ACCESS NUMBER: 0319M

STUDY TITLE: Building a Database to Assess the Relative Vulnerability of Migratory Bird Species to Offshore Renewable Energy Projects on the Atlantic OCS

REPORT TITLE: The Relative Vulnerability of Migratory Bird Species to Offshore Wind Energy Projects on the Atlantic Outer Continental Shelf: An Assessment Method and Database

CONTRACT NUMBER: GS-10F-0319M, Order No. M12PD00026

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APPLICABLE PLANNING AREA(S): Atlantic Coast

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BACKGROUND: Offshore wind energy has the potential to provide a significant source of energy to the coastal areas of the mid-Atlantic and northeastern United States. The Bureau of Ocean Energy Management (BOEM) has several ongoing studies and planned studies investigating the abundance and distribution of birds on the Atlantic Outer Continental Shelf (AOCS). BOEM uses this information to identify wind energy areas for leasing consideration and to evaluate proposed offshore projects. However, additional information is needed to better assess the relative vulnerability of individual migratory bird species to wind energy development.

OBJECTIVES: (1) develop a method to quantify the vulnerability of seabirds to offshore wind development on the AOCS that builds on methods and approaches used by others, (2) conduct a peer review of the method, (3) compile species-specific data and implement the method on 170+ additional species.

DESCRIPTION: Offshore wind facilities may impact bird populations directly through mortality from collisions and indirectly through displacement that affects population fitness. We present data on population size, conservation importance, and ecological traits of bird species found in the vicinity of the AOCS and a method of ranking their relative sensitivity to the impacts of collision and displacement.

SIGNIFICANT CONCLUSIONS: The collision sensitivity rank identified that populations of gulls, phalaropes, cormorants, and jaegers are of higher concern on the AOCS relative to other taxa. The displacement sensitivity rank identified that populations of sea ducks, loons, and some alcid species are most vulnerable relative to other taxa. Based on both our literature synthesis and the sensitivity rank,

avoidance behavior and flight height appear to be key factors that influence vulnerability to collision. Available literature and the displacement sensitivity rank both suggest that avoidance of wind facilities and habitat flexibility appear to be key behavioral traits causing potential, though possibly temporary, loss of population fitness through displacement. The impacts of displacement, during construction and operation of wind facilities, on populations will be less immediate and less obvious than those of mortality from collision; therefore, we hope that the approach developed here for BOEM will help prioritize monitoring programs of vulnerable species before, during, and after construction and assist with informing siting decisions for offshore wind facilities. More data are urgently needed on species-specific flight altitude and species-specific avoidance behavior, and we recommend that studies required by BOEM target these two areas of data collection using standardized and cross-study comparable methodologies.

STUDY RESULTS: Our indices provide an assessment of the relative vulnerability of bird species to offshore wind development in the AOCS using multiple factors. This exercise proved to be useful for (1) gaining a better understanding of the environmental factors that likely influence the vulnerability of birds to wind turbines, (2) identifying gaps in knowledge of certain species' biology and life history, and (3) determining the most practical and relevant next phase of applied research using our vulnerability assessments.

Species that scored highly in our population sensitivity indices are often from small biogeographic or global populations of high conservation importance and with high adult survival ranking. These include species such as Black-capped and Bermuda petrels and Least and Roseate terns. The lowest ranking species consisted of songbirds, waterfowl, and wading birds from large global populations and broad distributions. These results were not unexpected, but there was uncertainty associated with some species with limited data on AOCS population size and adult survival.

Consistent with the results of Garthe and Hüppop (2004), Furness and Wade (2012), and Furness et al. (2013), species with higher scores for collision sensitivity included certain gulls, jaegers, and the Northern Gannet. Additional species in our database that also received higher scores for collision sensitivity include phalaropes, tropicbirds, and the Brown Pelican. Behavioral traits that drove higher collision sensitivity indices included low macro avoidance rates with high uncertainty, high amounts of time spent in the rotor swept zone, and high occurrence in the AOCS. Species with low collision sensitivity scores include many passerines that only cross the AOCS briefly during migration and typically fly above the rotor swept zone. Many of these species also had large global populations and low population sensitivity rankings.

Species identified as being vulnerable to displacement were similar to those identified by Garthe and Hüppop (2004), Furness and Wade (2012), and Furness et al. (2013). These included sea ducks and alcids with restricted prey availability, but other taxa that were ranked as more highly vulnerable to displacement included species that have high annual occurrence and feed and breed in the AOCS. Species that had a zero displacement sensitivity score were those such as passerines and shorebirds that have no habitat requirements in the AOCS.

For all three sensitivity indices there were significant areas of uncertainty with key data, particularly population size, adult survival, macro avoidance, and flight height. With this uncertainty in mind, our database was built to be dynamic, and it can therefore easily be updated as new information becomes available from offshore field studies. The uncertainty values also allowed us to identify and account for gaps present in the data for certain species.

Although we used a comprehensive set of metrics in our study, many other environmental factors could influence bird vulnerability to offshore wind facilities. Weather variables have a big influence on collisions with turbines, especially during periods of inclement weather with low visibility (Fox et al.

2006). Weather variables vary greatly both spatially and temporally, and a study of weather influences over the whole AOCS was outside the scope of this study. Factors specific to a wind farm such as lighting (Merkel and Johansen 2011) and area of the rotor swept zone (USFWS 2012) may also affect birds' sensitivity to offshore turbines. These factors also vary over space, and with no offshore wind facilities in the AOCS at the time of this study, it was not possible to include them in our analysis.

While data on biology and life history of birds in the AOCS is incomplete for more in-depth assessments of vulnerability to offshore wind turbines (e.g., using demographic models), our work has applicability in focusing conservation efforts on certain species known or predicted to be most vulnerable to offshore wind facilities. Our predictions could be applied to a specific area by gathering field data to determine the species present and using our indices to assess the vulnerability of species recorded during the field studies (Desholm 2009). Minimization and mitigation efforts could be focused on those species determined to be most vulnerable. In addition, field data could be used to generate maps showing spatial variation in the sensitivity of individual species and total bird sensitivity in a study area, helping to assess likely impact as well as better design wind facilities to reduce that impact. At larger scales across the AOCS, such maps could inform broader policies concerning development of offshore wind energy facilities.

In 2012, the U.S. Fish and Wildlife Service released land-based wind energy guidelines for developing and operating wind projects with respect to minimizing wildlife impacts (USFWS 2012). These guidelines outline a tiered approach (Tiers 1–5) for planning, collecting, and evaluating wildlife studies at wind facilities. Each tier becomes more specific in scope as the study progresses. While there are no equivalent guidelines for offshore wind energy projects, it is reasonable to assume that a tiered approach, or equivalent, will eventually be developed for offshore wind energy projects. Our database and vulnerability ranks would be useful in implementing Tier 1 (or equivalent) studies that recommend a landscape-level assessment for species of concern including acquisition of comprehensive data sources (USFWS 2012). Our database could also be supplemented with spatial data on species' geographic range to further assess which vulnerable species are likely to occur at the location of a proposed wind facility.

STUDY PRODUCT(S):

Report: Robinson Willmott, J. C., G. Forcey, and A. Kent. 2013. The Relative Vulnerability of Migratory Bird Species to Offshore Wind Energy Projects on the Atlantic Outer Continental Shelf: An Assessment Method and Database. Final Report to the U.S. Department of the Interior, Bureau of Ocean Energy Management, Office of Renewable Energy. OCS Study BOEM 2013-207. 275 pp.

Database: Robinson Willmott, J., and G. Forcey. 2013. The Relative Vulnerability of Migratory Bird Species to Offshore Wind Energy Projects on the Atlantic Outer Continental Shelf: An Assessment Method and Database. Normandeau Associates, Inc. OCS Study BOEM 2013-207.

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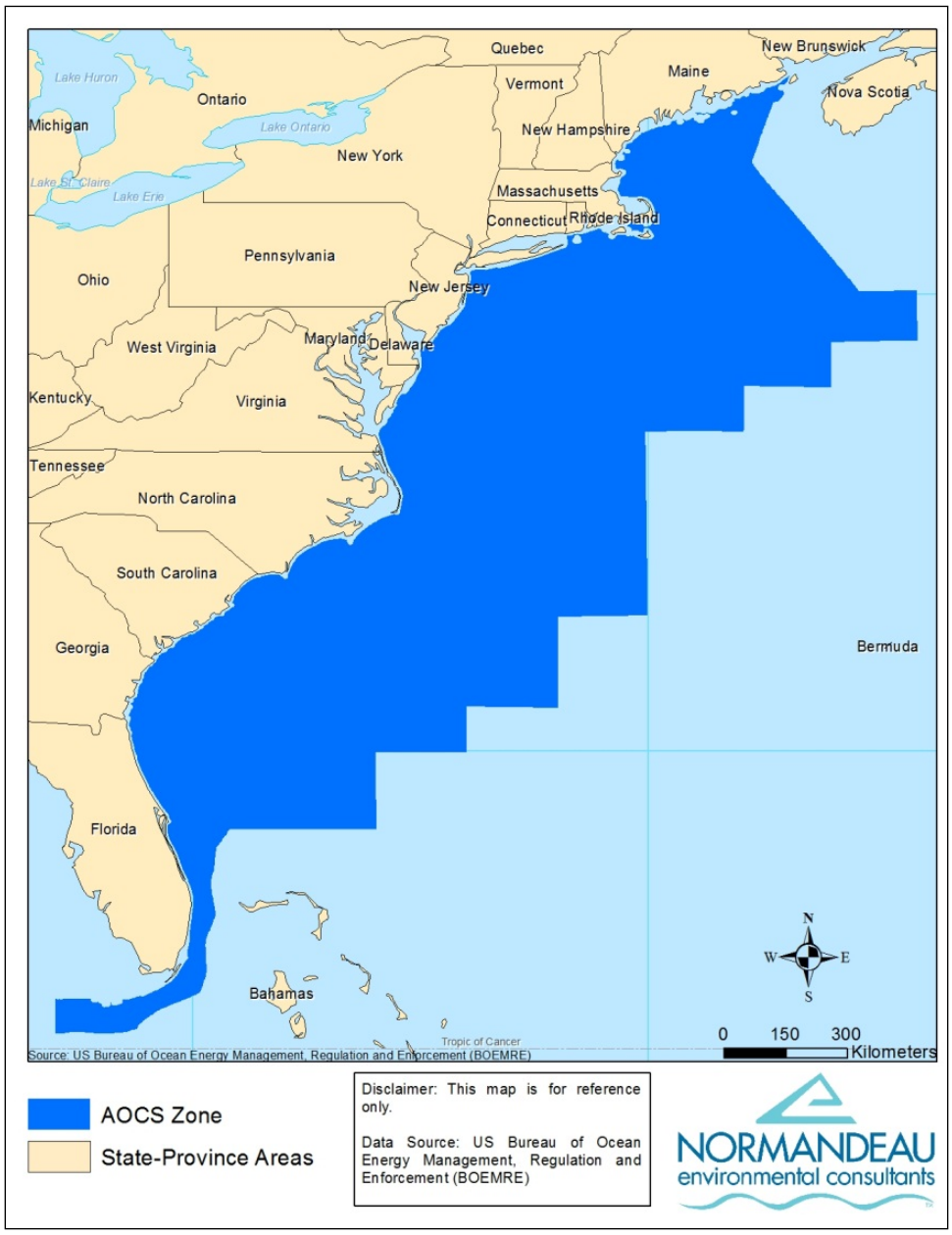

Geographic scope of the Atlantic Outer Continental Shelf.

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