11. MARINE MAMMALS

Summary of previous findings

A total of 46 marine mammals were recorded during the period 2003-2006, primarily from boat transect surveys during bird survey work. Harbour porpoise and grey seal were the most commonly observed species. The site-specific sightings data alone indicate that marine mammals do not tend to be seen within the operational wind farm array; however, other evidence (from CMACS surveys and third party tracking studies) demonstrates that both harbour porpoise and grey seal will enter the array.

The reason for this disparity is not clear. Marine mammal sightings are, in general, relatively rare events in the context of many hours observations at sea and it may be that further monitoring will reveal more animals to be using the wind farm array area. Other monitoring certainly reveals that there are relatively abundant food resource for pisciverous marine mammals such as seals and porpoise (MarineSeen and CMACS 2004).

11.1 INTRODUCTION

There is no formal requirement under FEPA licence conditions for the monitoring of marine mammal species at the NHOWF. However, a range of information on marine mammal activity in relation to the construction and operation of the wind farm has been collected during the course of other environmental monitoring, or is available via other sources.

The purpose of this section is to summarise such data and create a central source of information. Centre for Marine and Coastal Studies Ltd (CMACS) has collated information from the following sources:

1. marine mammal sightings noted by surveyors engaged on site-specific ornithological surveys as part of the FEPA monitoring program;
2. casual sightings by CMACS staff during other environmental surveys in and around the NHOWF area;
3. records maintained by the Hilbre Island Observatory;
4. information from other scientific studies and Environmental Impact Assessments.

A basic interpretation of these data is provided with the aim of establishing the accuracy of the prediction made following the original environmental impact assessment that NHOWF would not an adverse impact upon the marine mammal populations of Liverpool Bay and the Eastern Irish Sea.

11.2 SUMMARY OF AVAILABLE INFORMATION

11.2.1 Site-specific Surveys

Marine mammal observations have been routinely recorded during ornithological line transect surveys at the NHOWF site and adjacent waters between 2003 and 2007 during surveys by Ocean Marine (2003-2004), ERM Ltd (2004-2006) and ESS (2006-2007). Sea bird surveys were carried out as part of ongoing monitoring works in compliance with the conditions of the

Food and Environmental Protection Act (FEPA) 1985: Part II (as amended) issued for the NHOWF. Anecdotal marine mammal data of sightings and surface activity were recorded by the ornithologists on board the survey vessels.

Seabird surveys were undertaken on a monthly basis by both ESS and ERM between March 2006 and January 2007, and April 2004 and December 2005 respectively. Surveys did not take place in all months (assumed due to inclement weather). ESS also undertook survey transects within the Rhyl Flats development area and waters between the two offshore wind farms. Both point and extended surveys (of 1-2 days duration) were completed prior to this within the NHOWF site by Ocean Marine who also covered the Rhyl Flats and the Gwynt y Môr OWF development areas. During some of these surveys only a percentage of the NHOWF area was covered. Data are summarised in Appendix 11.1.

The ornithological transect surveys began in February 2003, prior to any construction activity on the NHOWF and ran continuously through the construction (March 2003-December 2003) and post-construction (March 2004-January 2007) phases of development.

Date	Surveyor	% site surveyed	Date	Surveyor	% site surveyed
12-Feb-03	OM	100%	24-Apr-05	ERM	n/a
19-Feb-03	OM	100%	24-Jun-05	ERM	n/a
30-Mar-03	OM	100%	11-Dec-05	ERM	n/a
31-Mar-03	OM	100%	16-Mar-06	ESS	n/a
18-Jun-03	OM	100%	22&23-Apr-06	ESS	n/a
20-Jul-03	OM	100%	04&05-May-06	ESS	n/a
24-Sep-03	OM	40%	14-Jun-06	ESS	n/a
15-Jan-04	OM	100%	5-Jul-06	ESS	n/a
11-Feb-04	OM	100%	12-Sep-06	ESS	n/a
14-Feb-04	OM	100%	27-Sep-06	ESS	n/a
22-Apr-04	ERM	n/a	4-Oct-06	ESS	n/a
27-Apr-04	ERM	n/a	7-Nov-06	ESS	n/a
05-May-04	ERM	n/a	21-Dec-06	ESS	n/a
05-Sep-04	ERM	n/a	24&25-Jan-06	ESS	n/a
15-Oct-04	ERM	n/a	-		

Table 11.5 Dates and Survey Company contracted to undertake ornithological surveys within the NHOWF site and its surrounds. The percentage of the site surveyed is also included for surveys undertaken by Ocean Marine (OM).

11.3 SUMMARY OF SITE-SPECIFIC SURVEY DATA

A total of 79 marine mammal individuals were recorded during the 2003-2007 surveys (see Appendix 11.1). Harbour porpoise and grey seal were the most commonly observed species. Five separate sightings also recorded the presence of bottlenose dolphin, two unknown small dolphin species (presumed common or bottlenose dolphin), an unknown seal species[4] and an

[4] A determination of 'unidentified species' typically occurs when the surveyor catches only a brief glimpse of an animal. The designation does not imply that the animal is not a grey seal or harbour porpoise.

unknown small cetacean, which could not be confidently identified. These cetaceans were observed in relatively close proximity to the wind farm site in small numbers (usually 1-2 individuals) (see

Figure **11.2**).
It must be highlighted that care should be exercised when interpreting the figures presented within this and the following sections since there has been no standardisation of survey effort across the area shown (e.g. considerably more effort has been expended obtaining sightings close to NHOWF than other areas in this analysis). Site-specific surveys have also been undertaken for other wind farm areas located within Liverpool and these are considered within the following sections.

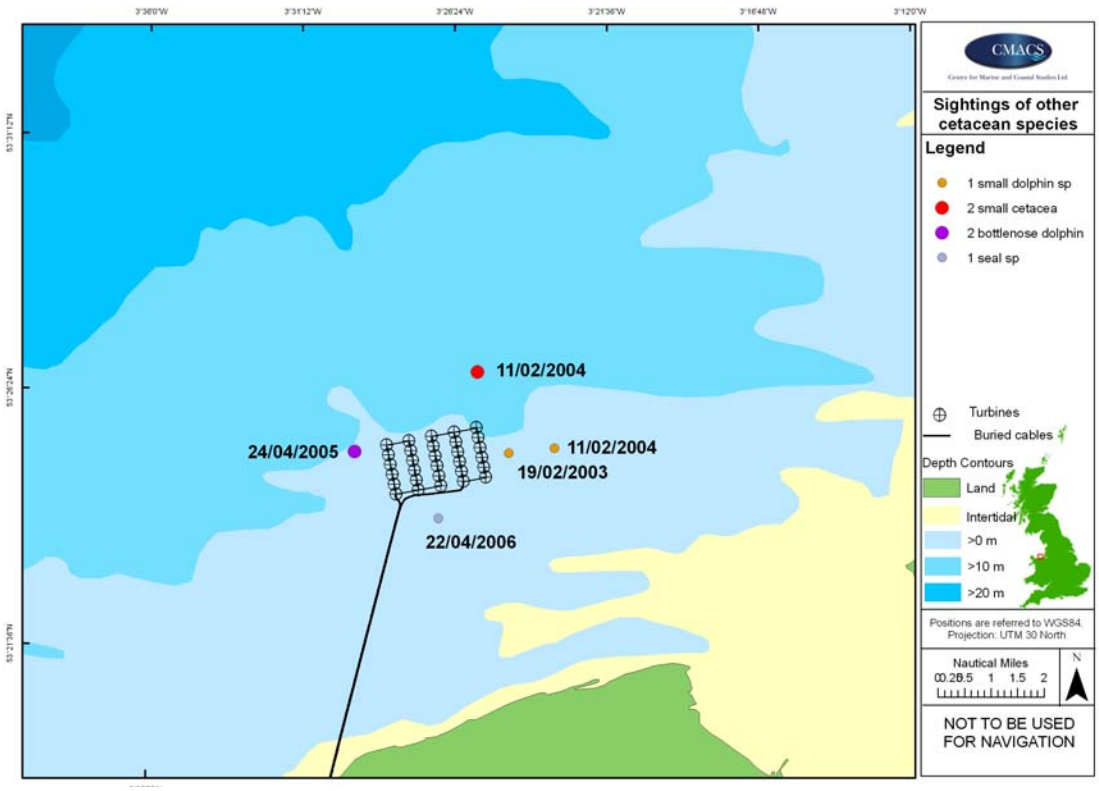

Figure 11.2 Marine Mammal sightings (other than Harbour porpoise and Grey seal) recorded during ornithological line transect surveys in the NHOWF and its surrounds between 2003 and 2007.

11.3.1 Harbour porpoise (*Phocoena phocoena*)

38 harbour porpoise individuals have been recorded during the ornithological surveys. A number of sightings have been of animals very close to the wind farm, although none have been of animals within the wind farm array itself (see
Figure **11.3**). The majority of sightings were of single porpoise; however occasionally pairs of this cetacean and, on a single occasion, a group of 5 individuals were observed.

Pairs of porpoise were observed east and south of the turbine array area during a survey in February 2003 (before wind farm construction), April 2004 and January 2007 (after wind farm construction) respectively. A pair of harbour porpoise was also observed further afield west of the turbine array during a survey in February 2004 and north of the turbine array in May 2006. Sightings of harbour porpoise were otherwise distributed throughout the NHOWF survey area and included a group of 5 individuals being spotted early on during February 2003.

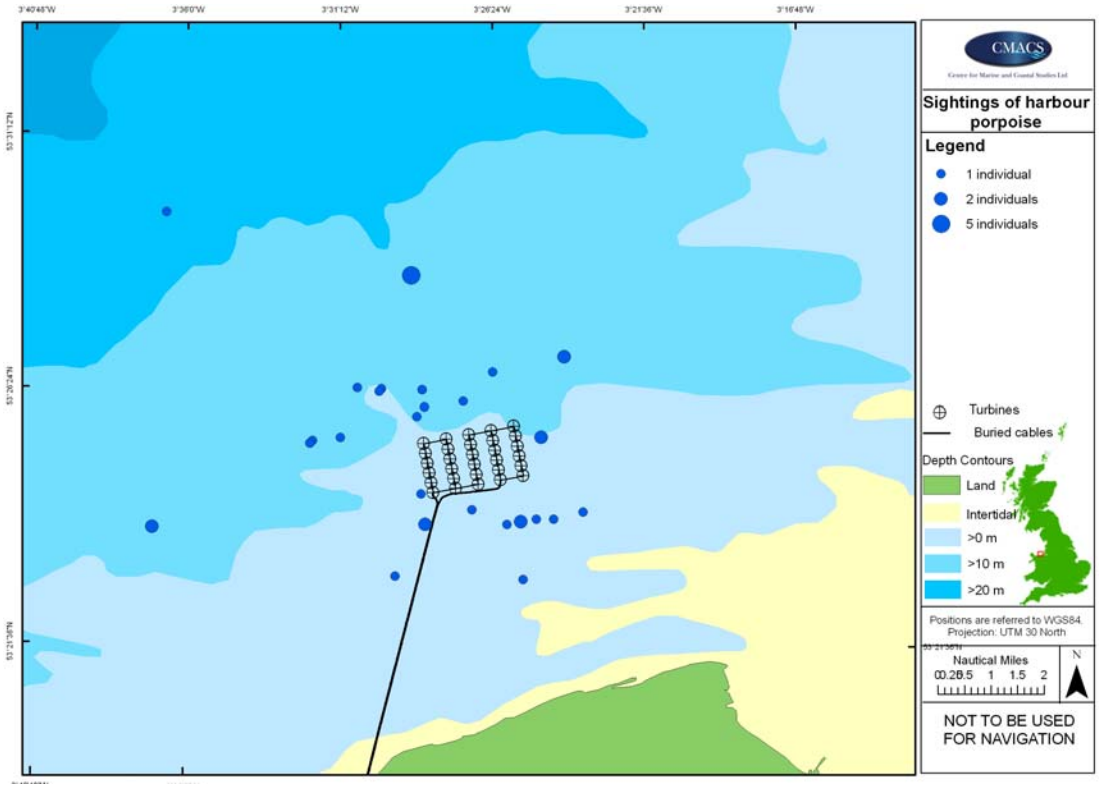

Figure 11.3 Distribution of Harbour porpoise sightings in the NHOWF area and its surrounds between 2003 and 2007.

Harbour porpoise were recorded in relatively high numbers during winter and early spring in 2003 (February-March) and 2004 (February-May) (and), although no sightings were recorded over the same period in 2005. These observations were made before the start of construction activities in early 2003 and immediately after the completion of the wind farm in February 2004. Fewer porpoise were recorded during other months, although small numbers were observed during summer 2003 and autumn 2004. No harbour porpoise were observed during post-construction monitoring in 2005, although relatively high numbers were observed in late spring in 2006 (May). A pair of individuals was recorded later in January 2007.

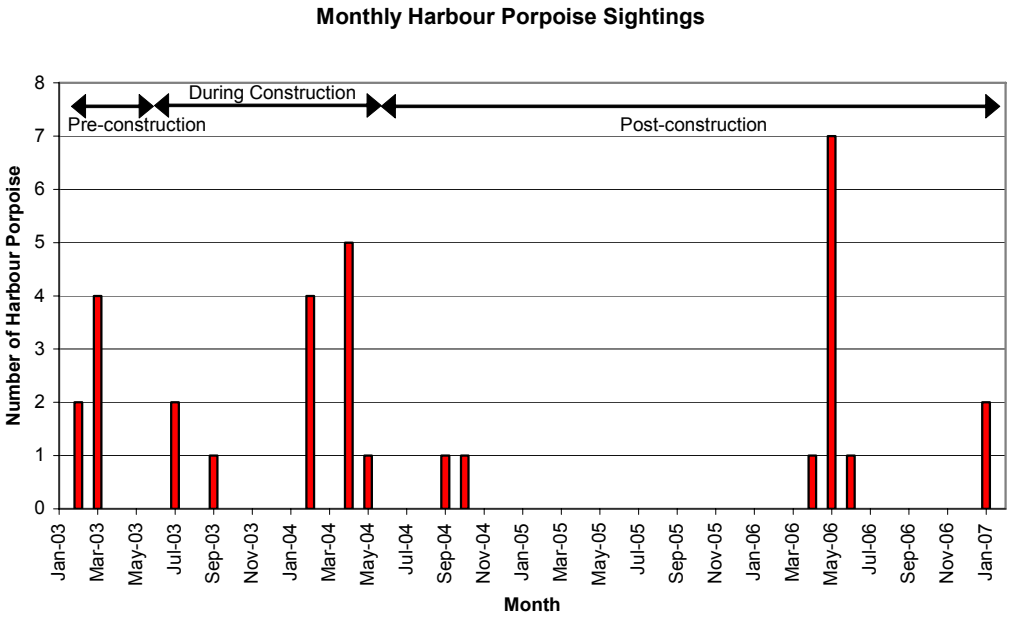

Figure 11.4 Number of Harbour porpoise recorded within the NHOWF area and its surrounds between 2003 and 2007.

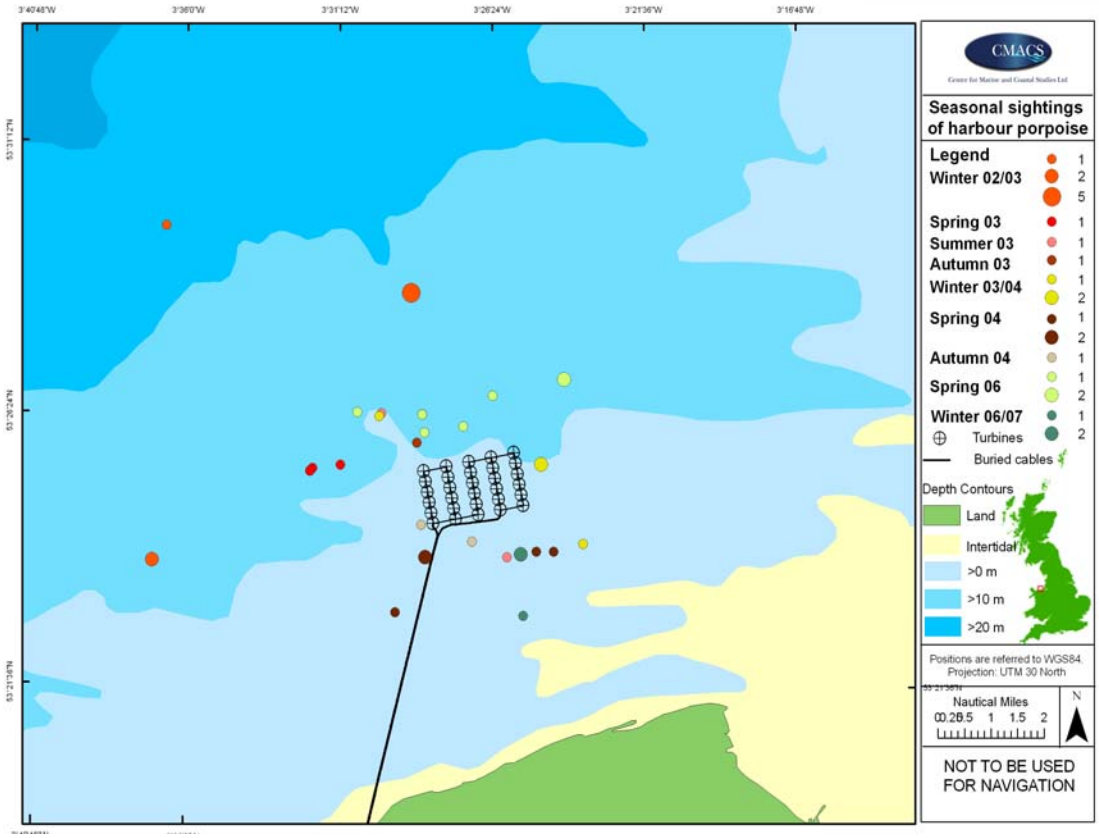

Figure 11.5 Seasonal distributions of Harbour porpoise sightings in the NHOWF area and its surrounds between 2003 and 2007.

11.3.2 Grey Seal (*Halichoerus grypus*)

34 grey seal were observed during the ornithological surveys. The majority of observations recorded single individuals; however on two separate occasions a pair of grey seal was seen in the vicinity of the NHOWF. Many sightings were clustered around the edge of the NHOWF array but very few were within the array and none near the centre of the array area. Sightings are summarised in Figure 11.6

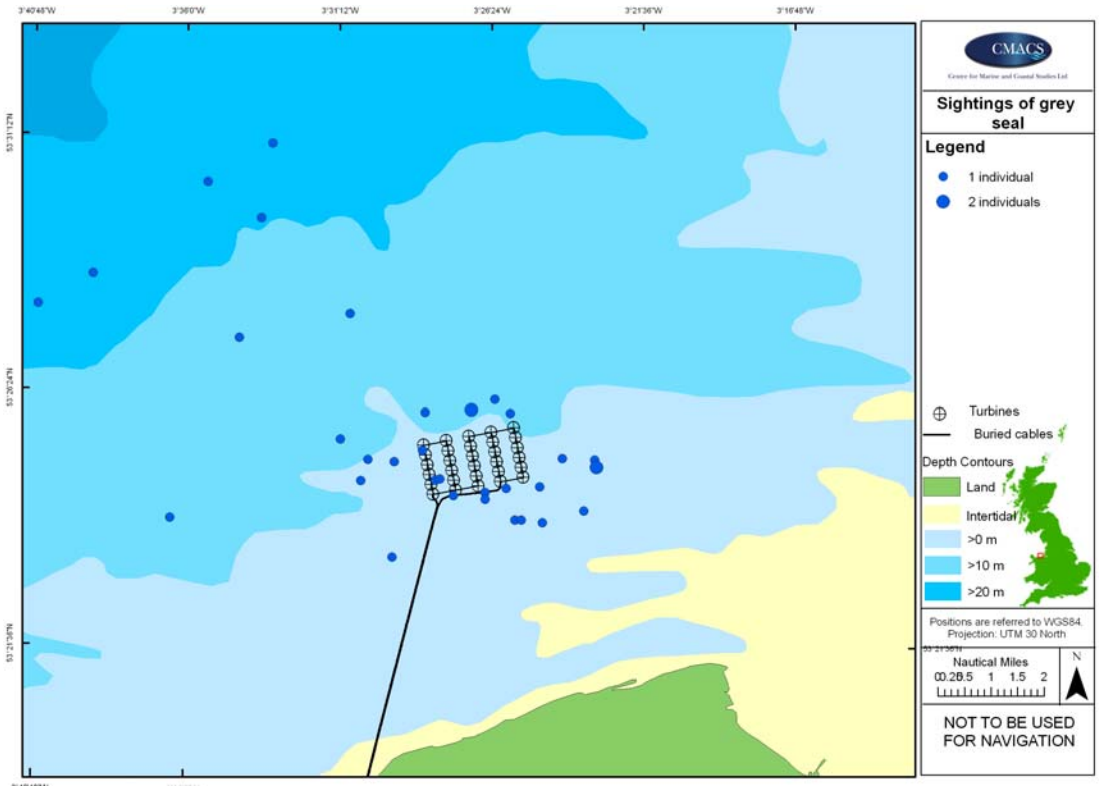

Figure 11.6 .Distribution of Grey seal sightings in the NHOWF area and its surrounds between 2003 and 2007.

Grey seal were recorded in larger numbers during winter and spring of 2003, 2004 and 2006 (Figure 11.7 and Figure 11.8). However, there was an absence of sightings during the same time periods in 2005 (this is a similar trend to that noted for harbour porpoise). Grey seal were recorded in lower numbers and at a much lower frequency during the intervening months, with only a small number of single sightings during summer and autumn 2003. Two individuals were spotted on separate occasions in June and December 2005. Sightings were more sporadic during the final year of post-construction monitoring in 2006 with relatively high numbers being observed during September.

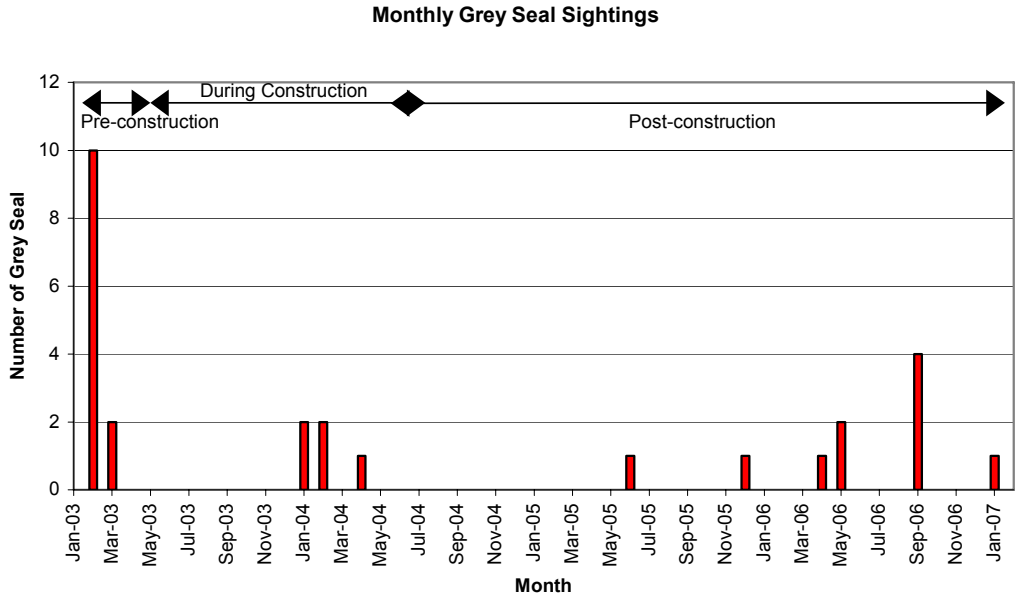

Figure 11.6 Seasonal distributions of Grey seal sightings in the NHOWF area and its surrounds between 2003 and 2007.

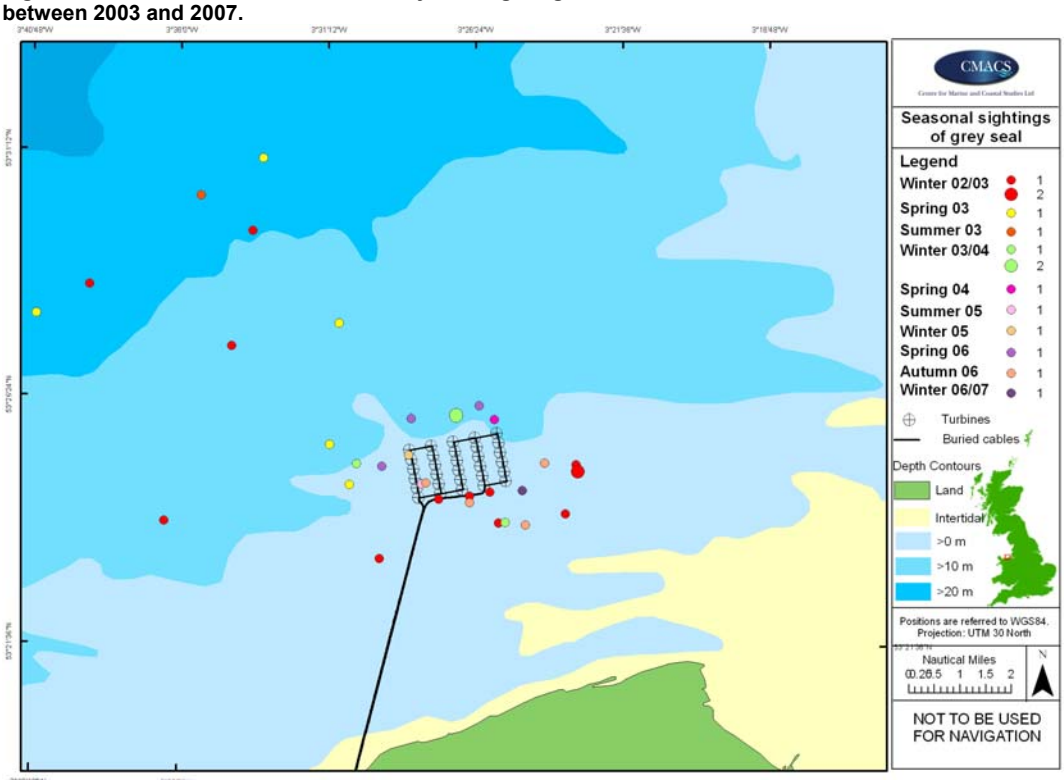

Figure 11.7 Seasonal distributions of Grey seal sightings in the NHOWF area and its surrounds between 2003 and 2007.

11.4 CASUAL MARINE MAMMAL SIGHTINGS

Casual marine mammal observations have also been recorded by the CMACS during other environmental monitoring surveys within the NHOWF and adjacent waters, including the Rhyl Flats and Gwynt y Môr OWF development areas. These are summarised in Table 11.6, below.

Date	Site	Approximate Position	Species	Number	Behaviour
March 2005	NHOWF	Turbine 18 N53.41963 E-3.44888 Second row of turbines in from the western extreme of the site in the upper section of the array.	Harbour porpoise	3	Three porpoise were actively foraging around the turbines within the central part of the wind farm array
04/10/2005	NHOWF	Turbine 2 N53.41624 E-3.42323 Furthest row of turbines to the east, second turbine in from the shore	Harbour porpoise	3	Porpoise were swimming directly through the wind farm array in a SW-NE direction
22/11/2003	Gwynt y Môr	N53.43181 E-3.64035 Bottom central location of site offshore from Abergele	Common Dolphin	approx 200	A very large group of individuals, seen throughout the afternoon. Heading E-W with the group splitting into two north of the boat. The main group headed off towards Anglesey and the smaller group headed inshore towards Colwyn Bay/Little Orme. Juveniles were spotted swimming next to adults. Those in the distance were jumping clear of the water and occasionally somersaulting.
03/12/2003	Gwynt y Môr	N53.40497 E-3.78416 South west corner of the Gwynt y Môr site, offshore from the Great Orme	Common Dolphin	12	Group appeared within 10-20m of the boat moving W-E. Single juvenile spotted.
04/12/2003	Gwynt y Môr	Offshore from Abergele	Dolphin sp	2 groups: 20-30 individuals	Moving in a S-N direction. One group appeared 100m from the boat and the other approx 300m. The far group were leaping clear of the water.
10/09/2006	Rhyl Flats	N53.37076 E-3.60845	Grey seal	1	Individual seal observed spy hopping approximately 10m away on port side of survey vessel
08/08/2006	NHOWF	N53.38675 E-3.46980	Grey seal	2	Pair of grey seal observed with heads out of the water observed 10-15m away from the survey vessel
09/09/2006	Rhyl Flats	N53.37860 E-3.77593	Sun fish* (included because species is rare/vagrant in Irish Sea)	1	Individual spotted on the port side of the survey vessel basking on its side on the surface. Individual was approximately 0.8m in diameter and swam away quickly after 3-4min interaction.

Table 11.6 Casual marine mammal observations made by CMACS during ongoing monitoring surveys within the NHOWF, Rhyl Flats and Gwynt y Môr OWF project areas.

The data summarised above were collected during the latter stages of wind farm construction and during the post-construction phase of the development. Several of these sightings have been local to the turbine array and have documented foraging activity in the centre of the wind farm and passage of harbour porpoise through the wind farm. Large groups of common dolphin have been observed further north and west, within the Gwynt y Môr OWF development area.

11.5 HILBRE ISLAND OBSERVATORY REPORTS

There is an established Atlantic Grey Seal haul out located on the West Hoyle Bank, which is situated approximately 10km south east of the NHOWF. The seals at Hilbre are not a breeding population but use Liverpool Bay to feed, haul out and moult. These seals have long been considered to originate from Ramsey Island in south west Wales.

Maximum and average monthly counts of Atlantic Grey Seal at the haul out between 1964 and 2005 (no data is currently available for 2006/07) are summarised in below. Average monthly counts are shown for the decades between 1960 and 1990. Maximum annual counts are reported for more recent years including 2001, 2002, 2003 and 2005. No data were available for 2000 or 2004. Numbers of Atlantic Grey seal varied seasonally and were highest at the haul out during April 2005 when approximately 600 individuals were recorded. This is somewhat unusual compared to previous years' counts where the largest numbers of seal were generally recorded over the summer, with numbers regularly in excess of 400 seals being recorded over recent years between May and August. Post-breeding dispersion probably accounts for the annual increase in seal numbers during spring and summer on the West Hoyle haul out. Over 500 seals were recorded during summer 2001, 2002 and 2003, with a peak of 600 seals being recorded in June 2003 and April 2005. Full count data are provided in Appendix 2.

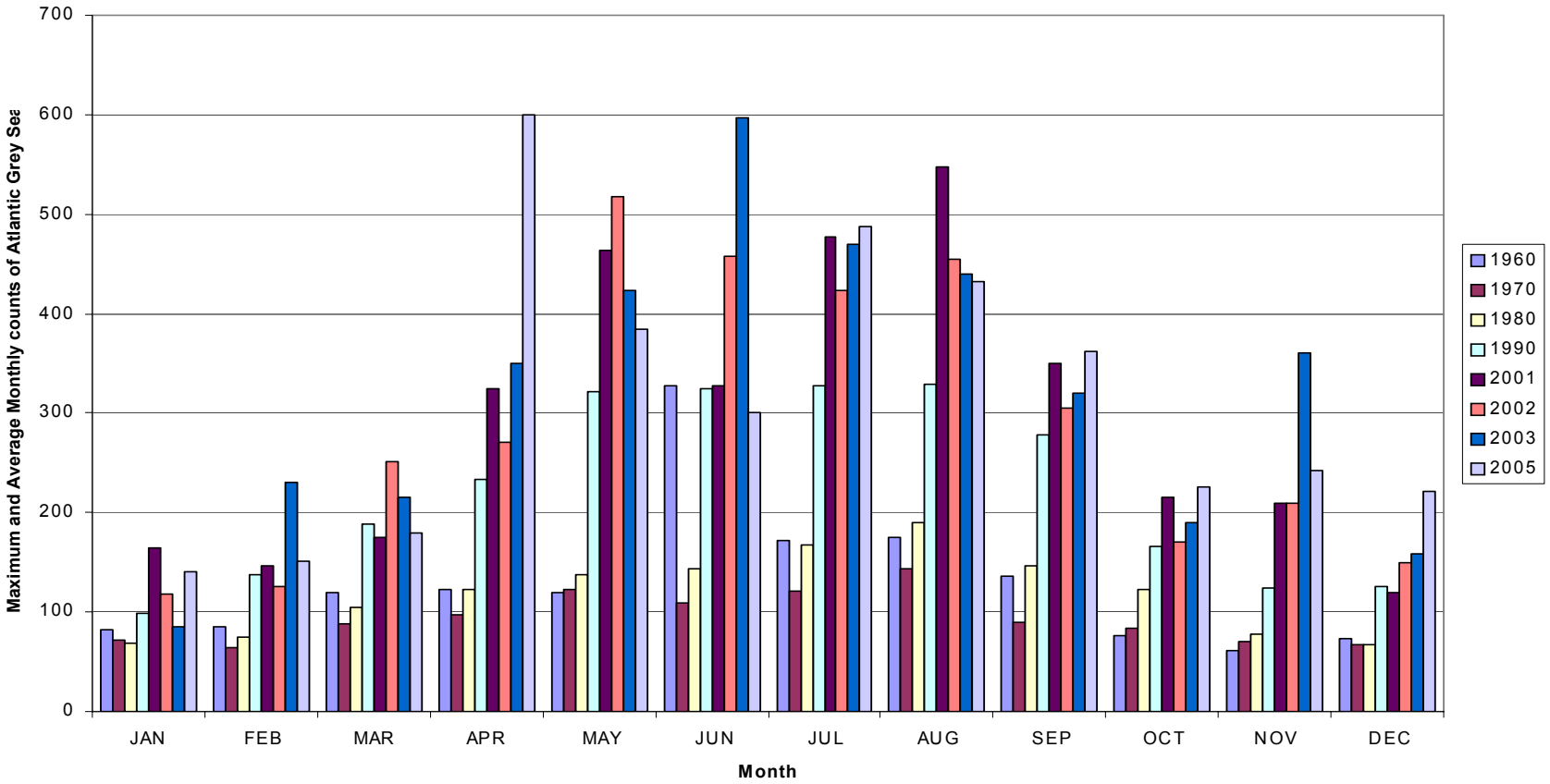
Maximum and Average Monthly counts of Atlantic Grey Seal
700
600
500
400
300
200
100
0
JAN
FEB
MAR
APR
MAY
JUN
JUL
AUG
SEP
OCT
NOV
DEC
Month
1960
1970
1980
1990
2001
2002
2003
2005

Figure11.9

Numbers of Atlantic Grey seal can be compared between the pre-construction phase of the NHOWF (pre- April 2003), the construction phase (April-December 2003) and the post-construction phase. Data were requested for all survey years, however were not available for 2000 or 2004. Large numbers of seal were regularly recorded during construction activities at the NHOWF site. Numbers were regularly in excess of 300 seal over the majority of the construction period, peaking during June at almost 600 individuals. Similarly large numbers of seal were recorded at the NHOWF site during the post-construction phase of the development in 2005, peaking during April at 600 individuals representing the highest count ever recorded. Comparisons between years show similar numbers of grey seal at the haul out before, during and after the months of construction. There appears to be no direct effect on the number of seal at the haul out by wind farm construction. Differences over the year are likely to be seasonally driven and not a direct result of wind farm activities.

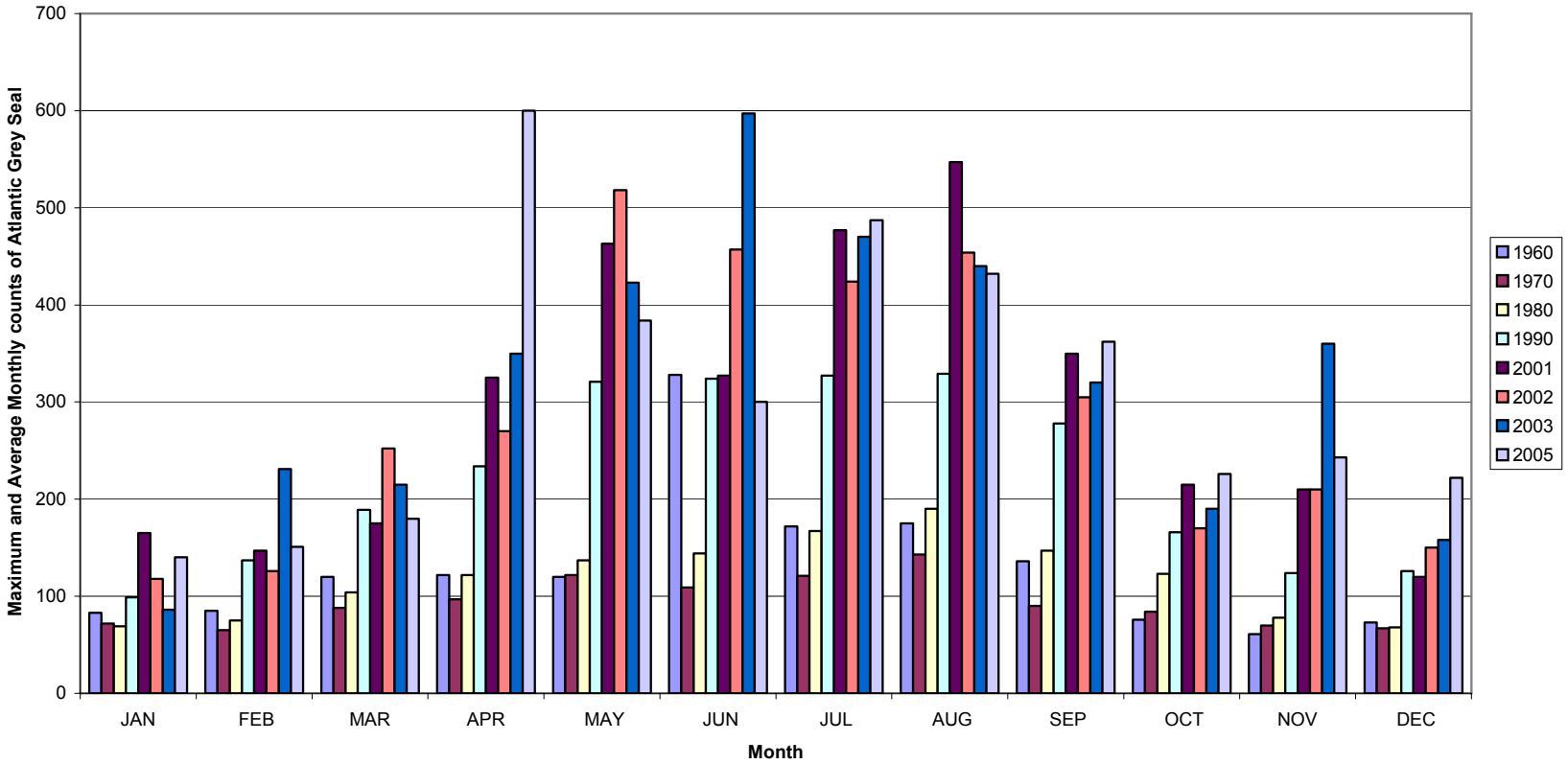

Figure 11.9 Maximum and Average monthly counts of Atlantic Grey seal at Hilbre Island. Average data are provided per decade for the 1960s to 1990s and maximum annual counts for more recent years (2001-2005 (NB 2004 data not available). (Data obtained from Hilbre Bird Observatory Reports, Wirral).

The Hilbre Island haul out data in particular provides a useful long-term record of seals in the area, covering the period both before and during construction of the NHOWF. The area is of some importance for grey seal, providing a haul out for individuals. Numbers on the West Hoyle Bank swell during summer and spring owing to post breeding dispersions of individuals to the area. The area is not so important for harbour seals with only a sole annual sighting in 2003 being recorded, although 26 individuals were recorded, all single sightings, hauled out locally near Hilbre between March and October during 2005.

Casual marine mammal sightings have also been made and reported by the Hilbre Bird Observatory. These data are available for 2001-2005, except 2004.

Pinniped			Cetacean		
Date	Species	Sighting	Date	Species	Sighting
January/ February 2001	Harbour seal	Individual was hauled out on a sand bar opposite the Observatory, and persisted throughout February.	9th February 2001	Dolphin spp	Group of individuals observed
1st May 2003	Harbour seal	Sole record of the year	3rd Aug, 9th & 20th Sept, 6th Oct 2002	Harbour porpoise	Single individual separately spotted on each date, except 20th Sept when a group of 3 dolphin were spotted.
11/04/2005	Grey seal	600 individuals spotted at West Hoyle Bank- maximum count recorded	3rd Aug, 9th & 20th Sept, 6th Oct 2002	Bottle-nosed dolphin	Single individual separately spotted on each date, except 20th Sept when a group of 3 dolphin were spotted.
26/03/2005- 31/10/2005	Harbour seal	26 sightings in total hauled out at Hilbre's north end, lower rocks	26/03/2005	Harbour porpoise	Two individuals spotted close off Hilbre
These data represent casual marine mammal sightings reported in Hilbre Bird Observatory Reports.			28/03/2005	Harbour porpoise	Two individuals spotted close off Hilbre
			13-25/04/2005	Harbour porpoise	Two individuals spotted on five dates between the 13th and 25th of April
			07/09/2005	Dolphin spp	Individual spotted in the local area
			11/09/2005	Whale spp	Short dorsal fin spotted in West Hoyle Bank area
			11/09/2005	Harbour porpoise	Two individuals spotted locally

Table 11.7 Casual marine mammal observations made by the Hilbre Bird Observatory.

Harbour porpoise form the majority of the casual marine mammal sightings off Hilbre Island, although several other dolphin species including Bottlenosed dolphin have been recorded. A sole sighting of an unknown species of whale was also reported in the West Hoyle area in 2005. These sightings are generally made up of individual encounters or at most small groups of individuals. The Hilbre Bird Observatory has also recorded five instances of adult marine mammals being found dead in the local area, including three harbour porpoise, a Bottlenosed dolphin and a fifth dolphin species which could not be identified. Two of these sightings were recorded during the construction phase of the NHOWF in 2003. The remaining sightings were

recorded in 2005 during the post-construction phase of the development. Detailed descriptions of any injuries or physical damage are not generally provided in the Observatory's report and therefore the cause of death in these mammals is not clear, although no trauma has been recorded on occasion suggesting natural causes in some cases.

11.6 FURTHER INFORMATION

11.6.1 Irish Sea seal tagging study

The Irish Sea tagging study was carried out as part of the Strategic Environmental Assessment for the Liverpool Bay area.

Hammond et al. (2005) identified the southern part of Liverpool Bay (including the operational NHOWF site) as heavily used by grey seals. The authors tracked the movements of 19 seals around Wales; including several seals tagged at the Hilbre Island (West Hoyle) haul out, for approximately 3 months from mid June 2004. Tracks of tagged animals indicated that individual seals swam through the (operational) wind farm array at NHOWF. Hammond et al. (2005) also suggested that the grey seals which haul out at sites in Liverpool Bay, Wales and southeast Ireland comprise a separate population from animals to the north off western Scotland and to the south off Cornwall and France. The population breeding along the coast of Wales was estimated at around 5,000 animals.

11.6.2 Sea Watch Foundation Liverpool Update (2001-2005)

The Sea Watch Foundation have provided an update on sightings of cetacean species in Liverpool Bay and the Northern Irish Sea for the period 2001-2005 (covering the period of wind farm construction and post-construction monitoring) and updating a similar review of data in 2001 (see Evans and Anderwald, 2006). No new species have been recorded since 2001 and the total number of species of cetaceans recorded since 1975 in near-shore waters in Liverpool Bay remains at fifteen (as previously reported within the NHOWF EIA (Innogy, 2002)). These include six species which are either present at any time of the year or recorded annually as seasonal visitors: minke whale *Balaenoptera acutorostrata*, long-finned pilot whale *Globicephala melas*, Risso's dolphin *Grampus griseus*, bottlenose dolphin *Tursiops truncatus*, common dolphin *Delphinus delphis*, and harbour porpoise *Phocoena phocoena*.

Evans and Anderwald (2006) reported that for the Bottlenose Dolphin (*Tursiops truncatus*), which is the second most commonly recorded species in the northern Irish Sea, an increase in survey coverage of the region over the last few years (at least in part due to OWF applications and NHOWF construction and monitoring) has revealed the species to be more common than previously thought (although in past decades the species appears to have been scarce). Sightings have occurred over a large part of the region (in coastal waters). There was also no indication that Common Dolphin (Delphinus delphis) have shifted their distribution or markedly changed their status in this region since 2001 compared with the years prior to this date.

The authors also state that Harbour Porpoise is the most widely distributed and commonly recorded species of cetacean in the northern Irish Sea, as well as elsewhere in the UK. With recent extensions of survey effort (again due in part to the increased activity associated with the OWF developments of the eastern Irish Sea) the species appears to be more or less continuously distributed around the coasts of south-west Scotland, North Wales and north-west England, including Liverpool Bay. There is no evidence that the species has become less common or changed its distribution since 2001. An analysis of effort-related sightings data collected between 1980 and 2002 was used to locate hotspots of porpoise distribution in UK waters (Evans and Wang, 2003); this did not reveal any areas of concentration in Liverpool Bay of UK importance. The species is apparently resident throughout the year in the region, although peak numbers are recorded in late winter and spring (Evans et al., 2003). The area is used both for feeding and breeding.

Evans & Anderwald (2006) go on to conclude that there is no evidence for long-term distributional changes of any cetacean species from a comparison of sightings data before NHOWF construction commenced with those thereafter. However, they do state that an important caveat should be made in that there have been no systematic effort-related marine mammal observations data collected during or after the wind farm construction period, and that the presented results have therefore had to focus upon overall distribution patterns from incidental sightings.

11.6.3 Gwynt y Môr Environmental Impact Assessment

This detailed a systematic marine mammal survey programme for the proposed Gwynt y Môr OWF, the geographical limits of which were very close to NHOWF, have provided a more detailed picture of the marine mammal activity within the wider area. It has been demonstrated that the Gwynt y Môr site is utilised primarily by harbour porpoises and grey seals and that there are distinct seasonal patterns in their activity. A combination of ship based surveys, static hydrophone loggers and land-based surveys were undertaken to collect both visual and acoustic data were undertaken during 2004 over an annual cycle to obtain a full seasonal data set.

Data from the visual sightings show that harbour porpoise were recorded across the entire survey area including within the Gwynt y Môr project area itself. Elevated concentrations of sightings were noted to the north east, south and west of the Gwynt y Môr project area and, to a certain extent, these concentrations (especially in the southern area) seem to mirror the water depth contours of Liverpool Bay. Acoustic distribution data shows that harbour porpoise are recorded consistently along transects both within and outside the Gwynt y Môr project area. Although greater incidences are recorded within the project area from the acoustic data when compared to data from the visual surveys, the distribution within the Gwynt y Môr is generally similar to the distribution throughout the wider survey area and is not considered to represent an area of any specific significance to these species.

The static TPOD loggers recorded the highest number of cetaceans to be found at the inshore Constable Bank TPOD (located to the south west of the project area) rather than

those deployed within/close to the boundary of the proposed Gwynt y Môr OWF project area. Observational behaviour recorded included feeding and travelling by harbour porpoise.

The results from the annual site-specific visual transect survey revealed Grey seals to be recorded from all over the survey area, also with a slight trend related to depth contours. A clear seasonal pattern was also emergent for the months of April and May with concentrations of grey seals to the north of the survey area. For the month of September, this distribution switched to higher concentrations of seals inshore. Reasons postulated for this are that the seals are feeding at the highly productive area known as the Liverpool Bay Plankton front, located to the north of the survey area. In September, sea temperatures are at their warmest and productivity is high and it is likely that the seals are following their prey species and feeding in the inshore areas. No other patterns of distribution were discernable for other months due to the sporadic nature of the sightings.

Data from the Gwynt y Môr survey effort yielded harbour porpoise and grey seal records within and around the newly constructed NHOWF.

11.6.4 Rhyl Flats OWF Monitoring

The Bridge Marine Science Group (contracted by npower renewables Ltd) have undertaken site–specific acoustic baseline cetacean monitoring at the Rhyl Flats Offshore Wind Farm site located on Constable Bank to the West of North Hoyle. This pre-construction environmental monitoring was undertaken using four static TPODs deployed within and around the Rhyl Flats OWF site for a 16 month period from September 2005-December 2006 to encompass an entire annual cycle. Results indicated that the area is utilised by harbour porpoise all year around with clear seasonal patterns of harbour porpoise activity within and around the Rhyl Flats area with low levels in the summer and higher activity recorded in the late winter and spring months. This data broadly mirrored the results from the Gwynt y Môr
baseline data but with extended periods of activity within the inshore waters by harbour porpoise with offshore interpretation more for migratory and transient behaviour through the areas of Gwynt y Môr (Goold et al., 2007).

These results provide further information regarding the movement of harbour porpoise within the area in proximity to NHOWF, again recording their seasonal behaviour within Liverpool Bay.

11.7 DISCUSSION

The data available do not permit a detailed analysis of the effects of construction and operation of the wind farm; however, some discussion is possible.

The NHOWF site-specific sightings data alone initially suggest that marine mammals do not appear to frequently enter the operational wind farm array; however, the focus of these surveys was clearly for birds sightings and not solely for marine mammals. Other evidence (from CMACS surveys, seal tracking studies and marine mammal studies at other sites which

incorporate the NHOWF e.g. Gwynt y Môr) demonstrates that both harbour porpoise and grey seal will do so and will also forage amongst the turbines.

Information obtained from site-specific surveys at the neighbouring Rhyl Flats OWF and proposed Gwynt y Môr OWF have provided more data concerning the marine mammal populations of this area of Liverpool Bay and have shown that the two main species are grey seals and harbour porpoise. Data from these surveys also revealed the presence of these mammals within and around the North Hoyle array and the fact that sightings are strongly correlated to seasonality and also to the depth contours of Liverpool Bay.

The original Environmental Impact Assessment (EIA) for NHOWF assessed the impacts for marine mammals from the presence of the NHOWF to be as follows (Innogy, 2002):

> "…it is likely that porpoise will be minimally sensitive to the noise generated by the operating wind farm. Following familiarisation with physical presence of the wind farm, porpoise and other odontocete cetaceans such as the bottlenose dolphin, would not be adversely affected by the noise generated by wind farm operation and indeed may exploit wind farm sites as feeding areas."

> "..it is unlikely that [grey seals] will show any reaction other than to the physical presence of the turbine. However, seals are very inquisitive by nature and so it is likely that they would quickly habituate to the wind farm, which may provide a feeding area if, as expected, turbines function as Fish Aggregating Devices."

Overall, from the anecdotal and scientific data available, it can be confirmed that the statements made within the EIA were justified and that the construction of the NHOWF appears to have had no significant impact upon the Liverpool Bay or Eastern Irish Sea Marine Mammal populations.

It has not been possible to assess for the affects of direct construction impacts due to the lack of site-specific survey information from the North Hoyle area concerning marine mammals for the construction phase. However, information yielded from the visual surveys and also from the long term data sets at Hilbre Island do not suggest any adverse effects to the marine mammal populations for Liverpool Bay as a result of the construction phase of the NHOWF.

11.8 CONCLUSION

The information presented here does suggest that there has been little change in species composition or spatial distribution of marine mammals within Liverpool Bay and overall it appears that the presence of the NHOWF has had little impact upon the marine mammal populations of the area. This is unsurprising given the transient nature and wide ranging capacity of these species

No specific monitoring conditions were included in the FEPA Licence and for NHOWF no further monitoring is proposed.

Whilst data collection has now ceased, agreement will additionally be needed on some aspects of data interpretation both from the NWPO monitoring and the findings of external research work such as the COWRIE funded monitoring. Such agreement is required to discharge the FEPA Licence monitoring conditions. It is proposed that the summary results of the monitoring and conclusions of the analysis are presented to the Licensing Authority and their agents.