European Offshore Wind Deployment Centre
Environmental Statement

Chapter 12: Marine Mammals

12 MARINE MAMMALS

1 This Environmental Statement (ES) chapter provides a condensed summary of the marine mammal baseline and presents the findings of the EIA technical report. Genesis Oil and Gas Consultants carried out the marine mammal assessment.

2 The structure of the marine mammal assessment can be summarised as follows:

- Marine Mammal Baseline Report (Appendix 12.1): this provides a summary of the existing information relating to the distribution and abundance of marine mammals in Scotland with a focus on Aberdeen Bay. This report draws on the findings of a desk based study, marine mammal research studies and also dedicated marine mammal surveys carried out for the purpose of supplementing the baseline for the EOWDC
- Marine Mammal EIA Technical Report (Appendix 12.2): provides an assessment of the impact of the project on marine mammals in the study area

12.1 Introduction

12.1.1 Methodology Consultation

3 Consultation with key stakeholders, specifically Scottish Natural Heritage (SNH), Joint Nature Conservation Committee (JNCC) and Marine Scotland occurred at an early stage of the originally proposed development and has continued throughout the scoping stage of the EOWDC. Key issues raised were potential impacts upon marine mammals from underwater sound and potential impacts to marine mammal species from nearby Special Areas of Conservation (SACs).

12.1.2 Data Information and Sources

12.1.2.1 Boat-based Surveys

4 Boat-based surveys were carried out during to collect species-specific data on marine mammals within the proposed EOWDC area and its immediate surroundings from 2007- 2008 by IECS and 2010-2011 by SMRU Ltd (Figure 10.1). Surveys were conducted once every month during daylight hours and efforts were made to undertake the survey over two consecutive days. All surveys utilised at least two trained marine mammal observers, an additional two marine mammal observers were utilised in the surveys conducted between 2010 and 2011. Details of the methodology and survey areas are covered are provided in Appendix 12.1.

5 A towed Passive Acoustic Monitoring (PAM) system was used on during both the IECS and SMRU Ltd boat surveys to collect information on vocalising marine mammals.

12.1.2.2 Vantage Point Surveys

6 Shore-based vantage point bird surveys were conducted for two hours weekly at Blackdog and Donmouth and fortnightly at Drums and Balmedie covering a distance of up to 2 km from shore (Figure 10.2). These surveys were designed primarily for bird observations, but collected information on marine mammals observed. Vantage point surveys were conducted from August 2005 until March 2008 (Alba Ecology and Envirocentre 2008).

12.1.2.3 Desk-based Study

7 In order to establish and better understand the marine mammal species present in the Aberdeen Bay and wider area an in-house desk based study was completed to form the basis of the baseline marine mammal report.

12.1.2.4 Underwater Sound Modelling

8 During the scoping stage of the project the potential impacts of sound from construction activities was identified as an issue requiring detailed investigation. The Applicant commissioned Subacoustech Ltd to carry out predictive noise modelling and an impact assessment of the piling sound on the marine mammal receptors (Appendix 3.1)

12.1.3 Key Guidance Documents

9 A summary of the main survey reports and studies used in the EIA for marine mammals is presented below:

- Envirocentre and Alba Ecology (2008). Shore based Vantage Point counts of marine mammals 2005 – 2008 in Aberdeen Bay
- IECS (2008). Aberdeen Offshore Wind Farm – ship-based Marine Mammal Survey Results (February 07- January 08). The Institute of Estuarine & Coastal Studies (IECS)
- Gordon, J (2008). Analysis of acoustic detections of porpoise from AMEC surveys off Aberdeen. Ecologic UK Ltd Report. 11pp
- RPS (2008). Review of Bird and Marine Mammal Data, RPS
- SMRU Ltd (2010) Marine Mammal Data Review. Sea Mammal Research Limited
- SMRU Ltd (2011) 4 month boat based survey report. Sea Mammal Research Limited
- Travers, S., Thomson, S. and Mander, L. (2008). Institute of Estuarine & Coastal Studies, University of Hull. 68pp. Monthly boat based marine mammal survey reports February-April 2008. The Institute of Estuarine & Coastal Studies (IECS)

12.2 Baseline Assessment

10 The marine mammal environmental baseline drew upon existing research surveys conducted on marine mammals in the wider area as well as several years of land based and boat surveys of the wider EOWDC development area. Several marine mammal species have been recorded (sighting and/or stranding) in Aberdeen Bay and the surrounding area; including 12

odontocete species, three mysticete species and three pinniped species. Of these, bottlenose dolphins, harbour porpoises, white-beaked dolphins, minke whales, Risso's dolphins, harbour seals and grey seals occur regularly in the area, with other species only being recorded occasionally or rarely.

11 Bottlenose dolphins in the Aberdeen area are part of the resident population from the Moray Firth Special Area of Conservation (SAC) and Aberdeen is recognised as an important area for bottlenose dolphins. Bottlenose dolphin were the second most frequently sighted cetacean species during the surveys carried out as part of the EOWDC, with a total of 200 individuals being detected.

12 Harbour porpoises are the most common species of cetacean in the North Sea and have a wide range and distribution in both coastal and offshore areas. Harbour porpoises were the most recorded cetacean species during the EOWDC boat surveys with over 420 individuals detected visually and was also the species detected most frequently during acoustic surveys. The harbour porpoise was the only species that was detected in sufficient numbers to enable density estimates to be generated.

13 White-beaked dolphins are present in the central and northern North Sea throughout most of the year. Sightings data suggests their presence in the coastal waters off Aberdeenshire is seasonal, with sightings recorded between June and August. White beaked dolphins were detected during the EOWDC surveys over the course of several years during the month of August.

14 Minke whales occur throughout the central and northern North Sea, particularly during summer months. The seasonal movement of minke whales into coastal waters during the summer is thought to be related to prey availability. Six minke whales have been observed as part of the EOWDC surveys.

15 In the northern and central North Sea, Risso's dolphins are primarily observed around Shetland and Orkney. Risso's dolphins have been recorded off Aberdeenshire since 2005 at various times of the year. Risso's dolphins were observed during vantage point surveys, but not during any of the EOWDC boat surveys. The increase in sightings of Risso's dolphins may point towards an increase in the use of the Aberdeen area in comparison to historic levels.

16 Both grey and harbour seals are regularly present and frequently sighted in Aberdeen bay, especially at the entrances to the rivers Dee and the Don. Grey seals were the most frequently observed seal species recorded during the boat surveys carried out in 2007-2008. Almost equal proportions of grey and common seals were recorded during boat surveys carried out during 2010-2011.

17 Designated coastal SACs for harbour seals are present along the east coast of mainland Scotland, these are situated in the Dornoch Firth and Morrich Moore in the Moray Firth and Firth of Tay and Eden estuary.

18 Designated SAC's for grey seals along the east coast of Scotland include the Isle of May at the entrance of the Firth of Forth, and it can be expected that individual seals from these colonies may be passing through and the EOWDC development area.

19 Other marine mammal species including white-sided dolphins, killer whales, common dolphins, striped dolphins, long-finned pilot whales, sperm whales, humpback whales, fin whales, beaked whales and other seal species, although present in the area off north-east Scotland this is only a marginal part of their habitat, and is likely to be inhabited only during a restricted part of the year by relatively few individuals.

12.3 Impact Assessment

12.3.1 Impact Assessment Methodology

20 All cetacean species and seals that are likely to be found in Aberdeen Bay are of either national or international importance due to their conservation status. All cetacean species and seals are considered to be receptors of high importance due to the national and international protection measures afforded to them.

21 The Habitats Directive outlines a number of protection measures for marine mammals and has been implemented in Scotland through the Conservation (Natural Habitats, &c.) Regulations 1994 (as amended in Scotland) termed the 'Habitat Regulations'. The Habitat Regulations provide the protection afforded to European Protected Species (EPS) animals listed on Annex IV of the Habitats Directive which includes all species of cetacean whose natural range occurs in Great Britain.

22 The European Protected Species (EPS) provisions create a number of offences that relate to causing injury or disturbance to EPS species as defined in regulation 39 of the Conservation (Natural Habitats, &c.) Regulations 1994 (as amended). Before an EPS licence can be issued there are three tests which must be met by the appropriate licensing authority, which in the case of a renewable energy development would be issued by the Scottish Government. The EPS licence process and other protection measures for marine mammals are explained in more detail in Appendix 12.2.

23 The harbour seal, common seal, the harbour porpoise and bottlenose dolphin are listed on Annex II of the Habitats Directive and require member countries to consider the designation of Special SACs for these animals. The cetacean species which require the designation of SACs are the bottlenose dolphin and the harbour porpoise.

24 The Marine (Scotland) Act 2010 introduces a number of measures for seal protection to update and replace the earlier Conservation of Seals Act 1970. It is now an offence to kill or take any seal at any time (with exceptions only under specific licence or for animal welfare) and it is also now an offence to harass seals at their haul-out sites.

25 For each impact, the assessment aims to describe the magnitude of effect (i.e the change created by an activity in terms of its spatial extent, duration and scale) and the sensitivity of each receptor, that is, the resources that would be affected (based on the importance of the receptor and its recoverability). The combination of the effect and the sensitivity of the receptor were used to derive the significance of the impact.

26 Whilst the matrix approach was used in the impact assessment as a way to categorise and assess the significance of any potential impacts to marine mammals, discussions with SNH have reiterated the importance of also applying rigorous professional judgement in determining the significance of any potential impacts.

27 Impact significance is then given as major, moderate, minor or negligible guided by the following matrix.

TABLE 12.1
Matrix for significance of impact (based on importance and recoverability

	Sensitivity of Receptor				
Magnitude of Effect (based on spatial, duration and scale of effect)		**Very High**	**High**	**Medium**	**Low**
	Very High	Major	Major	Major	Moderate
	High	Major	Major	Moderate	Minor
	Medium	Major	Moderate	Moderate	Minor
	Low	Moderate	Minor	Minor	Negligible
	Negligible	Minor	Negligible	Negligible	Negligible

28 All marine mammal species are protected species, as such their sensitivity within the impact assessment is considered to be 'Very high', and therefore even when the magnitude of effect has been assessed as being of negligible significance, this still results in a 'minor' significant impact.

12.3.2 Impact Assessment

12.3.2.1 Construction Phase

Impact of Noise: Physiological Damage

29 The impact assessment has considered the risks and impacts to marine mammals from the construction, operation and decommissioning of the EOWDC.

30 The significance of potentially killing a marine mammal during the piling of the EOWDC was assessed as being of major significance, however, with the successful adoption of the mitigation measures for piling, there are not anticipated to be any residual risks given that a marine mammal would have to be present in such close proximity to the pile driver (3 m) to be at any risk. It is considered the risk of marine mammals receiving sound levels capable of causing their death appears to be remote.

31 Other forms of physical injury (non-auditory) are estimated to occur out to a greater range (60 m), and the risk of piling causing other forms of physical impacts cannot be ruled out, and has been assessed as being of major significance for all marine mammal species. The natural curiosity of seals may increase the risk of exposing both grey and common seals to sound levels capable of causing adverse physical effects.

Impact of Noise: Cumulative Exposure Impacts

32 The cumulative noise dose modelling indicate that unless a cetacean is within the immediate vicinity of piling operations (<1.35 km) or a seal is situated within 3.6 km, the only possibility for an auditory injury to occur is during the initial piling period. It is expected that the perceived loudness of the piling activity would cause the marine mammal to exhibit an aversive behavioural

reaction, with the animal moving from the area before the onset of any auditory injury can occur.

33 The marine mammals which are most likely to be exposed are the more commonly sighted species within Aberdeen Bay, with the harbour porpoise, bottlenose dolphins and grey and common seals being the species most at risk from physical impacts. Given that the relatively small Moray Firth bottlenose dolphin population has been increasing its range expansion in a southerly direction, and that Aberdeen Bay frequently has bottlenose dolphins, especially during the winter and spring months, the potential impact both to the individual and population is considered to be of high magnitude and potentially of major significance. It should be considered that the majority of bottlenose dolphins sightings have been observed frequenting the harbour mouth area and that the mitigation measures mentioned below they should be sufficient to ensure that no bottlenose dolphins are situated within 820 m prior to piling activities. If such measures are put in place the anticipated magnitude of the effects is expected to be negligible and thus be of minor significance to the bottlenose dolphin populations.

Impact of Noise: Behaviour Disturbance and Displacement

34 The range at which behavioural responses are considered potential adverse is up to 22 km for harbour porpoise and 16 km for common and grey seals. For harbour porpoises the results of post-monitoring studies suggest that after piling stops the animals have been found to return to the area within a few hours. The haul out locations of seals could be affected by the piling operations, which could cause temporary displacement of seals from such areas. Therefore, behavioural disturbance, which would lead to displacement of marine mammals from the piling activities, is only expected to occur for the duration of piling activities.

35 The potential exclusion of bottlenose dolphins through behavioural displacement for the duration of the piling activity and out to an extent of 16 km has been assessed as being of high magnitude, and therefore of potentially of major significance to the bottlenose dolphin. As bottlenose dolphins are present along the east coast of Scotland, it has been predicted that the temporary displacement of animals from the Aberdeen Bay area would be mitigated by animals moving into other areas within their natural range. This is a hypothetical assessment and is based on the available habitat range for bottlenose dolphins being extensive and covering the coastal waters along the Scottish east coast.

36 The other species of cetacean present in Aberdeen Bay are not restricted to coastal areas and are present throughout a far wider area. Aberdeen Bay has not been recognised as being of particular importance for breeding or calving purposes for other cetacean species. The possible exception is that in that shallower coastal water of the east coast of Scotland other cetacean species have been speculated to have a role in breeding or calving for the white beaked dolphin during the summer period.

37 If piling occurs during summer months (July/August) the significance of the behavioural disturbance could be major for the white beaked dolphins and the bottlenose dolphin, but of minor significance impact for all other cetacean species. Any temporary exclusion of the cetacean species (except bottlenose) from Aberdeen Bay is considered to be of moderate significance, given that there is likely to be adequate areas for foraging relatively nearby.

38 The vessels used in the construction of Aberdeen Bay may locally increase the ambient sound levels, cause disturbance and may temporarily contribute to the displacement marine mammal from the vicinity of construction activities. However, the significance of this local displacement of marine mammals is minor.

Impact of Noise: Interference with the use of Sound

39 During the pile driving construction activities there is the potential for the sound to mask any seal vocalisations, potentially out to a distance of 80 km. The spatial scale of the potential masking would be dependent upon prevailing ambient sound levels and 80 km is a theoretical maximum. The actual significance of this potential impact is expected to be low given that there are no notable haul out locations in close proximity to Aberdeen Bay and that any potential masking would be temporary.

40 Masking of biologically relevant sounds produced by high frequency cetaceans, such as the harbour porpoise, and possibly mid-frequency cetaceans, such as the bottlenose dolphin, is unlikely as the piling pulses have little high frequency energy (Thomsen et al., 2006). Pile driving pulses are of short duration, and are therefore likely to be below the time where full detection of signals is possible in cetaceans (Thomsen et al., 2006). The magnitude of the impact on marine mammal vocalisations is considered to be low for seal and negligible for other cetacean species. The overall significance is considered to be moderate for seals and minor for cetaceans. After completion of the construction works there are not anticipated to be any residual impacts.

41 Vessel sounds are likely to be audible to marine mammals, they are not considered to be capable of permanently masking the sounds produced by cetacean species that are most commonly present in Aberdeen Bay.

Impact of Elevated Suspended Sediments

42 No impacts to marine mammals are anticipated from an increase in suspended sediments levels as the increases are still within the ranges of naturally occurring levels.

Impact of Displacement of Prey Species

43 Marine mammals are highly mobile and are expected to follow their prey should they be displaced from the area during construction activities. Piling would be infrequent and temporary so that any disturbance to prey species would be intermittent and not consecutive. Therefore any foraging impacts are unlikely to be of sufficient magnitude or duration to adversely affect any life history traits of marine mammals. The marine mammals present in Aberdeen have been known to feed on varied prey species and should be adaptable if one of the more sensitive species to sound is temporarily displaced from the local area.

Impact of Increased Vessel Activity

44 Increased shipping levels could be considered to increase the risk of collisions with marine mammals. Construction vessels would be transiting at slow speeds within Aberdeen Bay and are typically slow moving and generate low frequencies. It is considered that any marine mammals would be able to avoid approaching vessels. There have never been any reports of ship strikes from stranding records along the Grampian coast, which suggests the magnitude of the effect to marine mammals is negligible.

12.3.2.2 Operation Phase

Impact of Underwater Sound

45 The noise from the operational wind farm is not considered to be capable of causing disturbance or displacement to marine mammals. There has been considerable variation in the reported underwater noise measurement from operational wind farms, yet all the sound levels reported thus far are relatively low.

46 Aberdeen Bay is already very busy with a wide range of human activities and the small increase in vessel activity associated with the maintenance of the EOWDC proposed wind farm is unlikely to cause any notable increase disturbance to marine mammals.

Impact of Loss of Habitat

47 The worst case scenario in terms of seabed habitat lost would be through the use of gravity based structures for all 11 wind turbines, this would result in the loss of 0.03 km^2 of seabed habitat. As the turbines are separated by a considerable distance, the movement of marine mammals should not be restricted through the EOWDC. This loss of seabed habitat, in terms of similar available habitat within Aberdeen Bay is of negligible magnitude, with the significance of the impact being minor.

Impact of Electromagnetic Fields generated from cables

48 From the monitoring studies of constructed wind farms there is no evidence of any increases or decreases in marine mammal activity that would suggest attraction or avoidance related to magnetic fields. The information on the potential effects of EMF on marine mammals is largely unknown and further research is required to determine the potential risks this may pose to these species. The ecological significance of EMFs is an area of research which requires further study and is discussed further in Chapter 13.

TABLE 12.2
Summary of Impact Assessment

Impact	Environmental effect	Probability of effect occurring	Magnitude	Duration	Spatial extent	Significance level*	Mitigation	Residual impacts	Monitoring
Construction									
Sound	Physiological damage (death) marine mammals	Negligible	High	Temporary	Site specific 3 m from piling	Major	Marine Mammal Protection Plan (MMPP) Including piling mitigation measures; soft – start Marine Mammal Observers, Passive Acoustic Monitoring (PAM).	None	MMPP
	Physiological damage (non-auditory) injury	Very Low			Local (injury possible to 60 m and cumulative dosage impacts upto 3.6 km)				
	Physiological damage (auditory damage) to marine mammals	Very Low	High	Temporary	Local (species specific ranges)	Major	MMPP	None	MMPP

TABLE 12.2
Summary of Impact Assessment

Impact	Environmental effect	Probability of effect occurring	Magnitude	Duration	Spatial extent	Significance level*	Mitigation	Residual impacts	Monitoring
	Behavioural disturbance and displacement	High*(seasonally variable for white beaked dolphins)	High (bottlenose dolphins, White beaked dolphins	Temporary	Regional	Major (piling sound)	MMPP	None	MMPP
			Low (other species marine mammals)			Minor (piling and construction sound)			
Sound (piling)	Interference of sound produced by seals	Low	Low / Negligible	Temporary	Local	Moderate / Minor	MMPP	None	None
	Interference of sound produced by cetaceans	Very low	Negligible	Temporary	Local	Minor	MMPP	None	None
Sound (all other construction sounds)	Interference sound marine produced by mammals	Very low	Negligible	Temporary	Local	Minor	MMPP	None	None
Suspended sediment levels	Impact to marine	Negligible	Negligible	Temporary	Local	Minor	None	None	None

TABLE 12.2
Summary of Impact Assessment

Impact	Environmental effect	Probability of effect occurring	Magnitude	Duration	Spatial extent	Significance level*	Mitigation	Residual impacts	Monitoring
	mammals (foraging etc)								
Disturbance to prey species	In-direct impact upon marine mammals	Low	Low	Temporary	Regional	Moderate	None	None	None
Construction vessels and infrastructure	Disturbance to marine mammals	Negligible	Negligible	Temporary	Local	Minor	MMPP	None	MMPP
Operation									
Operational noise turbines	Disturbance to cetaceans	Low	Negligible	Long term	Site specific	Minor	None	None	None
	Disturbance to seals and baleen whales	Medium	Low	Long term	Local	Moderate	None	None	None
Maintenance vessels	Disturbance marine mammals	Negligible	Negligible	Long term	Local	Minor	None	None	None
Turbine foundations	Habitat loss	High	Low	Long term	Local	Moderate	None	None	None
Electromagnetic Fields	Disturbance to marine mammals	Negligible	Negligible	Long term	Local	Minor	None	None	None

TABLE 12.2
Summary of Impact Assessment

Impact	Environmental effect	Probability of effect occurring	Magnitude	Duration	Spatial extent	Significance level*	Mitigation	Residual impacts	Monitoring
Decommissioning									
Cutting of foundations	Disturbance to marine mammals	Low / Medium	Moderate	Temporary	Local	Moderate / Major	Decommissioning Plan recommended mitigation	None	None

12.3.2.3 Mitigation and Monitoring

49 The Marine Mammal Protection Plan would be developed to address and mitigate any of the impacts identified as being of concern to marine mammals. The MMPP would outline the mitigation procedures to be used during construction activities to minimise the risk of impacts to marine mammals, the final MMPP would be developed in consultation with advice from statutory consultees.

50 The programme of boat based surveys and acoustic monitoring using both towed and stationary devices (C-Pods) would continue throughout the development and construction of the EOWDC to enable the identification of marine mammals in the lead up to construction and also to identify potential impacts upon marine mammals

12.4 Summary

51 The environmental baseline identified the distribution and abundances of the marine mammal species in the developmental area that could be potentially impacted. The impacts assessment process considered the worst case developmental scenario and applied this to potential impacts during the construction, operation and subsequent decommissioning of the EOWDC.

52 Underwater sound, principally generated during the piling activities, was assessed as being of potential concern with a number of potentially significant impacts identified (physical damage, behavioural disturbance and in-direct impacts on prey species). The underwater sound generated from the operation and the losses of seabed habitat from the placement of the foundations were both assessed as being impacts of moderate significance. The removal of the foundation by cutting techniques could be an activity that is of major / moderate significance of causing disturbance to marine mammals. Providing the appropriate mitigation measures are followed during construction, operation and decommissioning activities there are not anticipated to be any long lasting residual impacts upon marine mammals.

53 Information to Inform a Habitats Regulations Appraisal (HRA) with respect to marine mammals can be found in Appendix 29.1.