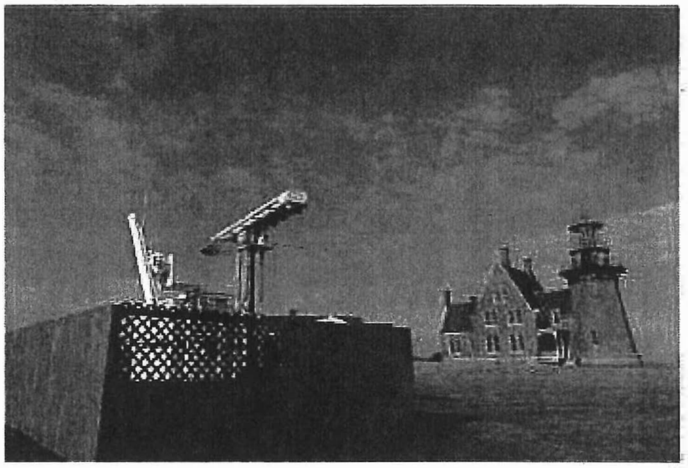
Construction and Post-Construction Avian and Bat Monitoring Plan

Block Island Wind Farm



Prepared for:

DEEPWATERWIND
Clean energy is just over the horizon.

Deepwater Wind Block Island, LLC
56 Exchange Terrace
Suite 101
Providence, RI 02903

Prepared by:

TETRA TECH

451 Presumpscot Street
Portland Maine 04103
March 2012

February 28, 2014

DEEPWATERWIND

TABLE OF CONTENTS

List of Tables

List of Figures

1.0 INTRODUCTION

Deepwater Wind Block Island, LLC (Deepwater Wind) proposes to develop the Block Island Wind Farm (BIWF or Project), a 30 megawatt offshore wind farm located in state waters approximately 3 miles (mi) (4.8 kilometers [km]) southeast of Block Island, Rhode Island. The BIWF will consist of five 6 megawatt wind turbine generators (WTGs), a submarine cable interconnecting the WTGs (Inter-Array Cable), and a 34.5-kilovolt transmission cable from the northernmost WTG to an interconnection point on Block Island (Export Cable). Federal and State permit applications were submitted in 2012.

1.1 Purpose and Need

Deepwater Wind is committed to environmental due diligence and recognizes the need to assess potential impacts of the BIWF on birds and bats. This proposed monitoring plan is in response to U.S. Fish and Wildlife Service (USFWS) and Rhode Island Coastal Resource Management Council (CRMC) recommendations.

Potential impacts to bird and bat species were evaluated based on the pre-construction data collected during the BIWF Pre-Construction Avian and Bat Assessment, 2009–2011. The potential impacts of the BIWF may include:

1. **Construction**
    a. Direct habitat loss and change
    b. Disturbance during construction
2. **Operational**
    a. Collision during operation
    b. Displacement of foraging birds during operation
    c. Barrier effects on birds transiting or migrating through the area during operation

The purpose of this document is to describe the proposed construction and post-construction monitoring (PCM) surveys for the BIWF, as well as to outline a process for data collection and analyses. The proposed survey methods in this document are consistent with similar monitoring survey protocols for offshore wind energy facilities in Europe (Maclean et al. 2009).

Monitoring will include:

- Construction Phase:
    - pre-construction beached bird surveys on Block Island;
    - bat acoustic monitoring during construction of the BIWF;
- Post Construction Phase:
    - post-construction beached bird surveys on Block Island;
    - visual observation surveys in and around the BIWF during operation;

- thermal imaging camera monitoring during operation of the BIWF; and
- avian radar monitoring during operation of the BIWF.

Deepwater Wind will complete one year of pre-construction beached bird monitoring as well as bat acoustic monitoring during construction. Post-construction, Deepwater Wind will complete three nonconsecutive years of PCM surveys within the first five years of Project operations. The initial year of PCM surveys would coincide with the first year the Project is operational. The second and third years of monitoring would be performed during the third and fifth year of operations.

2.0 CONSTRUCTION AND POST-CONSTRUCTION AVIAN AND BAT MONITORING

2.1 Objectives of Construction Monitoring

The objectives of the beached bird survey is to assess the relative abundance of bird carcasses washing up on the south and east coast of Block Island prior to construction of the BIWF and after construction of the BIWF. The objective of the bat acoustic survey is to determine if bats are attracted to lit construction vessels during nighttime construction activity at the BIWF WTGs.

2.2 Objectives of Post-Construction Monitoring

The objectives of the PCM surveys are to assess changes in temporal and spatial patterns of avian and bat occurrence in the BIWF Project area, as well as to sample potential avian collision rates at select WTGs. The ability to accurately assess the collision rate of birds and bats at the BIWF is limited because traditional mortality ground searches are not possible in the marine environment. Potential impacts of the BIWF are not limited to mortality and may also include displacement of foraging and migrating birds. The PCM surveys are designed to assess these impacts.

The goals of the PCM are to:

1. Evaluate the potential displacement of foraging and migrating birds from the installation of the WTGs within the Project area and vicinity.
2. Evaluate potential collision rates of migratory birds with the WTG array.

2.2 Level of Effort and Timing

Table 1 provides a summary of the level of effort and timing for each survey.

Table 1. Construction and Post-Construction Monitoring Survey Summary

Effort		Total Duration	Timing	Focus
Construction Monitoring				
Beached Bird Surveys	Twice per month at each of three Block Island beaches (as detailed in Figure 1)	1 year	One full year pre-construction, and during years 1 and 3 of operation	Baseline and post-construction beached bird carcass wash up rates on southern Block Island
Bat Acoustic Vessel Monitoring	Nightly on a maximum of two construction vessels operating with deck lights on, with a minimum of two bat acoustic detectors on each vessel	1 season	Nightly during the warm period (March 15 – October 15) during construction only	Bat activity during construction
Post-construction Monitoring				
Beached Bird Surveys	Twice per month, year round at each of three Block Island beaches (as detailed in Figure 1)	2 years	During the first and third year that the BIWF wind farm is operational	Baseline and post-construction beached bird carcass wash up rates on southern Block Island
Ship-based Bird Monitoring	Once per month	2 years	Year round, during years 1 and 3 of operation	Displacement of migrating and foraging birds
Nocturnal Bird Flight and Collision Monitoring (Thermal Imaging)	24 hours per day, year round.	3 years	Year round, during years 1, 3, and 5 of operation.	Nocturnal migrant activity and collision rates at two WTGs
Avian Radar Monitoring	24 hours per day, year round.	3 years	Year round, during years 1, 3, and 5 of operation.	Migration activity, flight behavior, passage rates, and avoidance behavior in BIWF

3.0 CONSTRUCTION AND POST-CONSTRUCTION MONITORING SURVEY METHODS

3.1 Beached Bird Surveys

Rationale

Beached bird carcass surveys are considered to be an effective method for evaluating long-term trends in seabird populations. The abundance of beached birds is thought to be a result of habitat change and disruption caused by natural phenomena (i.e., hurricanes and Nor'Easters), as well as human impacts such as development and oil spills. Beach surveys have also been used to identify and quantify other threats to seabirds such as fishing gear entanglement, marine pollution, disease, marine debris ingestion, and trauma (Harris et al. 2006).

Traditional onshore wind energy post-construction monitoring techniques for assessing avian mortality are logistically impossible at offshore wind farms. The beached bird surveys will not provide a estimate of bird mortality associated with the wind farm. They will provide the relative abundance of beached birds washing up on the southern and eastern coasts of Block Island before construction and during operation of the wind farm.

Methods

Several acceptable survey methodologies have been developed for conducting beached bird surveys. For the purposes of this study the methods outlined in *Seabird Ecological Assessment Network's (SEANET) Protocol, A Guide for SEANET Volunteers, Version 3.1, 2010* (SEANET 2010) will be used.

Beached bird surveys will be performed by trained field technicians on three beaches along the southern, southeastern, and eastern portions of Block Island (Figure 1). Surveys are scheduled to be performed twice per month at each location year round starting approximately 12 months prior to construction of the BIWF. Once the BIWF is constructed beached bird surveys will continue at a rate of twice per month for the first and third years of operation. Data will be recorded on standardized data sheets (Appendix A). Data sheets will be transferred to Project biologists once per month by the field technicians on Block Island.

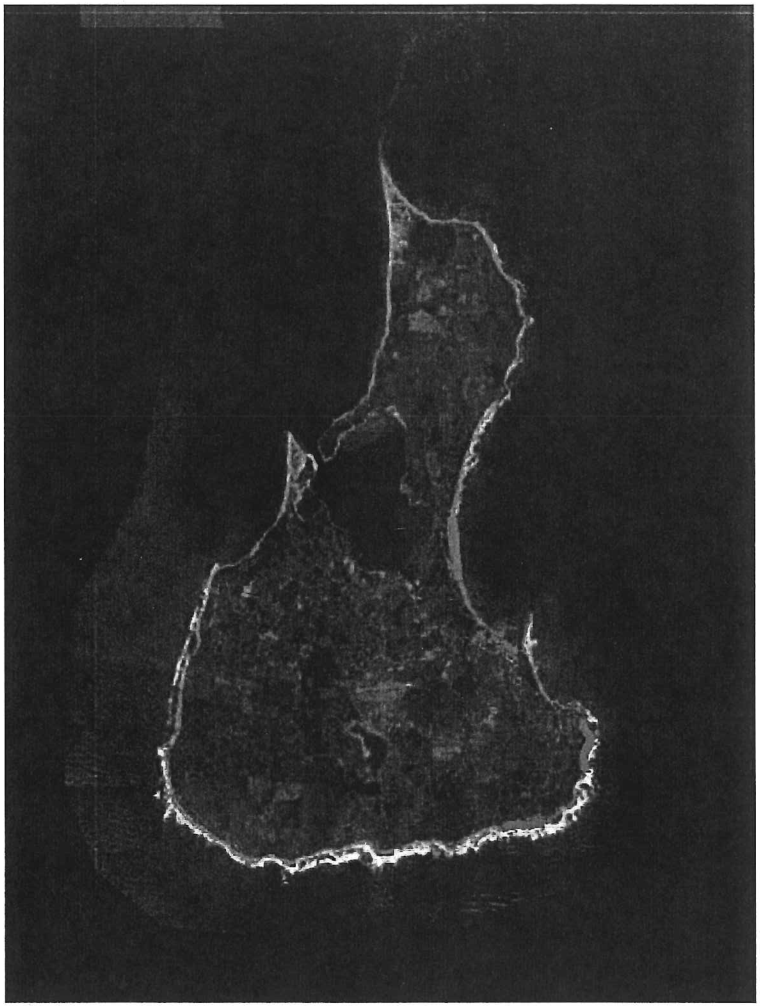


Figure 1. Beached bird survey transect locations (red lines) on Block Island.

3.2 Bat Acoustic Vessel Monitoring

Rationale

In order to address USFWS's concern that bats may be attracted to bright lights on construction vessels during installation of the BIWF WTGs, Deepwater Wind will conduct acoustic monitoring of lit vessels

Acoustic monitoring is one of the most effective and efficient means of assessing bat species diversity and activity levels (Britzke et al. 2010). Active sampling can be useful in determining species presence and activity levels, with the added benefit of producing precise spatial distribution information correlated with a global positioning system (GPS).

Methods

Bat acoustic monitoring during construction will be performed on vessels operating at night with deck lights, or other work lights that are continuously illuminated, during at least 4 hours of the night. Surveys will be performed on a maximum of two construction vessels, with a minimum of two ultrasonic bat acoustic monitoring systems. Vessel monitoring will occur whenever the selected construction vessels are active at night between March 15 and October 15.

The detectors will be placed as high as possible above the decks of the ships and as far away from noisy equipment as possible. Prior to vessel deployment, and once per week after construction has begun, the bat acoustic monitoring systems will be manually checked by Tetra Tech staff or the Deepwater Wind Construction Environmental Compliance Monitor, and the data from each unit will be downloaded and stored on redundant hard drives.

The methods for analyzing and summarizing the bat acoustic vessel monitoring data will be similar to the methods used to analyze the bat acoustic data collected during pre-construction surveys for the BIWF. Qualitative, visual comparisons of recorded call sequences of sufficient length (three or more pulses) will be made to established reference libraries of bat calls. This technique of comparing recorded call sequences to known parameters for typical species specific call sequences allows for relatively accurate identification of bat species (O' Farrell et al. 1999, O' Farrell and Gannon 1999).

3.3 Ship-Based Avian Surveys

Rationale

One potential impact of the BIWF is displacement of foraging or migrating birds from the area where the WTGs are installed. In order to determine the magnitude of this potential impact Deepwater Wind proposes to conduct year-round ship-based avian surveys using similar methods to the pre-construction ship-based surveys. Ship-based surveys will be conducted in the first and third year the BIWF is operational.

The purpose of the surveys will be to record information on birds that may be foraging, transiting, or migrating through the BIWF area and adjacent areas. The goal of the ship-based surveys is to assess potential displacement effects of the BIWF on birds.

Ship-based strip transect surveys, at a sampling rate of once per month, are proposed for the following reasons:

1. Strip transects are preferable to point counts because vessel time is maximized by collecting data for the entire duration the field team is on the water. Data collection time would be lost traveling between point count locations. Additionally, because of the general homogeneity of habitat in the Project area it will be more effectively sampled by continuous observation strip transects. If there were significant differences in habitat type across the Lease Area then a point count sampling approach would be more effective (Buckland et al. 1993).
2. By sampling a large area (across the entire BIWF Project area) it may be possible to reduce potential misinterpretations of shifts in the distribution of pelagic birds as changes in temporal occurrence patterns (Buckland et al. 1993).
3. Based on our survey goals we feel that 12 replications per year is sufficient to sample adequate variance in the target populations and will allow a "reasonable" degree of freedom for analyses of clustered and unique data points (i.e., seaducks and pelagics) (Buckland et al. 1993, Gray and Burlew 2007).

4. The evaluation of the effects of offshore wind energy facilities on avian distribution patterns in Europe have used similar survey techniques at similar levels of effort (Kahlert et al. 2000, Innogy 2003, Camphuysen et al. 2004, CEFAS 2004, BOWind 2005, Chamberlain et al. 2005, Fox et al. 2006, Hüppop et al. 2006, Petersen et al. 2006, Winiarski et al. 2009, NJDEP 2010, Winiarski et al. 2011).

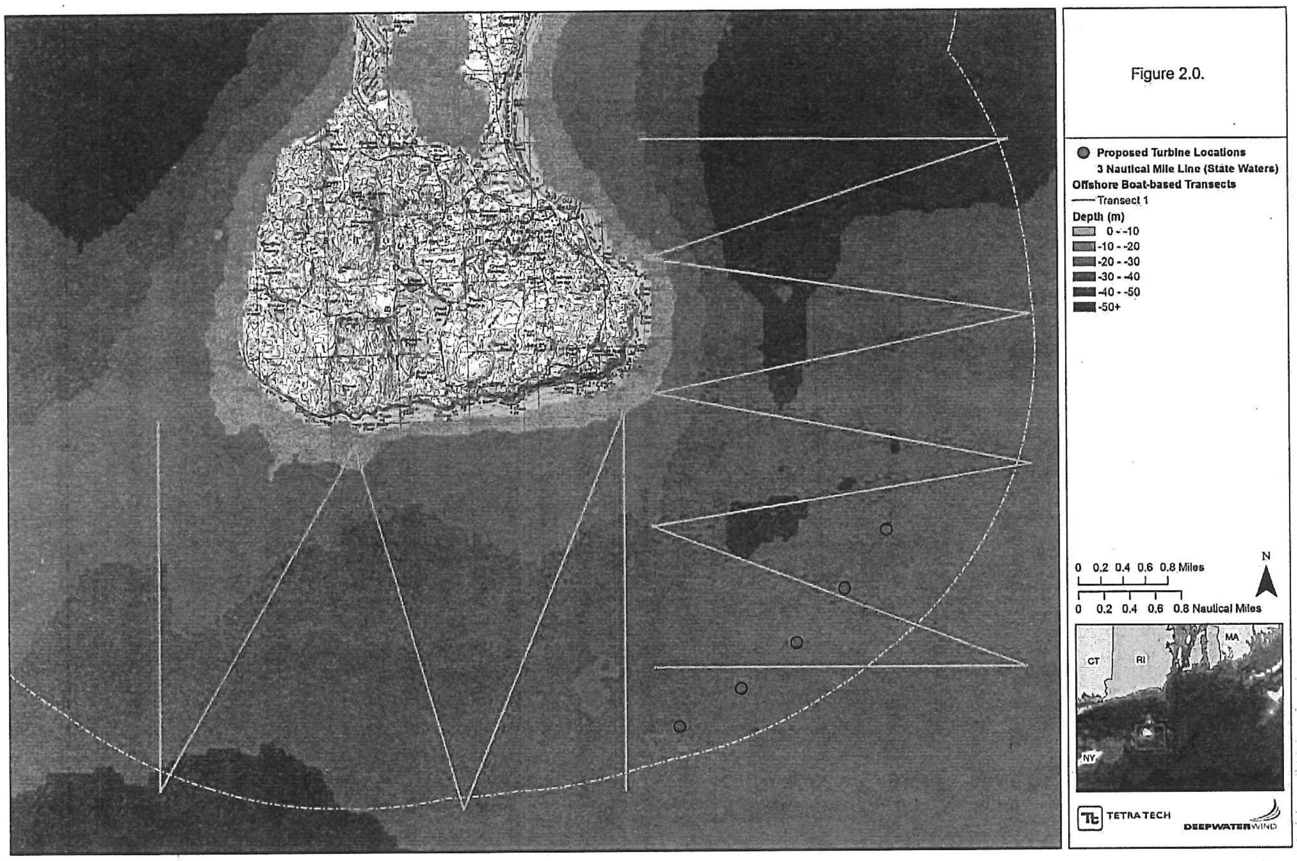
Methods

Monthly systematic ship-based visual observation surveys will begin the first year the BIWF is operational, and again during the third year of operation. Ship-based surveys will occur once per month and will follow a double saw tooth pattern throughout the BIWF Project area. The survey transect will cover a sufficiently large spatial area to assure that nearshore and offshore areas are sampled around the BIWF.

Separation between transects will be 300 m, at a minimum, to avoid double counting. Data will be collected using standard distance sampling techniques including distance and direction of the observed bird to observer, and the behavior of the bird (Thomas et al. 2006). Surveys will be conducted on days when seas are appropriate for a safe and productive ship-based survey (World Meteorological Organization Sea states of 1–4). Detailed weather observations will be recorded using handheld anemometers every 30 minutes during the survey. Observers will record wind speed, wind direction, air temperature, relative humidity, and sea state on standardized data sheets. Surveys will be a minimum of three days apart. Surveys will be conducted on days when sea conditions are appropriate for a safe and productive ship-based survey (World Meteorological Organization Sea States of 1–4).

The survey vessel will travel at a constant speed of 10 knots (18.5 km/hour). Surveys will begin at or after sunrise and continue until the full transect is complete. Two qualified biologists will conduct the surveys; one primary observer will record all birds that fall within a moving "box" that measures 400 m ahead and 400 m perpendicular to the ship. The primary observer will be assisted by a data recorder-observer so that the primary observer can focus on identifying birds. Data will be recorded on a handheld personal digital assistant (Trimble Yuma) equipped with a global positioning system (GPS). All individual birds detected during the surveys will be identified to species level, when possible. Behavioral information on all birds encountered will be recorded including feeding, sitting on water, direct flight, and diving. For birds sitting on the water (and for birds in flight, when possible) the observer will estimate a perpendicular distance from ship to the bird using the following categories and record the distance to the nearest 10 meters. Observers will be equipped with range finders to calibrate their estimates of bird distances. Prior to each survey, observers will use a fixed point, such as a buoy at a variety of distances, to visually calibrate their distance estimate. For birds observed in flight, the vertical flight elevation above the water will be recorded in the following height bins: <10 m, 10–25 m, 26–125 m, 126–200 m, and >200m. Observers will perform a series of flight height tests using laser range finders to accurately gauge flight heights from a subset of birds flying directly overhead. Gulls often kite over moving vessels offshore and therefore serve as large targets that can be used to calibrate flight height estimates as they follow the vessel during transit to the survey transects (i.e., prior to the start of surveys). Definitive flight direction will also be recorded as follows: north (N), northeast (NE), northwest (NW), south (S), southeast (SE), southwest (SW), east (E), west (W), and variable. Data will be analyzed using standard distance sampling methods (Thomas et al. 2006). Estimated density, encounter rate, and relative abundance of birds within subsections of the proposed lease area will be calculated. Data will be plotted spatially via geographic information systems (GIS) and presented on map figures. Data will be archived and backed up by field biologists during transit, and at Tetra Tech's Portland, Maine office.

Figure 2. Ship-based survey transect.



3.4 Nocturnal Bird Flight and Collision Monitoring (Thermal Imaging)

Rationale

Birds, especially nocturnal migrants, and bats have potential to collide with the BIWF WTG blades, towers, and jacket foundations. Monitoring nocturnal migration at offshore wind farms is exceedingly challenging. Thermal imaging cameras mounted on two WTG structures will provide insight into the interactions between wildlife and WTG blades during the day, at night, and during periods of poor visibility. The goal of the Thermal Imaging Monitoring is to sample avian collision rates at two WTGs with thermal imaging videography.

Desholm (2003 and 2005) pioneered the use of thermal imaging videography to monitor offshore WTGs with the Thermal Animal Detection System (TADS). Thermal imaging technology is progressing rapidly and therefore prior to the start of construction Deepwater Wind will identify the best available technology for use on the Project rather than committing to a technology at this time.

Methods

Thermal image monitoring will be initiated during the first year the Project is operational and will occur year-round for a total of three years during the first, third, and fifth years of operation.

Vertically orientated thermal imaging cameras will monitor two of the WTGs. Cameras will have a resolution of at least 320 x 240 pixels. Images of the entire rotor swept area (RSA) will be recorded. Data will be recorded locally at the WTGs and transmitted via a remote data connection from the camera systems to Project biologist.

Cameras will be ground-truthed and settings adjusted during the initial setup period, and then revisited periodically for maintenance and quality assurance. Quality assurance visits will take place once per quarter during the survey window (ground-truthing days will be conducted in spring, summer, fall, and winter) at each of the two WTGs monitored. The thermal imaging camera settings will be adjusted quarterly in order to provide optimal recording of target species groups. The target species groups will change by season and will include:

- Songbird during spring and fall
- Seaducks and gulls during the winter
- Terns and pelagic birds during the summer

Quality assurance visits will be completed by two biologists who will refine the settings of the video system to maintain optimal surveillance of the RSA air space and of target species groups. During quality assurance visits one biologist will monitor the video output of the thermal camera(s) and one biologist will visually monitor (with binoculars and/or spotting scope) the RSA of the WTG. The biologists will quantify the efficacy of the thermal camera and software at detecting birds. Any modifications to the settings of the system will be cataloged to facilitate future refinements of the technique. The quality of the videos recorded, as well as the sensitivity of the image recognition software, will be evaluated quarterly.

The results of the video survey effort will include a list of all targets recorded, approximate height above sea level that targets flew, type of target (i.e., taxa and, if possible, bird or bat species or at least a general description of size), weather conditions during which the target was observed, and whether the target collided with any portion of the WTGs. Statistical methods for estimating collision rates from the thermal imaging data are under development and will be incorporated into the video survey results as appropriate.

3.5 Avian Radar

Rationale

During pre-construction surveys Deepwater Wind's MERLIN avian radar system provided near continuous, 24-hours per day surveillance of biological target (birds and bats) movements in the Study Area. The system's dual radars, vertical and horizontal, allowed for multiple "zones" of the Study Area to be subsampled and compared. Target passage rates (TPR), flight heights, and flight directions were recorded. A similar survey effort will be implemented during post-construction monitoring of the Project.

Determining the impact of the proposed BIWF on birds, especially nocturnal migrants, is an important component of the BIWF post-construction monitoring program. Ship-based surveys will provide data for birds active during the day, and thermal imaging is expected to gather data on nocturnal activity within the RSA of two of the WTGs. The use of avian radar, either mounted directly to a turbine platform or on the Block Island shore, will gather information on diurnal and nocturnal migrants in the wind farm and adjacent areas. Flight heights, flight direction, and the magnitude of activity (target passage rates) will be recorded. The post-construction radar data would then be comparable to the pre-construction survey data.

Methods

Avian Radar surveys of the WTG array will be conducted year-round during the first, third, and fifth years the BIWF is operational. The radar system will have dual marine radar sensors. A remote data uplink will allow remote system monitoring through the Internet, access to recorded data, and system administration. Project biologists will conduct the initial setup and periodic maintenance visits. The system will otherwise be remotely monitored via the data uplink/Internet connections.

Vertical Scanning Radar (VSR) Operation

The VSR X-band radar will operate in the vertical (y-z) plane transmitting a wedge-shaped beam from horizon to horizon using the vertical scanning technique. In this configuration the radar is turned on its side so it scans a vertical slice through the atmosphere. The radar software detects and tracks targets that pass through or along the vertical beam, recording target size, speed, and altitude attributes, as well as other characteristics. This radar transmits a 22°, fan-shaped beam at a scan rate of approximately 2.5 seconds/scan, and can reliably detect small, bird- and bat-sized targets on either side of and above the radar. The VSR in this configuration outputs the lowest power density, but it provides high spatial resolution data with low side lobe returns to provide optimal detection of bird/bat targets as they pass through the study site. As the X-band is a short wavelength radar (3 cm), it is susceptible to interference from precipitation; radar data collected during moderate to heavy rain events will be quantified and removed during post-processing. The VSR data will be used to determine target altitudes and are also the primary dataset used to determine target counts and target passage rates.

Horizontal Scanning Radar (HSR) Operation

The HSR S-band radar will operate in the horizontal (x-y) plane transmitting a 24°, wedge-shaped beam relatively perpendicular to the VSR. The HSR for this survey will be configured to operate with a short pulse but transmits at a longer wavelength (10 cm) of energy than the VSR. The S-band has the advantage of greater detection range and less signal attenuation (interference) from surrounding vegetation and waves (typically referred to as ground and wave clutter, respectively), as well as rain. It is also less sensitive to insect contamination. Clutter interference is additionally reduced by applying the radar software clutter suppression algorithms that improve detection of small (bird- and bat-sized) targets in high clutter environments. The HSR scans 360° in the horizontal plane at a scan rate of approximately 2.5 seconds/scan and a range setting of 3.7 km (2.0 nm) radius (for this survey), detecting and tracking targets moving around the survey site. The HSR data will be used to determine directional movement of targets over or through the Project Area.

The results of the radar survey effort will include a summary of target flight heights, passage rates, and flight directions. Summaries will be presented for different biological periods (spring, summer, fall, and winter) as well as day, night, dawn, and dusk. Discrete spatial summaries will be provided for different portions of the BIWF and adjacent areas. Data will then be compared to the pre-construction avian radar results.

4.0 AGENCY COORDINATION

4.1 Quarterly Updates

Deepwater Wind will provide quarterly field report to the USACE, the USFWS and the CRMC during the execution of the PCM surveys. The quarterly field reports will summarize the activities conducted during the quarter, the level of effort, and plans for the next quarter's activities.

4.2 Annual Reporting

Deepwater Wind will prepare a comprehensive annual report following the completion of each year of PCM surveys. Deepwater Wind will provide statistical interpretation of the post-construction data and conclusions. Deepwater Wind shall also hold a meeting with USACE, USFWS and CRMC following each year of PCM surveys at the BIWF.

4.3 Continued Coordination

Deepwater Wind commits to continued coordination with USACE, USFWS and CRMC regarding impacts to protected avian and bat species throughout the PCM period and the duration of the BIWF. Yearly during the PCM period, Deepwater Wind will review the results of the surveys with said agencies and modify the PCM if deemed appropriate.

5.0 LITERATURE CITED

BOWind. 2005. Specifications for Pre-Construction, Construction and Post-Construction Environmental Monitoring. Barrow Offshore Wind Ltd.

Britzke, E. R., B.A. Slack, M.P. Armstrong, and S.C. Loeb. 2010. Effects of Orientation and Weatherproofing on the Detection of Bat Echolocation Calls. Journal of Fish and Wildlife Management 1:136 - 141.

Buckland, S. T., D. R. Anderson, K. P. Burnham, and J. L. Lake. 1993. Distance sampling: estimating abundance of biological populations. Chapman and Hall, New York, New York.

Camphuysen, C. J., Fox, A. D., Leopold, M. F., and Petersen, I.K. . 2004. Towards standardised seabirds at sea census techniques in connection with environmental impact assessments for offshore wind farms in the U.K. A comparison of Ship and Aerial Sampling Methods for Marine Birds, and Their Applicability to Offshore Wind Farm Assessments. Koninklijk Nederlands Instituut voor Onderzoek der Zee

CEFAS. 2004. Offshore Wind Farms: Guidance Note for Environmental Impact Assessment in Respect of FEPA and CPA Requirements. Centre for Environment, Fisheries and Aquaculture Science (CEFAS), Department for Environment, Food and Rural Affairs.

Chamberlain, D., S. Freeman, M. Rehfisch, T. Fox, and M. Desholm. 2005. Appraisal of Scottish Natural Heritage's Wind Farm Collision Risk Model and its Application. British Trust for Ornithology. Report BTO Research Report 401.

Desholm, M. 2003. Thermal Animal Detection System (TADS). Development of a method for estimating collision frequency of migrating birds at offshore wind turbines. National Environmental Research Institute, Denmark. 27 pp. – NERI Technical Report No. 440.

Desholm, M. 2005. Preliminary investigations of bird-turbine collisions at Nysted offshore wind farm and final quality control of Thermal Animal Detection System (TADS). National Environmental Research Institute, Denmark. 30 pp.

Maclean, I. M. D., L. J. Wright, D. A. Showler, and M. M. Rehfisch. 2009. A Review of Assessment Methodologies for Offshore Windfarms. British Trust for Ornithology Report Commissioned by Cowrie Ltd.

Fox, T., T. K. Christensen, M. Desholm, J. Kahlert, and I. K. Petersen. 2006. Final Results of the Avian Investigations at the Horns Rev and Nysted Offshore Wind Farms. National Environment Research Institute, Department of Wildlife Ecology and Biodiversity.

Gray, Brian R., and Michele M. Burlew. 2007. Estimating Trend Precision and Power to Detect Trends Across Grouped Count Data. Ecology 88:2364–2372. http://dx.doi.org/10.1890/06-1714.1

Harris, R.J., Tseng, F.S., Pokras, M.A., Suedmeyer, B.A., Bogart, J.S.H., Prescott, R.L. & Newman, S.H. 2006. Beached bird surveys in Massachusetts: the Seabird Ecological Assessment Network (SEANET). Marine Ornithology 34: 115–122. Accessed on December 12, 2011.< http://www.marineornithology.org/PDF/34_2/34_2_115-122.pdf>

Hüppop, O., J. Dierschke, K.-M. Exo, E. Fredrich, and R. Hill. 2006. Bird migration studies and potential collision risk with offshore wind turbines. Ibis 148:90-109.
Innogy. 2003. North Hoyle offshore wind farm baseline monitoring report. RWE Innogy. Report NH/MonR/Rev 1.

Innogy (2003). North Hoyle offshore wind farm baseline monitoring report. Essen, Germany, RWE Innogy: 41.

Jain A., Kerlinger P., Curry R., and Slobodnik L. 2007. Annual Report for the Maple Ridge Wind Power Project Post-construction Bird and Bat Fatality Study – 2006. Available from http://silverlakeview.com/wind/maple_ridge_report_2006.pdf.

Kahlert, J., M. Desholm, I. Clausager, and I. K. Petersen. 2000. Environmental impact assessment of an offshore wind park at Rødsand: Technical report on birds. National Environmental Research Institute (NERI), Ministry of the Environment.
Nearshore and Offshore Avian Resource Prior to Potential Alternative Energy Development. in University of Rhode Island, Department of Natural Resources Science Kingston, RI.

NJDEP. 2010. Ocean/Wind Power Ecological Baseline Studies Final Report, January 2008 - December 2009. New Jersey Department of Environmental Protection, Office of Science.

O'Farrell, M. J., and W. L. Gannon. 1999. A comparison of acoustic versus capture techniques for the Inventory of bats. Journal of Mammalogy:24-30.

O'Farrell, M. J., B. W. Miller, and W. L. Gannon. 1999. Qualitative identification of free–flying bats using the anabat detector. Journal of Mammalogy 80:11-23.

Petersen, I. K., T. K. Christensen, J. Kahlert, M. Desholm, and A. D. Fox. 2006. Final results of bird studies at the offshore wind farms at Nysted and Horns Rev, Denmark. National Environmental Research Institute.

SEANET (Seabird Ecological Assessment Network). 2010. SEANET Protocol A Guide for SEANET Volunteers Version 3.1. SEANET.2010. Accessed on December 12, 2011. http://www.tufts.edu/vet/seanet/resources/seanet_protocol.pdf

Thomas, L., Lake, J.L., Strindberg, S., Marques, F.F.C., Buckland, S.T., Borchers, D.L., Anderson, D.R., Burnham, K.P., Hedley, S.L., Pollard, J.H., Bishop, J.R.B. and Marques, T.A. 2006. Distance 5.0. Release 2. Research Unit for Wildlife Population Assessment, University of St. Andrews, UK. Available at http://www.ruwpa.st-and.ac.uk/distance/

Winiarski, K., B. Harris, C. Trocki, P. Paton, and S. McWill. 2009. Assessing Rhode Island Sound's Nearshore and Offshore Avian Resource Prior to Potential Alternative Energy Development. University of Rhode Island, Department of Natural Resources Science Kingston, RI.

Winiarski, K., C. Trocki, P. Paton, and S. McWilliams. 2011. A Baseline Assessment of Avian Use of Rhode Island's Nearshore and Offshore. In University of Rhode Island, Department of Natural Resources Science, Kingston, RI.

Buckland, S. T., D. R. Anderson, K. P. Burnham, and J. L. Lake. 1993. Distance sampling: estimating abundance of biological populations. Chapman and Hall, New York, New York.