


Annual FEPA Monitoring Report (2004-5)

February 2006

North Hoyle Offshore Wind Farm



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PROJECT TEAM



Project Management Support Services (PMSS) has extensive experience in managing renewables projects including development, consenting and construction. PMSS are currently responsible for managing FEPA consent compliance including environmental monitoring and co-ordination of the FEPA reporting on behalf of npower renewables.



Osiris Projects provide a comprehensive range of shallow water seabed mapping and geophysical survey services. Osiris Projects have carried out a number of surveys on behalf of npower renewables, ranging from pre-construction geophysical mapping to post construction debris surveys, cable route surveys and on-going scour monitoring around turbine bases and met mast structures.



Centre for Marine and Coastal Studies Ltd

Centre for Marine and Coastal Studies Ltd (CMACS) provides specialist environmental consultancy research services based on ecological investigation and interpretation. CMACS has been involved in the full project cycle for npower renewables, from EIA to post-construction monitoring. CMACS have undertaken all the benthic and beam trawl monitoring and reporting at North Hoyle since 2001.



Centre for Environment, Fisheries and Aquaculture Science (Cefas) collate and provide data on the demersal fish in the eastern Irish Sea, based on data from annual groundfish surveys. These reports and data assist in the overall assessments of fishes undertaken by CFCM. Cefas has been involved in the project since 2004.



Coastal Fisheries Conservation & Management. Dr Stephen Lockwood operates as an independent consultant with almost forty years experience of marine fisheries and coastal research, assessment and management. As an independent consultant since 1999 he has contributed to the preparation of FEPA applications for the shellfish industry, port and offshore wind-farm developers. As vice-chairman of the North Western & North Wales Sea Fisheries Committee he also contributes to fishery-related FEPA consultations.



Environmental Resources Management (ERM) is a multi-disciplinary consultancy which has considerable experience in both onshore and offshore Environmental Impact Assessment (EIA), and has specific offshore experience in Liverpool Bay having worked on a range of oil and gas, aggregate and renewable projects. ERM has been undertaking ornithological monitoring work at the North Hoyle Offshore Wind Farm since February 2004, and is leading a team who are undertaking boat based ornithological surveys and managing the data from these surveys including statistical analyses.

1 EXECUTIVE SUMMARY

1.1 INTRODUCTION

This document describes the monitoring undertaken during 2004-5 to comply with the conditions of the Food and Environmental Protection Act (FEPA) 1985: Part II (as amended), licence reference 31579/02/0 (as amended), issued to NWP Offshore Ltd. for the North Hoyle Offshore Wind Farm.

As recent environmental monitoring results are assimilated and compared against those of previous monitoring campaigns at the site, it is now becoming possible to predict tentative conclusions on the overall impact from construction and operation of the wind farm on the physical and biological environment. The project team continue to liaise on monitoring progress through annual FEPA monitoring review meetings in order to assess the impact of the wind farm on cross-disciplinary issues such as the interaction between changes in the physical environment, benthos, epibenthos and the distribution of birds.

So far it is apparent that there are no significant short term negative environmental impacts on the environment have been identified. Natural sedimentary processes continue to dominate the seabed geomorphology, and the installation of foundation structures and construction of the wind farm itself has not created any discernible change in these processes or the seabed composition itself. Similarly, erosion of the seabed through scour, as predicted in design studies, has not transpired.

Benthic and epibenthic organisms have shown small scale responses since monitoring began, but these are speculated to be within the range of normal inter-annual variation and certainly do not give cause for concern. Indeed, biodiversity is highest at grab sample sites within the wind farm array and common species for the communities present still prevail, as before. Comparison of fish data from 2m beam trawls within the wind farm area and with CEFAS beam trawl sites in the wider eastern Irish Sea show that the numbers and assemblage of fish have not changed significantly, the closest CEFAS site to North Hoyle even show notable increases in numbers compared to the 10 year baseline 1993-2003.

As bird species such as Divers and Scoter are reliant upon shallow water and marine benthos for food; any effects on benthic habitat (an inferred change in biomass) could have a deleterious effects on bird numbers and distribution. Boat and aerial survey monitoring, combined with interpretation of benthic data (biotope characterisation) over the last 12 months has shown that available food resources have not changed. Some birds species have shown subtle changes in distribution (including some avoidance) in response to installation of structures and operation of the turbines however, as numbers of birds affected is very small, the impact upon populations is inherently low. Furthermore, the risk of collision is commensurately low illustrated by the fact that negligible numbers of birds were actually seen to fly at turbine blade height.

Therefore, early conclusions show that the construction and first year of operation of the wind farm have not had any significant effects on the environment. Continued monitoring over the next 12 months will provide further evidence to support these early findings.

1.2 MARINE SEDIMENTS

Most of the sites within the survey area had a seabed of coarse sand with some of medium sand. A few sites to the east and west of the survey area had a notable amount of silt. The coarse and medium sands were fairly evenly distributed over the survey area with no obvious inshore/offshore differences. There has not been a consistent pattern of change in dominant sediment type near and within the turbine array or along the cable route in 2004 with sediments at some sites becoming generally finer, others coarser and two sites remaining the same. As sites within the wind farm array and in control areas have shown both increases and decreases in coarseness there is no trend present that would suggest that wind farm

construction, cable burial or adjustment of hydrodynamic forces due to the presence of the piles in the seabed are responsible for the changes in sediment type at each site. The original geophysical survey in 2001 described several areas of rippled and megarippled seabed and it is possible that there are different sediment types on the crests and in the troughs of these ripples. It is also plausible that the grab is sampling from different pockets of sea bed type which alter as a result of natural variation over the course of the year.

There is also no evidence that the distribution of drill cuttings arising from the construction process over the sea bed has acted to increase the coarseness of the sea bed sediments at the wind farm site with most of the wind farm sites (1, 3, 4 and 5) having the same sediment classification in 2003 as in 2002 (prior to any construction activity). However, the results from future monitoring surveys will help to confirm whether this is the case.

1.2.1 Scour

It has been widely recognised that the dominant factor in mobilising soft re-workable surface sediment (i.e. sands) at North Hoyle was the action of tidal current (ebb and flood tides). Based upon surveys and subsequent assumptions, backed by coastal processes expert opinion, and from the latest set of surveys; it can be concluded that, to date, no long term scour is developing at the North Hoyle Offshore Wind Farm.

There appears to be no scientific value in carrying out a survey at the end of the summer period in 2005 (the next timetabled survey slot) which merely reflects a regime of normal tidal processes, where it has already been established that scour (to the degree predicted prior to construction) has not occurred. Therefore, NWPO Ltd requested that the Licensing Authority reconsider the frequency of survey requirements from bi-annually to annually starting in Spring 2005.

NWPO Ltd propose to undertake subsequent scour surveys annually during the Autumn for the duration of the Licensing period.

Bomel (2004) concluded that the North Hoyle monopiles, based on the design basis, would have an acceptable performance in respect of axial capacity, lateral response and loading-induced stresses. Hence, given the maximum scour development seen to date is less than 0.5m depth, scour is unlikely to affect the structural integrity of the monopile foundations.

Scour development is less than that predicted in the Project Method Statement and in line with the design assumptions made by the project designers.

Based upon bottom and side scan sonar survey pre and post construction, there has been no perceptible global scour or change in seabed bathymetry.

Environmental implications are effectively negligible as no distinct scour pits have developed. Placement of rock around the J-Tubes will provide a stable substrate for organisms to grow and improve biodiversity.

1.3 BENTHIC ORGANISMS

There were general reductions in the number of taxa, individuals and species diversity in the 2004 surveys. It is important to note, however, that these reductions have occurred at sites both within and outside of the wind farm, including at distant control areas. Sites within the wind farm continued to have the highest number of taxa, as in previous years.

Overall, there is no substantial evidence to suggest that the biotopes previously identified at North Hoyle from the baseline survey of 2001 have changed. This is only the second survey after construction, however, and continuing monitoring will provide reassurance that

construction and operation of the wind farm has not had any major deleterious impacts on the benthic infaunal communities.

The impact of electric and magnetic fields from submarine power cables associated with offshore wind farms on electrically and magnetically sensitive species is unclear. Such fields could attract or repel fish, or there may be no effect. Work is ongoing through the COWRIE programme to further investigate these effects. Due to the low number of elasmobranchs caught in all three surveys (including the baseline) it is difficult to formulate conclusions relating to these species. However, there is no evidence that dogfish, if present, have been attracted to the wind farm array area or cable route sites.

The epifaunal species identified during the 2004 survey indicated that the majority of the trawl sites were within areas of hard substratum. Those sites, which yielded the highest numbers of fish, supported invertebrate species more common with sandy sub-littoral environments. Invertebrate species recorded at the array sites reflected a more intermediate substratum.

The results from the 2004 surveys suggest that characteristics of the Irish Sea assemblages identified after the initial 2001 survey have been retained with the presence throughout the survey area of several key fish and invertebrate species. Sites also retained features of similar substratum types to those from the previous surveys. Continuation of the future monitoring programme and relation to wider fisheries data such as CEFAS trawls and other survey data (grab samples) will enable more definitive conclusions to be drawn.

The results from the previous surveys identified the benthic communities at the North Hoyle wind farm as having similar qualities to those described by Ellis *et al* (2000) for the Irish Sea. There is no reason to suggest that any alterations to these assemblages have occurred from the results obtained during the 2004 beam trawl survey. However, future monitoring, including analysis of CEFAS data will enable any effects of the North Hoyle wind farm on the benthic communities to be identified.

1.4 FISHERIES

In the 2004 survey it was found that the highest numbers of fish were recorded from the inshore and sandier sites located to the south east of the wind farm. Sites within the wind farm itself had comparable numbers of fish to those located outside the array area. In general, the 2004 survey yielded results that were comparable to those from the two previous surveys (2001 and 2003).

Overall, fish survey results in relation to the wind farm development were highly variable. It is possible at this stage to note that there has been neither a wholesale avoidance of the area or a general increase in demersal fish abundance/diversity at benthic habitats within the array area. Gadoid species (poor cod and whiting) may be less readily captured within the array area now that they appear to be congregating around monopile structures.

Future surveys will help determine if the changes in fish populations that have been noted are a result of small-scale population level effects, seasonal variability or if results reflect a wider response to the presence of the wind farm.

Data from 2004 CEFAS surveys indicated that catch rates of 12 species (dab, plaice, sole, solenette, scaldfish, whiting, poor cod, thornback ray, spotted ray, lesser spotted dogfish, tub gurnard and common dragonet) at the station near North Hoyle were greater than those in 2002. Catches of solenette and poor cod reached a record high for the time-series. There was, however, a decline in the catches of grey gurnard, pogge and lesser weever. Catches of the three species of elasmobranch near North Hoyle were all above the long-term average for the sampling station.

Bearing in mind the limitation outlined above, the CPUE data nevertheless suggest no major deviations in demersal fish populations in autumn 2004. Ten of the seventeen species were caught in numbers which were higher than the ranges for the previous ten years in the North

Hoyle area suggesting that construction and operation of the wind farm have not had any major deleterious effects on fish populations.

During the latter stages of the North Hoyle construction phase (spring 2004) it appears that fish distributions or behaviour were affected in some way that resulted in poor catches. From spring 2005 the general impression is that fishing in close proximity to the North Hoyle wind farm has picked up and is not significantly different from how it was immediately before construction work began.

Although formal records have not been kept, the angling charter boat skippers take a keen interest in the range of species taken by their clients as this influences subsequent bookings. They are satisfied that the variety of species and size of fish is sufficient to meet their clients' expectations and ensure further bookings.

The charter-boat angling in close proximity to the north-west corner of the wind-farm site has regularly yielded catches of rays, tope and a variety of dogfish species. Although it is too early to draw any firm conclusions with respect to individual species or elasmobranchs in general, these initial reports suggest that the elasmobranch species are not being driven from the area as a result of operation of the wind farm.

1.5 ORNITHOLOGY

The findings of the ornithological survey for the period March 2004 to March 2005 are presented in this report. This period covers the first 12 months of post construction monitoring and constitutes year three of a five year programme. The surveys and analytical approach were amended slightly from those adopted in the previous report to reflect the latest guidance in seabird surveys techniques and the greater data set available for analysis. The range of species recorded was similar to those reported previously.

The analyses of the data found some significant changes in the distribution of the birds, however, these changes differed with species and the phase of the development and there was no clear pattern of effect on all species. Some species such as shag showed significant shifts in their distribution towards the wind farm during construction and operation, whilst auk species as a whole showed a continual shift in their distribution away from the wind farm over the same period. Some species such as red-throated diver appeared to be unaffected by the wind farm development.

Effects on the qualifying interest species of the 'proposed' Liverpool Bay mSPA also differed. Common scoter showed a low preference for the North Hoyle Offshore Wind Farm site pre-construction, and this was enhanced by a further avoidance during the construction stage. The effect was reduced during operation and further surveys will help assess whether this effect is reduced further with time. In contrast no significant effects on red-throated diver were found.

Despite some localised changes, especially during the construction phase, there are no indications that the North Hoyle Wind Farm has caused any significant changes in the general distribution of the main concentrations of common scoter in Liverpool Bay, all of which lie some distance from the North Hoyle Offshore Wind Farm. The aerial surveys show that the distribution across the Bay has changed little since the AWCSS started in the winter of 2001/02.

It is unclear whether the effects on piscivores are related to effects on their prey species, or due to disturbance effects from the wind farm. This assessment will require more data during the operating period and hence will be informed by the findings of ongoing surveys.

Prior to the next monitoring report, a review will be undertaken of the data collected during surveys for the Gwynt y Môr Offshore Wind Farm. It is possible that the current dataset and analyses may be enhanced by use of these data.

There was little direct evidence of the wind farm causing a significant barrier effect, although some minor effects on species such as common scoter and gannet maybe occurring and require some further assessment.

The findings of the boat surveys have indicated that the proportion of the birds flying at a height which is likely to result in a collision event is very low, approximately 0.3% of the total numbers recorded. All the birds recorded at heights of over 20m were gulls. No further collision risk assessment work is currently considered necessary.

1.6 MARINE MAMMALS

Although wind farm construction activities can have a detrimental effect on particular near shore species of cetacean like the harbour porpoise, causing avoidance during pile driving, as has been found elsewhere (see, for example, Tougaard *et al.*, 2003), there is no evidence for long-term distributional changes of any cetacean species from a comparison of sightings data before wind farm construction commenced with those thereafter. However, an important caveat should be made: there have been no systematic effort-related observations collected over the two periods in the vicinity of Liverpool Bay, and the results presented here have focussed upon overall distribution patterns from incidental sightings.

Investigation of the Sea Watch Foundation cetacean sightings database suggests that there is no evidence that the construction and operation of North Hoyle offshore wind farm has had any adverse impact on populations of cetaceans, especially the most commonly occurring species, harbour porpoise, in Liverpool Bay.

There are currently insufficient data from the grey seal haul out at West Hoyle Bank to make similar conclusions for the only pinniped species to occur regularly in the area. However, casual records of both grey seal and harbour porpoise within the operational wind farm area and the movements of tagged grey seals through the operational wind farm demonstrate that individual animals are prepared to visit the wind farm site and apparently to forage actively within it. Given the concentration of food resources around wind turbine foundations (CMACS and MarineSeen 2004) this is perhaps not surprising but does provide reassurance that the presence of the wind turbines does not exclude these marine mammal species from the site. It must, however, be borne in mind that the casual records of harbour porpoise and grey seal occurred on relatively calm days (sea state 1) when operation noise from the wind turbines would have been minimal. No conclusion can be drawn about whether animals visit during windy days.

Further data will be reported in the next annual report as seal haul out data from West Hoyle bank and marine mammal sightings data from site-specific ornithological surveys become available.

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