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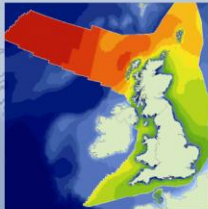
Marine Scotland

Socio-economic Baseline Review Methodology and Data Gap Analysis for Offshore Renewables in Scottish Waters

Report R.1904

September 2012

Creating sustainable solutions for the marine environment



Marine Scotland

Socio-economic Baseline Review Methodology and Data Gap Analysis for Offshore Renewables in Scottish Waters

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Summary

ABP Marine Environmental Research Ltd (ABPmer) and RPA have been commissioned by Marine Scotland to prepare a national and six regional socio-economic baseline reviews that can be used to inform impact assessments for future sectoral plans for offshore wind, wave and tidal development.

This document summarises the background to and aims of the study and sets out the approach that has been adopted to identifying baseline information requirements, which takes account of potential interactions between offshore renewables development and marine uses and other interests.

Abbreviations

ABPmer	ABP Marine Environmental Research Ltd
AIS	Automatic Identification System
ArcGIS	Geographic Information System Software by ESRI
BMF	British Marine Federation
BRIA	Business & Regulatory Impact Assessment
CAA	Civil Aviation Authority
CCS	Carbon Capture and Storage
CCSA	Carbon Capture Storage Association
CFP	Common Fisheries Policy
CO ₂	Carbon Dioxide
CoSLA	Convention of Scottish Local Authorities
CPUE	Catch per Unit Effort
DASA	Defence Analytical Services and Advice
DECC	Department of Energy and Climate Change
DfT	Department for Transport
EIA	Environmental Impact Assessment
EMEC	European Marine Energy Centre
GCal Uni	Glasgow Caledonian University
GIS	Geographic Information System
GT	Gross Tonne(s)
GVA	Gross Value Added
GW	Gigawatt(s)
HAL	Highlands and Islands Airports Ltd
HIE	Highlands and Islands Enterprise
HRA	Habitats Regulations Appraisals
IALA	International Association of Marine Aids to Navigation and Lighthouse Authorities
ICES	International Council for the Exploration of the Sea
ITOMS	International Transmission Operations & Maintenance Study
KIS-CA	Kingfisher Information Service - Cable Awareness
km	kilometre(s)
kw	kilowatt(s)
LA	Local Authority
LVIA	Landscape and Visual Impact Assessment
m	metre(s)
MCA	Maritime and Coastguard Agency
MEDIN	Marine Environmental Data and Information Network
MOD	Ministry of Defence
MPA	Marine Protected Area
NATS	National Air Traffic Services
NGL	Natural Gas Liquids
nm	nautical mile(s)

OER	Offshore Energy Regions
ONS	Office of National Statistics
OSPAR	Mechanism by which fifteen Governments of the western coasts and catchments of Europe, together with the European Community, cooperate to protect the marine environment of the North-East Atlantic
OWF	Offshore Wind Farm
PEXA	Practice and. Exercise Areas
PFOW	Pentland Firth and Orkney Waters
RLG	Regional Locational Guidance
RPA	Risk & Policy Analysts
RYA	Royal Yachting Association
SCCS	Scottish Centre for Carbon Storage
SE	Scottish Enterprise
SEA	Strategic Environmental Assessment
SeaZone	SeaZone Solutions Ltd
SEPA	Scottish Environment Protection Agency
SIC	Standard Industrial Classification
SORER	Scottish Offshore Renewable Energy Regions
UK	United Kingdom
UKCPC	United Kingdom Cable Protection Committee
UKDEAL	UKDEAL Common Data Access Ltd
UKMMAS	UK Marine Monitoring and Assessment Strategy
USA	United States of America
VMS	Vessel Monitoring System

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1. Introduction

ABP Marine Environmental Research Ltd (ABPmer) and RPA have been commissioned by Marine Scotland to prepare a national and six regional socio-economic baseline reviews that can be used to inform impact assessments for future sectoral plans for offshore wind, wave and tidal development.

This document summarises the background to and aims of the study and sets out the approach that has been adopted to identifying baseline information requirements, which takes account of potential interactions between offshore renewables development and marine uses and other interests.

A draft version of this document has been used to engage the Project Steering Group and wider stakeholders in clarifying the information requirements and thus to focus the scope and content of the baseline reviews.

1.1 Background to Study

Marine Scotland (on behalf of Scottish Ministers) is responsible for marine planning in Scottish Territorial Waters (0-12 nautical miles (nm)) and the waters offshore of Scotland (12-200nm), collectively referred to in this report as 'Scottish Waters'. In addition to the ongoing development of National and Regional Marine Plans, Marine Scotland is also developing sectoral plans for offshore wind and wave and tidal development for Scottish waters.

In March 2011, Marine Scotland published a Sectoral Marine Plan for Offshore Wind Energy in Scottish Territorial Waters (Marine Scotland, 2011a). Marine Scotland is now in the process of developing a Sectoral Marine Plan for Wave and Tidal Energy in Scotland's Renewable Energy Zone (0-200nm) and a Review of the Sectoral Marine Plan for Offshore Wind Energy (to now include 0-200nm).

The Plan for Offshore Wind contains six sites for development which have a potential generation capacity of around 5.4GW. The plan also contains a further 25 'areas of search' for potential development (Figure 1). The Plan will be reviewed over a 2 year period. The scope of the Plan Review will be extended to include the extent of Scotland's Renewable Energy Zone (out to 200nm).

Marine Scotland is also developing a Sectoral Marine Plan for Wave and Tidal Energy in Scotland's Renewable Energy Zone (0-200nm). An Initial Plan Framework is currently being finalised, which will provide a strategic overview of where wave and tidal development could be progressed between 0-12nm. Figure 2 provides a map of the locations of the leased areas and the areas of opportunity identified by Marine Scotland.

Socio-economic impact assessments will be undertaken as part of the development of these plans. The programme of work to complete these impact assessments will contain three distinct but interconnected stages:

- Stage 1 - Socio-Economic Baseline Review and Data Gap Analysis;
- Stage 2 - Required Studies to address Data Gaps; and
- Stage 3 - Impact Assessments Stage, which will include:
 - Socio-economic Impact Assessment of the Wave and Tidal Energy Sectoral Marine Plan;
 - Socio-economic Impact Assessment of Offshore Wind Sectoral Plan (as part of the overall review of this plan);
 - Cumulative Socio-economic Impact Assessment of Offshore Wind and Wave and Tidal Energy;
 - Business and Regulatory Impact Assessment for the Sectoral Marine Plan Review for Offshore Wind Energy; and
 - Business and Regulatory Impact Assessment for the Sectoral Marine Plan for Wave and Tidal Energy.

The Socio-Economic Baseline Review and Data Gap Analysis (this study) is the first of these three stages. The findings from this specific project will inform the studies undertaken in Stage 2 and will also underpin the impact assessments undertaken in Stage 3.

1.2 Study Aims

The broad aims for Stage 1 (this study) are to:

- Identify data and evidence requirements for constructing baselines to assess the potential social and economic impacts of offshore wind, wave and tidal energy on marine uses and other interests at regional levels;
- Use existing data and evidence to identify related social and economic activities taking place on land and within specific areas of Scotland's Renewable Energy Zone identified for potential offshore wind, wave and tidal energy development;
- Map both the intensity and value of these activities, and assess how these activities have changed over time and may change in the future;
- Identify social and economic activities taking place within specific areas of Scotland's Renewable Energy Zone for which the required data or evidence does not exist, and which will need to be developed to allow comprehensive assessments of impacts to be undertaken; and
- Recommend methodologies for addressing identified data and evidence gaps, and advise on the extent to which these would be successful.

The project is focusing on regional subdivisions of Scotland's Renewable Energy Zone. For the purposes of this work, 'regions' are those established within the Sectoral Marine Plan for Offshore Wind in Scottish Territorial Waters and will be termed the Scottish Offshore Renewable Energy Regions (s) (SORER). Within these regions, the analysis has concentrated on previously identified areas for development of Offshore Wind Energy (Figure 1) and Wave and Tidal Energy (Figure 2).

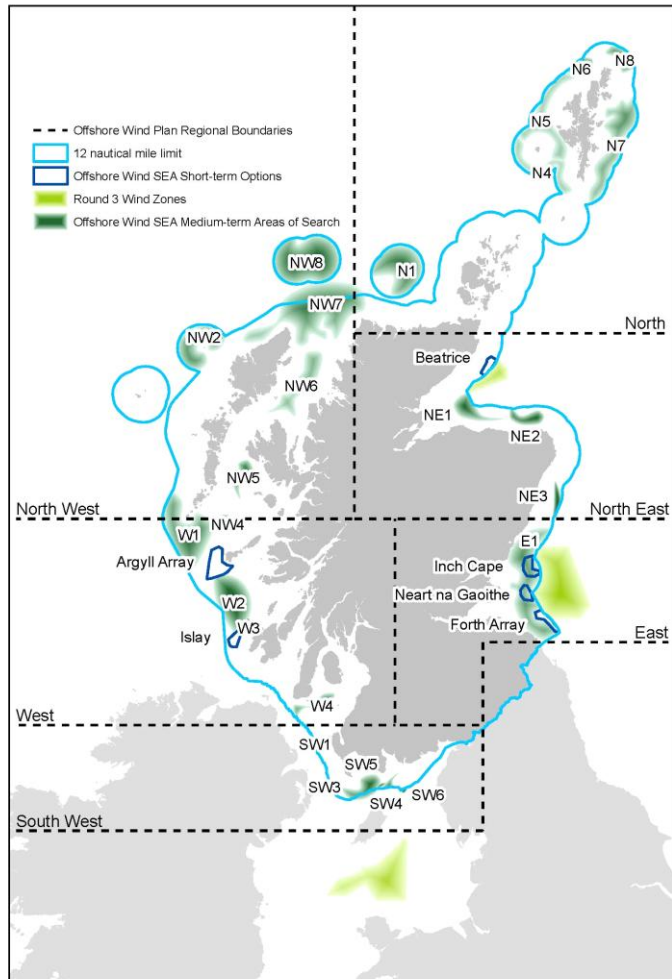


Figure 1. Short-term Sites and Medium Term Areas of Search for Offshore Wind (Marine Plan for Offshore Wind Energy in Scottish Territorial Waters)

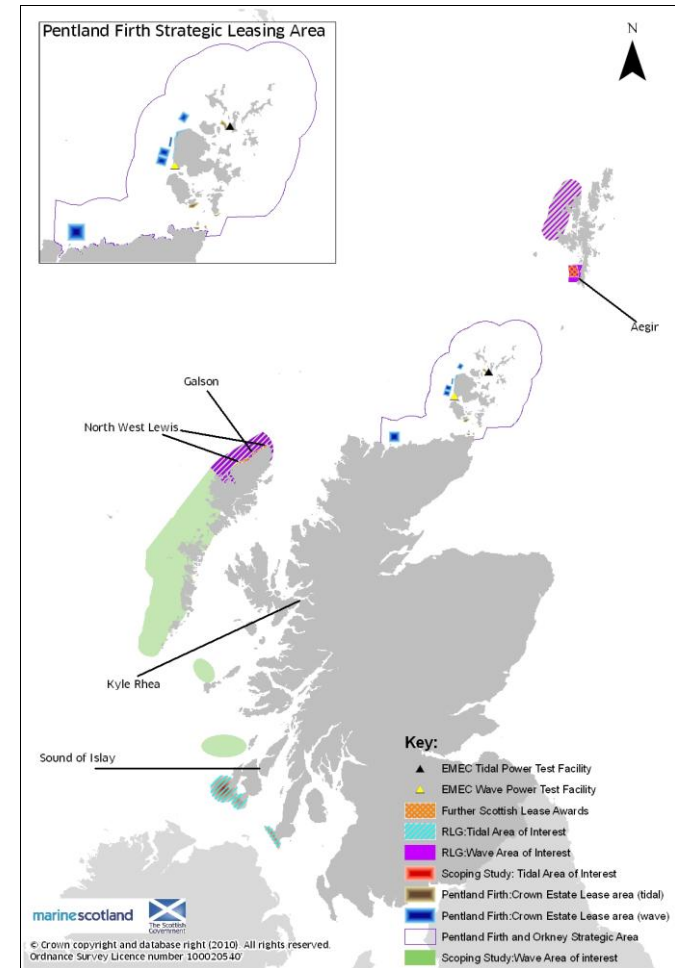


Figure 2. Map of Wave and Tidal Lease Areas and Areas of Opportunity (Initial Plan Framework)

1.3 Project Oversight

The project has been managed by Marine Scotland’s Marine Renewables policy team. Advice and comment has also been provided by a Steering Group involving relevant national stakeholders. The Steering Group met on two occasions to discuss the proposed approach and evidence requirements (2 November 2011) and to provide comments on the draft project outputs (7 December 2011). A list of organisations represented on the Steering Group is provided at Appendix A.

The project was undertaken by ABPmer supported by Risk & Policy Analysts (RPA) in the period September - January 2012.

1.4 Methodology

The study has been progressed through completion of the following tasks, described in more detail below and as shown in Figure 3:

- Identifying the evidence requirements;
- Preparation of national and regional baseline reviews;
- Review of data adequacy and data gap analysis; and
- Recommending data collection methodologies for priority data gaps.

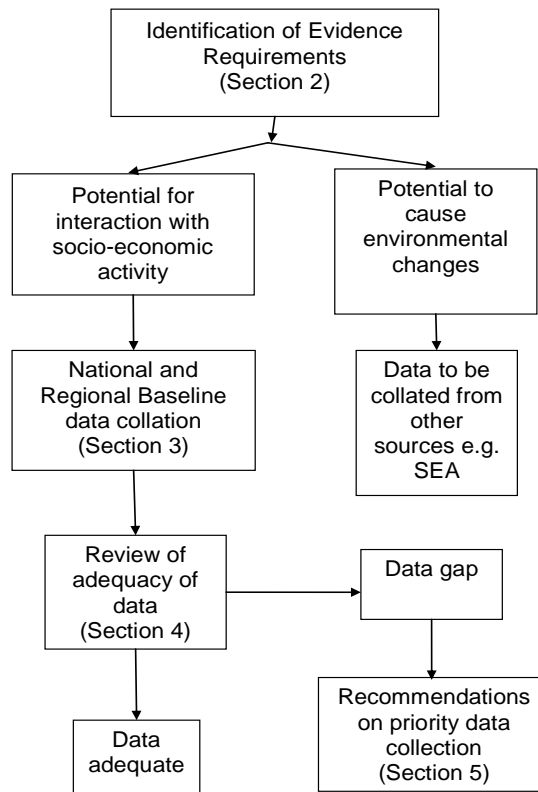


Figure 3. Flow Diagram of Methodology Process

These stages are described in more detail in the following sections. The baseline report structure was discussed in the first Steering Group meeting and an example of a draft baseline review was copied to the Steering Group for comment and the full baseline review was discussed at the second Steering Group meeting. The documents were finalised in the light of comments received and a comments log identifying how all comments received had been addressed was provided to Marine Scotland.

1.5 Structure of Report

This report is structured into the following sections:

- Section 1 – Introduction (this section);
- Section 2 – Identifying the Evidence Requirements;
- Section 3 - Preparation of Baseline Reviews;
- Section 4 – Review of Data Adequacy and Data Gap Analysis; and
- Section 5 - Recommendations to Fill Data Gaps.

The national and regional baseline reviews are presented in a separate volume (ABPmer & RPA 2012a).

2. Identifying the Evidence Requirements

2.1 Identification and Categorisation of Relevant Marine Uses and Other Interests

Offshore wind and wave and tidal developments have the potential to interact with most existing marine uses. The list of marine uses from Scotland's Marine Atlas (Baxter *et al*, 2011) has therefore been used as a starting point as it provides a comprehensive categorisation of marine uses in Scotland's seas. Non-marine interests such as aviation, tourism and social factors have been added to this list, as previous studies have indicated the potential for interaction with offshore wind and/or wave and tidal development.

The categories for the baseline reviews therefore encompassed the following marine uses and other interests:

- Aquaculture (finfish and shellfish);
- Aviation;
- Carbon Capture and Storage;
- Coast Protection and Flood Defence;
- Commercial Fisheries (including salmon and sea trout);
- Energy Generation (and offshore renewables supply chains);
- Military Interests;
- Oil and Gas (including exploration, production, interconnectors, gas storage);
- Ports and Harbours;
- Power Interconnectors;
- Recreational Boating;

- Shipping;
- Social and Community (including population, income, index of deprivation, economic activity, community wellbeing, education and skills, health and housing);
- Telecom Cables;
- Tourism (including heritage assets);
- Waste Disposal (dredge material); and
- Water Sports.

During the first Steering Group meeting a request was made to ensure that all social impacts were considered including the use of the area by indigenous peoples e.g. use of coastal footpaths, golf courses, health and employment. These are reported within the social and community sections of the baseline review.

2.2 Factors in the Consideration of Evidence Requirements

Existing guidance on impact assessment¹ is not prescriptive in terms of baseline evidence requirements, indicating that: *'The effort applied at each step of completing an Impact Assessment, in particular the estimation of cost and benefits, should be proportionate to the scale of the costs and benefits, outcomes at stake, sensitivity of the proposal and the time available'. The guidance further states that 'As you move through the policy making process and progress the different stages of the accompanying Impact Assessment, the quality of data being used and depth of analysis should be refined to make it more specific to the proposals, and to improve its accuracy'.*

In the absence of clear guidance, there are a number of considerations that can help to inform the information requirements.

2.2.1 The Potential for Interaction with Socio-economic Interests

It is helpful to understand the potential for interaction between offshore wind, wave & tidal development with other marine uses and interests and to seek to ensure that the baseline information can inform subsequent assessments of the potential cost impacts associated with the outcome of those interactions. A number of previous studies have helped to identify potential interactions including Scottish Executive (2007); Marine Scotland (2011b); ABPmer *et al* (2011) and ABPmer & RPA (2012b). Information from these studies has been used to scope potential interactions and their associated information requirements (see section 2.3).

2.2.2 Economic Value and Employment

Impact assessments seek to identify those sectors and interests that might be affected by the policy intervention and to quantify (as far as possible) changes in costs and benefits. These costs and benefits are usually expressed in terms of economic value and employment. Information on existing economic values and employment in those sectors and interests that might be affected is therefore important in providing a baseline against which future changes

¹ HM Government, 2011. Impact Assessment Guidance: When to do an Impact Assessment, August 2011. <http://www.bis.gov.uk/assets/biscore/better-regulation/docs/i/11-1111-impact-assessment-guidance.pdf>

can be assessed. Preferably economic value information is to be presented as Gross Value Added (GVA – a measure of the increase in value of goods and services produced by an activity), although in the absence of GVA data, information on turnover or replacement cost (for example, in relation to damage to assets) can be used.

2.2.3 Spatial Extent and Intensity of Activity and Interests

Given that the potential for the potential socio-economic impact (and thus interaction) often depends on the spatial location of marine uses and other interests relative to offshore wind, wave or tidal development, it is important that the socio-economic baselines include a strong spatial component and that the spatial distribution of the relevant uses and interests are defined at a suitable level of resolution. In addition, information on the spatial intensity of an activity is also important in informing how economic value may be distributed spatially and can thus be important in identifying the relative scale and value of an activity or interest that might be at risk as a result of any interaction.

2.2.4 Temporal Change

Impact assessments need to consider how costs and benefits may change over time. For uses and interests that may be variable over time, it is helpful to understand the scale of that variability and historical trends and to take account of future protected changes, where available. The Treasury Green Book² notes that 'Costs and benefits considered should normally be extended to cover the period of the useful lifetime of the assets encompassed by the options under consideration'. For the purposes of this study, current baselines will be projected up to 50 years in the future. This takes account of the potential phasing of development and decommissioning and a lifetime for offshore wind assets of 40 years (assuming repowering after 20 years).

2.3 Scoping of Interactions

A scoping exercise was carried out to support the identification of baseline evidence requirements which took account of the potential for interaction between offshore renewable energy development and other marine uses and interests. Appendix B provides a series of tables for each marine use or interest which:

- Describe the potential for interaction with offshore wind, wave and tidal development;
- Identify the information requirements necessary to provide a socio-economic baseline that can adequately inform impact assessments (having regard to the nature and scale of the likely interactions); and
- Summarise existing national and regional data sources on which the baseline reviews might draw.

² HM Treasury, 2011. The Green Book - Appraisal and Evaluation in Central Government. Treasury Guidance, updated July 2011. http://www.hm-treasury.gov.uk/d/green_book_complete.pdf

Collation of baseline information to inform an assessment of all of these interactions would be a major task. In order to focus the baseline reviews, a simple exercise was undertaken which considered:

- The potential socio-economic impacts that may arise as a result of the interactions and their likely significance – where interactions and potential impacts were considered to be small no baseline data was considered necessary (see Column 4 of the Appendix B); and
- The cause of the potential socio-economic impact – where socio-economic impacts may arise as a result of potential environmental changes, these have been scoped out the socio-economic baseline study, on the basis that the Strategic Environmental Assessment (SEA) and Habitats Regulations Appraisals (HRA) that will be prepared to accompany future sectoral plans for offshore wind, wave and tidal energy will provide the necessary environmental information to inform an assessment of potential socio-economic impacts, should this be required.

2.4 Overall Baseline Information Requirements

Based on the considerations in section 2.2 and the scoping exercise described in section 2.3, the general approach adopted in developing the baseline reviews has therefore been to seek to compile information on the following elements:

- Distribution, level and intensity of uses and interests, including an indication of how they have changed over last decade;
- Specific information identified as necessary from the scoping of interactions;
- Map of spatial distribution of existing activity;
- Current and recent economic values and employment – this has used the most recent data available, with base year data generally within the period 2008 to 2010; and
- Future trends – these have been described as far as possible using available information, looking forward for a period of 50 years.

During discussions with the Steering Group the project team were asked if the future trends could be considered both qualitatively and quantitatively, it was agreed that all activities could be described in qualitative terms based on past trends and on sound knowledge of any future developments or changes in the sectors. However any description of trends going forward in a quantitative manner would be limited and provided where possible on an activity by activity basis.

3. Preparation of Baseline Reviews

The collation of baseline information has been taken forward in a number of steps, described below. In particular, these reviews have collated and present information on the spatial distribution, intensity (level of activity) and economic value of these uses and other interests, together with information on levels of employment where available. The reviews have taken account of historical trends (last 10 years) and future trends (over 50 years), recognising the potential lifetime of offshore renewable energy assets. They have also sought to compile

baseline information that might inform the assessment of the specific interactions identified in Appendix B.

3.1 Reviewing Information Sources

A number of previous studies have identified relevant sources of information on marine socio-economic activity, including:

- Charting Progress 2 (UKMMAS, 2010);
- Scotland's Marine Atlas (Baxter *et al*, 2011);
- The Economic Assessment of Short Term Options for Offshore Wind energy in Scottish Territorial Waters (ABPmer *et al*, 2011); and
- Development of a Socio-economic Methodology and Baseline for Pentland Firth and Orkney Waters Round 1 Wave and Tidal Developments (ABPmer & RPA, 2012b).

Information sources accessed in these studies were used as a starting point for the baseline reviews, and were supplemented by additional sources of data identified through consultation with relevant stakeholders. Full lists of references used in the study are provided in the detailed reviews (ABPmer & RPA, 2012a).

3.2 Identifying Regional Distribution of Activities

A spatial analysis was undertaken in a GIS system (ESRI ArcGIS 10) to identify relevant marine uses and other activities and interests occurring within each offshore renewable energy region. The presence or absence of each use, activity or interest was recorded in a simple matrix and used to focus the regional baseline reviews the resulting matrix is shown in Table 1 and forms the basis for the regional distribution of activities within the SORERs as described in the baseline report (ABPmer & RPA, 2012a).

3.3 Consultation with Steering Group and Wider Stakeholders

The initial outputs from the scoping exercise were circulated to Steering Group members and wider stakeholders for review and comment and to identify any additional data sources for the baseline reviews. The comments received were used to inform the final scope of the baseline reviews.

A list of wider stakeholder organisations contacted is provided in Appendix C. A copy of the initial contact letter to stakeholders is provided in Appendix D.

3.4 Baseline Reporting

The baseline report R.1905 - ABPmer & RPA, 2012a) has been divided into two distinct parts; a **national overview** which considers each marine use and interest, and a series of six **regional overview** which describes the regional activity, economic value and employment, and future trends for each relevant marine use and interest. The structure as set out in Sections 2.3.1 and 2.3.2 was followed for all sectors where possible to provide the information

in a uniform manner. The methods by which the data has been collated for each section are given below.

3.4.1 National Overview

The national overview is divided into the following sections:

- Definition of sector/activity;
- Description of information sources; and
- National overview of current activity.

Definition of sector/activity

A definition of each sector is given to inform the reader of the content of each sector.

Description of information sources

Within this section a table of the sources of data and information is provided, which shows the scale of the coverage e.g. Scotland, UK and the date of the source. In addition a sub-section on data limitations has been presented to give an indication either of a data gap or that caution should be exercised when considering the findings of any sector.

National overview of current activity

This section was further sub-divided as follows:

- **Location and intensity of activity** - where a description of the current activity is provided based on the data sources identified in the section above, internet searches, published and grey literature, stakeholder engagement (see Appendix C) and from previous studies. The information presented has also taken account of the data requirements identified in Column 4 in Appendix B. National spatial overview maps are provided together with graphical output as applicable;
- **Economic value and employment** - provides commentary on the national economic value of the sector and employment figures. Sources of information included those stated above. However where figures on employment were not readily available directly from the sector sources, the Office of National Statistics (ONS) were used. The Standard Industrial Classification (SIC) codes were matched as closely as possible to the sector, with comment being made whether this was an over or under estimation of employment within the sector;
- **Historic trends** - a description of how the sector has changed over the past decade; and
- **Future trends** - these considered the future trend of each activity for up to 50 years, splitting this between the next 10-20 years (more certain) and the following 30 years (less certain) where information was available.

3.4.2 Regional Overview

To scope the baseline review requirements for each offshore energy region, a spatial analysis was undertaken using ESRI ArcGIS v10 to identify the distribution of marine uses (activity) and other interests within each region, by sieve mapping. For each region the activity was considered as to whether it occurred on land i.e. terrestrial, within the coastal area (0-12nm) and offshore in the 12-200nm zone. The information on each activity has been assessed as being present i.e. the activity occurs within the region, as being absent or as intrinsically linked as in the case of some activities in the terrestrial area.

Originally the table only considered the activities as being in the coastal area or offshore, however during the Steering Group meeting the scope of the table and thus the areas of search for baseline material were extended to cover the land immediately adjacent to the water. As can be seen in Table 1, this addition mainly concerned the social and community, tourism, ports and harbours and to a lesser extent, the water sports activities.

Regional activity

For each SORER the activities that occur have been described based on the same principle as given above, and was again supported with regional spatial maps and graphs.

Regional economic value and employment

The economic value and employment are described or, where no regional information exists, this is stated. Where employment data was not available from the sector sources the ONS data has been used in an attempt to provide some quantification. Employment data was downloaded from the ONS website using Scottish intermediate zones to determine the areas. The shape file of intermediate zones provided by ONS was overlaid onto the SORER using GIS. Where intermediate zones fell wholly within an SORER they were included in that respective SORER. Where intermediate zones fell on the border between two SORERs, intermediate zones were assigned to the SORER in which the majority of its coastline lay. Where intermediate zones were located inland they were assigned to the SORER in which the majority of its area lay. As in the national overview the same SIC codes were used for the regional descriptions. In some cases the SIC codes were either sufficiently unrelated to the sector being considered or included such low numbers of employees that the records were discounted as not reliable for the baseline study. This was recorded within each sector as appropriate.

Employment figures for the military sections have been compiled from the MOD Quarterly Manning Report which provides the number of MOD personnel (military and civilian) employed in each of the Scottish Local Authority (LA) areas. However these areas do not directly align with the SORER boundaries and therefore the LAs may occur within more than one SORER. Where this is the case, the SORER containing the largest proportion of the LA (visually assessed) is listed first in the employment table, the subsequent SORERs listed contain decreasing proportions of the LA. The values therefore can only be taken as indicative.

Table 1. Presence of activity by region based on sieve mapping

Sector/Interest	Scottish Offshore Energy Region																	
	South-West			West			North-West			North			North-East			East		
	T	C	O	T	C	O	T	C	O	T	C	O	T	C	O	T	C	O
Aquaculture	x	✓	x	x	✓	x	x	✓	x	x	✓	x	x	✓	x	x	x	x
Aviation	x	x	x	x	✓	✓	x	✓	✓	x	✓	✓	x	✓	✓	x	✓	✓
Carbon Capture and Storage	x	x	x	x	x	x	x	x	x	x	x	✓	x	x	✓	x	x	x
Coast Protection and Flood Defence	x	x	x	x	✓	x	x	✓	x	x	x	x	x	✓	x	x	✓	x
Commercial Fisheries	x	✓	✓	x	✓	✓	x	✓	✓	x	✓	✓	x	✓	✓	x	✓	✓
Energy Generation	x	✓	x	x	✓	x	x	✓	x	x	✓	x	x	✓	x	x	✓	x
Military Interests	x	✓	✓	x	✓	✓	x	✓	✓	x	✓	✓	x	✓	✓	x	✓	✓
Oil and Gas	x	✓	x	x	x	x	x	x	✓	x	✓	✓	x	✓	✓	x	x	✓
Ports and Harbours	✓	✓	x	✓	✓	x	✓	✓	x	✓	✓	x	✓	✓	x	✓	✓	x
Power Interconnectors	x	✓	x	x	✓	x	x	✓	x	x	✓	x	x	✓	x	x	✓	x
Recreational Boating	x	✓	✓	x	✓	✓	x	✓	✓	x	✓	✓	x	✓	✓	x	✓	✓
Shipping	x	✓	✓	x	✓	✓	x	✓	✓	x	✓	✓	x	✓	✓	x	✓	✓
Social and Community	✓	✓	x	✓	✓	x	✓	✓	x	✓	✓	x	✓	✓	x	✓	✓	x
Telecom Cables	x	✓	✓	x	✓	✓	x	x	✓	x	✓	✓	x	✓	✓	x	x	✓
Tourism	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
Waste Disposal	x	✓	✓	x	✓	✓	x	✓	x	x	✓	x	x	✓	x	x	✓	x
Water Sports	*	✓	x	*	✓	x	*	✓	x	*	✓	x	*	✓	x	*	✓	x

Key:
T Terrestrial,
C Coastal i.e. 0-12nm;
O Offshore i.e. 12-200nm;
✓ Present,
X Absent,
* Intrinsically linked.

The economic value and employment figures for the Oil and Gas industry have been taken from the Oil and Gas UK's economic report for 2011 (Oil and Gas, 2011), which are based on parliamentary constituencies and may in some cases (North East and East region) include a degree of overlap.

Future trends

In some cases future trends are available and these have been discussed, however for many sectors no breakdown from the national overview could be found and where this occurred the reader was referred back to the national information.

4. Review of Data Adequacy

As part of the baseline review, specific data gaps were identified where the absence of suitable baseline data might significantly compromise the preparation of regional scale impact assessments for future sectoral plans for offshore wind or wave and tidal energy. The data gap analysis took into account relevant ongoing studies and impending studies which may be able to fill some of the current data gaps.

This section summarises data gaps identified through the baseline review, identifies approaches to and priorities for addressing these gaps (taking account of current planned research projects) and suggests methodologies for filling gaps identified as being of medium or high priority.

4.1 Identification of Data Gaps

During the collation of the baseline mapping and data report (ABPmer & RPA, 2012a) a number of data gaps have been identified for the various activities. These are presented in Table 2, where no entry denotes that data are available. The data gaps have been assigned to four broad categories:

- Spatial coverage and/or resolution of location data - this includes circumstances where the location of an activity is poorly spatially resolved, geographic coverage is poor, or where location data is not available because of data sensitivities;
- Availability of information on levels of activity - this includes information on activity intensity and/or value (turnover, GVA, expenditure, replacement cost, avoidance cost etc)
- Availability of information on employment; and
- Other information requirements to inform baseline – in order to provide a baseline against which some impacts might be measured, various other types of information may be required. For example, to provide a baseline against which impacts associated with fouling of fishing gear on cables might be assessed, additional information on fouling rates would be required (for example, drawn from experiences with existing English OWF).

4.2 Existing Initiatives

Marine Scotland has already commissioned a number of specific studies to address particular gaps in socio-economic data to inform future marine planning and the development of sectoral plans. These include:

- Collation of detailed baseline information on inshore fisheries around Scotland; and
- Studies to collect more detailed information on shipping movements within the Pentland Firth and Orkney Waters and Aberdeen, Clyde, Dundee and Forth port areas.

The fishing study will help to fill current gaps in understanding of the distribution of fishing activity by <15m fleet and thus help to provide a more spatially resolved baseline. The shipping studies will help to provide better information on vessel movements within and through the relevant areas. The Pentland Firth will also provide new data on the movements of recreational vessels. The studies may be rolled out further across Scotland in the future.

4.3 Actions to Address Data Gaps and Prioritisation

Having established that there are gaps in knowledge that would reduce the ability to provide robust impact assessments, a number of actions have been identified as possible ways in which to fill these gaps. These actions and their suggested prioritisation are presented in Table 3. In developing the suggested prioritisation, we have had regard to:

- The relative significance of the potential interaction and thus the potential scale of any impact, based on available evidence and the judgement of the study team; and
- The extent to which other information might provide a useful proxy indicator (suitability of proxy information).

The prioritisation has been graded as follows:

- **Low :** A significant interaction is unlikely to occur based on existing experiences (taking account of likely mitigation measures); Alternative information sources could be used to inform the baseline and/or Information is currently being collected elsewhere.
- **Medium:** A significant interaction may occur based on existing experiences.
- **High:** A significant interaction is likely to occur and/or affecting a large number of users based on existing experiences.

Table 4 shows the data gaps which are considered to of medium or high priority.

Employment figures directly related to most activities have been difficult to obtain and therefore quantify. In addition, for all activities there is also a level of uncertainty about future levels of activity, which can be dependent on factors such as wider economic performance, levels of demand, climate change and government policy. While little can be done to improve levels of confidence, it may be worthwhile seeking to generate a common set of central projections or scenarios that might be used to provide a measure of consistency in future impact assessments.

Table 2. Data gaps identified during the production of the baseline information

Activity	Data Gap			
	Spatial Coverage and Resolution	Levels of Activity or Value	Levels of Employment	Additional Factors
Aquaculture		Production and turnover values for individual farms are commercially sensitive. The only information in the public domain tends to be national turnover and value data.		
Aviation	Information on aircraft routes is considered sensitive and hence not generally available. No GIS layer of helicopter routes is available, but it will be possible to create these from co-ordinate data		As of November 2011 no central source of employment figures for the 'minor' airports in Scotland had been identified.	
Carbon Capture and Storage	Future locations can be linked to redundant oil and gas fields, although precise locations for CCS are currently unknown.	There is no agreed methodology for estimating the economic value of sea areas for future CO ₂ storage.	No information is available on employment.	
Coast Protection and Flood Defence		Information is available on the capital costs of some flood and coast defence schemes. There is no central source of information on maintenance expenditure. While methodologies exist for estimating benefits associated with flood and coastal defence schemes, there is no central source of information relating to Scottish assets as a whole.	No information is available on employment.	
Commercial Fisheries	The location of fishing activity cannot be fully resolved. Vessel monitoring system (VMS) data only covers fishing vessels 15m and over in length, since only these vessels are required to have onboard vessel monitoring systems. Overflight (surveillance sightings) data is biased as some ICES rectangles have more over flights than others. Overflights are only carried out in daylight hours approximately once a week. Routes to and from fishing grounds are not well documented	Landings data is based on all landings caught in s into the UK or by UK vessels landing abroad. It does not include fish caught by foreign vessels and landed abroad. The offshore/inshore split shown in the landings data is an estimate which may understate the inshore component and, equivalently, over-state the offshore component. The landings data cannot readily be resolved below the level of ICES rectangles owing to the lack of good information on the location of fishing activity by the <15m fleet. The scale at which landings data is reported (ICES rectangles) often does not match the boundaries		Information on fuel costs for a range of different vessel types and sizes. Information on the frequency of fouling events (e.g. no of fouling events per thousand hours fishing for different gear types in areas with cables). Information on spatial and temporal extent of other pressures affecting landing values.
Energy Generation	The future location of renewables supply chain activities has yet to be established	The pace and scale of development of renewables supply chains has yet to be established	No information is available on employment.	
Military Interests	Location of activities within exercise areas poorly resolved due to national security requirements.	Information on expenditure is not broken down below UK level and as there is no measurable output from this activity it is not possible to calculate GVA. Owing to the confidential nature of military defence activities it is difficult to assess the extent and frequency of activity in the marine environment.		
Oil and Gas		It is not currently possible to assign gas production revenues to individual fields owing to the way the data is collected.	No information is available on direct employment.	There is no central source of information on the frequency of pipeline maintenance and inspection or related expenditure.

Activity	Data Gap			
	Spatial Coverage and Resolution	Levels of Activity or Value	Levels of Employment	Additional Factors
Oil and Gas Continued		There is currently no agreed methodology for determining the economic value of pipelines associated with oil and gas from the overall economic value of the sector as a whole. The simplest method would be to use replacement cost.		There is no publicly available information on routes used by vessels to and from installations owing to restrictions on AIS data.
Ports and Harbours		While information on port throughput is available, turnover and GVA figures are only available at UK level.	No central source of data on individual ports; some local data available.	No central source for projected port development, available on a port by port basis to varying degrees of detail.
Power Interconnectors		There is currently no agreed methodology for determining the economic value of power interconnectors from the overall economic value of the sector as a whole. The simplest method would be to use replacement cost.	There is no reliable source of information on employment – the SIC classification does not breakdown employment figure to subsea power cable level.	There is no central source of information on the frequency of cable maintenance and inspection or related expenditure. There is no publicly available information on routes used by vessels to and from cables owing to restrictions on AIS data.
Recreational Boating	The published information on cruising and sailing routes is indicative and there is a lack of reliable data on the actual routes taken by recreational vessels on a regional basis. There is also a lack of information on vessel numbers passing along particular routes. (N.B. these data may be available at local scale)	Information on the economic value of recreational boating is only available at a regional scale i.e. Sailing Tourism Region which, do not align with the regions therefore there is overlap and double counting in some areas.	There is a lack of regional employment data.	No central source of information on locations of potential recreational boating investment.
Shipping	While the MCA collects national AIS data, this is currently not publicly available. Some ports collect AIS data for their own purposes which may be available on request.	Economic value data only available at level of UK	SIC classification employee figures are not specific to this activity	
Social and Community		While there are central statistics available for many social trends, they generally cannot be readily monetised.		
Telecom Cables		There is currently no agreed methodology for determining the economic value of telecoms cables from the overall economic value of the sector as a whole. The simplest method would be to use replacement cost.	There is a lack of information on employment associated with marine telecom cables.	There is no central source of information on the frequency of cable maintenance and inspection or related expenditure. There is no publicly available information on routes used by vessels to and from cables owing to restrictions on AIS data.
Tourism	The scale at which tourism activity is reported does not align well with the regions. In particular, it doesn't distinguish between coastal dependent tourism and wider tourism.	The information available does not enable values to be assigned specifically to coastal activities	There is a lack of information on employment associated with coastal-tourism	
Waste Disposal		Data on the amounts disposed at individual disposal sites is available. However, no information is available on turnover or GVA associated with this activity.	No SIC data available to assess numbers employed in this activity, although numbers will be low.	
Water Sports	Spatial data coverage and resolution are reasonable, given the informal nature of these activities.	National data is available for recreational fishing but information for other activities is poor, particularly at regional level	Limited regional data is available for recreational fishing with very little information available for other activities	

Table 3. Actions to address data gaps and prioritisation

Activity	Suggested Actions to Address Data Gaps	Prioritisation *			Justification
		Low	Medium	High	
Aquaculture	Production and turnover data - spatially resolved information on production or turnover is not available for reasons of commercial sensitivity. This limitation needs to be accepted.	✓			Significant interaction unlikely to occur as aquaculture locations tend not to be suitable for offshore renewables deployment. Spatial data on the location of aquaculture installations can be used to identify the potential for interaction.
Aviation	Aircraft routes - detailed information could be sought from CAA and NATS on aircraft approach routes, subject to any confidentiality restrictions.	✓			Significant interaction unlikely to occur because of potential economic impacts. In the absence of detailed information on aircraft routes, proximity to airports can provide an indication of the potential for interaction.
	Helicopter routes – information on the co-ordinates of helicopter routes has been sourced from NATS and could be used to create a GIS layer for the main routes.		✓		There is potential for interaction when helicopters need to reduce altitude in adverse weather
	Employment - collation of information from individual airports	✓			It is very unlikely that a offshore energy development would be accepted within a plan, if it compromised operation of an existing airport
Carbon Capture and Storage	Spatial location – approach DECC and CCSA for any updated information on proposed storage locations or pipeline routes		✓		Large offshore renewables developments could compromise storage locations and pipeline routes
	Economic value – work could be undertaken to develop a methodology for valuing CCS areas,	✓			The current value of traded carbon could be used as a simple measure of value if required.
	Employment – could be estimated using indicative revenue and suitable multiplier (e.g. cf oil & gas industry)	✓			Could be estimated using indicative value and suitable employment multiplier
Coast Protection and Flood Defence	Economic value – it would be possible to estimate economic values for flood defence and coast protection schemes using information on scheme benefits. It would also be possible to collate information on maintenance expenditure from the various asset owners.	✓			Developments which significantly affect flood defence and coast protection schemes are unlikely to be approved.
	Employment – it may be possible to obtain information on employment from those organisations responsible for constructing and maintaining assets.	✓			Developments which significantly affect flood defence and coast protection schemes are unlikely to be approved.
Commercial Fisheries	Location of activity – Marine Scotland is taking forward work to better characterise the spatial distribution of fishing effort by <15m vessels;	✓			Information is currently being collected by Marine Scotland
	Spatial resolution of value data – the above study will also assist in improving the spatial resolution of landings data;	✓			Information is currently being collected by Marine Scotland
	Routes to and from fishing grounds – interrogation of AIS and radar data, consultation with fishermen		✓		Offshore renewables have the potential to disrupt existing routes to fishing grounds
	Fuel costs – information should be readily available from the industry on fuel costs for a range of different vessel types and sizes;		✓		Offshore renewables have the potential to disrupt existing routes to fishing grounds
	Frequency of fouling events - information should be available from the offshore wind industry and fishing industry on the number and nature of fouling incidents in relation to OWF in English waters		✓		Offshore renewables structures have the potential to foul fishing gears
	Cumulative effects – some information is likely to be available from various sources on the nature and severity of other future pressures on commercial fisheries (CFP reforms, fisheries closures, marine protected areas etc).		✓		A range of other factors have the potential to contribute to cumulative effects on commercial fishing interests
Energy Generation	Location of supply chains for offshore renewables to service projects identified in existing plans – some information on potential supply chain development locations is included in the National Renewables Infrastructure Plan. Additional consultation could be carried out with developers to seek to identify their intentions			✓	The development of the offshore renewables supply chain to service projects identified in existing plans is likely to be significant.
	Economic value of supply chains for offshore renewables to service projects identified in existing plans – additional consultation could be carried out with developers to seek to identify their investment intentions			✓	The development of the offshore renewables supply chain to service projects identified in existing plans is likely to be significant.
	Employment – little is known of the likely employment need due to the infancy of the industry. This will become more apparent with time.	✓			This could be inferred from investment intentions using appropriate employment multipliers

Activity	Suggested Actions to Address Data Gaps	Prioritisation *			Justification
		Low	Medium	High	
Military Interests	Location of activities – could approach MOD to seek to obtain any further information on usage of PEXAs, subject to confidentiality restrictions	✓			Developments which significantly affect MOD's interests are unlikely to be approved.
	Value of activity – it may be possible to obtain additional information from MOD on the relative scale of activity within different exercise areas as a basis for crudely assigning relative value, but this is considered to be a low priority owing to the lack of spatial resolution highlighted above.	✓			Developments which significantly affect MOD's interests are unlikely to be approved.
Oil and Gas	Spatial apportionment of gas revenues – it is not possible to allocate gas revenues to gas fields owing to the way in which data is collected. It may be worthwhile discussing with DECC whether it would be possible for them to collect and/or make available such information from operators of gas fields.	✓			Developments which significantly affect gas production are unlikely to be approved.
	Value of pipelines – there is no agreed methodology for separately valuing pipelines from other upstream activity. The simplest approach would be to use replacement cost, based on pipeline length and current average construction and installation costs per km.		✓		Offshore renewables may interact with oil & gas cables and pipelines
	Frequency of maintenance and inspection and expenditure – there is no central source for this information. It may be possible to collect this information from the industry.		✓		Offshore renewables may interact with oil & gas cables and pipelines
	Maintenance/inspection vessel routeing – there is no public source of this information. The information could be extracted from AIS data should this become available. Otherwise it may be possible to obtain indicative information from the industry		✓		Offshore renewables installations may have the potential to disrupt navigation routes to offshore installations
Ports and Harbours	Future port development – could be collected through survey of Scottish ports.		✓		Offshore renewables may affect navigation routes or port approaches, reducing attractiveness to potential customers; offshore renewables also creates opportunity for port development
	Economic value – this is not resolved below the level of Scotland. Specific work would be required to develop information at regional level. The available information on port throughput provides a suitable proxy indicator for the potential significance of any interaction.	✓			The available information on port throughput provides a suitable proxy indicator for the potential significance of any interaction.
	Employment data – there is no central source of employment data at or below regional level.	✓			The information on port throughput provides a suitable proxy indicator for the potential significance of any interaction.
Power Interconnectors	Economic value - there is no agreed methodology for separately valuing cables from the associated generating activity. The simplest approach would be to use replacement cost, based on cable length and current average construction and installation costs per km;		✓		Offshore renewables may interact with offshore power cables
	Employment – information could be sought from individual cable owners/operators	✓			Offshore renewables unlikely to give rise to significant impacts on offshore interconnector employment
	Frequency of maintenance and inspection and expenditure – there is no central source for this information. It may be possible to collect this information from the industry.		✓		Offshore renewables may interact with offshore power cables
	Maintenance/inspection vessel routeing – there is no public source of this information. The information could be extracted from AIS data should this become available. Otherwise it may be possible to obtain indicative information from the industry		✓		Offshore renewables installations may have the potential to disrupt navigation routes to offshore cables
Recreational Boating	Spatial data – Specific surveys of routes (and activity levels) would be required to provide a more robust baseline;			✓	Offshore renewables will interact with recreational boating interests
	Economic value – current regional breakdowns do not align with SORERs. It may be possible to re-work the previous analysis if raw data are available.	✓			Existing information may be sufficient
	Employment – a regional breakdown is not available. Employment could be inferred from economic value using suitable multipliers	✓			Can be estimated using existing economic value information and suitable multipliers
Shipping	Spatial data – MCA AIS data is not currently available for many areas. Some ports and harbours collect data and it may be possible to obtain this information. Ideally, agreement should be reached concerning suitable access to UK data and local sources used as fill in where necessary. The ongoing Marine Scotland shipping studies will improve available information for these areas but others areas will remain poorly described.			✓	Offshore renewables will interact with navigation routes

Activity	Suggested Actions to Address Data Gaps	Prioritisation *			Justification
		Low	Medium	High	
Shipping cont...	Economic value – no breakdown is available below the level of Scotland. If AIS data is made available, this could be used to indicate the potential intensity of interaction	✓			Developments which significantly affect key navigation routes are unlikely to be approved.
	Employment - no breakdown is available below the level of UK. If AIS data is made available, this could be used to indicate the potential intensity of any interaction	✓			Developments which significantly affect key navigation routes are unlikely to be approved.
Social and Community	Economic value of social factors – information could be collected through valuation surveys		✓		Offshore renewables may give rise to social and community impacts.
Telecom Cables	Economic value - there is no agreed methodology for separately valuing cables from the associated generating activity. The simplest approach would be to use replacement cost, based on cable length and current average construction and installation costs per km;		✓		Offshore renewables may interact with telecom cables
	Employment - there is no reliable source of information on employment. Information on maintenance and inspection expenditure may provide an indication of long-term employment (see below);	✓			Offshore renewables unlikely to give rise to significant impacts on telecom cables employment
	Frequency of maintenance and inspection and expenditure – there is no central source for this information. It may be possible to collect this information from the industry.		✓		Offshore renewables may interact with telecom cables
	Maintenance/inspection vessel routing – there is no public source of this information. The information could be extracted from AIS data should this become available. Otherwise it may be possible to obtain indicative information from the industry		✓		Offshore renewables installations may have the potential to disrupt navigation routes to offshore cables
Tourism	Spatial scale of economic data - the scale at which tourism activity is reported does not align well with the regions. It may be possible to reanalyse the information to SORER boundaries. More importantly, the reporting regions do not distinguish coastal-related tourism. It is likely that specific research would be required at a number of locations around Scotland to identify the proportion of coastal-related tourism.		✓		Offshore renewables may interact with tourism interests
	Employment – as above		✓		Offshore renewables may interact with tourism interests
Waste Disposal	Economic value – no information on the economic value of disposal is available.	✓			It is unlikely that an offshore renewables development would be allowed if it had a significant impact on a disposal site. Information on the volumes of material disposed provide a proxy that can indicate the potential scale of any interaction
	Employment – no information is available on levels of employment associated with waste disposal, although the numbers are likely to be very low.	✓			It is unlikely that an offshore renewables development would have a significant impact on employment associated with waste disposal as the activity would need to continue. Information on the volumes of material disposed provide a proxy that can indicate the potential scale of any interaction
Water Sports	Spatial data – spatial data on key locations is available for most activities, but information on levels of activity is relatively poor. Information could be collected through on-line questionnaire available through user associations and other relevant information points.		✓		Offshore renewables may interact with water sports
	Economic value - national data is available for some activities, but regional data is more limited. Data could be collected on expenditure as part of a wider questionnaire to users. The lack of trade associations and the dispersed and fragmented nature of the supply chain are likely to make it difficult to obtain information from the industries themselves.		✓		Offshore renewables may interact with water sports
	Employment – there is limited data available, particularly at a regional scale. Specific research would be required to identify relevant employment statistics.	✓			Employment can be inferred from economic value using appropriate employment multipliers

* See Section 4.3 for definition of High, Medium and Low

Table 4. Medium and high priority gaps

Priority	Activity	Key Gaps
High	Energy Generation	Location and economic value of supply chains to service offshore renewables projects in existing plans
	Recreational Boating	Spatial data on cruising and sailing routes and intensity of use
	Shipping	Spatial data on shipping routes and intensity of use (for areas not covered by existing Marine Scotland projects)
Medium	Aviation	Helicopter routes
	Carbon Capture and Storage	Location of storage areas and pipeline routes
	Commercial Fisheries	Routes to and from fishing grounds, fuel costs, fouling rates for fishing gear, cumulative pressures (existing fishery closures, MPAs, CFP reforms)
	Oil and Gas	Economic value of pipelines, frequency of inspection and maintenance of pipelines and expenditure; routeing of maintenance vessels
	Ports and Harbours	Future investment plans
	Power Interconnectors	Economic value, frequency of inspection and maintenance of pipelines and expenditure; routeing of maintenance vessels
	Social and Community	Economic value of social factors
	Telecom Cables	Economic value, frequency of inspection and maintenance of cables and expenditure; routeing of maintenance vessels
	Tourism	Economic value and employment associated with coastal tourism;
Water Sports	Spatial location of water sports activities and economic value	

5. Recommendations to Fill Data Gaps

5.1 Suggested Methodologies for Priority Actions

This section describes possible methodologies and approaches for taking forward medium and high priority actions.

5.1.1 Aviation

Information providing the co-ordinates of the main helicopter routes is available from NATS and could be used to develop a GIS layer of relevant routes.

5.1.2 Carbon Capture and Storage

There is currently a high level of uncertainty about the future location and scale of carbon capture and storage activity in UK seas, in particular commercial viability is still to be demonstrated. While there are a large number of potential storage sites in Scottish seas, preferred sites have not been confirmed, nor the associated pipeline routes. DECC and the Carbon Capture and Storage Association could be approached in order to obtain any updated information.

5.1.3 Commercial Fisheries

It is likely to be difficult to obtain good information on fishing vessel routes to and from fishing grounds. Some information will be available from existing AIS and radar data. Additional information could be obtained through consultation with individual fishermen, but it is likely to be difficult to obtain a comprehensive picture of routes and their intensity of use.

Information on fuel costs for different vessel types and sizes could be collected relatively easily through consultation with the Scottish Fishermen's Federation. For example, it would be helpful to have information on fuel costs (during normal steaming) for a vessel representative of the inshore fleet (say 9m vessel) and the offshore fleet (say 18m vessel), although this information might be better collected at the impact assessment stage.

Some information on the frequency of gear fouling on offshore energy cables is obtainable from R1 and R2 English OWF developers. However, there may not be sufficient information to standardise for fishing intensity, fishing methods and cable length. Comparable information may be available from the oil and gas industry.

Information to inform an assessment of the cumulative effects of displacement on commercial fisheries could be obtained as follows:

- Existing fisheries closures (Marine Scotland);
- Potential displacement from Scottish MPAs (Marine Scotland, once decisions have been taken on location and management measures); and
- Common Fisheries Policy Reform (Marine Scotland, once 2012 reforms have been agreed and implications understood).

5.1.4 Energy Generation

Consultation could be undertaken with existing offshore renewables developers to seek to identify their investment intentions (location and expenditure), although a significant level of uncertainty is likely to remain, pending, for example, the relevant port infrastructure developments obtaining the necessary consents. .

5.1.5 Oil and Gas

An indicative economic value for oil and gas pipelines could be calculated based on the length of pipeline and the current replacement cost. This would provide a simple low value estimate.

Some information on the frequency of maintenance and inspection, vessel routing and associated expenditure could be obtained through consultation with the oil and gas industry. Initial discussions with Oil and Gas UK have indicated that it is unlikely that comprehensive information will be obtainable, but it should be possible to acquire indicative information that could be used to estimate a baseline for Scottish waters.

5.1.6 Ports and Harbours

Information on future development intentions of individual ports could be obtained through consultation. However, there will be a significant level of uncertainty as progress for individual developments will be largely dependent on investment decisions.

5.1.7 Power Interconnectors

An indicative economic value for power interconnectors could be calculated based on the length of cable and the current replacement cost. This would provide a simple low value estimate.

Information on the frequency of maintenance and inspection, vessel routing and associated expenditure could be obtained through consultation with the grid companies and offshore wind farm developers. Initial discussions with the industry have indicated that information that has already been shared within ITOMS (International Transmission Operations & Maintenance Study) would be made available, but there may be commercial sensitivity surrounding some interconnector-specific information. It may be possible to facilitate information sharing through industry associations such as Subsea Cables UK or Renewable UK.

5.1.8 Recreational Boating

Spatial data on recreational vessel movements and activity levels could be collected using locally sited radar. However, this would be an expensive option to achieve wide-scale coverage of the Scottish coastline. It may be possible to work with RYA Scotland and marina owners to develop a voluntary initiative for recreational sailors to provide information from their log books to develop suitable mapped outputs which indicate specific routes used, the types of vessels using them, intensity of use (to include seasonality) and anchorages. Such a partnership approach could be particularly cost effective as well as usefully engaging the recreational boating community.

5.1.9 Shipping

Spatial data on vessel movements to determine the density, routing, vessel type, cargo and draught should be obtained from existing MCA AIS data as a nationally robust data set (which includes passenger vessels and shipping of >300GT). Ideally this should cover all of Scotland's seas for a period of one year as the information would also be useful to inform wider marine planning. It is recognised that information for some areas is in the process of being collated and analysed. It would be possible to expand coverage across Scottish seas on an area by area basis and to integrate the outputs. Owing to the very large data volumes associated with decoded

AIS data, it is unlikely to be practicable to process data for all Scottish seas simultaneously, particularly for a period of one year.

5.1.10 Social and Community

The economic value of social impacts could be assessed using valuation studies if it was considered necessary to obtain monetised information. This might be most appropriate in relation to factors such as quality of life which are often difficult to quantify, although various indicators of quality of life are available (e.g. Scottish statistics).

5.1.11 Telecommunication Cables

An indicative economic value for power interconnectors could be calculated based on the length of cable and the current replacement cost. This would provide a simple low value estimate.

Information on the frequency of maintenance and inspection, vessel routing and associated expenditure could be obtained through consultation with the cable companies. It may be possible to facilitate such an exercise through Subsea Cables UK as per power interconnectors above. It is unlikely that comprehensive information will be available, but it should be possible to acquire indicative information that could be used to estimate a baseline for Scottish waters.

5.1.12 Tourism

There is a lack of reliable information on coastal tourism in Scotland. To obtain better estimates of coastal-related tourism activity, economic value and related employment, primary research is likely to be required. Such a study should take account of likely geographic differences in the relative importance of coastal tourism (for example, this may be a primary reason for tourist footfall to Scottish islands), but incidental for tourism associated with coastal cities. It should also be targeted towards those areas with a high dependence on tourism (West coast and Scottish islands). Visit Scotland are responsible for collection of tourism statistics in Scotland. It is recommended that the detailed scope of any future study is taken forward in partnership with them as it is likely that some of the required information could be collected through extension of their existing surveys. .

5.1.13 Water Sports

There is reasonable spatial and value information for recreational fishing. There is some information on the location of other water sports activities (surfing, windsurfing, kitesurfing, canoeing, kayaking, and diving) but information on levels of activity and expenditure is poor. To obtain better information on the location, levels of activity and expenditure for these water sports activities, primary research would be required.

Participant based questionnaire surveys are a viable way of collecting information on location, intensity and expenditure. A location based approach might be suitable for certain areas such as well known surf beaches. However, given the remoteness of many parts of Scotland and the

high daily variability in usage of an area (dependant on season, weather, weekend/week day, sea state etc) this technique could be very costly.

A more effective technique would probably involve online questionnaire surveys. This could be done through governing bodies such as Scottish Canoeing Association, Scottish Sub Aqua Club, British Surfing Association or UK Windsurfing Association. However, membership of these organisations often only represents a small fraction of participants involved in the water sport as a whole. Another approach is using charity websites such as Surfers Against Sewage. However, the most effective approach would probably be to use popular private water sports websites such as 'Magic Seaweed' (mainly surfing but also used by wind surfers and kayakers), social networking sites (such as Facebook) and magazines (both online and paper based magazines) to advertise any such online survey. Any such survey should be initiated by the relevant governing bodies.

The MEDIN guideline for the collection of marine leisure and recreational data (ABPmer, 2011) provides a useful template for the focus of data collection, although it will also be important to collect information on expenditure.

A separate survey on the supply chains for individual water sports to estimate their economic value and associated employment is considered unlikely to be effective in generating meaningful data. There are no specific trade associations for water sports activities and the supply base is highly fragmented. For example, while some surf and outdoor shops sell specialist water sports equipment and products, other shops sell more 'lifestyle' fashion such as clothes to people even if they do not necessarily participate in the water sports, ('diluting' any value estimate).

5.1.14 Cross-cutting Action

Future activity levels are necessarily uncertain. However, it may be useful to develop central assumptions to be applied when estimating future activity levels and values to seek to ensure consistency of approach between different impact assessments. These assumptions could be on the basis of central projections for future activities or else based around different scenarios, for example, based on the UK Foresight programme scenarios.

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Appendices



Appendix A

List of Steering Group Members



Appendix A. List of Steering Group Members

Organisation	Contact Name
Scottish Government	David Pratt
Scottish Government	Fiona Simpson
Scottish Government	Pippa Goldschmidt
Scottish Government	Kevin Brady
Scottish Government	Andreas Lerch
Highland and Islands Enterprise/Scottish Enterprise	Norma Hogan
Natural Power	Jeremy Sainsbury
Scottish Fishermen's Federation	Kenny Coull
Scottish Natural Heritage	Daniel Gotts
Scottish Salmon Producers' Organisation	Stephen Bell
The Crown Estate	John Stevenson
UK Chamber of Shipping	Richard Nevinson

Appendix B

Evidence Requirements Summary Tables and
Information Sources by Sector



Appendix B. Interaction Summary Tables and Information Sources by Sector

Aquaculture

Explanation of column content:

Column 1: Describes the potential interaction between the activity and any renewable technology;

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Column 4: Identifies the indicative information necessary to inform the baseline reviews, in some cases these may be environmental parameters which are not described or mapped in this study; and

Column 5: Based on the information requirements in Column 4 the study team have made a judgment on whether the information should be included in the socio-economic baseline reviews and if not have provided a source for completeness.

1	2	3	4	5
Potential Interaction	Technology Relevance (Wind, Wave, Tidal)	Potential Socio-economic Consequence	Indicative Baseline Information Requirements	Recommendation on Inclusion of Information in Socio-economic Baseline?
Environmental impacts to aquaculture species as a result of construction, operation and decommissioning (changes in underwater noise, turbidity and water quality).	All	Loss of income for fish farm producers through a reduction in farm productivity	Baseline information on underwater noise, turbidity and water quality at specific locations and projections of how these might change relative to impact thresholds for aquaculture species	x (Information identified in Column 4 will be provided by SEA/HRA)
Displacement of existing or future aquaculture activity	All	Reduction in income for aquaculture producers.	Spatial data on current and potential future locations of aquaculture installations. Information on current economic value and employment for individual sites.	✓
Co-management of aquaculture and offshore renewable energy installations in the same area.	Wind	Increase the income from the OWF lease.	Information on location of future offshore wind farm developments with which aquaculture installations will be co-located	x Dependent on site specific considerations which will only be resolved at project level (e.g. lease agreements etc)

Scale	Information Available	Date	Source
Scotland	Production and turnover 2005-2009	2005-2009	Baxter <i>et al</i> (2011)
Scotland	Scottish shellfish production survey	2010	Marine Scotland (2010)
Scotland	Scottish fish farm production survey	2009	Marine Scotland (2009)
UK	Future trends	2006+	Wilding <i>et al</i> (2006)
Regional	Economic value and trends	2010	Scottish Salmon Producers Organisation (2010)

Aviation

Explanation of column content:

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1	2	3	4	5
Potential Interaction	Technology Relevance (Wind, Wave, Tidal)	Potential Socio-economic Consequence	Indicative Baseline Information Requirements	Recommendation on Inclusion of Information in Socio-economic Baseline?
Height obstruction of commercial navigation routes	Wind	Additional track miles for helicopters owing to height obstruction in inclement weather Loss of trade at airports	Existing helicopter routes and intensity of use in proximity to future offshore wind development area Economic value and employment at airports. Runway approach routes in proximity to future offshore wind development area	✓

Scale	Information Available	Date	Source
Scotland	UK Air Passenger Demand Forecasts	2009+	Department for Transport (2009)
Scotland	Scottish Transport Statistics	2010	Scottish Government

Carbon Capture Storage

Explanation of column content:

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Column 5: Based on the information requirements in Column 4 the study team have made a judgment on whether the information should be included in the socio-economic baseline reviews and if not have provided a source for completeness.

1	2	3	4	5
Potential Interaction	Technology Relevance (Wind, Wave, Tidal)	Potential Socio-economic Consequence	Indicative Baseline Information Requirements	Recommendation on Inclusion of Information in Socio-economic Baseline?
Competition for space Increased difficulty of access to pipelines / rigs	All	Sterilization of potential storage areas/obstruction of potential pipeline routes Increased maintenance costs for pipeline owners; loss of revenue for asset owners; loss of revenue for dependent businesses/customers	Potential location of CO2 pipeline network and suitable geological reservoirs.	✓

Scale	Information Available	Date	Source
Scotland	Potential CO2 storage sites, transport options between sources and storage sites (ship and pipeline)	2009	Scottish Centre for Carbon Storage (2009.)
Scotland	Refined estimate of CO2 storage capacity in North East Region, estimates of timelines to CCS deployment and employment estimates	2011	Scottish Centre for Carbon Storage (2011)
Scotland	Potential transport options and possible European CCS Network	2010	Scottish Government and Scottish Enterprise (2010)
Scotland	Potential CO2 storage sites	2011	Baxter <i>et al</i> (2011)

Coastal Defence and Flood Protection

Explanation of column content:

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1	2	3	4	5
Potential Interaction	Technology Relevance (Wind, Wave, Tidal)	Potential Socio-economic Consequence	Indicative Baseline Information Requirements	Recommendation on Inclusion of Information in Socio-economic Baseline?
Loss of integrity of structures at cable crossings	All	Increased maintenance costs	Location and type of man made defences; maintenance expenditure	✓

Scale	Information Available	Date	Source
Scotland			SEPA/Local authorities

Commercial Fisheries

Explanation of column content:

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1	2	3	4	5
Potential Interaction	Technology Relevance (Wind, Wave, Tidal)	Potential Socio-economic Consequence	Indicative Baseline Information Requirements	Recommendation on Inclusion of Information in Socio-economic Baseline?
Displacement and disruption to existing fisheries within arrays and along cable routes	All	Reduction in landings/Catch per Unit Effort (CPUE)	Distribution and intensity of fishing activity, economic value of landings	✓
Disturbance of mobile species and disruption or damage to habitats, nursery and spawning grounds	All	Reduction in landings/Catch per Unit Effort (CPUE)	Change in extent and intensity of damage compared to baseline; understanding of relationship between habitat quality and fish production	✗ (information will be provided by SEA/HRA)
Obstruction of navigation routes	All	Increased steaming times	Existing vessel movements, frequency, vessel types, destinations, fuel costs	✓
Fouling of fishing gear on cables or seabed infrastructure	All	Loss of fishing gear	Distribution of bottom fishing activity (trawls, pots) over time; frequency of activity, information on frequency of fouling events	✓
Cumulative effects of other pressures (e.g. fisheries closures, spatial closures related to Marine Protected Areas or major offshore developments and changes introduced through Common Fisheries Policy reforms)	All	Reduction in CPUE and consequential loss of profit	Information on spatial and temporal extent of other pressures and their influence on landings values	✓
Spillover benefits	All	Increased CPUE and/or landings	Change in extent and intensity of damage compared to baseline; understanding of relationship between habitat quality and fish production	✗ (likely to be minor as development areas occupy small areas of sea space)

Scale	Information Available	Date	Source
Scotland	Value and weight of catches by port Average effort (kw days) in sea areas by UK vessels (range) Average value of landings from sea areas (range) Average number of days of foreign vessel fishing activity per ICES square (range) Reported annual catches by fishing type (fixed engine, rod and line, net and coble)	2005-2009	Baxter <i>et al</i> (2011)
Scotland	Locations and types of fishing; status of stocks; economic and social aspects of the fisheries	2010	Crawley, D. (2010)
Fishing District	Sea Fisheries Statistics for fishing fleet, employment and catches and landings	2009	Marine Scotland - Science
ICES rectangle	Landings data (weight and value of landings into a UK port by vessel size, nationality and gear type for each species)	2000-2010	Marine Scotland
ICES rectangle	Satellite (VMS) data of UK vessels	2006-2010	Marine Monitoring Centre, Marine Scotland
ICES rectangle	Vessel surveillance data by nationality and gear type	2006-2010	Marine Monitoring Centre, Marine Scotland
Statistical Districts	Aggregate catch data for salmon and sea trout fisheries by fishing type	2000-2010	Freshwater Laboratory Field Station, Marine Scotland - Science

Energy Generation

Explanation of column content:

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1	2	3	4	5
Potential Interaction	Technology Relevance (Wind, Wave, Tidal)	Potential Socio-economic Consequence	Indicative Baseline Information Requirements	Recommendation on Inclusion of Information in Socio-economic Baseline?
Development opportunities for supply chain	All	Additional supply chain activity (economic value and employment)	Spatial data on supply chain locations	✓
Competition for space (offshore)	All	Reduced renewable energy capacity	Spatial data on leasing areas for different types of renewable energy	✓
Competition for transmission capacity	All	Either reduced energy output from other energy sources (due to displacement by renewables) or reduced renewable energy capacity	Information on capacity for electricity transmission (within Scotland and from Scotland to other countries)	✓

Scale	Information Available	Date	Source
Scotland	Amount of electricity generated by energy source in Scotland (Scottish Environmental Statistics Online)	2009	Scottish Government Statistics
Scotland	National Renewables Infrastructure Plan	2010	SE & HIE (2010)
Scotland	Blue Seas – Green Energy - A Sectoral Marine Plan for Offshore Wind Energy in Scottish Territorial Waters	2010	Scottish Government
Scotland	Potential Development Scenarios for Scottish Offshore Wind Supply Chain	2010	Scottish Renewables (2010)
Scotland	Scotland's Offshore Wind Route Map – Developing Scotland's Offshore Wind Industry to 2020	2010	Offshore Wind Industry Group
Scotland	The Offshore Valuation – A valuation of the UK's offshore renewable energy resource	2010	Public Interest Research Centre on behalf of The Offshore Valuation Group (2010)
Scotland	Scottish Offshore Wind: Creating an Industry to Scottish Renewables	2010	IPA Energy + Water Economics (2010)
Scotland	Information and analysis of wave and tidal market in Scotland	2011	Pure Marine Gen Ltd (2011)
Scotland	Draft Electricity Generation Policy Statement 2010	2010	Scottish Government
Scotland	A Low Carbon Economic Strategy for Scotland	2010	Scottish Government
Pentland Firth and Orkney Waters	Supply Chain Demand - PFOW Round 1 Wave and tidal Projects	2011	BVG Associates (2011)
West Coast	Scottish Offshore Renewables Development Sites	2011	Scottish Development International, Highlands and Islands Enterprise, and Scottish Enterprise (2011)
Scotland	Scotland's Renewable Energy Potential: realising the 2020 target	2005	Scottish Executive (2005), Future Generation Group Report
Scotland	Scottish Renewable Energy Generation Capacity	2010	Scottish Renewables
Scotland	Interim Great Britain Seven Year Statement	2004	National Grid (2004)
Scotland	Scottish and Southern Energy plc Annual Report 2011	2011	Scottish and Southern Energy plc (2011)

Military

Explanation of column content:

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1	2	3	4	5
Potential Interaction	Technology Relevance (Wind, Wave, Tidal)	Potential Socio-economic Consequence	Indicative Baseline Information Requirements	Recommendation on Inclusion of Information in Socio-economic Baseline?
Interference with radar systems	Wind	The need to provide radar mitigation for strategic en-route and low level radar interference.	Location of future offshore wind farm developments in areas of importance to strategic en-route and low level radar systems	✓
Interference with underwater communications	All	Displacement of activity leading to increased costs	Submarine and other exercise areas	✓

Scale	Information Available	Date	Source
Scotland	Scottish Naval Exercise Areas Information	2010	http://mopsscotland.netfirms.com/index.htm
Scotland	Defence Analytical Services and Advice. DASA Quad Service. 4	2010	www.dasa.mod.uk/

Oil and Gas

Explanation of column content:

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1	2	3	4	5
Potential Interaction	Technology Relevance (Wind, Wave, Tidal)	Potential Socio-economic Consequence	Indicative Baseline Information Requirements	Recommendation on Inclusion of Information in Socio-economic Baseline?
Increased difficulty of access	All	Increased maintenance costs for pipeline owners; loss of revenue for asset owners; loss of revenue for dependent businesses/customers	Producing platforms and pipeline location information. Information on the frequency of maintenance / inspection and route usage information.	✓

Scale	Information Available	Date	Source
Scotland	All pipelines and cables	Current	SeaZone Solutions Ltd and UKDEAL
UK	Oil pipelines - Subsea pipelines and umbilical's related to the petroleum industry.	Current	UKDEAL
UK	Oil and gas employment	2009	Oil and Gas UK 2010 Economic report: http://www.oilandgasuk.co.uk/cmsfiles/modules/publications/pdfs/EC021.pdf
Scotland	Revenues and production from Scottish Sea areas (2005-2008). Oil, gas and NGL production and revenue (2005-2008) for all Scottish waters and regional breakdown.	2005-2008	Baxter <i>et al</i> (2011)

Ports and Harbours

Explanation of column content:

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1	2	3	4	5
Potential Interaction	Technology Relevance (Wind, Wave, Tidal)	Potential Socio-economic Consequence	Indicative Baseline Information Requirements	Recommendation on Inclusion of Information in Socio-economic Baseline?
Reduced development opportunities	All	Loss of customers and revenue (long-term); increased costs associated with development	Projected future developments at risk.	✓
Increased development opportunities	All	Commercial opportunities for port expansion associated with construction, operation and maintenance activities.	Projected changes in development based on assessing supply chain benefits.	✓

Scale	Information Available	Date	Source
UK	Employment and GVA multipliers for ports (all UK)	2009	Oxford Economics (March 2009): "The Economic Contribution of Ports to the UK Economy" www.ukmajorports.org.uk/file_library/file_library_files/download/173
UK	Marine Traffic, passenger numbers and cargo volume	2000-2010	Department for Transport "Transport Statistics" http://www.dft.gov.uk/statistics/series/ports/
UK	Port and harbour locations, port types, port ownership, contact details	Current	Ports and Harbours of the UK, 2011. Website: http://www.ports.org.uk/
Scotland (including Orkney, Shetland and mainland)	Maritime transport statistics and overview, generalised information on Scottish Ports.	2009-2010	Baxter <i>et al</i> (2011) The Scottish Government (2011) 'Scotland's Marine Atlas - Information for the National Marine Plan' March 2011
Scotland	Commercial listings of ports in Scotland, service providers, contact details, description of services and current development plans.	Current to 2009	Port of Scotland (2010) - annual publication (current issue print date 2009)
Scotland	Recent trends	To 2008	British Ports Association (2008)

Power Interconnectors

Explanation of column content:

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1	2	3	4	5
Potential Interaction	Technology Relevance (Wind, Wave, Tidal)	Potential Socio-economic Consequence	Indicative Baseline Information Requirements	Recommendation on Inclusion of Information in Socio-economic Baseline?
Increased difficulty of access	All	Increased maintenance costs for cable owners; loss of revenue for asset owners; loss of revenue for dependent businesses/ customers	Cable location information. Information on the frequency of maintenance / inspection and route usage information.	✓

Scale	Information Available	Date	Source
Scotland	All pipelines and cables	Current	SeaZone Solutions Ltd
Scotland	Power cables (submarine electricity cables)	Current	Baxter <i>et al.</i> (2011)
Scotland	Potential future subsea cable developments / reinforcements	2009	National Planning Framework for Scotland Annex National development 11 (Scottish Government, 2009b)

Recreational Boating

Explanation of column content:

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1	2	3	4	5
Potential Interaction	Technology Relevance (Wind, Wave, Tidal)	Potential Socio-economic Consequence	Indicative Baseline Information Requirements	Recommendation on Inclusion of Information in Socio-economic Baseline?
Alterations to informal cruising routes; loss or alteration of 'essential routes' into sheltered harbours and anchorages	All	Increased fuel costs for motorized vessels; possible relocation of vessels leading to loss of revenues for supply chain	Spatially resolved information on recreational vessel movements. Information on vessel type and draught supplemented with any additional data collected for site specific navigation risk assessment.	✓
Displacement of vessels into higher risk areas	All	Increased costs to boat owners; possible relocation of vessels leading to loss of revenues for supply chain	As above	✗ Risks managed through navigation risk assessment; thus reduced to acceptable levels
Increased collision risk with rotor blades and/or sub-surface structures	All	Reduction in activity levels leading to loss of revenue for supply chain	As above	✗ Risks managed through navigation risk assessment; thus reduced to acceptable levels
Impacts to landscape or seascape	Wind	Reduction in activity levels leading to loss of revenue for supply chain	Information used to inform an LVIA such as landscape/seascape sensitivity and character	✗ (Baseline information will be provided in SEA)
Additional opportunities created such as increased land-based infrastructure (e.g. all weather harbours, all tide slipways, boat storage areas) arising from the construction and operation of renewable developments designed to accommodate and made available to recreational activities.	All	Increase in expenditure by recreational boat owners in the area	Projected changes in development based on assessing supply chain benefits.	✗ Likely to minimal as any benefit will be serendipitous
Deterrent to investment in marinas/supply chain	All	Reduced investment	Identify potential investment at risk.	✓

Scale	Information Available	Date	Source
Scotland	Statistics on sailing tourism	No date	Tourism Resources Company <i>et al</i> (2010)
All Regions	Number of resident home berths Number of visiting berths Proportion of total Scotland berths Demand for home berths (occupancy) Visiting craft demand for berths Average annual spend per boat (high, medium and low) Direct expenditure Multipliers (from Scottish Tourism Multiplier Study) Visiting boat nights Visiting boat expenditure Employment Gross Value Added	No date	Tourism Resources Company <i>et al</i> (2010)
Scotland	Sailing area value and berth numbers	No date	Baxter <i>et al</i> (2011)
Scotland	RYA cruising routes and sailing areas	No date	Baxter <i>et al</i> (2011)

Shipping

Explanation of column content:

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1	2	3	4	5
Potential Interaction	Technology Relevance (Wind, Wave, Tidal)	Potential Socio-economic Consequence	Indicative Baseline Information Requirements	Recommendation on Inclusion of Information in Socio-economic Baseline?
Obstruction of transiting vessel navigation routes: Increased steaming distances/time Increased marine risk (grounding) through route deviation	All	Increased costs; increased insurance costs	Potential increases in steaming distances/ times, based on AIS data interrogation. For groundings, AIS data could be used to establish the draught profile of vessels transiting the area, to identify potential constraints.	✓
Obstruction of established ferry routes: Increased steaming distances/time Reduced turnaround times Increased marine risk (grounding)	All	Increased costs to ferry companies	As above.	✓
Increased ship collision risk	All	Increased costs; increased insurance costs	Quantitative marine risk assessment using input traffic levels (from AIS and/or radar surveys).	✗ Risks managed through navigation risk assessment; thus reduced to acceptable levels
Displacement of recreational craft into navigation lanes	All	Increased costs; increased insurance costs	Quantitative marine risk assessment using input traffic levels (from AIS and/or radar surveys).	✗ Risks managed through navigation risk assessment; thus reduced to acceptable levels
Requirement for additional aids to navigation	All	Costs of meeting IALA requirements met by developers	The marking of offshore energy installations are recommended to follow advice from the International Association of Marine Aids to Navigation and Lighthouse Authorities (IALA).	✗ Risks managed through implementation of required mitigation measures
Displacement of anchorage areas	All	Increased costs	AIS or radar surveys of the area in comparison with sea usage charting. This information should be matched to local Harbour Authorities information on both formal and informal anchorage within their Harbour Authority areas.	✓
Fouling of anchors on cables	All	Increased insurance costs	Shipping lane location, Information on the frequency of fouling events	✓
Commercial opportunities to support offshore renewables	All	Increased usage of vessels to support offshore renewables through project life cycle	Supply chain activities relating to shipping and potential scale of activity	✓

Scale	Information Available	Date	Source
Scotland	Number of passengers, cars and commercial vehicles on ferries (graph), Shipping traffic: no. of vessels in a given area during 1st week of Jan.2010 (map), AIS regional maps,	2005-2010	Baxter <i>et al</i> (2011) The Scottish Government (2011) 'Scotland's Marine Atlas - Information for the National Marine Plan' March 2011
Scotland	Scottish Transport Statistics	2009	Scottish Government (2009a)
Scotland	Scottish Transport Statistics	2010	Scottish Government (2010)
Scotland	DFT Maritime Transport Statistics Compendium	2010	DFT (2010)
Regional	Regional scale AIS density maps	2005-present	Maritime and Coastguard Agency (MCA) - Direct contact with MCA Office: http://www.dft.gov.uk/mca/mcga07-home/aboutus/contact07/mcga-atoz.htm □

Social and Community

Explanation of column content:

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Column 5: Based on the information requirements in Column 4 the study team have made a judgment on whether the information should be included in the socio-economic baseline reviews and if not have provided a source for completeness.

1	2	3	4	5
Potential Interaction	Technology Relevance (Wind, Wave, Tidal)	Potential Socio-economic Consequence	Indicative Baseline Information Requirements	Recommendation on Inclusion of Information in Socio-economic Baseline?
Population	All	Changes in population as a result of changes in employment	Projected changes in employment.	✓
Local employment	All	Reduction in employment opportunities; increase in employment opportunities as a result of supply chain development	Projected changes in employment based on sectoral impacts and supply chain benefits.	✓
Deprivation	All	Changes in the levels of deprivation as a result of changes in other social factors	Information on existing levels of deprivation (index)	✓
Community wellbeing	All	Changes in levels of poverty and neighbourhood perceptions as a result of changes in other social factors	Information on existing poverty levels and neighbourhood perceptions	✓
Housing	All	Changes in housing availability as a result of changes in other social factors	Information on housing stock and availability	✓
Health	All	Changes in population health	Self reported health information	✓
Education and skills	All	Changes in the levels of education and skills	Information on levels of education and skills	✓

Scale	Information Available	Date	Source
Scotland Datazone (groups of census output areas)	Number of business sites by industry sector	2010 (also 2007 to 2010)	Scottish Neighbourhood Statistics
Local authority	Business birth and death rates (including 3 year survival rates)	2002 to 2009	Scottish Neighbourhood Statistics
Local authority	Employment (by industry sector)	2009 to 2010	ONS
Scotland	Social economy turnover	2004 to 2009	Scottish Neighbourhood Statistics
Scotland	Community well-being (poverty)	1998/99 to 2007/08	Scottish Neighbourhood Statistics
Local authority	Percentage of adults who rate their neighbourhood as a very good place to live	1999/00 to 2007/08	Scottish Neighbourhood Statistics
Local authority	Education level (education to degree level, percentage receiving job-related training, with low of no qualifications)	2004 to 2010	Scottish Neighbourhood Statistics
Local authority	Self-assessed health rating	1999/00 to 2007/08	Scottish Neighbourhood Statistics
Local authority	House sale prices	1993 to 2010	Scottish Neighbourhood Statistics
Datazone (groups of census output areas)	Index of deprivation (ranks)	2009	Scottish Neighbourhood Statistics
Local authority	Population (2001 census and mid-year estimates)	2001 to 2010	Scottish Neighbourhood Statistics

Telecommunication Cables

Explanation of column content:

Column 1: Describes the potential interaction between the activity and any renewable technology;

Column 2: Identifies the types of offshore renewable development (wind, wave or tidal) for which the interaction may arise;

Column 3: Identifies the potential socio-economic consequence associated with the interaction identified in Column 1;

Column 4: Identifies the indicative information necessary to inform the baseline reviews, in some cases these may be environmental parameters which are not described or mapped in this study; and

Column 5: Based on the information requirements in Column 4 the study team have made a judgment on whether the information should be included in the socio-economic baseline reviews and if not have provided a source for completeness.

1	2	3	4	5
Potential Interaction	Technology Relevance (Wind, Wave, Tidal)	Potential Socio-economic Consequence	Indicative Baseline Information Requirements	Recommendation on Inclusion of Information in Socio-economic Baseline?
Competition for Space	All	Increased costs associated with new cable or pipeline laying operations; increases in subsequent maintenance costs	Cable location information.	✓
Increased difficulty of access for maintenance and inspection	All	Increased maintenance costs for cable and pipeline owners; loss of revenue for asset owners; loss of revenue for dependent businesses/customers	Cable location information. Information on the frequency of maintenance / inspection and route usage information.	✓

Scale	Information Available	Date	Source
Regional	Telecom Cable Routes including both in and out of service cables.	Issue 13/ January 2011	KIS-CA http://www.kisca.org.uk/charts.htm
Scotland	All pipelines and cables	Current	SeaZone Solutions Ltd
Scotland	Overview of Telecommunication cables, with lengths of active cables per region.	No date	Baxter <i>et al</i> (2011)

Tourism

Explanation of column content:

Column 1: Describes the potential interaction between the activity and any renewable technology;

Column 2: Identifies the types of offshore renewable development (wind, wave or tidal) for which the interaction may arise;

Column 3: Identifies the potential socio-economic consequence associated with the interaction identified in Column 1;

Column 4: Identifies the indicative information necessary to inform the baseline reviews, in some cases these may be environmental parameters which are not described or mapped in this study; and

Column 5: Based on the information requirements in Column 4 the study team have made a judgment on whether the information should be included in the socio-economic baseline reviews and if not have provided a source for completeness.

1	2	3	4	5
Potential Interaction	Technology Relevance (Wind, Wave, Tidal)	Potential Socio-economic Consequence	Indicative Baseline Information Requirements	Recommendation on Inclusion of Information in Socio-economic Baseline?
Impacts to landscape or seascape	Wind	Reduction in tourism income and investment	Information on economic value of coastal tourism and employment; potential future investment plans	✓
Changes to the local character of an area	Wind	Reduction in tourism income and investment	Information on economic value of coastal tourism and employment; potential future investment plans	✓
Disturbance or injury to coastal or marine wildlife*	All	Reduction in income for ecotourism businesses	Distribution of marine wildlife and how this may change in response to offshore energy development in time and space.	✗ (Baseline information will be provided in SEA)
Disturbance or damage to heritage assets	All	Reduction in visitor attraction income; reduction in wider tourism income	Location of heritage assets relative to potential development areas. An assessment of the importance of a site and the consequence of any interaction	✓
Creation of new visitor attraction	All	Increase in tourism income	Future visitor number projections based on previous case examples, market and tourist perception studies.	✗ (Likely to be small impact unless further investment made to enhance visitor experience)
* Given that adequate mitigation measures will be required by law to protect marine wildlife, these measures would also be expected to protect associated socio-economic interests.				

Scale	Information Available	Date	Source
Scotland	Leisure and recreation statistics	2011	Baxter <i>et al</i> (2011)
Scotland	Economic impact of offshore wind farms	2009	GCal Uni (2009)
Scotland	Visitor numbers by region	- 2010	Visit Scotland
Scotland	The tourism prospectus: investing for growth	2007	Visit Scotland
Scotland	Expenditure by coastal and marine wildlife visitors in Scotland.	2009	Bournemouth University (2010)
Scotland	Value of whale watching in Scotland	2009	O'Connor <i>et al.</i> (2009)
Scotland	Value of conserving whales: impacts of cetacean-related tourism on the economy of rural West Scotland	2003	Aquatic Conservation: Marine and Freshwater Ecosystems Journal
Scotland	Scotland's Coastal and Maritime Managed Heritage Assets; Visitor Numbers and Revenue	2004-2009	Historic Scotland; Visit Scotland
Scotland	Fishing tourism research	2007	Visit Scotland
Scotland	Value to economy of tourism	No date	
Scotland	Towards a Strategy for Scotland's Marine Historic Environment	2009	Historic Scotland

Waste Disposal

Explanation of column content:

Column 1: Describes the potential interaction between the activity and any renewable technology;

Column 2: Identifies the types of offshore renewable development (wind, wave or tidal) for which the interaction may arise;

Column 3: Identifies the potential socio-economic consequence associated with the interaction identified in Column 1;

Column 4: Identifies the indicative information necessary to inform the baseline reviews, in some cases these may be environmental parameters which are not described or mapped in this study; and

Column 5: Based on the information requirements in Column 4 the study team have made a judgment on whether the information should be included in the socio-economic baseline reviews and if not have provided a source for completeness.

1	2	3	4	5
Potential Interaction	Technology Relevance (Wind, Wave, Tidal)	Potential Socio-economic Consequence	Indicative Baseline Information Requirements	Recommendation on Inclusion of Information in Socio-economic Baseline?
Competition for Space (development of new sea disposal sites)	All	Increased disposal costs associated with use of new or less preferred disposal sites.	Potential future disposal sites.	✓
Loss of, or disruption of access to, dredge material disposal sites	All	Increased disposal costs associated with use of less preferred disposal sites.	Location of disposal sites; routes to disposal sites; volumes / frequency of dredge material disposal to each site. Potential future port developments. A site specific assessment should be conducted in consultation with relevant port and harbour authorities for any affected disposal sites.	✓

Scale	Information Available	Date	Source
UK	Dredge disposal sites and volumes disposed of in the OSPAR Maritime Area	2009	OSPAR, (2009): http://www.ospar.org/documents/dbase/publications/p00433_JAMP%20Dumping%20Assessment.pdf
Scotland	Potential future port developments	2009	National Planning Framework for Scotland (Scottish Government, 2009b).
Scotland	Locations and tonnage at open disposal sites	2011	Baxter <i>et al.</i> (2011)

Water Sports

Explanation of column content:

Column 1: Describes the potential interaction between the activity and any renewable technology;

Column 2: Identifies the types of offshore renewable development (wind, wave or tidal) for which the interaction may arise;

Column 3: Identifies the potential socio-economic consequence associated with the interaction identified in Column 1;

Column 4: Identifies the indicative information necessary to inform the baseline reviews, in some cases these may be environmental parameters which are not described or mapped in this study; and

Column 5: Based on the information requirements in Column 4 the study team have made a judgment on whether the information should be included in the socio-economic baseline reviews and if not have provided a source for completeness.

1	2	3	4	5
Potential Interaction	Technology Relevance (Wind, Wave, Tidal)	Potential Socio-economic Consequence	Indicative Baseline Information Requirements	Recommendation on Inclusion of Information in Socio-economic Baseline?
Impacts to seascape/setting	All	Reduction in activity levels leading to loss of revenue for supply chains	Information used to inform an LVIA such as landscape/seascape sensitivity and character, photo montages and proposed development locations.	× (Baseline information will be provided in SEA)
Displacement or obstruction of water sports activity	All	Reduction in activity levels leading to loss of revenue for supply chains	Information on existing levels of activity, expenditure and employment associated with different areas.	✓
Collision risk for humans or vessels	Tidal	Reduction in activity levels leading to loss of revenue for supply chains	Risk study at a site specific level based on device location, characteristics and activity intensity levels in that area.	× Risks managed through navigation risk assessment; thus reduced to acceptable levels
Changes to the wave climate (wave height, period and direction) altering the quality and consistency of waves for surfing.	Wind and Tidal	Reduction in surfing activity leading to loss of revenue for supply chain	Physical data from project level EIAs and consultation with stakeholders	× Baseline information will be provided in SEA. Changes likely to be very small
Additional opportunities created such as increased land-based infrastructure (e.g. all weather harbours, all tide slipways, boat storage areas) arising from the construction and operation of renewable developments designed to accommodate and made available to recreational activities.	All	Increase in expenditure by water sport participants in the area	Projected changes in development based on assessing supply chain investments.	× Changes likely to be very small and dependent on site specific factors which cannot be predicted at regional level
Impacts on fish stocks of angling target species as a result of impacts to feeding, breeding and/or migration of species of angling interest (e.g. collision risk or disruption/disturbance through increased noise, vibration, turbidity or electromagnetic fields).	All	Reduction in recreational angling leading to loss of revenue for supply chain	Impact assessment information undertaken as part of the SEA/HRA process	× Baseline information will be provided in SEA

Scale	Information Available	Date	Source
Scotland	Number of sea anglers	2006-2007	Radford <i>et al</i> (2009)
Scotland	Economic impact of sea angling (by region)	No date	Radford <i>et al</i> (2009)
Scotland	Angler days by resident, by origin, by type (short, boat, charter)	No date	
Scotland	Expenditure	No date	
Scotland	Trends (days fished, competitiveness of region)	No date	
Scotland	Output of DREAM® model gives multipliers (associated with angling)	No date	
Scotland	Estimated regional sea angling activity and expenditure (also for Scotland)	No date	Baxter <i>et al</i> (2011)
Scotland	Origin and destination of overnight fishing trips to Scotland	2006-2007	Radford <i>et al</i> (2009)
Highlands and Islands	Statistics on water sports	No date	George Street Research & Jones Economics (2004)

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Appendix C

List of Stakeholders



Appendix C. List of Stakeholders

Organisation	Contact Name
Argyll & Bute Council	
Association of Scottish Shellfish Growers	Walter Speirs
Bristow Helicopters European Operations - Aberdeen	Scott Butler
British Ports Association	Sandra Laurenson
British Surfing Association	Jo Hillman
Chamber of Shipping	Saurabh Sachdeva
Civil Aviation Authority	Neal Henley
Clyde Fishermen's Association	Archie McFarlane
Convention of Scottish Local Authorities (CoSLA)	George Hamilton
David MacBrayne Ltd	Archie Robertson
Eilean Siar	John Cunningham
Forth Ports/UK Major Ports Group	Bob Baker
Highland and Islands Enterprise/Scottish Enterprise	Calum Davidson
Highland and Islands Enterprise/Scottish Enterprise	Elain Cameron
Highlands and Islands Airports Ltd. (HIAL)	Ann Phillips
Historic Scotland	Philip Robertson
Infratil - Operator of Glasgow Prestwick Airport	Carol-Anne Elliot
Joint Nature Conservation Committee	Mark Tasker
Marine Alliance for Science and Technology for Scotland	Mark James
Maritime and Coastguard Agency	Graeme Proctor
Ministry of Defence	Jon Wilson
National Air Traffic Services	Jon Westbrook (national infrastructure safeguarding) Kel Kirkland (local impacts around airports)
Natural Power	Jeremy Sainsbury
Northern Lighthouse Board	Peter Douglas
Oil and Gas UK	Mick Borwell
Orkney Islands Council	
Renewable Energy Association	Steph Merry
RenewableUK	Paul Reynolds
Royal Institute Town Planning	John Esslemont
Royal Yachting Association (RYA)	Caroline Price
RYA Scotland	James Stuart
Scottish Boating Alliance / British Marine Federation	Mike Balmforth
Scottish Coastal Forum	Rhona Fairgreive
Scottish Development International	Kenneth Clarke
Scottish Enterprise	Veronica Noone
Scottish Environment Protection Agency	Campbell Gemmell
Scottish Fishermen's Federation	Kenny Coull
Scottish Natural Heritage	Daniel Gotts
Scottish Renewables	Jenny Hogan
Scottish Salmon Producers' Organisation	Stephen Bell
Scottish Sea Angling Conservation Network	Steve Bastiman
Scottish Surfing Federation	Chris
Scottish Sustainable Management Environment Initiative	Isabel Glasgow
Shetland Islands Council	
Sport Scotland	Campbell Gerard
Surfers Against Sewage	Gilly Slater
The Crown Estate	John Stevenson
The Highland Council	
UK Chamber of Shipping	Richard Nevinson
UK Major Ports Group	Derek McGlashan
UK Windsurfing Association	Alastair Campbell
UKCPC	Alisdair Wilkie
Visit Scotland	David McGilp

Appendix D

Letter to Stakeholder - 14 October 2011





Appendix D. Letter to Stakeholder – 14 October 2011

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