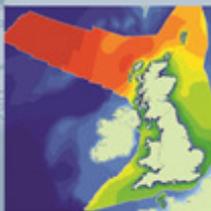


# The Crown Estate Wave and Tidal Leasing

Summary of Information for  
Habitats Regulations Assessments

The Crown Estate  
April 2016

Creating sustainable solutions for the marine environment



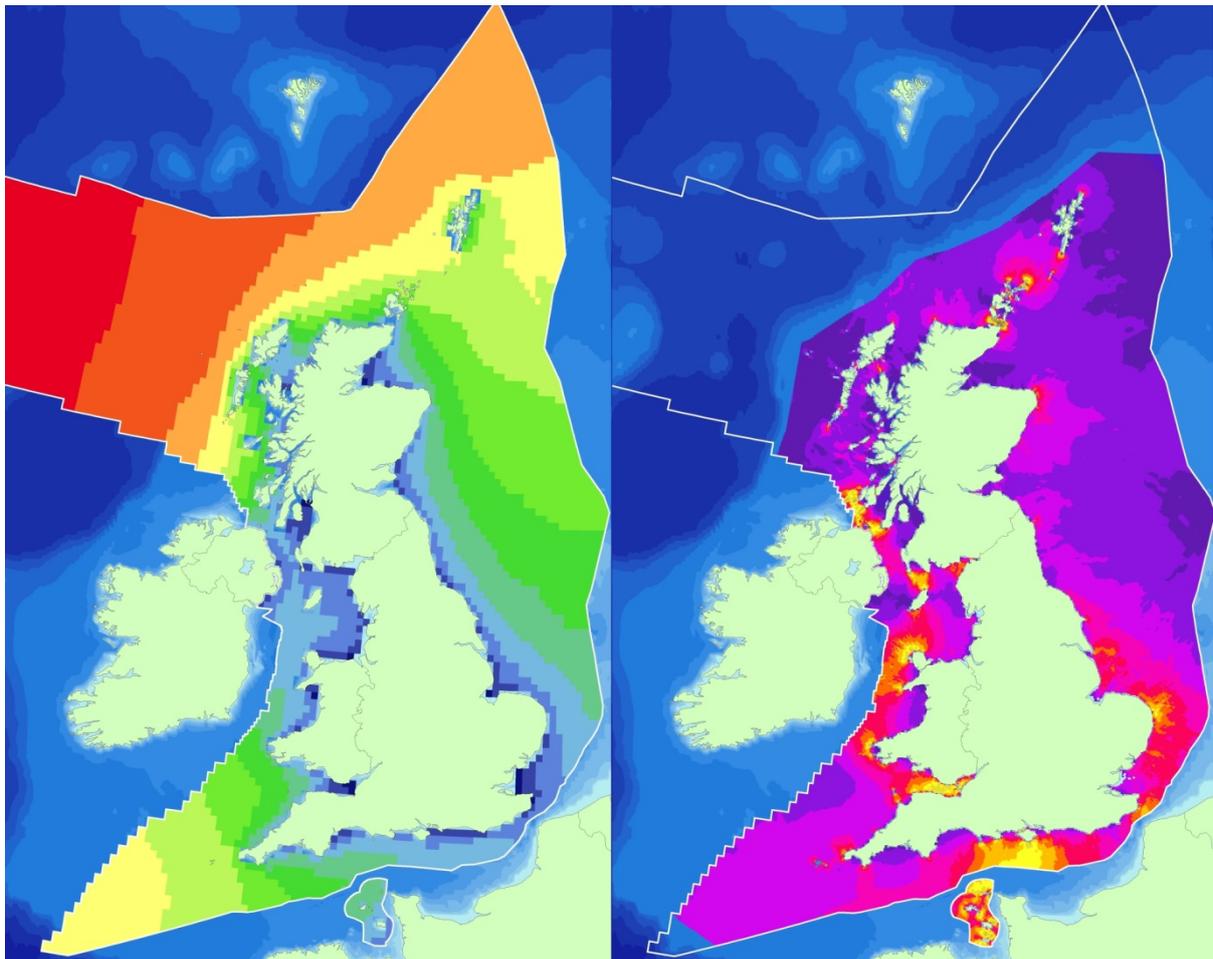
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# The Crown Estate

## Wave and Tidal Leasing

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# Document Information

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# Summary

The Crown Estate has commissioned ABP Marine Environmental Research Ltd (ABPmer) to produce this document which collates key information of relevance to project-level Habitat Regulations Assessments (HRAs) for wave and tidal stream energy developments. It is intended to be used by developers, Competent Authorities and Statutory Nature Conservation Bodies (SNCBs) to help them understand how they can draw from, and build upon, previous assessment and information collation work done by The Crown Estate and others. It is anticipated that the document will be of particular value to successful developer applicants in The Crown Estate's new wave and tidal leasing process for small, up to 3 MW projects.

In 2014, The Crown Estate undertook a 'plan-level HRA' in support of its Wave and Tidal Leasing (W&TL) plan (ABPmer, 2014). This process collated a great deal of information on sensitive receptors, impact pathways and mitigation measures which could be of value in informing project-level HRA. This document highlights the sections where this key information is available within the outputs of The Crown Estate's plan-level HRA. By 'signposting' to these relevant sections in this manner, this report provides a framework for developers to navigate all of the existing HRA information.

This report also highlights any more up-to-date scientific evidence and guidance that should be taken into account in project-level HRAs. This information may also be relevant to other project-level assessments (e.g. Environmental Impact Assessments (EIAs) and Marine Conservation Zone (MCZ) assessments). In addition, key relevant evidence-gathering and plan implementation processes have been identified. A review of the status of existing and proposed European and international designations has also been undertaken.

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# 1 Introduction

This document has been produced to facilitate better access to generic information that could be relevant to projects coming forward as part of The Crown Estate's new wave and tidal leasing process for small, up to 3 MW projects. This includes information provided in the previous Wave and Tidal Further Leasing (W&TL) plan Habitats Regulations Assessment (HRA) (ABPmer, 2014) and any pertinent information that has emerged since the finalisation of that plan-level HRA. In fulfilment of this measure, The Crown Estate has commissioned ABP Marine Environmental Research Ltd (ABPmer) to produce a summary document which can be issued to successful developer applicants in the new leasing process.

In order to produce this summary document, a desk-based review of the W&TL plan HRA documents has been undertaken to identify generic information that would be relevant to wave and tidal stream projects for which a project-level HRA may be required. Any new scientific evidence and published guidance that has emerged since that plan-level HRA was completed has also been collated and reviewed. In addition, key relevant evidence-gathering and plan implementation processes that are being undertaken for a number of plans by UK regulators and competent authorities have been identified. A review of the status of existing and proposed European and international designations has also been undertaken.

The findings of this review are summarised in this report in a clear and non-technical manner. This summary report is designed to provide relatively generic and high-level guidance to assist with the HRA process at the project-level and is designed to complement rather than replace established statutory guidance.

To help guide users, this document highlights the sections where key information is available within the overarching W&TL plan HRA. By 'signposting' these sections, this report provides a framework to navigate to all of the existing HRA information. It also highlights any more up-to-date scientific evidence and guidance that should be taken into account in project-level assessments. The W&TL plan HRA is available to download from the [Marine Data Exchange \(MDE\)](#).

## 2 Legislative Context and HRA Guidance

### 2.1 Requirement for an appropriate assessment

Under Article 6(3) of the EC Directive on the Conservation of Natural Habitats and of Wild Fauna & Fauna (the Habitats Directive), an Appropriate Assessment (AA) is required where a plan or project is likely to have a significant effect upon a Natura 2000 site (also known as a 'European Site') either individually or in-combination with other plans or projects. The following sites comprise the Natura 2000 network:

- Special Areas of Conservation (SACs) designated under the Habitats Directive; and
- Special Protection Areas (SPAs) sites classified under the EC Directive on the Conservation of Wild Birds (the Birds Directive).

In the UK, these requirements also extend to the consideration of effects on:

- Ramsar Sites listed under the 1971 Ramsar Convention on Wetlands of International Importance; and
- Sites that are proposed for designation and inclusion in the Natura 2000 network and sites that are currently in the process of being classified such as potential/proposed SPAs (pSPAs), candidate and possible/proposed SACs (cSACs and pSACs), and Sites of Community Importance (SCIs<sup>1</sup>).

In addition, it is policy in England<sup>2</sup> that proposed Ramsar sites and sites identified, or required, as compensatory measures for adverse effects on designated or proposed European and/or Ramsar sites be given the same protection as European sites.

All the above designated, proposed and compensation sites are collectively referred to as European/Ramsar sites in this report and in the W&TL plan HRA.

The Habitats Directive is transposed into UK law through the following Regulations:

- The Conservation of Habitats and Species Regulations 2010 which replace the Conservation (Natural Habitats, &c.) Regulations 1994 (as amended) in England and Wales (and to a limited degree in Scotland - as regards to reserved matters);
- The Conservation (Natural Habitats, &c) Regulations 1994 (SI 1994 No. 2716) (as amended);
- The Conservation (Natural Habitats, &c) Regulations (Northern Ireland) 1995 as amended;
- The Offshore Marine Conservation (Natural Habitats) Regulations 2007 (SI 2007 No. 1842) (as amended) (the Offshore Habitats Regulations);
- The Conservation (Natural Habitats, &c.) Amendment (Scotland) Regulations 2004;
- The Conservation (Natural Habitats, &c.) Amendment (Scotland) Regulations 2007; and
- The Conservation (Natural Habitats, &c.) Amendment (No. 2) (Scotland) Regulations 2007.

This legislation provides the framework for HRA and is collectively referred to in this report as the Habitats Regulations.

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<sup>1</sup> Sites that have been adopted by the European Commission but not yet formally designated by the government of each country.

<sup>2</sup> Paragraph 118 of the National Planning Policy Framework (DCLG, 2012).

An AA considers a plan or project's environmental and ecological effect against the European/Ramsar sites' Conservation Objectives and it is produced by the competent authority in compliance with the Habitats Directive. The competent authority can adopt a plan or grant consent for a project only after having ascertained that it will not adversely affect the integrity of any European/Ramsar site(s) (either alone or in-combination with other plans or projects).

For project-level assessments, if it is concluded that the project will have an adverse effect on the integrity (AEOI) of a European/Ramsar site, the project can only be consented if certain derogations apply. These derogations include that there are no feasible alternative solutions having a less damaging effect and there are Imperative Reasons of Overriding Public Interest (IROPI) for undertaking a project, including those of a social or economic nature. In these circumstances, before such a project can proceed, compensatory measures must be secured to ensure that the overall coherence of the network of Natura 2000 sites is maintained.

## 2.2 Project-level HRA guidance

HRA is a step-by-step process which helps determine firstly, whether there is going to be a "likely significant effect" (LSE)<sup>3</sup> and then (where appropriate) whether there will be any adverse impacts on the integrity of a European site, recognising alternative solutions, and providing justification for IROPI. Comprehensive guidance on undertaking HRAs is provided by the European Commission (EC, 2001). This guidance describes a four stage process to project-level HRA (see Figure 1). This guidance has been updated by more recent guidance on undertaking project-level HRAs (e.g. Defra, 2012; PINS, 2013) and new advice continues to emerge through case-law judgements (for example see Section 3 which describes the implications of the 'Briels Case' from May 2014).

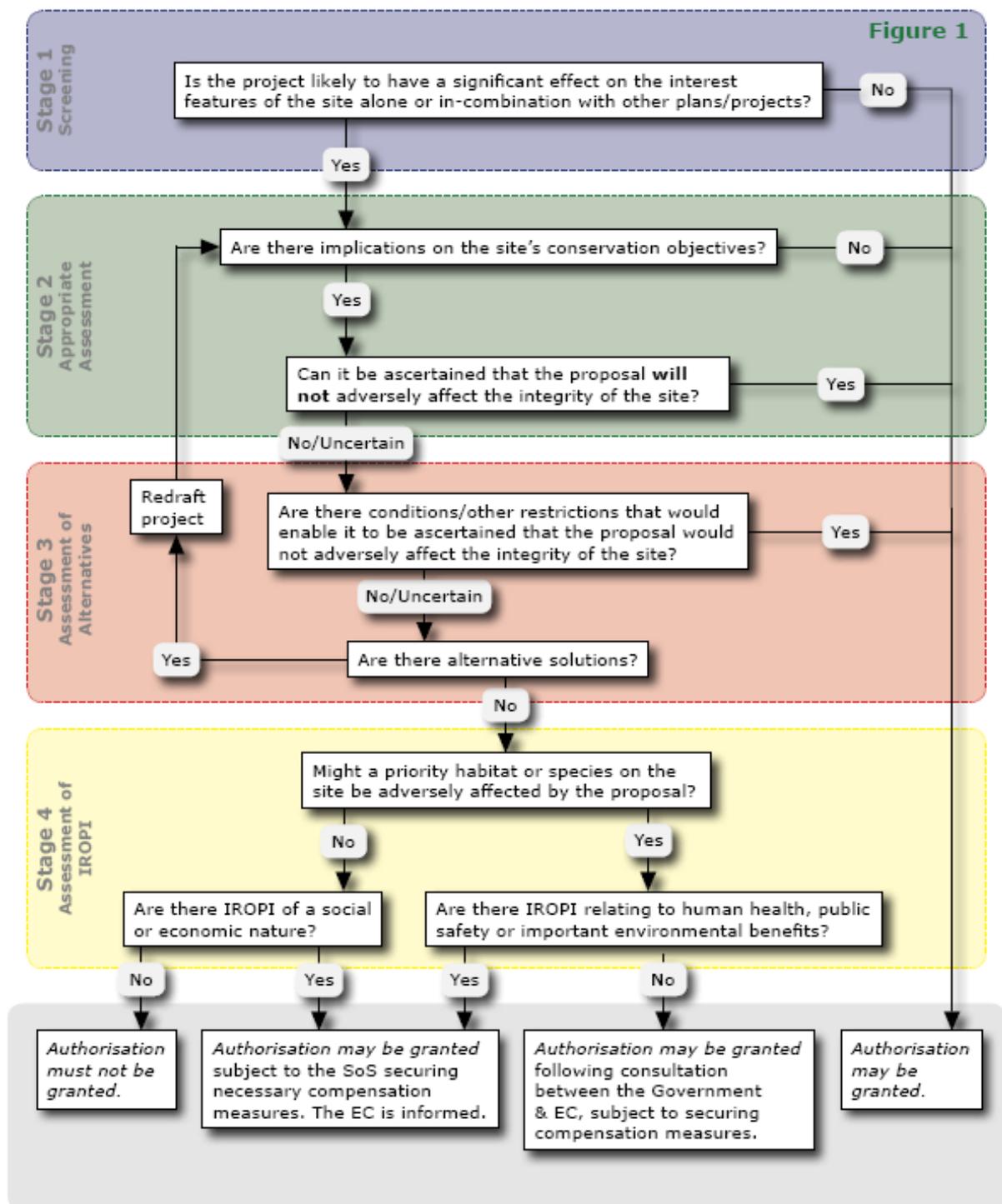
In accordance with the Habitats Regulations, **it is the responsibility of the developer to provide sufficient information to the competent authority to allow them to determine whether an AA is required.** Information on whether an AA is required is usually included within the Environmental Impact Assessment (EIA) Scoping Report. The competent authority will confirm if there is a requirement for an AA through the Scoping Opinion, on advice from the relevant Statutory Nature Conservation Bodies (SNCBs).

**If the competent authority considers that an AA is required, further information will need to be provided by the developer to the competent authority.** This information is normally provided in the form of a report which is variously referred to as an Appropriate Assessment Information Report (AAIR), a Shadow Appropriate Assessment or simply an HRA Report, which is submitted to the competent authority alongside the EIA. The competent authority will then undertake an AA following advice from relevant SNCBs.

**Developers are also advised to engage early with decision makers, relevant SNCBs and others to ensure the evidence they supply is suitable to inform regulatory decisions and the underpinning environmental assessment processes, including HRA (Defra, 2012).**

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<sup>3</sup> LSE is a 'coarse filter' or statement that the anticipated effects of the project will be more than trivial (i.e. that the anticipated changes resulting from a project have the potential to impact on an interest feature of a European/Ramsar Site) (English Nature, 1999). It does not automatically follow that an impact will occur, or that the impact would be significant, with a decision of LSE being purely an indication of the need for an AA. The interpretation of the term significant under the Habitats Directive in England is therefore different to its use under the Environmental Impact Assessment (EIA) Directive, with LSE in the Habitats Directive effectively analogous to a Screening Decision under EIA.



Source: PINS, 2013, adapted from Defra, 2012

Figure 1. Stages involved in project-level HRA<sup>4</sup>

<sup>4</sup> For the purposes of this summary document, it is assumed that the project is not directly connected with or necessary to the management of the site.

### 3 Key Information Sources

There is a lot of information already available within the AAIR of the overarching W&TL plan HRA that will assist developers in compiling the project-level HRA information required by the competent authority. The sections where this information is available are highlighted in Table 1.

**Table 1. Information in the W&TL plan HRA that is relevant to project-level HRAs**

Information	Relevant Interest Feature Group	AAIR Volume	AAIR Section
Review of sensitivities to relevant impact pathways	Habitats	1	3.2
	Birds	1	4.2
	Marine Mammals	1	5.2
	Fish	1	6.2
	Otter	1	7.2
Review of potential adverse effects on integrity (AEOI)	Habitats	1	3.3.3
	Birds	1	4.3.3
	Marine Mammals	1	5.3.3
	Fish	1	6.3.3
	Otter	1	7.3.3
In-combination effects with other plans and projects	All	1	8
		2	Appendix G
List of generic measures to address all potential effects to European/Ramsar site interest features	All	2	Appendix H

Other key information sources which might be of relevance for a project-level HRA of a wave or tidal development project have been identified in Appendix A, Table A1. These sources hold valuable information, ecological assessments and strategic monitoring work, including those which identify the efficacy of project-level mitigation measures to avoid or reduce certain impacts. These information sources also take account of publicly available project-level monitoring studies from deployments of wave and tidal stream prototypes and initial array developments in the UK and Europe (and other forms of offshore renewable energy development where relevant). One particular initiative that should be highlighted is the Offshore Renewables Joint Industry Programme (ORJIP) Ocean Energy Forward Look which includes a prioritised list of strategic research projects to address key EIA/HRA issues for the wave and tidal sectors (Aquatera, 2016). **Developers will need to check whether any new evidence has emerged from these information sources at the time of undertaking their project-level HRA.**

The scientific evidence is clearly always growing and the latest developments need to be recognised. In this document new scientific evidence and guidance that has emerged since the finalisation of the HRA record for The Crown Estate's W&TL plan (ABPmer, 2014) and that could be of relevance to a project-level HRA is shown in Appendix A, Table A2. This includes evidence and guidance relating to the behaviour of mobile interest features and relevant ecological impact pathways (e.g. collision risk and entanglement). A particularly useful scientific report on the effects of wave and tidal devices on the marine environment is the Annex IV 2016 State of the Science Report (Copping *et al.*, 2016). **Developers will need to consider all this evidence and guidance in project-level HRAs and confirm that it remains up-to-date and current.**

## 4 Project-Level HRA Requirements

All future projects taken forward in response to the new wave and tidal leasing process will need to be screened to establish whether an AA is required. It is the responsibility of developers to provide the necessary screening information for the competent authority to decide whether an AA is required taking advice from the relevant SNCBs. This information is usually included within the EIA Scoping Report. If an AA is judged necessary, developers will need to provide further information in a report so that the competent authority can produce an AA, again taking advice from the relevant SNCBs (see Section 2.2).

### 4.1 Stage 1: Screening for 'likely significant effects'

At a project-level, a more focused screening exercise will need to be undertaken than the high-level screening process undertaken by The Crown Estate for the HRA of its W&TL plan. The previous HRA for the W&TL plan involved, by necessity, a broad overview of the possible European/Ramsar sites that could be affected and it is not recommended that the methods applied for screening at the plan-level are directly applicable to screening at the project-level. Instead project-level screening should be undertaken based on the knowledge of the project details and using, where required, the latest scientific evidence on the impact pathways and species' sensitivities, as well as information on the baseline environmental conditions and advice from the relevant SNCBs.

For example, at the project-level more details will clearly be known about the location and nature of landside infrastructure. As the plan-level HRA was undertaken at a high level and on a precautionary basis, it is likely that a number of sites (in particular terrestrial sites and features) can be screened out (excluded from assessment) at project-level. On the same premise, it is likely that baseline information which is available at the project-level can be used to adjust/reduce the number of screened in (included) European/Ramsar sites and features on the basis that there will be no potential impact pathway.

**The information that the developer is likely to be required to provide at the screening stage of a project-level HRA includes:**

- Detailed description of the project, i.e. the location, scale and density of the project and the timing and method of proposed activities;
- Details of the screening methods used to determine which European/Ramsar sites are likely to be potentially affected and should be included within the assessment taking account of the latest advice (e.g. JNCC and Natural England, 2013);
- A plan and description of the European/Ramsar sites and all the associated interest features (and sub features) likely to be affected;
- Latest information on the Conservation Objectives and the Favourable Condition Status of relevant European/Ramsar site(s) and their interest features<sup>5</sup>;
- An outline and interpretation of baseline information;

<sup>5</sup> The Special Protection Area (SPA) Review that was undertaken by the UK country agencies has updated the understanding of the UK SPA network, both in terms of the number of sites selected and the species that qualify within these sites (Stroud *et al.*, 2001). The review presents site accounts that may differ from the currently classified SPA citation and Natura 2000 Standard Data Form. These accounts are effectively lists of potential qualifying features. In Wales, it is Welsh Government policy that these features should be taken into account by third party managers and/or developers in project-level HRAs.

- Information on interest feature (and sub feature) sensitivities (in the context of the latest scientific understanding, see Section 3); and
- High-level assessment of whether likely significant effects can be ruled out.

There have been a number of recent changes to the status of existing and planned European/Ramsar sites across the UK since the W&TL plan HRA was finalised in April 2014. These changes, detailed in Appendix B, Table B1, include the introduction of newly proposed sites and some extensions to existing sites. It is Government policy that proposed European/Ramsar sites should be treated as though they are already designated for the purposes of HRA processes until the Ministers have decided whether or not to designate them (see Section 2). **The developer will need to check the status of existing and planned European/Ramsar sites with the relevant SNCBs and consider those that are relevant within their project-level HRAs.**

Impact pathways<sup>6</sup> associated with wave and tidal development that are relevant to each of the main interest feature groups that were assessed in the plan-level W&TL HRA are included in Table 2. These can be used at screening to help provide a clear scope of the project elements that will require further assessment work. A high-level review of the sensitivities of each of the interest feature groups to these impact pathways is included in the HRA record for the W&TL plan (Table 1).

**Table 2. Impact pathways associated with wave and tidal development<sup>7</sup>**

Impact Pathways <sup>8</sup>	Habitats	Birds	Marine Mammals	Migratory Fish
Loss of coastal and offshore habitat under the footprint of devices, cables and cable armouring from the installation, operation and decommissioning of these structures.	✓			
Loss of onshore habitat (including bird breeding and roosting grounds, freshwater habitats, otter holts or shelters) under the footprint of cables, cable armouring and landside infrastructure due to the installation, operation and decommissioning of these structures.	✓	✓		✓
Loss of foraging areas from reduction in coastal and offshore habitat due to installation of devices and cable armouring within the development footprint.		✓	✓	✓
Presence of structures on seabed for the duration of the project resulting in changes to prey and species behaviour (e.g. acting as FAD (Fish Aggregating Device), artificial reef or bird roost).		✓	✓	✓
Changes to coastal and offshore habitat as result of damage from baseline surveys (e.g. boreholes/trawls); from equipment use causing abrasion, damage or smothering during installation and from maintenance and removal of cables/devices (e.g. jack-up legs, vessels, anchors, mooring chain).	✓			

<sup>6</sup> An impact pathway is the mechanism by which an activity arising from the W&TL Plan could affect a relevant habitat or species.

<sup>7</sup> Further information on impact pathways associated with wave and tidal energy developments is provided by the IMPACT tool <http://www.gov.scot/Topics/marine/Licensing/marine/tool>. This tool also provides access to relevant guidelines and recommendations for how best to assess, monitor and manage these impacts.

<sup>8</sup> These pathways concur broadly with Natural England's 'Advice on Operations'. More detailed site specific advice is (or will be) available from Natural England's web based Designated Sites System <https://www.gov.uk/government/collections/conservation-advice-packages-for-marine-protected-areas>.

Impact Pathways <sup>8</sup>	Habitats	Birds	Marine Mammals	Migratory Fish
Changes to coastal and offshore habitat as a result of alterations to the wave climate or hydrodynamic regime from the presence of devices, power cables or cable armouring causing physical changes (including changes to sediment transport and/or sediment scour).	✓			
Damage to onshore habitat (including bird breeding grounds, freshwater habitats, otter holts or shelters) by excavation, piling and construction work associated with the installation, operation and decommissioning of cables and landside infrastructure.	✓	✓		✓
Reduction in quality of foraging areas as result of damage to coastal and offshore habitat from baseline surveys (e.g. boreholes and trawls); from equipment use causing abrasion, damage or smothering during installation; from maintenance and removal of cables/devices or from scour, sediment transport and hydrodynamic change during operation.		✓	✓	✓
Damage to seal haul out locations during the installation, decommissioning and operation of the cables and cable armouring.			✓	
Collision risk and possible mortality of species due to the presence of devices (including the influence of lighting).		✓	✓	✓
Collision risk and possible mortality of species from vessels travelling to and from the site (including below water propeller collision risk).		✓	✓	
Risk of entanglement following a collision with power cables or mooring elements.		✓	✓	
Presence of structures and disturbance (noise or visual) associated with devices presenting a barrier to movement and blocking migratory pathways or access to feeding grounds depending on array design.		✓	✓	✓
Visual disturbance and exclusion from areas as a result of surveying, cable and device installation/operation and decommissioning activities and movements of vessels.		✓	✓	✓
Noise/vibration disturbance and exclusion from areas as a result of vessels and other activities during survey work (e.g. seismic exploration and geophysical surveys), construction (e.g. piling, drilling, cable laying), operation (e.g. device noise), maintenance or decommissioning.		✓	✓	✓
Impacts from Electromagnetic Fields (EMF) on electromagnetically sensitive fish and cetaceans interfering with prey location and mate detection in some species and creating barriers to migration.			✓	✓
Spillage of fluids, fuels and/or construction materials during installation or removal of structures (devices and cables) or during survey/maintenance.	✓	✓	✓	✓
Release of contaminants associated with the dispersion of suspended sediments during installation or removal of structures (devices and cables).	✓	✓	✓	✓
Increase in turbidity (and possibly reduced dissolved oxygen) associated with the release of suspended sediments during installation or removal of structures (devices and cables).	✓	✓	✓	✓
Predation by introduced rats/mink through the positioning of devices close to breeding seabird sites.		✓		
Introduction of new structures on the seabed providing new substratum that facilitates the colonisation and ingress of invasive non-native species.	✓			
Introduction and ingress of invasive non-native species as biofouling species on the surfaces of vessels or construction plant.	✓			

## 4.2 Stage 2: Appropriate assessment

An AA will need to be undertaken where a LSE on a European/Ramsar site has been confirmed or cannot be ruled out at the screening stage (see footnote 5). **It is the developer's responsibility to produce a report that provides information as may reasonably be required by the competent authority or even multiple authorities to underpin the production of the AA (see Section 2.2).**

The purpose of the AA is to allow the competent authority to decide whether the project may have an adverse effect on the integrity of the site, alone or in-combination with other plans or projects, in view of the site's Conservation Objectives. The assessment may also be important for deciding whether the derogation tests have been met, for example, in deciding the nature and scale of compensatory measures.

The assessment should build on the initial analysis undertaken at the screening stage. **The developer will need to provide more detailed consideration of the following:**

- Assessment of all the potential likely direct and indirect effects on each European/Ramsar site and interest feature (and sub feature) during all phases of the project (including any cumulative effects and the in-combination effects with other plans or projects);
- Identifying how each potential effect could impact on the site's Conservation Objectives;
- Identifying the degree of certainty which underpins the assessment of effects; and
- Proposed mitigation measures where these are relevant and necessary.

High-level reviews of the potential AEOI of the W&TL plan on each of the major European/Ramsar interest feature groups have been undertaken for the W&TL plan HRA (Table 1).

The potential in-combination effects of the W&TL plan with other plans or projects were reviewed in the HRA record for the W&TL plan (Table 1). These assessments should still be relevant to future wave and tidal projects, but will need to be revisited and addressed in a more comprehensive manner at the project-level. The use of best practice tools to facilitate the assessment of cumulative and in-combination effects will need to be considered at the project-level, for example exploration of the use of Population Viability Analysis (PVA) or Potential Biological Removal (PBR) based modelling to determine thresholds for impacts at a species population/management unit scale.

In addition to other plans or projects, the W&TL plan HRA identified ongoing activities that do not require an assessment in their own right but will influence the baseline conditions of the environment and may need to be considered at the project-level. These included recreational activities, commercial fishing and military activities. Since the completion of the W&TL plan HRA, Defra has published guidance<sup>9</sup> whereby commercial fishing operations need to be managed in accordance with Article 6 of the Habitats Directive. **All future project-level HRAs will therefore need to ensure that the effects of the project are assessed in-combination with fishing activity.**

From the high-level review undertaken for the plan-level HRA, the main concerns at a project-level for both wave and tidal energy developments relate to:

- The potential impacts to mobile species via collision risks;
- Disturbance (visual, noise and vibration) and displacement;
- The direct physical damage to habitats within the footprint of the development; and
- The potential effects of electromagnetic fields (EMF).

<sup>9</sup> <https://www.gov.uk/government/publications/revised-approach-to-the-management-of-commercial-fisheries-in-european-marine-sites-overarching-policy-and-delivery>

The extent to which these or other effects are pertinent or critical will depend on the project detail (e.g. scale of development) and especially whether it is wave or tidal devices that are being assessed. The scientific understanding about these impacts also varies, for example, the direct and indirect effects to benthic habitats and species in the vicinity of the individual developments are well understood. Such relatively localised impacts from future projects are foreseeable and it should be possible to address them through mitigation and/or compensation as required where they result in a potential adverse effect on a European/Ramsar site. The greatest risk of an in-combination impact with other plans or projects (as well as higher levels of uncertainty about the impact) is likely to be for mobile interest feature species such as marine mammals, breeding, foraging and migratory birds and migratory fish which could be affected by multiple developments or activities in different locations.

## 5 Project-Level Mitigation

The application of project-level mitigation will be required where these are relevant to the project and necessary to avoid an AEOI of a European/Ramsar site. Mitigation relates to measures that avoid or reduce the negative effects of a plan or project so that a potential AEOI of a European/Ramsar site can either be ruled out, or (if this is not possible) reduced in terms of likelihood or potential impact. For example, it may involve switching to a less damaging method of construction; or undertaking the works at a less sensitive time of year (e.g. outside a breeding season); not proceeding with some parts of the plan or project; or incorporating additional works into the plan or project to avoid or reduce its impact.

### Case law on the distinction between mitigation and compensation

Mitigation differs from the concept of compensation under the Habitats Regulations. Compensation is only formally considered as part of the derogations process (see Section 2). It relates to offsetting any negative effect of the plan or project where it has not been possible to rule out a potential AEOI of a European/Ramsar site and normally involves the creation of replacement habitat (Defra, 2012).

Following the Briels case in May 2014, the creation (including translocation) of either designated or supporting habitat within the boundaries of the European/Ramsar site is to be considered as compensation rather than mitigation. This case centred on what types of measures are relevant to consider as mitigation, when coming to a conclusion as to the effect on European site integrity of a proposed plan or project. The Court ruled in this case that the habitat creation on land within a SAC proposed to avoid an overall loss of habitat was in fact a compensatory measure and not eligible to be included as mitigation against damaged or lost habitat of the same type. As such this should not be taken into account until later in the formal Habitats Directive decision making process (i.e. after the consideration of alternative solutions and only having established IROPI in the project).

There are many project-level mitigation measures available to help avoid and reduce ecological effects of wave and tidal development where necessary. To assist with judgments about the possible need for such measures in the future, an overall list of generic measures to address all potential effects to European/Ramsar site interest features has been assembled from a range of sources in the HRA record for the W&TL plan (Table 1) to provide a central 'project-level mitigation options' table. These project-level mitigation measures are not a definitive requirement of all future projects under the new leasing process. Instead they represent a range of options that may be needed and adopted in the light of project-specific information and HRA findings. **A summary of the key generic project-level mitigation measures that developers will need to consider for the pressures of primary concern is provided in Table 3.**

**Table 3. Key generic project-level mitigation measures<sup>10</sup>**

Pressure	Generic Mitigation Measures
Collision risk	<ul style="list-style-type: none"> <li>▪ Consider designing device for minimal impact;</li> <li>▪ Seek to avoid siting devices in key sensitive areas e.g. breeding areas;</li> <li>▪ Consider increasing device visibility or use of acoustic warning devices ;</li> <li>▪ Consider automatic shutdown of vessel rotary mechanisms by proximity sensor/observer where necessary;</li> <li>▪ Design surveys to avoid visual disturbance and/or collision risk from vessels or shoreline activity where necessary;</li> <li>▪ Underwater noise during operation may alert species to the presence of the device, reducing the risk of collision;</li> <li>▪ Where possible and necessary, aim to avoid undertaking installation/decommissioning activities at night when birds may be more vulnerable to collisions; and</li> <li>▪ Minimise device lighting.</li> </ul>
Disturbance (visual, noise and vibration)	<ul style="list-style-type: none"> <li>▪ Where possible, avoid sensitive sites/species;</li> <li>▪ Seek to avoid sensitive seasons where necessary and practicable;</li> <li>▪ Increase device visibility where necessary and suitable;</li> <li>▪ Use methods and/or timings to reduce noise where necessary and practical (e.g. soft start piling during construction);</li> <li>▪ Consider use of marine mammal observers where necessary; and</li> <li>▪ Minimise use of high noise emission activities such as impact piling where necessary.</li> </ul>
Direct physical damage within footprint	<ul style="list-style-type: none"> <li>▪ Seek to avoid sensitive sites/species/areas/periods where necessary and possible;</li> <li>▪ Seek to micro-site around any features; and</li> <li>▪ Minimise cable length.</li> </ul>
EMF	<ul style="list-style-type: none"> <li>▪ Seek to design cables (e.g. burial depth) to minimise EMF fields where necessary; and</li> <li>▪ Seek to design cable export route to minimise exposure to electro sensitive species.</li> </ul>

<sup>10</sup> The effectiveness of many of these mitigation measures is unproven and will need to be considered further at the project level.

## 6 References

- ABPmer, 2014. Wave and Tidal Further Leasing HRA: Volume 1 (Reports), Volume 2 (Appendices) and Volume 3 (Consultation Report). ABP Marine Environmental Research Ltd, Report No. R.2160a-c for The Crown Estate.
- Aquatera, 2016. The Forward Look. An Ocean Energy Environmental Research Strategy for the UK. Report to: The Crown Estate, Marine Scotland and Welsh Government.
- Benjamins, S., Harnois, V., Smith, H.C.M., Johanning, L., Greenhill, L., Carter, C. and Wilson, B., 2014. Understanding the potential for marine megafauna entanglement risk from renewable marine energy developments. Scottish Natural Heritage Commissioned Report No. 791.
- Bradbury G., Trinder M., Furness B., Banks A.N., Caldow R.W.G., Hume D., 2014. Mapping Seabird Sensitivity to Offshore Wind Farms. PLoS ONE 9(9): e106366. doi:10.1371/journal.pone.0106366
- BSG Ecology, 2014. Bat migration research (2012 -2014).
- Copping, A., Sather, N., Hanna, L., Whiting, J., Zydlewski, G., Staines, G., Gill, A., Hutchison, I., O'Hagan, A.M., Simas, T., Bald, J., Sparling C., Wood, J., and Masden, E., 2016. Annex IV 2016 State of the Science Report: Environmental Effects of Marine Renewable Energy Development Around the World.
- DCLG, 2012. National Planning Policy Framework. Department for Communities and Local Government. March 2012.
- Defra, 2012. The Habitats and Wild Birds Directives in England and its seas. Core guidance for developers, regulators & land/marine managers December 2012 (draft for public consultation).
- EC, 2001. Assessment of plans and projects significantly affecting Natura 2000 sites.
- English Nature, 1999. Habitats Regulations Guidance Note 3: The Determination of Likely Significant Effect under The Conservation (Natural Habitats &c) Regulations 1994.
- Guerin, A.J., Jackson, A.C., Bowyer, P.A. and Youngson, A.F., 2014. 'Hydrodynamic models to understand salmon migration in Scotland.' The Crown Estate, 116 pages. ISBN: 978-1-906410-52-0.
- IAMMWG, 2015. Management Units for cetaceans in UK waters (January 2015). JNCC Report No. 547, JNCC Peterborough.
- JNCC and Natural England, 2013. JNCC and Natural England interim advice on Habitats Regulations Assessment (HRA) screening for seabirds in the non-breeding season. February 2013.
- Jones, E. L., McConnell, B. J., Smout, S., Hammond, P. S., Duck, C. D., Morris, C. D and Matthiopoulos, J., 2015. Patterns of space use in sympatric marine colonial predators reveals scales of spatial partitioning. Marine Ecology Progress Series, 534, 235-249.
- Judd A.D., Backhaus T. and Goodsir, F., 2015. An effective set of principles for practical implementation of marine cumulative effects assessment. Environmental Science &Policy 54: 254-262.

Lepper, P.A., Gordon, J., Booth, C., Theobald, P., Robinson, S. P., Northridge, S. and Wang, L., 2014. Establishing the sensitivity of cetaceans and seals to acoustic deterrent devices in Scotland. Scottish Natural Heritage Commissioned Report No. 517.

Marine Scotland: Impact Assessment Tool: <http://www.gov.scot/Topics/marine/Licensing/marine/tool>

Natural Resources Wales (NRW) (2015). Guidance to inform marine mammal site characterisation requirements at wave and tidal stream energy sites in Wales. NRW Evidence Report Number 82: <http://www.naturalresources.wales/media/4856/guidance-to-inform-marine-mammal-site-characterisation-requirements-at-wave-and-tidal-stream-energy-sites-in-wales-2015.pdf>

PINS, 2013. Advice note ten: Habitat Regulations Assessment relevant to nationally significant infrastructure projects Planning Inspectorate for England and Wales.

Pirotta, E., Merchant, N. D., Thompson, P. M., Barton, T. R., and Lusseau, D., 2015. Quantifying the effect of boat disturbance on bottlenose dolphin foraging activity. *Biological Conservation*, 181, 82-89.

SNH, 2015. Interim advice on risk of seal corkscrew injuries. February 2015.

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. Joint Nature Conservation Committee (JNCC), Peterborough.

The Crown Estate, 2014. Wave and Tidal Enabling Actions Report. Consolidation of wave and tidal EIA/HRA issues and research priorities. Technical report. Final Report. 60pp.

The Crown Estate, 2016. Current new wave and tidal leasing process. Available from: <http://www.thecrownestate.co.uk/energy-and-infrastructure/wave-and-tidal/wave-and-tidal-current/working-with-us/current-leasing-opportunities/>

Thompson, D., Onoufriou, J., Brownlow, A. and Bishop, A., 2015. Preliminary report on predation by adult grey seals on grey seal pups as a possible explanation for corkscrew injury patterns seen in the unexplained seal deaths: addendum Sea Mammal Research Unit, University of St Andrews, Report to Scottish Government, no. US1 & 6 addendum, St Andrews, 14pp.

Tougaard, J., Buckland, S., Robinson, S. and Southall B., 2013. An analysis of potential broad-scale impacts on harbour porpoise from proposed pile driving activities in the North Sea. Report of an expert group convened under the Habitats and Wild Birds Directives – Marine Evidence Group. MB0138. 38pp.

## 7 Abbreviations/Acronyms

AA	Appropriate Assessment
AAIR	Appropriate Assessment Information Report
ABPmer	ABP Marine Environmental Research Ltd
ADD	Acoustic Deterrent Devices
AEOI	Adverse Effect on Integrity
BPEO	Best Practical Environmental Option
CRA	Collision Risk Assessment
cSAC	candidate Special Area of Conservation
DCLG	Department for Communities and Local Government
Defra	Department for Environment, Food and Rural Affairs
DoENI	Department of the Environment Northern Ireland
dSPA	draft Special Protection Area
EC	European Commission
EEZ	Exclusive Economic Zone
EIA	Environmental Impact Assessment
EMEC	European Marine Energy Centre
EMF	Electromagnetic Field
ERM	Encounter Risk Model
ETPM	Exposure Time Population Model
GIS	Geographic Information System
HRA	Habitat Regulations Assessment
IAMMWG	Inter-Agency Marine Mammal Working Group
IPR	Iterative Plan Review
IROPI	Imperative Reasons of Overriding Public Interest
JNCC	Joint Nature Conservation Committee
LSE	Likely Significant Effect
MARINET	Marine Renewables Infrastructure Network
MCZ	Marine Conservation Zone
MDE	Marine Data Exchange
MEP	Marine Energy Pembrokeshire
MRE	Marine Renewable Energy
MREP	Marine Renewable Energy Programme
MU	Management Unit
MW	Megawatts
NRW	Natural Resources Wales
ORE	Offshore Renewable Energy
ORJIP	Offshore Renewables Joint Industry Programme
PBR	Potential Biological Removal
PCOD	Population Consequences of Disturbance
PFOW	Pentland Firth and Orkney Waters
PINS	Planning Inspectorate for England and Wales
pSAC	proposed Special Area of Conservation
pSPA	proposed Special Protection Area
PVA	Population Viability Analysis
Ramsar	Wetlands of international importance, designated under the Convention on Wetlands (Ramsar, Iran, 1971)
SAC	Special Area of Conservation
SCI	Site of Community Importance

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SI	Statutory Instrument
SMRU	Sea Mammal Research Unit
SNCB	Statutory Nature Conservation Body
SNH	Scottish Natural Heritage
SORRS	Scottish Offshore Renewables Research Strategy
SPA	Special Protection Area
SRSL	SAMS Research Services Ltd
SpORRAn	Scottish Offshore Renewable Research Framework
UK	United Kingdom
W&TL	Wave and Tidal Further Leasing

Cardinal points/directions are used unless otherwise stated.

SI units are used unless otherwise stated.

# Appendices



## A Information Sources

**Table A1. Key information gathering sources**

Organisation	Web Link	Brief Description	Relevant Interest Feature Group
Agence des Aires Marines Protégées	<a href="http://www.aires-marines.com/">http://www.aires-marines.com/</a>	French public agency involved in the protection of the marine environment. This organisation holds information regarding the French EEZ.	All
EMEC	<a href="http://www.emec.org.uk/research/emec-site-specific-projects/">http://www.emec.org.uk/research/emec-site-specific-projects/</a>	Site specific outcomes of monitoring at the test/demonstration sites. Link to published reports.	All
France Energies Marines	<a href="http://en.france-energies-marines.org/R-D">http://en.france-energies-marines.org/R-D</a> <a href="http://en.france-energies-marines.org/Centre-de-ressources">http://en.france-energies-marines.org/Centre-de-ressources</a>	Research and development programmes for marine renewable energy devices. There are test sites around France	All
Fundy Force	<a href="http://fundyforce.ca/environment/research/">http://fundyforce.ca/environment/research/</a>	Test centre in Canada which works with developers, regulators and researchers to study and monitor tidal turbines in the bay of Fundy.	All
Future of the Atlantic Marine Environment (FAME)	<a href="http://www.fameproject.eu/en/">http://www.fameproject.eu/en/</a> <a href="http://www.fameproject.eu/en/results/united-kingdom/">http://www.fameproject.eu/en/results/united-kingdom/</a>	Five countries (UK, Ireland, France, Spain and Portugal) that are running projects ranging from seabird tracking and monitoring to mapping, data analysis and engagement with the offshore renewable energy sector.	Birds
Marine Energy Pembrokehire (MEP)	<a href="http://www.marineenergypembrokeshire.co.uk/">http://www.marineenergypembrokeshire.co.uk/</a>	Partnership between developers, academia and the public sector. Provides guidance and publications to support growth of the marine energy sector.	Birds Marine Mammals Fish
Marine Scotland	<a href="http://www.scotland.gov.uk/Topics/marine/marineenergy/Research">http://www.scotland.gov.uk/Topics/marine/marineenergy/Research</a> <a href="http://www.scotland.gov.uk/Topics/marine/Publications/publicationslatest/energy">http://www.scotland.gov.uk/Topics/marine/Publications/publicationslatest/energy</a>	Marine Renewable Energy Programme (MREP) established in 2011 to give scientific support to policy development.	Birds Marine Mammals Fish
Marine Scotland	No website available yet	Scottish Offshore Renewable Research Framework (SpORRAn) initiative. A recent group set up under the Iterative Plan Review (IPR) process for the Sectoral Marine Plans for Wind, Wave and Tidal Energy Generation in Scottish waters. SpORRAn will be underpinned by a new Scottish Offshore Renewables Research Strategy (SORRS).	
MARINELife	<a href="http://www.marine-life.org.uk/press-publications/publications-reports/2009---present-day">http://www.marine-life.org.uk/press-publications/publications-reports/2009---present-day</a>	Ferry-based marine mammal and bird surveys in the English Channel, North Sea and the Bay of Biscay since 1995.	Marine Mammals
MARINET	<a href="http://www.fp7-marinet.eu/">http://www.fp7-marinet.eu/</a>	A European network of world class research infrastructures to develop offshore renewable energy.	All
Offshore Renewables Joint Industry Programme (ORJIP) Ocean Energy	<a href="http://www.orjip.org.uk/">http://www.orjip.org.uk/</a>	A joint industry project aimed at reducing the consenting risk for ocean energy projects by highlighting the key research, monitoring and process related priorities for the sectors to address.	All

Organisation	Web Link	Brief Description	Relevant Interest Feature Group
ORJIP Ocean Energy, Forward Look	<a href="http://www.orjip.org.uk/sites/default/files/ORJIP_Ocean_Energy_Forward_Look_2.pdf">http://www.orjip.org.uk/sites/default/files/ORJIP_Ocean_Energy_Forward_Look_2.pdf</a>	The objective of the Forward Look is to inform the focus of ORJIP Ocean Energy, ensuring that research is focused on priority consenting EIA/HRA issues for the wave and tidal sectors, projects are coordinated to avoid duplication of effort, and key information and data gaps are addressed. The Forward Look builds upon the work previously undertaken by Aquatera; incorporating evolving sector needs and consideration of recent completed research as well as planned and ongoing research.	All
Offshore Renewable Energy (ORE) Catapult	<a href="https://ore.catapult.org.uk/">https://ore.catapult.org.uk/</a>	A knowledge network that facilitates the exchange of data in the emerging wave and tidal energy industry.	All
Sea Mammal Research Unit (SMRU) Consulting Ltd.	<a href="http://www.smruconsulting.com/projects/">http://www.smruconsulting.com/projects/</a> <a href="http://www.smruconsulting.com/reports-publications/">http://www.smruconsulting.com/reports-publications/</a>	Running a large number of projects including the Population Consequences of Disturbance Framework (PCOD). This framework has been developed for assessing the effects of underwater noise disturbance generated by offshore energy developments on marine mammals.	Marine Mammals
SMRU	<a href="http://www.smru.st-andrews.ac.uk/pageset.aspx?psr=152">http://www.smru-st-andrews.ac.uk/pageset.aspx?psr=152</a>	Marine mammal research publications.	Marine Mammals
Tethys	<a href="http://tethys.pnnl.gov/">http://tethys.pnnl.gov/</a>	A knowledge management system that gathers information on how ORE devices interact with the environment.	All
The Crown Estate	<a href="http://www.marinedataexchange.co.uk/">http://www.marinedataexchange.co.uk/</a>	The Marine Data Exchange holds information on survey data and reports during all stages of offshore renewable energy projects.	Habitats Birds Marine Mammals Fish
	<a href="http://www.thecrownestate.co.uk/energy-and-infrastructure/wave-and-tidal/wave-and-tidal-current/pentland-firth-and-orkney-waters/enabling-actions/projects-and-publications/">http://www.thecrownestate.co.uk/energy-and-infrastructure/wave-and-tidal/wave-and-tidal-current/pentland-firth-and-orkney-waters/enabling-actions/projects-and-publications/</a>	Enabling actions project. The Crown Estate funded and supported work that accelerates and de-risks development of the wave and tidal projects in the Pentland Firth and Orkney waters, to facilitate successful and timely construction and operation.	All

**Table A2. Key new scientific evidence and guidance**

Reference	Web Link	Brief Description	Relevant Interest Feature Group
Benjamins <i>et al.</i> (2014)	<a href="http://www.snh.org.uk/pdfs/publications/commissioned_reports/791.pdf">http://www.snh.org.uk/pdfs/publications/commissioned_reports/791.pdf</a>	This research looked at the risk of marine mammals becoming entangled with a rope or line, and the environmental and biological factors that might influence that risk. Pinnipeds and bottlenose dolphins were considered to have the smallest risk of becoming entangled as they are small and agile and are able to detect objects in the water from tens of metres away.	Marine Mammals
Bradbury <i>et al.</i> (2014)	<a href="http://journals.plos.org/plosone/article?id=10.1371/journal.pone.0106366">http://journals.plos.org/plosone/article?id=10.1371/journal.pone.0106366</a>	This work presents a Geographic Information System (GIS) tool, SeaMaST (Seabird Mapping and Sensitivity Tool), to provide evidence on the use of sea areas by seabirds and inshore waterbirds in English territorial waters, mapping their relative sensitivity to offshore wind farms. The underpinning seabird abundance analysis has been extended UK wide and could be used as a basis for applying sensitivity indices for wave and tidal development (and other industries).	Birds
BSG Ecology (2014)	<a href="http://www.bsg-ecology.com/research/bsg-ecology-bat-migration-research-2012-2014/">http://www.bsg-ecology.com/research/bsg-ecology-bat-migration-research-2012-2014/</a>	Research on the evidence for bat migration between the UK and continental Europe in 2012. It was found that bats can forage and migrate over greater distances than previously considered.	Bats
Copping <i>et al.</i> (2016)	<a href="http://tethys.pnnl.gov/annex-iv-2016-state-science-report-public-review-draft">http://tethys.pnnl.gov/annex-iv-2016-state-science-report-public-review-draft</a>	This Annex IV 2016 State of the Science Report summarises the current evidence of interactions and effects of marine renewable energy (MRE) devices on the marine environment, the animals that live there, and the habitats that support them. This report serves as an update and a complement to the 2013 Annex IV report that can be found at <a href="http://tethys.pnnl.gov/publications/state-of-the-science-2016">http://tethys.pnnl.gov/publications/state-of-the-science-2016</a> .	All
Guerin <i>et al.</i> (2014)	<a href="http://www.thecrownestate.co.uk/media/5534/published-eri-salmon-migration-report.pdf">http://www.thecrownestate.co.uk/media/5534/published-eri-salmon-migration-report.pdf</a>	This work considers methods for assessing the likelihood that salmon originating from Scottish rivers will pass close enough to an installation to experience potential effects from, for example, noise, electromagnetic emissions or physical interaction with devices.	Fish
Inter-Agency Marine Mammal Working Group (IAMMWG) (2015)	<a href="http://jncc.defra.gov.uk/pdf/Report_547_webv2.pdf">http://jncc.defra.gov.uk/pdf/Report_547_webv2.pdf</a>	The final Management Units (MUs) for marine mammals have been published by the UK IAMMWG. This report identified an additional MU associated with south west coastal populations of bottlenose dolphins which are considered to be a combination of transients, occasional visitors and residents.	Marine Mammals
Jones <i>et al.</i> (2015)	<a href="http://www.int-res.com/abstracts/meps/v534/p235-249/">http://www.int-res.com/abstracts/meps/v534/p235-249/</a>	The results illustrate that, for broad-scale marine spatial planning, the conservation needs of harbour seals are different from those of grey seals. More generally, the results illustrate the importance of detailed knowledge of marine predator distributions to inform marine spatial planning.	Marine Mammals
Judd <i>et al.</i> (2015)	<a href="http://cmscoms.com/wp-content/uploads/2015/09/Principles-for-cumulative-effects-assessment-2015-54-254-262.pdf">http://cmscoms.com/wp-content/uploads/2015/09/Principles-for-cumulative-effects-assessment-2015-54-254-262.pdf</a>	The report provides a set of principles for the practical implementation of marine cumulative effects assessment.	All

Reference	Web Link	Brief Description	Relevant Interest Feature Group
Lepper <i>et al.</i> (2014)	<a href="http://www.snh.org.uk/pdfs/publications/commissioned_reports/517.pdf">http://www.snh.org.uk/pdfs/publications/commissioned_reports/517.pdf</a>	This research concluded that there is a possible risk that Acoustic Deterrent Devices (ADDs) could exceed injury criteria for both seals and porpoises and cause permanent hearing damage.	Marine Mammals
Marine Scotland	<a href="http://www.gov.scot/Topics/marine/Licensing/marine/tool">http://www.gov.scot/Topics/marine/Licensing/marine/tool</a>	The IMPACT tool allows users to identify the potential key environmental impacts associated with wave and tidal energy developments and to access guidelines and recommendations for how best to assess, monitor and manage these impacts.	All
Natural Resources Wales (NRW) (2015)	<a href="http://www.naturalresources.wales/media/4856/guidance-to-inform-marine-mammal-site-characterisation-requirements-at-wave-and-tidal-stream-energy-sites-in-wales-2015.pdf">http://www.naturalresources.wales/media/4856/guidance-to-inform-marine-mammal-site-characterisation-requirements-at-wave-and-tidal-stream-energy-sites-in-wales-2015.pdf</a>	NRW commissioned a report carried out by SMRU Consulting to inform marine mammal site characterisation requirements at wave and tidal stream energy sites in Wales. This project developed a framework for assessing risk to marine mammals from wave and tidal stream developments and provides guidance on how to tailor surveys to provide better information for impact assessments.	Marine Mammals
Pirotta <i>et al.</i> (2015)	<a href="http://www.abdn.ac.uk/lighthouse/documents/Pirotta_et_al_2015_effects_of_boat_disturbance_on_dolphins.pdf">http://www.abdn.ac.uk/lighthouse/documents/Pirotta_et_al_2015_effects_of_boat_disturbance_on_dolphins.pdf</a>	This paper highlights the importance of the physical presence of a vessel rather than just noise stimuli in causing disturbance in bottlenose dolphins.	Marine Mammals
Scottish Natural Heritage (SNH) (2015)	Awaiting publication. Consultation draft available from: <a href="http://www.snh.gov.uk/planning-and-development/renewable-energy/consultations/">http://www.snh.gov.uk/planning-and-development/renewable-energy/consultations/</a>	The purpose of this guidance note is to provide an overview of the three most commonly used models for collision risk assessment (CRA) of marine wildlife that may interact with tidal turbines, and provide, for each, instructions on how to undertake a collision risk assessment for an operational tidal array. The approaches to be covered are: <ul style="list-style-type: none"> <li>• The Band/SNH collision risk model (CRM);</li> <li>• The SRSL / Wilson <i>et al</i> encounter rate model (ERM); and</li> <li>• The exposure time population model (ETPM), developed for diving birds by RPS under contract to SNH.</li> </ul>	Marine Mammals Birds
The Crown Estate (2014)	<a href="http://www.nerc.ac.uk/innovation/activities/infrastructure/offshore/nerc-crown-estate-workshop/">http://www.nerc.ac.uk/innovation/activities/infrastructure/offshore/nerc-crown-estate-workshop/</a>	This report identifies the key strategic EIA/HRA issues facing the tidal (and wave) sector, the priority research gaps and how these can be addressed through a coordinated programme.	All
Thompson <i>et al.</i> (2015)	<a href="http://www.smrु.st-andrews.ac.uk/documents/scotgov/USD1and%206_addendum_report_VF2.pdf">http://www.smrु.st-andrews.ac.uk/documents/scotgov/USD1and%206_addendum_report_VF2.pdf</a>	This report presents evidence that 'corkscrew injuries' which were previously thought to be caused by ducted propellers and azimuth thrusters (used for dynamic positioning of vessels) can be caused by grey seal predation on weaned grey seal pups. Despite this work, the possibility still exists that some of the corkscrew injuries could be caused by interactions with propellers. Further research is underway to try to resolve these issues.	Marine Mammals
Tougaard <i>et al.</i> (2013)	<a href="http://randd.defra.gov.uk/Default.aspx?Menu=Menu&amp;Module=More&amp;Location=None&amp;ProjectID=19403&amp;FromSearch=Y&amp;Publisher=1&amp;SearchText=MB0138&amp;SortString=ProjectCode&amp;SortOrder=Asc&amp;Paging=10#Description">http://randd.defra.gov.uk/Default.aspx?Menu=Menu&amp;Module=More&amp;Location=None&amp;ProjectID=19403&amp;FromSearch=Y&amp;Publisher=1&amp;SearchText=MB0138&amp;SortString=ProjectCode&amp;SortOrder=Asc&amp;Paging=10#Description</a>	An expert group provides an objective, scientific assessment of the potential noise disturbance impacts of planned large-scale offshore wind energy development on marine mammals in the North Sea.	Marine Mammals

## B Changes in Existing and Planned European/ Ramsar Sites

Table B1. Changes in status of existing and planned European/Ramsar sites in the UK (April 2016)<sup>11</sup>

Changes	Description	Link to Further Information	Interest Features
Extensions to existing SPAs	Three Welsh SPAs in Wales were extended in October 2014 (Aberdaron Coast and Bardsey Island SPA, Skokholm and Skomer SPA and Grassholm SPA). These extensions involved updating the lists of bird species and numbers of birds, as well as extending the existing boundaries seawards.	<a href="https://naturalresources.wales/about-us/consultations/our-own-consultations-closed/consultation-on-proposed-changes-to-three-existing-special-protection-areas-spas/?lang=en">https://naturalresources.wales/about-us/consultations/our-own-consultations-closed/consultation-on-proposed-changes-to-three-existing-special-protection-areas-spas/?lang=en</a>	Gannet <i>Morus bassanus</i> Chough <i>Pyrhcorax pyrrhcorax</i> Manx Shearwater <i>Puffinus puffinus</i> Storm Petrel <i>Hydrobates pelagicus</i> Manx Shearwater <i>Puffinus puffinus</i> Puffin <i>Fratercula arctica</i> Chough <i>Pyrhcorax pyrrhcorax</i> Short Eared Owl <i>Asio flammeus</i> Lesser Black Backed Gull <i>Larus fuscus</i> Breeding assemblage of over 20,000 seabirds
Possible extensions to marine SPAs	Natural England sought views on the proposals to extend the Flamborough Head and Bempton Cliffs SPA and revise the landward boundary of the Flamborough Head SAC. The consultation ended 14 April 2014 and Natural England is currently analysing feedback.	<a href="https://www.gov.uk/government/consultations/flamborough-and-filey-coast-potential-special-protection-area-pspa-and-flamborough-head-possible-special-area-of-conservation-psac">https://www.gov.uk/government/consultations/flamborough-and-filey-coast-potential-special-protection-area-pspa-and-flamborough-head-possible-special-area-of-conservation-psac</a>	Black-Legged Kittiwake <i>Rissa tridactyla</i> Northern Gannet <i>Morus bassanus</i> Common Guillemot <i>Uria aalge</i> Razorbill <i>Alca torda</i> Reefs Submerged or partially submerged sea caves Vegetated sea cliffs of the Atlantic and Baltic coasts
	The Department of the Environment Northern Ireland (DoENI) is currently consulting on proposals to extend the existing boundary of Carlingford Lough SPA to include the marine area adjoining the existing SPA and a further area off the south-east County Down coast. The consultation will close on 14 April 2016.	<a href="https://www.doeni.gov.uk/consultations/carlingford-lough-spa-renotification">https://www.doeni.gov.uk/consultations/carlingford-lough-spa-renotification</a>	Sandwich Tern <i>Sterna sandvicensis</i> , Common Tern <i>Sterna hirundo</i> Light-Bellied Brent Goose <i>Branta bernicla hrota</i>
	Natural England and the Joint Nature Conservation Committee (JNCC) are seeking views on the proposal to extend the Outer Thames Estuary SPA (SPA) marine site. This consultation close on 21 April 2016.	<a href="https://www.gov.uk/government/consultations/outer-thames-estuary-special-protection-area-extension-comment-on-proposals">https://www.gov.uk/government/consultations/outer-thames-estuary-special-protection-area-extension-comment-on-proposals</a>	Red Throated-Diver <i>Gavia stella</i>

<sup>11</sup> The status of these sites will change as the sites become designated. The most up to date information on designated and proposed sites will need to be used when carrying out project-level assessments.

Changes	Description	Link to Further Information	Interest Features
	Natural England is seeking views on the proposal to extend Hamford Water SPA marine site. This consultation will close on 21 April 2016.	<a href="https://www.gov.uk/government/consultations/hamford-water-special-protection-area-extension-comment-on-proposals">https://www.gov.uk/government/consultations/hamford-water-special-protection-area-extension-comment-on-proposals</a>	Little Tern <i>Sternula albifrons</i> Avocet <i>Recurvirostra avosetta</i> Dark-Bellied Brent Goose <i>Branta bernicla bernicla</i> Black-Tailed Godwit <i>Limosa limosa</i> Redshank <i>Tringa totanus</i> Ringed Plover <i>Charadrius hiaticula</i> Shelduck <i>Tadorna tadorna</i> Teal <i>Anas crecca</i> Grey Plover <i>Pluvialis squatorola</i>
	Natural England is seeking views on the proposal to extend Poole Harbour SPA. This consultation will close on 21 April 2016.	<a href="https://www.gov.uk/government/consultations/poole-harbour-special-protection-area-extension-comment-on-proposals">https://www.gov.uk/government/consultations/poole-harbour-special-protection-area-extension-comment-on-proposals</a>	Common Tern <i>Sterna hirundo</i> Sandwich Tern <i>Sterna sandvicensis</i> Black-Tailed Godwit <i>Limosa limosa</i>
	Natural Resources Wales (NRW) is currently consulting on the proposed marine extension to two existing SPAs in Welsh waters (Anglesey Terns and Skomer, Skokholm and the Seas off Pembrokeshire). The consultation is due to end on 3 May 2016.	<a href="https://naturalresources.wales/about-us/consultations/our-own-consultations/proposed-new-marine-special-areas-of-conservation-and-special-protection-areas/proposed-new-marine-special-areas-of-conservation-and-special-protection-areas/?lang=en">https://naturalresources.wales/about-us/consultations/our-own-consultations/proposed-new-marine-special-areas-of-conservation-and-special-protection-areas/proposed-new-marine-special-areas-of-conservation-and-special-protection-areas/?lang=en</a>	Arctic Tern <i>Sterna paradisae</i> Common Tern <i>Sterna hirundo</i> Roseate Tern <i>Sterna dougallii</i> Sandwich Tern <i>Sterna sandvicensis</i> Storm Petrel <i>Hydrobates pelagicus</i> Lesser Black-Backed Gull <i>Larus fuscus</i> Manx Shearwater <i>Puffinus puffinus</i> Atlantic Puffin <i>Fratercula arctica</i> Breeding seabird assemblage
Possible changes to marine SPAs	Natural England is seeking views on the proposal to combine and extend 2 existing sites (Morecambe Bay and Duddon Estuary pSPA) as a single Special Protection Area (SPA). The consultation will close on 21 April 2016.	<a href="https://www.gov.uk/government/consultations/morecambe-bay-and-duddon-estuary-special-protection-area-changes-comment-on-proposals">https://www.gov.uk/government/consultations/morecambe-bay-and-duddon-estuary-special-protection-area-changes-comment-on-proposals</a>	Black-Tailed Godwit <i>Limosa limosa</i> Whooper Swan <i>Cygnus Cygnus</i> Little Egret <i>Egretta garzetta</i> Mediterranean Gull <i>Larus melanocephalus</i> Lesser Black-Backed Gull <i>Larus fuscus</i> Ruff <i>Philomachus pugnax</i>
Possible new marine SPAs	Natural England sought views on the proposal to designate Falmouth Bay to St Austell Bay as a pSPA. The consultation ended 21 July 2014 and Natural England is currently analysing feedback.	<a href="https://www.gov.uk/government/consultations/falmouth-bay-to-st-austell-bay-potential-special-protection-area-pspa">https://www.gov.uk/government/consultations/falmouth-bay-to-st-austell-bay-potential-special-protection-area-pspa</a>	Black-Throated Divers <i>Gavia arctica</i> Great Northern Divers <i>Gavia immer</i> Slavonian Grebes <i>Podiceps auritus</i>
	DoENI is currently consulting on proposals to classify an area off the East Coast of Northern Ireland as a marine SPA. The consultation will close on 14 April 2016.	<a href="https://www.doeni.gov.uk/consultations/east-coast-northern-ireland-marine-special-protection-area-consultation">https://www.doeni.gov.uk/consultations/east-coast-northern-ireland-marine-special-protection-area-consultation</a>	Great Crested Grebe <i>Podiceps cristatus</i> Red-Throated Diver <i>Gavia stellata</i> Manx Shearwater <i>Puffinus puffinus</i> Sandwich Tern <i>Sterna sandvicensis</i> Common Tern <i>Sterna hirundo</i> Arctic Tern <i>Sterna paradisae</i>
	Natural England is seeking views on the proposal to designate the Solent and Dorset Coast as a pSPA. The consultation will close on 21 April 2016.	<a href="https://www.gov.uk/government/consultations/solent-and-dorset-coast-potential-special-protection-area-comment-on-proposals">https://www.gov.uk/government/consultations/solent-and-dorset-coast-potential-special-protection-area-comment-on-proposals</a>	Sandwich Tern <i>Sterna sandvicensis</i> , Common Tern <i>Sterna hirundo</i> Little Tern <i>Sternula albifrons</i>

Changes	Description	Link to Further Information	Interest Features
	Natural England is seeking views on the proposal to designate Northumberland Marine as a pSPA. The consultation will close on 21 April 2016.	<a href="https://www.gov.uk/government/consultations/northumberland-marine-potential-special-protection-area-comment-on-proposals">https://www.gov.uk/government/consultations/northumberland-marine-potential-special-protection-area-comment-on-proposals</a>	Sandwich Tern <i>Sterna sandvicensis</i> , Common Tern <i>Sterna hirundo</i> Little Tern <i>Sternula albifrons</i> Arctic Tern <i>Sterna paradisae</i> Roseate Tern <i>Sterna dougallii</i> Atlantic Puffin <i>Fratercula arctica</i> Common Guillemot <i>Uria aalge</i>
	NRW is currently consulting on proposals to designate Northern Cardigan Bay as a new pSPA. The consultation is due to end on 3 May 2016.	<a href="https://naturalresources.wales/about-us/consultations/our-own-consultations/proposed-new-marine-special-areas-of-conservation-and-special-protection-areas/proposed-new-marine-special-areas-of-conservation-and-special-protection-areas/?lang=en">https://naturalresources.wales/about-us/consultations/our-own-consultations/proposed-new-marine-special-areas-of-conservation-and-special-protection-areas/proposed-new-marine-special-areas-of-conservation-and-special-protection-areas/?lang=en</a>	Red-Throated Diver <i>Gavia stellate</i>
	There is a suite of marine draft SPAs (dSPAs) that have been recommended to Scottish Government by Scottish Natural Heritage (SNH) and the JNCC. The possible addition of these 14 SPAs for marine birds in Scotland will be subject to formal public consultation prior to any decision being made on their inclusion in the SPA network. The timescale for this process is unknown.	<a href="http://www.snh.gov.uk/protecting-scotlands-nature/protected-areas/international-designations/spa/marine-spas/">http://www.snh.gov.uk/protecting-scotlands-nature/protected-areas/international-designations/spa/marine-spas/</a>	Greater Scaup <i>Aythya marila</i> Common Eider <i>Somateria mollissima mollissima</i> Common Eider <i>Somateria mollissima faeroensis</i> Long-Tailed Duck <i>Clangula hyemalis</i> Common Scoter <i>Melanitta nigra</i> Velvet Scoter <i>Melanitta fusca</i> Common Goldeneye <i>Bucephala clangula</i> Red-Breasted Merganser <i>Mergus serrator</i> Goosander <i>Mergus merganser</i> Red-Throated Diver <i>Gavia stellata</i> Black-Throated Diver <i>Gavia arctica</i> Great Northern Diver <i>Gavia immer</i> Slavonian Grebe <i>Podiceps auritus</i> . Northern Fulmar <i>Fulmarus glacialis</i> Manx Shearwater <i>Puffinus puffinus</i> European Storm-Petrel <i>Hydrobates pelagicus</i> Northern Gannet <i>Morus bassanus</i> European Shag <i>Phalacrocorax aristotelis</i> Arctic Skua <i>Stercorarius parasiticus</i> Great Skua <i>Stercorarius skua</i> Black-Legged Kittiwake <i>Rissa tridactyla</i> Black-Headed Gull <i>Chroicocephalus ridibundus</i> Little Gull <i>Hydrocoloeus minutus</i> Common Gull <i>Larus canus</i> Herring Gull <i>Larus argentatus</i> Little Tern <i>Sternula albifrons</i> Sandwich Tern <i>Sterna sandvicensis</i>

Changes	Description	Link to Further Information	Interest Features
			Common Tern <i>Sterna hirundo</i> Arctic Tern <i>Sterna paradisaea</i> Common Guillemot <i>Uria aalge</i> Razorbill <i>Alca torda</i> Atlantic Puffin <i>Fratercula arctica</i>
Possible extension to SAC	Natural England sought views on the proposals to revise the landward boundary of the Flamborough Head SAC. The consultation ended 14 April 2014 and Natural England is currently analysing feedback.	<a href="https://www.gov.uk/government/consultations/flamborough-and-filey-coast-potential-special-protection-area-pspa-and-flamborough-head-possible-special-area-of-conservation-psac">https://www.gov.uk/government/consultations/flamborough-and-filey-coast-potential-special-protection-area-pspa-and-flamborough-head-possible-special-area-of-conservation-psac</a>	Reefs Vegetated sea cliffs of the Atlantic and Baltic Coasts Submerged or partially submerged sea caves Fisher's estuarine moth
New SCI	A number of cSACs were updated to SCI status in May 2015 (Sound of Barra in Scotland, Hamford Water, and Tankerton Slopes and Swalecliff in England).	<a href="http://jncc.defra.gov.uk/page-1488">http://jncc.defra.gov.uk/page-1488</a>	Sandbanks which are slightly covered by sea water all the time Reefs
Possible new marine SACs	NRW is currently consulting on three pSACs in Welsh waters (North Anglesey Marine, West Wales Marine and Bristol Channel Approaches). The consultation is due to end on 3 May 2016.	<a href="https://naturalresources.wales/about-us/consultations/our-own-consultations/proposed-new-marine-special-areas-of-conservation-and-special-protection-areas/proposed-new-marine-special-areas-of-conservation-and-special-protection-areas/?lang=en">https://naturalresources.wales/about-us/consultations/our-own-consultations/proposed-new-marine-special-areas-of-conservation-and-special-protection-areas/proposed-new-marine-special-areas-of-conservation-and-special-protection-areas/?lang=en</a>	Harbour porpoise <i>Phocoena phocoena</i>
	JNCC is currently consulting on three pSACs in UK waters (Bristol Channel Approaches, North Channel and Southern North Sea). The consultation is due to end on 3 May 2016.	<a href="http://jncc.defra.gov.uk/SACconsultation">http://jncc.defra.gov.uk/SACconsultation</a>	Harbour porpoise <i>Phocoena phocoena</i>
	SNH is currently consulting on the Inner Hebrides and the Minches pSAC in Scottish waters. The consultation is due to end on 18 May 2016.	<a href="http://www.snh.gov.uk/protecting-scotlands-nature/protected-areas/2016-harbour-porpoise-consultation/">http://www.snh.gov.uk/protecting-scotlands-nature/protected-areas/2016-harbour-porpoise-consultation/</a>	Harbour porpoise <i>Phocoena phocoena</i>



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Creating sustainable solutions for the marine environment