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# Northern Cardigan Bay / Gogledd Bae Ceredigion Special Protection Area

Advice provided by Natural Resources Wales in fulfilment of Regulation 37 of the Conservation of Habitats and Species Regulations 2017.

January 2019

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## Summary

This document contains Natural Resources Wales's advice issued under Regulation 37 of the Conservation Regulations 2017, for the *Northern Cardigan Special Protection Area* namely conservation objectives and advice on operations. It also includes an explanation of the purpose and format of NRW's "Regulation 37 advice".

**Table 1 summarises the features for the site and provides a direct link to the Conservation Objectives but it is important that all sections are read in full.**

This report is divided into a series of sections as follows:

**Section 1** is a brief introduction to the legal context for Regulation 35 advice.

**Section 2** explains in more detail the legal basis and practical requirements for setting conservation objectives for Natura 2000 sites, as understood by NRW. It also explains the legal and practical basis of the operations advice.

**Section 3** contains a brief overall description of *Northern Cardigan Bay SPA*, current operations taking place within the SPA and information on modifications as a result of human activity.

**Section 4** describes species for which the *Northern Cardigan Bay SPA* has been selected as a SPA as well as why they are considered important. The information is presented using the same headings as those used to describe the conservation objectives so that useful underpinning information in support of these objectives can easily be referenced.

**Section 5** contains NRW's advice as to the conservation objectives (Regulation 37(3)(a)) for the features for which the site has been designated as a SPA. This includes a vision statement which is a descriptive overview of what needs to be achieved for conservation on the site. It brings together and summarises the Conservation Objectives into a single, integrated statement about the site.

**Section 6** contains NRW's advice as to the operations which may cause deterioration or disturbance of the habitats and species for which the sites has been selected (Regulation 37(3)(b)). This is provided to assist the relevant authorities and others in understanding the implications of the designation of the sites and the requirements of the Habitats Regulations and government policy towards it.

**Table 1:** Summary of site features and link to Conservation Objectives.

Site Name	Designated Features	Link to Conservation Objectives
Northern Cardigan Bay SPA	<ul style="list-style-type: none"> <li>Red-throated diver <i>Gavia stellata</i></li> </ul>	<a href="#">Conservation objectives</a>

## Crynodeb

Mae'r ddogfen hon yn cynnwys cyngor gan CNC a roddwyd dan Reoliad 37 Rheoliadau Cadwraeth 2017, ar gyfer *Gogledd Bae Ceredigion* AGA, sef amcanion cadwraethol a chyngor ynghylch gweithrediadau. Mae hefyd yn cynnwys esboniad o bwrpas a fformat "cyngor Rheoliad 37" CNC.

**Mae Tabl 1 yn rhestru'r nodweddion ar gyfer y safle a hefyd cynhwysir dolen sy'n arwain yn syth at yr Amcanion Cadwraethol, ond mae'n bwysig i'r holl adrannau gael eu darllen yn llwyr.**

Caiff yr adroddiad hwn ei rannu'n gyfres o adrannau, fel a ganlyn:  
Yn **Adran 1** ceir cyflwyniad byr i gyd-destun cyfreithiol cyngor Rheoliad 37.

Mae **Adran 2** yn esbonio'n fwy manwl y sylfaen gyfreithiol a'r gofynion ymarferol wrth bennu amcanion cadwraethol ar gyfer safleoedd Natura 2000, fel y'u deellir gan CNC. Ymhellach, mae'n esbonio'r sylfaen gyfreithiol ac ymarferol parthed cyngor ynghylch gweithrediadau.

Mae **Adran 3** yn cynnwys disgrifiad cyffredinol byr o *Gogledd Bae Ceredigion* AGA y gweithrediadau sydd ar waith ar hyn o bryd oddi mewn i'r AGA a gwybodaeth am addasiadau o ganlyniad i weithgareddau pobl. Yn yr adran hon hefyd ceir disgrifiad byr o'r tair Ardal Gwarchodaeth Arbennig sydd i'w cael naill ai'n gyfan gwbl neu'n rhannol oddi mewn i ffiniau'r ACA.

Yn **Adran 4** ceir disgrifiad o'r cynefinoedd a'r rhywogaethau sy'n sail i'r rheswm pam y dewiswyd *Gogledd Bae Ceredigion* AGA, yn ogystal â pham y cânt eu hystyried yn bwysig. Caiff yr wybodaeth ei chyflwyno trwy ddefnyddio'r un penawdau â'r rheini a ddefnyddir i ddisgrifio'r amcanion cadwraethol, fel y gellir cyfeirio'n rhwydd at wybodaeth ategol ddefnyddiol sy'n cefnogi'r amcanion hyn.

Mae **Adran 5** yn cynnwys cyngor CNC parthed amcanion cadwraethol (Rheoliad 37(3)(a)) y nodweddion sy'n sail i ddyndiad yr AGA. Mae hyn yn cynnwys datganiad gweledigaeth sy'n drosolwg disgrifiadol o'r hyn y mae angen ei gyflawni o safbwynt cadwraeth ar y safle. Mae'n dwyn ynghyd ac yn crynhoi'r Amcanion Cadwraethol mewn un datganiad integredig ynglŷn â'r safle.

Yn **Adran 6** ceir cyngor CNC o safbwynt y gweithrediadau a allai ddirywio neu amharu ar y cynefinoedd a'r rhywogaethau y cafodd y safle ei ddewis o'u herwydd (Rheoliad 37(3)(b)). Nodir y cyngor hwn er mwyn cynorthwyo'r awdurdodau perthnasol ac eraill i ddeall goblygiadau dynodiad y safle a gofynion y Rheoliadau Cynefinoedd a pholisïau'r llywodraeth.

**Tabl 1:** Crynodeb o nodweddion y safle a dolen yn arwain at yr Amcanion Cadwraethol.

Enw'r Safle	Nodweddion Dynodedig	Cysylltiad â'r Amcanion Cadwraethol
Gogledd Bae Ceredigion AGA	<ul style="list-style-type: none"> <li>Trochydd gyddfgoch <i>Gavia stellata</i></li> </ul>	<a href="#">Amcanion Cadwraethol</a>

## 1. Introduction

The 1992 EC Habitats Directive<sup>1</sup> aims to help conserve the diversity of habitats and species across the European Union. The Habitats Directive requires member states to take a variety of measures aimed at the conservation of biodiversity. These measures include the designation of Special Areas of Conservation (SACs) on land and sea. Each SAC is to be designated for particular habitats and/or species, and they are to be managed in ways that help conserve those habitats and species.

The Habitats Directive is given effect in the UK largely through the Conservation of Habitats and Species Regulations 2017 (“the Habitats Regulations”)<sup>2</sup>. These Regulations set out the powers and duties of UK statutory bodies towards compliance with the requirements of the Habitats Directive. Under these Regulations SACs, together with Special Protection Areas (SPAs) classified under the 1979 EC Birds Directive for the conservation of birds, are called “European sites” and those that include marine areas are called “European marine sites”.

Regulation 37 of the Habitats Regulations requires Natural Resources Wales (NRW) to advise the relevant authorities<sup>3</sup> for each European marine site in, or partly in, Wales as to “(a) the conservation objectives for that site, and (b) any operations which may cause deterioration of natural habitats or the habitats of species, or disturbance of species, for which the site has been designated.” This document contains NRW’s advice under Regulation 37 in relation to the Northern Cardigan Bay SPA.

None of the information contained in this document legally binds any organisation (including NRW) to any particular course of action. However, in exercising their functions in accordance with the requirements of the Habitats Directive, as required by the Habitats Regulations, and in accordance with government policy towards Ramsar sites, the relevant authorities should be guided by the advice contained in this document. This applies to, amongst other things, the establishment of a “management scheme”<sup>4</sup>, if such a scheme is established.

Relevant authorities and others may have obligations towards the conservation of habitats and species that are not features for which the sites comprising the Northern Cardigan Bay SPA has been designated, and such obligations are not affected by this document.

The information contained in this document is based on best available knowledge at time of writing and is subject to review at NRW’s discretion. Further guidance relating to European marine sites is published by the National Assembly for Wales (*European marine sites in England and Wales*, June 1998, Department of the Environment and Welsh Office), CCW (*European marine sites: an introduction to management*, 1998, CCW Bangor) and European Commission (*Guidelines for the establishment of the Natura 2000 network in the marine environment. Application of the Habitats and Birds Directive May 2007*).

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<sup>1</sup> Council Directive 92/43/EEC on the conservation of natural habitats and of wild fauna and flora (OJ No L 206)

<sup>2</sup> <https://www.legislation.gov.uk/ukxi/2017/1012/contents/made>

<sup>3</sup> Defined in regulation 6 of the Habitats Regulations

<sup>4</sup> Regulation 38 of the Habitats Regulations.

## 2. Purpose and format of information provided under Regulation 37

The information provided under Regulation 37 is in two parts: the conservation objectives and the advice on operations. The legal context for each of these elements, the format of the advice and its underlying rationale are explained here. Sections 5 (conservation objectives) and 6 (operations advice) should be read in conjunction with these explanatory notes.

### 2.1 Conservation Objectives Background

#### 2.1.1 Legal Background

The conservation objectives for a European marine site are intended to represent the aims of the Habitats and Birds Directives in relation to that site. The Habitats Directive requires that measures taken under it, including the designation and management of SACs, be designed to maintain or restore habitats and species of European Community importance at “favourable conservation status” (FCS), as defined in Article 1 of the Directive (see Box 1).

#### Box 1: Favourable conservation status as defined in Article 1 of the Habitats Directive

**Conservation status of a natural habitat** means the sum of the influences acting on a natural habitat and its typical species that may affect its long-term natural distribution, structure and functions as well as the long-term survival of its typical species within the territory referred to in Article 2.

The conservation [sic] status of a natural habitat will be taken as ‘favourable’ when:

- its natural range and the areas it covers within that range are stable or increasing, and
- the specific structure and functions which are necessary for its long-term maintenance exist and are likely to continue to exist for the foreseeable future, and
- conservation status of typical species is favourable as defined in [Article] 1(i).

**Conservation status of a species** means the sum of the influences acting on the species concerned that may affect the long-term natural distribution and abundance of its populations within the territory referred to in Article 2;

The conservation status will be taken as ‘favourable’ when:

- population dynamics data on the species concerned indicate that it is maintaining itself on a long-term basis as a viable component of its natural habitat(s), and
- the natural range of the species is neither being reduced, nor is likely to be reduced, for the foreseeable future and
- there is, and will probably continue to be, a sufficiently large habitat to maintain its populations on a long-term basis

Guidance from the European Commission<sup>5</sup> indicates that the Directive intends FCS to be applied at the level of an individual site, as well as to habitats and species across their European range. Therefore, in order to properly express the aims of the Habitats Directive for an individual site, the conservation objectives for a site are essentially to maintain (or restore) the habitats and species of the site at (or to) FCS.

### 2.1.2 Practical Requirements

In practical terms, the conservation objectives for a site set the standards which must be met if the habitats and species (collectively referred to as “features”) are to be at FCS. There are four elements to this. The conservation objectives must;

- 1) form the basis for proactively identifying what actions, if any, need to be taken by those bodies responsible for the management of operations in and around the site, in order to conserve the features.
- 2) inform the consideration of proposed developments, or “plans or projects”<sup>6</sup>, which are likely to significantly affect the features of the site. In order for a plan or project to proceed, it must be ascertained that it will *not* adversely affect the “integrity of a site”<sup>7</sup>. This depends on whether or not the plan or project will adversely affect the conservation status of one or more of the features and therefore requires direct reference to the conservation objectives.
- 3) set the standard against which NRW reports to government on the conservation status of the features on the site. Government in turn will use this information, together with that from other SPAs and on the status of habitats and species outside designated sites, to report to the EC on the implementation and effectiveness of the Habitats Directive.
- 4) set the standard against which the appropriateness of management can be judged. If the conservation objectives are not being met it may be due to inappropriate management of the site or to factors originating outside the site or outside the control of those responsible for management, or a combination.

To achieve this we provide conservation objectives covering all the elements of FCS as set out in the Directive, at the same time as being suitable for guiding the preparation of management plans and testing the acceptability or otherwise of the effects of plans and projects. Box 2 indicates the various aspects of conservation status described in this package to help explain the conservation objectives. NRW also uses a related set of “performance indicators” which supports monitoring<sup>8</sup> and allows judgements to be made

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<sup>5</sup> European Commission (2000). *Managing Natura 2000 sites: the provisions of Article 6 of the Habitats Directive 92/43/EEC*. DGXI, Brussels, p.18.

<sup>6</sup> Plans and projects are certain types of operation that the Habitats Directive and Regulations require be subject to specific procedures. Plans or projects considered likely to have a significant effect on a European (marine) site must be subject to appropriate assessment of their implications for the site in view of the site’s conservation objectives. The carrying out of an appropriate assessment must include consultation with NRW, and such consultation is a separate process to the advice in this document. The information in this document is intended to assist in the identification of plans and projects which are likely to require appropriate assessments, and will form the basis for advice given by NRW in relation to individual plans and projects.

<sup>7</sup>“Integrity of the site” is not defined in the legislation, but has been defined by the UK government as “the coherence of its ecological structure and function, across its whole area, that enables it to sustain the habitat, complex of habitats and/or the levels of populations of the species for which it was classified [i.e. designated]”. This definition is similar in intent to FCS.

<sup>8</sup> Monitoring is defined as “Surveillance undertaken to ensure that formulated standards are being maintained. The term is also applied to compliance monitoring against accepted standards to ensure that agreed or required measures are

about site condition<sup>9</sup> and conservation status of features for purposes such as reporting and review of management.

The results of the monitoring of feature condition, combined with information on security and suitability of management and the results of surveillance support the making of judgements about whether or not the conservation objectives are being met. Knowledge of the dynamics of many marine species and communities and their sensitivity is limited. Accordingly, in many cases it is not yet possible to identify values above or below which conservation status would be considered unfavourable. When there is a dearth of information the precautionary principle is to be applied. Surveillance<sup>10</sup> is necessary to:

- gain a greater understanding of feature and factor variability,
- provide information which can assist in the interpretation of the results of monitoring of the performance indicators e.g. information on trends in other attributes and factors can assist the identification of the causes of changes observed in the performance indicators;
- improve the overall level of understanding of the site, its features and the factors affecting them.

**Box 2: Elements of favourable conservation status described in this document to help explain the conservation objectives\***

**(I) For each HABITAT feature**

- RANGE – including distribution and extent
- STRUCTURE & FUNCTION – including geology, sedimentology, geomorphology, hydrography & meteorology, water and sediment chemistry and biological interactions
- TYPICAL SPECIES – including species richness/evenness, population dynamics and range as defined for species features (below)
- NATURAL PROCESSES

**(II) For each SPECIES feature**

- POPULATION – including size, structure, production and physiological health
- RANGE – including areas of the site which the population/individuals use
- SUPPORTING HABITATS & SPECIES – including distribution and extent, structure, function and quality and prey availability & quality.

For both habitats and species information is provided on natural processes, current condition and modifications as a result of human activity.

*\*The information is limited by the availability of data and in many cases our understanding of these elements in particular locations is incomplete. All descriptions are therefore based on the best available information at the time of writing.*

The performance indicators and surveillance requirements for the features of the site are not included in this document. The feature of this SPA represents part of the range and variation of that feature within the UK and Europe. The SPA makes up part of a suite of sites across the UK that were selected to represent the range and variation of all relevant features within the UK, and to become part of the pan-European network of conservation

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being followed.” (A statement on Common Standards Monitoring, 1998, Joint Nature Conservation Committee, Peterborough, <http://www.jncc.gov.uk/page-2198>)

<sup>9</sup> The status of the site at a particular moment in time.

<sup>10</sup> Surveillance is defined as “a continued programme of surveys systematically undertaken to provide a series of observations in time” (A statement on Common Standards Monitoring, 1998, Joint Nature Conservation Committee, Peterborough, <http://www.jncc.gov.uk/page-2198>)



areas – Natura 2000. Additional information about SPAs in the UK is provided on the website of the Joint Nature Conservation Committee<sup>11</sup>.

## 2.2 Operations which may cause deterioration or disturbance

### 3.2.1 Legal context

NRW's specific duty in Regulation 37 is to give advice on operations that are potentially damaging needs to be seen in the context of the Habitats Directive, which requires that for a SPA:

- the necessary conservation measures are established which correspond to the ecological requirements of the species on the site;
- appropriate steps are taken to avoid significant disturbance of species.
- any plan or project which is likely to have a significant effect on a site is subject to an appropriate assessment in view of the site's conservation objectives.

The operations advice, in combination with the conservation objectives, is designed to assist relevant authorities and other decision-makers in complying with these provisions. The operations advice given in this document is without prejudice to other advice given, including the conservation objectives themselves and other advice which may be given by NRW from time to time in relation to particular operations.

The term "operations" is taken to cover all types of human activity, irrespective of whether they are under any form of regulation or management<sup>12</sup>. This is because the obligations in the Directive are defined by the conservation requirements of the habitats and species, not by existing regulatory or management regimes. Thus the advice contains reference to operations which may not be the responsibility of any of the relevant authorities.

### 3.2.2 Practical Requirements

Operations manifest themselves through one or more factors<sup>13</sup>. The conservation status of a given habitat or species could potentially be affected by many different types of factor, and hence many different types of operation<sup>14</sup>. The key practical purpose of the Regulation 37 operations advice is to assist in the identification of priorities for management, by identifying operations to which features are both 'sensitive' and 'vulnerable'. Sensitivity is defined as 'the intrinsic intolerance of a habitat, community or individual of a species to damage from an external factor.' Vulnerability is defined as 'the likelihood of exposure of a habitat, community or individual of a species to a factor to which it is sensitive'<sup>15</sup>. Thus the potential for an operation to deteriorate or disturb a feature depends both on the sensitivity of the feature to the operation – through its associated factors - and the location, intensity, duration and frequency of the operation and the factors that it affects or causes.

Formulating the operations advice has three main elements:

1. Identifying factors to which the features are sensitive.

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<sup>11</sup> <http://jncc.defra.gov.uk/page-162>

<sup>12</sup> The term also includes what the Habitats Directive and Regulations call "plans and projects" (see footnote 6).

<sup>13</sup> A factor is defined as "A component of the physical, chemical, ecological or human environment that may be influenced by a natural event or a human activity" (*Sensitivity and mapping of inshore marine biotopes in the southern Irish Sea (Sensmap): Final report*. CCW, Bangor, December 2000.)

<sup>14</sup> The complexity of formulating operations advice is compounded by the "many-to-many" relationship that exists between operations and factors, where an operation may manifest itself through several factors, and a factor may be affected by several operations, in different ways and to different magnitudes.

<sup>15</sup> Adapted from Hiscock (1996)

2. Identifying the types of operation that can cause or affect those factors.
3. Assessing the likelihood of those factors (and hence the features) being affected by those operations, in other words assessing the vulnerability of the features to those effects.

The first and second of these elements relies on current understanding of the inherent sensitivity of features to particular factors, and the effect of operations on factors. Although there will be site specific elements to this information, it may often rely on information from a variety of sources which are not specific to this site. The third stage is very site-specific, relying on information about the types, location, intensity, duration and so on, of operations occurring or likely to occur in or around the site.

Given that in many cases, information of the type indicated in the previous paragraph is rudimentary, or simply not available a precautionary approach is adopted for the identification of factors and operations. This means that where there is uncertainty about the relevance or otherwise of a factor or operation, NRW favours including it in Regulation 37 advice. The output from this process is a list of operations that NRW considers may cause deterioration or disturbance to the features of the site, with accompanying information on the factors through which the each operation affects the feature. The operations advice clearly has to be based on the best available knowledge at the time and is subject to continual review. It necessarily involves an element of risk assessment, both in terms of assessing the likelihood of an operation or factor occurring, and the likelihood of it having an adverse effect on a feature.

NRW's advice to the relevant authorities is that, as a minimum, the extent and management of the operations identified in Section 6 should be reviewed in the context of the conservation objectives. The list should also help identify the types of plans or projects that would be likely to have a significant effect and should be subject to appropriate assessment, noting that such judgements will need to be made on a case-specific basis.

The advice in Section 6 of this document is not a list of prohibited operations, or operations necessarily requiring consultation with NRW, or NRW's consent<sup>16</sup>. The input of the relevant authorities and others is a legal and practical necessity in determining the management needs of the site. Thus, the operations advice is provided specifically with the intention of initiating dialogue between NRW and the relevant authorities.

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<sup>16</sup> However, in relation to land included within the SPA, which has been notified as a Site of Special Scientific Interest (SSSI), owners or occupiers require NRW's consent for any operations included in the SSSI notification, and statutory bodies intending to carry out or permit potentially damaging operations must notify NRW and comply with certain other provisions. (Wildlife and Countryside Act 1981, section 28, as amended by the Countryside and Rights of Way Act 2000, section 75). General guidance on the operation of SSSIs is given in the CCW leaflet *Sites of Special Scientific Interest: A guide for landowners and occupiers* (Countryside Council for Wales, Bangor, 2001).

## 3. Site Description

### 3.1 Northern Cardigan Bay SPA

Northern Cardigan Bay / Gogledd Bae Ceredigion SPA, as the name suggests occupies the northern half of Cardigan Bay on the west coast of Wales.

Several rivers flow into the northern part of Cardigan Bay including the Dwyfach, Glaslyn/Dwryrd, Wnion, Dysynni, Leri, Mawddach and Dyfi. The coastline is dominated by rocky cliffs and shores with occasional sandy beaches and estuaries. Where estuaries flow into northern Cardigan Bay, the sea quickly becomes more than 20 metres deep, but elsewhere remains shallow (less than 10 m deep) for up to 20 km offshore. These shallow areas are sub-tidal shingle reefs, known as the sarnau. All three of the sarnau lie roughly north-east to south-west and are presumed to be formed from glacial deposits left at the end of the last ice age. Sarn Badrig is the largest and most northerly sarn, running parallel with the Llŷn Peninsula from Harlech up to 24 km offshore. Sarn y Bwlch is the smallest sarn, starting from near Tywyn. Sarn Cynfelyn, the most southerly sarn, starts from north of Aberystwyth. These shallow reefs are important ecological habitats within the Northern Cardigan Bay / Gogledd Bae Ceredigion SPA and are important features of the Pen Llŷn a'r Sarnau Special Area of Conservation (SAC), designated under the EC Habitats and Species Directive.

The two tidal streams that enter the Irish Sea, from the north near the Isle of Man and the south through the St George's Channel, meet in the vicinity of Cardigan Bay resulting in weak tidal currents in the area. The tidal range in the bay is up to 4m at a spring tide.

#### 3.1.1 Sources and limitation of site information

All feature descriptions are based on best available knowledge at the present time and in some cases this is limited. The Northern Cardigan Bay SPA has been identified by Natural Resources Wales (NRW) as qualifying as a SPA, based on data collected from aerial surveys during the winters of 2000/01 to 2003/04 and analysed by JNCC Seabirds Team. These data demonstrate that the area regularly supports wintering red-throated diver in numbers of European importance, as defined in the UK SPA selection guidelines (JNCC 1999), namely more than 1% of the GB population.

### 3.5 Operations within the EMS

The area within and around the Northern Cardigan Bay SPA is fundamentally rural with very little, if any, heavy industry. The sea and adjacent land is widely used for a variety of commercial and recreational activities with tourism, farming and fishing providing key sources of income to the local economy. The main settlements of the area are concentrated around the coast (e.g. Pwllheli, Porthmadog, Barmouth and Aberdyfi) although the inland towns of Dolgellau and Machynlleth are in close proximity to the upper reaches of the estuaries of the SPA. Although parts of the coast of the SPA are relatively inaccessible due to their topography or restricted land access, many areas within the SPA can be accessed from the main coastal settlements or from small roads, slipways and beaches throughout the site.

Many parts of the landward boundary of the SPA remain unmodified but others have been altered and there are extensive stretches of coastal and flood defences in some areas.

A wide range of recreational activities take place in and around the SPA. Water-based recreation (such as swimming, sailing, power boating (including jet skis), diving and kayaking) is very popular and a very important part of the tourist-based economy of the area. These activities are seasonal in nature with most peaking in the summer months. There are various facilities around the site to support this including marinas, harbours, slipways and associated support services. Several national and international boating events (sail and power boats) take place in the SPA every year, many of them using the marina facilities at Pwllheli. There are a number of beaches that are particularly popular with holidaymakers during the summer season and these see visitor numbers peak during the summer months. Equally, there are many smaller quieter areas around the coast that people specifically come to the area to enjoy. Recreational sea angling is popular in the SPA and takes place from the shore and from boats. Some angling charter boats operate within the SPA. Wildlife watching is increasing in popularity and there are boats which operate during the summer months to take people out to some of the more accessible islands and coast to see the wildlife.

The area of the SPA is important for commercial fishing, with the main fishing being potting for lobsters and crabs, although potting for prawns and whelks also occurs. Some netting (drift and set gill nets and some tangle netting) occurs in the SPA. Historically very little trawling and dredging has taken place in the SPA and scallop dredging is now no longer allowed in the overlapping Pen Llŷn a'r Saurau SAC<sup>17</sup> or within one nautical mile of the shore.

It should be noted that these activities have been in place for a number of years during which time the birds have achieved a level suitable for European designation.

There has been interest expressed in possible aquaculture/mariculture activities in the SPA although there are no firm proposals to date.

There have been historical changes in sewage treatment and disposal with a number of improvements over recent years through upgrading of the main sewage treatment plants and installation of small treatment systems for those premises not using the main sewage system (e.g. installation of small individual treatment systems for homes and businesses adjacent to the SPA, e.g. caravan sites). As a result water quality within the SPA should have improved. Diffuse inputs into the SPA, particularly within the estuary catchments, together with discharges via combined sewer outfalls are not well known. With the prospect of increasing rainfall as a result of climate change this input may become a more substantial contribution. Further information on water quality can be found on the Water Watch Wales website<sup>18</sup>.

### 3.6 Modifications as a result of human activity

Various anthropogenic activities currently taking place within the SPA have an influence on the species feature and Section 6 provides additional information on the ways in which

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<sup>17</sup> The Scallop Fishing (Wales) Order 2010 (<http://www.legislation.gov.uk/wsi/2010/269/contents/made>).

<sup>18</sup> <http://waterwatchwales.naturalresourceswales.gov.uk/en/>. The relevant waterbodies for North Cardigan Bay are Cardigan Bay north, Tremadog Bay, Ystyth & Rheidol estuaries and Glaslyn.

activities might affect the feature. Some of the activities will have a direct effect whilst others will have an indirect effect, by altering or modifying the physical, chemical and environmental factors and processes (structural and functional characteristics) which affect the supporting habitats for the species feature. Whilst the structural and functional characteristics of the SPA and its species feature is an inherently important attribute of the marine ecosystem, it is the effect that these characteristics have on the wildlife of the EMS that is of conservation importance.

Many activities have the potential to affect the SPA features by causing direct or indirect damage or deterioration of supporting habitats. These effects are considered to be significant where a subsequent detrimental impact on the species and communities associated with the features of the SPA would result. Some activities are localised in a part of the site and may be time limited or more prevalent at certain times of the year (e.g. coastal development proposals, high speed water craft). Other pressures and threats on the wildlife and habitats of the SPA may be more long term and may be directly or indirectly caused or influenced by human activity, such as climate change issues (sea level rise, increased storminess, coastal squeeze) and non-native species introduction.

No high or medium pressures or threats have been identified for this site, however, the following **low-level** pressures/threats were identified<sup>19</sup>:

- Exploration and extraction of oil or gas,
- Marine water pollution and
- Fishing and harvesting aquatic resources.

Other activities have the potential to create pressure or threat by disturbance to the feature, for example from noise or high-speed activity.

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<sup>19</sup> In the standard data form for the site: <http://jncc.defra.gov.uk/pdf/SPA/UK9020327.pdf>

## 4. Feature Descriptions

### 4.1 Red Throated Diver

#### 4.7.1 Population status and range

Although not regarded as threatened within the EU, the conservation status of this species is regarded as unfavourable because of declines in the European breeding populations between 1970-1990. The population is now considered stable though depleted.

The Great Britain population of wintering red-throated diver was previously estimated to be c.4,850 birds (Danielsen *et al.* 1993). A more recent estimate has been derived using a combination of shore-based observations and aerial and boat surveys. Such surveys from boats and planes have been responsible for identifying much larger numbers wintering in British coastal waters than previously known. The GB wintering population is now estimated to be around 17,000 individuals (Musgrove, *et al.* 2013) representing about 0.5-4.9% of the NW Europe non-breeding population (Wetlands International, 2002).

In Great Britain, wintering red-throated divers are associated with inshore waters, often occurring within sandy bays, firths and sea lochs, although open coastline is also frequently used (Skov *et al.*, 1995; Stone *et al.*, 1995). The GB wintering population is aggregated in substantial numbers in several areas including the Moray Firth and south western North Sea, with almost 50% of the North Sea population in the Outer Thames Estuary. Ring recoveries suggest that birds wintering in Great Britain are largely birds which breed in the UK, Greenland, Iceland and Scandinavia (O'Brien *et al.* 2008). Wintering red-throated divers start to arrive in UK coastal waters from September, with numbers peaking during the winter and declining in Welsh waters from late February.

#### 4.7.2 Population size and density

Based on aerial survey data, the population of red-throated divers of Northern Cardigan Bay SPA is estimated as 1,186 birds (O'Brien *et al.* 2010). This figure includes survey counts labelled as 'unidentified divers', this was due to no other diver species being regularly recorded. A similar assumption was made elsewhere (in relation to Liverpool Bay (Webb *et al.* 2004) the Outer Thames estuary (O'Brien *et al.* 2015)) where a large number of diver observations were not identified to particular species but where records of diver species other than red-throated diver are very rare.

Densities of wintering red-throated divers range between 0.01 birds/km<sup>2</sup> at the edges of the site up to 2.75 birds/km<sup>2</sup> in the core areas. As a result of the relatively high abundance of red-throated diver in Cardigan Bay, the approach to boundary setting (explained further in section 3.5 below) resulted in the density threshold used to draw the boundary at this site (0.53 birds per km<sup>2</sup>) being high compared to that used for Liverpool Bay, the only other SPA on the west coast of Great Britain designated for red-throated diver (at 0.21 birds per km<sup>2</sup>). For comparison, the Outer Thames Estuary density threshold was 0.62 bird's km<sup>2</sup>.

### 4.7.3 Habitat and prey species

Herring and sprat are amongst the most frequently recorded prey species of red-throated divers (Cramp & Simmons 1977), although this species is considered to be an opportunistic feeder, taking a rather broad range of fish species (Guse *et al.* 2009 and references therein).

Several rivers flow into the northern part of Cardigan Bay including the Dwyfach, Glaslyn/Dwryd, Wnion, Dysynni, Leri, Mawddach and Dyfi. The coastline is dominated by rocky cliffs and shores with occasional sandy beaches and estuaries. Where estuaries flow into northern Cardigan Bay, the sea quickly becomes more than 20 metres deep, but elsewhere remains shallow (less than 10 m deep) for up to 20 km offshore. These shallow areas are sub-tidal shingle reefs, known as the sarnau. All three of the sarnau lie roughly north-east to south-west and are presumed to be formed from glacial deposits left at the end of the last ice age. Sarn Badrig is the largest and most northerly sarn, running parallel with the Llŷn Peninsula from Harlech up to 24 km offshore. Sarn y Bwlch is the smallest sarn, starting from near Tywyn. Sarn Cynfelyn, the most southerly sarn, starts from north of Aberystwyth. These shallow reefs are important ecological habitats within the Northern Cardigan Bay / Gogledd Bae Ceredigion SPA and are important features of the Pen Llŷn a'r Sarnau Special Area of Conservation (SAC), designated under the EC Habitats and Species Directive.

## 5. Conservation Objectives

**This is the first version of the Regulation 37 package for this site.**

In order to meet the aims of the Habitats Directives, the conservation objectives seek to maintain (or restore) the habitat and species features, as a whole, at (or to) favourable conservation status (FCS) within the site.

The Vision Statement is a descriptive overview of what needs to be achieved for conservation on the site. It brings together and summarises the Conservation Objectives into a single, integrated statement about the site.

### 5.1 Vision statement for Northern Cardigan Bay Special Protection Area

**Our vision for the Northern Cardigan Bay Special Protection Area (SPA) is one of high quality marine environments, where the protected species of the site are in a condition as good as or better than when the site was selected; where human activities co-exist in harmony with the species of the site and where use of the marine environment is undertaken sustainably.**

### 5.2 Conservation objectives for Northern Cardigan Bay Special Protection Area

The single qualifying feature of the proposed SPA is the nationally important non-breeding population of Red-throated diver (*Gavia stellata*)

To achieve favourable conservation status all the following, subject to natural processes, need to be fulfilled and maintained in the long-term. If these objectives are not met restoration measures will be needed to achieve favourable conservation status.

<p>The size of the population should be stable or increasing, allowing for natural variability, and sustainable in the long term.</p>	<p>The wintering population of Red-throated diver should be stable or increasing, for a peak mean of 1,186 individuals (2000/01- 2003/04).</p>
<p>There should be sufficient habitat, of sufficient quality, to support the population in the long term.</p>	<p>The foraging habitat of this species should not decrease significantly, and its quality should remain unaffected by anthropogenic factors.</p>

Supporting habitats for the bird species of the Northern Cardigan Bay SPA include:

- The sarnau reefs of Northern Cardigan Bay



## 5.4 Understanding the Conservation Objectives

### 5.3.1 A dynamic marine environment

The conservation objectives recognise and acknowledge that the features are part of a complex, dynamic, multi-dimensional environment. The structures, functions (environmental processes) and species populations of habitat features are inextricably linked. Marine habitats are complex ecological webs of species, habitat structure and environmental functions that vary dynamically in time and space. Variety and change in habitat structure is primarily driven by environmental and physicochemical factors, including water movement, water quality, sediment supply and prevailing weather conditions.

The species populations associated with these habitats also vary in time and space and this is, in part, a direct reflection of the variable habitat structure and dynamic environment. It is also the product of stochastic events and the great variation in survival and recruitment of species, particularly those with dispersive reproductive strategies.

Within the dynamism of habitats and species, there is also an element of stability and persistence, where species' and communities' populations as well as physical habitat structure show little overall long-term variation.

### 5.3.2 Human activities

These conservation objectives recognise and acknowledge that human activity has already modified and continues to modify habitats and species populations in various ways, to varying degrees and at varying spatial and temporal scales, either acutely or chronically. The conservation objectives do not aim to prevent all change to the habitat and species features, or to achieve an indefinable, abstract natural or pristine state, since these would be unrealistic and unattainable aspirations. Rather, they seek to prevent further negative modification of the extent, structure and function of natural habitats and species' populations by human activity and to ensure that degradation and damage to the features that is attributable to human activities or actions is prevented. Consequently, in order to meet the requirements of the Directive and ensure the site makes its appropriate contribution to conservation of biodiversity, the conservation objectives seek to:

- Encompass inherent dynamism rather than to work against it;
- Safeguard features and natural processes from those impacts of human activity that cause damage to the features through the degradation of their range, extent, structure, function or typical species;
- Facilitate, where necessary, restoration of features or components of features that are currently damaged or degraded and in unfavourable condition.

The term *degradation* is used to encompass damage or deterioration resulting only from such human activities or actions as have a detrimental effect on the feature. The magnitude of any degradation is dependent on the longevity and scale of the impact and the conservation importance of the species or habitats on which the impact occurs. This is influenced by:

- the type of human action, its nature, location, timing, frequency, duration and intensity;
- the species or habitats, and their intolerance and recoverability.

Outcomes arising from human action that are likely to be considered detrimental include effects such as:

- permanent and long-term change of distribution or reduction in extent of a feature or feature component, or temporary modification or reduction sufficiently significant to negatively impact on biota or ecological processes;
- reduction in ecological function caused by loss, reduction or modification of habitat structural integrity;
- interference in or restriction of the range, variety or dynamism of structural, functional or ecological processes, e.g.: alteration of habitat structure, obstruction of tidal streams, chronic or acute thermal, salinity or suspended sediment elevations or reductions;
- hypertrophication or eutrophication;
- contamination by biologically deleterious substances;
- reduction in structure, function and abundance of species populations;
- change in reproductive capacity, success or recruitment of species populations;
- reduction in feeding opportunities of species populations
- reduction of health to a sub-optimal level, or injury, rendering the population less fit for, *inter alia*, breeding, foraging, social behaviour, or more susceptible to disease;
- increase in abundance and range of opportunist species through the unnatural generation of preferential conditions (e.g. organic enrichment), at the expense of existing species and communities.
- increase in abundance and range of non-native species.

Table 2 provides illustrative examples of specific changes and whether they would constitute degradation of the feature.

It is important to note that many human activities can either be beneficial (reduce or reverse detrimental human influence (e.g. improve water quality)), trivial (e.g. no significant and/or substantive long-term effect) or benign (no outcome) in terms of their impact on marine habitats and species.

Advice on potentially detrimental human activities is provided in Section 6 (activities or operations which may cause damage or disturbance to features).

**Table 2:** Examples of change and whether they would constitute degradation of the feature.

Degradation	Not Degradation
Reduction in grey seal reproductive potential as a result of sub optimal physiological health caused by high tissue burdens of anthropogenically derived contaminants.	Reduction in grey seal reproductive potential as a result of sub optimal physiological health caused by density dependent incidence of endemic disease.
Modification of a seabed community by organically rich effluent from a new sewage outfall.	Modification of a seabed community as a result of a <u>reduction</u> in organic material entering the sea from a sewage outfall.
Change in seabed community composition as a result of coastal engineering that has altered local wave exposure.	Change in seabed community composition as a result of a cliff fall, the debris from which has altered local wave exposure.
Change to the species composition of a seabed community as a result of an increase in scallop dredging intensity.	Change to the composition of a seabed community as a result of a reduction in scallop dredging intensity.

Permanent reduction of extent of sand and mud-flat as a result of new coastal development.	Permanent reduction of extent of sand and mud-flat as a result of long-term natural changes in sediment transport.
Changes in sediment granulometry as a result of beach recharge operations	Changes in sediment granulometry as a result of natural cliff fall and erosion

### 5.3.3 Use of the conservation objectives – Site management

The components of favourable conservation status detailed in the conservation objectives have different sensitivities and vulnerabilities to degradation by human activities.

Conservation and protection of site features is provided by management, which should be based on levels of risk. The form of management and degree of protection necessary will vary spatially, temporally and from one feature component to another due to their differences in conservation importance and their sensitivity and susceptibility to change as a result of human action. Therefore, it needs to be understood that these conservation objectives require a risk-based approach to the identification, prioritisation and implementation of management action.

Security of management is provided in part 6, sections 59 to 66, of the Conservation of Habitats and Species Regulations 2017, which require the assessment of plans and projects likely to have a significant effect on the site.

Where there is a potential for a plan or project to undermine the achievement of the conservation objectives, NRW will consider the plan/project to be likely to have a significant effect and require appropriate assessment. Unless it is ascertained, following an appropriate assessment, that a plan or project will not undermine the achievement of the conservation objectives, the plan/project should be considered as having an adverse effect on the integrity of the site<sup>20</sup>.

Appropriate and secure management of activities may also be provided through a site management plan.

## 6. Advice as to operation which may cause deterioration or disturbance to the features

The range and scale of both natural and anthropogenic stressors on the marine habitats and species within the SPA are large. Species populations may be affected at many levels e.g. physiological, genetic, single organism, population and groups of species.

Table 3 identifies where there is a potential for operations or activities to have an adverse effect on the feature of this site - Red-throated diver. This does not imply a significant actual or existing causal impact. The potential for, and magnitude of, any effect will be dependent on many variables, such as the location, extent, scale, timing and duration of operations or activities, as well as proximity to the feature. Due to the complexity of the possible inter-relationships between operations or activities and the feature, the factors and effects listed in this table are the predicted most likely effects and are not exhaustive.

- The 'activity' column lists potentially damaging operations and gives an indication of their current known status within the SPA. Operations or activities marked with an

<sup>20</sup> Uncertainty should not result in a conclusion of no adverse effect on site integrity.

asterisk (\*) may have associated consents, licences, authorisations or permissions which are (or may be) plans or projects, within the meaning of Article 6 of the Habitats Directive. (The potential effects of the construction phase of operations marked with a hash (#) are included in the general operation 'construction'.

- The 'relevant factors' column (physical, chemical and biological factors) give an indication of the key mechanisms by which the operation or activity may cause an effect on each habitat feature.
- The 'most likely relevant component and effects' column indicates the most likely components of Favourable Conservation Status that might be affected by each operation or activity.
- The 'advice as to likely required action' column provides an indication of the actions required (from NRW and others) to undertake specific risk assessments of relationships between the operation or activity and relevant features, including any further information that would be necessary to further refine / tailor advice.

**Table 3: Operations which may cause deterioration or disturbance to the feature Red-throated diver and supporting habitats**

Activity	Relevant factors	Most likely relevant components & effects <i>Information necessary to further refine / tailor advice to specific operations</i>	Advice as to likely required action
<b>DOCKS, MARINAS &amp; SHIPPING</b>			
<p><b>Dock, harbour &amp; marinas structures: Construction*</b></p> <p><i>Small to medium-scale Ports and, harbours around the Llŷn and Meirionnydd coasts. Medium scale marina at Pwllheli. Marina at Aberystwyth (outside of SPA to the south)</i></p>	<p><u>Geophysical regime:</u> modification of hydrodynamic regime &amp; sediment transport processes; alteration / loss of substrate</p> <p><u>Fundamental environmental parameters:</u> changes to available oxygen; turbidity; suspended sediments</p> <p><u>Environmental quality:</u> remobilisation of toxic &amp; non-toxic contaminants</p> <p><u>Physical disturbance:</u> displacement, crushing, abrasion, smothering visual, noise</p>	<p><u>Extent &amp; distribution:</u> loss of / reduction in habitat extent; reduction in habitat distribution; particularly intertidal habitats.</p> <p><u>Structure &amp; function:</u> modification of physical structure and morphology; modification of hydrodynamic, sediment transport, and turbidity regimes, water and sediment chemistry; mobilisation / addition of contaminants; introduction of anthropogenic material; noise/visual disturbance effecting mobile species particularly mammals; modification to local hydrodynamic regime effecting exposure sensitive communities/species; elevated suspended sediments and contaminants limiting growth of benthic flora, smothering sessile benthic species and increasing likelihood of toxic bioaccumulation; modification to sediment transport leading to changes in local habitat structure; modification to biological processes including food contamination and availability, and changes to biological interactions due to modification to habitat and physical factors.</p> <p><u>Conservation status of typical species &amp; species features:</u> likely decrease in species/community diversity, effects to population dynamics, and restrictions to range of mobile species (especially migratory fish) dependant on location and extent of proposed construction.</p> <p><u>Operation specific information required:</u> <i>location, extent, scale, timing and duration; relevant location-specific biotic and abiotic information.</i></p>	<p>Treat as plan or project as appropriate (including assessment of cumulative effects in association with others plans and projects, where necessary).</p>
<p><b>Shipping: vessel traffic</b></p> <p><i>No data available. Most shipping in transit in Irish Sea unlikely to pass through SPA, except to seek shelter on passage.</i></p>	<p><u>Geophysical regime:</u> vessel wash - substrate erosion, local modification of wave exposure regime</p> <p><u>Fundamental environmental parameters:</u> turbidity</p> <p><u>Physical disturbance:</u> collision, noise, visual</p>	<p><u>Structure &amp; function:</u> local effects to sediment habitat structure; noise/visual disturbance effecting mobile species particularly mammals; potential for collision with seals; local modification of physical processes with elevated levels of suspended sediments effecting benthic flora and smothering sessile benthic fauna; modification to biological processes including food availability, and changes to biological interactions due to modification of habitat and physical factors.</p> <p><u>Conservation status of typical species &amp; species features:</u> particularly effecting the diversity, health and extent of wave sheltered communities and the distribution of communities along physical gradients. Also, an alteration/reduction in quality of communities/populations containing species sensitive to changes in turbidity, light, oxygen and smothering (particularly shallow subtidal algal and eelgrass communities, species-rich sediment infaunal communities, and sessile faunal turf communities).</p> <p><u>Operation specific information required:</u> <i>location, frequency and duration of operation; scale of effect of wash and water movement from vessel movement dependent on vessel size, activity, speed and proximity to sensitive (sheltered, intertidal and /or shallow subtidal) habitats/communities and species (seals); relevant location-specific biotic and abiotic information</i></p>	<p>Treat as plan or project as appropriate (including assessment of cumulative effects in association with others plans and projects, where necessary).</p>
<p><b>Shipping: Refuse &amp; sewage disposal</b></p>	<p><u>Environmental quality:</u> addition of toxic (metals, synthetic organic compounds, microbial pathogens) &amp; non-toxic (nutrients,</p>	<p><u>Structure &amp; function:</u> water and sediment quality; habitat modification through introduction of anthropogenic material; physical disturbance; local modification of sediment processes with raised suspended particulate concentrations; elevated</p>	<p>Review, revise or establish management practices and spatial, temporal &amp; technical operational limits</p>

Activity	Relevant factors	Most likely relevant components & effects <i>Information necessary to further refine / tailor advice to specific operations</i>	Advice as to likely required action
<i>Possibly occurs in SPA, at unknown level – likely low level in site as not on main shipping routes.</i>	inert particulates and materials) contaminants. <u>Physical disturbance</u> : entanglement, smothering	suspended particulates modifying turbidity & ambient light (limiting growth of benthic flora) and smothering sessile benthic fauna; chemical contamination leading to toxic effects; modification to biological processes including food contamination and availability, and changes to biological interactions due to modification to habitat and physical factors.  <u>Conservation status of typical species &amp; species features</u> : effects on species variety, population dynamics, physiological health in species sensitive to organo-metal compounds, biocides, bleaches etc. (particularly chronic effects on sediment, molluscan, algal and macrophyte species); entanglement (grey seal, erect benthic invertebrates including a low growing, long lived species e.g. sponges, corals); local smothering.  <u>Operation specific information required</u> : location, extent, scale, frequency, timing and duration; types and toxicity of waste; relevant location-specific biotic and abiotic information	suitable to secure features at FCS. Seek advice from relevant agency (e.g. NRW).
<b>Shipping: operational discharges</b>  <i>Possibly occurs in SPA, at unknown level – likely low level in site as not on main shipping routes.</i>	<u>Environmental quality</u> : addition of toxic & non-toxic contaminants particularly hydrocarbons; organic enrichment <u>Physical disturbance</u> : smothering	<u>Structure &amp; function</u> : elevation of water (and sediment) contaminant and / or nutrient burden. <u>Conservation status of typical species &amp; species features</u> : effects on species variety, composition, population dynamics & physiological health in species sensitive to hydrocarbons, organo-metal compounds, biocides, bleaches etc.; nutrient enrichment  <u>Operation specific information required</u> : location, extent, scale, frequency, timing and duration; types and toxicity of discharge; relevant location-specific biotic and abiotic information	Review, revise or establish management practices and spatial, temporal & technical operational limits suitable to secure features at FCS. Seek advice from relevant agency (e.g. NRW).
<b>Shipping: accidents - may be associated with cargo / bunkers discharges</b>  <i>No known recent events. Potential exists for a damaged or struggling vessel to be brought into Tremadog Bay.</i>	<u>Geophysical regime</u> : local modification of substrate structure & topography <u>Environmental quality</u> : addition of toxic & non-toxic contaminants <u>Physical disturbance</u> : displacement, amputation, crushing abrasion; visual; noise	<u>Structure and function</u> : physical damage to local substrate, geology & morphology; degradation of habitat quality; elevation of water (and sediment) hydrocarbon contaminant burden. <u>Conservation status of typical species &amp; species features</u> : local effects on populations of species sensitive to physical impacts &/or hydrocarbon contamination; effects on species variety, abundance, dynamics, physiological health.  <u>Operation specific information required</u> : location, extent, scale, timing and duration; type, amount and toxicity of discharges; relevant location-specific biotic and abiotic information	Review, revise or establish management practices and spatial, temporal & technical operational limits suitable to secure features at FCS. Seek advice from relevant agency (e.g. NRW).
<b>Shipping: accidents - fuel oil &amp; / or petrochemical discharges</b>  <i>No known recent events. Potential exists for a damaged or struggling vessel to be brought into Tremadog Bay.</i>	<u>Environmental quality</u> : addition of toxic & non-toxic contaminants particularly petrochemicals <u>Physical disturbance</u> : smothering	<u>Structure &amp; function</u> : elevation of water and sediment hydrocarbon contaminant burden; decrease in habitat quality; modification of biological interactions following decline in populations of ecologically structuring species (e.g. grazing molluscs) <u>Conservation status of typical species &amp; species features</u> : lethal and sub lethal physiological effects on species sensitive to hydrocarbons; effects on population variety, abundance, dynamics, physiological health.  <u>Operation specific information required</u> : location, extent, scale, timing and duration; types and toxicity of discharge; relevant location-specific biotic and abiotic information	Review, revise or establish management practices and spatial, temporal & technical operational limits suitable to secure features at FCS. Seek advice from relevant agency (e.g. NRW).

Activity	Relevant factors	Most likely relevant components & effects <i>Information necessary to further refine / tailor advice to specific operations</i>	Advice as to likely required action
<p><b>Shipping: accidents – non-petrochemical cargo losses / discharges</b></p> <p><i>No known recent events.</i></p>	<p><u>Geophysical regime</u>: local modification of or addition to substrate</p> <p><u>Environmental quality</u>: addition of toxic &amp; non-toxic contaminants - potentially wide range of organic &amp; inorganic materials &amp; particulates.</p> <p><u>Physical disturbance</u>: displacement, amputation, abrasion, smothering</p>	<p><u>Structure &amp; function</u>: elevation of water and sediment contaminant burdens; decrease in habitat quality.</p> <p><u>Conservation status of typical species &amp; species features</u>: lethal and sub lethal physiological effects on species sensitive to discharge; effects on population variety, abundance, dynamics, physiological health.</p> <p><u>Operation specific information required</u>: <i>location, extent, scale, timing and duration; type, amount and toxicity of discharge; relevant location-specific biotic and abiotic information.</i></p>	<p>Review, revise or establish management practices and spatial, temporal &amp; technical operational limits suitable to secure features at FCS. Seek advice from relevant agency (e.g. NRW).</p>
<p><b>Shipping: accidents - salvage operations</b></p> <p><i>No known recent events. Potential exists for a damaged or struggling vessel to be brought into Tremadog Bay.</i></p>	<p><u>Geophysical regime</u>: local modification of or addition to substrate</p> <p><u>Environmental quality</u>: addition of toxic &amp; non-toxic contaminants - petrochemicals, synthetics &amp; metals debris</p> <p><u>Physical disturbance</u>: displacement, amputation, crushing, abrasion, noise; visual</p>	<p><u>Structure and function</u>: physical damage to local substrate, geology &amp; morphology; degradation of habitat quality; elevation of water (and sediment) contaminant burdens.</p> <p><u>Conservation status of typical species &amp; species features</u>: local effects on populations of species sensitive to physical impacts &amp;/or potential contaminants; effects on species variety, abundance, dynamics, physiological health.</p> <p><u>Operation specific information required</u>: <i>location, extent, scale, timing, duration and nature; likely effects and outcome; relevant location-specific biotic and abiotic information</i></p>	<p>Review, revise or establish management practices and spatial, temporal &amp; technical operational limits suitable to secure features at FCS. Seek advice from relevant agency (e.g. NRW).</p> <p>Provide environmental advice to salvage managers and salvors.</p>
<b>CIVIL ENGINEERING</b>			
<p><b>Coastal protection: Barrages (amenity, storm surge, tidal) *#</b></p> <p><i>None at present.</i></p>	<p><u>Geophysical regime</u>: modification of tidal regime, streams &amp; amplitude, substrate, sediment transport, wave exposure</p> <p><u>Fundamental environmental parameters</u>: modification of salinity, suspended sediments, turbidity, dissolved oxygen, temperature, seabed illuminance</p> <p><u>Environmental quality</u>: toxic &amp; non-toxic contaminant build-up; modification of suspended particulates; organic enrichment</p> <p><u>Physical disturbance</u>: displacement</p>	<p><u>Extent &amp; distribution</u>: loss of / reduction in habitat extent; reduction in habitat distribution, e.g. estuary and encompassed (particularly intertidal and rocky) habitats; chronic loss of reef through siltation in enclosed waterways</p> <p><u>Structure &amp; function</u>: upstream of barrage: change of habitat type(s); modification or loss of characterising geomorphology of features (ria, estuaries, tidal narrows); loss or change of habitat structure, sedimentology &amp; bathymetry; disruption of hydrodynamic regime (including tidal regime) &amp; sediment transport processes; modification of suspended particulates, turbidity, light; modification of water and sediment chemistry (salinity regime, deoxygenation, eutrophication, contaminant &amp; nutrient accumulation); increased homogeneity of habitats within impounded areas</p> <p>Downstream from barrage: modification of habitat structure, sedimentology; hydrodynamic regime; sediment transport processes; suspended particulates, turbidity, water (and sediment) chemistry, particularly salinity regime and nutrient / contaminant fluxes.</p> <p><u>Conservation status of typical species &amp; species features</u>: decrease in species variety, modification of distribution; change in species composition from fully saline and mixed salinity to low salinity species. Consequential near and far-field modification of species population structure, physiological health, reproductive capacity. Reduction in species ranges (reproductive propagules of sessile biota and movement of mobile biota including vertebrates and species features)</p> <p><u>Operation specific information required</u>: <i>location, extent, scale of impoundment; potential modification of tidal and freshwater flow; timing and duration of construction; maintenance requirements &amp; frequency; relevant location-specific biotic and abiotic information.</i></p>	<p>Treat as plan or project as appropriate (including assessment of cumulative effects in association with others plans and projects, where necessary).</p>

Activity	Relevant factors	Most likely relevant components & effects <i>Information necessary to further refine / tailor advice to specific operations</i>	Advice as to likely required action
<p><b>Foreshore deposit of rock, rubble etc.</b></p> <p><i>Isolated incidences throughout the SPA.</i></p>	<p><u>Geophysical regime</u>: modification of substrate, hydrodynamic regime &amp; sediment transport</p> <p><u>Fundamental environmental parameters</u>: suspended sediments, turbidity</p> <p><u>Environmental quality</u>: remobilisation of toxic &amp; non-toxic contaminants</p> <p><u>Physical disturbance</u>: displacement, amputation, crushing, abrasion, smothering, noise, visual; indirect effects from modified hydrodynamic regime</p>	<p><u>Extent &amp; distribution</u>: loss of / reduction in habitat extent; reduction in habitat distribution, e.g. estuary and encompassed (particularly intertidal and rocky) habitats; chronic loss of reef through siltation in enclosed waterways</p> <p><u>Structure &amp; function</u>: upstream of barrage: change of habitat type(s); modification or loss of characterising geomorphology of features (ria, estuaries, tidal narrows); loss or change of habitat structure, sedimentology &amp; bathymetry; disruption of hydrodynamic regime (including tidal regime) &amp; sediment transport processes; modification of suspended particulates, turbidity, light; modification of water and sediment chemistry (salinity regime, deoxygenation, eutrophication, contaminant &amp; nutrient accumulation); increased homogeneity of habitats within impounded areas</p> <p>Downstream from barrage: modification of habitat structure, sedimentology; hydrodynamic regime; sediment transport processes; suspended particulates, turbidity, water (and sediment) chemistry, particularly salinity regime and nutrient / contaminant fluxes.</p> <p><u>Conservation status of typical species &amp; species features</u>: decrease in species variety, modification of distribution; change in species composition from fully saline and mixed salinity to low salinity species. Consequential near and far-field modification of species population structure, physiological health, reproductive capacity. Reduction in species ranges (reproductive propagules of sessile biota and movement of mobile biota including vertebrates and species features)</p> <p><u>Operation specific information required</u>: location, extent, scale of impoundment; potential modification of tidal and freshwater flow; timing and duration of construction; maintenance requirements &amp; frequency; relevant location-specific biotic and abiotic information.</p>	<p>Treat as plan or project as appropriate (including assessment of cumulative effects in association with others plans and projects, where necessary).</p>
<p><b>Artificial reef</b></p> <p><i>Artificial reef with sea defence and recreational function (surfing) at Borth.</i></p>	<p><u>Geophysical regime</u>: modification of tidal, streams, wave exposure, substrate, sediment transport</p> <p><u>Fundamental environmental parameters</u>: modification of salinity, suspended sediments, turbidity, dissolved oxygen, temperature, seabed illuminance</p> <p><u>Environmental quality</u>: modification of suspended particulates</p> <p><u>Physical disturbance</u>: displacement, smothering,</p>	<p><u>Extent &amp; distribution</u>: loss of / reduction in habitat extent</p> <p><u>Structure &amp; function</u>: change of habitat type(s); modification or loss of structure, characterising geomorphology, sedimentology &amp; bathymetry; disruption of hydrodynamic regime &amp; sediment transport processes; modification of suspended particulates, turbidity, light; modification of biological interactions (change in habitat type and altered balance of predator and grazer species)</p> <p><u>Conservation status of typical species &amp; species features</u>: modification in species variety, distribution, composition, ranges</p> <p><u>Operation specific information required</u>: location, extent, scale of structure; timing and duration of construction; maintenance requirements &amp; frequency; relevant location-specific biotic and abiotic information.</p>	<p>Treat as plan or project as appropriate (including assessment of cumulative effects in association with others plans and projects, where necessary).</p>



Activity	Relevant factors	Most likely relevant components & effects <i>Information necessary to further refine / tailor advice to specific operations</i>	Advice as to likely required action
<p><b>Power station *#</b></p> <p><i>None at present in SPA.</i></p>	<p><u>Fundamental environmental parameters:</u> thermal discharge; local modification of salinity</p> <p><u>Environmental quality:</u> addition of toxic contaminants - biocides; atmospheric discharge; deposition of toxic &amp; non-toxic contaminants</p>	<p><u>Structure &amp; function:</u> localised, and potential far-field, modification of thermal regime; salinity and water circulation; possible increase in contaminants.</p> <p><u>Conservation status of typical species &amp; species features:</u> localised modification of species distribution, composition, variety; modification of physiological health, reproduction, survival and competitive ability. Facilitation of survival and reproduction of non-native species.</p> <p><u>Operation specific information required:</u> <i>location, extent, scale, frequency, timing, duration and nature of operations affecting features; location, scale, frequency, timing, duration and content of discharges, relevant location-specific biotic and abiotic information.</i></p>	<p>Treat as plan or project as appropriate (including assessment of cumulative effects in association with others plans and projects, where necessary).</p>
<p><b>Pipelines *#</b></p>	<p><u>Geophysical regime:</u> addition of artificial substrate; local modification of water movement</p> <p><u>Physical disturbance:</u> displacement, visual, noise; scour effect from cables due to wave action.</p>	<p><u>Structure &amp; function:</u> dependent on depth of pipeline burial in seabed – modification of sediment transport processes and local hydrodynamic regime.</p> <p><u>Conservation status of typical species &amp; species features:</u> dependent on depth of pipeline burial in seabed – localised modification of species composition, variety.</p> <p><u>Operation specific information required:</u> <i>location, extent, scale, frequency, timing and duration; maintenance requirements &amp; frequency; relevant location-specific biotic and abiotic information.</i></p>	<p>Treat as plan or project as appropriate (including assessment of cumulative effects in association with others plans and projects, where necessary).</p>
<p><b>Power / communication cables *#</b></p> <p><i>Some present in SPA, e.g. electricity cable across Dyfi.</i></p>	<p><u>Geophysical regime:</u> addition of artificial substrate; local modification of water movement</p> <p><u>Physical disturbance:</u> displacement, visual, noise. Potential electro-magnetic effects of electrical cables.</p>	<p><u>Structure &amp; function:</u> dependent on depth of cable burial in seabed – modification of sediment transport processes and local hydrodynamic regime.</p> <p><u>Conservation status of typical species &amp; species features:</u> dependent on depth of cable burial in seabed – localised modification of species composition, variety. Modification of behaviour caused by electro-magnetic effects.</p> <p><u>Operation specific information required:</u> <i>location, extent, scale, frequency, timing and duration; maintenance requirements &amp; frequency; relevant location-specific biotic and abiotic information</i></p>	<p>Treat as plan or project as appropriate (including assessment of cumulative effects in association with others plans and projects, where necessary).</p>
<b>EXPLOITATION OF LIVING RESOURCES</b>			
<p><b>Trawling: beam</b></p> <p><i>Some activity in the SPA. Exact scale and location of operation not fully known. Byelaws limit larger vessels fishing within overlapping SAC.</i></p>	<p><u>Geophysical regime:</u> modification of substrate; addition of persistent inert debris</p> <p><u>Fundamental environmental parameters:</u> elevation of turbidity &amp; suspended particulates.</p> <p><u>Physical disturbance:</u> displacement, crushing, amputation, abrasion, entanglement, collision, visual, noise</p> <p><u>Other factors:</u> removal of target species</p>	<p><u>Structure &amp; function:</u> modification of sedimentology – decrease in sediment habitat heterogeneity, sediment transport processes; damage to rocky habitat structure; modification of biological interactions (ecosystem effects) through depletion of target species, removal of ecologically structuring species as by-catch, modification of prey and food availability for predator and scavenger species (including species features).</p> <p><u>Conservation status of typical species &amp; species features:</u> modification of target &amp; non-target species composition, population sizes, structures and ranges – particularly long-lived species; reduction in species variety, extent, distribution and biomass in sediment habitats; shift in species composition toward opportunist species; potential incidental physical damage to reef-living species on rocky substrates; potential disruption of species feature behaviours and consequential effects.</p> <p><u>Operation specific information required:</u> <i>gear type and size; location, extent, scale, frequency, timing and duration; relevant location-specific biotic and abiotic information</i></p>	<p>To secure features at FCS, assess the impacts from the activity on the features of the site.</p>
<p><b>Trawling: otter</b></p>	<p><u>Geophysical regime:</u> modification of</p>	<p><u>Structure &amp; function:</u> modification of sedimentology – decrease in sediment</p>	<p>To secure features at FCS, assess the</p>

Activity	Relevant factors	Most likely relevant components & effects <i>Information necessary to further refine / tailor advice to specific operations</i>	Advice as to likely required action
<p><i>Some activity in the SAC. Exact scale and location of operation unknown. Statutory instrument limit larger vessels fishing within overlapping SAC.</i></p>	<p>substrate; addition of persistent inert debris</p> <p><u>Fundamental environmental parameters:</u> elevation of turbidity &amp; suspended particulates.</p> <p><u>Physical disturbance:</u> displacement, crushing, amputation, abrasion, entanglement, collision, visual, noise</p> <p><u>Other factors:</u> removal of target species</p>	<p>habitat heterogeneity, sediment transport processes; damage to rocky habitat structure; modification of biological interactions (ecosystem effects) through depletion of target species, removal of ecologically structuring species as by-catch, modification of prey and food availability for predator and scavenger species (including species features).</p> <p><u>Conservation status of typical species &amp; species features:</u> modification of target &amp; non-target species composition, population sizes, structures and ranges – particularly long-lived species; reduction in species variety, extent, distribution and biomass in sediment habitats; shift in species composition toward opportunist species; potential incidental physical damage to reef-living species on rocky substrates; potential disruption of species feature behaviours and consequential effects.</p> <p><u>Operation specific information required:</u> gear type and size; location, extent, scale, frequency, timing and duration; relevant location-specific biotic and abiotic information</p>	<p>impacts from the activity on the features of the site</p>
<p><b>Dredging: toothed</b></p> <p><i>Does not occur in SPA</i></p>	<p><u>Geophysical regime:</u> modification of substrate; addition of persistent inert debris</p> <p><u>Fundamental environmental parameters:</u> elevation of turbidity &amp; suspended particulates.</p> <p><u>Physical disturbance:</u> displacement, crushing, amputation, abrasion, entanglement, collision, visual, noise</p> <p><u>Other factors:</u> removal of target species</p>	<p><u>Structure &amp; function:</u> modification of sedimentology – decrease in sediment habitat heterogeneity, sediment transport processes; damage to rocky habitat structure; modification of biological interactions (ecosystem effects) through depletion of target species, removal of ecologically structuring species as by-catch, modification of prey and food availability for predator and scavenger species (including species features).</p> <p><u>Conservation status of typical species &amp; species features:</u> modification of target &amp; non-target species composition, population sizes, structures and ranges – particularly long-lived species; reduction in species variety, extent, distribution and biomass in sediment habitats; shift in species composition toward opportunist species; potential incidental physical damage to reef-living species on rocky substrates; potential disruption of species feature behaviours and consequential effects.</p> <p><u>Operation specific information required:</u> gear type and size; location, extent, scale, frequency, timing and duration; relevant location-specific biotic and abiotic information</p>	<p>This activity has been assessed and is not permitted within the site.</p>
<p><b>Dredging: bladed – mussel</b></p> <p><i>Not known to occur in SPA.</i></p>	<p><u>Geophysical regime:</u> modification of substrate; addition of persistent inert debris</p> <p><u>Fundamental environmental parameters:</u> elevation of turbidity &amp; suspended particulates.</p> <p><u>Physical disturbance:</u> displacement, crushing, amputation, abrasion, entanglement, collision, visual, noise</p> <p><u>Other factors:</u> removal of target species</p>	<p><u>Structure &amp; function:</u> modification of sedimentology – decrease in sediment habitat heterogeneity, sediment transport processes; damage to rocky habitat structure; modification of biological interactions (ecosystem effects) through depletion of target species, removal of ecologically structuring species as by-catch, modification of prey and food availability for predator and scavenger species (including species features).</p> <p><u>Conservation status of typical species &amp; species features:</u> modification of target &amp; non-target species composition, population sizes, structures and ranges – particularly long-lived species; reduction in species variety, extent, distribution and biomass in sediment habitats; shift in species composition toward opportunist species; potential incidental physical damage to reef-living species on rocky substrates; potential disruption of species feature behaviours and consequential effects.</p> <p><u>Operation specific information required:</u> gear type and size; location, extent, scale, frequency, timing and duration; relevant location-specific biotic and abiotic information</p>	<p>To secure features at FCS, assess the impacts from the activity on the features of the site.</p>

Activity	Relevant factors	Most likely relevant components & effects <i>Information necessary to further refine / tailor advice to specific operations</i>	Advice as to likely required action
		<i>information</i>	
<p><b>Dredging: bladed – mussel seed</b></p> <p><i>May have occurred at a few localised areas in SPA.</i></p>	<p><u>Geophysical regime</u>: modification of substrate; addition of persistent inert debris</p> <p><u>Fundamental environmental parameters</u>: elevation of turbidity &amp; suspended particulates.</p> <p><u>Physical disturbance</u>: displacement, crushing, amputation, abrasion, entanglement, collision, visual, noise</p> <p><u>Other factors</u>: removal of target species</p>	<p><u>Structure &amp; function</u>: modification of sedimentology – decrease in sediment habitat heterogeneity, sediment transport processes; damage to rocky habitat structure; modification of biological interactions (ecosystem effects) through depletion of target species, removal of ecologically structuring species as by-catch, modification of prey and food availability for predator and scavenger species (including species features).</p> <p><u>Conservation status of typical species &amp; species features</u>: modification of target &amp; non-target species composition, population sizes, structures and ranges – particularly long-lived species; reduction in species variety, extent, distribution and biomass in sediment habitats; shift in species composition toward opportunist species; potential incidental physical damage to reef-living species on rocky substrates; potential disruption of species feature behaviours and consequential effects.</p> <p><u>Operation specific information required</u>: gear type and size; location, extent, scale, frequency, timing and duration; relevant location-specific biotic and abiotic information</p>	<p>This is a permitted fishery and undergoes Habitat Regulation Assessments.</p>
<p><b>Dredging: bladed - oyster</b></p> <p><i>Not known to occur.</i></p>	<p><u>Geophysical regime</u>: modification of substrate; addition of persistent inert debris</p> <p><u>Fundamental environmental parameters</u>: elevation of turbidity &amp; suspended particulates.</p> <p><u>Physical disturbance</u>: displacement, crushing, amputation, abrasion, entanglement, collision, visual, noise</p> <p><u>Other factors</u>: removal of target species</p>	<p><u>Structure &amp; function</u>: modification of sedimentology – decrease in sediment habitat heterogeneity, sediment transport processes; damage to rocky habitat structure; modification of biological interactions (ecosystem effects) through depletion of target species, removal of ecologically structuring species as by-catch, modification of prey and food availability for predator and scavenger species (including species features).</p> <p><u>Conservation status of typical species &amp; species features</u>: modification of target &amp; non-target species composition, population sizes, structures and ranges – particularly long-lived species; reduction in species variety, extent, distribution and biomass in sediment habitats; shift in species composition toward opportunist species; potential incidental physical damage to reef-living species on rocky substrates; potential disruption of species feature behaviours and consequential effects.</p> <p><u>Operation specific information required</u>: gear type and size; location, extent, scale, frequency, timing and duration; relevant location-specific biotic and abiotic information</p>	<p>This would be a permitted fishery and would have to undergo a Habitats Regulation Assessment.</p>
<p><b>Dredging: deep hydraulic (e.g. WJID)</b></p> <p><i>Prohibited within the overlapping SAC under a statutory instrument</i></p>	<p><u>Geophysical regime</u>: modification of substrate</p> <p><u>Fundamental environmental parameters</u>: elevation of turbidity &amp; suspended particulates</p> <p><u>Environmental quality</u>: remobilisation of toxic &amp; non-toxic contaminants</p> <p><u>Physical disturbance</u>: displacement, crushing, amputation, smothering</p> <p><u>Other factors</u>: removal of target species</p>	<p><u>Structure &amp; function</u>: modification of seabed structure, sedimentology, sediment transport processes; damage to rocky habitat structure; modification of biological reef structures (e.g. mussel); modification of biological interactions (ecosystem effects) through depletion of target species, removal of ecologically structuring species as by-catch, modification of prey and food availability for predator and scavenger species (including species features)</p> <p><u>Conservation status of typical species &amp; species features</u>: modification of target &amp; non-target species composition, population sizes, structures and ranges – particularly long-lived species; reduction in species variety, extent, distribution and biomass in sediment habitats; shift in species composition toward opportunist species; potential incidental physical damage to reef-living species on rocky substrates; potential disruption of species feature behaviours and consequential effects.</p>	<p>This would be a permitted fishery and would have to undergo a Habitats Regulation Assessment.</p>

Activity	Relevant factors	Most likely relevant components & effects <i>Information necessary to further refine / tailor advice to specific operations</i>	Advice as to likely required action
		<i>Operation specific information required: gear type and size; target species; location, extent, scale, frequency, timing and duration; relevant location-specific biotic and abiotic information.</i>	
<b>Dredging: shallow hydraulic (e.g. suction)</b>  <i>Not an approved Welsh Government fishing method.</i>	<u>Geophysical regime:</u> modification of substrate  <u>Fundamental environmental parameters:</u> elevation of turbidity & suspended particulates  <u>Environmental quality:</u> remobilisation of toxic & non-toxic contaminants  <u>Physical disturbance:</u> displacement, crushing, amputation, smothering  <u>Other factors:</u> removal of target species	<u>Structure &amp; function:</u> modification of seabed structure, sedimentology, suspended particulates & sediment transport processes; modification of biological interactions (ecosystem effects) through depletion of target species, removal of ecologically structuring species as by-catch; modification of prey and food availability for predator and scavenger species  <u>Conservation status of typical species &amp; species features:</u> modification of target & non-target species composition, population sizes, structures and ranges – particularly long-lived species; reduction in species variety, extent, distribution and biomass in sediment habitats; shift in species composition toward opportunist species; indirect effect on reef species from elevated suspended particulates / turbidity - sub lethal impacts on invertebrate species (smothering, impedance of feeding mechanisms)  <i>Operation specific information required: gear type; location, extent, scale, frequency, timing and duration; relevant location-specific biotic and abiotic information</i>	This would be a permitted fishery and would have to undergo a Habitats Regulation Assessment.
<b>Netting: (bottom set gill)</b>  <i>Mainly for Bass.</i>	<u>Geophysical regime:</u> modification of substrate -addition of persistent inert debris  <u>Physical disturbance:</u> entanglement, displacement (target & non-target species), amputation, abrasion  <u>Other factors:</u> removal of target species	<u>Structure &amp; function:</u> modification of biological interactions (ecosystem effects) through depletion of target species (predators & scavengers), removal of ecologically structuring species (predators & scavengers) as by-catch, modification of prey availability for predators (including species features). Lost net will degrade habitat quality and create chronic entanglement risk.  <u>Conservation status of typical species &amp; species features:</u> depletion of target species populations. Incidental modification of non-target species populations, population structures, e.g. damage / displacement of fragile, erect benthic reef species; entanglement of vertebrate species, including species features. Indiscriminate 'ghost fishing' by lost netting.  <i>Operation specific information required: gear type and effort; location, extent, scale, frequency, timing and duration; relevant location-specific biotic and abiotic information</i>	To secure features at FCS, assess the impacts from the activity on the features of the site.
<b>Netting: bottom-set tangle / trammel</b>  <i>Occurs within SPA, scale and location of operations not known.</i>	<u>Geophysical regime:</u> modification of substrate -addition of persistent inert debris  <u>Physical disturbance:</u> entanglement, displacement (target & non-target species), amputation, abrasion  <u>Other factors:</u> removal of target species	<u>Structure &amp; function:</u> modification of biological interactions (ecosystem effects) through depletion of target species (predators & scavengers), removal of ecologically structuring species (predators & scavengers) as by-catch, modification of prey availability for predators (including species features). Lost net will degrade habitat quality and create chronic entanglement risk.  <u>Conservation status of typical species &amp; species features:</u> depletion of target species populations. Incidental modification of non-target species populations, population structures, e.g. damage / displacement of fragile, erect benthic reef species; entanglement of vertebrate species, including species features. Indiscriminate 'ghost fishing' by lost netting.  <i>Operation specific information required: gear type and effort; location, extent, scale, frequency, timing and duration; relevant location-specific biotic and abiotic information</i>	To secure features at FCS, assess the impacts from the activity on the features of the site.

Activity	Relevant factors	Most likely relevant components & effects <i>Information necessary to further refine / tailor advice to specific operations</i>	Advice as to likely required action
<p><b>Netting: surface-set gill</b></p> <p><i>Occurs within SPA. Scale and location of operations not known.</i></p>	<p><u>Geophysical regime</u>: modification of substrate -addition of persistent inert debris</p> <p><u>Physical disturbance</u>: entanglement, displacement (target &amp; non-target species), amputation, abrasion</p> <p><u>Other factors</u>: removal of target species</p>	<p><u>Structure &amp; function</u>: modification of biological interactions (ecosystem effects) through depletion of target species (predators &amp; scavengers), removal of ecologically structuring species (predators &amp; scavengers) as by-catch, modification of prey availability for predators (including species features). Lost net will degrade habitat quality and create chronic entanglement risk.</p> <p><u>Conservation status of typical species &amp; species features</u>: depletion of target species populations. Incidental modification of non-target species populations, population structures, e.g. damage / displacement of fragile, erect benthic reef species; entanglement of vertebrate species, including species features. Indiscriminate 'ghost fishing' by lost netting.</p> <p><u>Operation specific information required</u>: gear type and effort; location, extent, scale, frequency, timing and duration; relevant location-specific biotic and abiotic information</p>	<p>To secure features at FCS, assess the impacts from the activity on the features of the site.</p>
<p><b>Netting: demersal seine</b></p> <p><i>Not currently known to occur within the SPA.</i></p>	<p><u>Geophysical regime</u>: modification of substrate -addition of persistent inert debris</p> <p><u>Physical disturbance</u>: entanglement, displacement (target &amp; non-target species), amputation, abrasion</p> <p><u>Other factors</u>: removal of target species</p>	<p><u>Structure &amp; function</u>: modification of biological interactions (ecosystem effects) through depletion of target species (predators &amp; scavengers), removal of ecologically structuring species (predators &amp; scavengers) as by-catch, modification of prey availability for predators (including species features). Lost net will degrade habitat quality and create chronic entanglement risk.</p> <p><u>Conservation status of typical species &amp; species features</u>: depletion of target species populations. Incidental modification of non-target species populations, population structures, e.g. damage / displacement of fragile, erect benthic reef species; entanglement of vertebrate species, including species features. Indiscriminate 'ghost fishing' by lost netting.</p> <p><u>Operation specific information required</u>: gear type and effort; location, extent, scale, frequency, timing and duration; relevant location-specific biotic and abiotic information</p>	<p>To secure features at FCS, assess the impacts from the activity on the features of the site.</p>
<p><b>Netting: other (e.g. fyke)</b></p> <p><i>Not known if this occurs in SPA.</i></p>	<p><u>Geophysical regime</u>: modification of substrate -addition of persistent inert debris</p> <p><u>Physical disturbance</u>: entanglement, displacement (target &amp; non-target species), amputation, abrasion</p> <p><u>Other factors</u>: removal of target species</p>	<p><u>Structure &amp; function</u>: modification of biological interactions (ecosystem effects) through depletion of target species (predators &amp; scavengers), removal of ecologically structuring species (predators &amp; scavengers) as by-catch, modification of prey availability for predators (including species features). Lost net will degrade habitat quality and create chronic entanglement risk.</p> <p><u>Conservation status of typical species &amp; species features</u>: depletion of target species populations. Incidental modification of non-target species populations, population structures, e.g. damage / displacement of fragile, erect benthic reef species; entanglement of vertebrate species, including species features. Indiscriminate 'ghost fishing' by lost netting.</p> <p><u>Operation specific information required</u>: gear type and effort; location, extent, scale, frequency, timing and duration; relevant location-specific biotic and abiotic information</p>	<p>This would be a permitted fishery and would have to undergo a Habitats Regulation Assessment.</p>

Activity	Relevant factors	Most likely relevant components & effects <i>Information necessary to further refine / tailor advice to specific operations</i>	Advice as to likely required action
<b>Electro-fishing: molluscs</b>  <i>Not approved Welsh Government fishing method.</i>	<u>Other factors:</u> removal of target species, possible impact to non-target species.	<u>Conservation status of typical species &amp; species features:</u> modification of target & non-target species composition, population sizes, structures and ranges – particularly long-lived species; reduction in species variety, extent, distribution and biomass in sediment habitats; shift in species composition toward opportunist species; potential incidental physical damage to reef-living species on rocky substrates; potential disruption of species feature behaviours and consequential effects.	This would be a permitted fishery and would have to undergo a Habitats Regulation Assessment.
<b>Hand gathering: crustacean / shellfish</b>  <i>Occurs in SPA. Intensity, location and effort information is unknown.</i>	<u>Geophysical regime:</u> modification of substrate, physical structure  <u>Fundamental environmental parameters:</u> elevation of turbidity; reduced oxygen  <u>Environmental quality:</u> remobilisation of toxic & non-toxic contaminants (digging)  <u>Physical disturbance:</u> displacement, possible crushing & amputation, visual  <u>Other factors:</u> removal of target species	<u>Structure &amp; function:</u> modification of habitat structure, sedimentology, topography and microtopography; modification of sediment processes, sediment chemistry (e.g. sediment oxygenation, mobilisation of contaminants); modification of biological interactions (ecosystem effects) through depletion of target species, including ecologically structuring species; modification of prey and food availability for predator and scavenger species  <u>Conservation status of typical species &amp; species features:</u> depletion of target species populations and modification of population structures; modification of species composition and variety (e.g. increase in predatory species) in sediment habitats; potential depletion of predator prey species  <u>Operation specific information required:</u> target species; location, extent, scale, frequency, timing duration and nature of collection activity; relevant location-specific biotic and abiotic	To secure features at FCS, assess the impacts from the activity on the features of the site.
<b>CULTIVATION OF LIVING RESOURCES</b>			
<b>Aquaculture: molluscan 'farming' * (molluscan culture using trestles, ropes, cages or other structures)</b>	<u>Fundamental environmental parameters:</u> oxygen depletion  <u>Environmental quality:</u> nutrient & organic enrichment; possible addition of pesticides & antifoulants  <u>Other factors:</u> introduction of non-native species	<u>Structure &amp; function:</u> modification of habitat structure, sedimentology, sediment processes; reduction in habitat quality (introduction of artificial substrate); modification of water & sediment chemistry (increase in nutrients, toxic & non-toxic contaminants, oxygen demand); modification of biological interactions (e.g. predator-prey relationships)  <u>Conservation status of typical species &amp; species features:</u> local modification of species physiological health, variety, composition within zone of influence; increase in population size and range of (invertebrate) predatory species; modification of behaviour and range of predatory vertebrate species (including species features)  <u>Operation specific information required:</u> species and aquaculture structures; location, extent, scale and duration; relevant location-specific biotic and abiotic information	This would be a permitted activity and would have to undergo a Habitats Regulation Assessment.
<b>EXPLOITATION OF NON-LIVING RESOURCES</b>			
<b>Renewal energy generation: tidal barrage*#</b>  <i>No proposals at present.</i>	<u>Geophysical regime:</u> modification of tidal regime, streams & amplitude, substrate, sediment transport, wave exposure  <u>Fundamental environmental parameters:</u> salinity, suspended particulates, turbidity, dissolved oxygen, temperature, seabed light  <u>Environmental quality:</u> toxic & non-toxic contaminant accumulation ; organic	<u>Extent &amp; distribution:</u> loss of / reduction in habitat extent; reduction in habitat distribution, e.g. estuary and encompassed (particularly intertidal and rocky) habitats; chronic loss of reef through siltation in enclosed waterways  <u>Structure &amp; function:</u> upstream of barrage: change of habitat type(s); modification or loss of characterising geomorphology of features (ria, estuaries, tidal narrows); loss or change of habitat structure, sedimentology & bathymetry; disruption of hydrodynamic regime (including tidal regime) & sediment transport processes; modification of suspended particulates, turbidity, light; modification of water and	Treat as plan or project as appropriate.

Activity	Relevant factors	Most likely relevant components & effects <i>Information necessary to further refine / tailor advice to specific operations</i>	Advice as to likely required action
	enrichment	<p>sediment chemistry (salinity regime, deoxygenation, eutrophication, contaminant &amp; nutrient accumulation); sediment transport processes; increased turbidity; increased homogeneity of habitats within impounded areas.</p> <p>Downstream from barrage: modification of habitat structure, sedimentology; hydrodynamic regime; sediment transport processes; suspended particulates, turbidity, water (and sediment) chemistry, particularly salinity regime and nutrient / contaminant fluxes.</p> <p><u>Conservation status of typical species &amp; species features:</u> decrease in species variety, modification of distribution; change in species composition from fully saline and mixed salinity to low salinity species; consequential near and far-field modification of species population structure, physiological health, reproductive capacity. Reduction in species ranges (reproductive propagules of sessile biota and movement of mobile biota including vertebrates and species features)</p> <p><u>Operation specific information required:</u> location, extent, scale of impoundment; potential modification of tidal and freshwater flow; timing and duration of construction; maintenance</p>	
<p><b>Renewable energy generation: tidal impoundment *#</b></p> <p><i>No proposals at present.</i></p>	<p><u>Geophysical regime:</u> modification of tidal regime, streams &amp; amplitude, substrate, sediment transport, wave exposure</p> <p><u>Fundamental environmental parameters:</u> salinity, suspended particulates, turbidity, dissolved oxygen, temperature, seabed light</p> <p><u>Environmental quality:</u> toxic &amp; non-toxic contaminant accumulation; organic enrichment</p>	<p><u>Extent &amp; distribution:</u> loss of / reduction in habitat extent; reduction in habitat distribution, e.g. estuary and encompassed (particularly intertidal and rocky) habitats; chronic loss of reef through siltation in enclosed waterways</p> <p><u>Structure &amp; function:</u> upstream of barrage: change of habitat type(s); modification or loss of characterising geomorphology of features (ria, estuaries, tidal narrows); loss or change of habitat structure, sedimentology &amp; bathymetry; disruption of hydrodynamic regime (including tidal regime) &amp; sediment transport processes; modification of suspended particulates, turbidity, light; modification of water and sediment chemistry (salinity regime, deoxygenation, eutrophication, contaminant &amp; nutrient accumulation); sediment transport processes; increased turbidity; increased homogeneity of habitats within impounded areas.</p> <p>Downstream from barrage: modification of habitat structure, sedimentology; hydrodynamic regime; sediment transport processes; suspended particulates, turbidity, water (and sediment) chemistry, particularly salinity regime and nutrient / contaminant fluxes.</p> <p><u>Conservation status of typical species &amp; species features:</u> decrease in species variety, modification of distribution; change in species composition from fully saline and mixed salinity to low salinity species; consequential near and far-field modification of species population structure, physiological health, reproductive capacity. Reduction in species ranges (reproductive propagules of sessile biota and movement of mobile biota including vertebrates and species features)</p> <p><u>Operation specific information required:</u> location, extent, scale of impoundment; potential modification of tidal and freshwater flow; timing and duration of construction; maintenance</p>	Treat as plan or project as appropriate.
<p><b>Alternative energy production: tidal current turbine*#</b></p> <p><i>No proposals at present.</i></p>	<p><u>Geophysical regime:</u> modification of wave and tidal regimes; removal &amp; alteration of substrate</p> <p><u>Environmental quality:</u> possible toxic &amp; non-toxic contaminants; modification of suspended particulates</p>	<p><u>Extent &amp; distribution:</u> potential habitat loss within footprint of generating structures</p> <p><u>Structure &amp; function:</u> potentially highly variable dependent on nature, construction and scale of structures. Modification of habitat structure, sedimentology &amp; sediment processes, hydrodynamic regime</p> <p><u>Conservation status of typical species &amp; species features:</u> modification of species</p>	Treat as plan or project as appropriate.

Activity	Relevant factors	Most likely relevant components & effects <i>Information necessary to further refine / tailor advice to specific operations</i>	Advice as to likely required action
	<u>Physical disturbance</u> : displacement, crushing, smothering by structures or anchoring mechanisms; collision; noise	variety, distribution, physiological health (collision, entrainment); modification of species ranges (disturbance; artificial reef effects)  <u>Operation specific information required</u> : type, construction & size; location & extent; timing and duration of installation; permanence; anchoring structures; cabling requirements; maintenance requirements & frequency; relevant location-specific biotic and abiotic information	
<b>Alternative energy generation: offshore wind</b> *#  <i>No proposals at present.</i>	<u>Geophysical regime</u> : modification of wave and tidal regimes; modification to substrate  <u>Environmental quality</u> : possible toxic & non-toxic contaminants  <u>Physical disturbance</u> : general physical effects; possible collision	<u>Extent &amp; distribution</u> : potential habitat loss within footprint of generating structures  <u>Structure &amp; function</u> : potentially highly variable dependent on nature, construction and scale of structures. Modification of sedimentology & sediment processes, hydrodynamic regime  <u>Conservation status of typical species &amp; species features</u> : modification of species variety, & distribution; modification of species ranges (disturbance; artificial reef effects)  <u>Operation specific information required</u> : type, construction & size; location & extent; timing and duration of installation; permanence; cabling requirements; maintenance requirements & frequency; relevant location-specific biotic and abiotic information	Treat as plan or project as appropriate.
<b>POLLUTION RESPONSE</b>			
<b>Oil spill response: at sea</b>  <i>Reactive only. No recent activity.</i>	<u>Environmental quality</u> : toxic contamination - petrochemicals, surfactants, demulsifiers  <u>Physical disturbance</u> : noise, visual	<u>Structure &amp; function</u> : modification of water chemistry (with purpose of ameliorating degree of modification)  <u>Conservation status of typical species &amp; species features</u> : acute modification of species physiological health (sub lethal and possibly lethal); population structure & dynamics (primarily shallow sediment & reef species, fish and mammals, including species features)  <u>Operation specific information required</u> : location, extent, scale, timing and duration; relevant location-specific biotic and abiotic information	Develop and maintain appropriate pollution response contingency plans; inclusion and maintenance of information on site features and sensitivity to at-sea response activities in appropriate pollution response advice contingency plan
<b>RECREATION</b>			
<b>Recreational boating: high speed power craft (incl. PWC)</b>  <i>Common in SPA with peak activity during summer season.</i>	<u>Geophysical regime</u> : modification of substrate physical structure; wave exposure regime  <u>Fundamental environmental parameters</u> : turbidity  <u>Environmental quality</u> : hydrocarbon contaminants; organic enrichment  <u>Physical disturbance</u> : displacement, collision, noise, visual	<u>Structure &amp; function</u> : local modification of sediment structures (erosion), wave exposure in wave sheltered locations (vessel wash); local modification of water quality (hydrocarbon and other contaminants)  <u>Conservation status of typical species &amp; species features</u> : disturbance and modification of range and behaviour of vertebrate species; local modification of species composition  <u>Operation specific information required</u> : location, extent, scale, frequency, timing and duration; relevant location-specific biotic and abiotic information	Education & awareness raising Activity surveillance.
<b>Recreational boating: low speed power craft</b>	<u>Geophysical regime</u> : modification of substrate physical structure; wave exposure	<u>Structure &amp; function</u> : local modification of sediment structures (erosion), wave exposure in wave sheltered locations (vessel wash); local modification of water	Education & awareness raising



Activity	Relevant factors	Most likely relevant components & effects <i>Information necessary to further refine / tailor advice to specific operations</i>	Advice as to likely required action
<i>Common in SPA with peak activity during summer season.</i>	regime <u>Fundamental environmental parameters:</u> turbidity <u>Environmental quality:</u> hydrocarbon contaminants; organic enrichment <u>Physical disturbance:</u> displacement, collision, noise, visual	quality (hydrocarbon and other contaminants) <u>Conservation status of typical species &amp; species features:</u> disturbance and modification of range and behaviour of vertebrate species; local modification of species composition <u>Operation specific information required:</u> location, extent, scale, frequency, timing and duration; relevant location-specific biotic and abiotic information	Activity surveillance.
<b>Recreational boating: sail</b> <i>Common in SPA with peak activity during summer season.</i>	<u>Physical disturbance:</u> displacement, collision, noise & visual	<u>Conservation status of typical species &amp; species features:</u> disturbance and modification of range and behaviour of vertebrate species; local modification of benthic species population structures <u>Operation specific information required:</u> location, extent, scale, frequency, timing and duration; relevant location-specific biotic and abiotic information	Education & awareness raising Activity surveillance.
<b>Recreational boating: canoeing</b> <i>Sea kayaking occurs in SPA. Frequency and intensity unknown.</i>	<u>Physical disturbance:</u> displacement, collision, noise & visual	<u>Conservation status of typical species &amp; species features:</u> disturbance and modification of range and behaviour of vertebrate species; local modification of benthic species population structures <u>Operation specific information required:</u> location, extent, scale, frequency, timing and duration; relevant location-specific biotic and abiotic information	Education & awareness raising Activity surveillance.
<b>Recreational boating: other non-mechanically powered craft (e.g. kite-surfing, board-sailing etc.)</b> <i>Occurs at some locations in SPA. Frequency and intensity unknown.</i>	<u>Physical disturbance:</u> displacement, collision, noise & visual	<u>Conservation status of typical species &amp; species features:</u> disturbance and modification of range and behaviour of vertebrate species; local modification of benthic species population structures <u>Operation specific information required:</u> location, extent, scale, frequency, timing and duration; relevant location-specific biotic and abiotic information	Education & awareness raising Activity surveillance.
<b>Coastal access for recreation (bathing, dog walking, coastering etc.)</b> <i>Substantial, but unquantified. Seasonally and spatially highly variable.</i>	<u>Environmental quality:</u> organic enrichment, microbial pathogens, persistent inert materials <u>Physical disturbance:</u> general physical effects; trampling; noise; visual	<u>Conservation status of typical species &amp; species features:</u> disturbance and modification of range and behaviour of vertebrate species; local modification of benthic species composition <u>Operation specific information required:</u> location, extent, scale, frequency, timing and duration; relevant location-specific biotic and abiotic information	Education & awareness raising
<b>Light aircraft</b> <i>Occasional craft flying over SPA.</i>	<u>Physical disturbance:</u> noise & visual	<u>Conservation status of typical species &amp; species features:</u> disturbance and modification of range and behaviour of vertebrate species <u>Operation specific information required:</u> location, extent, scale, frequency, timing and duration; relevant location-specific biotic and abiotic information	Activity surveillance
<b>Wildfowling</b> <i>Occurs in SPA, primarily in estuaries.</i>	<u>Environmental quality:</u> metals, persistent inert materials <u>Physical disturbance:</u> crushing; noise; visual	<u>Structure &amp; function:</u> modification of sediment chemistry (heavy metal contamination); habitat modification (manipulation to encourage target species) <u>Conservation status of typical species &amp; species features:</u> local modification of sediment benthic species population structures, particularly sediment habitats; disturbance and modification of range and behaviour of vertebrate species <u>Operation specific information required:</u> location, extent, scale, frequency, timing	Activity surveillance Education & awareness raising Review, monitor and enforce spatial, temporal and effort operational limits suitable to secure features at FCS

Activity	Relevant factors	Most likely relevant components & effects <i>Information necessary to further refine / tailor advice to specific operations</i>	Advice as to likely required action
		<i>and duration; relevant location-specific biotic and abiotic information</i>	Appropriate implementation of SSSI procedures & access byelaws
<b>Marine wildlife watching / eco-tourism</b>  <i>Some charter boats operate in area. Some coastal activity.</i>	<u>Physical disturbance:</u> noise & visual	<u>Conservation status of typical species &amp; species features:</u> disturbance and modification of range and behaviour of vertebrate species  <u>Operation specific information required:</u> location, extent, scale, frequency, timing and duration; relevant location-specific biotic and abiotic information	Activity surveillance
<b>MILITARY ACTIVITIES</b>			
<b>Military activity: ordnance ranges*</b>  <i>No ranges within or near to SPA.</i>	<u>Environmental quality:</u> metals, persistent inert materials  <u>Physical disturbance:</u> noise; visual	<u>Structure &amp; function:</u> modification of water quality  <u>Conservation status of typical species &amp; species features:</u> disturbance and modification of range and behaviour of vertebrate species; potential effects of contaminants on physiological health  <u>Operation specific information required:</u> location, extent, scale, frequency, timing and duration; relevant location-specific biotic and abiotic information	Research potential effects on features
<b>Military activity: marine exercises</b>  <i>Not known within SPA.</i>	<u>Environmental quality:</u> metals, persistent inert materials  <u>Physical disturbance:</u> noise; visual	<u>Structure &amp; function:</u> modification of water quality  <u>Conservation status of typical species &amp; species features:</u> disturbance and modification of range and behaviour of vertebrate species  <u>Operation specific information required:</u> location, extent, scale, frequency, timing and duration; relevant location-specific biotic and abiotic information	Research potential effects on features
<b>Military activity: aircraft</b>  <i>Llanbedr airfield</i>	<u>Physical disturbance:</u> noise & visual	<u>Conservation status of typical species &amp; species features:</u> disturbance and modification of range and behaviour of vertebrate species  <u>Operation specific information required:</u> location, extent, scale, frequency, timing and duration; relevant location-specific biotic and abiotic information	Activity surveillance
<b>MISCELLANEOUS OPERATIONS AND USES</b>			
<b>Animal welfare operations &amp; sanctuaries</b>  <i>Not known in site.</i>	<u>Environmental quality:</u> potential release of microbial pathogens  <u>Physical disturbance:</u> noise, visual  <u>Other factors:</u> habituation of wild species to humans	<u>Conservation status of species features:</u> effects on population physiological health (survival and release of low-fitness individuals), potential exposure to domestic disease; potential disturbance and modification of range and behaviour  <u>Operation specific information required:</u> location, extent, scale, frequency, timing and duration; relevant location-specific biotic and abiotic information	Activity surveillance  Education & awareness raising  Review, develop and/or implement and monitor best practice suitable to secure features at FCS

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## Annex 2 Glossary of Terms

Meaning of the following terms as employed in this conservation advice:

Term	Meaning as employed in this conservation advice
baroclinic	Seawater circulation pattern arising when density and pressure gradients are perpendicular to each other
benthos; benthic	The forms of marine life that live on, or in, the sea or ocean bottom. Pertaining to the sea or ocean bottom.
bioaccumulation	The uptake and retention of a 'bioavailable' chemical form from any one of, or all possible external sources ( <i>cf</i> biomagnification <i>qv</i> ).
biodiversity	Biodiversity has been widely defined and is understood in various ways. It is widely used to capture the concept of the 'variety of life' and includes genetic, species and community diversity.
biogenic	Produced directly by the physiological activities of organisms, either plant or animal (Baretta-Bekker <i>et al</i> 1998). Biogenic reefs – long-lived, hard, biological structures comprised of large numbers individual organisms such as mussel or sand-tube building worms <i>Sabellaria</i> .
biomagnification	The process whereby a chemical, as it is passed through a food chain or food web, builds to increasingly higher concentrations in the tissues of animals at each higher trophic level ( <i>cf</i> bioaccumulation <i>qv</i> ).
biotic and abiotic factors ( <i>qv</i> )	<p>Biotic: "Pertaining to life ... influences caused by living organisms", <i>cf</i> abiotic: "characteristics and elements of the environment (which) influence survival or reproduction of organisms, that are not alive themselves" (Baretta-Bekker <i>et al</i> <i>ibid</i>)</p> <p>Influences and elements of both a biological and non-biological nature that:</p> <ul style="list-style-type: none"> <li>• contribute to the composition of a habitat, its structure, function or biology (<i>i.e.</i> the factors that the comprise habitat, as defined in Habitats Directive, Article 1f: "<i>habitat of a species</i> means an environment defined by specific abiotic and biotic factors, in which the species lives at any stage of its biological cycle");</li> <li>• contribute to a result or to bringing about a result;</li> <li>• affect the course of events.</li> </ul> <p>Many factors are <i>processes</i> (<i>qv</i>)</p> <p>Biotic factors include competitive interaction (e.g. for space and food, predation, scavenging and grazing).</p>
bioturbation	Biological perturbation, or reworking, of sediment by organisms, affecting the exchange of organic matter, oxygen, nutrients etc between buried sediment and the sediment surface and overlying waters.
by-catch	"The catch of non-target species and undersized fish of target species." (CCW 200125). "The part of the catch that does not belong to the retained part of the target species of a fishery. ... unmarketable component of target species, marketable species which were not aimed for, ... accidental catches. The term is often used rather loosely" (Baretta-Bekker <i>et al</i> <i>ibid</i> )
contaminant	Anthropogenically synthesised chemicals (e.g. PCBs, biocides etc.) and anthropogenically elevated naturally occurring chemical components (e.g. heavy metals) that are toxic or otherwise detrimental to the physiological health or well-being of typical species.
degrade	( <i>degrade</i> : to lower in rank or grade, to lower in character, value or position or in complexity; <i>degraded</i> : declined in quality or standard. <i>Chambers Dictionary</i> 1998). In this document, the meaning of degrade is applied to damage or impairment resulting from such human action as has a detrimental outcome for features.
demersal	Living on or near the seabed.
detrimental	Causing damage or harm; damaging, disadvantageous
dioecious	Sexes separate, <i>i.e.</i> not hermaphrodite
epifauna (-flora, -biota)	Animals (fauna), plants (flora), organisms (biota) that live on top of seabed or other organisms, either attached to them or freely moving over then; <i>cf</i> infauna ( <i>qv</i> )
eutrophic	Waters rich in mineral and organic nutrients that promote a proliferation of plant life, especially algae, which reduces the dissolved oxygen content and often causes the reduction or extinction of other organisms.
evolve	To alter with time, either remaining stable ( <i>qv</i> ) or changing

Term	Meaning as employed in this conservation advice
extent	The area a feature, or one of its components, covers within its natural range (qv) within the site.
factor	A circumstance, fact, influence or element that: <ul style="list-style-type: none"> <li>• contributes to composition of a habitat, its structure, function or biology;</li> <li>• contributes to a result or to bringing about a result;</li> <li>• affects the course of events.</li> </ul> <p><i>Many factors are processes (qv)</i></p>
functions	Functions are processes that may, directly or indirectly, influence: <ul style="list-style-type: none"> <li>• the state of a physical habitat;</li> <li>• the marine life associated with that habitat.</li> </ul>
habitat components	Contributing to the composition of a habitat. This includes physical and biological sub-habitats e.g. different types of reef, as well as different elements such as particular communities that make up reef habitats
halocline	The boundary zones between layers of seawater at different salinities (see also thermocline and oxyclines). Together with thermoclines, halocline have a strong influence on seawater density, circulation and species distribution
hydrodynamics	The mechanical effects of moving fluids; i.e. the motions of the sea. (Baretta-Bekker <i>et al ibid</i> )
hydrography	The description of the seas: 1) “marine cartography” (coastlines, bathymetry); 2) “descriptive oceanography” (the “description of water properties, their distribution and variation”; encompasses hydrodynamics qv) (Baretta-Bekker <i>et al ibid</i> )
hypertrophic	Waters in which mineral and organic nutrients are elevated above natural levels (cf eutrophic qv).
inherent	Existing in and inseparable from something else; innate; natural; the relation between a quality or attribute and its subject (Oxford English and Chambers Dictionaries)
inhibit	To hold in or back; to keep back; to restrain or check; to restrict or prevent
maerl	A calcareous red alga (seaweed) that is an important habitat-structuring component. Maerl is very slow growing and maerl beds tend to support particularly rich and biodiverse marine communities.
maximum sustainable yield (MSY)	Maximum use that a renewable resource can sustain without impairing its renewability through natural growth or replenishment. Fishing at MSY levels means catching the maximum proportion of a fish stock that can safely be removed from the stock while, at the same time, maintaining its capacity to produce maximum sustainable returns, in the long term. Considered as an international minimum standard for stock rebuilding strategies (i.e. stocks should be rebuilt to a level of biomass which could produce at least MSY).
mega, macro, and meio- (biota / flora / fauna)	The sizes of plants and animals. Mega-: no internationally agreed definition, but commonly defined as large enough to be seen discriminated in photographs, 2 cm or larger. Macro - large enough to be seen by the naked eye, greater than 0.5 mm, to up to 2cm. Meio-: organisms that cannot be observed without a microscope; organisms between 0.03 or 0.06 mm and 0.5 mm (cf micro-: organisms invisible to the naked eye, smaller than meiofauna; defined as <32µm) ( <i>Multiple references</i> )
natural	In this document, the meaning of natural is taken to be as defined in standard English dictionaries: inherent, innate, self-sown and uncultivated, not the work of or the direct product of interference by human action; in accordance with nature; relating to or concerning nature; existing in or produced by nature; in conformity with nature; not artificial. It does not mean or imply pristine (i.e. an original, unmodified, state).
oxycline	The boundary zones between layers of seawater with different dissolved oxygen concentrations (see also halocline and thermocline). Strong influence on species distribution.
process	A series of actions, events or changes that vary in space and over time. In this context processes include physical, chemical and biological environmental changes which are inherently natural, but which may be modified by human activity (e.g. wave action, nutrient fluxes).

Term	Meaning as employed in this conservation advice
	All processes are factors.
quality (of habitat)	The relative absence of anthropogenic modification of naturalness of habitat extent, structure, function and typical species as a result of, inter alia: <ul style="list-style-type: none"> <li>• change in distribution, extent, geology, sedimentology, geomorphology, hydrography, meteorology, water and sediment chemistry and biological interactions;</li> <li>• change in species richness, population structure and dynamics, physiological health, reproductive capacity, recruitment, mobility and range or of anthropogenic modification of suitability of habitat as a result of, inter alia;</li> <li>• level of disturbance</li> <li>• alternation of prey/food supply</li> <li>• contamination of food supply</li> </ul>
range	The natural spatial distribution of a feature, habitat, habitat component or species. Depending on the context, this term either describes the global distribution of the feature or, in the context of the site, the distribution of the feature within the site
safe biological limits	ICES definition of fisheries sustainability. "Within SBL" defined as stock at full reproductive capacity and harvested sustainably. ICES Advice Autumn 2004 & summarised at <a href="http://www.defra.gov.uk/environment/statistics/coastwaters/cwfishstock.htm">www.defra.gov.uk/environment/statistics/coastwaters/cwfishstock.htm</a>
salinity	Seawater salinity is measured in parts of salt in one thousand parts water (‰).
salt wedge	When freshwater and seawater meet in an estuary or sheltered marine inlet, the two water masses of different density often do not mix completely. A distinguishable inflowing tongue of dense seawater beneath a less dense layer of freshwater is referred to as a salt wedge. The shape of the salt wedge in Milford Haven is measurably deflected to the south side of the Haven by the earth's rotation.
sessile	Benthic (qv) organisms living attached to the seabed substrate.
species richness	Variety of species. The total number of species: <ul style="list-style-type: none"> <li>• among a fixed number of individuals;</li> <li>• per unit of surface area (of habitat).</li> </ul>
spraint	Descriptive term for otter faeces. Spraint has a distinctive smell and appearance; it contains indigestible food remains from which prey species may be identified.
stable	Tendency towards an equilibrium state in spite of varying external conditions.
structure	The composition and arrangement of those: <ul style="list-style-type: none"> <li>• parts of the feature,</li> <li>• parts of the natural environment,</li> <li>• circumstances,</li> </ul> that constitute the feature or are required by the feature for its maintenance in both the long term and foreseeable future.
stochastic	Random, chaotic, possible but unpredictable.
thermocline	A boundary zone between layers of seawater at different temperatures (see also halocline and oxycline). Together with haloclines, thermoclines have strong influences on seawater density, circulation and species distribution.
supporting sediments	Sediments with strong geomorphological / sediment-transport links to the feature. Particularly relevant to areas of sediment exchange and supply.
thermohaline circulation	Seawater circulation driven by density differences caused by seawater temperature and salinity differences.
typical species	Species that are, from time to time, associated with a specified habitat within the site; i.e. all species that contribute to the biodiversity of the specified habitat within the site.



### **Annex 3 List of SSSIs and SACs partly or wholly with the SPA**

#### **Sites of Special Scientific Interest that are partly or wholly within the SPA:**

- Glanllynnau a Glannau Pen – Ychain I Cricieth
- Tiroedd a Glannau rhwng Cricieth ac Afon Glaslyn
- Morfa Dyffryn
- Glannau Tonfanau i Friog
- Broadwater
- Dyfi
- Borth – Clarach
- Allt wen a traeth Tanybwllch
- Craigyfulfran & Clarach

#### **SACs that are partly or wholly within the SPA**

- Pen Llŷn a'r Sarnau / Lley Peninsula and the Sarnau
- West Wales Marine / Gorllewin Cymru Forol

## Annex 4 Elements of favourable conservation status

Elements that may be considered when assessing or considering favourable conservation status of a habitat or feature.

**Table 4.1:** Habitats – elements of favourable conservation status and its rationale

Element	Description and rationale
<b>RANGE</b>	
Distribution	Distribution of habitat features within the site, and also within a national and European context, has a key role in determining the distribution and abundance of typical species. Also important is the distribution within a habitat feature of components of habitat structure (e.g. Sediment granulometry) and of habitat function (e.g. Wave exposure).
Extent	Overall extent, large examples or extensive areas are inherently highly rated and contribute to conservation of structure and function The extents of habitat components, both structural functional are important determining factors of habitat and species diversity.
Structure	Physical structures of habitat features, and their variation are the foundation of habitat diversity and, accordingly, species diversity. Along with environmental processes (function), habitat structure strongly influences where things live.
Geology	Geology at all spatial scales underpins the structure of the habitats, from overall coastal structure, which determine exposure to major environmental processes, to local habitat structure. The range of rock types and the distribution of rock folding, faulting and fracturing determine the overall complexity of shape of the seabed and coast and the diversity of habitats.
Sedimentology	Sedimentology is the result of complex processes significantly influenced by water movement. Sediment granulometry, structure and degree of sorting (from well sorted fine – medium sands and muddy sands to poorly sorted, mixed substrata containing mud, gravel, shell and stones) creates an extremely wide range of sediment habitats.
<b>GEOMORPHOLOGY</b>	
morphology (shape)	The gross shape of features and of individual sections of features is an essential component of habitat structure and contributes to habitat diversity.
topography (surface structure)	Surface relief of all substrates is a fundamentally important component of habitat structure, underpinning biological diversity through the provision of different habitats and microhabitats and a range of depths below sea level or intertidal drying heights. Topography, together with morphology, has a critical influence on hydrodynamic processes. Rock topography is fundamentally determined by geology. The range of rock topography is a particularly important contributor to reef biodiversity. Sediment topography is important in sediment habitats. For example, granulometry and slope together determine sediment flats' ability to retain water during low tide (the amount of interstitial water retained is important in determining community composition); the breadth of the shore (related to slope) in combination with shore aspect, is important in determining the degree of wave energy expended on any part of the shore, therefore influencing community composition.
microtopography	Rock microtopography is determined by geology, with surface pits, cracks, fissures, bore-holes etc. providing additional niches for marine wildlife. The microtopography of sediment flats is important in determining water runoff (including the formation of rips) and retention and, in turn, influence the distribution of surface biota and granulometry.
orientation and aspect	Orientation and aspect are products of morphology and topography that, in combination with functional processes such as wave or light exposure, extend the variety of niches provided by habitat features. Range and variation in orientation and aspect enhance habitat and species diversity.
bathymetry	Bathymetry is determined by other structural components and by hydrodynamic and sediment processes. Depth of seabed is in turn a critical influence on hydrodynamic processes, such as wave exposure and tidal streams. In combination with water

Element	Description and rationale
	clarity, depth determines light attenuation through the water column thereby contributing directly to community structure. Bathymetric variation within and between individual parts of features enhances habitat and species diversity
FUNCTION	Distribution, extent, abundance and variety of species populations is shaped by spatial and temporal variation of a wide range of physico-chemical and biological processes (functions).
Hydrography & meteorology	Hydrographic & meteorological processes are fundamental to the structure and function of habitats and their species populations. The magnitude of hydrographic factors varies along gradients determined by the underlying geomorphology of the site and complex interactions with other functional processes.
hydrodynamics (water movement)	<p>Water movement is a fundamentally important environmental process that determines the species composition present at any particular location, both directly and indirectly through its effect on other important processes such as nutrient, sediment and dissolved gas transport. The range of relative contributions of tidal streams, wave action and residual currents to water movement is particularly important in determining biological composition.</p> <p><i>Tidal range and rise</i> - fall is of critical importance to structure, function and species population of habitats both directly – determining extent of intertidal areas and the emergence regime; and indirectly through the action of tidal streams.</p> <p><i>Tidal streams (currents)</i>: the strength, patterns, relative constancy, lack of attenuation with depth, general bidirectionality and spatial and temporal variations in tidal streams are important in structuring the distribution of species populations; food, sediment and chemical transport processes; water mixing.</p> <p><i>Wave exposure</i>. Wave action is one of the most physically powerful, chaotic and relatively unpredictable processes. Exposure to wave action is determined by habitat morphology, topography, aspect, attenuation with depth and meteorological processes and has a major influence on distribution of species populations; water clarity and water mixing. The range of wave exposure within the site is extreme.</p> <p><i>Residual current</i> flows modify local hydrodynamic and meteorological processes for example through inputs of water masses with elevated suspended sediment loads, temperature and / or nutrients and contaminants.</p>
temperature (water)	<p>Water temperature strongly influences water chemistry and biological processes, such as reproduction and metabolism.</p> <p>The biogeographical location of the sites and the degree of buffering of winter minima and summer coastal warming by oceanic waters (North Atlantic Drift) strongly influences and limits the sea temperature range. Temperature range is important in mediating reproduction and survival of species, shielding submerged species from the more extreme temperatures experienced by intertidal species and reducing the ability of some non-native species to become established.</p> <p>Global processes (global warming, shifts in ocean currents), influenced by climate change, also influence local seawater temperature regime temporarily, seasonally or chronically.</p>
light intensity (ambient seabed and water column)	<p>Seabed light intensity has an important influence on community structure, particularly through algal species distribution, mediated by bathymetry, water transparency and localised shading (e.g. from overhangs, caves or aspect). Spatial and temporal variation in light intensity has considerable broad and local scale impacts on species population distributions and community variation. Water column light intensity in combination with shelter from extreme water movement and elevated nutrients is important in the occurrence and distribution of seasonal plankton blooms.</p>
Seston Concentrations and water transparency (clarity/ turbidity)	<p>Seston (suspended particulate matter) concentrations are critically importance as a food-energy resource, is a factor in sediment processes and deposition including smothering and scouring of biota, and through absorption of light modifying light availability at seabed and in water column.</p> <p>Seston composition and water column loads are determined by the origins of the particulate matter – biological productivity and / or riverine, coastal or oceanic water inputs.</p>

Element	Description and rationale
<b>METEOROLOGY</b>	
temperature (air)	Air temperature is an important factor in several aspects of intertidal habitat function (heat / cold tolerance, control of reproduction, desiccation, dissolved oxygen, salinity). Although overall air temperature is climate controlled, it is subject to local modifications by habitat structure and species populations.
light (solar irradiance)	Solar irradiance is a fundamental requirement for plant primary production. It is determined by meteorological conditions, and seabed and water column irradiance is mediated as described above. It also has direct effects on temperature, desiccation, UV exposure, dissolved oxygen and salinity in intertidal habitats, where it is mediated by localised shading (e.g. from overhangs, caves or aspect).
humidity	In association with temperature and air movement, humidity is an important factor controlling evaporation, and consequently salinity and the desiccation of intertidal species. Although overall humidity is climate controlled, it is subject to local modifications by habitat structure and species populations.
air movement (wind)	Wind strength, direction and fetch are the fundamental influences on wave action. The effect of air temperature and humidity on intertidal species and communities is strongly influenced by air movement. Although overall air movement is climate controlled, it is subject to local modification by habitat structure and local topography.
precipitation	Rainfall locally modifies salinity in intertidal areas, modifies temperature and humidity and increases transport of terrestrial sediments and other materials (e.g. nutrients, contaminants) into the marine environment. Land use and surface water management influences the effect of heavy rainfall in creating spate events that increase short term flow rates, soil erosion and particulate suspension.
<b>WATER &amp; SEDIMENT CHEMISTRY</b>	
salinity	Salinity is of fundamental physiological and ecological significance. Horizontal and vertical salinity gradients from average fully saline open coast seawater through brackish to freshwater and temporal variation in the gradients are of primary importance in species distribution.
nutrients	Dissolved organic nutrients and trace elements are essential to biochemical processes. Major nutrients in unmodified conditions vary seasonally within ranges characteristic of individual water bodies with the uptake by and decomposition of biota. Acute or chronic anthropogenic elevation causes ecologically important eutrophication or toxic effects.
contaminants	Levels of acutely or chronically toxic anthropogenically synthesised chemicals (e.g. PCBs, biocides etc.) and anthropogenic elevation of naturally occurring chemical components (e.g. some hydrocarbons, heavy metals) are critical influences for example on species survival, physiological health, and reproductive capacity.
dissolved oxygen	Oxygen availability is of fundamental physiological and ecological significance. Availability is influenced by water movement and surface disturbance, water temperature, sediment granulometry and disturbance, organic content and biological oxygen demand. Reduced oxygen flow and / or increased oxygen demand (through decomposition of trapped organic matter) within sediments tends to result in significantly reduced levels; anaerobic conditions in sediments may result in the formation of toxic substances (e.g. hydrogen sulphide).
sediment processes	Sediment erosion, transport and deposition are critical in determining extent, morphology and functional processes of sediment-based habitats and have important functional influences on rock-based habitats. Sediment processes in the site are a reflection of many complex causal processes and are themselves complex, contributing to high habitat and community diversity.
TYPICAL SPECIES	As the rationale for selection of components of species conservation status is similar for both species features and typical species of habitat features the rationale for both has been combined and is given the species table below.

**Table 4.2:** Typical species & species features – elements of favourable conservation status and its rationale.

Element	Description and rationale
<p><b>SPECIES RICHNESS</b> (Variety of species)</p>	<p>Species richness is most likely to be applicable as a component of FCS for typical species of Habitat features.</p> <p>However, the variety of available prey is likely to be important to predatory species features such as dolphins, seals, otter, lamprey and shad, and, as such, it forms an important measure of a species features habitat quality.</p> <p>Biological variety is a key contributor to biodiversity and applies at both taxonomic and genetic levels.</p> <p>Species variety “typical” of different habitats is dependent on the ecological opportunities available (niche diversity), particularly the degree of stress from natural processes.</p> <p>Habitats and communities subject to moderate levels of disturbance tend toward high species diversity. A high proportion of the species in such highly diverse communities are usually present at low frequencies and, individually, may make a small contribution to the overall functioning of the community. Nevertheless, such “species redundancy” is a vital contribution to biodiversity in many marine habitats and communities and is consequently extremely important in terms of the conservation of the habitat features.</p>
<p><b>POPULATION DYNAMICS</b></p>	<p>Species population dynamics are inherently important in maintaining viability of species populations and species variety.</p>
<p><b>POPULATION SIZE</b></p>	
<p>Population size (species abundance)</p>	<p>Sizes of species populations vary widely depending on their biology and ecology (e.g. Reproductive, competitive, survival and life history strategies; recruitment, habitat requirements; adaptation to natural processes and factors) and stochastic events.</p> <p>For a species feature, population size is a key measure of the species ecological success or failure. Along with a typical species’ distribution, its population size determines its contribution to biodiversity and to habitat structure and function.</p> <p>Population sizes of small, short-lived, rapidly reproducing species are orders of magnitude greater than large, long-lived, slowly reproducing and infrequently recruiting species. Populations of many species fluctuate widely in response to natural and artificial perturbations and opportunities; many others remain stable for long periods and many of these are particularly sensitive to anthropogenic disturbance or habitat degradation.</p>
<p>Contribution to the integrity of wider population</p>	<p>The full range of some species features are only partly encompassed by the site. The long-term viability of the species population may therefore be in part or mainly determined by stock outside the site, and vice versa (e.g. through immigration and emigration, genetic variation etc.). The contribution a species population occurring within a site makes to the wider population status is important to the long-term viability of the species as a whole, including that occurring within the site.</p>
<p>Biomass</p>	<p>Biomass is the potential energy of species populations, and thus fundamental to species physiological health, reproductive capacity and energy reserves, and is an energy resource for other species.</p> <p>Sediments with high organic input typically support a species biomass and rate of turnover (productivity) sufficiently high to contribute significantly to the maintenance of predatory typical species such as fish and waders and wildfowl.</p> <p>However, high biomass and low species variety may also be indicative of environmental stress or perturbation.</p> <p>Biomass of different reef habitats is extremely variable, varying with species composition and recruitment, age structure, health and environmental stress and consequently frequently varies widely within a small area of apparently similar habitat for a variety of reasons.</p>
<p>Reproductive success</p>	<p>The ability to successfully reproduce is critical to a species population’s long-term viability. Reproductive success is a function of reproductive capability and the survival of young.</p> <p>Reproductive capability is a function of many factors including physiological health, temperature regime and population density. Reduced physiological health and other</p>

Element	Description and rationale
	stressors can reduce reproductive capability as, under these circumstances, most species concentrate internal resources on survival instead of reproduction. For many species (not mammals and birds) gonadal somatic index (ratio between body mass and gonad mass) is a good measure of reproductive capability. High reproductive capability does not necessarily translate to high reproductive success. Survival of young to age of recruitment to the population is a function of reproductive strategy and varies by orders of magnitude depending on the strategy, ecological hazards and stochastic events. Dispersive invertebrate larval stages vary extremely in the numbers surviving from place to place and time to time with weather, currents, availability of food, period spent in the plankton, predation and intrinsic variability in processes killing and removing species e.g. competition for food and space, predation. At the other extreme, survival of young marine mammals is very high because of the heavy parental investment in low numbers of offspring. However, the relative survival rates of all strategies are vulnerable to modification by stochastic events.
Recruitment	Recruitment of young is critical to the maintenance of species population's long-term viability. Natural variation in successful recruitment is a critical factor contributing to species variety. Many invertebrate and algal species are at least partly dependant on recruitment from outside the feature.
<b>POPULATION STRUCTURE</b>	
Age frequency	Age frequency is important in determining the degree of success of population reproduction and resilience to perturbation for many species. Variation in population structure contributes to the complexity of community mosaics and to biodiversity. Age or size frequency is an important indicator of a species population's long-term viability.
Sex ratio	Sex ratio is important in determining the degree of reproductive success and therefore the long-term viability of dioecious species populations.
Physiological health	Physiological health is a critical component of a species population's long-term viability. It encompasses both genetic and physiological fitness. Knowledge of the physiology of most marine species is inadequate to directly express health in positive terms. Indicators of healthiness include reproductive capacity (e.g. gonadal somatic index) and immunity to disease; and of potential poor health: contaminant burden, immunosuppression, epibiota burden, nutritional state and physical damage.
Immunity to endemic disease	Reduced physiological health, e.g. through raised stress or chemical contamination, typically increases susceptibility to endemic diseases.
Exposure to anthropogenic disease	Certain species may contract diseases of humans and domesticated animals. Certain anthropogenic activity can increase the risk of this. Whilst diseases that can cross such species barriers are few, if it were to occur there is the potential for very significant impact on the wild species population.
<b>RANGE</b>	
Distribution throughout site	Species populations are distributed within their habitats according to their ecological requirements (particularly sessile species). The distribution of most species across and along environmental gradients results in extremely complex mosaic of communities (aggregations of species) that vary over time. The distribution and extent of species are, within constraints of species' adaptation to physical factors and biological interaction, variable in time and space. Modification of structural and functional factors by human action will likely result in alterations to species distribution, extent and abundance.
Distribution of specific behaviours throughout the site	Some mobile species (e.g. dolphins, seals, spider crabs & bass) use different parts of their habitat for different behavioural purposes (e.g. feeding, moulting, breeding). The locations used are usually important for the particular behaviour displayed. Displacement of this behaviour to other less favourable locations can be detrimental to the species.
Mobility (ability to move about the site, within and between features,	For most non-sessile species, the ability to move around unimpeded is a prerequisite to maintenance of viable populations through, inter alia, successful feeding, predation-avoidance and reproduction. This includes both territorial species with localised mobility requirement and highly mobile and / or migratory species which are dependent on features for a part of

Element	Description and rationale
unimpeded)	their ecological requirements (inter alia otter, seals, sea and river lamprey, shad, herring). Unimpeded mobility of reproductive products, larvae and juveniles of species is critical to the maintenance of viable species populations.
SUPPORTING HABITAT & SPECIES	Any components of habitat conservation status (Table 4.1 above) may apply to typical species of habitat features and may apply to a species feature where the component is relevant to the conservation of that species feature. The most likely components of habitat conservation status that are relevant to the conservation of species features are given below.
<b>DISTRIBUTION AND EXTENT</b>	
Preferred habitat	The habitat used by the species within the site. For wide ranging species this will likely be the whole area of the site.
Habitats utilised for specific behaviours	The distribution and extent of habitat necessary for specific behaviours, such as feeding, breeding, resting and social behaviour.
<b>STRUCTURE &amp; FUNCTION</b>	
Structural and functional integrity of preferred and specific habitats	The structure and functions that maintain the habitat in a form suitable for the long-term maintenance of the species population. This is linked to habitat quality.
Quality of habitat	The natural quality of habitat features may be reduced by modification of structural components identified above and, including by: <ul style="list-style-type: none"> <li>• the presence and persistence of artificial inert or toxic materials (e.g. synthetic plastics and fibres, hydrocarbons)</li> <li>• causing entanglement, smothering or ill-health;</li> <li>• decrease in seclusion because of noise and visual disturbance. Human activity with the potential to cause disturbance,</li> <li>• affecting behaviour or survival potential includes waterborne leisure and commercial activities, wildlife watching;</li> <li>• competition for space, causing displacement, collision, noise and visual disturbance, increased density dependent</li> <li>• pressure on preferred sites, exposure to disease (see above);</li> <li>• Contamination of prey (see below);</li> </ul>
Prey availability	The presence and abundance of prey within the site may contribute to the species presence and its long-term viability.
Prey contamination	Contamination of species feature prey can reduce the long-term viability of the species population. Contaminants that bioaccumulate and biomagnify and which affect the species physiological health would be of particular concern.



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