# Projects of the extended Danish Environmental Monitoring Programme on Horns Rev and Nysted Offshore Wind Farms (August 2009)

## Fish

Effect of the Horns Rev 1 offshore wind farm on fish communities

The project aim to clarify the effects of the Horns Rev 1 offshore wind farm on fish and fisheries interests, by documenting the spatial variation in fish communities within an around the wind farm. Being constructed in 2002, it may be expected that possible effects on fish communities induced direct and indirect by the wind farm will have stabilised by now. The project is a follow-up on the previous fish monitoring programme carried out at the Horns Rev 1 wind farm, and consists of two parts: 1) General fish communities and reef effect, and 2) Sandeels.

| | |
|---|---|
| Responsible developer: | Vattenfall |
| Responsible consultant: | Orbicon and DTU Aqua in association with Naturfocus and DHI |
| Status: | Initiated, reporting December 2010 |

## Harbour porpoise

Survey connecting the monitoring activities at Horns Rev II offshore wind farm and the FINO 3 platform with regard to responses of harbour porpoises to pile driving activities

The project aimed to survey the effects of ramming of monopoles on harbour porpoises in the area between Horns Rev and the German border. Construction work at both Horns Rev II and FINO 3 platform were carried out in the same period, and the response of porpoises to the construction noise were studied with porpoise detectors (PODs) both places. Further placing of a number of PODs between the two areas (approx. 50 km apart), should deliver data on porpoise response to pile driving over a distance of up to 50 km.

| | |
|---|---|
| Responsible developer: | DONG Energy |
| Responsible consultant: | BioConsult SH in association with Institut für Technische und Angewandte Physik (ITAP) |
| Status: | Completed, reporting September 2009 |

Testing the effectiveness of seal scarers in deterring harbour porpoises

Seal scarers are commonly used during offshore pile driving, and studies indicate that also harbour porpoises are deterred out of an area due to the seal scarers. The response of the porpoises and the efficiency of the devices are however not sufficiently documented. This study includes land based visual observations to measure temporal and spatial scale of harbour porpoise response to seal scares. The study is coordinated with a German study carried out in the North Sea also using PODs.

| | |
|---|---|
| Responsible developer: | DONG Energy |
| Responsible consultant: | BioConsult SH in association with ITAP and Sea Mammal Research Unit (SMRU Ltd.), Univ. of St. Andrews |
| Status: | Initiated, reporting December 2010 |

Effects of wind turbines on harbour porpoise behaviour and population dynamics under different environmental conditions

The scope of the project is to assess the cumulative effects of wind farms and other anthropogenic factors (traffic, fishery, bridges etc.) on harbour porpoise behaviour and population dynamics. A spatially explicit individual-based model (IBM) will be used. Once a sufficiently accurate model has been developed, it will be applied in a number of areas where wind farms have been constructed to validate the model. It is expected that the model can be used to assist the spatial planning of offshore wind farms in the future.

Responsible developer: DONG Energy
Responsible consultant: NERI dept. of Arctic Environment
Status: Initiated, reporting December 2010

**Birds**

Aerial surveys of common scoters Horns Rev, winter 2006/2007

The project aimed to document the occurrence of common scoters in and around the Horns Rev 1 wind farm during the winter of 2006/2007. It is a follow-up on the previous bird monitoring programme carried out at Horns Rev I. The project was initiated, as a follow up on reports on the presence of large numbers of common scoters within the wind farm.

Responsible developer: Vattenfall
Responsible: NERI dept. of Wildlife Ecology and Biodiversity
Status: Completed, reported April 2007
Download report on:
(http://193.88.185.141/Graphics/Energiforsyning/Vedvarende_energi/Vind/havvindmoeller/vvm%20Horns%20Rev%202/Horns%20Rev/fugle/HR_HabUtil_Scoter_2007%20.pdf)

Common scoters and food resources Horns Rev

The project will follow up on previous common scoter studies carried out at Horns Rev I, by undertaking a targeted sampling programme on common scoter food resources (razor clams and cut trough shells) using specialized sampling gear. The quantitative samples will allow for an update of the existing habitat suitability model of the distribution of the prey species over the period from 2000 to 2008. The updated model will also form basis for estimation of the distribution of the prey species, and thereby common scoter, during future planning of wind farms in the region.

Responsible developer: DONG Energy
Responsible consultant: Orbicon and DHI in association with Wageningen IMARES
Status: Initiated, reporting September 2010

Factors affecting the spatial distribution of long-tailed ducks around the Nysted offshore wind farm

Bird monitoring at the Nysted Offshore Wind Farm up til 2007 have shown, that long-tailed ducks reduced the degree of utilisation of the wind farm area and the immediate surroundings. In the same period, benthic studies found a decline in blue mussel biomass in the Nysted area. The aim of the present project is to analyse the possible influence of environmental variables, such as benthic biomass, on the observed spatial and temporal variation in the numbers of long-tailed ducks at Nysted.

| | |
|---|---|
| Responsible developer: | DONG Energy |
| Responsible consultant: | NERI dept. of Wildlife Ecology and Biodiversity in association with NERI dept. of Arctic Environment and Centre for Research into Ecological and Environmental Modelling, Univ. of St. Andrews (CREEM) |
| Status: | Initiated, reporting December 2010 |

Diver and seaduck numbers and distribution patterns in Danish offshore waters

The project shall provide an up-dated overview of numbers and distribution of key seabird species in Danish offshore waters, with the aim of improving the basis for spatial planning decisions and environmental impact assessment for future offshore wind farms. Spatial modelling with Generalised Additive Models will be carried out, incorporating biotic and abiotic explanatory variables. A separate part of the project (and deliverable), will focus on the occurrence of moulting common scoters in the Northern Kattegat area.

| | |
|---|---|
| Responsible developer: | Vattenfall |
| Responsible consultant: | NERI dept. of Wildlife Ecology and Biodiversity in association with DMI |
| Status: | Initiated, reporting October 2010 (moulting scoters Kattegat) and February 2010 (overall occurrence of seabirds in Danish waters) |

Cumulative effects of planned offshore wind farm development on divers

Previous studies conducted at the Horns Rev I offshore wind suggests that divers avoid offshore wind farms as feeding areas. The aim of this project is to attempt quantifying the potential cumulative effects on wintering divers in relation to the presently planned Danish offshore wind power development, and to assess its potential significance on a population level. The assessment will be based on an Agent Based Model, incorporating present knowledge on diver distribution and factors potentially affecting the distribution of these birds.

| | |
|---|---|
| Responsible developer: | Vattenfall |
| Responsible: | NERI dept. of Wildlife Ecology and Biodiversity in association with Centre for Research into Ecological and Environmental Modelling, Univ. of St. Andrews (CREEM) |
| Status: | Initiated, reporting April 2010 |