Harbour Porpoise (*Phocoena phocoena)* possible Special Area of Conservation:

North Anglesey Marine/

Gogledd Môn Forol

<u>Draft</u> Conservation Objectives and Advice on Activities

January 2016

Advice under Regulation 18 of The Offshore Marine Conservation (Natural Habitats, &c.) Regulations 2007 (as amended), and Regulation 35(3) of The Conservation of Habitats and Species Regulations 2010 (as amended).

Further information

This document is available as a pdf file on NRW's website for download if required (www.naturalresourceswales.gov.uk).

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Summary of Conservation Objectives and Advice on Activities

The Conservation Objectives and Advice on Activities are set out for the North Anglesey Marine / Gogledd Môn Forol possible SAC (pSAC) for the Annex II species harbour porpoise (*Phocoena phocoena*). The site covers both inshore (within 12 nautical miles of coast) and offshore (beyond 12 nautical miles of coast) waters where Natural Resources Wales (NRW) and the Joint Nature Conservation Committee (JNCC) have respective advisory responsibilities.

The general objective of achieving or maintaining Favourable Conservation Status (FCS) for all species and habitat types listed in Annexes I and II of the Habitats Directive needs to be translated into site-level Conservation Objectives. These which describe the condition to be achieved by species and habitat types within the sites in order that for the site to contributes in the best possible way to achieving FCS at the national, bio-geographical and European level.

The Conservation Objectives have been developed for the feature (harbour porpoise) throughout the recommended possible SAC network to ensure coherence across the network. This is also appropriate for a wide ranging, mobile and continuous population. The Advice on Activities is site-specific but based on a broad assessment of the sensitivity of the harbour porpoise to man-made pressures at a UK scale. The advice has been developed using the best-available scientific information and expert interpretation as at November 2015. The advice provided here will be subject to change as our knowledge about the site and the impacts of human activities improves.

The site should be managed in a way that ensures that its contribution to the maintenance of the harbour porpoise population at FCS is optimised. This may require management of human activities occurring in or around the site if they are likely to have an adverse impact on the site's Conservation Objectives either directly or indirectly identified through the assessment process. Management of activities that may affect processes on which the harbour porpoise is dependent, e.g. recruitment of prey species from supporting habitats, cannot be considered at present due to insufficient (often no) evidence linking habitat characteristics to prey of the harbour porpoise. There is some information on the prey of harbour porpoises, but their prey preferences whilst within the sites are not well known. It should be noted that as European Protected Species under Annex IV of the Habitats Directive, harbour porpoise are already strictly protected wherever they are in European waters. As such several management measures are already in place in the UK.

To fulfil the Conservation Objectives for the North Anglesey Marine / Gogledd Môn Forol harbour porpoise site, the relevant[1] and competent[2] authorities should consider human activities within their remit which might affect the integrity of the site.

[1] Relevant authorities are those who are already involved in some form of relevant marine regulatory function and would therefore be directly involved in the management of a marine site.

[2] A competent authority is any Minister, government department, public or statutory undertaker, public body of any description or person holding a public office.

Crynodeb o Amcanion Cadwraeth a Chyngor ynglŷn â Gweithgareddau

Mae'r Amcanion Cadwraeth a'r Cyngor ynglŷn â Gweithgareddau wedi'u nodi ar gyfer rhywogaeth Atodiad II Ardal Cadwraeth Arbennig posibl (ACAp) North Anglesey Marine/Gogledd Môn Forol, sef y llamhidydd (*Phocoena phocoena*). Mae'r safle'n cwmpasu dyfroedd y glannau (o fewn 12 morfilltir i'r arfordir) a dyfroedd alltraeth (y tu hwnt i 12 morffilltir o'r arfordir) lle mae gan Cyfoeth Naturiol Cymru (CNC), a'r Cyd-bwyllgor Cadwraeth Natur i gyd gyfrifoldebau cynghori.

Mae angen trosi'r amcan cyffredinol o gyrraedd neu gynnal Statws Cadwraethol Ffafriol i bob rhywogaeth a math o gynefin sydd wedi'u rhestru yn Atodiadau I a II o'r Gyfarwyddeb Cynefinoedd yn Amcanion Cadwraeth ar lefel safle. Rhaid i'r rhain ddisgrifio'r cyflwr y dylai rhywogaethau a mathau o gynefin o fewn safle ei wireddu er mwyn i'r safle gyfrannu yn y ffordd orau posibl tuag at wireddu Statws Cadwraethol Ffafriol ar lefel genedlaethol, bio-ddaearyddol ac Ewropeaidd. Cafodd yr Amcanion Cadwraeth eu datblygu ar gyfer y nodwedd (y llamhidydd) ledled y rhwydwaith o Ardaloedd Cadwraeth Arbennig posibl sy'n cael ei argymell i sicrhau cydlyniad ar draws y rhwydwaith. Mae hyn yn briodol hefyd i boblogaeth symudol a pharhaus, sy'n crwydro'n eang. Mae'r Cyngor ynglŷn â Gweithgareddau yn benodol i safle ond wedi'i seilio ar asesiad bras o sensitifrwydd y llamhidydd i bwysau o wneuthuriad dyn ar raddfa'r Deyrnas Unedig. Cafodd y cyngor ei ddatblygu gan ddefnyddio'r wybodaeth wyddonol a'r dehongliad arbenigol gorau a oedd ar gael ym mis Tachwedd 2015. Gallai'r cyngor a roddir yma newid wrth i'n gwybodaeth am y safle ac effaith gweithgareddau dynol wella.

Dylai'r safle gael ei reoli mewn ffordd sy'n sicrhau ei fod yn cyfrannu cymaint â phosib tuag at gynnal poblogaeth y llamhidydd ar Statws Cadwraethol Ffafriol. Gallai hyn olygu bod angen rheoli gweithgareddau dynol sy'n digwydd ar y safle neu yn y cyffiniau, os ydynt yn debygol o gael effaith niweidiol ar Amcanion Cadwraeth y safle un ai'n uniongyrchol neu'n anuniongyrchol, fel a nodir drwy'r broses asesu. Ar hyn o bryd ni ellir rheoli gweithgareddau a allai effeithio ar brosesau y mae'r llamhidydd yn ddibynnol arnynt, e.e. recriwtio rhywogaethau ysglyfaeth o gynefinoedd cynnal, oherwydd bod y dystiolaeth yn cysylltu nodweddion cynefin ag ysglyfaeth y llamhidydd yn annigonol (neu nid oes unrhyw dystiolaeth o gwbl yn aml). Mae yna rywfaint o wybodaeth am ysglyfaeth llamhidyddion, ond ni wyddom lawer am yr ysglyfaeth y maent yn ei ffafrio tra maent o fewn y safleoedd. Dylid nodi bod y llamhidydd, fel Rhywogaeth a Warchodir gan Ewrop o dan Atodiad IV o'r Gyfarwyddeb Cynefinoedd, eisoes yn cael ei warchod yn llym pryd bynnag y mae mewn dyfroedd Ewropeaidd. Mae sawl mesur rheoli eisoes ar waith felly yn y Deyrnas Unedig.

I gyflawni'r Amcanion Cadwraeth ar gyfer y llamhidydd, dylai'r awdurdodau perthnasol[3] a chymwys[4] yng nghyswllt safle North Anglesey Marine/Gogledd Môn Forol ystyried gweithgareddau dynol o fewn eu cylch gwaith a allai effeithio ar y safle ac ar Amcanion Cadwraeth y safle fel y'u disgrifiwyd.

[3] Awdurdodau perthnasol yw'r rhai sydd eisoes yn cyflawni rhyw fath o swyddogaeth reoleiddio forol ac a fyddai felly yn ymwneud yn uniongyrchol â rheoli safle morol.

[4] Awdurdod cymwys yw unrhyw Weinidog, adran llywodraeth, ymgymerwr cyhoeddus neu statudol, corff cyhoeddus o unrhyw fath neu berson sy'n dal swydd gyhoeddus.

Contents

1 Introduction

1.1 Background

A potential network of eight sites was identified within UK waters for harbour porpoise (*Phocoena phocoena*). Sites were identified within the UK portions of Management Units (MUs) defined for the species (ICES, 2014; IAMMWG, 2015a). The Welsh and Northern Ireland Governments, along with Defra on behalf of England and offshore waters, gave approval for sites within their areas of jurisdiction to proceed to consultation. The resulting five sites are shown in Figure 1.

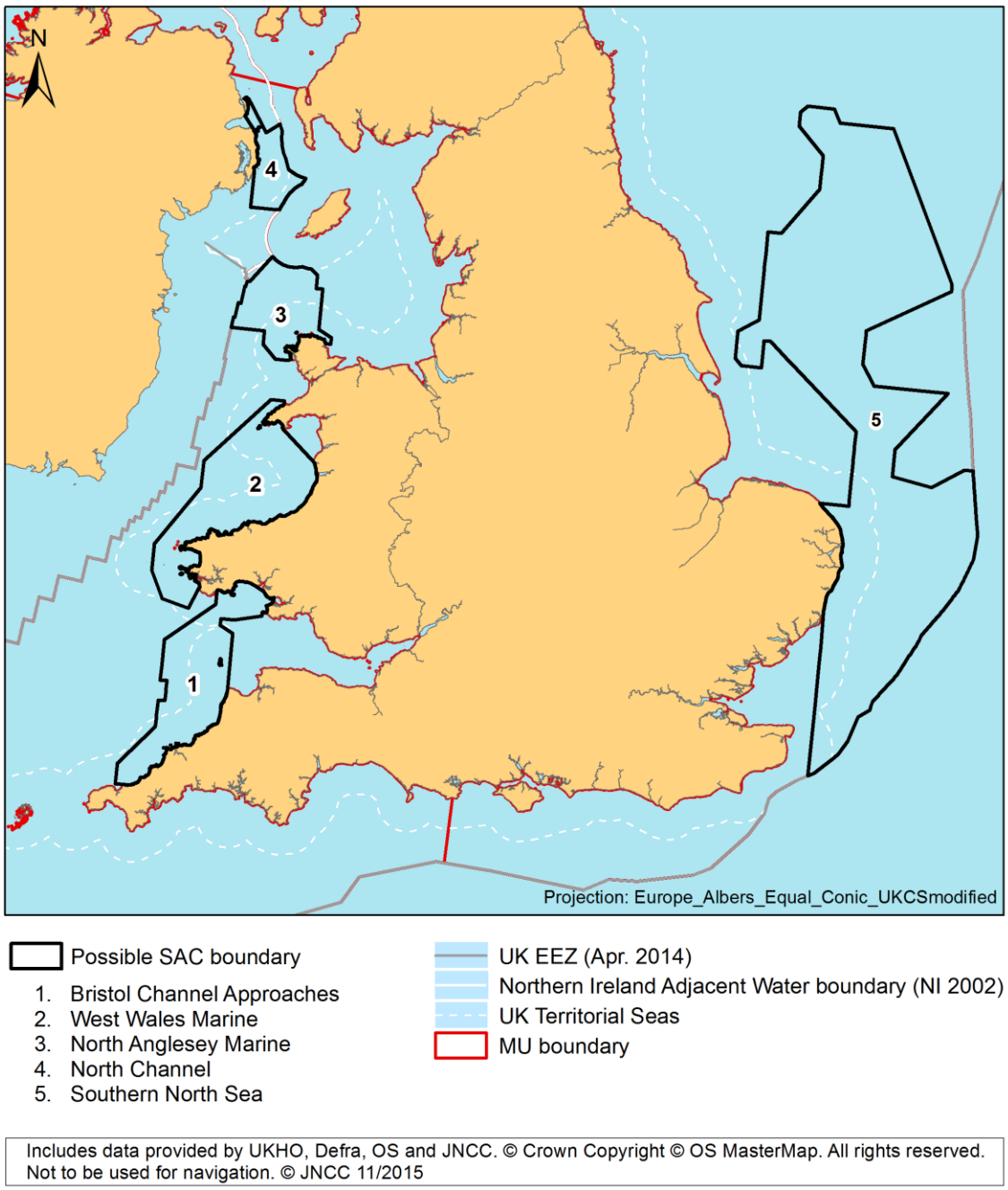


Figure 1: Possible Special Areas of Conservation for the harbour porpoise, *Phocoena phocoena* identified in Northern Ireland, England, Wales and offshore waters. The MU boundary refers to Management Units North Sea and Celtic and Irish Seas.

This advice is for the North Anglesey Marine / Gogledd Môn Forol site (Figure 2) which is subject to protection under the Habitats Directive as transposed by the Conservation of Habitats and Species Regulations 2010[5] and the Offshore Marine Conservation Regulations (Natural Habitats, &c.) Regulations 2007[6] (as amended). The advice is given in fulfilment of the duty of the Statutory Nature Conservation Bodies (SNCBs) under the Habitats Regulations to inform Relevant and Competent Authorities as to (a) the Conservation Objectives for the site; and (b) any activities which may negatively impact the feature [harbour porpoise] for which the site is designated[7]. The SNCBs aim to ensure that the Conservation Objectives are up-to-date, accessible and allow the assessment of the impact of proposed developments against them.

2 Responsibilities of Relevant and Competent Authorities

The Habitats Regulations require Relevant and Competent Authorities to exercise their functions so as to secure compliance with the Habitats Directive. Competent Authorities must, within their areas of jurisdiction, have regard to both direct and indirect effects on the site. This may include consideration of issues outside the boundary of the SAC, if the impact of these occurs within the site boundaries. Relevant and Competent Authorities are not required to undertake any actions or ameliorate changes in the condition of the site if it is shown that the changes result wholly from natural causes.

The natural variability of harbour porpoise distribution and abundance within sites is likely to be large due to the mobility and wide-ranging nature of this species. Apparent deterioration of harbour porpoise presence at the site must be contextualised in terms of natural variability and the abundance and distribution patterns at the population level (i.e. Management Unit level). SNCBs will work with Relevant and Competent Authorities and others to agree a protocol to guide assessments, and this will require consideration for the population at the wider scale MU population. It is essential that any assessment for the site reflect the natural variation of the species, including assessments in the condition of the site.

3 Conservation Objectives for harbour porpoise SACs

3.1 The role of Conservation Objectives

Site-level Conservation Objectives are a set of specified objectives that must be met to ensure that the site contributes to maintaining or achieving Favourable Conservation Status (FCS) of the designated site feature(s) at the national and biogeographic level (EC, 2012). Conservation Objectives constitute a necessary reference for identifying site-based conservation measures and for carrying out Habitat Regulations Assessments of the implications of plans or projects. The purpose of the Habitat Regulations Assessment is to determine whether a plan or project adversely affects a site's integrity. The critical consideration in relation to site integrity is not the extent or degree of an impact, or whether an impact is direct or indirect, but whether the implications of any activities affecting a site, either individually or in combination with other plans or projects, affect the site's ability to achieve its conservation objectives and favourable conservation status.

[5] This Conservation Objectives/Advice on Activities Reg 18/35 package differs in format from previous Welsh inshore SAC Reg 33/35 packages because it is a single feature site that is cross boundary (inshore and offshore waters).
[6] http://www.legislation.gov.uk/uksi/2007/1842/pdfs/uksi_20071842_en.pdf
[7] http://www.legislation.gov.uk/uksi/2007/1842/pdfs/uksi_20071842_en.pdf

Harbour porpoise are protected everywhere in European waters under the provisions of Annex IV and Article 12 of the Habitats Directive. The harbour porpoise in UK waters is considered part of a wider European population and the mobile nature of this species means that the concept of a 'site population' may not be appropriate for this species. Site based conservation measures will complement wider ranging measures that are in place for the harbour porpoise.

3.2 Background to Conservation Objectives

The Conservation Objectives are designed to ensure that the obligations of the Habitats Directive can be met. Article 6(2) of the Directive requires that there should be no deterioration or significant disturbance of the qualifying species or to the habitats upon which they rely. Therefore, the focus of the Conservation Objectives for harbour porpoise sites is on addressing pressures that affect site integrity and would include:

- killing or injuring significant numbers of harbour porpoise (directly or indirectly);
- preventing their use of significant parts of the site (disturbance / displacement);
- significantly damaging relevant habitats; or
- significantly reducing the prey base.

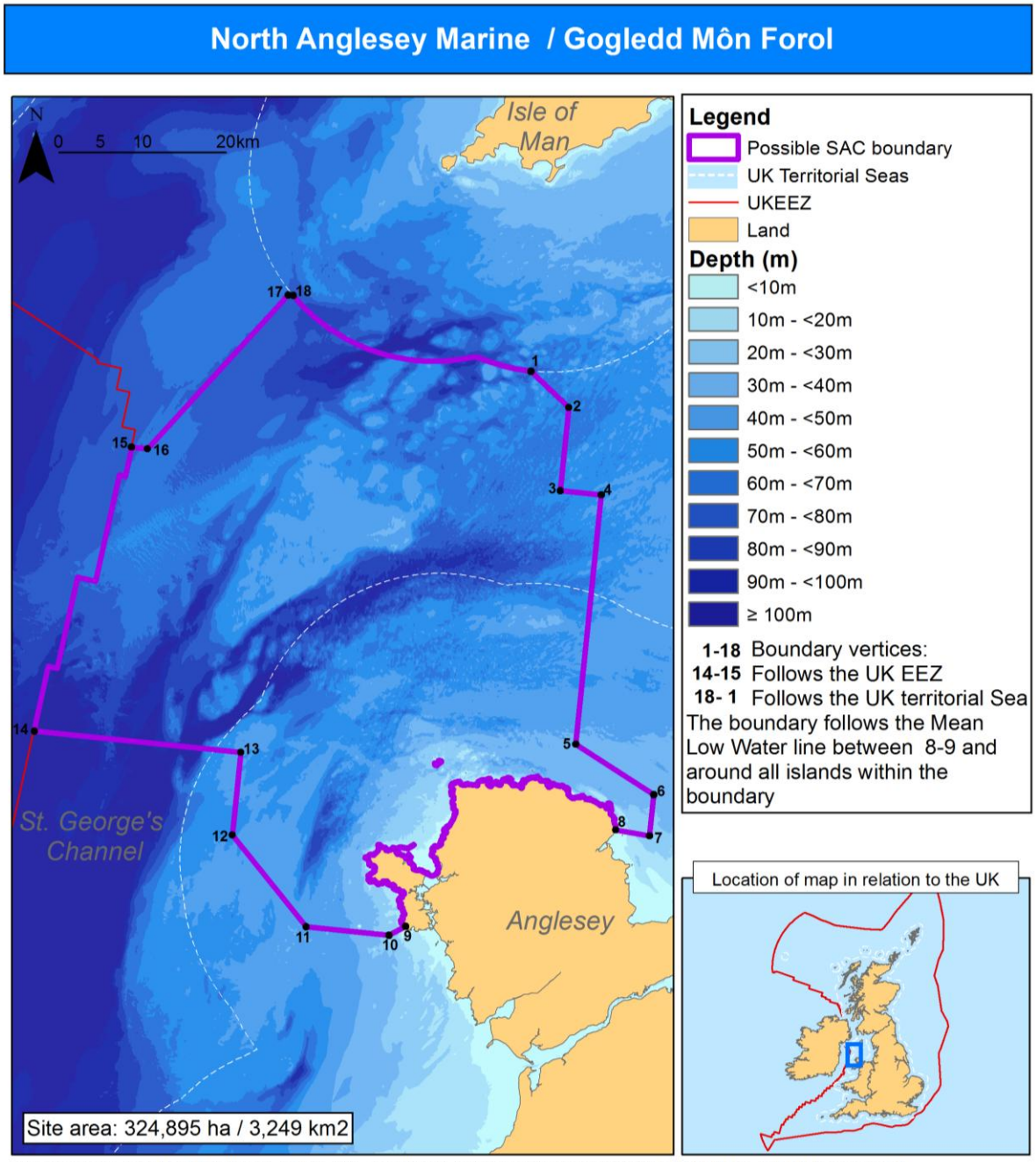
This Conservation Objectives document includes both a statement of the actual Conservation Objectives and supplementary advice with regard their intent and interpretation specific to the site. The Objectives have been set taking account of European Commission guidance (EC, 2012). Further guidance on their specific application to certain casework will also be provided at a later stage.

3.3 The North Anglesey Marine/ Gogledd Môn Forol pSAC Conservation Objectives

The North Anglesey Marine / Gogledd Môn Forol pSAC covers an area of 3,235km^2 reaching north-west from the Isle of Anglesey into the Irish Sea (Figure 2). The qualifying feature of the site is the Habitats Directive Annex II species:

- harbour porpoise (*Phocoena phocoena*)

The analyses of Heinänen and Skov (2015) shows that harbour porpoise occur in elevated densities in the whole of the site during summer (Figure 2).



ID	Latitude	Longitude	ID	Latitude	Longitude	ID	Latitude	Longitude
1	53°51'13.503"N	4°35'25.827"W	7	53°23'31.31"N	4°12'22.191"W	13	53°23'20.303"N	4°57'33.811"W
2	53°49'25.876"N	4°30'32.077"W	8	53°23'27.176"N	4°16'4.886"W	14	53°21'48.309"N	5°19'53.015"W
3	53°44'5.07"N	4°29'34.542"W	9	53°14'36.218"N	4°36'12.696"W	15	53°40'59.294"N	5°16'20.398"W
4	53°44'21.997"N	4°25'3.966"W	10	53°13'49.465"N	4°37'45.677"W	16	53°41'6.545"N	5°14'35.945"W
5	53°28'19.317"N	4°22'14.874"W	11	53°13'14.719"N	4°46'40.051"W	17	53°52'42.66"N	5°3'9.643"W
6	53°26'11.828"N	4°12'49.483"W	12	53°17'59.8"N	4°56'34.044"W	18	53°52'44.786"N	5°2'38.156"W

Figure 2: The North Anglesey Marine/ Gogledd Môn Forol possible Special Area of Conservation for harbour porpoise.

The Conservation Objectives for the site are:

To avoid deterioration of the habitats of the harbour porpoise or significant disturbance to the harbour porpoise, thus ensuring that the integrity of the site is maintained and the site makes an appropriate contribution to maintaining Favourable Conservation Status (FCS) for the UK harbour porpoise.

To ensure for harbour porpoise that, subject to natural change, the following attributes are maintained or restored in the long term:

1. The species is a viable component of the site.

2. There is no significant disturbance of the species.

3. The supporting habitats and processes relevant to harbour porpoises and their prey are maintained.

These Conservation Objectives are common across all UK sites proposed for this species to ensure coherence across the network (EC, 2012). These Conservation Objectives are based on considerations of the ecological requirements of the species within the site, although their interpretation is contextualised in their contribution to maintaining FCS at a wider scale (EC, 2012). With regard the North Anglesey Marine / Gogledd Môn Forol site, harbour porpoise need to be maintained rather than restored. Maintain implies that, based on our existing understanding, the feature is regarded as being in favourable condition and will, subject to natural change, remain in this condition.

1. The species is a viable component of the site:

Harbour porpoises are considered to be a 'viable component' of the site if they are able to survive and live successfully within it. The North Anglesey Marine / Gogledd Môn Forol site has been selected primarily on the basis of its long-term, preferential use by harbour porpoise in contrast to other areas of the UK portion of the Irish Sea. The implication is that this site provides good foraging habitat and it may also be used for breeding and calving. However, because the number of harbour porpoise using the site naturally varies, there is not an exact number of animals within the site above which the species is viable or below which it will become unviable.

For that reason, the intent of this objective is to minimise the risk posed by activities within the site to the species viability. Activities that kill, injure or significantly disturb harbour porpoise have the potential to affect species viability within the site.

The harbour porpoise is a European Protected Species (EPS) listed on Annex IV of the Habitats Directive and as such is already protected under Article 12 from deliberate killing (or injury), capture and disturbance throughout its range. However, relevant/competent authorities are reminded of these provisions and their application to the site as an integral part of the species' range. The Habitats Directive Article 12 guidance[8] proposes the following definition of deliberate: "*deliberate actions are to be understood as actions by a person who knows, in the light of the relevant legislation that applies to the species involved, and the general information delivered to the public, that his action will most likely lead to an offence against a species, but intends this offence or, if not, consciously accepts the foreseeable results of his action*".

[8] http://ec.europa.eu/environment/nature/conservation/species/guidance/pdf/guidance_en.pdf

The meaning of 'deliberately injure' should be taken from the definition under regulations 41(1)(a) and 39(1)(a) of the Conservation (Natural Habitats &c.) Regulations 1994 and its amendments consolidated in The Conservation of Habitats and Species Regulations 2010 for England and Wales.

Disturbance under Article 12(1)(b) must be deliberate and not accidental. The definition of 'deliberate disturbance' is given in 39(1)(b) of Offshore Marine Conservation (Natural Habitats, &c.) Regulations 2007 (Offshore Marine Regulations, OMR, as amended in 2009 and 2010) and Regulation 41(2) of the Conservation of Habitats and Species Regulations 2010. It is an offence under these Regulations to deliberately disturb EPS in such a way as to: a) impair their ability to survive, to breed or reproduce, or to rear or nurture their young or b) to affect significantly the local distribution or abundance of that species. Further guidance as to the interpretation of and what constitutes 'deliberate' and 'significant disturbance' is given in the JNCC EPS guidance[9]. These definitions of types of disturbance are for the purposes of assessing the need for an EPS licence and apply throughout UK waters.

Bycatch of harbour porpoise in fishing nets is not deliberate but incidental killing. Article 12 (4) of the Habitats Directive applies and states that Member States '*shall establish a system to monitor the incidental capture and killing of the species listed on Annex IV (all cetaceans). In the light of the information gathered, Member States shall take further research or conservation measures as required to ensure that incidental capture and killing does not have a significant negative impact on the species concerned*'. Consideration must be given to the effect of bycatch on the conservation status of harbour porpoise at the population level. With the designation of sites, bycatch within a site might contribute to a change in conservation status and therefore must also be considered. Bycatch poses a risk to the viability of the population and therefore could be deemed to affect the integrity of the site. Measures may be needed to minimise the risk of bycatch to porpoises using the site.

2. There is no significant disturbance of the species within the site.

Disturbance of harbour porpoise generally, but not exclusively, originates from activities that cause underwater noise (see section 4). Responses to noise can be physiological and/or behavioural. JNCC has produced guidelines to minimise the risk of physical injury to cetaceans from various sources of loud, underwater noise[10]. However, disturbance is a behavioural (non-injurious) response to noise and may lead to harbour porpoises being displaced from the area affected.

Within sites, the immediate effects of disturbance are in the loss (usually temporary) of habitat available to harbour porpoise. The North Anglesey Marine / Gogledd Môn Forol site has been identified on the basis of having persistent higher densities of harbour porpoises (Heinänen and Skov, 2015) when compared to other areas of the UK's Irish Sea continental shelf which is linked to the habitats within the site that likely promote good feeding opportunities. Therefore, activities within the site should be managed to ensure access to the site. Any disturbance should not lead to the exclusion of harbour porpoise from a *significant portion* of the site for a *significant period* of time. Case Work Advice Guidance in relation to various activities is being developed and expands this supplementary advice to define 'significant portion and period' in the context of impacting site integrity.

This Conservation Objective aims to ensure that the site contributes as best it can to maintaining the Favourable Conservation Status of the wider harbour porpoise population. As such, how any impacts within the site translate into effects on the Celtic and Irish Seas Management Unit population are of greatest concern.

[9] http://jncc.defra.gov.uk/PDF/consultation_epsGuidanceDisturbance_all.pdf
[10] http://jncc.defra.gov.uk/page-4273

3. The supporting habitats and processes relevant to harbour porpoises and their prey are maintained.

The harbour porpoise is a species that is highly dependent on a year-round proximity to food sources and its distribution and condition may strongly reflect the availability and energy density of its prey (Brodie 1995 in Santos & Pierce, 2003). The densities of porpoise using the site are likely linked to the availability (and density) of prey within this site. Porpoise eat a variety of prey including gobies, sandeel, whiting, herring and sprat (some of which may have spawning grounds within the North Anglesey Marine / Gogledd Môn Forol site). However, the diet of porpoises specifically when using the site is unknown. In the UK as a whole, the activity which potentially poses a risk to the achievement of this conservation objective is commercial fishing; although environmental variability also plays a role in determining the status of fish stocks. However, currently there is no evidence to suggest that competition for prey species with commercial fisheries is having an impact on the conservation status of the harbour porpoise.

The delineation of the North Anglesey Marine / Gogledd Môn Forol site is based on the prediction of 'harbour porpoise habitat' within the Celtic and Irish Seas (Heinänen and Skov, 2015). Habitat, in this context, means the characteristics of the seabed and water column. At the Management Unit scale, the distribution of harbour porpoise is related to water depth and variables within the water column (Heinänen & Skov, 2015). Harbour porpoise density peaked in stable stratified waters (based on vertical differences in temperature) with lower gradients of eddy activity (turbulence); higher densities were also found in areas with current speeds of 0.4-0.6m/s. The analysis indicated a preference for water depths between 30 and 50m throughout the year. In general, in both seasons, harbour porpoise preferred coarser seabed sediments (sand/gravel). How these environmental characteristics of the site influence the prey of harbour porpoise or other aspects of their life directly (e.g. breeding/calving) is currently unknown.

4 Advice on Activities

4.1 Purpose of advice

This section details the advice on human activities specifically occurring within or close to the North Anglesey Marine / Gogledd Môn Forol pSAC that would be expected to impact the site. Initial assessments were done at UK scale, with subsequent site level assessment (Section 6) detailing our understanding of impacts occurring with potential to affect harbour porpoise when using the site. Advice is given only where pressures[11] may act at the site level and therefore, may require management if the Conservation Objectives are to be met. Wide-spread pressures may also act to affect the overall status of harbour porpoise, but such effects are not restricted to specific sites. Such pressures are best dealt with through broader measures. Alongside and in addition to the identification of the network of harbour porpoise sites, an overarching conservation strategy (DETR, 2000) has been in place for harbour porpoise since 2000. In light of a recent conservation literature review (IAMMWG *et al*, 2015b), this strategy will be reviewed and updated where necessary.

This advice identifies activities that have the potential to affect harbour porpoise using the site (site level impacts), as well as (where possible) harbour porpoise supporting habitats in UK waters, which may impact the species' capacity to maintain FCS. This advice should also be used to help identify the extent to which existing activities are, or can be made, consistent with the conservation objectives, and thereby focus the attention of Relevant and Competent Authorities and surveillance programmes to areas that may need management measures.

[11] See Annex A for definition of key terms

This draft advice on activities will be updated and supplemented through further discussions with the Relevant and Competent Authorities and any advisory groups formed for the site.

4.2 Background

In compiling this advice on activities, the SNCBs have considered the pressures that may be caused by human activities and the sensitivity of the qualifying feature harbour porpoise, to those pressures. The advice is generated through a broad grading of sensitivity and exposure of the harbour porpoise to pressures associated with activities in order to gain an understanding of how vulnerable the species is to each activity at a UK level. The activities and their associated pressures to which the harbour porpoise is deemed vulnerable at UK level are then considered at site level in order to inform possible management needs necessary for the site to meet the conservation objectives. Annex A details the approach taken to identify the significant impacts on harbour porpoise from pressures, and the relative sensitivity and current exposure of harbour porpoise to those pressures at a UK wide scale.

This document is guidance only and activities and their management will be considered in the context of Habitats Regulations Assessments/Appropriate Assessment and, where applicable, through other environmental assessment processes (e.g. EIA).

5 Activity assessments at UK scale

The assessments have been carried out using all available evidence as of November 2015. As further information becomes available, assessments may be subject to alteration in line with the new evidence to support the change, and further improving the understanding of the vulnerability of harbour porpoise to activities occurring in UK waters. This advice is presented without prejudice to any assessment that may be required for specific proposals to be considered by a Relevant and/or Competent Authority. The level of any impact will depend on the location, timing and intensity of the relevant activity. This advice is provided to assist and focus the Relevant and/or Competent Authorities in their consideration of the management of these activities.

The harbour porpoise is a wide ranging species and occurs throughout the UK Continental Shelf area (<200m) (JNCC, 2013). It does occur in deeper waters but in very low densities, and perhaps only seasonally. As predominantly a shelf species, it is exposed to a wide range of pressures, that are both ubiquitous (e.g. pollution) and patchy (e.g. bycatch) in nature, and the list of anthropogenic activities leading to these pressures is long. Based on current available information the activities with the most notable impact on UK harbour porpoise are shown in Table 1.

The definitions of the pressures as applied within harbour porpoise SAC advice can be found in Annex B

Activities which currently pose a low risk to porpoises at the UK level (Annex A, Table A2) have not been considered in this advice. The exposure to the pressures associated with these activities is currently very limited and poses no significant threat to the maintenance of harbour porpoise FCS. Non-anthropogenic impacts are also not considered, such as attack and predation from other marine mammal species, that have the potential to impact harbour porpoise populations.

The full list of assessed activities and key references can be found in Annex A, Table A3. Updates to the assessments will occur as more evidence becomes available.

Table 1: Key activities and the relative risks of impacts on harbour porpoise throughout UK waters. Those pressures ranked 'high' are known to have the greatest impact relative to other pressures on the population of UK harbour porpoises.

Activities	Pressures	Impacts	Current relative level of impact
Commercial fisheries with bycatch of harbour porpoise (predominantly static nets)	**Removal of non-target species**	• Mortality through entanglement/bycatch	High
Discharge/run-off from land-fill, terrestrial and offshore industries	**Contaminants**	• Affects on water and prey quality • bioaccumulation through contaminated prey ingestion • health issues (e.g. on reproduction)	High
Shipping, drilling, dredging and disposal, aggregate extraction, pile driving, acoustic surveys, underwater explosion, military activity, acoustic deterrent devices and recreational boating activity	**Anthropogenic underwater sound**	• Mortality • Internal injury • disturbance leading to physical and acoustic behavioural changes (potentially impacting foraging, navigation, breeding, socialising)	Medium
Shipping, recreational boating, tidal energy installations	**Death or injury by collision**	• Mortality • Injury	Medium/Low
Commercial fisheries (reduction in prey resources)	**Removal of target species**	• Reduction in food availability • increased competition from other species • displacement from natural range	Medium

Removal of non-target species (harbour porpoise bycatch)

Bycatch of harbour porpoise in fishing gear is one of the most significant anthropogenic pressures impacting the population. The relevant commercial fisheries with harbour porpoise bycatch are bottom set nets. The areas where bycatch is of greatest concern is off southwest England and the southern North Sea. Mitigation of bycatch through the use of acoustic deterrent devices ('pingers') is required under EU Regulation 812/2004[12] on set net vessels of 12m or over. However, smaller set net vessels (12m) comprise the majority of the fleet and are the major source of harbour porpoise bycatch in UK waters. Where the bycatch/risk of bycatch within porpoise SACs threatens the sites' integrity, mitigation may be required.

Contaminants

The latest evidence (ASCOBANS, 2011; Law *et al*, 1992-2005 & 2009; Law *et al*, 2008, Murphy *et al.* 2015) shows that there is still a significant pollution issue for at least some cetacean species in European waters, which includes harbour porpoises and organochlorines (e.g. Polychlorinated biphenyls [PCBs]). Monitoring and investigation will

[12] http://eur-lex.europa.eu/LexUriServ/LexUriServ.do?uri=OJ:L:2004:150:0012:0031:EN:PDF

continue to be important, and research in this field should not remain focused on 'old' compounds and contaminants. Careful consideration is required to ensure we also monitor historical contaminant impacts as well as any current or emerging issues.

Anthropogenic underwater sound

Harbour porpoise use sound for foraging, navigation, social activities and predator detection. Changes in underwater noise therefore have the potential to interrupt these behaviours. The peak frequency of echolocation pulses produced by harbour porpoises is 120–130 kHz, corresponding to their peak hearing sensitivity although hearing occurs throughout the range of ~1 and 180 kHz (Southall *et al.* 2007). A range of activities emit sound that falls within the hearing sensitivities of porpoise, including shipping, pile driving, Acoustic Deterrent Devices and military activities. The exact frequency, intensity and longevity of the sound will determine the response. The impact on the porpoise is also mediated through individual behaviour, and perhaps quality of its immediate habitat, at the time of exposure.

Death or injury by collision

Post-mortem evidence indicates that few collisions between harbour porpoise and vessels occur and is not a significant pressure for this species.

Research surrounding wet renewables shows potential risk of harbour porpoise collision with sub-marine turbines, although there is no evidence of such collisions to date.

Removal of target species (harbour porpoise prey)

Porpoise diet within UK waters includes a wide variety of fish and they will generally focus on the most abundant local species (De Pierrepont *et al.* 2005, Camphuysen *et al.* 2006). The predominant prey type in general appears to be whiting, gobies and sandeel, although shoaling fish such as mackerel and herring are also taken. In the north-east Atlantic a long term shift from predation on clupeid fish (mainly herring) to predation on sandeels and gadoid fish, possibly related to the decline in herring stocks since the mid-1960s has been observed. Porpoise diets overlap extensively with diets of other piscivorous marine predators (notably seals) and many of the main prey species are also taken by commercial fisheries, although porpoises tend to take smaller fishes than those targeted by fisheries (Santos and Pierce 2003).

6 Site specific considerations: North Anglesey Marine/ Gogledd Môn Forol pSAC

6.1 Sensitivity of harbour porpoise to existing activities within or impacting on the site

The North Anglesey Marine / Gogledd Môn Forol site covers an area of 3,249km^2, reaching north-west from the Isle of Anglesey into the Irish Sea. It sits at the northern extent of St George's Channel, extending approximately half way across to the Republic of Ireland, skirting the national waters of the Isle of Man. A summary of the site can be found in the Selection Assessment Document[13]. Precise information on many activities within the

[13] SAC Selection Assessment Document

boundary is not currently available due to lack of targeted data collection to date. Assessing exposure carries certain assumptions about the spatial extent, frequency and intensity of the pressures associated with marine activities. Therefore site based exposure and resulting current level of impact has not been assessed at this stage.

Table 2 is an overview of activities occurring within or in proximity to the North Anglesey Marine / Gogledd Môn Forol site to which the harbour porpoise has a current level of impact risk of High or Medium at UK level and therefore may require further consideration concerning options for management. This information was derived from spatial data as GIS layers and a review of the literature, and includes all available data at time of writing.

Management measures are the responsibility of the relevant regulatory bodies, which consider the SNCBs' advice and hold appropriate discussions with the sector concerned, but the scale and type of mitigation is decided by the Regulators. Where consent is required and the activity (if considered a plan or a project) is likely to significantly affect a European Marine site (EMS), Article 6(3) of the Habitats Directive requires that an Appropriate Assessment (AA) is carried out. Assessments under Article 6(3) of the Directive are often referred to in the UK as "Habitat Regulations Assessments" (HRA). The HRA is a case-specific assessment made in view of the Conservation Objectives for the affected site. Each HRA requires case-specific advice from the SNCB but is the responsibility of the regulatory body concerned.

In 2012 the UK Government adopted a revised approach to the management of fishing activities within European marine sites in England. The revised approach is designed to ensure the consistency of the management of fishing activities with Article 6 of the Habitats Directive. Risk based prioritisation of managing the fishing activities of UK and non UK vessels has been applied to relevant European marine site features and sub features within the UK 12nm territorial limit. For EMS outside of 12nm, or sites outside 6nm where there are access rights for other Member States, managment measures designed to ensure adequate protection are proposed to and agreed by European Commission in accordance with the Common Fisheries Policy (CFP). The Welsh Government is developing an approach for assessing fishing activities in European marine sites in Wales.

Table 2: Activities occurring within/near to the North Anglesey Marine/Gogledd Môn Forol site to which the harbour porpoise is considered sensitive.

Activities	Pressure	Comment on current level of activity	Management considerations
Fisheries (commercial and recreational) with harbour porpoise bycatch	Removal of non-target (bycatch) species	UK registered vessels >12m: Evidence of low levels of static gears crossing over a small portion of the northwest corner of the site boundary[14] Vessels <12m (majority of Welsh small scale commercial fleet) include static nets: Minor to moderate effort and negligible to no bycatch. Recreational netting also occurs at a low level of effort along the coast with	Where management measures are required, the development of these would be undertaken via discussion with fishing interests and fishery managers and informed by any detailed information about fishing activity that can be made available. Detailed measures, if required, will be developed by the relevant regulator (European Commission/MMO/Defra/Welsh Government) Gillnetters of >12m working within the site operate within ICES area VIIa and are therefore not legally required to use

[14] The fisheries data are aggregated VMS data collected between 2006 and 2013.

		negligible / no bycatch. EU registered vessels: Evidence in Vessel Monitoring System (VMS) data of low levels of static gears (>12m vessels) crossing over the northwest of the site boundary	pinger under EU Regulation 812/2004. The risk of bycatch from this sector in the context of the Conservation objectives of the site may need to be assessed. Bycatch most often occurs in bottom set nets deployed from vessels <12m, and the use of pingers is not mandatory under Regulation 812/2004. Effort by this sector of the fleet in the site is currently considered low and risk of bycatch is also likely low. The need for further management will need to be fully assessed based on local fisheries data but it is currently considered unlikely that further measures will be required.
Discharge/run-off from land-fill, terrestrial/off shore industries	Contaminants	Current exposure within/near the site is unknown but historical metal mining operation outfalls potentially exist within the site. Wylfa nuclear power station operation and decommissioning, and re-construction and operation of new proposed nuclear station will have thermal discharge inputs.	This pressure generally cannot be managed effectively at the site level. Most of the pollutants of relevance to marine mammals have been effectively phased out of use by action under the OSPAR Convention and, more recently, the EU (e.g. PCBs). However, human activities may cause the re-release of these chemically stable chemicals into the environment or introduce other contaminants of which the impacts are poorly known. Any novel sources of potential contamination associated with a new plan or project may be assessed under HRA. It is recognised that further efforts to limit or eliminate discharges to the marine environment may still be needed.
Shipping	Anthropogenic underwater sound	The ferry port in Holyhead on Anglesey is the only significant harbour affecting the site. Busy shipping routes cross the site serving Liverpool Bay and Dublin.	The underwater sounds created by large ships are unlikely to cause physical trauma, but could make preferred habitats less attractive as a result of disturbance (habitat displacement, area avoidance). However, additional management is unlikely to be required given current levels within the site and elevated densities of porpoises in this area compared to other parts of the Celtic Irish Sea Management Unit.
Oil and gas drilling		Licensed areas for oil and gas extraction are not currently present in the site.	No management required, other than HRA of any plans/projects that may come forward..
Pile driving		Overlap with round three windfarm development zone (currently not being developed). Proposed harbour/breakwater construction likely to utilise impact piling.	A European Protected Species (EPS) licence is already required for any construction activity which carries the risk of significant disturbance or injury. As a minimum, developers are required to follow the 'Statutory Nature Conservation Agency protocol for minimising the risk of injury to marine mammals from piling

			noise'. (https://www.gov.uk/government/uploads/system/uploads/attachment_data/file/50006/jncc-pprotocol.pdf). A Habitats Regulations Assessment (HRA) will be considered for all new developments (coastal and marine) using pile driving within the site or within 26km (see Dahne et al. 2013; Tougaard et al. 2014) of site boundaries. If additional mitigation (to that required under EPS licence) is required, planning and management of pile driving activities may be needed within the site to ensure the Conservation Objectives are met.
Dredging and disposal		Maintenance dredging occurs at ports and planned dredging activities likely for Wylfa power station.	Dredging and disposal can cause disturbance leading to physical and acoustic behavioural changes. However, the risk is considered relatively low and additional management is unlikely to be required
Aggregate extraction		Limited aggregate resource within the site.	Aggregate extraction can pose disturbance leading to physical and acoustic behavioural changes. However, the risk is considered relatively low and additional management is unlikely to be required
Acoustic (including seismic) surveys		Acoustic seabed surveys (multibeam, sidescan survey) planned in parts of the site.	Some geophysical surveys within 5km of site boundary may require consent and be subject to HRA. Seismic surveys are likely to require an EPS licence which may specify conditions. As a minimum, it is expected that developers will adhere to the *JNCC Guidelines for minimising the risk of injury and disturbance to marine mammals from seismic surveys* (updated August 2010; https://www.gov.uk/government/uploads/system/uploads/attachment_data/file/50005/jncc-seismic-guide.pdf)
Recreational boating activity		Royal Yachting Association (RYA) cruising routes present around the coast of Anglesey	Adherence to wildlife codes of conduct is already advocated (e.g the WiSe scheme http://www.wisescheme.org/). No further management measures are likely to be required.
Acoustic deterrent/mitigation devices		Negligible or not currently present	No further management required
Pinger devices		Some UK and EU registered >12m vessels using gillnets in the site. Use of pinger	See 'Fisheries (commercial and recreational) with harbour porpoise

		devices is unknown.	bycatch' The use of pingers is low/not needed in the site.
Shipping	Death or injury by collision	The ferry port in Holyhead on Anglesey is the only significant harbour affecting the site. Busy shipping routes cross the site serving Liverpool Bay and Dublin.	Post mortem investigations of harbour porpoise have revealed death caused by trauma (potentially linked with vessel strikes) is not currently considered a significant risk and no additional management is therefore required.
Recreational boating activity		Sailing and racing routes focussed around the coastal areas, with cruising routes throughout the site	See 'Shipping' (with death or injury by collision). Boats conducting recreational activity should adhere to wildlife codes of conduct (e.g. the WiSe scheme http://www.wisescheme.org/).
Renewable energy developmen ts		One consented project site for tidal stream energy between the Anglesey coast and the Skerries. West Anglesey demonstration zone (tidal) and Holyhead Deep project site (tidal) within site. Irish Sea Zone offshore windfarm licenced area within the site (currently not being developed)	Future applications would be subject to an HRA and are already subject to EPS considerations. Consented projects, but which have not started construction, within the site may be required to undergo a review of that consent in the context of the Conservation objectives for the site.
Commercial fisheries (and recreational set nets)	Removal of target (prey) species	UK and EU Fisheries targeting prey species such as whiting, herring, mackerel, sandeel and sprat are present in the Celtic and Irish Seas, but few pelagic fisheries operate within the site. The majority of Welsh fleet are vessels <10m length i.e. small scale. Most fisheries within the site are demersal and target shellfish, but there are some vessels that use static nets with minor to moderate effort.	Commercial species are managed at the larger scale through the CFP

6.2 Limitations of the evidence

It is important to note that the information used to catalogue activities occurring within the site is not complete. The available data are drawn from existing monitoring programmes (e.g. the UK's bycatch of protected species monitoring and other European datasets linked to VMS monitoring of fishing vessels) but these have limitations including availability and accessibility at the time of preparing this advice. Caveats with how the data have been collected also need to be understood in order to correctly interpret the information. This can

result in the use of expert judgement where sufficient evidence is lacking, but risk is implied. Below are some points to consider alongside the above table in order to ensure the information is not taken out of context:

- **Data availability**
  - Globally, the marine environment is generally far behind the evidence levels of that on land, particularly in offshore areas, mainly due to scale and cost.
  - Sensitivities surround data that has been gathered by industry, and some data are not available for use for advice and management purposes. Often these data become available eventually, but not in time to inform management decisions.

- **Fishing: Limitations of fishing Vessel Monitoring System (VMS) data**
  - VMS positional data are transmitted at approximately 2 hour intervals. There is no information transmitted regarding precise vessel activity, therefore assumptions on its activity are often made using the location of the vessel and its speed profile.
  - Fishing vessels under 12m long, (and until 2013, vessels under 15m long) are not required to use the VMS, and therefore VMS data tells us nothing regarding the activity of this segment of the fleet. However, relevant data can be obtained from fisheries regulators and will be used to develop more detailed guidance to assist with identification of any management measures.
  - In Wales, the Scallop fishing fleet (mostly <12m long) have vessel tracking devices (Succorfish), but this fishery does not have harbour porpoise bycatch.

- **Contaminants**
  - Although use of many substances that have contaminated the environment is now illegal, re-suspension or reintroduction of pollutants that were used historically occurs. It is also difficult to identify sources of contamination when dealing with highly mobile species.

7 References

Article 17 Report, 2013. European Community Directive on the Conservation of Natural Habitats and of Wild Fauna and Flora (92/43/EEC) Third Report by the United Kingdom under Article 17 on the implementation of the Directive from January 2007 to December 2012 Conservation status assessment for Species: S1351 - Harbour porpoise (*Phocoena phocoena*). Available

ASCOBANS, 2011. European Cetacean and Pollution – an historical perspective. Proceedings of the ECS/ASCOBANS/ ACCOBAMS Joint workshop on chemical pollution and marine mammals (Ed. by Simmond M.P.). Held at the European Cetacean Society's 25th Annual Conference Cádiz, Spain, 20th March 2011 http://www.ascobans.org/sites/default/files/publication/Pollution_Proceedings_final.pdf

Camphuysen, C.J., Scott, B.E.andWanless, S. 2006. Distribution and foraging interactions of seabirds and marine mammals in the North Sea: multispecies foraging assemblages and habitat-specific feeding strategies. Top Predators in Marine Ecosystems: Their Role in Monitoring and Managemen (eds Boyd, I, Wanless, S, and Camphuysen, C.J.), pp. 82–97. Cambridge University Press, Cambridge, UK.

Dahne, M., Gilles, A., Lucke, K., Peschko, V., Adler, S., Krugel, K, Sundermeyer, J., and Siebert, U., 2013 Effects of pile-driving on harbour porpoises (*Phocoena phocoena*) at the first offshore wind farm in Germany. Environmental Research Letters, 8, 16pp

Deaville, R. and Jepson, P D. (Eds). 2011. Final Report for the period 1st January 2005 – 31st December 2010. Cetacean Stranding Investigation Programme CSIP, Defra contracts CR0346 and CR0364. Available at: http://randd.defra.gov.uk/Document.aspx?Document=FinalCSIPReport2005-2010_finalversion061211released[1].pdf

De Pierrepont, J.F. Dubois, B., Desormonts, S., Santos, M.B.A. and Robin, J.P. 2005. Stomach contents of English Channel cetaceans stranded on the coast of Normandy. Journal of the Marine Biological Association of the United Kingdom. *85*:1539-1546.

DETR. 2000. A UK conservation strategy for the harbour porpoise (*Phocoena phocoena*). Department for the Environment Transport and the Regions; Ministry of Agriculture, Fisheries and Food; Scottish Executive Rural Affairs Department; Department of Agriculture and Rural Development (Northern Ireland); National Assembly for Wales Environment Division; Department of the Environment in Northern Ireland

EC, 2012. Commission Note on Setting Conservation Objectives for Natura 2000 Sites.

Heinänen, S. and Skov, H. 2015, The identification of discrete and persistent areas of relatively high harbour porpoise density in the wider UK marine area, JNCC Report 544, ISSN 0963 8091.

IAMMWG, 2015a. Management Units for cetaceans in UK waters (January 2015). JNCC Report No. 547, JNCC Peterborough. http://jncc.defra.gov.uk/pdf/Report_547_webv2.pdf

IAMMWG, Camphuysen, CJ & Siemensma, M.L. 2015b. A Conservation Literature Review for the Harbour Porpoise (*Phocoena phocoena*). JNCC Peterborough. Report No. 566, Peterborough. 96pp

ICES, 2014. OSPAR request on implementation of MSFD for marine mammals. General Advice, May 2014. http://www.ices.dk/sites/pub/Publication%20Reports/Advice/2014/Special%20Requests/OSPAR_Implementation_of_MSFD_for_marine_mammals.pdf

JNCC, 2013. Third Report by the United Kingdom under Article 17 on the implementation of the Directive from January 2007 to December 2012. Conservation status assessment for Species:S1351 - Harbour porpoise (Phocoena phocoena). http://jncc.defra.gov.uk/pdf/Article17Consult_20131010/S1351_UK.pdf

Law, R.J., Bolam, T., James, D., Deaville, R.,Reid, R.J., Penrose, R. and Jepson, P.D. 2012. Butyltin compounds in liver of harbour porpoises *(Phocoena phocoena)* from the UK prior to and

following the ban on the use of tributytin in antifouling paints (1992-2005 & 2009) Marine Pollution Bulletin, 64: 2576-2580.

Law, R.J., Losada, S.,Barber, J., Bersuder, P.,Deaville, R., Brownlow, A., Penrose, R. and Jepson, P.D. 2013. Alternative flame retardants, Dechlorane Plus and BDEs in the blubber of harbour porpoises *(Phocoena phocoena)* stranded or bycaught in the UK during 2008. Environment International, 60; 81-88.

Murphy S, Barber JL, Learmonth JA, Read FL, Deaville R, Perkins MW, et al. (2015) Reproductive Failure in UK Harbour Porpoises *Phocoena phocoena*: Legacy of Pollutant Exposure? PLoS ONE 10(7): e0131085. doi:10.1371/journal.pone.0131085

Northridge, S., Kingston, A. and Thomas, L. 2011. Annual report on the implementation of Council Regulation (EC) No 812/2004. Scottish Oceans Institute and the Centre for Research into Ecological and Environmental Monitoring, University of St Andrews. Supplied by Defra to European Commission.

http://randd.defra.gov.uk/Default.aspx?Menu=Menu&Module=More&Location=None&ProjectID=18535

Santos, M.B. and Pierce, G.J. 2003. The diet of harbour porpoise (*Phocoena phocoena*) in the northeast Atlantic. Oceanography and Marine Biology: an Annual Review, 41, 355-390.

Santos, M.B., Pierce, G.J., Learmonth, J.A., Reid, R.J., Ross, H.M., Patterson, J.A. P., 2004. Variability in the diet of harbor porpoises (*Phocoena phocoena*) in Scottish waters 1992–2003. Marine Mammal Science 20 (1), 1-27

Southall, B. Southall, A. E., Bowles, W., Ellison, T., Finneran, J.J., Gentry, R. L., Greene Jr. C. R., Kastak, D., Ketten, D.R., Miller, J. H., Nachtigall, P. E., Richardson, W. J., Thomas, J. A., Tyack, P. L. 2007. Marine Mammal Noise Exposure Criteria: Initial Scientific Recommendations. Aquatic Mammals, Volume 33, Number 4.

Tougaard J, Buckland, S., Robinson, S. & Southall, S., 2014. An analysis of potential broad-scale impacts on harbour porpoise from proposed pile driving activities in the North Sea. Report of an expert group convened under the Habitats and Wild Birds Directives – Marine Evidence Group. Unpublished report to Defra.

8 Annex A: Assessment process to establish the significant threats to UK harbour porpoise populations

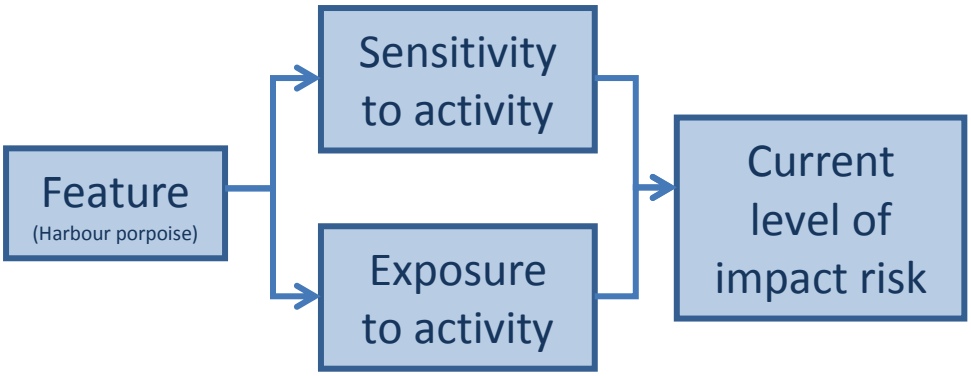
The sensitivity and vulnerability of harbour porpoise was assessed at UK level against the *pressure themes* identified by OSPAR's Intersessional Correspondence Group on Coordination of Biodiversity Assessment and Monitoring (ICG-COBAM)[15] which have been adapted slightly in order to suit the application of a highly mobile species. See Annex B for the definitions of pressures as used for the harbour porpoise assessments.

Definition of key terms

Term	Definition
Pressure theme	A group of like-pressures defined by ICG-COBAM
Sensitivity	A measure of tolerance (or intolerance) to changes in environmental conditions
Vulnerability	Vulnerability is a measure of the degree of exposure of a receptor to a pressure to which it is sensitive.
Pressure	The mechanism through which an activity has an effect on any part of the ecosystem'. The nature of the pressure is determined by activity type, intensity and distribution.
Impact	The effects (or consequences) of a pressure on a component.
Impact Risk	The current risk of impact
Exposure	The action of a pressure on a receptor, with regard to the extent, magnitude and duration of the pressure.
Activity	Human social or economic action or endeavours that may create pressures on the marine environment.

Source: jncc.defra.gov.uk/page-6515

Determining the level of impact risk of harbour porpoise to an activity



Sensitivity

Harbour porpoises were assessed as sensitive to a pressure when viability of an individual (including physiological stress, reduced fecundity, reduced growth) would be negatively affected and recovery did not take place rapidly (within weeks). The assessment incorporated expert judgement where required and adopted a single threshold to differentiate only between 'sensitive' and 'not sensitive'. The pressures that harbour porpoise are deemed sensitive to are listed in Table A1. Table A1: Pressures to which harbour porpoise may be sensitive

[15] OSPAR 20011: https://ospar.basecamphq.com/projects/6526112-icg-cobam/log

Pressure Theme	Pressures	Direct or Indirect impact
Pollution and other chemical changes	Contamination	Indirect – prey and habitat
	Enrichment	Indirect - habitat
Other physical pressures	Litter	Direct
	Anthropogenic underwater sound	Direct
	Barrier to species movement	Direct
	Death or injury by collision	Direct
Biological pressures	Introduction of microbial pathogens	Direct
	Removal of target species	Direct
	Removal of non-target species	Direct

Exposure

The list of pressures to which harbour porpoise is sensitive was combined with evidence of general exposure to these pressures in UK waters to get an understanding of the current level of impact risk; it combined expert knowledge on the overlap in spatial and temporal distributions of activities contributing towards a pressure and harbour porpoise densities, with direct evidence of impact as reported in the literature and from the UK Cetacean Strandings Investigation Programme[16].

Current level of impact risk

Caution was applied throughout the assessment process where there was a lack of direct evidence of exposure to an activity; a pressure to which a species was sensitive, was assumed to overlap with that species unless a case could be made to the contrary. In this sense, lack of direct evidence of exposure does not imply the species is not currently at risk. The current level of impact risk of harbour porpoise has not been assessed on a site basis due to uncertainties in exposure, driven by incomplete evidence to support the assessment at the site scale. The following level of impact scores were chosen to represent harbour porpoise vulnerability to activities within UK waters:

Scores	Criteria for overlap in space & time between pressure & species	Evidence of impact
Low	None or limited	No direct evidence in UK waters
Medium	Some	Some evidence of an impact occurring in UK waters
High	Widespread	Good evidence of a significant impact

The evidence used to assess the current level of impact is summarised in Table A3 and subsequent reference list.

Activities with a level of impact risk of 'low' have not been considered in the site assessments unless there is evidence to support a significant vulnerability despite the criteria described in the table above. This assessment, although inclusive of expert judgement in order to arrive at the assessment outcomes at UK level, provide a base from which to apply weighting to site based sensitivity assessments, using all available activity data.

[16] UK Cetacean Strandings Investigation Programme: http://ukstrandings.org/

Table A2 Full assessment of level of impact of activities on harbour porpoise in UK waters

Activities	Pressures	Impacts	Current level of impact risk
Commercial fisheries with bycatch (predominantly static nets)	Removal of non-target species	• Mortality through entanglement/bycatch	High
Discharge/run-off from land-fill, terrestrial and offshore industries	Contaminants	• Effects on water and prey quality • bioaccumulation through contaminated prey ingestion • health issues (e.g. on reproduction)	High
Noise from shipping, drilling, dredging and disposal, aggregate extraction, pile driving, acoustic surveys, underwater explosion, military activity, acoustic deterrent devices and recreational boating activity	Anthropogenic underwater sound	• Mortality • Internal injury • disturbance leading to physical and acoustic behavioural changes (potentially impacting foraging, navigation, breeding, socialising)	Medium
Shipping, recreational boating, renewable energy installations	Death or injury by collision	• Mortality • Injury	Medium/ Low
Commercial fisheries, bycatch	Removal of target species	• Reduction in food availability • increased competition from other species • displacement from natural range	Medium
Agriculture, aquaculture, sewage	Nutrient enrichment	• Effects on water quality • Increased risk of algal blooms may present health issues	Low
Agriculture, aquaculture, sewage	Organic enrichment	• Effects on water quality • increased risk of algal blooms may present health issues	Low
Waste disposal - navigational dredging (capital, maintenance)	Physical change (to another seabed type)	• Changes in availability of prey species	Low
Bridges, tunnels, dams, installations, presence of vessels (shipping, recreation)	Water flow (tidal current) changes - local	• Changes in location of prey species Displacement of harbour porpoise	Low
Terrestrial and at-sea 'disposal'	Litter	• Mortality through entanglement Ingestion	Low
Bridges, tunnels, dams, installations, presence of vessels (shipping, recreation)	Barrier to species movement	• Habitat inaccessible potential physiological effects	Low
Sewage	Introduction of microbial pathogens	• Increased risk of disease	Low

Table A3: Evidence used to assess exposure to each pressure to which harbour porpoise is considered sensitive.

Example activities linked to each pressure are listed.

Key activities linked to pressures	Pressures	Evidence		Key references
		Spatial overlap (species & pressure)	Post-mortem examination	
Discharge/run-off from land-fill, terrestrial and offshore industries	**Contaminants**		✓	Jepson et al, 2005; Deaville & Jepson, 2011; ICES, 2015a; Van De Vijver et al., 2003; Law et al. 2012; Pierce et al, 2008; Murphy et al, 2015.
Agriculture, aquaculture, sewage	**Nutrient enrichment**	✓	✓	Craig et al 2013
Agriculture, aquaculture' sewage	**Organic enrichment**	✓		Craig et al 2013
Terrestrial and at-sea 'disposal'	**Litter**	✓	✓	Deaville and Jepson, 2011
Marine renewable energy	**Electromagnetic changes**	✓		WGMME, 2012, ICES 2015a
Shipping, drilling, dredging, pile driving, military sonar, seismic surveys	**Anthropogenic underwater sound**	✓		Deaville & Jepson, 2011; Stone & Tasker, 2006; Stone, 2015; Jepson et al., 2005; Fernandez et al., 2005; Würsig & Richardson, 2009; WGMME, 2012.
Bridges, tunnels, dams, installations	**Barrier to species movement**	✓		WGMME., 2012; ICES 2015a
Shipping, recreational boating, renewable energy devices	**Death or injury by collision**	✓	✓	Deaville & Jepson, 2011; Dolman et al., 2006; ICES 2015a
Sewage	**Introduction of microbial pathogens**		✓	Harvell et al., 1999; Gulland and Hall, 2007; Van Bressem et al., 2009
Commercial fisheries	**Removal of target species**		✓	Simmonds and Isaac, 2007; OSPAR QSR 2010; MacLeod et al 2007a, b; Thompson et al. 2007; Santos and Pierce, 2003; Pierce et al, 2007; ICES 2015b
Commercial fisheries with by-catch	**Removal of non-target species**	✓	✓	Deaville and Jepson, 2011; Morizur et al., 1999; Read et al., 2006; Northridge, S. and Kingston, A. 2010; Northridge et al. 2013; ICES 2015b

Reference List for sources in Table A3

Craig, J.K., Crowder, L.B., Gray, C.D., McDaniel, C.J., Kenwood, T.A. and Hanifen, J.G. 2013. Ecological effects of hypoxia on fish, sea turtles, and marine mammals in the Northwestern Gulf of Mexico, in Coastal Hypoxia: Consequences for Living Resources and Ecosystems (eds Rabalais, N.N. and Turner, R.E.), American Geophysical Union, Washington, D. C.

Deaville, R. and Jepson, P D. (Eds). 2011. Final Report for the period 1st January 2005 – 31st December 2010. Cetacean Stranding Investigation Programme CSIP, Defra contracts CR0346 and CR0364. http://randd.defra.gov.uk/Document.aspx?Document=FinalCSIPReport2005-2010_finalversion061211released[1].pdf

Dolman, S., Williams-Grey, V., Asmutis-Silvia, R. and Isaac, S. 2006. Vessel collisions and cetaceans: what happens when they don"t miss the boat. WDCS Science Report.Chippenham. 25pp

Fernandez, A., Edwards, J.F., Rodrigeau, F., Espinosa de los Monteros, P., Herraez, P., Castro, P., Jaber, J.R., Martin, V. and Arbelo, M. 2005. Gas and fat embolic syndrome involving mass stranding of beaked whales (Family Ziphiidae) exposed to anthropogenic sonar signals. Veterinary Pathology 42: 446.

Gulland, F.M.D. and Hall, A.J., 2007. Is marine mammal health deteriorating? Trends in the global reporting of marine mammal disease. Ecohealth, 4: 135-150

Harvell, C.D., Kim, K., Burholder, J.M., Colwell, R.R., Epstein, P.R., Grimes, D.J., Hofmann, E.E., Lipp, E.K., Osterhaus, A.D.M.E., Overstreet, R.M., Porter, J.W., Smith, G.W. and Vasta, G.R. 1999. Emerging marine diseases--climate links and anthropogenic factors. Science, 285: 1505-1510

ICES 2015a. Report of the Working Group on Marine Mammal Ecology (WGMME). ICES Advisory Committee, ICES CM 2015/ACOM:25. 9–12 February 2015 London, UK. http://ices.dk/sites/pub/Publication%20Reports/Expert%20Group%20Report/acom/2015/WGMME/wgmme_2015.pdf

ICES. 2015b. Report of the Working Group on Bycatch of Protected Species (WGBYC), 2-6 February 2015, ICES Headquarters, Copenhagen, Denmark. ICES CM 2015\ACOM:26. 82 pp.

Jepson, P.D. Deaville, R., Patterson, I.A.P., Pocknell, A.M., Ross, H.M., Baker, J.R., Howie, F.E., Reid, R.J., Colloff, A. and Cunningham, A.A. 2005. Acute and chronic gas bubble lesions in cetaceans stranded in the United Kingdom. Veterinary Pathology, 42: 291.

Law, R.J., Barry, J., Barber, J.L., Bersuder, P., Deaville, R., Reid, R.J., Brownlow, A., Penrose, R., Barnett, J., Loveridge, J., Smith, B. and Jepson, P.D. 2012. Contaminants in cetaceans from UK waters: Status as assessed within the Cetacean Strandings Investigation Programme from 1990 to 2008. Marine Pollution Bulletin 64: 1485–1494

MacLeod, C.D., Santos, M.B., Reid, R.J., Scott, B.E. and Pierce, G.J. 2007a. Linking sandeel consumption and the likelihood of starvation in harbour porpoises in the Scottish North Sea: could climate change mean more starving porpoises? Biology Letters, 3: 185-188

MacLeod, C.D., Santos, M.B., and Pierce, G.J. 2007b. Starvation and sandeel consumption in harbour porpoises in the Scottish North Sea. Biology Letters, 3, 535-536.

Morizur, Y., Berrow, S.D., Tregenza, N.J.C., Couperus, A.S. and Pouvreau, S. 1999. Incidental catches of marine-mammals in pelagic trawl fisheries of the northeast Atlantic. Fisheries Research. 41: 297–307.

Murphy S, Barber JL, Learmonth JA, Read FL, Deaville R, Perkins MW, et al. 2015. Reproductive Failure in UK Harbour Porpoises *Phocoena phocoena*: Legacy of Pollutant Exposure? PLoS ONE 10(7): e0131085. doi:10.1371/journal.pone.0131085Northridge, S. and Kingston, A. 2010. Annual report on the implementation of Council Regulation (EC) No 812/2004 – 2009. Sea Mammal Research Unit, University St Andrews. Report prepared to the European Commission.

Northridge, S., Kingston, A. and Thomas, L. 2013. Annual report on the implementation of Council Regulation (EC) No 812/2004 – 2012. Sea Mammal Research Unit, University St Andrews. Report prepared to the European Commission

OSPAR QSR. 2010. Quality Status Report 2010 for the northeast Atlantic. [Available from http://www.ospar.org/]

Pierce, G.J., Santos, M.B. and Cervino, S., 2007. Assessing sources of variation underlying estimates of cetacean diet composition: a simulation study on analysis of harbour porpoise diet in Scottish (UK) waters. Journal of the Marine Biological Association of the United Kingdom, 87: 213-221.

Pierce, G.J., Santos, M.B., Murphy, S., Learmonth, J.A., Zuur, A.F., Rogan, E., Bustamante, P., Caurant, F., Lahaye, V., Ridox, V., Zegers, B.N., Mets, A., Addink, M., Smeenk, C., Jauniaux, T., Law, R.J., Dabin, W., Lopez, A., Alonso Farre, J.M., Gonzalez, A.F., Guerra, A., Garcia-Hartmann, M., Reid, R.J., Moffat, C.F., Luckyer, C. and Boon, J.P., 2008. Bioaccumulation of persistent organic pollutants in female common dolphins (*Delphius delphis*) and harbour porpoises (*Phocoena phocoena*) from western European seas: Geographical trends, causal factors and effects on reproduction and mortality. Environmental Pollution, 153: 401-415.

Read, A.J; Drinker, P., Northridge, S., 2006. Bycatch of marine mammals in U.S. and global fisheries. Conservation Biology, 20:163-169.

Santos, M.B. and Pierce, G.J. 2003. The diet of harbour porpoise (*Phocoena phocoena*) in the northeast Atlantic. Oceanography and Marine Biology: an Annual Review, 41: 355–390.

Simmonds, M.P., and Isaac, S.J. 2007. The impacts of climate change on marine mammals: early signs of significant problems. Oryx 41(1): 19-26

Stone, C.J. 2015. Marine mammal observations during seismic surveys from 1995-2010. JNCC Report No: 463a. JNCC, Peterborough, 64pp. Available at: http://jncc.defra.gov.uk/pdf/JNCC%20Report%20463a_Final.pdf

Stone, C.J. and Tasker, M.L. 2006. The effects of seismic airguns on cetaceans in UK waters. Journal of Cetacean Research and Management, 8: 255-263.

Thompson, P., Ingram, S., Lonergan, M., Northridge, S., Hall, A. and Wilson, B. 2007. Climate change causing starvation in harbour porpoises? Biology Letters 3, 533-534.

Van Bressem, M.F., Raga, J.A., Di Guardo, J., Jepson, P.D., Duignan, P., Siebert, U., Barrett, T., Santos, M.C.O., Moreno, I.B., Siciliano, S., Aguilar, A. and Van Waerebeek, K., 2009. Emerging infectious diseases in cetaceans worldwide and the role of environmental stressors. Diseases of Aquatic Organisms. **86: 143-157**

Van De Vijver, K.I., Hoff, P.T., Das, K., Van Dongen, W., Esmans, E.L., Jaunaiux, T., Bouquegneau, J., Blust, R. and De Coen, W. 2003. Perfluorated chemicals infiltrate ocean waters: link between exposure levels and stable isotope ratios in marine mammals. Environmental .Science andTechnology, 37: 5545-5550.

WGMME 2012. Assessment of the marine renewables industry in relation to marine mammals: synthesis of work undertaken by the ICES Working Group on Marine Mammal Ecology (WGMME). Available at http://www.researchgate.net/profile/Stefan_Braeger/publication/265728493_Assessment_of_the_marine_renewables_industry_in_relation_to_marine_mammals_synthesis_of_work_undertaken_by_the_ICES_Working_Group_on_Marine_Mammal_Ecology_%28WGMME%29/links/541a09080cf2218008bfa5ec.pdf

Würsig, B. and Richardson, W.J. 2009. Noise, effects of. Pp. 765–772. In: Perrin, W.F., Würsig, B., and J.G.M. Thewissen, Eds. The Encyclopedia of Marine Mammals, Ed. 2. Academic/Elsevier Press, San Diego, Ca. 1316 pp

9 Annex B: Definitions of Pressures as applied within harbour porpoise SAC Advice on Activities

Pressures	Definition in the context of harbour porpoise advice
Removal of non-target species	The removal of species not targeted by the fishery; in this case the bycatch (and probable mortality) of harbour porpoise
Contaminants	Introduced material capable of contaminating harbour porpoise, prey or habitat important to harbour porpoise, with a negative impact directly or indirectly on porpoises
Anthropogenic underwater sound	Introduced noise in a frequency with the potential to cause injury or displace harbour porpoise from their natural range
Death or injury by collision	Introduction of physical objects; mobile or immobile, that may collide with or result in potential collision of harbour porpoise resulting in injury or mortality
Removal of target species	Removal of harbour porpoise prey, resulting in increased competition amongst porpoise and other species, and/or displacement from their natural range