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Llywodraeth Cymru
Welsh Government

RPA
Risk & Policy Analysts

Proposed changes to three Special Protection Areas on the Welsh Coast

Socio-economic Impact Assessment: Main Report

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Drafted by: Jamie Gardiner
Checked by: Chris Adnitt
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Summary

This Socio-economic Impact Assessment on the proposed changes to three Special Protection Areas (SPAs) on the Welsh Coast was produced by Royal HaskoningDHV and Risk & Policy Analysts Ltd. on behalf of the Welsh Government.

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What is the problem under consideration? Why is government intervention necessary?

The majority of marine bird species that breed in the UK have some of their breeding sites protected by an existing network of SPAs. In Wales such protection is largely limited to land and the intertidal area above mean low water, but it is recognised that adjacent sea areas provide essential habitat for the species features of the SPAs.

The Welsh Government has devolved responsibilities for nature conservation both on land and out to 12 nautical miles around the Welsh coast. Welsh Government intervention is necessary to fulfil Wales's obligations under the EC Birds Directive to protect various species of birds and their associated habitats below Mean Low Water, i.e. in inshore waters.

The 2001 SPA review identified different species as qualifying interests to those listed on extant SPA citations. In these cases, the intended function of the 2001 SPA review was to provide the basis for reclassification of the sites.

What are the objectives?

The Welsh Government is reclassifying and proposing seaward extensions to three existing SPAs, namely Glannau Aberdaron & Ynys Enlli / Aberdaron Coast and Bardsey Island SPA, Skokholm and Skomer SPA and Grassholm SPA. This is an important element of Wales' implementation of the EU Birds Directive (79/409/EEC).

What is the requirement for a socio-economic impact assessment?

The proposed SPA extensions and changes to the lists of qualifying species, as with selection of potential SPA sites, are based on scientific information and the application of guidelines for the identification of SPAs agreed at a UK level. Socio-economic considerations can be taken into account when managing sites, but cannot influence whether or not a site should be classified as an SPA or determine the boundaries of that SPA.

This socio-economic impact assessment only considers the potential impacts of the proposals to extend the existing SPAs into the marine environment. This is because core management plans were adopted in 2008 for the three SPAs being considered by this impact assessment, which reflect the 2001 SPA review changes. It is considered that any

socio-economic impacts that could arise through the proposed changes to the SPA list species are already affecting the activities that are present, through the measures incorporated in the 2008 management plan, and therefore form part of the baseline situation.

What management options have been considered?

Three theoretical management options were considered to predict socio-economic impacts, as:

- Option 1: No seaward extension of SPAs (Do nothing)
- Option 2: Seaward extension with no additional management of current activities
- Option 3: Seaward extension with additional management of current activities

What is the preferred management option?

The socio-economic impact assessment has found **Option 2** to be the preferred option because it provides the necessary level of protection for seabirds with minimal socio-economic impact. The current status of the SPA bird populations are considered to be stable (Glannau Aberdaron & Ynys Enlli / Aberdaron Coast and Bardsey Island SPA) to increasing (Skokholm and Skomer, and Grassholm SPAs). For example, at Skokholm and Skomer, puffins have increased from 150,000 breeding pairs in 1998 to around 300,000 in 2012, and breeding Manx shearwater have increased from 101,800 breeding pairs in 1998 to 316,070 in 2012. Therefore, there is no evidence that current activities in the proposed SPA extension areas are any risk to the birds or their habitats (NRW, 2013).

Abbreviations

AA	Appropriate Assessment
Defra	Department for Environment, Food and Rural Affairs
EIA	Environmental Impact Assessment
GVA	Gross Value Added
HRA	Habitat Regulations Assessment
JNCC	Joint Nature Conservation Committee
MLW	Mean Low Water
MMO	Marine Management Organisation
NRW	Natural Resources Wales
PCNPA	Pembrokeshire Coast National Park Authority
RSPB	Royal Society for the Protection of Birds
SI	Statutory Instrument
SPA	Special Protection Area
SWSFC	South Wales Sea Fisheries Committee
WWF	World Wide Fund for Nature

1 Introduction

1.1 The proposal

The Welsh Government has devolved responsibility for nature conservation both on land and out to 12 nautical miles around the Welsh coast. To fulfil Wales' obligations under the EC Birds Directive (2009/147/EEC[1]) (henceforth referred to as the 'Birds Directive') to protect various species of birds and their associated habitats at sea, the Welsh Government is proposing to reclassify and make seaward extensions to three existing Special Protection Areas (SPAs); namely Glannau Aberdaron & Ynys Enlli / Aberdaron Coast and Bardsey Island SPA, Skokholm and Skomer SPA and Grassholm SPA, as shown in **Figure 1-1**.

1.2 Objective

The majority of the UK's breeding marine bird species have some of their breeding sites protected via an existing network of SPAs. In Wales such protection is largely limited to land above Mean Low Water (MLW), but it is recognised that adjacent sea areas provide essential habitat for the species features of those SPAs, including the sea surface, water column and sea bed.


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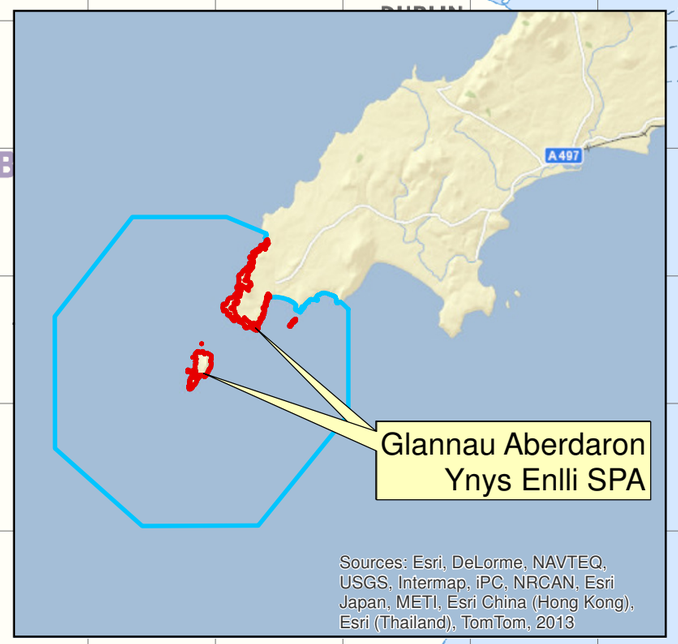
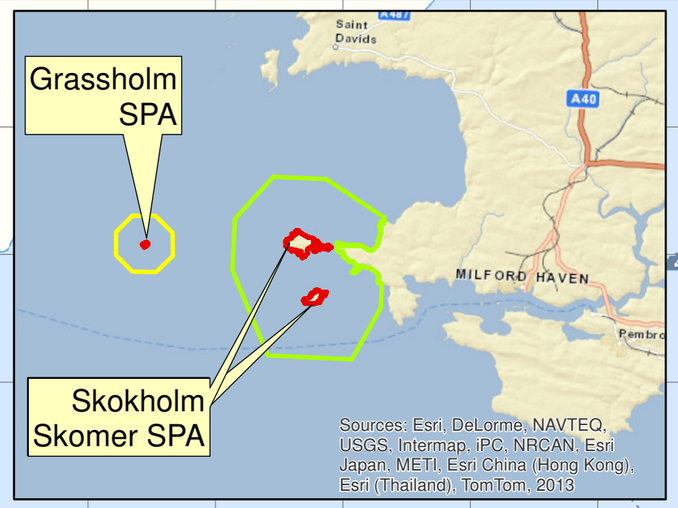
In 2001, a UK wide review of the SPA network was undertaken (Stroud *et al.,* 2001) which identified different species as qualifying interests to those listed on extant SPA citations. In these cases, the intended function of the 2001 SPA review was to provide the basis for reclassification of the sites. Its overall aim was to establish a consistent basis for the identification of the UK's suite of terrestrial SPAs, based on data from the mid-1990s.

In addition to the 2001 review, the UK Joint Nature Conservation Committee (JNCC), which carries out scientific work to support nature conservation throughout the UK and supports and advises Natural Resources Wales (NRW), has endorsed generic guidance on how far extensions should be made into the marine environment, depending on which breeding species are present (McSorley *et al.*, 2003, Reid and Webb 2005, McSorley *et al.*, 2008).

[1] Formerly 79/409/EEC





Key:

- SPA 9km Boundary
- SPA 4km Boundary
- SPA 2km Boundary
- Extent of SPA

Title:
Location of proposed SPA extensions

Project:
Impact assessment of proposed extension of three Special Protection Areas on the Welsh Coast

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Section 1 Introduction

The guidance includes the following recommendations:

- 1 km for SPAs with common guillemot, razorbill and Atlantic puffin as interest features;
- 2 km for SPAs with breeding northern gannet and northern fulmar; and
- 4 km for SPAs with Manx shearwater, or further where supported by site-specific evidence.

These recommendations were based on spatial analysis of data from survey work around a sample of UK seabird colonies, including three sites in Wales.

There are eight existing coastal SPAs in Wales whose classification has been based on the presence of at least one qualifying species of seabird. These SPAs were identified to protect breeding and overwintering seabirds. Of these eight sites, NRW working with the JNCC has further considered three coastal SPAs whose interest features had been identified as requiring marine extensions, namely Glannau Aberdaron & Ynys Enlli / Aberdaron Coast and Bardsey Island SPA, Skokholm and Skomer SPA and Grassholm SPA (see **Figure 1-1**). Given the need to extend these sites into the marine environment, the Welsh Government is taking this opportunity to also reclassify the sites to reflect the findings of the 2001 review.

The proposed changes to the three SPAs are as follows:

- **Glannau Aberdaron & Ynys Enlli / Aberdaron Coast and Bardsey Island SPA**
  - A seaward extension of 9km radius to the existing SPA boundary. This is beyond the generic 4km extension due to there being site specific survey data that showed 95% of adult shearwaters assemble in flocks or 'rafts' on the sea surface up to 9km from the colony onshore (McSorley *et al.,* 2008);
  - A change in the number of breeding chough and breeding Manx shearwater (both existing qualifying species); and
  - Non-breeding chough being listed as a new qualifying species.
- **Skokholm and Skomer SPA**
  - A seaward extension of 4km radius to the existing SPA boundary due to the presence of Manx shearwater (the site also supports puffin which justifies an extension of 1km);
  - A change in the number of breeding storm petrel, breeding Manx shearwater and breeding puffin (all existing qualifying species);
  - Breeding chough, breeding short eared owl and breeding lesser black backed gull being listed as new qualifying species;
  - An assemblage of more than 20,000 seabirds being listed as a new feature; and

  - The removal of breeding razorbill as a qualifying species in its own right (although razorbills are part of the seabird assemblage).
- **Grassholm SPA**
  - A seaward extension of 2km radius to the existing SPA boundary due to the presence of breeding gannet; and
  - A change in the number of breeding gannet (an existing qualifying species).

These three SPAs are all seabird colonies which currently have their nesting areas classified (designated) and protected. Their extension is proposed so that the birds' key ecological requirements in the marine environment are more fully represented in each site. This is an important element of Wales' implementation of the Birds Directive.

1.3 Background information

The Birds Directive provides a framework for the conservation and management of wild birds in Europe and sets broad objectives for member states including:

- "…the conservation of all species of naturally occurring birds in the wild state in the European territory of the Member States to which the Treaty applies." (Article 1).
- "Member States shall take the requisite measures to maintain the populations of the species … at a level which corresponds in particular to ecological, scientific and cultural requirements …" (Article 2).
- "The preservation, maintenance and re-establishment of biotopes and habitats shall include primarily the following measures:
  a) Creation of protected areas;
  b) Upkeep and management in accordance with the ecological needs of habitats inside and outside protected zones;
  c) re-establishment of destroyed biotopes;
  d) creation of biotopes." (Article 3).
- "Member States shall classify in particular the most suitable territories in number and size as special protection areas for the conservation of these species in the geographical sea and land area where this Directive applies." (Article 4(1)).
- "…Member States shall take the requisite measures to establish a general system of protection for all species of birds referred to in Article 1…" (Article 5).
- "…Member States shall prohibit the use of all means, arrangements or methods used for the large-scale or nonselective capture or killing of birds or capable of causing the local disappearance of a species, in particular the use of those listed in Annex IV…" (Article 8).

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- “Member States shall encourage research and any work required as a basis for the protection, management and use of the population of all species of bird referred to in Article 1…” (Article 10).

SPAs in Wales are classified by the Welsh Ministers under section 2 of the European Communities Act 1972.[2] Once classified, SPAs become ‘European sites’ or ‘European marine sites’ under the Conservation of Habitats and Species Regulations 2010 (as amended), and are subject to the provisions of those Regulations and Articles 6(2) to 6(4) of the Habitats and Species Directive.[3] According to Welsh Government policy, potential SPAs (that is proposed SPAs that are the subject of consultation prior to a decision on whether to formally classify them) should have the same degree of protection as classified SPAs. Currently there are 20 SPAs classified in Wales (JNCC, 2013).

1.4 Requirement for a socio-economic impact assessment

The proposed SPA extensions and changes to the lists of qualifying species, as with selection of potential SPA sites, are based on scientific information and the application of guidelines for the identification of SPAs agreed at a UK level. Socio-economic considerations can be taken into account when managing sites, but cannot influence whether or not a site should be classified as an SPA or determine the boundaries of that SPA.

Core management plans were adopted in 2008 for the threes SPAs being considered by this impact assessment. These management plans reflect the 2001 SPA review changes as, due to the review already being published, the proposed additional species had the status of "potential SPA" species, which under Welsh Government policy should be treated as if designated.

The plans themselves identified conservation management measures and actions to benefit the updated SPA list species, which were either already in place or were being negotiated with landowners. Therefore, it is considered that any socio-economic impacts that could arise through the proposed changes to the SPA list species are already affecting the activities that are present, through the measures incorporated in the 2008 management plan, and therefore form part of the baseline situation.

As a result, the proposed changes to the SPA interest features have not been considered further and this socio-economic impact assessment focusses on those activities that could potentially be impacted by the proposed marine extensions only. Dependent upon the

[2] This is a general provision empowering ministers to give effect to obligations arising from EU legislation.
[3] 92/43/EEC

specific location of each SPA, a variety of potential activities (e.g. commercial fishing, aquaculture, dredging, offshore renewable energy, shipping, military use, navigation, farming, tourism and recreational users) could be affected by the proposed extensions.

Extending the SPAs may also result in additional cost, in the form of administration, monitoring and enforcement on the relevant regulatory agency.

1.5 Purpose of this report

This report presents a preliminary impact assessment of the proposed SPA extensions on the activities and stakeholder interests within the extensions. It has been informed by an initial round of consultation with key stakeholders (see **Section 3**) and desk based research to identify current and future activities that could be affected by the SPA extensions. This preliminary impact assessment will be finalised following a second, wider stakeholder and public consultation exercise (see **Section 10**).

1.6 Report structure

Following this introductory section, this report comprises the following sections:

Section 2 sets out the approach taken to identify current and future activities and the potential costs and benefits of extending the SPAs;

Section 3 provides details of the consultation that has been undertaken so far to inform the impact assessment, including a summary of the responses received;

Section 4 presents the evidence base for interaction between human activities in the marine environment and seabirds;

Section 5 provides details of the theoretical management options that have been used to understand the potential implications of extending the SPAs;

Section 6 presents the current and future activities that have been identified and which have the potential to be affected by extending the SPAs;

Section 7 presents environmental and social costs that have been identified by extending the SPAs;

Section 8 presents the summary and conclusions of the socio-economic impact assessment;

Section 9 describes the data gaps and uncertainties that have been identified during the undertaking of the impact assessment;

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Section 10 provides details of the next steps to be taken to finalise the impact assessment, including details of future consultation; and

Section 11 provides the references used to inform the socio-economic impact assessment.

Appendices (separate document)

Appendix A provides the stakeholder consultee responses; and

Appendix B presents details of other costs and benefits that have the potential to arise by extending the SPAs.

2 Methodology

2.1 Introduction

This section sets out the approach taken to conduct the preliminary impact assessment, covering the following tasks:

- Stakeholder consultation;
- Interaction with seabirds;
- Development of management options;
- Determination of current and future activities; and
- Determination of other costs and benefits.

2.2 Stakeholder consultation

An initial round of consultation was undertaken with key stakeholders to inform the identification of current and future activities that have the potential to be affected by the proposed SPA extensions (see **Section 3**). In order to obtain the required information, stakeholders were asked to answer the following questions:

1. Do you carry out, or are you aware of, any activities within, or adjacent to, the proposed SPA extensions?
    a. Would you consider the level of the activity to be low, moderate or high?
    b. Do you hold any data/statistics that is readily available on the volume/cost of the activity?
2. Do you have, or are you aware of any, plans to carry out activities within, or adjacent to, the proposed SPA extensions, in the future (over the next 20 years)? Please provide further details (timeline, increase in volume etc.).
3. Are you aware of any activities that could have an adverse effect on seabirds within the SPA extensions? If so, please provide details (type of impact, location where impact could occur (e.g. known feeding area, supporting habitats) etc.).
4. Please can you provide details of any measures that you are aware of that can be used to manage activities and monitor the effects on seabirds (please provide indicative costs to implement, if possible).

Section 2 Methodology

2.3 Interaction with seabirds

Using available science and expert opinion, an assessment of how human activities interact with seabirds was undertaken (See **Section 4**). This assessment covered the following activities, which were identified as currently occurring or having the potential to occur in the future:

- Marine navigation;
- Commercial fishing;
- Aquaculture;
- Dredging;
- Offshore renewables; and
- Tourism and recreation.

Where possible, specific examples were identified for the seabird species being considered within the SPA extensions.

2.4 Development of management options

The findings of the assessment of how human activities interact with seabirds were used to determine the specific requirements of the management options proposed to be implemented, in particular the additional management of activities that comprised Management Option 3 (see **Section 5**). The following three options were identified:

1. No extension of SPAs (Do nothing scenario)
2. Extend SPAs with no additional management
3. Extend the SPAs with additional management of activities

2.5 Determination of current and future activities

The current and future activities were identified through the initial round of consultation with key stakeholders and desk based research. This research comprised a literature review of technical reports, research documents, internet search and case studies (see **Section 6**). A high level assessment was then undertaken to understand the potential impact of implementing the three management options for each of the SPA extensions. This assessment was undertaken using the findings of the literature review and expert opinion.

Section 2 Methodology

2.6 Determination of costs and benefits

The Costs and Benefits (**Section 7 and Appendix B**) followed existing guidance on impact assessment, including the Green Book[4]. The analysis moves from a qualitative to a quantitative assessment including monetary valuation, where appropriate, following the principle of proportionality, namely:

1. when the evidence supports the valuation of such impacts;
2. when impacts are considered to be significant in nature; and
3. the level of uncertainty is considered to be low.

The first step for the analysis was to categorise the activities with their level of use in order to estimate whether existing users would be affected by the extension to the SPAs and to what extent the affect would be felt. When the level of activity was considered low, the impacts were expected to be negligible. The groups and sub-groups impacted in each activity were also identified.

The impacts were first assessed qualitatively. The approach to the qualitative assessment of impacts was based on the following ratings:

- Significant effect: It is probable that an impact is sufficiently significant so as to be noticed (+++ positive (benefit) / --- negative (costs))
- Possible effect: It is possible that an impact is sufficiently significant so as to be noticed (++ positive (benefit) / -- negative (costs))
- Minimal effect, if any: It is probable than an impact is unlikely to be sufficiently significant so as to be noticeable, but that some possibility exists that an impact could occur (+ positive (benefit) / - negative (costs))

When the impacts were considered not to be minimal, quantification and monetisation were attempted. Knock-on social impacts were considered in terms of employment, cultural value and education. These impacts were only considered for those current and future activities for which impacts were considered to be possible or significant.

For commercial fisheries, economic data were used as provided by the Marine Management Organisation (MMO), for the relevant ICES Rectangles. In order to ensure the values were as representative of the areas covered by the SPA extensions as possible, the percentage of the ICES rectangles to be covered by the SPA extensions was used to provide proportion of the value of the landings from fisheries statistics. The estimates provide a worst case scenario of costs (loss of fisheries) should restriction

[4] Available at https://www.gov.uk/government/publications/the-green-book-appraisal-and-evaluation-in-central-governent

include a no-take zone and displacement of fishing effort not be possible, which was then converted in GVA in line with SeaFish indicators (from for 2007 to 2011).

Other illustrative costs were included for monitoring and administration of any new restrictions from the available literature (but specific to Wales to the extent possible). Again, these may overestimate the costs as additional work may be accommodated by the existing workforce and therefore it is unclear what costs will be attributable to the extension and what would be absorbed by the current SPA.

Benefits were expected to accrue to other users such as recreational users and tourist operators but there is significant uncertainty surrounding the valuation of these. Most of the approaches to value these benefits are based on actual expenditure by visitors, based upon case studies.

Because of the high level of uncertainty associated with the future activities, quantification was not possible. Illustrative costs were provided but these are considered to similarly overestimate the total costs for the reasons set out above.

3 Consultation

3.1 Initial stakeholder consultation

An initial round of consultation was undertaken from 14th November to 29th November 2013. The purpose of this consultation was to identify current and any planned future activities that take place within the proposed SPA extensions, and to determine whether these activities have the potential to interact with seabirds - either directly or indirectly - by affecting their feeding and/or resting habitats. The following stakeholders were consulted:

- Pembrokeshire Coast National Park Authority (PCNPA);
- The Crown Estate;
- Port of Milford Haven;
- The Royal Society for the Protection of Birds (RSPB) Cymru;
- Welsh Government (Nature Conservation Policy Officer);
- Welsh Government (Fisheries Department);
- Marine Conservation Society;
- Welsh Fisherman's Association;
- Welsh Federation of Sea Anglers;
- Wildlife Trust[5];
- National Trust Wales;
- Joint Nature Conservation Committee (JNCC);
- World Wide Fund for Nature (WWF) Cymru;
- Visit Wales;
- Gwynedd County Council;
- Pembrokeshire County Council;
- Pembrokeshire Coastal Forum;
- Royal Yachting Association;
- Welsh Association of Sub Aqua Clubs[5];
- Marine Energy Pembrokeshire;
- Thousand Islands[5];
- NRW; and
- NRW (Marine Licencing Unit).

Received comments were fed into the preliminary impact assessment and included in this report as appropriate. **Appendix A** summarises the received comments.

[5] No response received

Section 3 Consultation

3.2 Future stakeholder and public consultation

This socio-economic impact assessment will be circulated for comment and feedback. The report will be placed on the Welsh Government's website as part of the public consultation exercise on the proposals to reclassify and extend the SPAs along with a request to answer a number of questions aimed at ensuring that the content and approach to this impact assessment is appropriate and acceptable (see **Section 10**). If the sites are extended as proposed, the feedback on the report (and the report itself) will help inform options for future management of the sites.

4 Seabird Interactions

4.1 Current status of SPA bird populations

The current status of the SPA bird populations are considered to be stable (Glannau Aberdaron & Ynys Enlli / Aberdaron Coast and Bardsey Island SPA) to increasing (Skokholm and Skomer, and Grassholm SPAs). For example, at Skokholm and Skomer, puffins have increased from 150,000 breeding pairs in 1998 to around 300,000 in 2012, and breeding Manx shearwater have increased from 101,800 breeding pairs in 1998 to 316,070 in 2012 (NRW, 2013).

Given the above, and in general, the current level of human activity is not considered to be having an adverse effect on the SPA bird species. However, further assessment work is required to fully understand whether the current fishing activities that take place within the proposed SPA extensions are having an adverse effect on SPA bird species; therefore we are taking the precautionary approach and including fishing activities within the socio-economic analysis (see **Section 6** and **Appendix B**).

4.2 General interactions

There are a number of seabird interactions which are common to a range of activities in the marine environment. Human activity may disturb the birds causing an interruption to their natural behaviour. This disturbance may be more significant at certain times of year (e.g. whilst breeding and rearing chicks). If the disturbance is regular and sufficiently minor the birds may grow accustomed (habituated) to the disturbance and not react to it.

This section examines evidence of how the following human activities interact with seabirds:

- Marine navigation;
- Commercial fishing;
- Aquaculture;
- Dredging;
- Offshore renewables;
- Pipelines and cables; and
- Tourism and recreation.

These activities were identified through the consultation exercise and literature review as either currently occurring, or having the potential to occur in the future, in and around the proposed SPA extensions. Where possible, specific examples are provided for the seabird species occurring within the proposed SPA extensions.

Section 4 Seabird Interactions

4.3 Marine navigation

Disturbance by ships can be a major threat to birds through effects on behaviour, reproduction and fitness of individuals in colonies (e.g. Burger 1998, as cited in Schwemmer *et al*., 2011), as well as on foraging or resting habitats (e.g. Kaiser *et al.*, 2006 as cited in Schwemmer *et al*., 2011). However, the level of effect differs significantly between species, with red-throated and black-throated divers, common eider, long-tailed duck, common scoter and white-winged scoter, known to be highly sensitive to shipping activities (Schwemmer *et al*., 2011).

4.4 Commercial fishing

Research indicates that seabirds can be both harmed by and benefit from commercial fishing activities. The effect of fishing on birds can be direct (e.g. seabird bycatch) and/or indirect (e.g. through alteration in food supplies, including discards and changes to prey species).

4.4.1 Direct effects

4.4.1.1 Seabird bycatch

Accidental take (i.e. bycatch) during commercial fishing activities can cause direct harm to and death of seabirds. It is a particular issue for certain types of fishing, notably long-lining. Bycatch occurs because seabirds are essentially surface foragers, obtaining their prey from the top few metres of the water column. This means that they are well suited to stealing bait from hooks during line setting by long-lining fisheries (Brothers *et al.*, 1999), but also means they are vulnerable to being hooked, dragged underwater and drowned. Bycatch through this interaction is well documented to adversely impact albatross and petrels. However, other bird species (namely auks, gannets and shearwaters) covered under the proposed SPA extensions are generally less susceptible to bycatch by long-lining due to their prey species and feeding habitats (Royal Haskoning, 2009).Another type of gear reported to catch seabirds is fixed gill netting. Worldwide reports, including evidence from the Cornish bass fishery (Robins, 1991), indicate that puffin, guillemots and razorbill are taken in this way. In addition, divers (loons), grebes, sea ducks and cormorants are also considered vulnerable to entanglement (Piatt and Nettleship 1987, Žydelis *et al.*, 2009).

Small numbers of seabirds, especially young inexperienced birds, can also be drowned in lobster pots (Furness, 2003).

Section 4 Seabird Interactions

4.4.1.2 Disturbance to seabirds by fishing activities

See **Section 4.2** for disturbance from shipping activities.

4.4.2 Indirect effects

4.4.2.1 Changes to seabird prey abundance

Commercial fishing activities are thought to have contributed to the depletion of some fish species in the North Sea that are preyed upon by seabirds (Tasker and Furness, 1996). However, the effects of fishing are difficult to separate from natural changes in species abundance due to environmental changes in, for example, temperature and currents, or from man-made changes, such as increases in nutrients. Two fish species that are widely preyed upon by seabirds, including auks, are sandeel and sprat.

During the breeding season, seabirds feed predominantly close to their colonies (Monaghan *et al.*, 1992). After the breeding season, the seabirds are no longer tied to a particular area by nesting sites and are therefore less constrained in terms of feeding locations. Consequently, potential issues with competition for food are considered to be seasonal, being more sensitive during the breeding season.

Another effect of fisheries has been the reduction in stocks of large fish that has reduced competition for prey. For example, Sherman *et al.* (1981) considered that sandeel stocks had increased both in the North Sea and in the Western Atlantic shelf seas as a response to reduced competition with herring and mackerel.

4.4.2.2 Discards

Many fisheries activities increase the food supply by providing large quantities of discarded fish, guts and wastes from practices such as gutting at sea; particularly those from large, demersal species that are otherwise inaccessible to seabirds. Most surface-foraging seabirds will scavenge on fish guts and dead or moribund prey, making them 'pre-adapted' for supplementing natural diets by following fishing boats for discarded material (Brothers *et al*., 1999).

4.5 Aquaculture

Aquaculture interacts with birds through its consumption of resources, through the aquaculture process itself and through the release of wastes into the environment. The main interactions can be summarised under predation, predator control, disturbance, sedimentation, change in bio-geochemistry, infrastructure impacts, chemical use and indirect ecosystem impacts.

Section 4 Seabird Interactions

4.5.1 Predation

Auks such as puffins, black guillemots, razorbills, divers (red-throated, black-throated and great northern) and red breasted mergansers are other predators which may visit fish farms. These birds do not usually feed on caged stock but may be attracted by an increase in wild fish in the vicinity of the cages and so may become entangled in anti-predator nets. The arctic and common terns are both associated with feeding at fish farms, where they take small fish (less than 10cm) which they take by plunge diving. Gannets rarely have been reported as behaving similarly (Heffernan, 1999).

4.5.2 Predator control

Methods employed to deter predation by birds range from the presence of dogs/scarecrows and falcons to the installation of scaring devices that utilise flashing lights or sounds (e.g. recorded boat engines or loud bangs). Exclusion nets are generally very effective for fish cages when properly installed and maintained and have demonstrated that mortalities are reduced along with the incidence of wounding (Beveridge, 2001).

4.5.3 Disturbance

Other forms of noise disturbance may include increased boat activity; however, there is little evidence to show that this has significantly impacted bird populations.

4.5.4 Sedimentation

The harvesting of cultured shellfish species, such as mussels, oysters and scallops from the seabed is carried out by dredging, which has been found to adversely affect predators of benthic species, through either physical removal or smothering of habitats for key species, such as the burrowing sand eel *Ammodytes* sp., which is the staple diet of many sea birds such as arctic terns, kittiwakes, puffins, great skuas and red-throated divers (Heffernan, 1999). Dredging for shellfish cultivation purposes (bottom growing mussel) is usually limited to a small number of locations and occurs over a short time period, making it unlikely that the smothering of seabird food sources is a significant interaction.

In areas where fin fish are cultivated some sedimentation and smothering of benthic prey will occur due to waste nutrients and faecal/excess feed pellets being deposited on the seabed. This is in a limited ‘allowable zone of effect’ which is likely to be negligible in relation to the distribution of benthic food sources.

4.5.5 Change in bio-geochemistry

The consequences for seabirds with regard to reduced or extremely low dissolved oxygen levels, as a result of eutrophication, are likely to be significant as the supply of food organisms is affected. Adversely, a localised increase in nutrients and colonisation of

structures for marine invertebrates will increase food availability for resident and opportunistic bird species, which will produce a positive benefit to bird populations.

4.5.6 Infrastructure impacts

The main cause of physical disturbance to birds will be as a result of the service and maintenance of the aquaculture structures, which will affect intertidal feeders such as waders and wild fowl rather than sea birds.

4.5.7 Chemical use

Pesticide residues and other toxic chemicals have been implicated in bird population crashes (SNH, 2004), though it is unclear as to whether these chemicals are those specifically related to aquaculture activities. The organophosphate class of chemicals, such as dichlorvos and trichlorphon used to control sea lice, are toxic to some crustaceans and molluscs and may bioaccumulate in birds feeding on these benthic species (UNEP, 2002). This is not known to be a problem for the sea birds under consideration.

4.5.8 Indirect ecosystem impacts

This is primarily an issue for intertidal areas and relates to shellfish farming and harvesting. Wader species are most likely to be affected by loss of habitat as they feed and roost in areas suitable for shellfish farming and on the low shore to mid shore. Other species which may be impacted are the golden plover as well as some geese species (Heffernan, 1999). This is not known to be a problem for the sea birds under consideration.

4.6 Aggregate extraction

Marine sand and gravel (aggregates) make an important contribution to the UK's demand for construction materials. Whilst their extraction affects only a small proportion of the seabed, this dredging may potentially have significant effects for seabirds.

There is a substantial literature on the effects of dredging in the marine environment; this information can be found in documentation submitted with dredge licence applications, research reports, papers in scientific journals, and in 'grey' literature such as conference reports.

An extensive review of the effects of aggregate extraction on biodiversity (Gubbay, 2003) identifies a range of effects of dredging:

- Physical effects:
    - Increased turbidity of the water column due to physical disturbance of sediment;

  - Mobilisation of sediment into the water column;
  - Alteration of the character of the seabed; and,
  - Changes in the hydrodynamic regime and sediment transport.
- Biological effects:
  - Physical removal of benthos and infauna from the dredge site and associated reductions in biodiversity;
  - Smothering and deposition of seabed habitats and sessile or sensitive benthic species;
  - Changes in community structure and ecosystem functioning with possible effects at higher trophic levels; and,
  - Water chemistry effects (e.g. decreasing oxygen levels, release of organic materials and contaminants) on biodiversity.

Note, the effect of pollution from the release of toxins from aggregate dredging into the marine environment is considered to be of negligible significance (Cook and Burton, 2010).

Direct interactions between seabirds and dredging activity largely relate to disturbance due to the presence of the dredger and increased noise levels. Seabirds may be temporarily displaced from sites of dredging activity but may also temporarily benefit from an increase in organic matter released during the dredging activity.

Indirect interactions can occur where a prey species is affected by dredging activity, for example where the removal or disturbance of sandeels may have knock-on effects on seabird populations for which sandeels are a primary food source. This is unlikely to occur, however, given the relatively small area of seabed affected, the opportunistic feeding patterns of the majority of relevant species and the regulation of the aggregate industry. Similarly, increases in suspended sediment could reduce underwater visibility for diving species, but the area affected at any one time will be minimal (Good Marine, 2008).

Manx shearwater, European storm petrel, lesser black backed gulls and northern gannet are all relatively insensitive to the effects of marine aggregate dredging operations. Atlantic puffins are moderately sensitive to increases in sedimentation and impacts to the benthos and associated fish communities. However, their low exposure to these issues means that their vulnerability is low. As vision plays an important role in the foraging capabilities of Atlantic puffins, they have been assessed as being moderately vulnerable to changes in turbidity (Cook and Burton, 2010).

In summary, aggregate extraction is a highly regulated activity, and evidence suggests that interactions with the bird species for which SPA extensions have been proposed will be low. However, the nature of the interaction will depend upon the type and location of the activity relative to the SPA, and will depend upon the scale and duration of the activity.

Section 4 Seabird Interactions

4.7 Offshore renewable energy

Seabirds may be affected in a number of ways by the installation, operation and decommissioning of offshore wind, tidal and wave renewable energy devices.

An extensive body of literature reviews the effects of offshore wind farms on birds, based largely upon experiences at operational sites in northern European waters (e.g. Christensen *et al.*, 2003; Garthe and Hűppop, 2004; Vigo, 2007, Cook *et al.,* 2012, Wright *et al*., 2012). In general, academic studies and Environmental Impact Assessments (EIAs) undertaken for offshore wind farm developments have focused on the effects of development on 'divers' (e.g. red-throated diver, black-throated diver, great northern diver), as this bird group is usually considered most sensitive (Garthe and Hűppop, 2004; Vigo, 2007), although more recently other species, including, for example, auks, gulls and sea ducks have been investigated (Cook *et al.,* 2012, Wright *et al*., 2012).

The potential for interaction between diving seabird species is an element of the assessment of potential environmental impacts of tidal and wave energy projects, although the actual level of vulnerability is currently unknown. Furness *et al.* (2012) recently considered the potential vulnerability of seabirds to wave and tidal devices, while a recent study commissioned by The Crown Estate, Aquatera (2014), identified this subject as one of a number of priority areas for research.

Offshore wind farms may potentially impact bird populations through four main effects (these effects are also relevant to tidal and wave energy developments) (Wright *et al.,* 2012):

i. collision mortality;
ii. displacement due to the disturbance associated with developments;
iii. the "barrier effect" posed by developments to migrating birds and birds commuting between breeding sites and feeding areas; and
iv. indirectly, due to changes in habitat or prey availability.

These interactions are examined in further detail below. The nature of the interaction between the bird species for which SPA extension is recommended will depend upon a) the behaviour of the species in question (e.g. flight height, whether diving for foraging) and b) the location of the renewable energy devices relative to the SPA extensions, and will depend upon the scale, layout and operational regime of the installed devices.

4.7.1 Collision risk

Collision with offshore renewable energy structures may result in bird mortality. There is a risk of marine birds colliding with construction machinery and vessels present during the project installation phase. Collision can typically occur in two ways – flying birds colliding with the surface structures or ships colliding with birds rafting on the surface (Wilson *et al.*,

2007). Construction activity and the noise associated with it is likely to deter most birds from using installation sites and therefore the risk of collision is considered low for all bird species (Daunt *et al.*, 2006).

Collision risk is considered to be a more significant issue during device operation, and bearing in mind the wide range of devices that may be deployed, all species of bird may be at some risk.

The risk of birds colliding with wind turbine rotor blades has been extensively studied. Cook *et al.* (2012) investigating flight height to understand collision risk with offshore wind farms showed that the mean proportion of birds predicted to fly at the generic collision risk height window, of 20 to 150m above sea-level, varied from 0.03% for the Little Auk to 33.1% for the Great Black-backed Gull. For some species, notably divers, auks and sea duck, few individuals were predicted to fly at heights which placed them at risk of collision with wind turbines and there was relatively little variability in this finding between the sites investigated.

Birds in flight will generally employ avoidance tactics when encountering obstructions by taking alternative flight routes. Avoidance behaviour varies in response to distance from turbines and it is important to distinguish between macro-avoidance of the whole wind farm, and micro-avoidance of individual turbines within a wind farm. However, studies of avoidance have varied in their approaches, in particular, in the distances at which avoidance is measured and the avoidance rates reported are not strictly comparable (Cook *et al.,* 2012). The current guidance on avoidance suggests that avoidance rates may be likely to be more than 99% for some species (divers, Northern Gannet, sea ducks and auks). However, a value of 98%, as recommended by SNH (2010), should be used as a precautionary avoidance rate.

According to ICES (2011) *'the picture that emerges from functioning marine windfarms is of little observed bird mortality and a tendency for seabirds to avoid the arrays of turbines when flying past'*.

The potential for collision risk between tidal turbines and seabirds is the subject of much debate currently, being considered in a number of EIA's for development in the UK as well as in more strategic studies, as discussed earlier. Not all diving birds have a feeding ecology that has the potential to take them to depths where they would potentially be at risk from operational devices and in addition, many strongly tidal areas, suitable for deployment of tidal technologies, have been shown during baseline characterisation surveys not to be heavily used by species that could potentially be at risk of collision. Furness *et al.* (2012) undertook a review of the potential of a number of seabird species to collide with operational tidal turbines, resulting in a number of generic vulnerability scores based on the birds' known feeding ecology. Such theoretical vulnerability has not been

tested by more detailed research, and a recent review (Aquatera, 2014), identified this as a key area for research. A number of species present within the SPAs assessed in this report may be potentially vulnerable, based on their feeding ecology, including gannet, razorbill and puffin. However, a true assessment of vulnerability would require study of potential tidal energy sites to determine their actual level of use by these species.

4.7.2 Behavioural effects

Renewable energy structures that protrude above the surface of the water may act as a barrier to bird flight, altering local flight lines between roosting and feeding areas, or migration routes, with resulting increases in bird energy consumption. The expected scale of offshore renewable energy sites in the context of typical bird flight activity mean that any detours in flight lines would be unlikely to make the difference between survival and mortality. Barrier effects can be significant where several developments act cumulatively to alter flight patterns or feeding areas.

Seabirds at sea may also be more vulnerable to the impacts of disturbance, displacement and barriers when they are subject to particular time and energy stresses, such as when provisioning young and during moulting. Some species, notably auk and duck species, are particularly vulnerable to disturbance during the period of annual wing moult when they are temporally flightless.

4.7.3 Habitat changes

Installation of wind, tidal and wave devices and their supporting infrastructure may alter the seabed, and there may be permanent habitat loss within the development footprint. Birds feeding on benthic prey items have the potential to be affected by the loss of food resource, though the area of seabed affected is likely to be limited. If renewable energy devices have surface structures, it is possible that seabirds will use them as resting or breeding locations (Craik, 2004).

4.8 Pipelines and cables

The laying of pipelines and cables can affect seabirds through disturbance from vessel movements (see **Section 4.3**) and, if buried, increases in turbidity and mobilisation of sediment into the water column can occur, similar to the effects of dredging (see **Section 4.6**).

Most pipelines and cables are buried, in particular where there are a lot of marine activities (such as fishing); however, should they be laid on the seabed, localised habitat changes can occur, potential affecting prey species (see **Section 4.7.3**).

Section 4 Seabird Interactions

4.9 Tourism and recreation

Public interest in viewing wildlife has increased, and many protected areas encompassing seabird colonies are managed for both conservation and recreation. Despite deriving conservation benefits through revenue generation and public engagement, activities such as boat-based recreation and ecotourism can detrimentally affect seabird behaviour through disturbance.

Species differ drastically in their sensitivity to human disturbance. Critical reaction distances and their associated behavioural responses vary by species and perceived threat, so conservation measures such as buffer zones and seasonal restrictions must be tailored to the species and human activity in question (Martínez-Abraín *et al.*, 2008). Furthermore, some species show signs of habituation to human presence or a gradual decline in their flushing and stress responses with regular disturbance. However, this is by no means universal and, for other species, the presence of people at, or near to, their breeding and roosting areas fundamentally alters their behaviour and potentially also their vital demographic rates (BirdLife International, 2012).

5 Management Options

The following theoretical management options were proposed to assess the potential socio-economic impacts that could result from the proposed extensions of the three SPAs into the marine environment.

5.1 Option 1: No seaward extension of SPAs (Do nothing)

In line with impact assessment guidance, this option provides an important comparative basis from which Options 2 and 3 can be assessed.

There is an anticipated cost for future developments as new plans and projects would be considered under Article 6 of the Habitats Directive for the existing SPAs and Special Areas of Conservation.

The Welsh Government recognises it has a legal obligation to implement the requirements of the Birds and Habitats Directives and therefore Option 1 would not be taken forward unless new scientific advice showed that this was the best way forward for individual sites.

5.2 Option 2: No additional management of current activities

This option permits all current commercial and recreational activities to continue within the designated SPA extensions.

There is an anticipated additional cost for future developments. This is a result of the costs associated with the need to consider alternative options / locations.

New plans and projects would be considered under Article 6 of the Habitats Directive.

This is the preferred option, because it provides the necessary level of protection for seabirds with minimal socio-economic impact.

5.3 Option 3: Additional management of activities

This option requires additional management (including restriction) of current commercial and recreational activities in certain locations within and around the proposed extensions, where necessary to avoid, reduce and/or mitigate damage to birds or bird habitats (e.g. alternative location for future developments).

All other current activities would need to operate under agreed Codes of Conduct [voluntary and do not exist in all areas].

Section 5 Management Options

There is an anticipated cost for future developments. This is a result of the costs associated with the need to consider alternative options / locations. There would also be additional costs to the public sector, due to additional management costs.

New plans and projects would be considered Article 6 of the Habitats Directive.

6 Current and Future Activities

6.1 Introduction

The initial stakeholder consultation exercise (see **Section 3**) and literature review identified the following activities as currently occurring within and around the proposed SPA extensions:

- Marine navigation;
- Commercial fishing; and
- Tourism and recreation.

Additional potential future activities that have been identified include offshore renewable energy development, pipelines and cables and aquaculture.

The following sub-sections describe the current and future activities in and around each of the three SPA extensions (as summarised in **Table 6-3**). The potential impact of the three management options has then been reviewed to determine which activities should be included within the Costs and Benefits analysis (see **Appendix B**).

A summary table (**Table 6-4**) is presented at the end of this section to identify the activities taken forward for further assessment, and the activities scoped out of further assessment.

6.2 Current activities

6.2.1 Marine navigation

6.2.1.1 Occurrence within and around SPA extensions

Key marine navigation routes have been identified within and around the proposed extensions to Grassholm SPA and Skokholm & Skomer SPA. No major routes were identified in or near to the proposed extension to Glannau Aberdaron & Ynys Enlli / Aberdaron Coast and Bardsey Island SPA.

Indicative commercial vessel traffic movements can also be seen in **Figure 6-1**, as provided by the Port of Milford Haven. These movements include fishing vessels entering and leaving the port over a 25-day period in November 2002. As such, whilst the data are rather dated, it still provides an indication of the passage of commercial traffic in the vicinity of the proposed SPA extensions. Irish Ferries' twice daily service between Pembroke Dock and Rosslare (Ireland) also passes the general northerly route between Skomer and Grassholm.

Section 6 Current and Future Activities

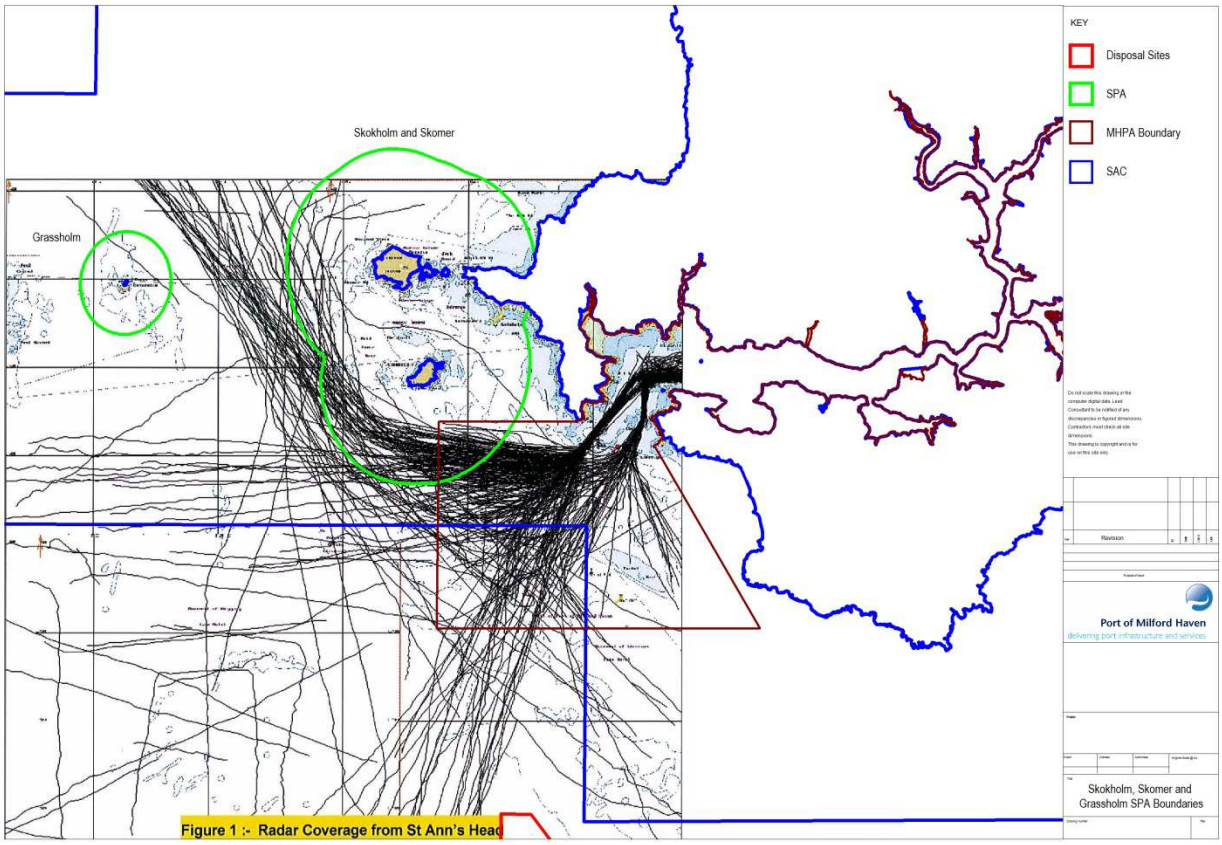

Figure 6-1 Commercial vessel traffic movements entering and leaving the port of Milford Haven over a 25-day period in November 2002 (courtesy of the Port of Milford Haven)

6.2.1.2 Potential impacts of management options

Option 1 and Option 2

The current use of SPA extension areas would be unaffected.

Option 3

Routes could be altered if they are considered to be damaging to birds or habitats, potentially resulting in increased costs (e.g. fuel), sailing times and emissions if longer routes were proposed as alternatives. Taking into account the increasing bird populations in each SPA, the well establish routes currently used and frequency of vessel traffic in the areas, such a requirement is considered to be highly unlikely.

Section 6 Current and Future Activities

6.2.2 Commercial fishing

6.2.2.1 Occurrence within and around SPA extensions

The Port of Milford Haven is the only major port within close proximity to the proposed SPA extensions where fish are landed. Some of the areas around Skokholm and Skomer provide safe anchorage during rough seas and are used by fishing vessels awaiting docking space in Milford Haven.

The vessel numbers and gross tonnage of fishing vessels registered at the port, from 2010 to 2012, are presented in **Table 6-1**.

Table 6-1 Fishing vessel numbers and associated gross tonnage for vessels registered at Milford Haven, from 2010 to 2012[6]

Vessel size	Number of vessels			Gross tonnage		
	2010	2011	2012	2010	2011	2012
10m & Under	442	425	440	1,194	1,203	1,218
Over 10m	41	40	39	4,754	4,600	4,182
Total	**483**	**465**	**479**	**5,948**	**5,803**	**5,399**

Commercial fishing within and around the proposed SPA extensions have been identified following a review of fisheries landings statistics for the relevant International Council for the Exploration of the Sea (ICES) statistical rectangles in which the proposed SPA extension is located. These are (see **Figure 6.2**):

- ICES Rectangle 34E5 (**Glannau Aberdaron & Ynys Enlli / Aberdaron Coast and Bardsey Island SPA**)
- ICES Rectangle 32E4 (**Grassholm and Skokholm and Skomer SPAs**)

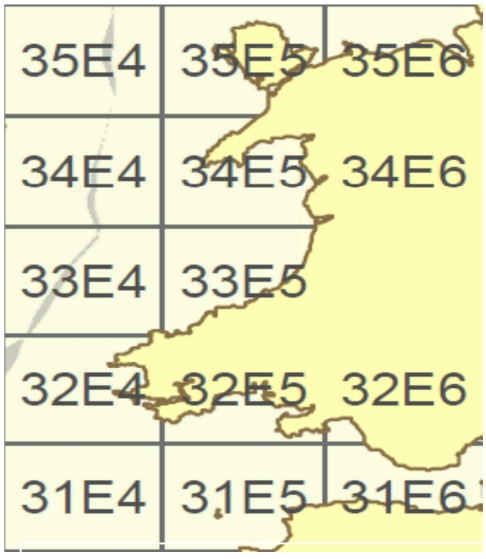

Figure 6.2 ICES Rectangles

[6] http://www.marinemanagement.org.uk/fisheries/statistics/annual.htm [accessed December 2013]

Section 6 Current and Future Activities

A summary of the fish landing statistics for ICES Rectangles 32E4 and 34E5 from 2012 are presented in **Table 6-2**. It should be noted that the proposed SPA extensions fall within a small area of each ICES rectangle and therefore the catch values are not directly related to the SPA extension areas.

Table 6-2 Fish landing statistics for ICES Rectangles 32E4 and 34E5 for 2012[6]

Gear Category	Length Group	Live Weight (tonnes)	Landed Weight (tonnes)	Value (£)
ICES Rectangle 32E4				
Beam Trawl	Over 10m	31.83	28.60	87,318.06
Demersal trawl/seine	10m&Under	0.80	0.65	1,083.22
	Over 10m	79.77	66.60	92,242.68
Dredge	10m&Under	0.33	0.33	217.75
	Over 10m	17.36	10.70	30,728.48
Drift and fixed nets	10m&Under	21.25	20.64	61,126.44
	Over 10m	17.02	14.79	56,120.04
Gears using hooks	10m&Under	8.5396	8.5016	53,676.100
Other passive gears	10m&Under	26.11	26.11	35,808.11
Pots and traps	10m&Under	462.72	460.56	1,181,121.56
	Over 10m	385.80	385.39	688,934.81
Total		**1,051.53**	**1,022.87**	**2,288,377.25**
ICES Rectangle 34E5				
Beam trawl	Over 10m	1.41	0.82	2,973.48
Demersal trawl/seine	Over 10m	5.01	4.48	4,500.12
Dredge	10m&Under	74.58	62.13	139,190.55
	Over 10m	102.02	88.14	177,162.27
Drift and fixed nets	10m&Under	1.21	1.14	5,200.72
Other passive gears	Over 10m	0.03	0.03	0.02
Pots and traps	10m&Under	453.95	453.82	691,274.98

Gear Category	Length Group	Live Weight (tonnes)	Landed Weight (tonnes)	Value (£)
	Over 10m	84.07	84.07	163,469.53
Total		**722.28**	**694.63**	**1,183,771.67**

Furthermore, species presented within the landing statistics of an ICES rectangle will not always be representative of the fishing activities that occur within the SPA extension. For example, mackerel is targeted by larger pelagic vessels that will normally fish further from shore. So although mackerel landings are presented within fishery statistics for an ICES rectangle, they are not necessarily targeted within the SPA extension area, apart from seasonal hand-lining, which is most likely to occur within the inshore areas.

6.2.2.2 Potential impacts of management options

Options 1 & 2

No impact as all existing activities permitted.

Option 3

Exclusion of commercial fishing from the proposed SPA extensions that is deemed to be damaging to SPA features would result in a number of potential costs and benefits as outlined below. The complete exclusion of all fishing activity is a worst case scenario, which is unlikely to occur. In reality fishery management measures (such as gear restrictions, seasonal exclusion zones for specific species and catch quotas to protect prey species) would be considered.

Potential costs:

- Costs to the commercial fishing sector in loss of catch from area;
- Increased fuel and operating costs for vessels to steam to new grounds and therefore loss of fishing time;
- Additional enforcement costs to the Welsh Government, including prioritization of areas patrolled;
- Displacement of effort increasing gear conflict and pressure on fisheries elsewhere;
- Potential environmental costs from increased fishing activity outside proposed extensions;
- Cost to vessels choosing to change to gear deemed not to be damaging to SPA features (gear costs and reduced catches when adopting new fishing practices); and

- Loss of safe anchorage within the proposed extensions during inclement weather, where the mooring of vessels is considered to disturb SPA features and therefore the anchorage is not replaced, resulting in increased risk to fishermen and vessels.

Potential benefits:

- Potential to reduce any bycatch impacts within SPA extension; and,
- Potential benefits to fish stocks and nursery and spawning areas providing possible ongoing benefits to fishermen.

6.2.3 Tourism and recreation

6.2.3.1 Occurrence within and around SPA extensions

Several recreational activities have been identified as occurring within the current SPAs and their proposed extensions. These activities include walking (including dog walking), wildlife watching, water sports (including surfing, diving, jet skiing etc.), rock climbing, sailing, cruising, and sea angling (from the shore and private / hired vessels). Many of these activities often have associated amenities such as clubs, marinas, shops, cafes and toilets.

An extensive number of moorings are located around the Milford Haven area, which form part of a valuable facility for the local community, tourism, local employment and secondary businesses, all of which are dependent on the water based recreation and tourism.

Organised tours allowing visitors to view the wildlife and natural heritage are known to currently occur in and around the SPAs. These tours include both boat trips and walking tours. There is the possibility that extensions to the SPAs are beneficial to tour organisers by enhancing wildlife populations on which these tours rely.

Bardsey Island welcomes hundreds of visitors during the summer months, both for day trips and staying visitors. Visitors are requested to follow a code of conduct to ensure safety and protection of the wide range of special wildlife interests, including birds, rare flowering plants, lichens, liverworts and mosses, coastal grassland and heathland, sea cliff ledges and marine wildlife. The Island forms part of several larger sites around the mainland coast and seas of the Llŷn Peninsula which are recognised internationally for their outstanding wildlife, in particular their birdlife, sea cliff habitats and marine wildlife.

The Llŷn Peninsula is well known for high water quality, good visibility and interesting shipwrecks and is thus popular with divers. Boats of all kinds can be launched from Aberdaron beach without charge. There are also harbour facilities at Abersoch and a protected marina at Pwllheli. Surfing is popular at Hell's Mouth and on Aberdaron beach

when the wave conditions are right. Kayaking, canoeing, wakeboarding and waterskiing can all be arranged in Abersoch.

Pembrokeshire is popular with tourists with a wide range of outdoor activities available. These range from water sports to visiting ancient monuments and wildlife watching. The Pembrokehsire Coastal path is a National Trail and extends 186 miles from St Dogmaels in the north to Amroth in the south. There are some popular recreation and tourist beaches along the Pembrokeshire coast. Surfing takes place at various locations including Tenby, Manorbier, Freshwater West, Newgale, Whitesands and Abereiddy. Pembrokeshire is host to the UK's only Coastal National Park and it is estimated that tourism in the county generated £569.64M total visitor spend in 2011.[7]

In response to the sensitive and important wildlife that surrounds the Pembrokeshire coast, a voluntary Code of Conduct has been produced: the Pembrokeshire Marine Code[8]. This Code identifies features and their locations that are sensitive to disturbance, highlighting specific periods when restrictions or avoidance should be adhered to.

Table 6-3, at the end of this section, presents which of the proposed SPA extensions are reported to support the various tourism and recreational activities.

6.2.3.2 Potential impacts of management options

Option 1 and Option 2

The current activities would not be impacted.

Option 3

More individuals may visit the site to view the wildlife, or would like the option to do so (use value). For example, a study by RSPB (2010) on South Stack Cliffs Reserve estimated an average daily spend per day-tripper of £16.91 and £18.26 per holiday maker. This site is highly popular and has a visitor centre. In 2009, between Easter (April) and the end of September the site received some 43,862 visits in total, a figure gained from counts at the visitor centre and the Lighthouse. A study by Ruiz-Frau also reports the average spend by bird-watchers. The costs range from £15 per person per day for those on a day trip to £41 per person per day for those staying overnight. The average was estimated at £28 per person per day (regardless of whether they stayed overnight) (Ruiz-Frau *et al.*, 2013).

Following designation, Skomer saw an increase in visitor numbers (ABPmer and RPA, 2007). The RSPB has noted that the proposed extensions may also protect the current level of economic activities associated with the site features, with a possibility of enhancing the economic value (RSPB, pers. comm.). It is important to acknowledge

[7] http://www.tourismhelp.co.uk/content.asp?id=339 [accessed December 2013]
[8] http://www.pembrokeshiremarinecode.org.uk/ [accessed December 2013]

however that any new visits may be displaced from other sites. The net economic impacts should only consider those genuinely new visits that are not displaced from elsewhere. The impacts therefore may not be significant, as birdwatchers may be time limited to visit additional sites.

Some activities would be subject to a code of practice to minimise disturbance to the SPAs. Given the existing Pembrokeshire Marine Code, activities occurring within and around Skokholm and Skomer, and Grassholm SPAs are not considered to be adversely affected, in economic terms, by this option.

Compliance with such a code would probably require only minor changes from current practice and would have limited impact on recreational users.

Potential costs include restrictions to individuals' access to or use of the area reducing the value of the recreational experience. However this is countered by the benefits of an improved natural environment increasing the value of the SPA as a recreational area (see, for example, RSPB, 2010).

Boat operators around Bardsey Island and the Aberdaron Coast would be asked by the local authority to comply with a voluntary code of conduct to minimise disturbance to the SPA. In most cases this would simply formalise best practice currently followed.

Potential costs

- Compliance with code may reduce the frequency of trips permitted reducing trip organisers' income; and
- Compliance with code may reduce the proximity at which a boat can observe wildlife, potentially reducing the quality of the passenger experience and consequentially reducing individuals' willingness to pay, reducing trip organisers' income.

Potential benefits

- Increased wildlife populations, increasing the quality of passenger experience.

None of the above effects are expected to be significant.

6.2.4 Public sector costs

6.2.4.1 Occurrence within and around SPA extensions

A number of government bodies and agencies (for example, the Welsh Government and NRW) have a responsibility in relation to SPAs and management of marine activities. Responsibilities include monitoring and reporting, site management, licensing and enforcement.

Section 6 Current and Future Activities

6.2.4.2 Potential impacts of management options

Option 1

Potential large cost to the public sector in the event that the Welsh Government is found not to meet the requirements under Article 4 of the Birds Directive, thereby incurring infraction fines.

Option 2

An additional cost will be incurred by extending the SPAs, such as from consultation and reporting. No other costs are anticipated.

Option 3

The additional information and reporting requirements for plans or projects affecting an SPA results in increased costs to the public sector.

Any additional management, monitoring and enforcement of extended SPAs would result in additional costs to the numerous public sector authorities with competence in marine matters. The extent of impact would in many cases be dependent upon any associated management responsibilities.

6.2.5 Summary of current activities per SPA

Table 6-3 below presents the current activities that have been identified through the consultation exercise and literature review within or around the proposed SPA extensions.

Table 6-3 Summary of current activities that are known to occur in and around the proposed SPA extensions (- = activity not present; ✓ = low, ✓✓ = moderate, ✓✓✓ = high level of activity)

Current activity	Special Protection Area		
	Glannau Aberdaron & Ynys Enlli / Aberdaron Coast and Bardsey Island	Skokholm and Skomer	Grassholm
Navigation			
Commercial shipping	-	✓✓✓	✓✓✓
Irish Ferries	-	✓✓	✓✓
Ferries (*summer only)	✓✓	✓✓*	-
Provision of safe anchorage	-	✓✓✓	-

Section 6 Current and Future Activities

Current activity	Special Protection Area		
	Glannau Aberdaron & Ynys Enlli / Aberdaron Coast and Bardsey Island	Skokholm and Skomer	Grassholm
Commercial Fishing			
Dredging and trawling	✓	✓✓	✓✓
Potting	✓✓	✓✓	-
Netting	-	✓	✓
Tourism and Recreation			
Chartered / private recreational sea angling	✓✓	✓✓✓	✓✓
Recreational boating (incl. kayaking)	✓✓	✓✓	✓
Power craft (incl. jet skis)	✓✓	✓	-
Tourist cruise boats	✓✓	✓✓	✓✓
Recreational diving / snorkelling	✓✓	✓✓	✓
Surfing	✓✓	✓✓	-
Wildlife tourism	✓✓✓	✓✓✓	✓✓✓
Education and scientific studies	✓✓	✓✓	✓

6.3 Future activities

6.3.1 Potential impacts on future development

The extension of the SPAs could have a potential impact on future development within and around the sites. While it is not possible to quantify these impacts without knowing the details of any future plans, the influence on the planning process can be determined and key activities where development may be affected can be identified.

In many cases the existing SPAs require environmental assessment of proposed developments and therefore the potential effect, in terms of licensing requirements, would be the same. However, there is the potential that the seaward extension of SPAs will result in more developments/activities being assessed in terms of their proximity to SPAs, which could result in some net increase in cost for such proposals.

Of importance (and potential cost) to developers will be the identification of alternative sites, mitigation and / or compensation, should significant effects to the integrity of the

sites are predicted to occur. In most instances such considerations would be required due to the presence of the existing SPAs. Therefore no net cost associated with SPA seaward extension would occur.

Development within and around designated sites is not prohibited, but additional information is often required to help to inform the Competent Authority's Appropriate Assessment (AA) of the potential impact of the proposed development on site integrity. This generally results in some additional costs to both developer in supplying the information and to the Competent Authority in undertaking that AA. The costs associated with the three management options are described below:

Option 1

No additional costs expected.

Option 2 and 3

Options 2 and 3 would both result in additional considerations within the consenting system.

In consenting terms, the extension of an SPA, as an EC designated site, will result in developers having to supply additional information on plans and projects to inform the Competent Authority. Projects would be subject to Habitats Regulations Assessment (HRA), irrespective of scale, and information on the specific impact on SPA interest features would be required. Under Article 6 of the Habitats Directive, the Competent Authority has a responsibility to undertake an AA of the impact on the integrity of a European site. In many instances the proximity of plans or projects to the existing SPA would mean this additional effort is already required, but the seaward extension suggests more plans and projects could fall into this category than is currently the case.

6.3.2 Costs to future development

The additional information and reporting requirements for plans or projects affecting an SPA results in increased costs to both the private (developer) and public sector (consenting authority). Wherever a development or activity in the proximity of an SPA extension requires planning permission or licensing, costs may result from:

1. Refusal or delay in approval;
2. Additional assessment at the planning stage;
3. Mitigation resulting from consideration of the SPA extension;
4. Additional monitoring costs in operation;
5. Additional costs of developing alternative sites; and
6. Opportunity cost of no alternative sites available.

Section 6 Current and Future Activities

The greatest costs are likely to be related to points 5 and 6; situations where no development occurs in an area and this economic activity does not occur elsewhere or there are greater costs in undertaking that activity elsewhere. These additional costs may be incurred at any or all stages throughout the lifecycle of a project and are impossible to quantify.

The presence of an SPA may mean that sites without designations are favoured by developers and therefore certain coastal areas will gain the economic benefits of developments over other coastal areas. While an SPA extension may mean that an area is more likely to miss out on a development, it should be remembered that there are also benefits to the economy and society from designated sites. An opportunity cost to the nation will only arise where a development, which would have progressed previously, is not taken forward at all or to the same extent or at a higher cost location due to the seaward SPA extension.

The sections below discuss the implications of potential costs to future development in relation to specific activities.

6.3.3 Marine navigation

It is not anticipated that freedom of navigation would be affected by the SPA extensions. However, future infrastructure developments, or significant increases in vessel movements, will have to take due account of the SPA extensions, with development arrangements or navigation routes considered accordingly. These alterations to port and harbour developments could have consequential effects for the shipping sector (e.g. increased fuel costs, sailing times), the environment (e.g. increased emissions) and, ultimately, the consumer (e.g. increased costs of goods and cargoes shipped).

6.3.4 Commercial fisheries

Future developments in the commercial fisheries sector will be dependent upon the status of target biological resources and the supporting ecosystems. This integration of the ecosystem approach within fisheries management may mean that additional management is applied in sensitive areas. This should however be based on scientific evidence of cause and effect.

Under Option 2 and 3 where management may reduce or prevent extractive industries, such as fishing, future development could be restricted to areas outside of the SPA extensions, should they be deemed a threat to SPA interest features.

6.3.5 Aquaculture

Future developments in finfish and shellfish aquaculture will require licences. The presence of an SPA and its associated interest features should, however, contribute to assessment of an area's suitability for development. Future aquaculture development within and around an SPA extension area will therefore automatically require an EIA to be submitted as part of the application process, regardless of the size of the proposed farm. Furthermore, any farms already within proposed SPA extensions will require an EIA for any proposed extension to that farm, regardless of size. However, in reality the threshold for triggering an EIA is low and any new development is likely to require an EIA, regardless of whether it is within a designated area.

6.3.6 Offshore renewables development

The Crown Estate has undertaken a study to determine the size and distribution of wave and tidal resources around the UK (The Crown Estate, 2012). Future tidal stream energy development has been identified off the Aberdaron coast, whilst future tidal stream and wave energy development has been identified off Pembrokeshire (see **Figure 6-2**).

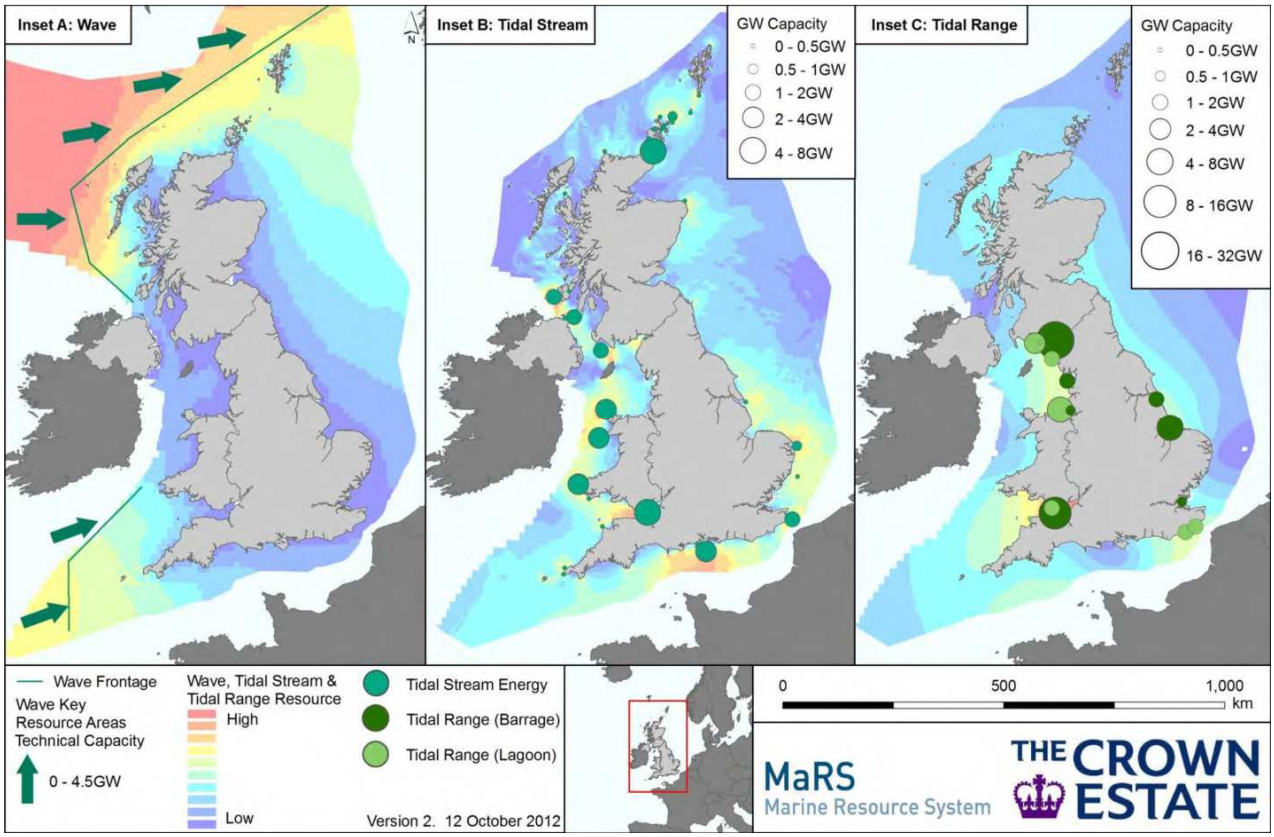

Figure 6-2 Distribution of tidal stream energy resources (The Crown Estate, 2012)

Section 6 Current and Future Activities

The potential impact of SPA extensions on future offshore renewable development could result in costs associated with points 1 to 6 presented in **Section 6.2.2**. The largest cost could result from the development of alternative sites that may be more expensive to develop or where resources may be less commercially attractive and/or viable for energy generation. An even larger cost emerges if no alternative sites can be identified and this offshore renewable capacity is not developed at all. The cost of this "lost" development is effectively an opportunity cost. This opportunity cost would include the lost reduction in carbon dioxide emissions and these have a significant monetary value.

6.3.7 Pipelines and cables

The interaction between pipelines and cables and bird interests tends to be during construction. The current SPAs are already taken into account when assessing the impact of proposed developments. Formalising the bird interests present in a sea area through the SPA extensions is likely to result in future developments avoiding those areas or incurring increased costs. Although development may be permitted following AA, necessary mitigation may involve additional costs through diverting a route around the SPA extension.

6.3.8 Other activities

For military use and recreational activities planning permission and licensing is generally not a requirement and therefore no costs associated with future developments in these sectors are anticipated.

6.3.9 Public sector

Local Authorities and other Competent Authorities (such as the Welsh Government) must ensure that any development plans do not adversely impact upon the proposed SPA extensions. As these are extensions to existing SPAs, they should already have been adequately considered. The SPA extensions may, however, mean that any current plans may require some revision to ensure responsibilities towards designated sites are being met. This will result in a cost to the public sector.

6.4 Summary

Table 6-4 presents the activities that would potentially be affected as a result of implementing Management Options 1, 2 or 3.

Table 6-4 Activities that would be potentially affected by Management Options 1-3 (shaded in red)

Option	Public sector	Marine navigation	Commercial fishing	Tourism and recreation	Offshore renewables	Pipelines and cables	Aqua-culture
Current activities							
Option 1 Do nothing							
Option 2 No additional management							
Option 3 Additional management for existing activities							
Future activities							
Option 1 Do nothing							
Option 2 No additional management							
Option 3 Additional management for future developments							

The following activities are considered to have the potential to be affected by one or more of the Management Options and therefore have been included within the costs and benefits analysis (see **Appendix B**):

- Marine navigation (future);
- Public sector (current and future);
- Commercial fishing (current and future);
- Aquaculture (future);
- Offshore renewables (future); and
- Pipelines and cables (future).

The Management Options are considered to have a minimal effect on the following activities are not considered to have the potential to be affected by any of the Management Options and therefore have been scoped out of the costs and benefits analysis:

- Tourism and recreation (current and future).

7 Other Costs and Benefits

7.1 Economic Benefits

Potential benefits have been identified from SPA extensions for activities that may benefit from an improved bird resource, for example bird watching visits and tours. As the proposed extension areas are already adjacent to SPAs and therefore already hold significant bird interest, it is unlikely that any extension will translate into a quantifiable increase in the economic value of dependent activities, even if some improvement in bird populations were to occur. Maintenance or improvement of bird populations may cause an improvement in the quality of the "visitor experience" of those watching the birds but this non market effect may not feed through into a market effect of more tours or a higher willingness to pay for them. While evidence exists around expenditure related to seabirds, there is limited evidence around the value society places on conserving bird colonies for future generations, or the value people derive from knowing that healthy bird populations exist (Defra, 2012).

7.2 Environmental and Social Benefits

There are a number of environmental and social benefits that may result from the expansion of the SPAs. These benefits have an economic value; however, quantifying this value is very complex and uncertain and has not been attempted in this impact assessment. These benefits are qualitatively described in greater detail below.

The protection of habitats and species of European and UK importance, through site protection mechanisms, provides benefit through existence value, the non-use value enjoyed by individuals due to the knowledge that the species or habitat exists. This value is likely to provide international as well as local benefits.

The protection of species and habitats in general reduces the risk of biodiversity loss and provides an option value through as yet unknown uses that may become apparent in the future. An example of such a benefit is often medicinal uses of natural substances. Like existence value, option value will accrue very widely resulting in international and national benefits as well as local ones.

Healthy, productive and biologically diverse sites provide numerous ecosystem services such as sustainable harvestable products (e.g. fish) as well as more intangible benefits such as climate regulation and nutrient cycling. Should these ecosystems significantly change or collapse, a flow of benefits currently enjoyed will no longer be provided. Maintaining strong and diverse flora and fauna in these sites reduces the risk of ecosystem change/collapse.

Section 7 Other Costs and Benefits

It should be noted that the environmental and social benefits listed above are explicit principles underlying the creation of *Natura 2000* sites, which include SPAs. While it may be very difficult or impossible to quantify these benefits, the EU directives and implementing laws of member states intrinsically recognise that these “intangible” benefits have significant value.

8 Summary and Conclusions

8.1 Summary

Based on the previous section, the main impacts on current activities resulting from the implementation of Option 3 are predicted to fall onto local fishermen. Should fishing effort be displaced rather than lost, the impacts are likely to be minimised. On the other hand, this may increase conflicts among users.

Local commercial traders and commercial shipping companies could also be affected if the extension results in the diversion of shipping routes. If diversions are needed, the costs may be passed on to customers. Furthermore, longer routes would result in additional carbon emissions.

Impacts in terms of increased administration and monitoring costs will fall onto the public sector and ultimately upon the tax-payer. Current monitoring and enforcement costs are considered to be moderate to significant in quantitative terms but vary significantly according to the specific measure (from £7,000 of enforcing a byelaw to £125,000 in total for Skomer). The impacts from Option 3 are likely to be smaller than the costs related to infringement procedures that could stem from Option 1 as it is expected that these additional activities will be accommodated within the current workload of staff. Further consultation may be required in this regard once management options are more clearly defined.

Any future plans and/or projects may result in additional surveys, mitigation and compensation costs. It is not possible to predict what all future plans/projects might be that would need to be assessed but further consultation may provide further information. There are likely to be significant costs to offshore renewables, should alternative sites / compensation be required, and the public sector stemming from any additional projects in the extended areas.

On the other hand, economic benefits could accrue to:

- Fishermen from increments in fish stocks, nursery and spawning areas (also outside SPAs);
- Recreational users from increased wildlife populations, increasing the quality of the experience which could result in increased number of visits;
- Tourism related businesses, derived from continuity/sustainability of marine recreation; and,
- Other users and non-users, in terms of altruistic values, educational and cultural values.

Section 8 Summary and Conclusions

Although the benefits to recreation and tourism are uncertain, they could, in the long term, compensate for any costs arising to industry in the shorter term and should not be considered to be negligible.

Significant effect: It is probable that an impact is sufficiently significant so as to be noticed (+++ positive (benefit) / --- negative (costs))

- Possible effect: It is possible that an impact is sufficiently significant so as to be noticed (++ positive (benefit) / -- negative (costs))
- Minimal effect, if any: It is probable than an impact is unlikely to be sufficiently significant so as to be noticeable, but that some possibility exists that an impact could occur (+ positive (benefit) / - negative (costs))

Table 8-1 summarises the potential social-economic impacts for the different activities from the implementation of the Management Options, based on the following ratings:

- Significant effect: It is probable that an impact is sufficiently significant so as to be noticed (+++ positive (benefit) / --- negative (costs))
- Possible effect: It is possible that an impact is sufficiently significant so as to be noticed (++ positive (benefit) / -- negative (costs))
- Minimal effect, if any: It is probable than an impact is unlikely to be sufficiently significant so as to be noticeable, but that some possibility exists that an impact could occur (+ positive (benefit) / - negative (costs))

Table 8-1 Summary of the potential social-economic impacts on current and future activities from the implementation of the Management Options

Activity	Option 1	Option 2			Option 3		
		Aberdaron & Ynys Enlli / Aberdaron Coast and Bardsey	Skokholm and Skomer	Grassholm	Aberdaron & Ynys Enlli / Aberdaron Coast and Bardsey	Skokholm and Skomer	Grassholm
Current activities							
Environment	-	+	+	+	++	++	++
Social	None	+	+	+	+	+	+
Marine navigation							
Commercial shipping	None	N/A	None	None	N/A	-/--	-/--
Irish ferries	None	N/A	None	None	N/A	-	-
Ferries	None	None	None	N/A	-	-	N/A

Section 8 Summary and Conclusions

Activity	Option 1	Option 2			Option 3		
		Aberdaron & Ynys Enlli / Aberdaron Coast and Bardsey	Skokholm and Skomer	Grassholm	Aberdaron & Ynys Enlli / Aberdaron Coast and Bardsey	Skokholm and Skomer	Grassholm
Commercial fishing							
Dredging and trawling	None	None	None	None	-	--	--
Potting	None	None	None	N/A	-/--	--	N/A
Netting	None	N/A	None	None	N/A	-	-
Tourism and recreation							
Chartered/ private recreational sea angling	None	None	None	None	-	None	None
Recreational boating (incl. kayaking)	None	None	None	None	-	None	None
Power craft (incl. jet skis)	None	None	None	N/A	-	None	N/A
Tourist cruise boats	None	None	None	None	-/+	+	+
Recreational diving/ snorkelling	None	None	None	None	-	None	None
Surfing	None	None	None	None	-	-	None
Wildlife tourism	None	None	None	None	-/+	+	+
Education and scientific studies	None	None	None	None	-/+	+	+
Public sector	---	-	-	-	-/--	-/--	-/--
Future developments							
Environment	-	+	+	+	++	++	++
Social	None	+	+	+	+	+	+
Marine navigation	None	-/--	-/--	-/--	-/--	-/--	-/--
Commercial fishing	None	-/--	-/--	-/--	-/--	-/--	-/--
Aquaculture	None	-/--	-/--	-/--	-/--	-/--	-/--
Offshore renewables	None	--/---	--/---	--/---	--/---	--/---	--/---
Pipelines and cables	None	-/--	-/--	-/--	-/--	-/--	-/--
Public sector	---	-/--	-/--	-/--	--	--	--

Option 1

Under this option, there would be a disbenefit to the environment by not extending the SPAs (i.e. the importance of the marine habitats to the breeding birds would not be recognised). There would also be a significant cost to the public sector in the event that

the Welsh Government is found not to meet the requirements under Article 4 of the Birds Directive.

There are no economic, social or environmental costs or benefits to any of the other activities.

Option 2

Current Activities

There are positive social and environmental benefits related to Option 2. There are no anticipated costs to current activities.

Future Activities

The same level of social and environmental benefits remains for future developments under Option 2. There is an anticipated cost for future developments in all other activities. This is a result of the costs associated with additional planning permission or licensing requirements, the need to consider alternative options / locations.

Option 3

Current Activities

The same level of social benefits remains under Option 3, while environmental benefits may be increased due to restrictions of current activities. There would be costs to the current shipping and fisheries activities as a result of any restrictions considered necessary under this option, the degree of which varies according to the SPA being considered due to the differing levels of activity. Tourism and recreation would see both positive and adverse impacts, as result of any enhanced visitor experience and should any restrictions on access be imposed, respectively.

The estimates contained in **Appendix B** represent the maximum costs should current activities be prohibited, which is considered very unlikely even if the evidence base changes in the long term. Also identified is a cost to the public sector in relation to enforcement.

Future Activities

Under Option 3 costs to future developments are similar to those presented for Option 2. This is the case for all activities, apart from the public sector, where the cost is considered to be higher than that for Option 2, due to the additional management costs.

Section 8 Summary and Conclusions

8.2 Conclusion

Option 1 represents the do nothing option but the Welsh Government has a legal obligation to implement the requirements of the Habitats and Birds Directives. Options 2 and 3 have similar costs for future development. **Table 9.1** presents the estimated worst case costs associated with Option 3 if current activities were restricted and is provided for illustrative purposes only; there is no indication that current activities in the areas proposed for extension are any risk to the birds or their habitats, given the stable and increasing SPA listed bird populations (NRW, 2013). **The assessment concludes that Option 2 is the preferred management option, because it provides the necessary level of protection for seabirds with minimal socio-economic impact.**

9 Data Gaps and Uncertainties

During the production of this preliminary impact assessment, a number of data gaps and uncertainties were identified. These are listed below:

- There is a paucity of information some human interactions and the bird species for which the SPA extensions are proposed, namely:
  - Disturbance from shipping activities; and
  - Offshore renewable energy generation.
- For the purposes of this assessment, it has been assumed that fishing type and effort is uniform across the ICES Rectangle, which is unlikely to be the case. Further information is required to determine the actual fishing activity within each of the proposed SPA extensions.
- Costs to fishing activity have been calculated on the basis that no other fishing grounds are available; however, this is unknown.
- Benefits to recreational users and tourist operators have been proposed; however, there is significant uncertainty surrounding the valuation of these. Most of the approaches to value these benefits are based on actual expenditure by visitors, based upon case studies.
- Potential impacts to future shipping are unknown and have been qualitatively assessed based upon a change in route or new routes be required; however, the extent of any change is unknown. Further information is required to understand and estimate any costs to the industry.
- Further work is required on current activities to enable future proposals to be considered and evaluated.

10 Next Steps

10.1 Further consultation

This report is provided for consultation simultaneously with the evidence provided by NRW. Comments should be provided either in writing or electronically to:

Richard Lowcock James

Marine Conservation Branch

Marine and Fisheries Division

Agriculture, Food and Marine

Welsh Government

Cathays Park

Cardiff

CF10 3NQ

Email: Marine@Wales.GSI.Gov.UK

10.2 The purpose of the consultation

The purpose of consultation on this report is to establish:

- Have the current and future activities been correctly identified?
- Does the report correctly identify the potential interactions of human activities with seabirds?
- Does the report correctly identify the potential impacts that could arise from the implementation of the management options?
- Do you agree with the recommended management option?

Answers to these questions, or other issues relating to the impact assessment would be welcome as a component of consultation. Feedback received will shape the finalisation of this report and the evaluation of the potential impacts that could arise from the proposed SPA extensions.

11 References

ABPmer and RPA, 2007. Regulatory Impact Assessment of the Marine Bill in Wales – Final Option Assessment.

Aquatera, 2014. Consolidation of wave and tidal EIA/HRA issues and research priorities. Technical Report to The Crown Estate. Issued by Aquatera Ltd. January 2014.

Beveridge, M. C. M., (2001). Overview of cage aquaculture. In: P. T. K. Woo, D. W. Bruno & S. L. H. Lim (Eds.) Diseases in Finfish in Cage Culture. University of Guelph, Canada, D.W. BRUNO, FRS Marine Laboratory, Aberdeen, UK, and L.H.S. LIM, University of Malaya, Kuala Lumpur, Malaysia. CAB International, Wallingford, Oxon.

BirdLife International, 2012. Human disturbance at seabird colonies has a range of impacts. Presented as part of the BirdLife State of the world's birds website. Available from: http://www.birdlife.org/datazone/sowb/casestudy/487. [Accessed 15/01/2014].

Brothers, N. P., Cooper, J. and Løkkeborg, S., 1999. The incidental catch of seabirds by long-line fisheries: worldwide review and technical guidelines for mitigation. FAO Fisheries Circular, 937: 100 pp.

Burger, J., 1998. Effects of motorboats and personal watercraft on flight behaviour over a colony of common terns *Sterna hirundo*. Condor 100:528-534.

Christensen, T.K., Hounisen, J.P., Clausager, I., Petersen, I.K., 2003. Visual and radar observations of birds in relation to collision risk at the Horns Rev offshore wind farm. National Environmental Research Institute. Ministry of the Environment - Denmark.

Cook, A. S. C. P., Johnston, A., Wright, L. J. and Burton, N. H. K., 2012. A review of flight heights and avoidance rates of birds in relation to offshore wind farms. Report of work carried out by the British Trust for Ornithology on behalf of The Crown Estate. May 2012

Cook, A.S.C.P. and Burton, N.H.K., 2010. A review of the potential impacts of marine aggregate extraction on seabirds. Marine Environment Protection Fund (MEPF) Project 09/P130.

Craik, C., 2004. Record breeding success of terns in West Scotland. Seabird Group Newsletter 98: 6 - 7.

Section 11 References

Defra (2012): Marine Strategy Framework Directive consultation: UK Initial Assessment and Proposals for Good Environmental Status, Impact Assessment March 2012.

Frederiksen, Jensen, Daunt, Mavor, Wanless, 2008. Differential Effects Of A Local Industrial Sand Lance Fishery On Seabird Breeding Performance. *Ecological Applications*: Vol. 18, No. 3, pp. 701-710.

Furness, R. W., 2003. Impacts of fisheries on seabird communities. *SCI. MAR., 67 (Suppl. 2)*: 33-45.

Furness, R. W., Wade, H. M., Robbins, A. M. C., and Masden, E. A. 2012. Assessing the sensitivity of seabird populations to adverse effects from tidal stream turbines and wave energy devices. - *ICES Journal of Marine Science*, 69: 1466-1479.

Garthe, S. and Hűppop, O., 2004. Scaling possible adverse effects of marine wind farms on seabirds: developing and applying a vulnerability index. *Journal of Applied Ecology*. 2004 41, 724–734.

Daunt, F., Wanless, S., Peters, G., Benvenuti, S., Sharples, J., Gremillet, D. and Scott, B., 2006. Impacts of oceanography on the foraging dynamics of seabirds in the North Sea. In: Top predators in marine ecosystems: their role in monitoring and management (eds Boyd, I.L; Wanless, S; Camphuysen, K).

Good Marine, 2008. Aggregate extraction in the marine environment. http://www.goodmarine.com/Default.aspx

Gubbay, S. 2003. Marine aggregate extraction and biodiversity. Information, issues and gaps in understanding. Report to the Joint Marine Programme of The Wildlife Trusts and WWF-UK.

Heffernan M.L., 1999. A review of the ecological implications of mariculture and intertidal harvesting in Ireland. Irish Wildlife Manuals, No. 7. Dúchas, The Heritage Service, Department of Arts, Heritage, Gaeltacht and the Islands, Dublin, Ireland.

ICES 2011. Effects of offshore windfarms on seabirds. pp.12-17 In Report of the Working Group on Seabird Ecology (WGSE) 1-4 November 2011, Madeira, Portugal. 73pp. CM2011/SSGEF:07. ICES, Copenhagen.

JNCC, 2013. http://jncc.defra.gov.uk/page-1403 [accessed 07/01/2014]

Kaiser, M.J., Galanidi, M., Showler, D. A., Elliott, A. J., Caldow, R. W. G., Rees, E. I. S., Stillman, R. A. and Sutherland, W. J., 2006. Distribution and behaviour of common scoter

Section 11 References

Melanitta nigra relative to prey resources and environmental parameters. Ibis 148:110-128.

Le Floc'h, P., Daures, F., Brigaudeau, C., Bihel, J., 2008. A comparison of economic performance in the fisheries sector: A short and long-term perspective. Marine Policy 32, 421-431.

Martínez-Abraín, A., Oro, D., Conesa, D. and Jiménez, J., 2008. Compromise between seabird enjoyment and disturbance: the role of observed and observers. *Environ. Conserv*. 35: 104–108.

McSorley, C.A., Wilson L.J., Dunn, T.E., Gray, C., Dean, B.J., Webb, A. & Reid, J.B. 2008. Manx shearwater *Puffinus puffinus* rafting behaviour around colonies on Skomer, Rum and Bardsey: its spatial extent and implications for recommending seaward boundary extensions to existing colony Special Protection Areas in the UK. JNCC Report no. 406

Monaghan, P., Uttley, J. D., and Burns, M. D., 1992. Effect of changes in food availability on reproductive effort in arctic terns *Sterna paradisaea*. Ardea, 80: 71-81.

NRW, 2013. Skokholm and Skomer SPA monitoring report. Pers. comm.

Piatt, J. F. and Nettleship, D.N., 1987. Incidental catch of marine birds and mammals in fishing nets off Newfoundland, Canada. *Mar. Pollut. Bull*. 18:344–349.

NRW, 2013a. Proposed changes to Glannau Aberdaron Ac Ynys Enlli / Aberdaron Coast and Bardsey Island SPA. Advice to the Welsh Government. October 2013

NRW, 2013b. Proposed changes to Grassholm SPA. Advice to the Welsh Government. October 2013

NRW, 2013c. Proposed changes to Skokholm and Skomer SPA. Advice to the Welsh Government. October 2013

Robins, M., 1991. Synthetic Gill Nets and Seabirds. Worldwide Fund for Nature/Royal Society for the Protection of Birds, Godalming. 68 pp.

Royal Haskoning, 2009. Regulatory Impact Assessment of Proposed Marine Extensions of Special Protection Areas. Report for the Scottish Government.

RSPB, 2010. The Local Value of Seabirds: Estimating spending by visitors to RSPB coastal reserves and associated local economic impact attributable to seabirds. The RSPB, Sandy, UK

Ruiz-Frau et al (2013): Ruiz-Frau A, Hinz G, Edwards-Jones G & Kaiser MJ (2013): Spatially explicit economic assessment of cultural ecosystem services: Non-extractive

Section 11 References

recreational uses of the coastal environment related to marine biodiversity, Marine Policy 38 (2013) 90–98.

Schwemmer, P., Mendel, B., Sonntag, N., Dierschke, V. and Garthe, S., 2011. Effects of ship traffic on seabirds in offshore waters: implications for marine conservation and spatial planning. Ecological Applications 21: 1851-1860.

Sherman, K., Jones, C., Sullivan, L., Smith, W., Berrien, P., and Ejsymonmt, L., 1981. Congruent shifts in sand eel abundance in western and eastern North Atlantic ecosystems. Nature, 291: 486-489.

SNH, 2004. Natural Heritage Trends - The Seas Around Scotland

SNH. 2010. Use of avoidance rates in the SNH wind farm collision risk model. SNH Avoidance Rate Information & Guidance Note. Scottish Natural Heritage, Inverness, UK.

Stroud, D.A., Chambers, D., Cook, S., Buxton, N., Fraser, B., Clement, P., Lewis, P., McLean, I., Baker, H. and Whitehead, S. (eds), 2001. The UK SPA network: its scope and content. JNCC, Peterborough

Tasker, M. L., and Furness, R. W., 1996. Estimation of food consumption by seabirds in the North Sea. ICES Cooperative Research Report, 216: 6-42.

Tasker, M. L., Camphuysen, C. J., Cooper, J., Garthe, S., Montevecchi, W. A., and Blaber, S. J. M., 2000. The impacts of fishing on marine birds. ICES Journal of Marine Science, 57: 531-547.

The Crown Estate, 2012. UK Wave and Tidal Key Resource Areas Project. Summary Report. October 2012

TEL, 2012. Tidal Stream Energy Demonstration Array St David's Head, Pembrokeshire. Environmental Scoping Report. Prepared by Tidal Energy Ltd on behalf of Tidal Energy Developments South Wales Limited. August 2012

UNEP Convention On Biological Diversity, 2002. The Effects Of Mariculture On Biodiversity.

Vigo, A.B., 2007. Impacts of Offshore Wind Developments on Birds. Cranfield University MSc Thesis, Supervisor: Andrew Gill.

Wanless, Greenstreet, Jensen, Daunt Hamer, Harris, 2008. The impact of the sandeel fishery closure on seabird food consumption, distribution, and productivity in the north-

Section 11 References

western North Sea Canadian Journal of Fisheries and Aquatic Sciences, Volume 65, Number 3, 1 March 2008, pp. 362-381(20).

Wilson, B., Batty, R. S., Daunt, F. and Carter, C., 2007. Collision risks between marine renewable energy devices and mammals, fish and diving birds. Report to the Scottish Executive. Scottish Association for Marine Science, Oban, Scotland, PA37 1QA.

Wright, L. J., Ross-Smith, V. H., Austin, G. E., Massimino, D., Dadam, D., Cook, A. S. C. P., Calbrade, N. A. and Burton, N. H. K., 2012. Assessing the risk of offshore wind farm development to migratory birds designated as features of UK Special Protection Areas (and other Annex 1 species). Report of work carried out by the British Trust for Ornithology on behalf of The Crown Estate. October 2012

Žydelis, R., Bellebaum, J., Österblom, H., Vetemaa, M., Schirmeister, B., Stipniece, A., Dagys, M., van Eerden, M. and Garthe, S., 2009. By catch in gillnet fisheries—an overlooked threat to water bird populations. *Biol. Conserv*. 142: 1269–1281.

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