



## Chapter 14.0 Marine Mammals

## 14.0 Marine Mammals

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### 14.1 Overview of existing situation

#### 14.1.1 Introduction

14.1.1.1 Eighteen species of cetacean have been recorded in Welsh waters since 1990 (Baines and Evans, 2012). Of these only five species: harbour porpoise (*Phocoena phocoena*), Risso's dolphin (*Grampus griseus*), common dolphin (*Delphinus delphis*), bottlenose dolphin (*Tursiops truncatus*) and minke whale (*Balaenoptera acutorostrata*) are either present at any time of the year or recorded annually as seasonal visitors within the Bristol Channel (Baines and Evans, 2012; Reid *et al.* 2003). Occasional sightings and strandings of other cetaceans such as long-finned pilot whale (*Globicephala melas*), fin whale (*Balaenoptera physalus*) and killer whale (*Orcinus orca*) have been recorded, although these remain scarce (Reid *et al.* 2003; Solandt, 2007; Baines & Evans, 2012).

14.1.1.2 The most common cetacean recorded in the Bristol Channel is the harbour porpoise, followed by the common dolphin. Of the pinnipeds, only the grey seal (*Halichoerus grypus*) is known to occur in the area.

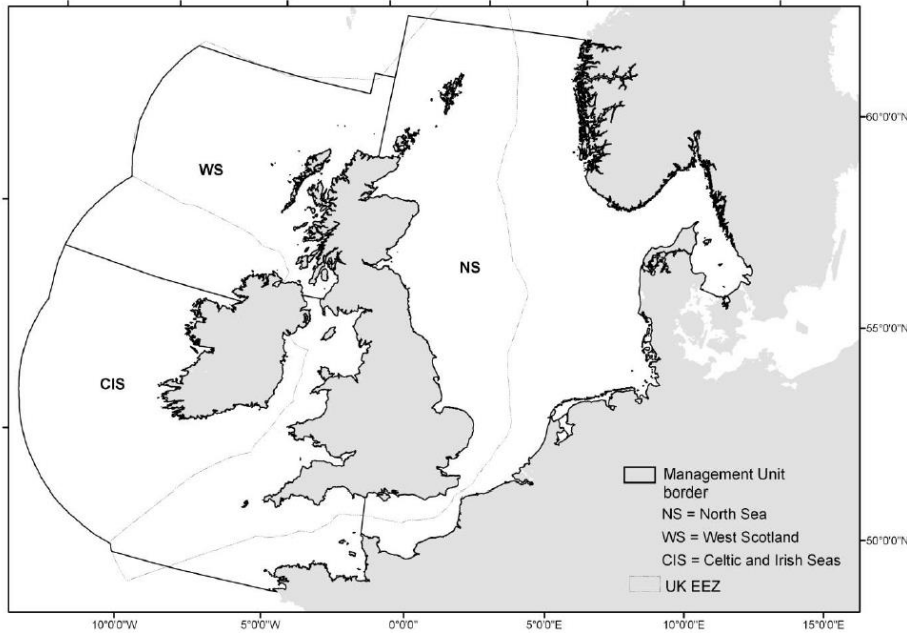
14.1.1.3 The Severn Estuary is characterised by its hyper-tidal range, high sediment loads and extensive intertidal mudflats. Large expanses of intertidal flats are exposed at low tide, significantly reducing the areas of open water across the estuary.

14.1.1.4 A detailed data review of available survey information and records of marine mammals was undertaken by Aquatic Environmental Research Ltd (AER Ltd) in order to inform the scoping report and provide an evidence baseline to inform future survey effort of the Severn Estuary for marine mammals.

14.1.1.5 The following sections give a brief overview, by species, of the existing situation in the Bristol Channel and the Severn Estuary and, where relevant, beyond the Bristol Channel. For the purposes of this chapter, the areas of the Bristol Channel and Severn Estuary are delineated in Figure 14.1 at the end of this chapter.

#### 14.1.2 Harbour porpoise

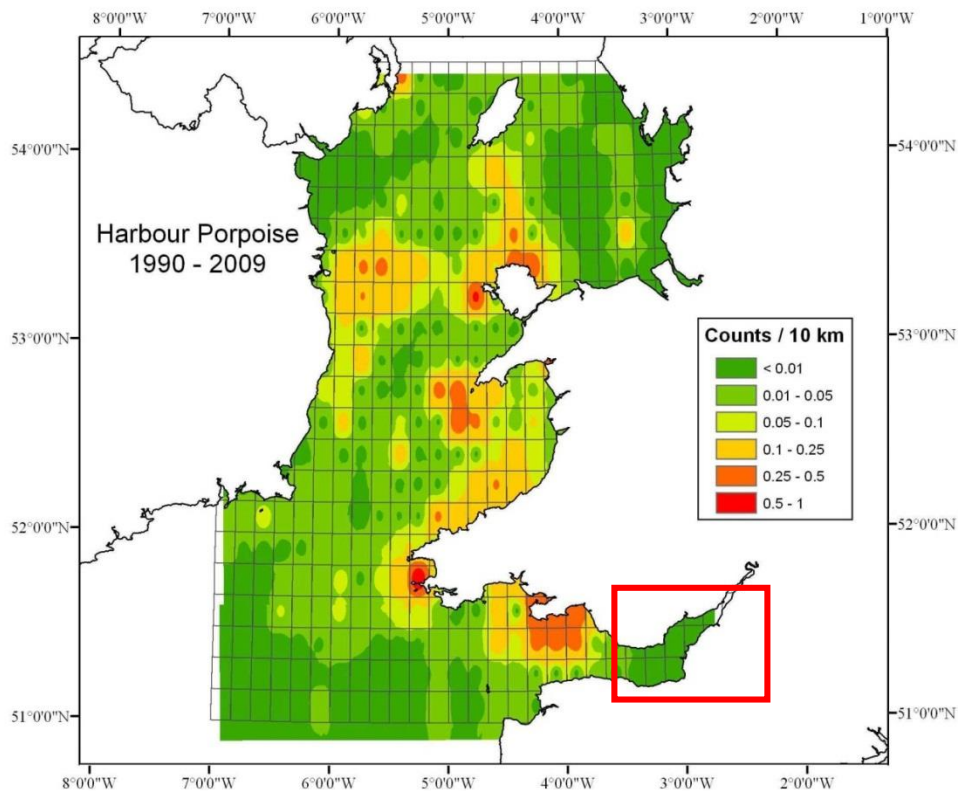
14.1.2.1 The Bristol Channel harbour porpoise population falls under the Celtic and Irish Seas (CIS) Management Unit (IAMMWG, 2013), which covers the seas from the Isle of Man, all around Eire, Cornwall, Channel Islands and offshore to the west (as illustrated in Figure 14.2 below).



**Figure 14.2 Inter-Agency Marine Mammal Working Group (IAMMWG) Management Units for Marine Mammals**

14.1.2.2 For this area, the population density has been estimated at 95,843 individuals (95% CI=43,200-212,700, CV=0.42).

14.1.2.1 Figure 14.3 below illustrates harbour porpoise sightings from systematic visual surveys conducted 1990-2009 around Welsh coastline, including the Bristol Channel (Baines and Evans, 2012). The red rectangle roughly encompasses the Severn Estuary, which includes the site of the Project. No density estimate exists for the Bristol Channel alone (Hammond, 2008) but Figure 14.3 indicates that porpoises are found in high densities throughout the Central Bristol Channel and off the coast of Pembrokeshire. It can be seen that harbour porpoise rarely occur in the Inner Bristol Channel or the Severn Estuary, with density estimates of <math><0.1/10\text{km}</math>.



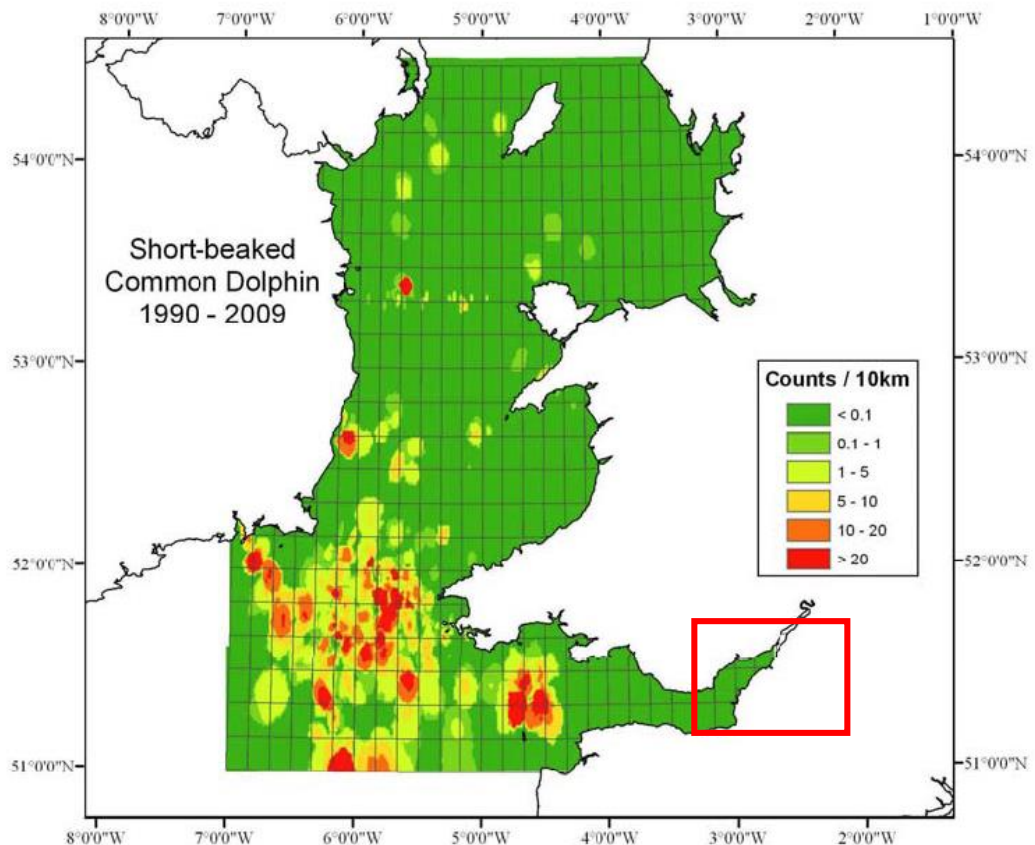
**Figure 14.3 Long term mean sightings rates (counts per 10 km distance travelled) of harbour porpoise in Welsh waters (Baines and Evans, 2012)**

- 14.1.2.2 The most detailed information of harbour porpoise in the Outer Bristol Channel comes from the Atlantic Array Offshore Windfarm Monitoring (Channel Energy, 2012). Harbour porpoise have also been regularly sighted in the Outer Bristol Channel during surveys by the Gower Marine Mammal Project (GMMP).
- 14.1.2.3 The Central and Outer Bristol Channel have been highlighted as a potentially important area for harbour porpoise and were recommended for consideration as a Special Area of Conservation (SAC) for harbour porpoise by the Worldwide Fund for Nature (WWF) (Evans and Prior, 2012).
- 14.1.2.4 Very few incidental records exist from the Inner Bristol Channel and Severn Estuary. A desk study request from the South East Wales Biodiversity Records Centre (SEWBReC) returned less than ten records of harbour porpoise from the Severn Estuary in the area between Cardiff and Newport between 2001 and 2014. Notwithstanding this, static acoustic monitoring studies conducted as part of the environmental monitoring for the Hinkley Power Point development at Bridgewater, showed regular harbour porpoise encounters on the southern side of the Inner Bristol Channel (Booth and Lacey, 2012).

### 14.1.3 Short beaked common dolphin

14.1.3.1 As shown in Figure 14.4 below, in the Bristol Channel, common dolphin has been shown to occur in moderate or sometimes high densities within the outer part of the channel (Baines and Evans, 2012).

14.1.3.2 Baseline surveys undertaken as part of the proposed Atlantic Array Offshore Wind Farm development in the Outer Bristol Channel recorded a high abundance of common dolphin in this area with more sightings than for any of the other species observed (Channel Energy Limited, 2012). Data from C-PODs deployed as part of the Atlantic Array wind farm monitoring programme indicated that dolphins (presumed to be common dolphins) visited the area throughout the year as they were detected acoustically on 81% of days between April 2010 and May 2011.

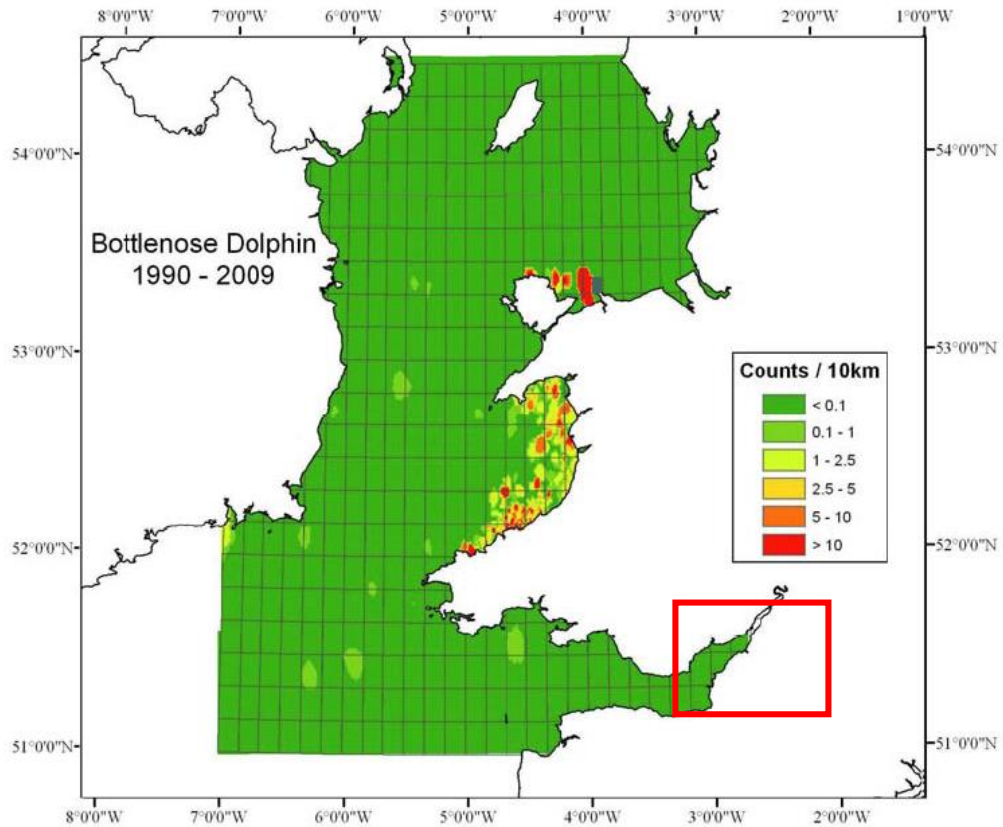


**Figure 14.4 Long-term mean sightings rate of common dolphin (Baines & Evans, 2012)**

14.1.3.3 There are no recorded sightings of common dolphins from the Central or Inner Bristol Channel or the Severn Estuary. Static acoustic monitoring studies at Hinkley recorded one dolphin encounter (unidentified species) over a 13 month study period (Booth and Lacey, 2012).

#### 14.1.4 Bottlenose dolphin

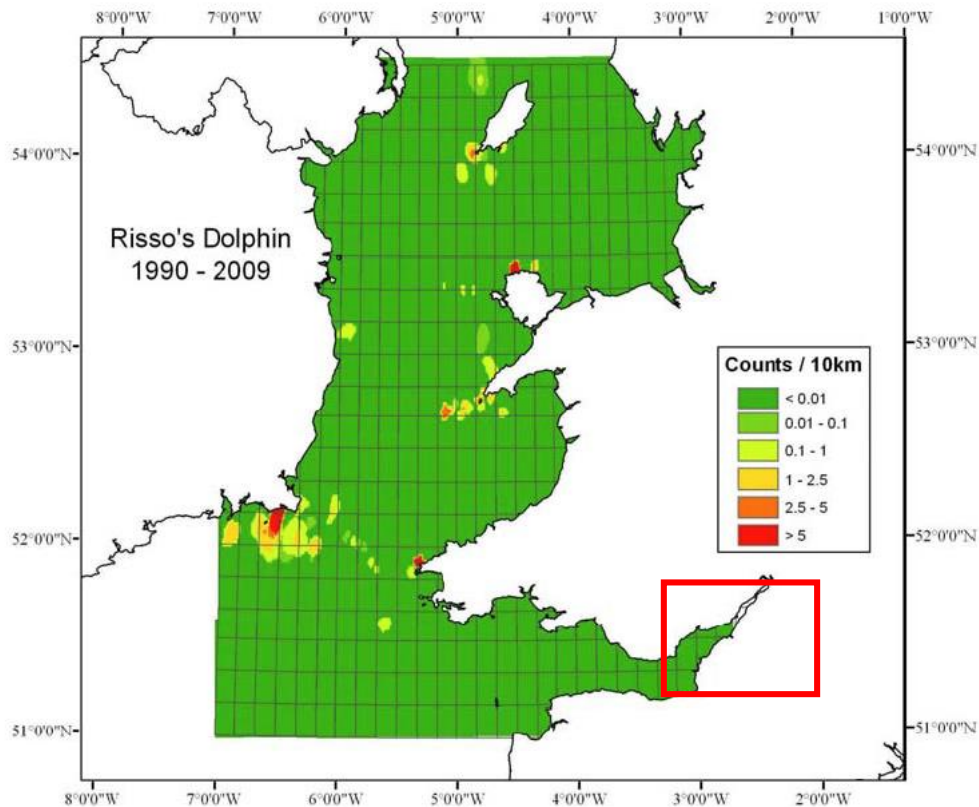
- 14.1.4.1 There are two separate populations of bottlenose dolphin in the North Atlantic, the 'coastal' and 'offshore' populations. The better known 'coastal' form is locally common in the Irish Sea (Cardigan Bay), off North East Scotland (the inner Moray Firth), in smaller numbers in the Hebrides (West Scotland), and off South West England. Little is known about the 'offshore' form of bottlenose dolphin, including the relationship between the offshore and coastal forms. More detailed studies in the North West Atlantic suggest that coastal and offshore populations are ecologically and genetically discrete (Hoelzel *et al.* 1998).
- 14.1.4.2 *The Atlas of the Marine Mammals of Wales* (Baines and Evans, 2012 and Figure 14.5 below) recorded the highest densities of bottlenose dolphin sightings in Southern Cardigan Bay but with moderately high sighting rates also extending North into Tremadog Bay. The species also occurs off the north coast of Wales, particularly north and east of Anglesey. The Cardigan Bay SAC is the nearest designated site to the Project that has bottlenose dolphin as a qualifying feature.
- 14.1.4.3 In addition to Cardigan Bay, the population of coastal bottlenose dolphin associated with south-west England has also been documented to be resident since the early 1990. However, the average group size of coastal bottlenose dolphin has declined from approximately 15 animals per sighting in 1991 to approximately six animals per sighting in 2007 (Doyle *et al.* 2007). Substantial numbers of bottlenose dolphin also inhabit offshore areas of the Celtic Sea which could occasionally visit the inshore waters of south-west England and south-west Wales.
- 14.1.4.4 The bottlenose dolphin is occasionally sighted in the Inner Bristol Channel although it is considered an infrequent visitor (Baines and Evans, 2012). There have been no other sightings from any of the other recent surveys undertaken in the Bristol Channel and Swansea Bay (e.g. Channel Energy Limited, 2012).



**Figure 14.5: Long-term mean sightings rate of bottlenose dolphins (Baines & Evans, 2012)**

#### 14.1.5 Risso's dolphin

14.1.5.1 In north-west Europe, Risso's dolphin appear to be a continental shelf species (Reid *et al.* 2003). The IAMMWG (2013) suggested a single Management Unit is appropriate for this species comprising all UK waters. Baines and Evans (2012) illustrate that around Wales, Risso's dolphin have a localised distribution, with sightings concentrated off Pembrokeshire, the Llyn Peninsula and north of Anglesey (see Figure 14.6). The data search returned no evidence of Risso's dolphin been recorded in the Bristol Channel or Severn Estuary.

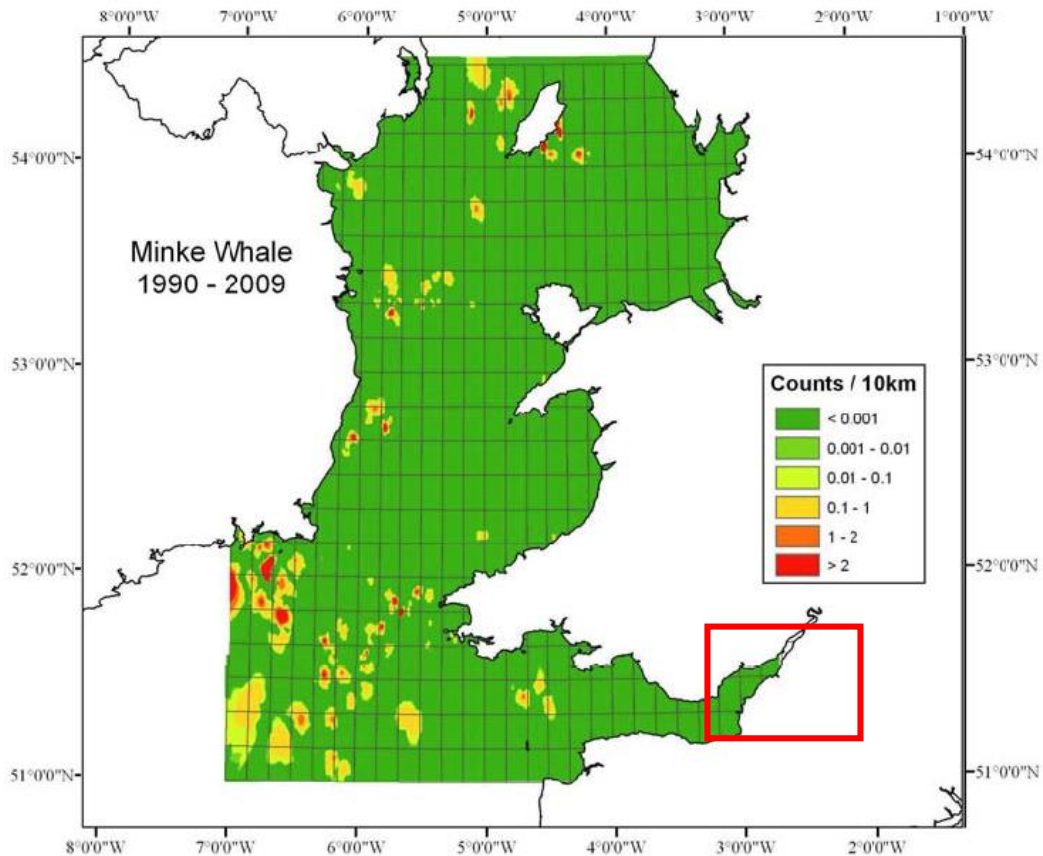


**Figure 14.6 Long-term mean sightings rate of Risso's dolphin (Baines & Evans, 2012)**

#### 14.1.6 Minke whale

14.1.6.1 Within UK waters, minke whales are most frequently sighted in the North Sea and west of Scotland around the Hebrides. Minke whales are present in low numbers in the Irish and Celtic seas (DECC, 2009). The IAMMWG (2013) suggested a single Management Unit is appropriate for this species comprising all UK waters. Within Welsh waters (Figure 14.7), minke whales have been recorded predominantly to the west of Pembrokeshire, although land watches have recorded minke whales in north Wales off Anglesey and Bardsey Island (Baines and Evans, 2012). The baseline surveys undertaken as part of the proposed Atlantic Array Offshore Wind Farm development found occasional minke whale sightings during summer in the Outer Bristol Channel with a total of eight sightings of single animals.

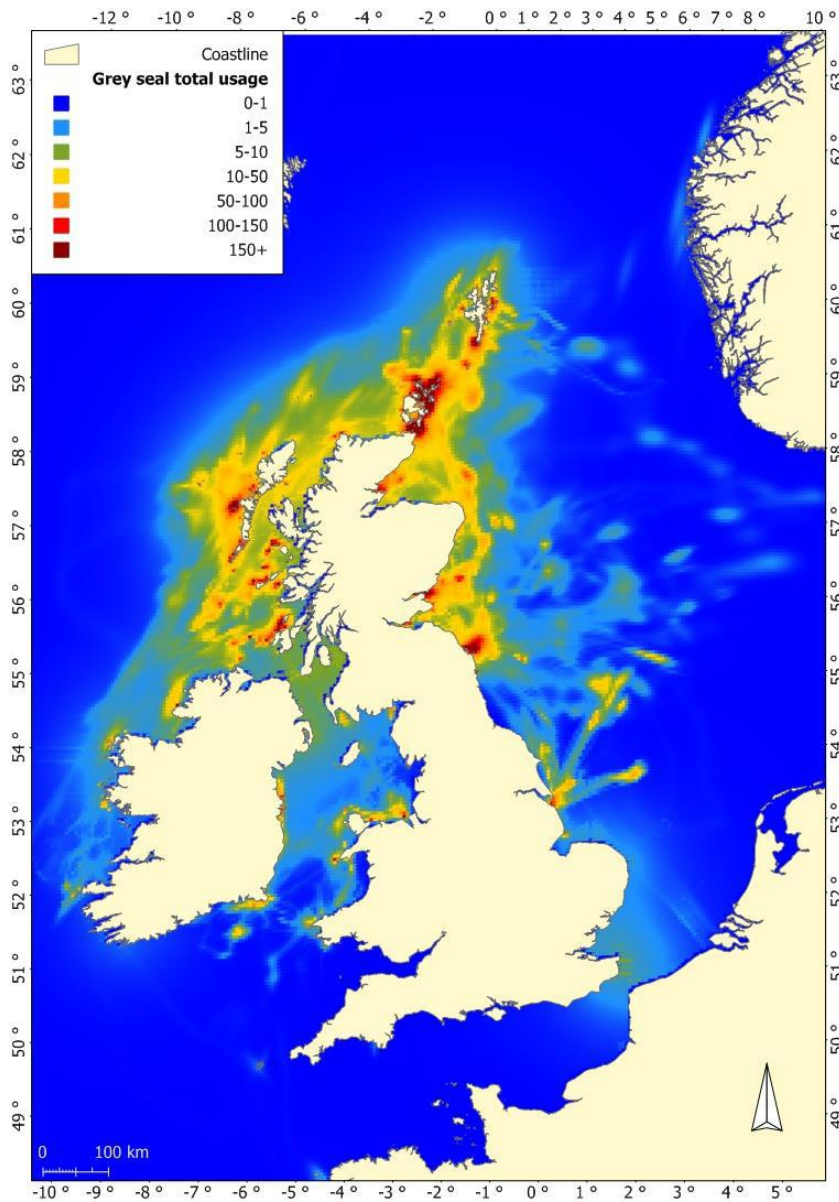




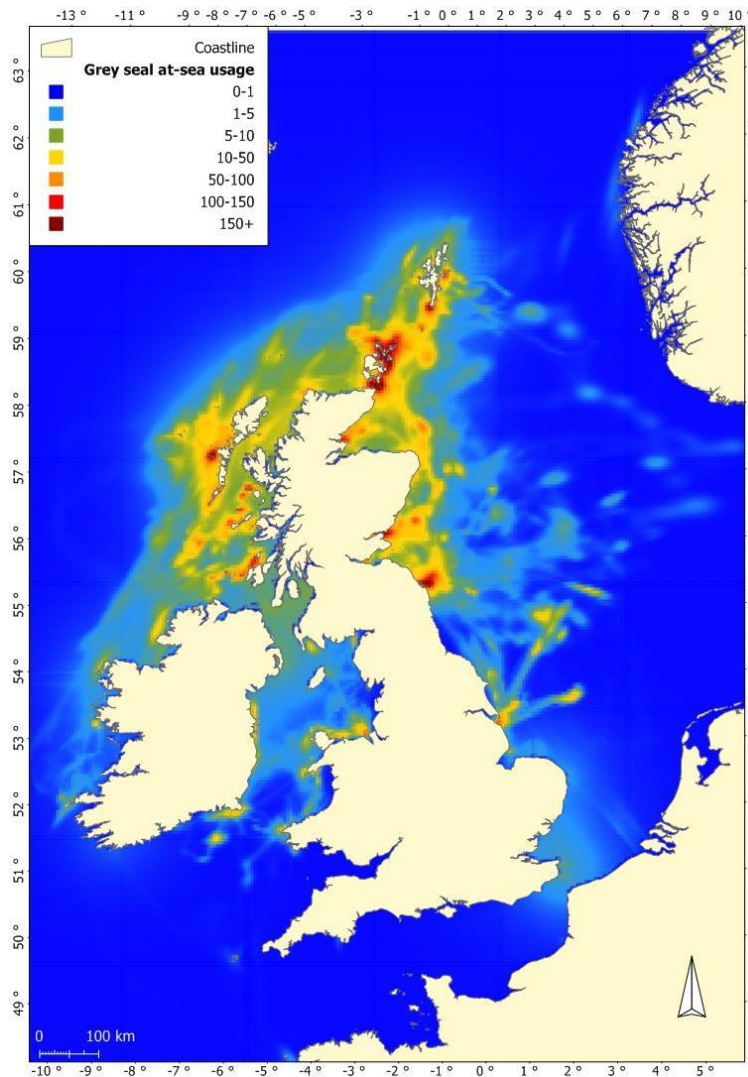
**Figure 14.7 Long-term mean sightings rate of minke whale (Baines & Evans, 2012)**

#### 14.1.7 Grey seal

14.1.7.1 Seal density maps for the UK were produced by Jones *et al.* (2013). Figure 14.8 below illustrates the mean 'total' density of grey seals, which combines the at-sea and hauled-out densities per 5km by 5km cell. Figure 14.9 illustrates the grey seals 'at-sea' usage around the UK per 5km by 5km cell. It can be seen from both figures that the Severn Estuary and the Bristol Channel falls in the 0-1 seals per 5km by 5km cell.



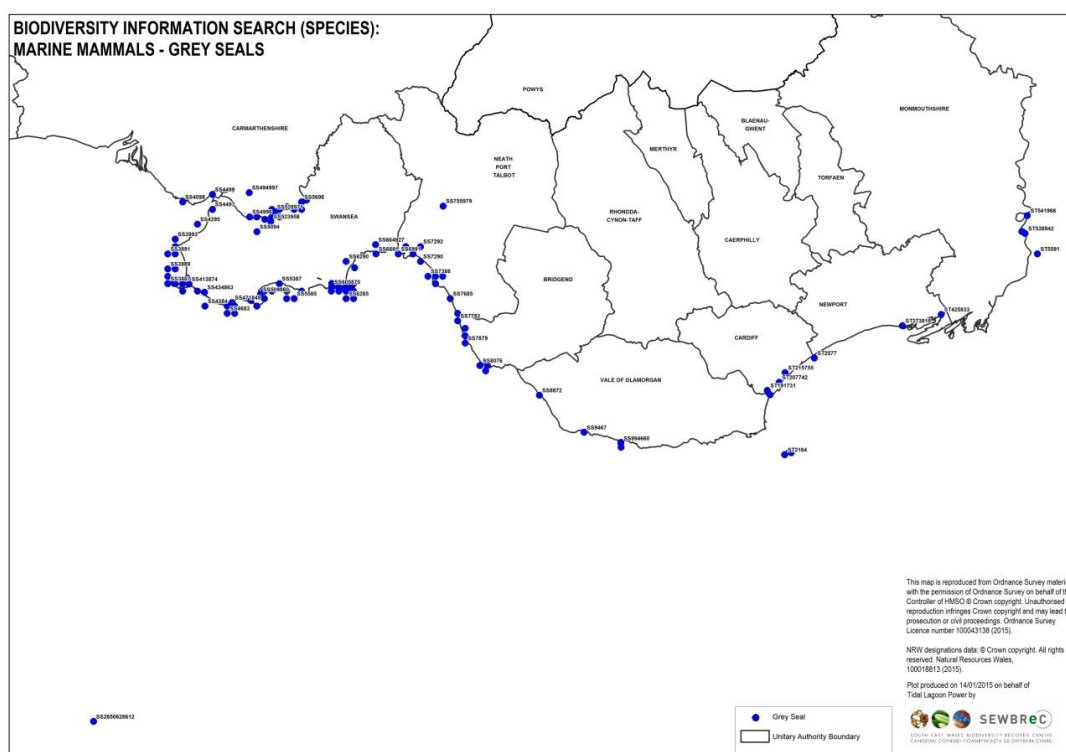
**Figure 14.8 Estimated total density of grey seals around the UK (taken from Jones *et al.* (2013))**



**Figure 14.9 Estimated grey seal at sea usage around the UK (taken from Jones *et al.* (2013))**

- 14.1.7.2 Grey seals predominantly inhabit remote islands and coastline in Wales, breeding on undisturbed beaches of cobble and boulders or within sea-caves. The nearest site to the Project which has grey seal as a qualifying feature (but not a primary feature) is Lundy SAC. Recent population surveys undertaken from 2006 to 2013 have recorded a steady increase in population numbers, with a peak total of 1318 seal sightings (not individuals) observed in 2012, decreasing to a total of 864 in 2013 (MacDonald, 2013). Pembrokeshire Marine SAC and the Cardigan Bay SAC also include grey seal as a qualifying feature.
- 14.1.7.3 Grey seals are regularly observed in the Outer and Central Bristol Channel, although usually in small numbers. During the Atlantic Array Offshore Wind Farm in the Outer Bristol Channel development baseline surveys, grey seal accounted for 7% of all marine mammal sightings (42 sightings). Grey seal sightings were widespread, with no evidence of clustering at any particular location.

- 14.1.7.4 Due to a lack of systematic surveys for grey seals in the Bristol Channel, a desk study was undertaken by AER Ltd, to collate records from a wide range of sources in order to provide an evidence base upon which future survey requirements could be evaluated against (see Appendix 14.1). This found that in general, grey seal sightings in the Severn Estuary were infrequent compared to other areas within the Bristol Channel and there were no recorded haul out sites (see Figure 14.10).



**Figure 14.10 Grey seal sightings in the Bristol Channel from Severn Estuary to Pembrokeshire between 1992 and 2013, map from SEWBRc**

## 14.1.8 Legislative and policy requirements

- 14.1.8.1 Relevant legislation, policies and guidance for the assessment for marine mammals includes, but are not restricted to, the following:

### International Conventions

- i. The Convention on the Conservation of European Wildlife and Natural Habitats 1979 (the Bern Convention)
- ii. The Convention for the Protection of the Marine Environment of the North-East Atlantic (the OSPAR Convention)
- iii. The Convention on the Conservation of Migratory Species of Wild Animals 1982. (the Bonn Convention)
- iv. The Convention on Biological Diversity 1992 (Biodiversity Convention)

## EC legislation

- I. EC Directive on the Conservation of Natural Habitats and of Wild Fauna and Flora (92/43/EEC) (EC Habitats Directive)
- II. EC Marine Strategy Framework Directive (2008/56/EC)

## National Acts, Statutory Instruments and Policy Statement

1. The Wildlife and Countryside Act 1981 (as amended)
2. Conservation of Seals Act 1970
3. Marine and Coastal Access Act 2009 (Marine Act)
4. National Environment and Rural Communities (NERC) Act 2006
5. UK Post-2010 Biodiversity Framework (2012)
6. The UK Marine Policy Statement (MPS)
7. National Planning Policy Framework

## 14.2 Scope of potential impact to be assessed

### 14.2.1 Introduction

14.2.1.1 The impact assessment will consider potential effects on marine mammals associated with the construction, operation and decommissioning phases of the Project. The potential range of effects for each phase are indicated below in Tables 14.1 - 14.3. It should be noted that the marine mammal assessments will draw on information from other Environmental Impact Assessment (EIA) studies for the Project including coastal processes, marine water quality, fish and marine noise and vibration. There will therefore be a close link between specialists working on these various topic areas to confirm data required and to share findings of assessments.

14.2.1.2 The Project has a planned lifespan from construction to decommissioning of around 120 years, consequently the assessment will need to consider the potential effects of climate change over this time period including potential changes in water temperature.

14.2.1.3 Direct and indirect impacts on marine mammals will be assessed, where direct impacts include direct physical disturbance and indirect impacts result in loss or disturbance of habitat or species through indirect routes e.g. deterioration in water quality.

14.2.1.4 Cumulative impacts will also be assessed in the EIA i.e. impacts of the Project combined with other developments that already exist, are currently under construction or currently have plans under consideration. These include the proposed Swansea Bay tidal lagoon, and the proposed Longbay Seapower West Somerset lagoon. Consultation will be held with the relevant authorities to assess

which projects should be reviewed as part of this process in addition to those projects identified in Chapter 3 Structure of the Environmental Statement.

- 14.2.1.5 The EIA will have to consider how the project may bring about changes to grey seal or cetaceans at a population level and the geographic scope of the impact assessment will be based on consideration of the potential zone of impact depending on the Project phase.

## 14.2.2 Potential effects during construction phase

**Table 14.1 Potential impacts of development on marine mammals during construction.**

Construction		
Potential source of impact	Potential development impact	Potential effect
Construction vessels and marine plant	Collision risk	Behavioural disturbance, injury or mortality
	Noise disturbance	
	Visual disturbance	Behavioural disturbance
Construction of breakwater, temporary cofferdam, installation of turbines	Temporary noise disturbance from piling	Behavioural disturbance, injury or mortality
	Temporary changes in suspended sediment concentration leading to effects on prey availability	Effect on fitness
	Barrier to movement	Behavioural disturbance
	Changes to foraging habitat due to alterations in coastal processes or loss of access to foraging habitat	Effect on fitness
Temporary discharges from construction works to environment, accidental spillages	Changes to water quality	Effect on fitness
Release of contaminants from disturbed bottom sediments		

### 14.2.3 Potential effects during operation phase.

**Table 14.2 Potential impacts of development on marine mammals during operation.**

Operation		
Potential source of impact	Potential development impact	Potential effect
Operational turbines	Collision risk	Behavioural disturbance, injury or mortality
	Noise disturbance	Behavioural disturbance
Presence of breakwater	Barrier to movement	Behavioural disturbance
	Changes to foraging habitat due to alterations in coastal processes or loss of access to foraging habitat	Effect on fitness
Maintenance dredging Release of contaminants from disturbed bottom sediments	Changes to water quality	Effect on fitness
Transmission of electricity	Electromagnetic fields	Behavioural disturbance

### 14.2.4 Potential effects during decommissioning phase.

- 14.2.4.1 The final decommissioning options have yet to be decided (see Chapter 6 Project Description). At this stage it is assumed that the breakwaters will not be removed and the decommissioning options will include the possible removal of the turbines and sluice gates and other infrastructure relating to the energy generation, or the upgrade of such infrastructure.

**Table 14.3 Potential impacts of development on marine mammals during decommissioning.**

Decommissioning		
Potential source of impact	Potential development impact	Potential effect
Decommissioning vessels and marine plant	Collision risk	Behavioural disturbance, injury or mortality
	Noise disturbance	
	Visual disturbance	Behavioural disturbance
Removal of turbines and sluice gates	Noise disturbance	Behavioural disturbance
	Changes in suspended sediment concentration leading to effects on prey availability	Effect on fitness

## 14.3 Existing baseline data, consultation and need for survey

### 14.3.1 Introduction

14.3.1.1 This section sets out the current understanding of the available baseline data and identifies any requirements for additional surveys to fill knowledge gaps to inform the EIA.

### 14.3.2 Overview of available data

14.3.2.1 A data review of sources required to characterise the marine mammals of the area has been undertaken by Aquatic Environmental Research Ltd and will be incorporated into the assessment. This included, but was not limited to a review of the following data sources:

- i. The CCW/NRW *Atlas of Marine Mammals of Wales* Baines and Evans (2012)
- ii. *Small Cetacean Abundance in the European Atlantic and North Sea programmes (SCANS and SCANS-II)* SCANS-II, (2008).
- iii. *Revised Phase III Data Analysis of Joint Cetacean Protocol Data Resource*. Paxton et al. (2013) Joint Nature Conservation Council (JNCC)
- iv. *Analysis of long-term effort-related land based observations to identify whether coastal areas of harbour porpoise and bottlenose dolphin have persistent high occurrence & abundance*. Evans et al. (2014)
- v. *Atlas of Cetacean Distribution in North West European Waters* Reid, et al. (2003)
- vi. *Management Units for Marine Mammals in UK waters: The Inter-Agency Marine Mammal Working Group (IAMMWG)* (2013).
- vii. *Abundance and Life History Parameters of Bottlenose Dolphin in Cardigan Bay: Monitoring 2005-2007*. Pesante et.al. (2008b) CCW Marine Monitoring Report No. 61, 1-75.
- viii. *Sea Watch Foundation Surveys (1994 – 2008)*
- ix. *Grey and Harbour Seal Density Maps. Sea Mammal Research Unit Report to the Scottish Government*. Jones et.al (2013).
- x. *Atlantic Array Offshore Wind Farm Draft Environmental Statement Volume 3: Annex 9.1: Marine Mammals*. Channel Energy Limited, 2012.
- xi. *Marine Conservation Society Outer Bristol Channel Megafauna Surveys 2007. A collaborative project between The Environment Agency and the Marine Conservation Society*. Solandt, J. (2007).
- xii. *Static acoustic monitoring of harbour porpoise and dolphins at the proposed jetty construction site off Hinkley Point Power Station*. Booth, C.G. & Lacey, C. (2012). SMRU Ltd Report to CEFAS. pp30. *British Energy Estuary and Marine Studies*, TR-S 172.



14.3.2.2 In addition a separate study was commissioned from AER Ltd in order to carry out a desk study of records of grey seals in the Bristol Channel (and the Severn Estuary in particular). The results of this study have been used to inform future survey requirements for the Project. This included, but was not limited to, contacting the following organisations/individuals (see Appendix 14.1 for full details):

- I. South East Wales Biodiversity Records Centre (SEWBReC)
- II. West Wales Biodiversity Information Centre (WWBIC)
- III. Wildlife Trust of South and West Wales (WTSWW)
- IV. Devon Biodiversity Records Centre (DBRC)
- V. Gloucestershire Centre for Environmental Records (GCER)
- VI. Local Authority Ecologists
- VII. Bird watchers
- VIII. Flat Holm
- IX. Lundy warden
- X. Sea kayakers
- XI. Seawatch Foundation
- XII. Fishermen

### **14.3.3 Need for future surveys**

14.3.3.1 The data review undertaken by AER Ltd found that the outer Bristol Channel has been systematically surveyed to some extent by several different survey projects using various methods including boat based and aerial visual surveys, as well as towed and static acoustic methods. Despite this, there are few larger scale datasets from recent years, the most recent having been the Wildfowl and Wetlands Trust (WWT) aerial surveys from 2001 -2009 (WWT, 2009). Very few harbour porpoise sightings were recorded from the Inner Bristol Channel and the survey area did not extend as far as the Severn Estuary.

14.3.3.2 There has been less coverage by systematic surveys in the Inner and Central Bristol Channel although several separate studies have been conducted and extensive static acoustic dataset exists for the Scarweather Sands wind farm and Hinkley power station project sites.

14.3.3.3 It is evident that low numbers of cetaceans and pinnipeds have been opportunistically sighted in the inner Bristol Channel and Severn Estuary area, which presumably has meant that there is little systematic survey data from the area.

14.3.3.4 For the purposes of EIA, the surveys outlined below have been designed to be used to gather a basic understanding of the presence or absence of most common species encountered in the Severn Estuary and inner Bristol Channel. This initial site characterisation (understanding acoustic encounter rates and sightings frequencies) would inform any future monitoring proposals for impact assessment (should it be required) through the ongoing development of an Adaptive Environmental Management Plan (AEMP). The surveys proposed have been developed following comments from Natural Resources Wales (NRW) and Natural England.

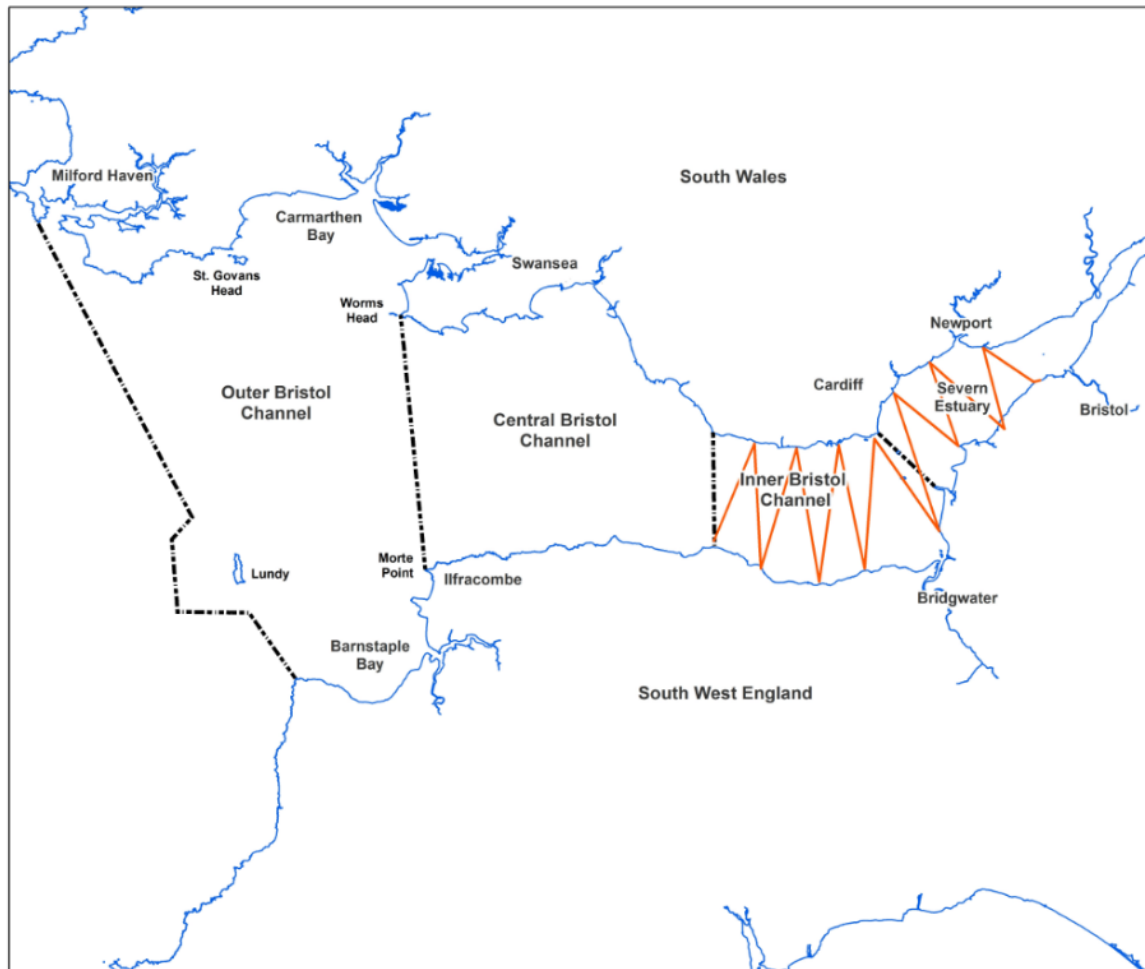
#### **14.3.4 Proposed survey techniques**

14.3.4.1 From the evidence collected to date, it is apparent that harbour porpoise and grey seals are the marine mammals that are most likely to occur in the Severn Estuary (with a small chance of common dolphin encounters). Survey methodologies used would therefore maximise the chance of detecting these species. A combined visual and towed acoustic survey of the Severn Estuary and Inner Bristol Channel is proposed, together with detailed, site specific static acoustic monitoring programme.

##### **Towed acoustic and visual boat surveys**

14.3.4.2 The most comprehensive survey option for baseline data collection is to conduct boat surveys (line-transect surveys) with visual observations and complement that with towed, passive acoustic survey. It is proposed that four surveys be undertaken to cover all seasons, from summer 2015 until spring 2016. Visual boat surveys would be able to collect data on harbour porpoise, common dolphin and grey seal.

14.3.4.3 Actual transect lines and geographical coverage are yet to be finalised as the transect lines will be generated by the software package DISTANCE which will also be used to analyse the data (Buckland et al. 2001) (See Figure 14.11 for an estimate of geographic coverage, approximately 300km). Basic distance sampling methodology will be applied to the survey, ensuring representative coverage of the survey area and that each point in the area has an equal probability of being sampled. This is necessary because animals are not randomly distributed in space. The survey will be conducted perpendicular to any density gradient and the same lines will be selected on each survey in order to measure trends.



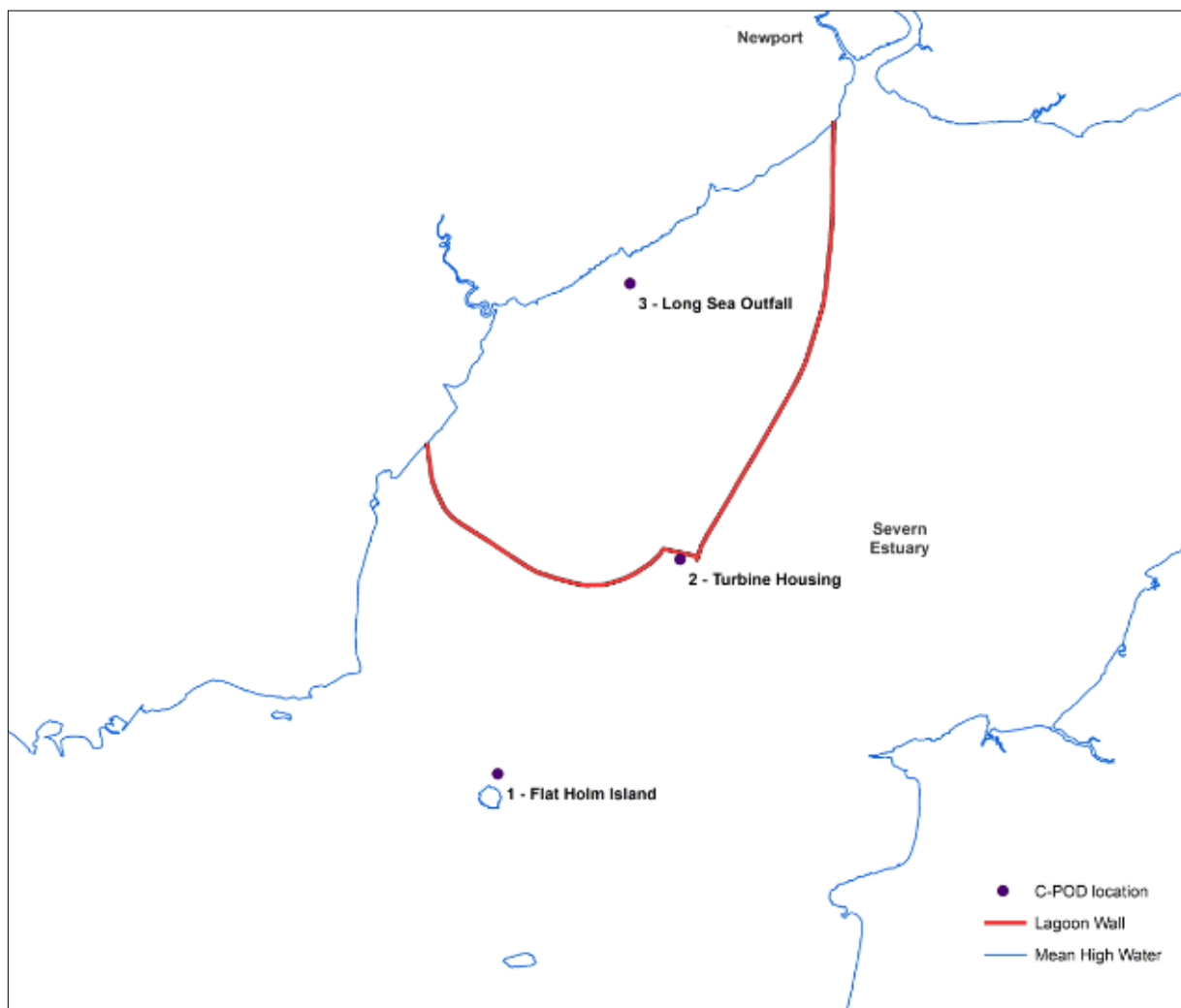
**Figure 14.11 Indicative geographic extent of proposed transect line (approximately 300km)**

- 14.3.4.4 Selection of vessel will depend on habitat constraints, but the vessel should be large enough to operate from elevated platform and be able to cruise around 200-330 km a day at 10-12 knots (Evans and Thomas, 2013). For towed acoustic surveys the cruising speeds are generally slightly lower, adjusted to the towed equipment, which should also help when trying to obtain harbour porpoise data.
- 14.3.4.5 Although these surveys will not be able to establish absolute numbers of any species in the area, surveys will follow the standard procedure surveys according to Joint Cetacean Protocol (JCP) using existing data templates so that any accrued data could be used in future density estimations. The data will be used for baseline characterisation surveys to assess animal distribution and abundance in the study area, across seasons. In order to provide more detailed information regarding porpoise use of the area around the lagoon, a static acoustic monitoring programme at and near the Project is proposed. The baseline data collection has been designed so that any data collected can be used towards potential future impact study.

### **Deployment of static acoustic monitoring devices (C-PODs) and moorings**

- 14.3.4.6 Static acoustic monitoring devices (such as C-PODs) log echolocation clicks of cetaceans and they are increasingly used in monitoring studies for coastal development due to their cost effectiveness and continuous automated data collection, both day and night, regardless of the weather. As the harbour porpoise is very vocal, it lends itself well to acoustic monitoring, particularly as it can be rather difficult to study using visual means, due to its small size and inconspicuous behaviour.
- 14.3.4.7 There are advantages and disadvantages with using C-POD's. The key advantage is the continuous data collection throughout the day and night, during all tidal periods and in most weather conditions. This allows large datasets to be collected, assisting in understanding seasonal and diurnal patterns in cetacean habitat use (Simon et al. 2010). Porpoises in particular are thought to be very active at night, which can be missed by traditional boat surveys. Although C-PODs cannot reveal actual numbers of animals, and are hence not suitable for abundance estimation, they are able to detect trends in their presence and absence, thereby revealing foraging patterns (Nuutila et al. 2013).
- 14.3.4.8 The disadvantage of using static devices in high tidal energy environments is the likely chance of losing equipment, or reduced quality of data due to high levels of ambient noise. As every deployment site will have its own challenges, it is difficult to design a fully functioning static acoustic monitoring programme before pilot deployments are undertaken to test the feasibility of the devices at the sites.
- 14.3.4.9 It is therefore proposed to deploy pairs of static acoustic monitoring devices (C-PODs), at three key locations (6 C-PODs in total) in order to capture harbour porpoise activity in the area (particularly at night). The pairs of C-PODs will be positioned:
- i. close to the proposed turbine housing for the Project;
  - ii. close to the long sea outfall within the Project footprint; and
  - iii. close to Flatholm (see Figure 14.12).
- 14.3.4.10 It is proposed that the C-PODs will be deployed for 4 months as an initial pilot exercise. After 4 months the data will be retrieved and the success of the site assessed. The monitoring programme in terms of site numbers and locations will then be reviewed. It is considered at this stage that a continuous presence will try to be maintained.

- 14.3.4.11 The results of the initial C-POD data collection will inform future survey and monitoring requirements for the Project. Impact monitoring, which has the primary aim of assessing the accuracy of predictions made in the Environmental Statement regarding the impacts of the development on the marine mammal populations, may require a different survey approach to establish whether impacts are occurring as a result of construction and operation, and whether the mitigation techniques used are appropriate (Macleod et al. 2011). The design of appropriate surveys for impact monitoring for this Project will depend on the outcome of the characterisation surveys, the final design of this Project and the significance of the impacts predicted, in addition to a consideration of any cumulative or in-combination effects from other proposed developments.
- 14.3.4.12 Data will also be analysed from any C-PODs deployed as part of the Swansea Bay Tidal Lagoon project in order to increase the knowledge of harbour porpoise activity within the Bristol Channel.



**Figure 14.12 Proposed location of C-PODS**

### **Grey seal surveys**

- 14.3.4.13 The results of the AER Ltd desk study into grey seal sightings (see Appendix 14.1) demonstrated that within the Severn Estuary grey seals are seldom recorded and that there are no known haul out sites on the Welsh or English side of the Estuary. The Welsh side of the Estuary is well observed, with the Wales Coastal Footpath, the Newport Wetlands Centre and the urban centres of Cardiff, Newport and Chepstow all along the coastline. On the English coastline are the urban and industrial centres of Gloucester, Avonmouth and Portishead, the Severn Way long distance footpath and the Wildfowl and Wetlands Trust Reserve at Slimbridge. The topography is generally very flat and muddy, enabling extensive visibility of the intertidal areas and as a result there are few places grey seals may 'hide'. Therefore it is a reasonable assumption to make that if there were a regular haul out site along this stretch of coastline, it would be known about.
- 14.3.4.14 No specific surveys for grey seal haul out sites are therefore proposed. The visual boat surveys, as discussed above, would record any grey seals in the Inner Bristol Channel and Severn Estuary. In addition to this, for the purposes of the EIA, contact will be made once again with certain organisations identified during the desk study to gain further updated information with respect to any grey seal sightings that can inform the baseline.
- 14.3.4.15 The potential impacts on grey seal will be assessed through both the EIA and HRA process. It is considered that the only feasible method to conduct impact monitoring on grey seals would be to monitor a haul out site in the proximity of the Project. However, no such sites exist, the nearest site with a regular grey seal presence in large numbers is Lundy, at least 120km away from the Project. Due to the distance between the Project and Lundy, it would therefore be very difficult to ascertain that any changes in distribution or abundance trends at this site were caused by the Project and not other development, anthropogenic factors, fluctuations in prey availabilities, changes in water temperatures, weather conditions, or some other environmental variable.

### **14.3.5 Consultation**

- 14.3.5.1 It is good practice, and a legal requirement at certain stages, to consult with stakeholders (encompassing statutory bodies, Non-Government Organisation (NGOs) with technical knowledge and local communities).

14.3.5.2 In addition to the statutory consultation at specific stages, there will be an iterative process of consulting relevant statutory bodies and NGOs with technical knowledge in relation to available data for marine mammals. The consultation process will encompass discussion of survey/monitoring design, the approach to impact assessment, the potential effects arising from the Project, and potential mitigation options where required.

## **14.4 Proposed assessment methodology**

### **14.4.1 Impact assessment methodology**

14.4.1.1 The impact assessment approach will be based on the following:

- i. Advice on operations within European Marine Sites (English Nature, 1998);
- ii. An Environmental Risk Assessment approach developed by ABP Research (ABP Research, 1997); and
- iii. Guidance from the Institute for Ecology and Environmental Management Guidelines for Marine Impact Assessment (IEEM, 2010) and the Ecological Impact Assessment (EclA) guidance set out by the Institute of Ecology and Environmental Management (IEEM, 2006).

14.4.1.2 This impact assessment framework, which is presented in the following sections, is designed to incorporate the key criteria and considerations without being overly prescriptive.

#### **Stage 1 - Identify features and changes**

14.4.1.3 The first stage is identifying the potential impacts resulting from the proposed activities comprised in the Project (pressures) and the features of interest (receptors) that are likely to be affected. The combination of the pressure and receptor exposure to that pressure is referred to as the impact pathway. This aspect of the assessment will be developed in consultation with key statutory and non-statutory authorities.

14.4.1.4 Potential impacts will be identified for the three phases of the Project: construction, operation and decommissioning. In addition, any potential in-combination impacts of the Project with other plans and projects in the area will be assessed.

#### **Stage 2 - Understand change and sensitivity**

14.4.1.5 The second stage of the impact assessment involves understanding the nature of the environmental changes to provide a benchmark against which the changes and levels of exposure can be compared. The scale of the impacts via the impact pathways depend upon a range of factors, including the following:

- i. Magnitude;

- Spatial extent (small/large scale);
- Duration (temporary/short/intermediate/long-term);
- Frequency (routine/intermittent/occasional/rare);
- ii. Reversibility;
- iii. Probability of occurrence;
- iv. The margins by which set values are exceeded (e.g. water quality standards);
- v. The baseline conditions of the system (including existing long-term trends and natural variability); and
- vi. The sensitivity of the receptor (resistance/adaptability and recoverability).

### Stage 3 - Impact assessment

- 14.4.1.6 The likelihood of a feature/receptor being vulnerable to an impact pathway will then be evaluated as a basis for assessing the level of the impact and its significance.
- 14.4.1.7 The key significance levels for either beneficial or adverse impacts are described as follows:
- i. **Insignificant:** Insignificant change not having a discernible effect;
  - ii. **Minor:** Effects tending to be discernible but tolerable;
  - iii. **Moderate:** Where these changes are adverse they may require mitigation; and
  - iv. **Major:** Effects are highest in magnitude and reflect the high vulnerability and importance of a receptor (e.g. to nature conservation). Where these changes are adverse they will require mitigation

### Impact assessment guidance tables

- 14.4.1.8 The matrices in Tables 14.4 to 14.6 have been used to assess significance.
- 14.4.1.9 Table 14.4 has been used as a means of generating an estimate of exposure. Magnitude of change has been considered in spatial and temporal terms (including duration, frequency and seasonality), and against the background environmental conditions in the Project area. Once a magnitude has been assessed, this has been combined with the probability of occurrence to arrive at an exposure score which has been used for the next step of the assessment, which is detailed in Table 14.5. For example, an impact pathway with a medium magnitude of change and a high probability of occurrence will result in a medium exposure to change.



**Table 14.4 Exposure to change, combining magnitude and probability of change.**

Probability of Occurrence	Magnitude of Change			
	Large	Medium	Small	Negligible
High	High	Medium	Low	Negligible
Medium	Medium	Medium/Low	Low /Negligible	Negligible
Low	Low	Low /Negligible	Negligible	Negligible
Negligible	Negligible	Negligible	Negligible	Negligible

14.4.1.10 Table 14.5 has been used to score the vulnerability of the features of interest based on the sensitivity of those features and their exposure to a given change. Where the exposure and sensitivity characteristics overlap, then vulnerability exists and an adverse effect may occur. For example, if the impact pathway previously assessed with a medium exposure to change acts on a receptor which has a high sensitivity, this will result in an assessment of high vulnerability. Sensitivity can be described as the intolerance of a habitat, community or individual of a species to an environmental change and essentially considers the response characteristics of the feature. Thus, if a single or combination of environmental changes is likely to elicit a response, then the feature under assessment will be considered to be sensitive. Where an exposure or change occurs for which the receptor is not sensitive, then no vulnerability will occur. Similarly, where a negligible exposure is identified during an impact assessment, vulnerability will always be 'none' no matter how sensitive the feature is, if the exposure to change has been assessed as 'negligible'.

**Table 14.5 Estimation of vulnerability based on sensitivity and exposure to change.**

Sensitivity of Feature	Exposure to Change			
	High	Medium	Low	Negligible
High	High	High	Moderate	None
Moderate	High	Moderate	Low	None
Low	Moderate	Low	Low	None
None	None	None	None	None

14.4.1.11 The vulnerability is then combined with the importance of the feature of interest using Table 14.6 to generate an initial level of significance. The importance of a feature is based on its value and rarity such as the levels of protection. For example if a high vulnerability has previously been given to a feature of low importance the initial level of significance will be assessed as minor.

**Table 14.6 Estimation of significance based on vulnerability and importance.**

Importance of Feature	Vulnerability of Feature to Impact			
	High	Moderate	Low	None
High	Major	Moderate	Minor	Insignificant
Moderate	Moderate	Moderate/Minor	Minor/Insignificant	Insignificant
Low	Minor	Minor/Insignificant	Insignificant	Insignificant
None	Insignificant	Insignificant	Insignificant	Insignificant

- 14.4.1.12 The final stage of the assessment process will identify any impacts that are moderate and/or major adverse significant and require mitigation measures to reduce residual impacts, as far as possible, to environmentally acceptable levels. Within the assessment procedure the use of mitigation measures will alter the risk of exposure and hence will require significance to be re-assessed and thus the residual impact (i.e. with mitigation) will be identified.

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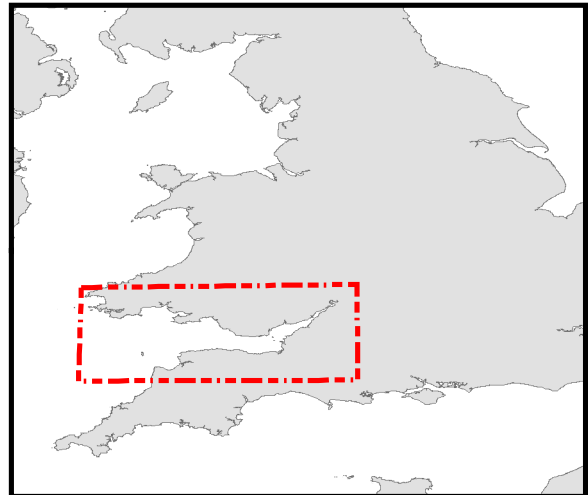
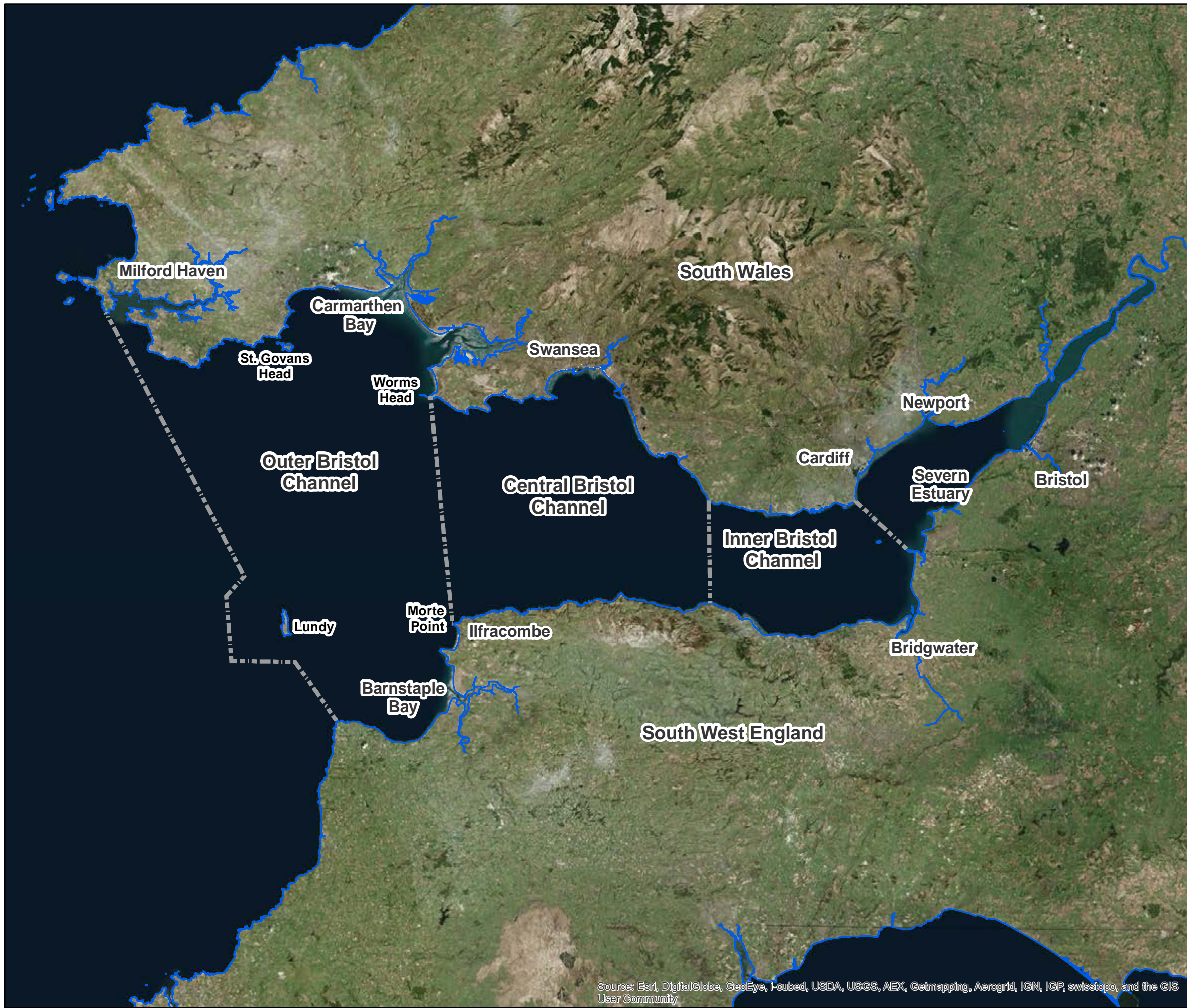
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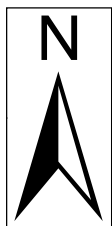
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## Figures



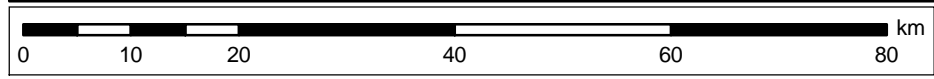
- Mean High Water
- Boundary Lines



BOUNDARIES OF THE BRISTOL CHANNEL AND SEVERN ESTUARY

Figure 14.1

Date FEBRUARY 2015	Drawn By SC
Location Severn Estuary & Bristol Channel	Issue 1



© Crown copyright and database rights 2014 Ordnance Survey 0100031673 Scale @ A3 1:700,000

Source: Esri, DigitalGlobe, GeoEye, I-cubed, USDA, USGS, AEX, Getmapping, Aerogrid, IGN, IGP, swisstopo, and the GIS User Community



## **Appendix 14.1**

### **Desktop study of Grey Seal Sightings in the Bristol Channel, for Tidal Lagoon Power**



Aquatic Environmental Research Ltd

Client: Tidal Lagoon Power plc

Project: Cardiff Tidal Lagoon Scoping Study

Date: 31 January 2015  
25 February 2015 (revised 3<sup>rd</sup> version)


Project ID: AER 014

Authors: Bertelli, C, Gray, G.

Report: Desktop study of Grey Seal Sightings in the Bristol Channel, for Tidal Lagoon Power.

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Client: Tidal Lagoon Power PLC		
Project: Cardiff Tidal Lagoon Scoping study		
Title: Desktop study of Grey Seal Sightings in the Bristol Channel, for Tidal Lagoon Power		
Issue: 1	Original date: 30 January 2015	Aquatic Environmental Research Ltd, Spinoff of Swansea Innovations, Swansea University Company Registration 08847127
Checked by:		
Approved by: Nicole Esteban		Aquatic Environmental Research Ltd Nicole Esteban, Department of Research and Innovation Swansea University, Singleton Park, Swansea SA2 8PP T: 01792513005 E: n.esteban@swansea.ac.uk



## 1.0 Introduction

There are two species of pinniped found to both live and breed in UK waters, the common or harbour seal (*Phoca vitulina*) and the grey seal (*Halichoerus grypus*). The harbour seal is widespread around the west coast of Scotland, the Hebrides and the Northern Isles, but are less frequent on the east coast with populations restricted to the Thames, The Wash, The Moray Firth and the Firth of Tay estuaries (SCOS, 2013). No known breeding colonies of Harbour seal are known around the Welsh coast, and individual seals are rarely sighted in Welsh waters. The only breeding pinniped around the Welsh coast is the grey seal, with the largest pup production in colonies off Pembrokeshire, in particular Ramsey Island, but also Skomer and southern Ceredigion (Baines and Evans, 2012). In the UK, grey seals are protected under the Conservation of Seals Act 1970 (England and Wales), the Marine (Scotland) Act 2010 and the Wildlife (Northern Ireland) Order 1985. The grey seal is a feature of several sites in the Bristol Channel and beyond which are designated under the European Council Directive 92/43/EEC on the Conservation of natural habitats and of wild fauna and flora (the "Habitats Directive"). These include Lundy Special Area of Conservation (SAC), Pembrokeshire Marine SAC and Cardigan Bay SAC.

The information collected and presented in this report will be used as part of an evidence base to determine the extent of future marine mammal survey requirements for tidal lagoon development proposals in the Severn Estuary.

## 2.0 Methodology

The data for this report was acquired by contacting numerous stakeholders, biodiversity records centres, recreational users of coastal waters and wildlife enthusiasts thought to be able to provide sighting of seals that could otherwise be overlooked. The work was split into two parts, and two geographical units to allow efficient and thorough research to be undertaken in the time frame required. Primarily a desk based internet search was conducted to identify potential sources of records or seal sightings. The location within the Bristol Channel was divided into the Welsh side of the Channel as far as Stackpole, and The English side of the Channel as far as Hartland Point and Lundy Island. These sections were then split further into the Severn Estuary, the inner Bristol Channel, the central Bristol Channel and the outer Bristol Channel. The second part to the methodology involved contacting the identified parties by telephone and email wherever possible. Any contact made was recorded and the information provided submitted into a table, including responses that could lead to other sources of records which were subsequently contacted (see table 1).

Where relevant, sightings locations were marked on a satellite imagery map, but only sightings verified by local records centres or records provided from the data collected that could be referenced. Vague anecdotal inference was excluded.



Table 1: Data sources, responses and records of seal sightings given for the Welsh and English coast of the Bristol Channel

ID	1. Welsh Coast Contact	Email/website	Form of contact	Records / Response
1	British Marine Life Study Society - Andy Horton		Email	no records to provide
2	Lizzie Wilberforce Conservation Manager Welsh WT	l.wiberforce@wels hwildlife.org	Email	Suggested other contacts would be interested in seeing final report.
3	Porcupine Marine Natural History Society - Roni Robbins		Email	no response
4	Seasearch - Kate Lock		Email	no response
5	Blaise Bullimore SAC officer Carmarthen Bay and Estuaries		Email	no response
6	Deb Hill Countryside Team Leader (Swansea)		Email and phone	No response
7	Rebecca Sharpe (Newport)	l.palmer@neath- porttalbot.gov.uk; biodiversity@npt. gov.uk	Email	Records given to South East Wales Biodiversity Records Centre (SEWBRc). Suggested other point of contacts.
8	Matthew Harris (Cardiff)	MBHarris@cardiff. gov.uk	Email	Records given to SEWBRc. Suggested other point of contacts.
9	Isabel Macho Biodiversity Officer (Carmarthen)	<a href="mailto:conservation@car-marthenshire.gov.uk">conservation@car-marthenshire.gov.uk</a>	Phone and email	No records, advised who to contact.
10	Geoff Hobbs Ecologist (Bridgend)	<a href="mailto:Geoffrey.Hobbs@bridgend.gov.uk">Geoffrey.Hobbs@bridgend.gov.uk</a>	Contacted Robert Jones on behalf - email	Records given to SEWBRc.
11	Cliff Benson - Sea Trust	<a href="mailto:info@seatrust.org.uk">info@seatrust.org.uk</a> <a href="http://www.seatrust.org.uk">www.seatrust.org.uk</a>	Contacted	No records of Grey Seals east of Caldey in Welsh waters, some may be found around the Gower. Some seals breed around Caldey Island and St Margaret's Island.
12	Powell Strong -Pembrokeshire college	<a href="mailto:p.strong@pembrokeshire.ac.uk">p.strong@pembrokeshire.ac.uk</a>	Email	Gave contact for ex-warden of Caldey Island

13	Steve Sutcliffe - ex-warden Caldey Island	stevesutcliffe@lineone.net	Email	An average of around 10 to 15 maximum in late summer seen around Caldey Island although never seen more than 2 bulls at any time. Usually around 5 pups are born on Caldey each year - mainly around Redberry Bay on the south side where they breed in caves. No known haul out sites between Pendine and Tenby.
14	Dave McDonald British Divers Marine Life Rescue		Telephone	Records given to Biodiversity records centre
15	Clive Hurford NRW		Email	Suggested other points of contact
16	Barry Stewart Gower wildlife blog	<a href="http://gowers.blogspot.co.uk/2013_02_01_archive.html#uds-search-results">http://gowers.blogspot.co.uk/2013_02_01_archive.html#uds-search-results</a> ; moonmoths@virginmedia.com	(contacted by Clive Hurford)	Several records on blog, most included in local biodiversity records centre data
17	Rob Colley	<a href="mailto:rob.colley@ecosurveyers.uk.com">rob.colley@ecosurveyers.uk.com</a>	Email	Casual sightings: on Worm's Head; 1-2 females hauled out in Bracelet Bay and Caswell; twice seen a single seal feeding near the Neath Rivermouth
18	Mark Hipkin – County Bird Recorder		Email	No response
19	Sam Eaves - Cardiff Harbour Authority		Email	No response
20	Dave Westerland - Flat Holm project		Email	No response
21	Colin Titcombe- Monmouthshire Green web newsletter		Internet search	Anecdotal records of occasional grey seals since 2001 as far up as Redbrook on the River Wye in 2006. Most recent observation dating from 2011 along the lower Wye near Pierce Woods (Chepstow)
22	Stuart Yendle - sea kayaker		Email	Only ever observed one seal at a time in the Bristol Channel and it has been at lone bull. Llantwit Major beach 1 seal 20/02/2010; 1 calf hauled out and 1 female (mother) in water at Jacksons bay, Barry 10/2014 but shoed into the water by the council; Sightings around Tusker rock off Porthcawl, Steep Holm and Flat Holm. Considered very rare to see any seals east of Swansea Bay.
23	Adam Tilt, wildlife blog		Internet search	2 grey seals by the fish ladder, Tawe barrage in Swansea marina 02/09/2011; Individuals off Oxwich Point, Fall Bay, Bracelet Bay and at least twelve hauled out on the rocks and in the sea off Worms Head 09/2011; 1 grey seal feeding in Tawe barrage 31/10/2011
24	Steve Austin, Swansea Coastguard Station		Internet search	1 grey seal hauled out Limeslade Bay, June 2014
25	Wildlife Trust of South and West Wales		Internet search	Sedger's Bank off Port Eynon known as a haul-out site for grey seals
26	Katrin Lohrengal - Sea Watch Foundation		Internet search	1 grey seal bracelet Bay, 09/11/13
27	<a href="http://surfnslide.wordpress.com/tag/grey-seals/">Blog - http://surfnslide.wordpress.com/tag/grey-seals/</a>		Internet search	10-15 in the waters off the coast around Worm's Head June 2012

28	Wales online		Internet search	1 grey seal hauled out in Limeslade bay July 2014
29	MarLIN website records from Julie Furber, Clair Jones, Stephen Furley and Charlotte Bettle		Internet search	
				1 grey seal in Bristol channel off East beach, Flat Holm 01/06/2004
				1 grey seal playing in water off Ogmores-by-sea 08/08/2004
				1 grey seal by rocky outcrop, Flat Holm 29/09/2004
				1 grey seal from Island Bay, Flat Holm 22/10/2004
				14 grey seals playing in surf Ogmores-by-sea towards Southerndown 09/10/2004
				7 spotted on Rat Island Rocks off Lundy, 14/07/2005
				1 hauled out on sand bank at Neath Rivermouth, 27/08/2005
				1 surfacing and diving for approximately 1.5hrs opposite Craig-yr-eos Rd in Ogmores-by-Sea 02/08/2005
				1 female hauled out on beach, Flat Holm 29/01/2007
30	Seal safari, Tenby		Telephone	No response received in time for submission
31	Tenby sea fishing (Triton 2)	<a href="http://www.tenbyseafishing.co.uk/contact.html">http://www.tenbyseafishing.co.uk/contact.html</a>	Telephone and email	No response
32	Caldey Island	<a href="mailto:inquiries@caldey-island.co.uk">inquiries@caldey-island.co.uk</a>	Telephone	No records kept but seals are frequently observed around the back of the Island in particular.
33	Saundersfoot Pleasure boats	<a href="mailto:info@saundersfootboattrips.co.uk">info@saundersfootboattrips.co.uk</a>	Telephone and email	No response
34	SEWBReC – South East Wales Biodiversity Records centre	<a href="mailto:Rebecca.wright-davies@sewbrec.org.uk">Rebecca.wright-davies@sewbrec.org.uk</a>	Email	Received records
35	WWBRC- West Wales Biodiversity Records Centre	<a href="mailto:Colin.russell@wwbic.org.uk">Colin.russell@wwbic.org.uk</a>	Email	Received records
36	Claire Godfey - Porthcawl Harbourside Project		Email	No records
37	Judith Oakley - Oakley intertidal		Email	No response

38	Gower Coast Adventure David Tonge Director / Skipper Gower Coast Adventures Ltd	<a href="mailto:info@gowercoastadventures.co.uk">info@gowercoastadventures.co.uk</a>	Email	Anecdotal records of up to 50 grey seals hauled out on the rock on the North side of Worms Head. Also observed hauled out on the rocks at Limeslade bay and sometimes around the slipways in Knab rock. Regularly observe a single seal up the Tawe river near to the barrage.
39	Rod Penrose - Seawatch foundation	<a href="mailto:rodpenrose@strandings.demon.co.uk">rodpenrose@strandings.demon.co.uk</a>	Email	Only mortality records, no sightings data.
40	Kathy James – Sightings Officer, Seawatch Foundation, New Quay Office.	Kathy.james@seawatchfoundation.org.uk	Email	No records. Suggested other points of contact.
	<b>2. English Coast Contact</b>	<b>Email</b>	<b>Form of contact</b>	<b>Records / Response</b>
41	Cornwall Seal Group	<a href="mailto:sue@cornwallsealgroup.co.uk">sue@cornwallsealgroup.co.uk</a>	Email and telephone	Suggested other points of contact.
42	British Divers - Marine life rescue	<a href="mailto:info@bdmlr.org.uk">info@bdmlr.org.uk</a>	Email	Suggested other points of contact.
43	Cornwall Wildlife Trust	<a href="http://www.cornwallwildlifetrust.org.uk">www.cornwallwildlifetrust.org.uk</a>	on line form	No response
44	Devon wild life trust - Headquarters	<a href="mailto:contactus@devonwildlifetrust.org">mailto:contactus@devonwildlifetrust.org</a>	Telephone	No response
45	Devon Wildlife Trust - Wembury office Coral Smith DWT Marine Awareness Officer	<a href="mailto:info@wemburymarinecentre.org.uk">info@wemburymarinecentre.org.uk</a>	Email and telephone conversation	No records. Suggested other points of contact.
46	Devon Biodiversity Records Centre	<a href="mailto:eknott@devonwildlifetrust.org">eknott@devonwildlifetrust.org</a>	Email and telephone	Received records
47	Wildfowl and Wetlands Trust (WWT) Slimbridge Wetland Centre Dave Paynter Reserve Manager	<a href="mailto:cpdadmin@wwt.org.uk">cpdadmin@wwt.org.uk</a>	Telephone contact with Dave Paynter - email reply received	Both Grey and Common Seals are rare vagrants here. Greys especially so. There has been a run of Common Seal sightings over the past two summers. Possibly only one individual seen on the rising tide from Purton to Saul, it has been observed actively chasing Mullet into the shallows on many occasions.
48	Gloucestershire Centre for Environmental Records	<a href="mailto:rob.curtis@gloucesterwildlifetrust.co.uk">rob.curtis@gloucesterwildlifetrust.co.uk</a>	Email	Request form for data completed. Email reply, 3 sightings only received
49	North Devon animal ambulance		On line form	No response
50	Lundy Island warden Rebecca MacDonald	<a href="mailto:warden@lundyisland.co.uk">warden@lundyisland.co.uk</a>	Email and telephone conversation	Sent reports on Lundy seal data.

51	National Trust at Lundy	<a href="mailto:lundy@nationaltrust.org.uk">mailto:lundy@nationaltrust.org.uk</a>	Email	No response
52	Avon Wildlife Trust	<a href="mailto:mail@avonwildlifetrust.org.uk">mail@avonwildlifetrust.org.uk</a>	Telephone	Sighting of 1 seal about 20 years ago from Joe Middleton
53	Secret World Pauline Kidner	<a href="mailto:fundraising@secretworld.org">fundraising@secretworld.org</a>	Email	No records
54	RSBP		Email	Suggested other points of contact
55	Flatholm Island	<a href="mailto:flatholmproject@cardiff.gov.uk">mailto:flatholmproject@cardiff.gov.uk</a> <a href="mailto:park@cardiff.gov.uk">park@cardiff.gov.uk</a>	Telephone: requested to send an email to Cardiff	No response
56	Steep Holm Shirkers	<a href="http://www.steeptholm.org.uk/">http://www.steeptholm.org.uk/</a>	Telephone on line form	1 to 2 seals about sixteen times during the year
57	Chris Maslen Steepholm warden		Telephone	No response
58	Sea watch foundation - Chris Blackmore/Claire Rowberry/Vanessa Lloyd		Telephone and Email	Data sets received
	Katrin Lohrengal - Sea Watch - Wales	<a href="mailto:katrinlohrengal@seawatchfoundation.org.uk">katrinlohrengal@seawatchfoundation.org.uk</a>	Email	No response
59	Nigel Phillips - Somerset Coast		Email	No response
60	Tom Williams - wildlife columnist		Telephone	No response
61	Marine Conservation Society		Email	No response
62	Paul Bower	<a href="mailto:paul@ukbirds.net">paul@ukbirds.net</a>	Email	Sand Point: 20th January 2014 and 17th December 2013. Brean Down 29th January 2011
63	Rob Parry - Conservation Manager Wildlife Trust Wales	<a href="mailto:r.parry@welshwildlife.org">r.parry@welshwildlife.org</a>	Email	No response
64	British Divers - Marine life rescue	<a href="mailto:Phil@bdmlr.org.uk">Phil@bdmlr.org.uk</a>	Email	No response
65	Devon Birds Steve Waite Devon Bird Recorder		Email	No records. Suggested further points of contact
66	Sevenside Ramblers		Email	No response

67	Bristol Ramblers	<a href="mailto:footpaths@bristolramblers.org.uk">footpaths@bristolramblers.org.uk</a>	Email	No response
68	Bristol Channel charters	<a href="mailto:info@bristolchannelcharters.co.uk">info@bristolchannelcharters.co.uk</a>	Email	No response
69	Ilfracombe Princess' - charter boat	<a href="http://www.ilfracombepriincess.co.uk">http://www.ilfracombepriincess.co.uk</a>	Telephone	No response
70	Martin Legg - skipper 'chopperscrazyboat trips'	<a href="http://www.chopperscrazyboattrips.com/">http://www.chopperscrazyboattrips.com/</a>	Telephone	>100 seals 2014 off Lundy. 3-4 on isolated sights from Morte point to Lynmouth
71	John Scunthorpe -Lundy castaway boat		Telephone	Most concentrated population observed around Lundy Island also observed at Morte and Baggy Point -North Devon. Cannot confirm definite numbers
72	Paul Barbary - skipper 'Osprey charters'	<a href="http://www.ospreycharterers.co.uk/">http://www.ospreycharterers.co.uk/</a>	Telephone	
73	Bay Island Voyages - Cardiff		Telephone	No response
74	Joel Soul North Devon Bass Guide	<a href="mailto:joelsoul68@live.com">mailto:joelsoul68@live.com</a>	Telephone	No response
75	Al Venables		Email	No records. Suggested further points of contact
76	Tom Dalrymple - Newport Wetlands		Telephone	No response
77	Lundy diving	<a href="http://www.lundydiving.co.uk">http://www.lundydiving.co.uk</a>	Telephone	No response
78	NDYC yacht club		Telephone	No response
79	Paul Bowman -Sevenside birds		Email	No response
80	Gloucestershire Naturalists Society	<a href="mailto:enquiries@glosnats.org.uk">enquiries@glosnats.org.uk</a>		Email
81	Ben Macdonald - television researcher, naturalist		on line form	No records
82	Ed Drewitt			No records. Suggested further points of contact
83	Andrew Benjey - boat skipper		Telephone	No response
84	Robert Irving - Lundy Management Group Principal Consultant Sea-Scope, Marine Environmental Consultants	<a href="mailto:robert@sea-scope.co.uk">robert@sea-scope.co.uk</a>	Email	No records. Suggested further points of contact
85	Stuart Line cruises	Helen Newton	Email	No records – based in Exmouth



86	Avocet line	<a href="http://www.avocetline.org.uk/">www.avocetline.org.uk/</a>	on line form	No response
87	North Devon Ramblers	<a href="http://www.northdevonramblers.co.uk/">www.northdevonramblers.co.uk/</a>	Email	No response
88	Bristol Marina	<a href="http://www.bristolmarina.co.uk/">www.bristolmarina.co.uk/</a>	on line form	No records
89	Bristol Docks office	<a href="mailto:docks.office@bristol.gov.uk">docks.office@bristol.gov.uk</a>	Email	No response
90	Steve Trehwella - Coastal wildlife photographer		Email	No records
91	Simon King Wildlife presenter	<a href="mailto:support@simonkingwildlife.com">support@simonkingwildlife.com</a>	Email	No response
92	Southwest Coastal path group Mark Owen, South West Coast Path National Trail Officer	<a href="mailto:swcpteam@devon.gov.uk">'swcpteam@devon.gov.uk'</a>	Email	No records
93	Sevenside Birds Paul Bowerman			Anecdotal records of single grey seals at Severn Beach.
94	National Trust - Brean Down Ian Clemmett Lead Ranger, North Somerset National Trust - Heart of the Cotswolds & North Somerset	<a href="http://nationaltrust.org.uk">nationaltrust.org.uk</a>	Email	No records
95	Portishead lifeboat	<a href="mailto:hello@portishead-lifeboat.org.uk">hello@portishead-lifeboat.org.uk</a>	Email	No response
96	Minehead lifeboat	<a href="mailto:Minehead@rnli.org.uk">Minehead@rnli.org.uk</a>	Email	No response
97	Weston-super-mare lifeboat	<a href="mailto:Weston-super-mare@rnli.org.uk">Weston-super-mare@rnli.org.uk</a>	Email	No response
98	Lymington lifeboat	<a href="mailto:Lymington@rnli.org.uk">Lymington@rnli.org.uk</a>	Email	No response
99	Peter Hazlewood		Email	Seals are very rare this far up the estuary, with only one or two per year. Only observed 3 in 10 years of regular visits (av. 2 visits per week) to Oldbury Power Station. Other anecdotal sightings date from: 01/05/12, 15/09/07, 23/09/06
100	Somervalley FM radio	<a href="mailto:studio@somervalleyfm.co.uk">mailto:studio@somervalleyfm.co.uk</a>	Email	No response
101	Natural England Nik Ward Team Leader - Devon Marine Team	<a href="mailto:Nik.Ward@naturalengland.org.uk">Nik.Ward@naturalengland.org.uk</a>	Email	No records

103	Little Valley RSPCA	<a href="mailto:info@rspca-littlevalley.org.uk">info@rspca-littlevalley.org.uk</a>	Email	No records
104	North Devon RSPCA	<a href="mailto:info@rspca-northdevon.org.uk">info@rspca-northdevon.org.uk</a>	Email	No response
105	Bristol and District RSPCA	<a href="mailto:info@rspca-bristol.org.uk">info@rspca-bristol.org.uk</a>	Email	No response
106	Cheltenham Animal shelter	<a href="mailto:reception@gawa.org.uk">reception@gawa.org.uk</a>	Email	No response
107	Exeter Wildlife watch	<a href="mailto:exeterwildlifewatch@gmail.com">exeterwildlifewatch@gmail.com</a>	Email	No response
108	Woolacombe Tourist Centre	<a href="mailto:info@woolacombe-tourism.co.uk">info@woolacombe-tourism.co.uk</a>	Email	No records. Suggested further points of contact
109	Devon and Severn inshore fisheries & Conservation authority	<a href="mailto:office@devonandsvernifca.gov.uk">office@devonandsvernifca.gov.uk</a>	Email	No response
110	Severn Canal Trust Jade Hester Customer Support Administrator	<a href="mailto:Enquiries.southwalessevern@canalrivertrust.org.uk">Enquiries.southwalessevern@canalrivertrust.org.uk</a>	Email	No records. Suggested further points of contact
111	Severn Canal Trust Dr Mark Robinson National Ecologist		Email	No records
112	Bristol Regional Environmental Records Centre	<a href="#">BRERC Data Enquiries</a> <a href="mailto:dataenquiries@brerc.org.uk">[dataenquiries@brerc.org.uk]</a>	Email	Data set and map received
113	Somerset Environmental Records Centre	<a href="#">Data Supply</a> <a href="mailto:data.supply@somerc.com">[data.supply@somerc.com]</a>	Email	Data set and map received

### 3.0 Results

#### 3.1 Severn Estuary

The Severn Estuary area for the purposes of this report consists of the uppermost reaches of the estuary as far as Fretherne, and the River Wye, as far out into the Bristol Channel as Lavernock on the Welsh coast, Flat Holm Island in the Channel and Brean Down near Western-Super-Mare on the English coast (see Figure 1).



Figure 1. Map of grey seal sighting locations in Severn Estuary, blue points from 1977-2014. (Google earth, 2015)

#### Welsh Coast

Grey seals have been spotted as far up the Severn Estuary on the Welsh side as the River Usk and the River Wye at Chepstow. There have been several sightings in the River Wye recorded from 2001 to 2011, occurring in the months of June, July, August and October. Some but not all of these sightings were passed to local county biodiversity recorders and subsequently included in the data obtained from SEWBRc. The sightings were of an individual seal in the water, usually on an incoming tide. In 2006 there were sightings at various locations in the Upper Severn Estuary, three locations along the River Wye and also records along the River Usk, at Newport Moorings and at Newbridge (Titcombe, 2011). Some of these sightings were not included in the dataset given by SEWBRc, although other records from Colin Titcombe (author of article in Monmouthshire Green Web newsletter, 2011) were included, so they may have been considered too vague for verification. Other records of sightings on the Welsh side of the Severn Estuary passed to SEWBRc consist of single sightings off Redwick in July 2010, Goldcliff in June 2010, and along to Cardiff Bay and Barrage where there have been several sightings spread from October 2002 to February 2008 (see figure 1). Flat Holm has also been favoured by the odd seal sighting in June, September and October 2004, and one female lying on a beach in January 2007, the only record found of a grey seal hauled out in the Severn Estuary (from SEWBRc and MarLIN data records).

#### English Coast

The English side of the Severn Estuary has a small number of records of individual grey seal spotted as far up as Sharpness Point in April 2010, Guscar rocks in May 2010 and the River Wye near Chepstow in June 2008 that were passed to the Gloucester Centre for Environmental Records (GCER). The Reserve Manager of the Wildfowl and Wetland Trust at Slimbridge stated that grey seals are vagrant visitors up the Severn Estuary, with one individual occasionally seen travelling on an incoming tide between Purton and Saul (Dave Paynter, *pers.comm*, 2014). Other sightings in the English Severn Estuary include Severn Beach (Paul Bowerman, *Serverside birds 2013-14*), Brean Down in January 2011 and Sand Point December 2013 and January 2014 (Paul Bower, *ukbirds.net*). Another bird watcher has historic sightings close to the shore at high tide in the area of Oldbury Power Station, individuals were seen in September 2006, September 2007 and May 2012. Other sightings provided by Bristol Regional Environmental Records Centre confirm these sightings (see Appendix 3).

### 3.2 Inner Bristol Channel

The area referred to as the Inner Bristol Channel for the purpose of this report is designated as west from Llantwit Major to Marcross near Llantwit Major on the Welsh coast, and west of Brean Down to Allerford near Minehead on the English coast, encompassing Steep Holm (see figure 2).

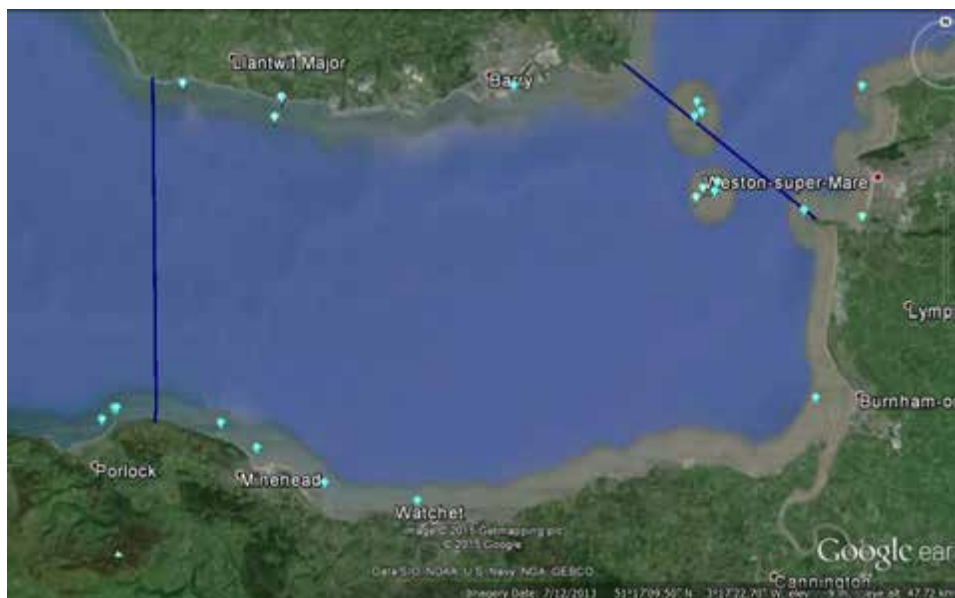


Figure 2. Map of grey seal sighting locations in the Inner Bristol Channel, blue points from 1977-2014. (Google earth, 2015)

#### Welsh Coast

There are few sightings of grey seal in the Inner Bristol Channel area, at only a few locations on the Welsh coast. The only sighting of a seal hauled out in this area was of a seal pup at Jackson's Bay, Barry which was apparently shoed into the sea by the local council, in October 2014 (Yendle, *pers. comm.* 2014). The only other records are of individuals off Llantwit Major in May 2012, April and May 2013 and one sighting off Tresilian Bay in February 2009 (SEWBReC, 2015).

#### English Coast

An individual sighting of a grey seal (January 2011) was recorded from Brean Down, which has been passed on from bird watcher Paul Bower (*ukbirds.net*). The National Trust ranger from North Somerset confirmed anecdotal records of seals in the vicinity of Brean Down, but had no confirmed records (Clemmett, *pers comm.*, 2014). Two sightings of grey seal have been recorded at Minehead Harbour in May 2013 and April 2014 and submitted to the Seawatch foundation. Bristol Regional Environmental Records centre provided records of 18 sightings of grey seal around Steep Holm

between 1994 and 2010. Most of these records were of a single animal, three sightings were of 2 seals and in 2002 five seals were sighted. In 2014, a volunteer from Steep Holm Shirkers observed 1-2 individuals on 16 occasions around the Island of Steep Holm (Wallace, *pers. comm.* 2014), however, no other specific information was available.

### 3.3 Central Bristol Channel

The Central Bristol Channel for the purpose of this report is defined as the area west from Marcross near Llantwit Major to Worm's Head on the Welsh coast, and west of Allerford near Minehead to Morte Point on the English coast (see figure 3).

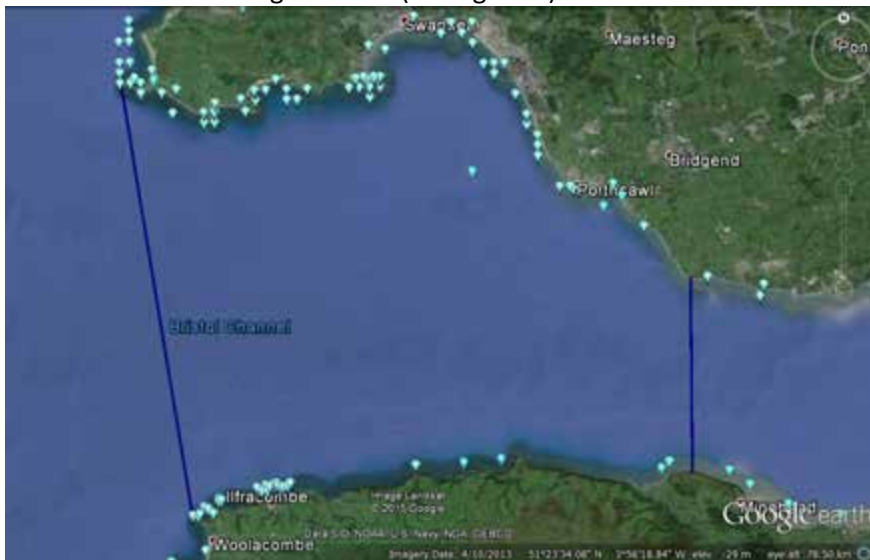


Figure 3. Map of grey seal sighting locations in the Central Bristol Channel, blue points from 1977-2014. (Google earth, 2015)

### Welsh Coast

Grey seal sightings become increasingly frequent in the Central Bristol Channel and heading further west. East of Llantwit Major, sightings start as individuals recorded off Porthcawl in May, June and September 2011, September 2013 and August 2014 (SEWBRc, 2015). Anecdotal sightings from sea kayakers around the Porthcawl area state that their observations were usually of a lone seal in the water, often a bull seal (Yendle, *pers comm.* 2014). Several sightings of individuals have been recorded off Sker Point in March and November 2005, May 2006 and April 2008. Similarly but more recently individual seals have been recorded off Kenfig in November 2006, November 2010, and September 2011. Beyond Kenfig along the coast to Crumlyn Burrows (east of Swansea docks) there have been 17 records of seals from 2006 to 2011 at various times of year (SEWBRc, 2015). Only a few records have been submitted to SEWBRc of individual grey seals around Swansea docks; one in February 2002; one in March 2005, and by Swansea barrage in November 2004 and January 2007. Anecdotal sightings of 2 seals in September 2011, and one in October 2011 have been recorded on a wildlife blog ([mylifeoutside.co.uk](http://mylifeoutside.co.uk)) by Adam Tilt. David Tonge (*pers.comm.* 2014) from Gower Coast Adventures also stated that he regularly sees a seal at Tawe River near the barrage, but no official records with dates have been submitted. Apart from the odd sighting in Swansea Bay, in August 2007 and Blackpill in January 2001 (grid ref: SS6290), the next concentration of seal sightings heading west is the area south of Mumbles Head. Here there have been 4 records submitted for Bracelet Bay (grid ref: SS6387), just west of Mumbles Head in September 2006, May and September 2010 and March 2014. Then 11 records off Tutt head, slightly further west again (grid ref: SS6386) over 11 years from May 2002 to May 2013, at various times of year. Of these records one seal was recorded hauled out in September 2005 on Limeslade cliff (same Grid reference). Anecdotal reports support this with two sightings in June and July of a single seal hauled out in Limeslade Bay sourced from local press (Wales online, 2014

and South Wales Evening Post, 2014). Other records from Limeslade, the bay just west of Bracelet Bay (grid ref: SS6244386990) include an individual sighted in June 2005, one in May 2007 and 3 seal observed in July 2012. From Limeslade to Caswell Bay (Gower) there are 6 sightings of individuals, 3 off Langland Bay and the rest along the rocky coast towards Caswell between May 2003 and August 2014 (SEWBRc, 2015). Records become more frequent and of higher number with closer proximity to Rhossili. There are 14 records for Oxwich Bay submitted to SEWBRc from 2003-2013 consisting of individuals and groups of 5, 7 and 9 seals recorded on separate occasions in January 2012. Port Eynon and Sedger's Bank, a Wildlife Trust Reserve on the southwest tip of Port Eynon Bay, have 26 official records submitted from May 2002 to February 2014. These sightings are mainly of individuals, but some of 2 to 4 seals. Although it has been suggested that Sedger's Bank is a haul out site for grey seals by Wildlife Trust of South and West Wales (2015), none of the records submitted to SEWBRc or other anecdotal sources obtained confirm this.

#### *Rhossili and Worm's Head*

The site with the highest frequency of records and numbers of seals sighted in the Central Bristol Channel is Worm's Head, the headland separated by a tidal causeway from Rhossili Bay. Due to the relatively difficult access to the headland (only at low water), the area remains somewhat undisturbed for the majority of time, which the grey seals take advantage of. For this reason, Worm's Head is also the main haul out site for grey seals in this area. There are 52 submitted records of grey seal sightings for around Rhossili Bay and Worm's Head from August 2001 to May 2013. In May 2003, 19 seals were recorded hauled out on the Inner Worm's Head (Grid ref:SS3987), with anecdotal sightings claiming that up to 50 grey seals can be seen hauled out at any one time (Tonge, *pers.comm.*, 2014). Pups are often sighted in autumn, but it is unclear whether there are breeding sites around Worm's Head.

#### **English Coast**

On the English side of the Central Bristol Channel there have been a number of sightings at Hurlstone Point, which is the northerly point of Porlock bay (West of Minehead). These are individual sightings recorded by the Sea Watch Foundation (2014), supplied in some cases by Exmoor Natural History Society members during the spring and summer of 2013 and 2014. Members of Somerset Ornithological Society have also noted sightings at Hurlstone Point from June 2013 to October 2014. Sightings become more frequent towards Ilfracombe, specifically at Capstone Point (grid ref: SS519480) with 110 records from Sea Watch Foundation database over the period between May 2006 and May 2014, with sometimes up to 4 sightings of individuals on the same day.

The majority of the sightings were recorded during effort related cetacean watches and are brief with most seals transiting through the area. Numbers in this area from the survey data average about 15 each year between 2008 and 2013, with a higher number of around 25 noted during 2012. Records do not show any seals hauling out at Capstone, the nearest haul out site is approximately 6km to the west between Rockham Bay (grid ref SS458460) and Morte Point (grid ref SS4434555). After Capstone Point, Morte Point has the next largest number of records with 46 sightings submitted to the Sea Watch Foundation database from 2006 to 2012, often of more than one seal with one sighting of 5 seals in July 2007 (seals monitored here by Morte point wild life group). Other locations where seals have been recorded include Bull Point, Rockham Bay (one sighting of 8 seals in October 2009), Baggy Point and Downend with lesser numbers recorded at Bideford and Barnstable Bay and Hartland Point. Anecdotal information received from boat skippers confirms sightings at Morte Point, Baggy Point, Rockham Bay and between Morte Point and Lynmouth, with a few mid channel sightings being observed (Barbury *pers comm.*, 2014 and Legg, *pers. comm.*, 2014).

#### **3.4 Outer Bristol Channel**

The area referred to as the Outer Bristol Channel for the purposes of this report is the area north and west of Worm's Head, including the north Gower coast and Burry Estuary, to Milford Haven,

Pembrokeshire on Welsh Coast. The area extends west of Morte Point near Ilfracombe to Hartland Point on the English coast and encompassing Lundy Island.

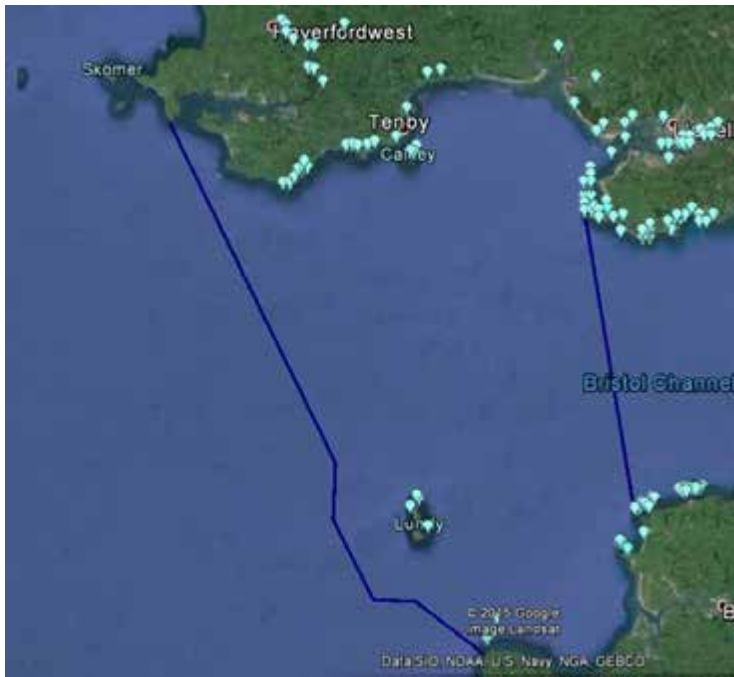


Figure 4. Map of grey seal sighting locations in the Central Bristol Channel, blue points from 1981-2014. (Google earth, 2015)

### Welsh Coast

Following the coast north away from Worm's Head, seal sightings are fewer and usually of individual seals. Sightings increase once more from the Burry Inlet and the Loughor River area. There have been approximately 40 sightings of seals submitted from this area, usually of lone seals, from February 2001 to April 2013 at various times of year (SEWBReC, 2015), and also one sighting submitted to WWBIC (2015) from October 1974 of a grey seal in Burry Port. There are very few sightings along the coast from Pembrey (west of the Burry Inlet) to Tenby and along the coast of Pembrokeshire. The sightings that have been submitted to WWBIC are from 1981 to 2014, however, there are only 33 sightings in total for this period of over 30 years, with the majority of records submitted in the 1980s. Only 6 records were submitted to WWBIC in the last 15 years. Anecdotal evidence for this area is also sparse. In November 1980 and May 1981, grey seals were recorded the Western and Eastern Cleddau as far as Uzmaston near Haverfordwest. Seals venturing this far would have entered from Milford Haven.

### Caldey Island

The next important concentration of grey seals of note is Caldey Island off Tenby. Grey seals are present around Caldey Island year round in small numbers, with counts of up to 10-15 in summer months (Sutcliffe, *pers. comm.*, 2015). Caldey Island does not keep records of seals due to difficulties of access to the sites at the south side of the island, and a proper census of the seals around Caldey would require boat surveys. As such the database from WWBIC have few records of grey seal sightings around Caldey Island, only 3 submitted from May 1988 and 1989, and the official records are not considered likely to reflect the true use of Caldey Island by grey seals. Caldey Island was also overlooked by the grey seal census undertaken in 1995 due to time constraints (Baines et al., 1995). Anecdotal evidence suggests that grey seals breed around Caldey and St Margarets Island (C.Benson *pers. comm.*, 2015). According to the ex-warden of Caldey Island there are usually 5 pups are born on Caldey each year, mainly around Redberry Bay on the south side where they breed in caves (see figure 5)(Sutcliffe, *pers. comm.*, 2015).



Figure 5. Map of grey seal sighting locations around Caldey Island, and Red Berry Bay from 1981-2014. (Google earth, 2015)

## English Coast

### *Lundy Island*

The most abundant sightings of grey seal on the English coastline of the Outer Bristol Channel were observed around the coastline of Lundy Island. Lundy Island lies off the North Devon coast where the Atlantic Ocean meets the Bristol Channel; the island is three miles long and half a mile wide. It is designated as Lundy SAC and in 2010 became the UK's first Marine Conservation Zone (MCZ).

Prior to a study by Westcott (2009), all that was known of the seals at Lundy is recorded in the Lundy Field Society Annual Reports. Information taken from the Lundy Field Society Records covering the years 1987 – 2007, reports numbers averaging 40 -60 individuals over each year long survey period. The highest count was recorded in August 1991 when 200 individuals were recorded. Lower numbers are generally seen in the earlier months of the year. The surveys were land based with the exception of a boat survey carried out during September and October 1995. A baseline study was carried out by Westcott (2009) to develop initial perception of the abundance and distribution of seals on Lundy. This study concluded that between 40 -50 pups were born each year, the pupping period starting at the end of August and continued until mid-October. The total number of seals on Lundy changes throughout the year, but it is thought to be in the region of 125 (Westcott, 2009). A proportion of the population is thought to be resident, whilst others migrate to Wales, the south-west coast and across to Ireland. The population at Lundy has been monitored annually since 2011 with previous surveys carried out in 2006, 2008 and 2009. The dedicated survey data covering the years 2006 – 2013, shows an increase in population numbers with the highest total number of seal sightings recorded in 2012 of 1,318 for the entire year (MacDonald, 2014). During 2013 the total number of individuals sighted decreased to 864 for the year. The survey methodology involves direct observation of the coastline surrounding Lundy and also included access into sea caves, either on foot or by kayak. Each survey records the number of individuals seen at locations around the island and where possible, sexes and age of individuals have also been determined.

In 2011 the island was divided into 45 regions to assist in determining regular haul out and breeding locations. The distribution of the island's breeding sites from 2006 to 2013 ranges from the north-



west point of the island down the east side of the island to the south-west point, with very few breeding sites noted on the western side. The surveys show that there is a variation in the number of individuals seen each month throughout the year with the month of August showing a peak in the population. Over the data period covered the north-east end of the island shows the most abundant numbers of individuals except during 2011 when 154 individuals of 'unknown sex' individuals were recorded in the south-east of the island at Surf Point (MacDonald, 2014).

#### 4.0 Conclusion

A large number of individuals and organisations were contacted for this study, which revealed a lot of anecdotal sightings, many of which were supported by the evidence collected by the individual records centres and data collection events such as Sea Watch events. The main concentrations of seal sightings appear to be around the coast of Pembrokeshire, Lundy Island and the Gower. There are very few sightings of grey seal between the Gower and Tenby and along the North Devon Coast. Records from the Inner Bristol Channel and the Severn Estuary are even more infrequent, with only 5 sightings around the Cardiff area in the last 14 years. All the collated evidence suggests that there are no known haul out sites within the Severn Estuary and that grey seal only very occasionally venture as far as Cardiff and beyond.

To gain a better general understanding of grey seals in the Bristol Channel there are some areas that could potentially be identified for further survey to provide good seasonal data such as Limeslade west of Mumbles Head, Worm's Head, and Caldey Island on the Welsh Coast, as sites known to be haul out sites. Sedger's Bank could also be considered although no evidence was found for seals hauling out at this location.

It should be made clear that the nature of the data collected for this report means that the survey or sighting effort is not consistent throughout the different parts of the Bristol Channel. However, the evidence that has been collated indicates that, for the consideration of possible impacts on grey seal in the context of the proposed Cardiff lagoon, no specific surveys are considered necessary.

For the English side of the Bristol Channel, Lundy Island is extensively surveyed and is the major haul out site for seals. Further grey seals surveys around Lundy are not necessary for the purposes proposed Cardiff lagoon.

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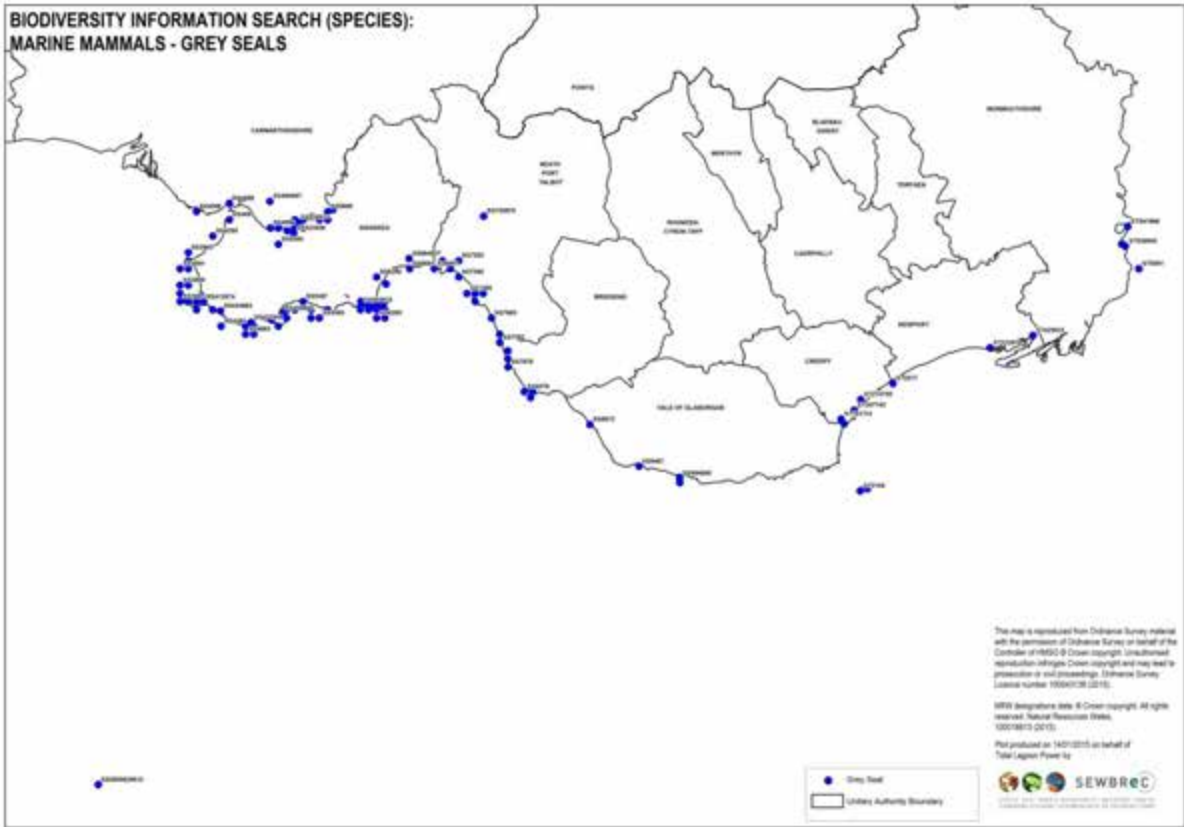
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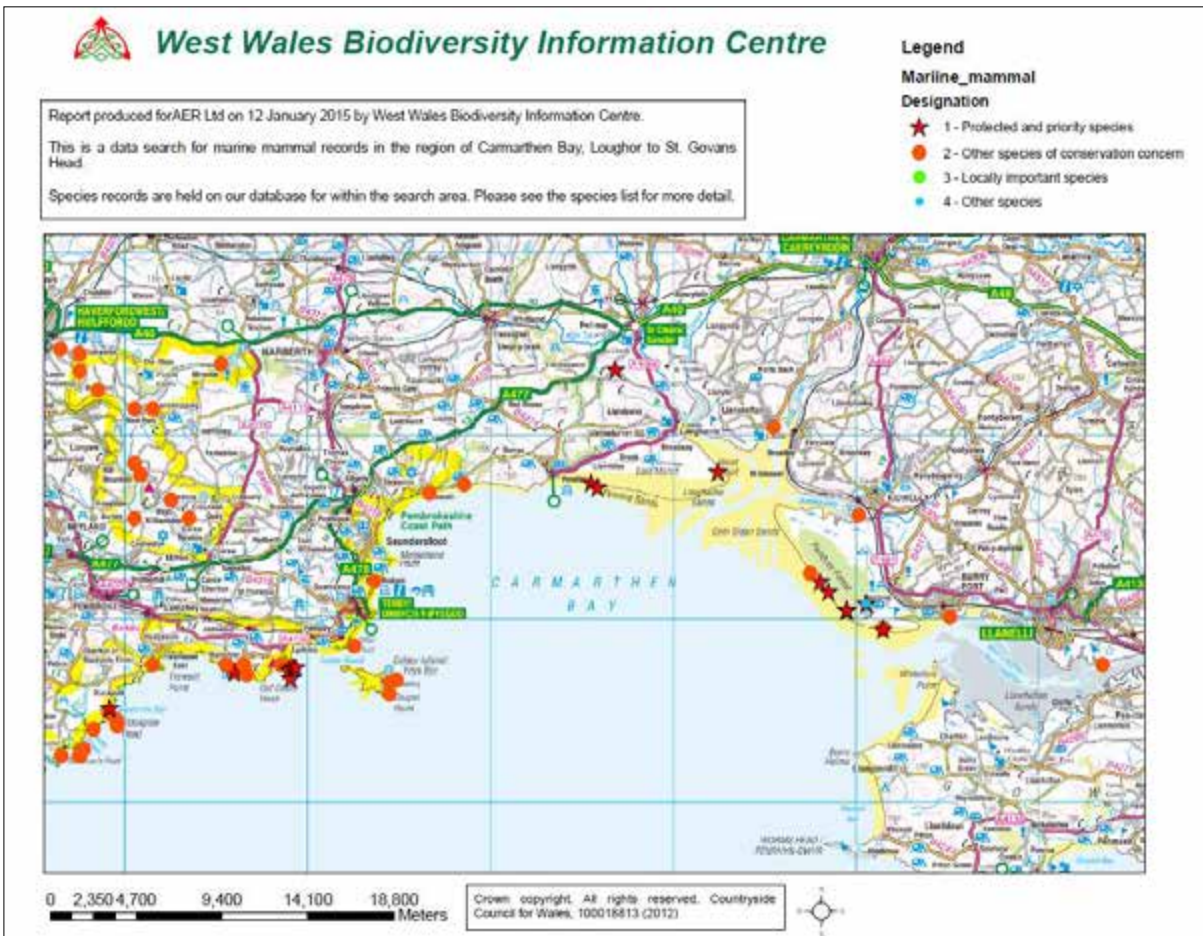
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WWBIC, West Wales Biodiversity Information Centre. Grey seal sightings records from 1980-2014.

Appendix



Appendix 1. Grey Seal *Halichoerus grypus*, sightings in the Bristol Channel from Severn estuary to Pembrey, 1977-2014. Map from SEWBRc.



Appendix 2. Grey seal (orange points) sightings from Loughor River to Stackpole, 1980-2014. Map from WWBIC.

Atlantic Grey Seals ( <i>Halichoerus grypus</i> ) Severn Estuary sightings				
Source	Date of sightings	Location	No. seals recorded	Comments
GCER	20/06/2008	River Wye close to Chepstow Castle	1	ST532942
GCER	12/04/2010	Sharpness point, Severn Estuary	1	SO666209
GCER	23/05/2010	Guscar Rocks	1	ST600980
Bird Watcher (see BRERC below)	23/09/2006	Near Oldbury Power Station	1	close to the shore at high tide
Bird Watcher	15/09/2007	Near Oldbury Power Station	1	close to the shore at high tide
Bird Watcher	01/05/2012	Near Oldbury Power Station	1	close to the shore at high tide
Bird Watcher	17/12/2013	Sand Point	1	close to the shoreline
Bird Watcher	20/01/2014	Sand Point	1	close to the shoreline
Bird Watcher	27/12/2014	Saul Warth (Frampton on Severn)	1	
Bristol Regional Environmental Records Centre (BRERC)	06/06/1980	Sea wall, Clevedon., Clevedon - Yeo	1	
Bristol Regional Environmental Records Centre (BRERC)	11/07/1994	Portishead, Battery Point	1	One seen at 0830hrs.
Bristol Regional Environmental Records Centre (BRERC)	14/04/1996	off Wain's Hill, South Clevedon	1	estuary (high tide) , seen swimming close inshore about 4.00pm
Bristol Regional Environmental Records Centre (BRERC)	08/11/1997	Nr Station Road, Severn Beach	1	close in shore (<10m) at high tide
Bristol Regional Environmental Records Centre (BRERC)	17/08/1999	Northwick Warth	1	
Bristol Regional Environmental Records Centre (BRERC)	17/09/1999	New Passage	1	
Bristol Regional Environmental Records Centre (BRERC)	11/08/2005	East of Hanham lock	1	
Bristol Regional Environmental Records Centre (BRERC)	11/05/2006	New Passage	1	
Bristol Regional Environmental Records Centre (BRERC)	07/08/2006	New Passage	1	
Bristol Regional Environmental Records Centre (BRERC)	21/08/2006	Severn Beach	1	
Bristol Regional Environmental Records Centre (BRERC)	23/09/2006	Oldbury Power Station	1	
Bristol Regional Environmental Records Centre (BRERC)	19/02/2007	Slipway on Uphill Beach	1	
Bristol Regional Environmental Records Centre (BRERC)	31/07/2007	New Passage	1	seen off shore eating a fish
Bristol Regional Environmental Records Centre (BRERC)	04/08/2007	Royal Portbury Docks	1	

Appendix 3. Grey Seal sources and sightings in English Severn Estuary.

Atlantic Grey Seals ( <i>Halichoerus grypus</i> ) Inner Bristol Channel sightings. Data supplied by the Somerset Environmental Records Centre																			
Year	Number of seals recorded																		
	1983	1985	1986	1987	1988	1994	1995	1996	1997	1998	2000	2002	2003	2004	2005	2006	2007	2009	2013
<b>Location</b>																			
Warren bay		1		2															
Dunster						1				1					1		1		
Minehead area			1	1			1				1		2	1	3				
Greenaleigh point										1									
Hurlstone	1					1	2	5	1	2				4	5				
Bossington								1											
Porlock				2	2		1			1	1	1						1	1
Foreland			1																
Lynmouth Bay															1				
Wringcliffe Bay		4																	
Highveer Point				1		1													

Appendix 4. Data of grey seal sightings provided by Somerset Environmental Records Centre for the Inner Bristol Channel.

