EEZ will be kept free of wind energy use, so that fisheries (and also military exercise areas) will not be restricted by wind energy in such areas.

As spatial areas for fisheries are not defined, the maps provided in the German MSP do not show any information relating to fisheries (Figure 6).

Figure 6: Maps for German EEZ (North Sea and Baltic Sea).



Source: Bundesamt für Seeschifffahrt und Hydrographie, 2008.

Using a 'core fishing grounds' approach to develop a spatial marine plan policy

The Plan (Bundesamt für Seeschifffahrt und Hydrographie, 2008) took three years to complete and the Federal Plan for the North Sea went into effect in September 2009 and the Federal Plan for the Baltic Sea went into effect in December 2009. The lead planning agency is the German Federal Maritime and Hydrographic Agency or Bundesamt für Seeschifffahrt und Hydrographie (BSH) (UNESCO, 2013).

A2.6 The Netherlands National Water Plan (2009)

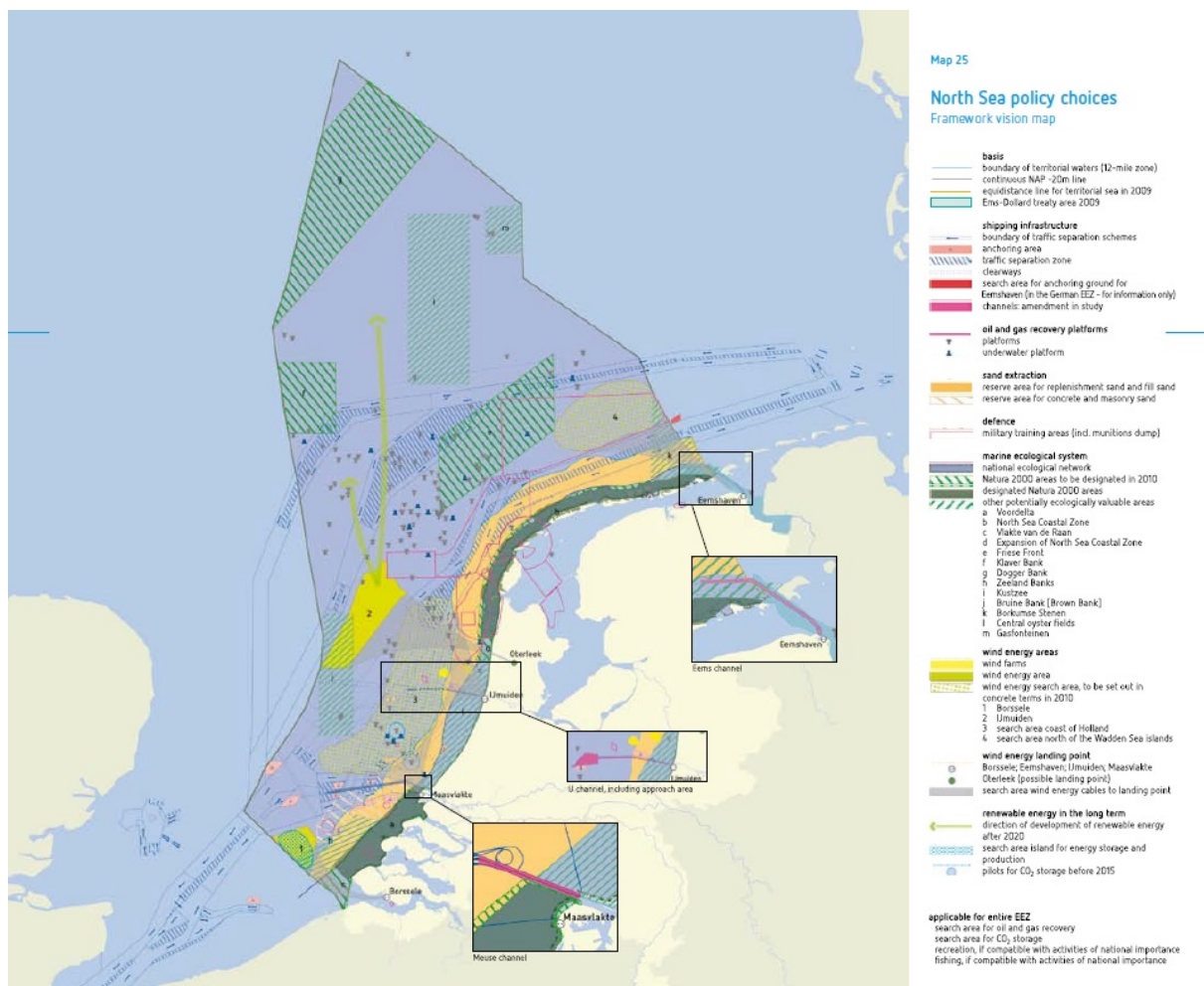
Marine Spatial Plans for the Dutch part of the North Sea became part of the National Water Plan in 2009. The National Water Plan (Ministry of Transport, Public Works & Water Management, 2009) is a strategic framework based on the Dutch Spatial Planning Act, which in 2010 replaced certain policy sections of the National Spatial Strategy, including the spatial plan for the North Sea. The Plan status is 'advisory', but the plan has the status of a 'policy rule' and the government is obliged to act in accordance with it.

The Lead Planning Agency is the Interdepartmental Directors' Consultative Committee North Sea (Interdepartementaal Directeurenoverleg Noordzee, IDON) led by the Ministry of Transport, Public Works and Water Management agency. Stakeholder participation mostly comprised consultations with other federal agencies, major marine industry sectors, and public review of plan documents. The time required to complete the plan was three years and it will be revised every five years (UNESCO, 2013).

Section 5.6 of the NWP states that within international frameworks, the Cabinet has prioritised the following activities that are of national importance to the Netherlands: sand extraction and replenishment; renewable (wind) energy; oil and gas recovery; CO₂ storage; sea shipping; and defence areas. In areas that have been designated for activities of national importance, other activities must not hinder this use. As such, fisheries will be required to give way to renewable energy developments and other activities of national importance.

Priority or core areas for fisheries are not defined in the plan, and no maps of fishing activity are provided. The maps provided for the North Sea do not include any information on fisheries (Figure 7).

Figure 7: Map of North Sea area in the Netherlands NWP.



Source: Ministry of Transport, Public Works & Water Management, 2009.

A2.7 Norwegian Sea Integrated Management Plan

The Norwegian Sea Integrated Management Plan (Norwegian Ministry of the Environment, 2008–2009) provides a framework for value creation and co-existence between industries in the Norwegian Sea through sustainable development. The plan provides a framework for both new and existing activities in order to facilitate value creation while protecting the area’s high environmental value and biological productivity. Fisheries are a major contributor to GDP and as such are already well protected in the Norwegian Sea, for example from the impacts of oil and gas development.

The plan did not identify any areas in which fishing activities are given priority, although maps of the most important fishing areas in the Norwegian Sea throughout the year were produced using VMS data and mapped along with other activities (

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Figure 8, Figure 9). Fisheries management measures are developed to achieve sustainable fishing in all Norwegian Sea fisheries. The plan recognised that healthy fish stocks are needed for sustainable harvesting and implemented special management strategies for unhealthy fish stocks, although due to socio-economic reasons the need to permit levels of harvesting that would prolong recovery was recognised. The plan also recognised valuable areas in which activities would be restricted in order to maintain the ecological functioning of the environment.

Figure 8: Maps of important commercial fisheries and fisheries activities with commercial shipping routes, Norwegian Sea Integrated Management Plan.

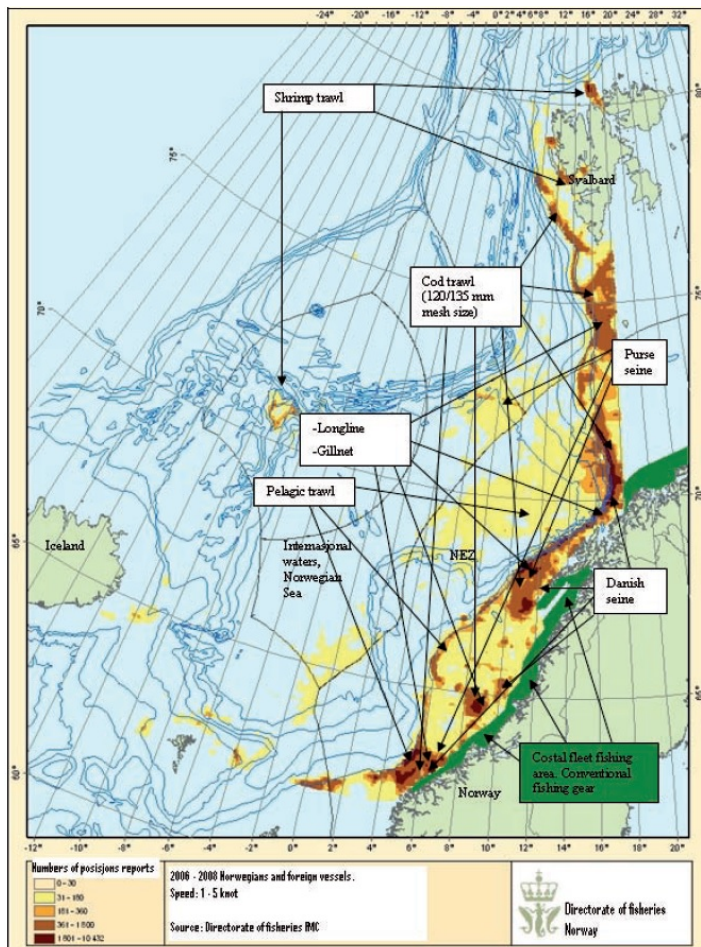


Figure 5.5 Map of the most important fisheries in the Norwegian Sea during the year
Source: Directorate of Fisheries

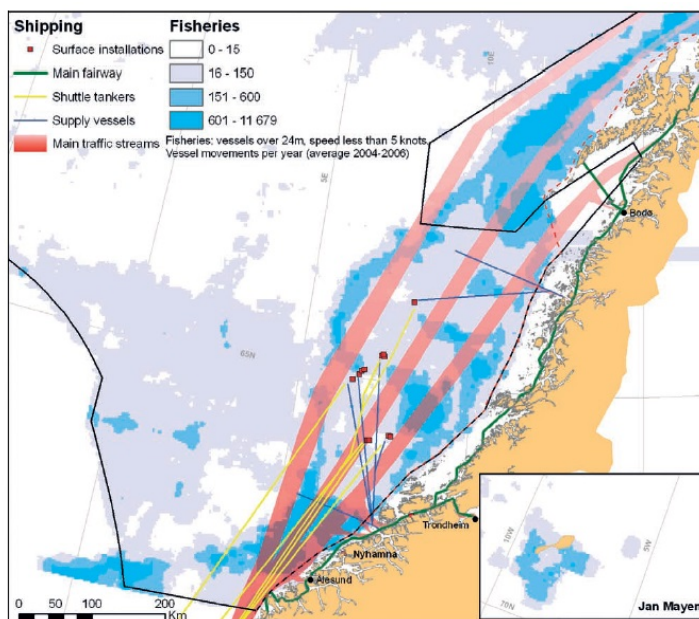


Figure 5.8 Main traffic streams and fisheries activities in the management plan area
Source: Norwegian Coastal Administration and Directorate of Fisheries

Source: Norwegian Ministry of the Environment, 2009.

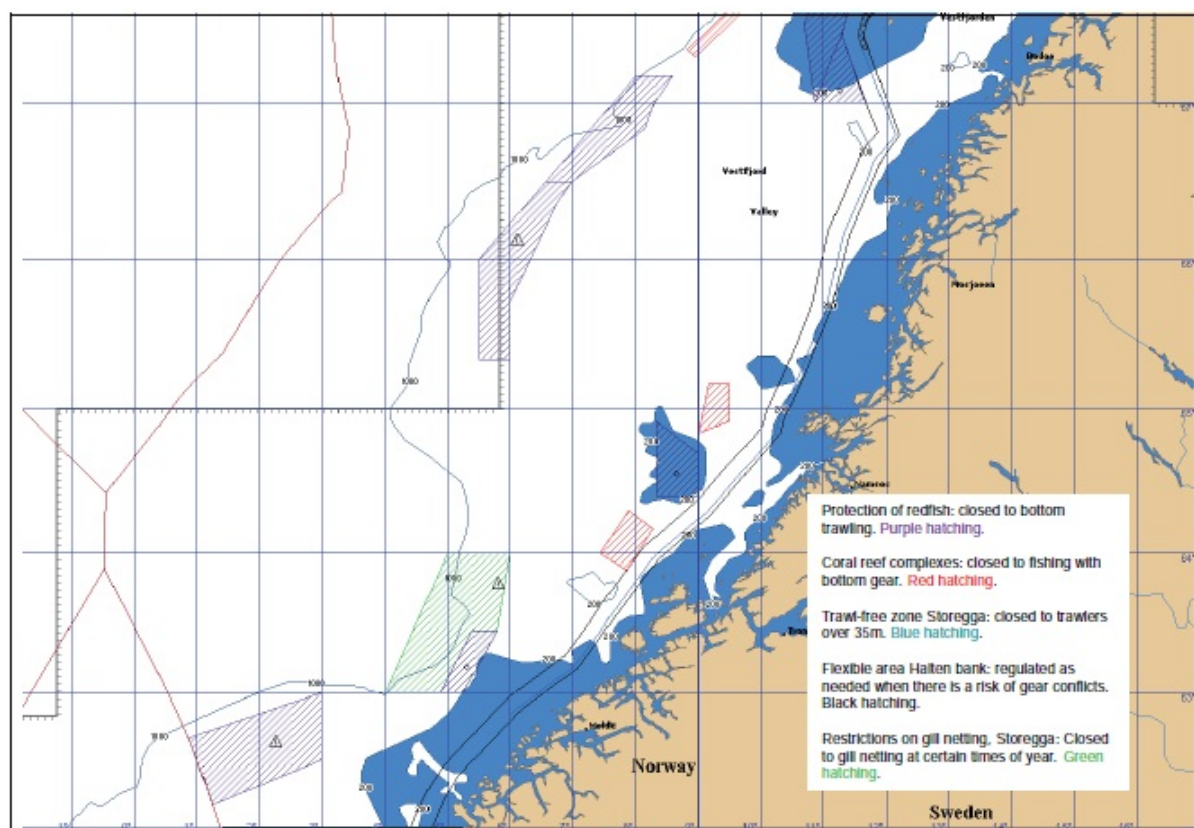
Using a 'core fishing grounds' approach to develop a spatial marine plan policy

Spatial measures presented in the plan relate to the restriction of fisheries (Figure 9). Such restrictions include:

- Prohibition against fishing for redfish in certain areas
- Establishment of 'fjord lines' to define areas restricted from fishing to protect spawning cod
- Opening/closure of fishing grounds to protect larvae and juvenile fish
- Trawl-free zones and flexible areas
- A need outlined in the Marine Resources Act to exercise appropriate care when fishing near known coral reefs.

The authorities can ensure that the development of renewable energy in the plan area takes place where conflict with fisheries is low enough to be acceptable. In general it is not considered necessary to impose fishing restrictions for renewable developments.

Figure 9: Map of spatial management measures in the fisheries sector from the Norwegian Sea Integrated Management Plan.



A2.8 C-SCOPE Dorset Coastal Plan

The C-SCOPE Dorset Coastal Plan (Dorset Coast Forum, 2012) was developed by the Dorset Coast Forum and The Coordination Centre on Integrated Coastal Zone Management in Belgium and seeks to provide direction, policies and advice to users, managers and regulators of the marine plan area to work towards sustainable development.

A number of plan policies relate to the spatial management of fisheries activities within the plan area. These include Fishery Closure Areas including seasonal closures of areas through Southern IFCA byelaws; No Trawl Areas within potential future MCZ reference areas; and the use of wrecks as Artificial Reef Areas. Important fish spawning and nursery areas were also identified and included in nature conservation management measures. No areas that give priority to fishing activities are identified.

The following plan policies relate to the management of fishing activity within the Marine Plan area:

HME 3: Developments or activities should have regard to the potential adverse effect either directly, indirectly or cumulatively on habitats or species which are not designated under European or National legislation but which warrant protection to maintain wider ecosystem function, or as providers of marine goods and services.

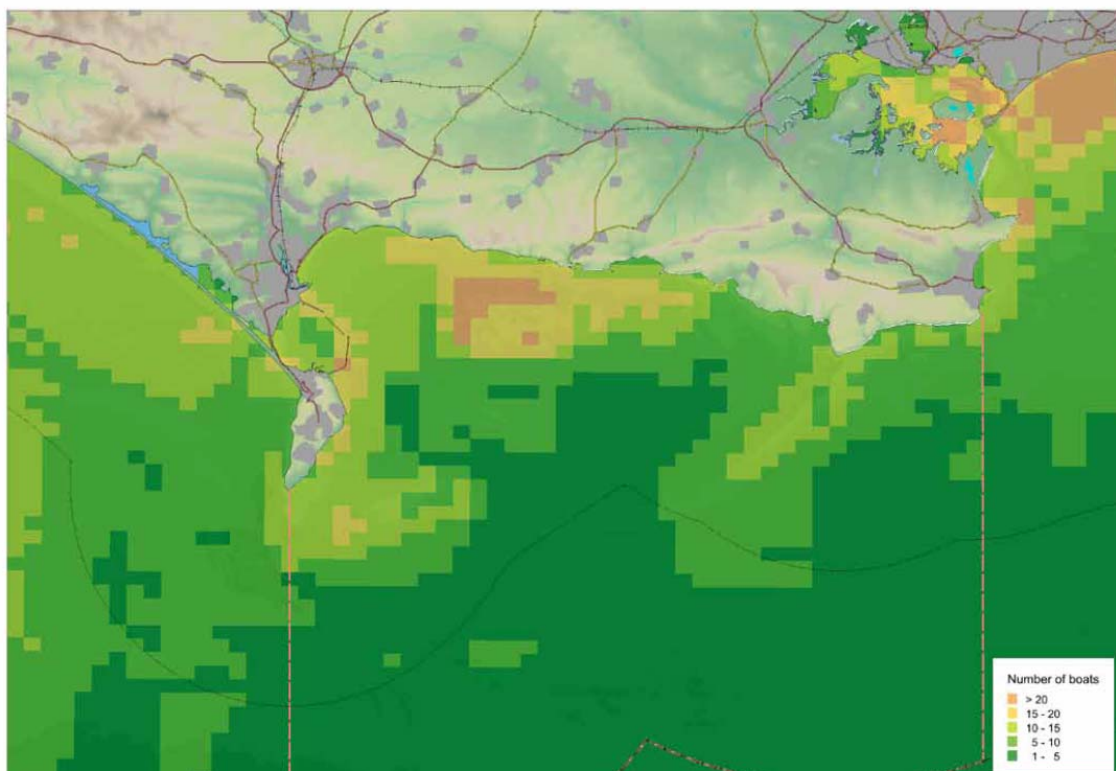
HME 5: In addition to complying with the Common Fisheries Policy and Southern IFCA byelaws, as a minimum requirement the commercial exploitation of fish and shellfish should be within safe biological limits.

HME 6: Fisheries enhancement initiatives (e.g. artificial reefs) which contribute to the maintenance and development of a sustainable fishing industry in Dorset will be encouraged where consistent with other policies in the plan.

SME 12: Development of mussel and scallop cultivation will be encouraged in the areas shown [...] However, this does not preclude other development which would otherwise be acceptable and the opportunities identified are indicative, subject to obtaining the required consents, and do not preclude development applications and activities elsewhere.

Commercial inshore fishing activity (number of boats) was mapped in the Marine Plan area (Figure 10).

Figure 10: Commercial inshore fisheries activity in the C-SCOPE Dorset Coastal Plan area.



C-SCOPE Marine Plan

Source: Dorset Coast Forum, 2012.

A2.9 Rhode Island Ocean Special Area Management Plan

The Rhode Island Ocean Special Area Management Plan (SAMP) (Rhode Island Coastal Resource Management Council, 2010), was an 'ocean zoning project' which defined use zones for Rhode Island's offshore waters through a research and planning process that integrated the best-available science with open public input and involvement. The process was led by the Rhode Island (RI) Coastal Resources Management Council (CRMC) and to fulfil the Council's mandate, the Ocean SAMP laid out enforceable policies and recommendations to guide CRMC in promoting a balanced and comprehensive ecosystem-based management approach to the development and protection of Rhode Island's ocean-based resources within the study area (UNESCO, 2013). The process took two years (2008–2010) and stakeholder engagement was extensive throughout the process and continued through the implementation phase. An Ocean SAMP stakeholder group was an integral part of both determining the scope and contents of the plan as well as refining its policies and management measures. Although the Plan can be continually amended through an administrative process, the CRMC will conduct a major review of the Ocean SAMP document every five years from adoption.

Data to map fishing activity in the Ocean SAMP (see the Commercial Fisheries Chapter 5 baseline characterisation) included (Figure 11):

- Historic trawling areas

- Qualitative input on fishing grounds from fishers
- Fishing areas based on vessel trip reports (to produce 'number of trips per cell' i.e. intensity maps, at grid resolution of one minute intervals).

The Plan refers to fish species which have 'Essential Fish Habitat' (EFH) within the Ocean SAMP and as a general policy states that 'The Council recognizes that while all fish habitat is important, spawning and nursery areas are especially critical in providing shelter for these species during the most vulnerable stages of their life cycles. The Council will ensure that proposed activities shall be designed to avoid impacts to these sensitive habitats, and, where unavoidable impacts may occur, those impacts shall be minimized and mitigated. In addition, the Council will give consideration to habitat used by species of concern as defined by the NMFS Office of Protected Resources'.

The Plan also provides for the establishment of Areas of Particular Concern (APC), which are designed to protect areas that have high conservation value, cultural and historic value, or human use value from large-scale offshore development. APCs can include areas of high fishing activity and the Plan states that '[a]reas of high fishing activity as identified during the pre-application process by the Fishermen's Advisory Board, may be designated by the Council as Areas of Particular Concern' (suggesting that at the time of publication the Ocean SAMP did not have any APCs designated for high fishing activity).

Using a 'core fishing grounds' approach to develop a spatial marine plan policy

Figure 11: Example maps from Rhode Island Ocean SAMP.

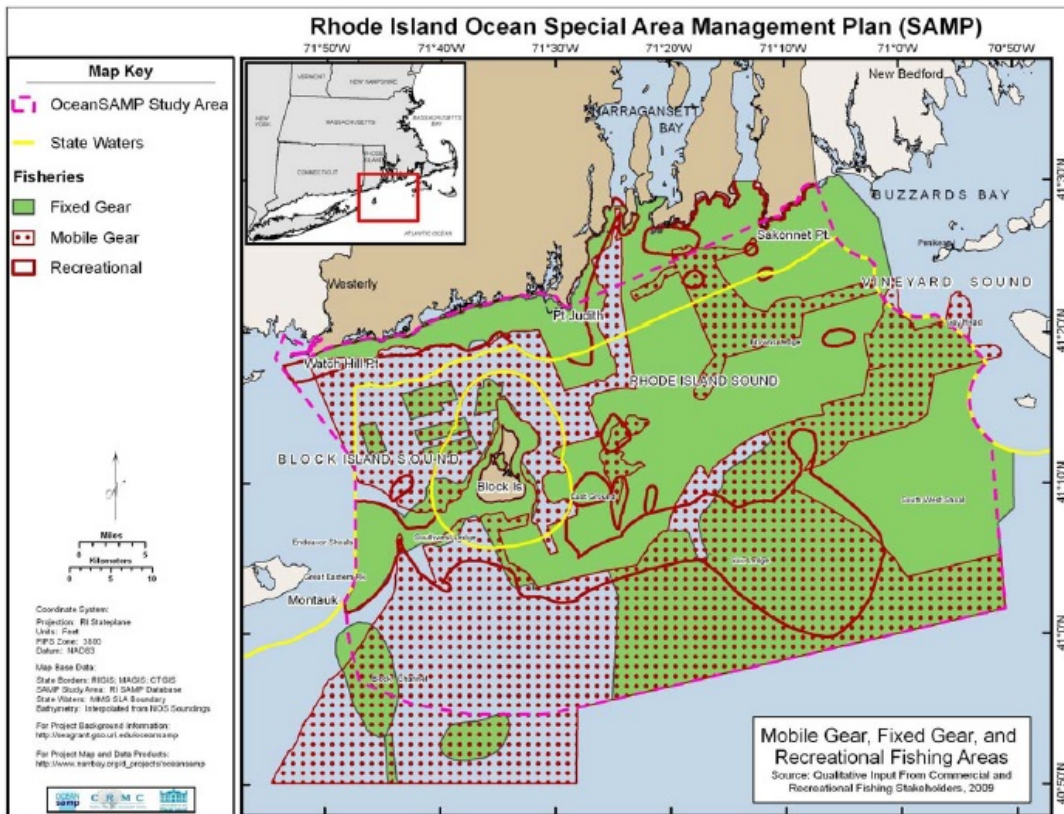


Figure 5.17. Mobile gear, fixed gear, and recreational fishing areas based on qualitative input.

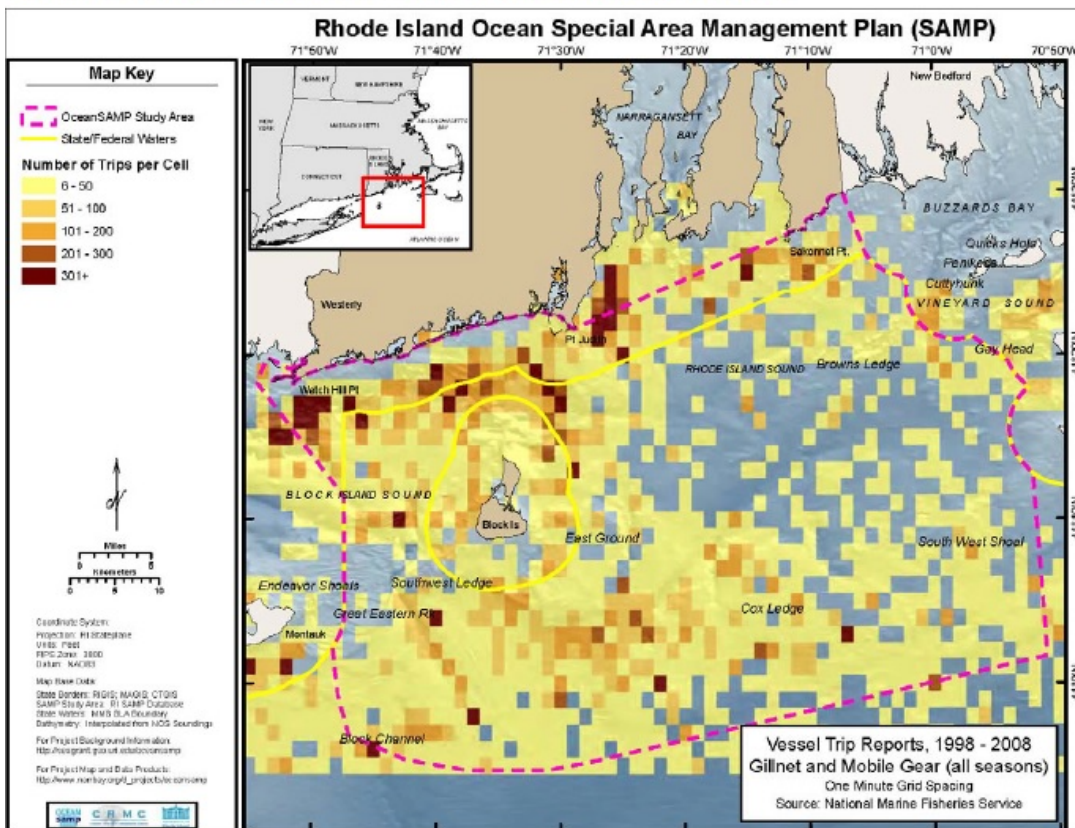


Figure 5.18. Commercial mobile gear and gillnet fishing areas based on NMFS Vessel Trip Reports, 1998 - 2008.

Source: Rhode Island Coastal Resources Management Council, 2010.

A2.10 Massachusetts Ocean Management Plan

The Massachusetts Ocean Management Plan (EEA, 2009) was developed in response to the Massachusetts Ocean Act 2008. The plan aims to provide a comprehensive approach to ocean resource management that supports ecosystem health and economic vitality. Specifically, the plan established three management areas: Prohibited, Renewable Energy and Multi-Use. The Ocean Act allows for developments within 'appropriate scale' of which there are seven factors. Such factors include mitigating and minimising effects to fisheries and locating developments away from high concentrations of human activities, including commercial and recreational fishing.

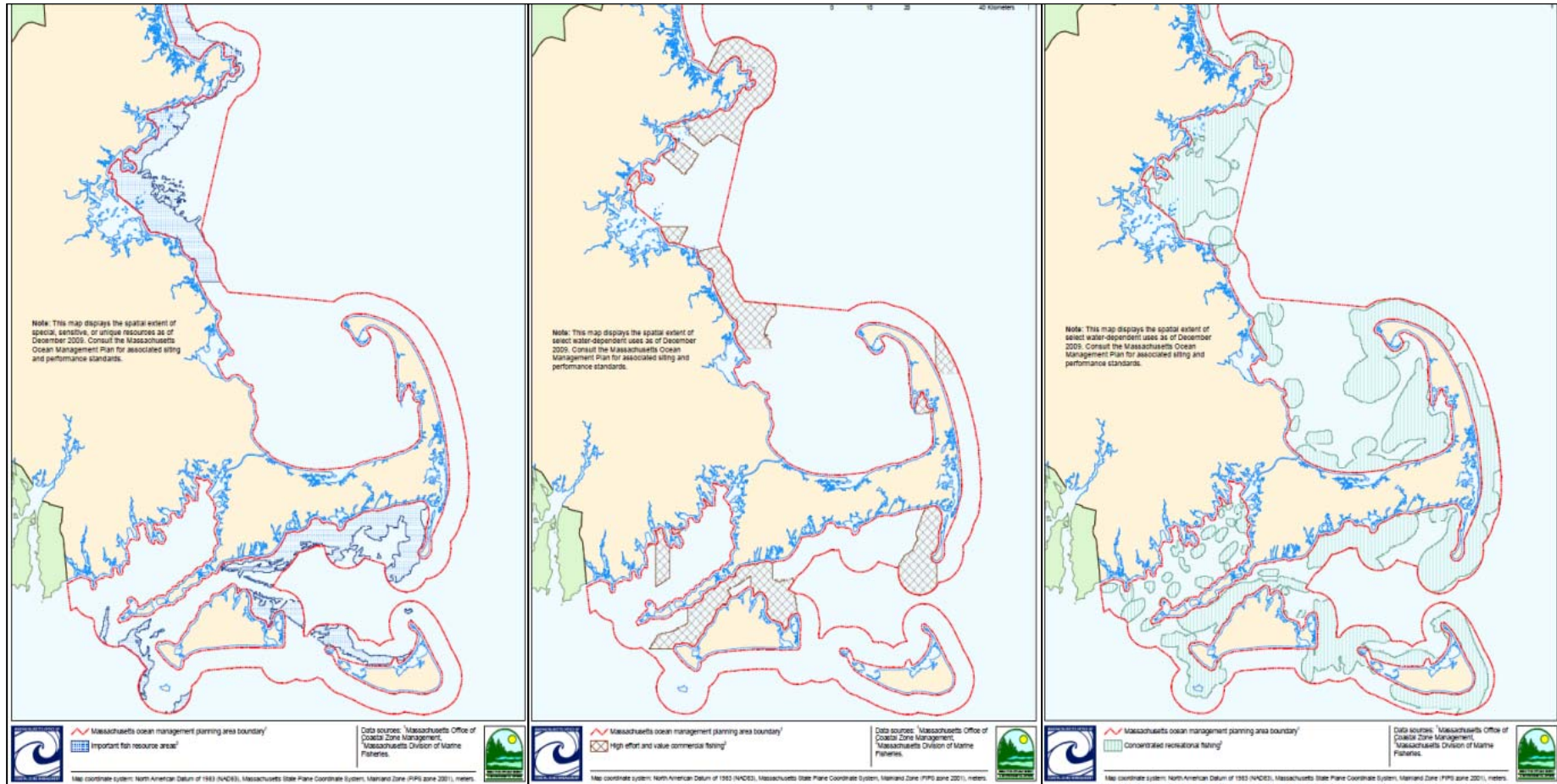
Commercial and recreational fishing are allowed uses managed by the Division of Marine Fisheries (DMF). The DMF maintains the authority to open or close areas for the taking of any or all types of fish. Such decisions are made by working closely with the Marine Fisheries Advisory Commission, the New England Fishery Management Council and the Atlantic States Marine Fisheries Commission in order to manage the harvesting of species consistently throughout the region.

Areas of high commercial importance to the fishing industry and high concentrations of recreational fishing were identified during plan development (Figure 12). Work to characterise fishing commercial fishing effort by gear type was initiated in order to understand benefits and impacts of different uses, activities and facilities to fishing.

Performance indicators for the plan were developed that included a Fish Population Assessment, economic value of both recreational and commercial fisheries and changes in fish and shellfish biomass and abundance. The plan also designates 'Special, Sensitive or Unique' species and habitats (SSUs) within the plan area. Such SSUs include 'Important Fish Resource Areas', defined as areas of high importance to commercial and recreational fisheries as represented by DMF data. SSUs also included areas of hard/complex seafloor and eelgrass, which may comprise important fish nursery grounds, although this is not recognised in the plan.

Using a 'core fishing grounds' approach to develop a spatial marine plan policy

Figure 12: Maps of important fishing resource, high value and recreational fishing areas from the Massachusetts Ocean Management Plan.



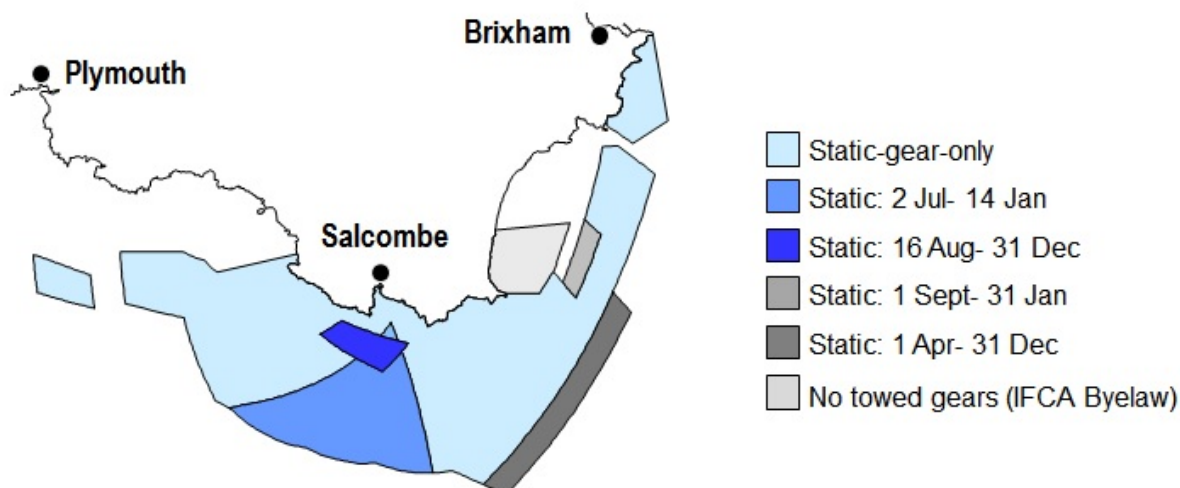
Source: Massachusetts Ocean Management Plan. Volume 1. 2009

A2.11 South Devon Inshore Potting Agreement (IPA)

The South Devon Inshore Potting Agreement (IPA) is a fisheries-specific spatial management arrangement. It was established in 1978 as a voluntary 'gentlemen's agreement' and formalised historic use patterns of, primarily, static gear fishers on the inshore fishing grounds around Start Point, South Devon. Exclusive areas for static gears, and areas where mobile gears are allowed on a seasonal basis, are established (Blyth *et al.*, 2002) (Figure 13).

After the 1978 version of the IPA was mapped, minor modifications were made subsequently in 1982, 1984 and 1993, allowing mobile gear access to different areas or to seasonal-use areas at different times. In March 2002, the IPA was afforded protection through national legislation, such that the system is no longer voluntary.

Figure 13: Map of management areas for South Devon IPA.



Source: Blyth *et al.*, 2002.

A2.12 Mid-Channel Agreement (MCA) for static and mobile gears

The Mid-Channel Agreement (MCA) was established as a voluntary agreement in the late 1970s, to reduce gear conflicts between predominantly UK-based pot fishers and mobile gear fishers from the UK, France and Belgium.

The MCA works through seasonally allocating areas of ground between the Devon/Dorset coast and the French coast to pot fishers (Figure 14). Mobile gears can be worked in corridors between the potting blocks. At the seasonal change-over, potters are required to move their static gear in to new blocks, so that the previously used grounds are opened to mobile gear fishers.

An annual meeting on the shape and operation of the MCA is held between fishers' representatives, culminating in new MCA charts being drawn up and issued.

Annex 3: Workshop Outputs

A3.1 Agenda

Scoping the opportunities and challenges to using a 'core fishing grounds' approach to develop a spatial marine plan policy for fishing

Monday 24th February 2014, 10am to 4.45pm, London, SW1P 3RB

Registration and Coffee 10.00 – 10.30

Introductory Session 10.30 – 11.15

- MMO will introduce the context for considering fisheries in marine planning and outline the specific aim to be achieved by the project. (Followed by Q&A)
- ABPmer will provide some detail of how fisheries have been incorporated into international marine spatial plans. (Followed by Q&A)

Exploring the potential and the limitations of using a core grounds approach

- Initial ideas - Each person will have an opportunity to record the potential and the limitations of the approach or alternative approaches.
- Summary and feedback on the above to whole group.
- Discussion of ideas – groups can comment on ideas based loosely on the questions below. Outcomes will be used in the next session.
 - Is using a core grounds approach suitable for marine planning?
 - What is the opportunity with such an approach?
 - What are the limitations of using/not using such an approach?
 - What are the key issues that need to be considered to take such an approach forward?

Lunch will be provided 12.30–13.15

Exploration of key issues for using a core grounds approach

- Initial response to issues raised in previous session - groups rotate around key issue boards so each person can contribute to each topic (13.15 – 14.30).
- Summary and feedback on the above to whole group (14.30 – 14.40).
- Discussion of issues – in groups and by whole group (14.40 – 15.30).

Break for refreshments 15.30–15.45

Final considerations 15.45–16.45

- Options and recommendations for taking the work forward – discussion and conclusions
- Next steps

Workshop close 16.45

Using a 'core fishing grounds' approach to develop a spatial marine plan policy

A3.2 Participants

Participants at the workshop included representatives from:

- MMO;
- Defra;
- Cefas;
- Marine Scotland;
- The Crown Estate;
- IFCA's;
- National Federation of Fishermen's Organisations (NFFO);
- Scottish Fishermen's Federation (SFF);
- New Under Ten Fishermen's Association (NUTFA);
- Dutch Fishing Industry;
- Natural Resources Wales;
- JNCC;
- Holderness Coast Fishing Industry Group;
- Tegen Mor Fisheries Consultants;
- Aggregates industry;
- Cables industry;
- Bangor University.

A3.3 Positive and negative aspects of a core fishing grounds approach, and alternative approaches

Positive aspects of the approach	Negative aspects of the approach
<p>Data</p> <ul style="list-style-type: none"> • Important to have some knowledge on spatial activity of the fishing industry (evidence of fishing activity atlas prepared by the MAFF laboratory in the 1950s). • Improve understanding over the interpretation of fisheries spatial data. • Provide a level of information, which currently is hard to access. • An agreement on the form of data required to identify core grounds would simplify negotiations between marine sectors. • A good way forward to depict where fishing is taking place. • Understanding space should allow stronger/more specific policies to be derived. <p>Clarity/Security</p> <ul style="list-style-type: none"> • Important to protect vital fishing grounds. • Potential protection of grounds from energies sectors (oil platforms, turbines and cables - potential exclusion zones). • Something to defend. • Other sectors (e.g., energy) being able to spatially define their activities. Fishing is losing out- need to show importance. 	<p>Data</p> <ul style="list-style-type: none"> • Insufficient data for large number of vessels. • Concern that an incomplete data set leads to impression that fishing activity not important in some areas. • Good policies could be hampered by poor data. • Fishing activity is dynamic. • Updates of areas. • Lack of information for some areas. • If accounting for fluctuation/variation in grounds, then will require 'resource intense' management of maps/spatial information. • It will be most useful if broken down by gear type and updated regularly in order to monitor trends. However, this will be costly – who will fund? • Will require necessary resources to maintain and review. • Snapshot. <p>Variability, flexibility</p> <ul style="list-style-type: none"> • What happens outside core fishing grounds – will there be flexibility for new/changing grounds? • Displacement. • Losing now, lost forever.

- Provides security- with other developments comes concern with erosion of important fishing areas.
- Clarity and certainty of fishing grounds in face of competing activities.

Cumulative impacts assessment

- Allow consideration of fishing activity in context of cumulative impacts assessments using marine plans.

Recognition

- Will increase the level of dialogue with the fishing industry.
- Consultation and recognition.
- Raise profile of 'important' grounds via marine planning/licensing systems - improve on the status quo.
- Can provide fishermen's interests with some form of official recognition - an understanding that they have a presence that is affected by other marine activity.

Parity with other sectors

- Gives parity of treatment with other 'zoned' sectors.

Decision making

- Improve policy re: decision making in marine areas when several activities overlap.
- Will help industry and managers make informed decisions.
- Will greatly help in marine planning and planning applications.
- Provides a good baseline for planning.

Provides opening for fishing in the planning debate

- Useful as a 1st scoping to highlight areas of high fishing intensity as a precursor to dialogue.
- Provides recognition of importance of seafood production and allows proper commercial planning for fishing industry.
- Accessible means of including fishing into planning debate.
- Allow fishing to be included in the planning process.

Reduce conflicts

- This analysis should improve decision making and reduce the potential for conflicts. It can identify win-wins, e.g., areas suitable for renewables but not much fishing. It is important to link to profits - Gross Value Added (GVA) maps.

Reduce uncertainty

- Drawing lines on maps will ensure consistent understanding amongst stakeholders.
- Reduces uncertainty from fishing industry perspective.

- Will not take into consideration seasonality unless it is annually updated.

- What is not important today may be important tomorrow and vice versa.

- Not flexible enough?

- Not responsive to changes in fish distribution e.g. in relation to climate change.

- Updating of spatial policies as grounds change.

- Avoid being too restrictive and prescriptive as historically fishing patterns change over time.

- Assumes no change in future species distribution.

- Restricts flexibility – fishing is not definitive so it's difficult to ensure 'core areas' will remain the same.

- Enough flexibility to quickly reflect shifting geography of fishing grounds?

- If taken as prescriptive of fishing areas, could reduce flexibility in local management of fishing effort.

'Boxed in'

- Perception of being 'boxed in'.

- Inherent threat that highlighting one area by definition demeans others.

- Concern about what happens 'outside' the core.

- Should not take away from current available data.

- Will core areas act as a flag for increased activity? E.g. issues with seabed integrity?

- Could be seen as prescriptive i.e. non-core area is regarded as non-fishing area.

- Danger of intensifying effort into 'core' areas.

- Losing ground = displacement; sectoral displacement.

- Potential isolation of nomadic fleets – restrictions on inshore vessels in a diverse fishery in the case of industry developing in non-core grounds.

Indicators to use

- Will vary according to how you define value (socio-economic/food security).

- Different sub-sectors may not agree on level of importance

- Need for different approaches inshore/offshore, as catch volume/value is not the main indicator for inshore fleet.

Scale of application

- An industry-wide view cannot easily represent the interests of an individual.

Non-UK vessels

- How will it fit in with the Common Fisheries Policy (CFP)?

- Potential for conflict of interest between UK and other EU nations?

- Non-UK interests.

- Challenge is to include UK and other Member States' fishing activity to gain a comprehensive picture (60% of all EU fishing activity apparently in UK waters).

Effectiveness

- If the concept of core grounds retains enough

Using a 'core fishing grounds' approach to develop a spatial marine plan policy

	<p>flexibility to allow for new situations/other overriding needs, will it really offer the protection/certainty for fishermen's economic/employment interests that they need?</p> <ul style="list-style-type: none"> • Will policies have any 'teeth'? Can information be ignored? <p>Impacts on other sectors</p> <ul style="list-style-type: none"> • What is the cumulative impact? Developers limited access to landfall (corridors to land); the rights of other seabed users in a 'core ground'. <p>Other issues</p> <ul style="list-style-type: none"> • How does a data-driven approach work alongside a consultative-based approach? • Challenge – making a spatial policy work alongside a general policy. • Need for fishing industry to be considered as statutory consultees. • Will not replace statute responsibilities e.g. management in Marine Protected Areas (MPAs).
<h3>Alternative Suggestions</h3>	
<ul style="list-style-type: none"> • Rather than a core fishing ground approach, consider essential life stage habitat protection for fishing e.g. breeding, spawning, nursery, feeding, etc. • Already have spatially defined fisheries e.g. aquaculture; CFP closed areas for recovery spp; Regional Advisory Councils (RACs); gear restrictions. • Should not be linked to economics. • Data limitations, also criteria used to define core fishing grounds. • More transparent evidence base. • If MP are to provide a focus or guidance to developers, such as 'evidence plans' by the Planning Inspectorate (PINs), then would it be sensible to relate impacts of fishing activity to the sensitivity of habitat? There may be areas where fishing is preferable as it will have less impact? This could be spatially defined. • North Sea – approach; consultation; scientific alignment methods. Economics – main driver. • Can other policies, already in place, achieve the same output? CFP? • Decisions must be made under the framework of the CFP – could be conflict in the 6-12nm area with other Member State vessels. • Define scale. • Allow for different scales – nationally-important fishing grounds vs regional. • Will need to contain sufficient attribute info to add value – gear type, fishery, port, etc. • Thresholds for defining core would be different for each fleet sector – 'contours' could be interpreted according to question being asked. • Contour system, fleet specific. Define limits, refresh rate. Need to differ between plan areas. Flexibility of approach. Intensity of use. • Need to define 'core' – will vary by sector, season, access, changes in fish movement, etc. • Certain species are more defined by spatially-discrete areas than others. These may be more easily 'planned' spatially. • Behaviour of different fisheries. • Alternative – identifying areas that have historically important – cyclical fisheries. Introduces a degree of flexibility. • Renewables Rule! (Unless you're a 'red throated diver'). • Promote dialogue on a case-by-case basis, involving regional stakeholders. 	

A3.4 Exploration of key issues

Exploration of key issues

1. Definitions of core fishing grounds, indicators to use

- Several delegates did not consider the term 'Core fishing Grounds' an appropriate heading as the wording implies little or no flexibility in the approach. Two suggestions of alternate wording were offered. "Fishing Interest Areas"- it was felt that this better incorporates the value of nursery and spawning grounds within an umbrella heading, as opposed to defining the physical space in which fishing occurs. Another suggestion was "Areas of Primary Fishing Importance" this suggestion was offered on the basis that it better defines those areas that fishermen can regularly depend on for catch. The exact wording of alternative suggestions was not important to delegates however they wanted to ensure the term was representative.
- There was significant discussion as to how best to define what a 'core area' is. Delegates agreed that there are many metrics for doing so and that it would be wrong to select one and expect that single metric to adequately define core grounds in all places.
- Several stakeholders highlighted the differences in fishing activities between the inshore (0-12nm) and offshore areas. Several stakeholders noted that there is a further delineation to make within the inshore- that of 0<6 and 6<12nm. Delegates felt this further distinction necessary because of legislative regimes, governing bodies, density and intensity of use in coastal waters and the displacement that has already occurred.
- Scale was a consideration with delineating between the inshore and offshore, both for the perceived necessary size difference of core grounds inshore/offshore and the limitations of the vessels operating closer inshore.
- Delegates considered that it would be possible to define core areas based on target species, habitat, effort by area, primary fishing activity (of vessels) amongst others. Delegates would consider a 'fishery' or 'ecosystem' approach rather than a species or fishing method approach to defining core grounds.
- With respect to the economic metrics that could be used to define core ground, delegates mentioned the following; landing value of catch, number of employees by boat, number of indirect employees (this would verge into social consideration) and the ability of fishers to adapt or diversify if the fishing area used were to become disrupted or unusable.
- Delegates wanted to ascertain the purpose of defining core areas- one suggesting that the reason to ensure fishing ground protection was primarily to maintain food security, especially planning to ensure food security in line with population growth. Note: it appears that the driving factor behind the metric suggested for defining core areas is influenced by the motivation for defining core ground- be it food security/protecting local interest/ensuring economic sustainability, etc.
- Delegates raised concerns as to how the data required to define core grounds would be acquired. Some noted that the source of the data would influence the definition and that this should be considered when designating a core area.
- Almost unanimously, delegates agreed that due to the variety of fishing activity, target species and possible sector interactions (proposals) with the fishing industry it would be impossible to select any one metric to define core areas. It was therefore agreed that economic, social and environmental (including biological) metrics could and should be available to define a core area.
- With so many possibilities delegates would welcome an easy-to-use matrix to help developers when scoping for project locations. It was agreed that using such an approach would negate the need to differentiate between inshore and offshore as the matrix would include all waters. This is of particular note as the complexity of differentiating is marred by the fact that individual Inshore Fisheries Conservation Authoritys (IFCAs) set different restrictions on the vessel size and power that can fish within 6nm.
- It was felt that a matrix (or similar) approach would allow one policy to sit in the plans and that the matrix would sit underneath the policy to offer additional information.
- In terms of defining the boundaries of core areas several delegates would like a 'traffic light' or phased boundary. Delegates considered that taking this approach would benefit developers in that it would identify the areas to avoid at all costs, those that should be avoided or heavily mitigated and those areas where a good case would permit development. Exactly how these boundaries are defined (for example at 70, 80- and 90% core ground boundaries) was a matter of debate. One stakeholder drew in the 3 pillar approach that could be used to determine the traffic light system. If one were to map social factors, environmental and economic factors, then overlay these in a Venn diagram style, where all 3 overlap could be defined as 'Core' with less overlaps deemed of lower significance. This was only one suggestion but was well received in the group.
- Delegates wanted to make it clear that the purpose for defining core grounds was not to determine an area where fishing was allowable, thus limiting the ability of fishers, but to protect a resource and preserve the ability to conduct an activity that has been ongoing in various forms for hundreds of years.
- Delegates had no objections and in several cases encouraged amiable collocation. Any core fishing ground

Exploration of key issues

should not be considered a complete no-go for any other activity, for example, if properly mitigated laying cables on pelagic or potting fishing grounds would not be considered an issue and any policy should account for co-location.

- One delegate noted that a direct comparison to renewable energy and aggregate extraction zones could not be drawn on the basis that these industries are highlighting future intent whereas the fishing industry would be protecting the right to fish.
- Delegates noted that it is important to consider the unintended consequences of a core ground policy as it simplify things for one industry but complicate matters for others. On this point, delegates thought it important to align any decision that was made on the definition of core grounds with neighbouring countries, and the EU (CFP) where possible.
- Delegates noted the importance in communicating such proposals with neighbouring states and with interest groups such as the Regional Advisory Councils.
- Some delegates considered it necessary to supplement a core ground with a policy similar to FISH1 as seen in the East plan regardless of how it is defined.

2. Data availability and use

- Addressing data gaps
 - A way forward is to agree on a representation of the available data and get buy-in from stakeholders that the dataset is a fair representation, move forward with this source (e.g. Scotmap data, where % coverage of fleet was low);
 - Might lose time while trying to standardise data – need to make a start;
 - Use iterative approach – start with what is available, update and improve in the future.
- Confidence in datasets needed
 - Datasets need 'stamp' of approval to show confidence in data source;
 - Reliability of data, verification (confidence in data), trustworthy.
- Different metrics are possible
 - 'Core grounds' should be based on various metrics;
 - Effort/people employed/economic value will all provide evidence;
 - Data produced are dependent on the policy question asked.
- Ownership and management of data:
 - Need to bring existing data together;
 - Consistent methods are important, need transparency, quality, and understanding of what the data represent (amongst all stakeholders);
 - Central coordination required (for processing and maintenance) e.g. regulators? Industry?
 - Need data use agreement (in Wales, data cannot be used by the Welsh Government, data belong to the fishermen/skippers [iVMS?])
- Ownership and management of data:
 - Data sensitivity – remove limitations for research (e.g. the Dutch) – Information Commissioner Office may be useful in this regard?
 - Include data issues in licensing conditions?
- Inshore fleet and iVMS:
 - Current need for inshore fleet to provide high resolution spatial data (e.g. Succorfish in East Yorkshire & Orkney);
 - iVMS also useful for >15m (VMS transmitting every 2 hours is not very good for identifying fine-scale fishing grounds).
- Drive for the approach needs to come from industry:
 - Change of attitude is underway in the fishing industry, more readiness to provide information on fishing grounds (to provide evidence to protect their grounds from other industry sectors);
 - Information must be for the fishermen's benefit, not used against them;
 - Need to work through fishermen's organisations, be proactive.
- Other initiatives could provide useful data sources:
 - Kent & Essex IFCA – 'informing the future' project – evidence of fishing grounds (information from and for the fishermen, compiled by IFCA);
 - Data from other projects could feed in to identification of core grounds (MPAs, etc.) – ongoing data initiatives;
 - Revised CFP may provide new information sources (e.g. monitoring of discard ban).
- Possibilities for taking forward:
 - Scope for a technical workshop in the future on details of data processing, metrics, etc.

3. Addressing variability and ensuring flexibility

- Update data regularly to take account of variability:
 - 5-10 year timescale?
- Further investigation needed to determine timescales for review/updating:
 - Do an historical analysis for different types of fishing activity to see how stable fishing patterns are;
 - Consider the effects of large policy changes e.g. CFP;
 - Climate (especially in south-west) changes variability;
 - Discard ban, Marine Conservation Zone measures will all affect spatial distribution of effort.
- Various metrics can provide useful information:
 - Effort, value (social, economic, environmental) all provide useful indicator in the puzzle;
 - More than one map could be useful – environmental, economic and social perspectives.
 - Combine qualitative and quantitative approach.
- Possibility of adding a 'buffer zone' around a core area had a mixed reception:
 - Could add flexibility, or may devalue the process;
 - 'Concentric circle' idea, with different levels of mitigation in different areas/contours, or red/amber/green approach (for particular species? Economic/environmental/social reasons?);
 - Layers of complexity, but need to keep it simple.
- Maintain general displacement policy.
 - Define areas with very low fishing activity: would be helpful (from MPA perspective).
- Need to consider international activity
- Different sorts of fisheries – core grounds may be easier to define for sedentary, shellfish, demersal – than for pelagic species:
 - Some fisheries more stable than other. Static gears easier?
 - Pelagic – more difficult to define as species move around more;
 - Demersal (seabed) – (strongly linked to habitat);
 - Scallops, prawns, nephrops, crab, lobster – should be easier to identify for these;
 - Some fisheries can move easier. Less adaptable ;
 - Do analysis on a sector-by-sector basis?
 - Have a discussion with fishing industry how to split these – local level involvement. Port level?
- VMS on inshore vessels would be helpful. Succorfish
- Reasons for designating core grounds
 - 'importance' can use participatory data if we define importance, as what they feel are the most important areas for the sector
 - Important to designate core grounds for different reasons, e.g. some wind farms only to demo technologies
 - Concentric circle idea – you don't necessarily need to pick the same one for each species/gears. Different levels of mitigation in each band.
 - Red/amber/green for different species, and econ/env/soc
 - Need some lines for certainty
 - How much area km² falls into each category may tell you where to draw the line
- Importance of doing at an England area. Consider on England level – not just regional plan areas. To take account of strategic areas. Some plan areas are more imp than others (Janette Lee looked at national vs regional). Scale.
 - Need to keep it simple, yet account for complexity!
- Resourcing, how frequently can we update this? Can the fishing industry take the lead? Level of resolution?
- Co-location. More in the plan about co-location.
 - Plan should pull out areas for co-location
 - This would reassure developers that they can use this space 'Marine Planning Toolkit'
- Difficult issues – what do we do if we designate core grounds, and an application is in process within a core ground?
 - It often takes 3 years to get an application through. What if the evidence changes part way through?
 - Any application in train – could end up being very difficult for them.
- Technology; catamarans access new grounds
 - E.g. under 10m catamarans can access new ground. Different fisheries becoming more accessible
 - Discard ban – people trying to avoid areas

4. Issues specific to the inshore area/sector

- What is inshore 0-6 nm or 0-12nm?
 - In some places, the inshore area as managed by the IFCA's can extend a long way out 24 nm in the Severn, nearly as far out in the Thames;
 - Management changes as head offshore: IFCA's 0-6 nm, MMO 6-12 nm, EU outside.
- Safety is a key issue inshore:
 - Smaller boats have a smaller range;
 - Geography may be a greater driver than economics in terms of where fishing occurs;
 - Can't necessarily just fish somewhere else if local grounds are closed.
- Target species and therefore gear types may switch often inshore, so flexibility to move/change may be important.
- Core grounds for each individual fisherman are likely to be much smaller inshore than offshore;
 - But many individuals inshore, versus fewer offshore.
- Other criteria may be important inshore:
 - History/families/community;
 - Employment;
 - Tourism and the value of a fishing activity to that;
 - Subsistence fisheries may have value inshore, rather than purely commercial fisheries.
- Access to grounds can be important - need routes out from or along the coast.
- Good data for the process are vital, but data are currently lacking inshore.
 - Succorfish/iVMS for <10m vessels is coming, but not here yet;
 - IFCA 'fishing activity mapping' is available, usually done by vessel sightings;
 - Shellfish returns (9x9 reporting grid?), but these may not have been processed?
 - Cefas- Zone of influence mapping for individual vessels around home ports?
 - Industry should have a role in providing data, and making it accessible for use;
 - There is existing work - Fishemap (+ Scotmap, FishMap Mon);
 - Need to weight data differently depending on how it was collected and verified;
 - Agreeing on a uniform template or process for data collection important, with local application.
- The collection of VMS data is being viewed more positively by industry:
 - Facilitates reduction in buffer zones around conservation features;
 - Provides more certainty for fishers and other interests about where fishing is happening;
 - Caveat - as long as it is anonymised.
- Regulating Orders, Several Orders, and other permitted areas could automatically be core fishing grounds.
- Criteria for identifying core areas will change based on priorities for that area - species, gears, fleets, etc.
- Intensification and displacement are potential issues.
- 0-6 nm inshore could be considered core ground:
 - Area is under huge pressure - fishermen already fishing in what's left inshore;
 - But, depends on the area - in some places the 0-6 nm is not fished intensively;
 - Protecting everything may result in the effectiveness being lost- "if everything is important then nothing is important";
 - Impractical as everything goes through the 0-6 nm (cables, ports, shipping, etc.).
- Could change 'core areas' to 'key areas of fisheries interest':
 - Addresses wider fisheries interest, including spawning grounds, nursery areas;
 - But knowledge of spawning grounds, nursery grounds is limited;
 - Could make these other areas lower priority 'core areas', or need to prioritise data collection.
- Hard boundaries to core areas are difficult:
 - No - need to go back to what the objective is - core areas need to be simple and understandable - discrete.

5. Practicalities of implementation

- Implementation fundamentally has to be data ownership/custodianship, and review on an appropriate timescale.
- Critical considerations in Environmental Impact Assessment(EIA):
 - Baseline;
 - Impacts.
- Footprint of activity and issue of cumulative impact;
- Obligated to consult with industry anyway via licensing;
- Policy applies to latest cut of the data (update annually/biannually);
- Need to identify all fishing data sources;

- Dutch – data availability good;
- What is mutually exclusive or compatible?
- What is the intention for use of the space? Use all / use some;
- What are the conflicts and how can that complexity be discussed?
- How to minimise the footprint of activities?
- Start implementation in offshore area due to data availability; increase in inshore data in time;
- Applying a weight to activity occurring in one area e.g. traffic light or scale of negligible to high impact;
- But there are issues with the data resolution we have:
 - VMS available for offshore;
- Take away individual interpretation on a case-by-case basis by providing agreed consistent overview;
- Overlap of interests;
- Plan is a first view of what is possible;
- Plan sets out more clearly what process to follow when making applications so decision-making process is clear;
- Independent agreed data source linked with plan so that all are working to the same data/evidence base;
- How to make decisions based on weighting?
 - Ranking system, set thresholds based on a few indicators e.g. economic, social – sensitive receptors based on all criteria.
- Plan-scale data are required for assessing cumulative impacts – fisheries data in a consistent suite in each application;
- Phased approach – offshore (comprehensive VMS);
- Flow chart/decision tree (for decision makers) with split between inshore/offshore, with attached QA system and consider confidence, risk; very good case to split inshore/offshore early;
- Agree update annually, contour map approach;
- What would be required to implement this in addition to current system?
- Don't have a single repository of all data of activities, impacts;
- Maps of spawning and nursery areas;
- Consideration of fisheries data in industry data initiative;
- What issues do customers have with licensing process?
- Value added by agreeing a strategic approach;
- Historical activity based on all previous data and validation ; get scale of ground;
- Potential to get older information from plotter;
- Sensitivity analysis of movement over time including all factors such as regulatory, markets, etc;
- Shared evidence base is very important;
- However, sharing the data will be complicated;
 - Offshore - MMO;
 - Inshore – MMO/IFCA/Cefas?
 - Lead regulator useful;
- Engagement during plan writing to gather strong ideas of value.

A3.5 Conclusions

Conclusions

- Data gap analysis – what data is needed, what don't we have? What is the art of the possible with available data?
- Pilot – offshore or focussed on where data is available – VMS? Start with how is the data to be used if it is provided/collected?
- Pilot – inshore too. North-East? Isle of Man? Provides opportunity to review process in that area.
- Be visual – get online to demonstrate potential.
- Planning – optimisation not preservation. Need a review process?
- Economics / food production / environment / social are just four metrics (in decreasing order of availability?)
- Linkages across planning process could protect fishing effectively, with a core grounds approach the final step.
- International fleets – data availability and accounting.