

STUDY TITLE: Compendium of Avian Occurrence Information for the Continental Shelf Waters along the Atlantic Coast of the United States

REPORT TITLE: Compendium of Avian Occurrence Information for the Continental Shelf Waters along the Atlantic Coast of the United States, Shorebird Data Section

CONTRACT NUMBER: M08PG20033

SPONSORING OCS REGION: Atlantic

APPLICABLE PLANNING AREA(S): North, mid, and south Atlantic

FISCAL YEAR(S) OF PROJECT FUNDING: 2009, 2010, 2011

COMPLETION DATE OF REPORT: April 2011

COSTS: \$50,000.00

PROJECT MANAGER(S): Allan F. O'Connell, Jr.

AFFILIATION: U.S. Geological Survey Patuxent Wildlife Research Center (PWRC)

ADDRESS: USGS, Patuxent Wildlife Research Center, Beltsville Lab, BARC East, Bldg. 308, Rm. 213, 10300 Baltimore Ave., Beltsville, MD 20705 Phone: 301-497-5255, Cell: 301-318-5760, Fax: 301-497-5624, [oconnell@usgs.gov](mailto:connell@usgs.gov)

PRINCIPAL INVESTIGATOR(S)*: Scott Johnston and Caleb S. Spiegel, U.S. Fish and Wildlife Service, Region 5, Division of Migratory Birds, Hadley, MA

KEY WORDS: Atlantic ocean, shorebird occurrence, shorebird data, wind power, marine birds

BACKGROUND: Wind energy is one of the fastest-growing segments of the world energy market, offering a clean and abundant source of electricity to meet growing demands. However, wind facilities may have detrimental impacts on many bird species, exposing them to increased mortality through turbine collisions, and altering behavior and flight pathways. Several wind energy facilities are currently being planned for offshore Atlantic waters of the United States. Under Federal laws, regulatory agencies, such as the Bureau of Ocean Energy Management Regulation and Enforcement (BOEMRE) and the U.S. Fish and Wildlife Service, have an obligation to protect populations of birds that may frequent these areas, including shorebirds. In the eastern U.S., BOEMRE has specific jurisdiction over offshore waters beyond three nautical miles (approx. 5.6 km) of shore. As a first step in evaluating the potential for detrimental effects to shorebirds posed by wind turbines in these offshore areas, there is a need to collect information on the occurrence (i.e., distributions) and behavior (e.g., flight heights, direction, timing, etc.) of birds in the marine environment. This information can then be used to develop predictive models of where birds occur and the factors (e.g., food, weather) that influence their distributions, allowing regulators and managers to assess the potential impacts of future offshore facilities. Ultimately, the information can also be used as a baseline for comparisons with post-construction species monitoring efforts, and to identify subsequent research and conservation priorities for species that may be most affected by offshore wind development.

OBJECTIVES: (1) Locate and summarize existing shorebird occurrence data for the U.S. Atlantic Outer Continental Shelf beyond three nautical miles of shore (hereafter "OCS zone"); (2) Map existing shorebird location data in the OCS zone using a GIS; (3) Review and summarize pertinent ancillary

information for western Atlantic shorebirds (e.g., seasonal ranges, flight patterns, and flight altitudes) to identify potential conflicts posed by offshore wind development; (4) Identify gaps in occurrence information and other pertinent information for shorebirds in the OCS zone; (5) Examine studies detailing shorebird interactions with offshore wind facilities in Europe and along the U.S. Atlantic coast to help predict potential conflicts that may occur at facilities to be sited in the OCS zone; (6) Recommend research and/or monitoring efforts that can be used to assess potential impacts of future offshore wind developments on shorebirds in the OCS zone.

DESCRIPTION: We identified all shorebird species that regularly occur along the U.S. Atlantic coast to determine which ones might be exposed to wind development in the OCS zone, using the Birds of North America (BNA) series, a current and comprehensive compilation of avian life history accounts for North American birds. For each species, we obtained broad movement information, including whether migratory pathways generally included offshore areas. We also obtained population estimates and conservation status, and noted abundances and timings of occurrence for each species using BNA and other current references.

To assess potential impacts of future offshore wind developments on shorebirds in the Atlantic OCS zone, we conducted a thorough and systematic search of the published and unpublished literature and reports of information on occurrence and locations, abundance, and behavior (e.g., flight altitude) in offshore marine waters, particularly the U.S. Atlantic. We also contacted biologists, ecologists and conservation professionals in the U.S. and Canada who possessed expertise in shorebird occurrence in offshore U.S. Atlantic waters, shorebird distribution and behavior, and/or shorebird interactions with wind facilities. Information was obtained from a variety of sources including academia, government agencies, and non-governmental organizations. All pertinent information was summarized and is presented in the report.

We obtained shorebird locations from databases containing spatially-explicit records for species that are known to occur in offshore and coastal areas of the U.S. Atlantic. All locations were compiled in a spreadsheet, imported into a Geographic Information System (GIS), and plotted on a GIS map of the study area. A scarcity of shorebird location data limited our ability to provide density estimates for shorebirds across the study area.

SIGNIFICANT CONCLUSIONS: This report synthesizes most extant information about shorebird occurrence and behavior in the Atlantic OCS zone and offers insight into the potential for interactions between shorebirds and future offshore wind development in the region. Despite an extensive search, a paucity of information was located. Few shorebirds have been documented in the OCS zone, though it is likely that several shorebird species pass through or over or it during migratory flights. Atlantic shorebirds will probably face a narrow window of exposure (compared to most marine birds) to wind facilities sited in the OCS zone because of phenology (most occur in the area only during brief migration periods) and behavior (most fly at high altitudes during migration) of most species. However, due to substantial gaps in distribution and behavior information for Atlantic shorebirds, the risk posed by offshore wind development remains unclear. While studies of wind facilities outside the OCS zone suggest that shorebirds should have the capacity to avoid turbines if exposed, few studies have detailed avoidance rates of shorebirds encountering wind turbines. The capacity for successful avoidance upon exposure is expected to be reduced during inclement weather and darkness. Due to the lack of information on shorebird distribution and behavior for the OCS zone and substantial variability of shorebird movement patterns in space and time, more data are required to adequately assess the risks that offshore wind development would pose for shorebirds in the region.

STUDY RESULTS: According to the BNA, thirty-five species of shorebirds occur in offshore and/or coastal areas of the U.S. Atlantic, with the greatest densities and species diversity found during spring and

fall migrations. Only five species breed in the region, while twenty-four species winter in the region, primarily in southern states. Much variability exists in migratory routes among species, with some shorebirds reported in offshore areas far more frequently than others. There is also great variability in population numbers and conservation status among shorebird species in the region.

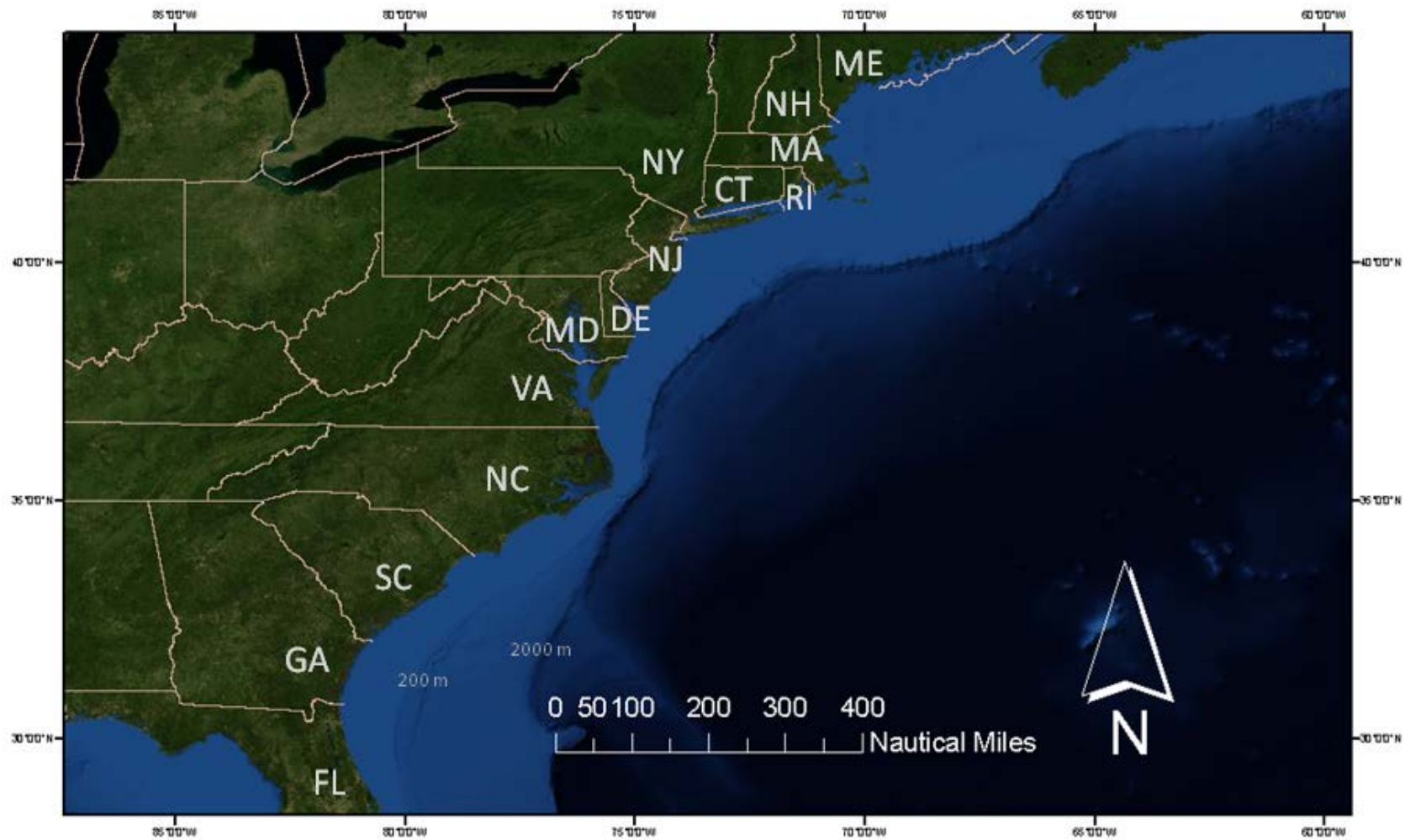
A thorough review of the literature and discussions with shorebird experts produced only minimal information about shorebird occurrence and behavior in the OCS zone, and several experts suggested these topics were not well studied. Despite the general scarcity of data, three multi-year surveys (aerial and ship-based) of marine birds were conducted in offshore waters of Massachusetts, Rhode Island, and New Jersey during the last five years. Each survey documented far fewer shorebirds than other marine bird species in OCS study areas. A small number of projects that used radar to monitor birds within offshore U.S. Atlantic waters found that some shorebird species flew over the OCS zone during migration, but generally maintained high altitudes above the rotor swept zone of proposed wind turbines. However, most of these studies also reported that shorebird flights were affected by environmental conditions including weather and poor visibility, with lower flight altitudes common during unfavorable conditions. Studies using geolocators and satellite tags to track shorebirds largely confirmed the findings that some shorebird species fly over the OCS zone during migration and that routes vary based on environmental conditions. However, these studies did not determine flight altitudes.

The ability of shorebirds to avoid turbines in their path is another important determinant of the risk posed by offshore wind facilities. No data on wind turbine avoidance behavior exists for shorebirds within the OCS zone as no offshore wind facilities have yet been constructed anywhere along the U.S. coast. Nevertheless, studies of shorebird interactions with offshore wind facilities in Europe found that most individuals encountering offshore wind facilities avoided turbines by several hundred meters, resulting in exceptionally low collision rates ($< 0.1\%$). It is difficult to predict exposure and avoidance rates based on the limited sample of European data, and because shorebird behavior varies greatly among species, individuals (e.g., sex, age, condition), and environmental conditions such as weather and predation pressure.

The majority of location data for shorebirds in offshore and nearshore U.S. Atlantic waters were found in two databases, the Compendium of Avian Occurrence Information for Continental Shelf Waters Along the Atlantic Coast of the United States (hereafter “Offshore Atlantic Bird Compendium”), and the Avian Knowledge Network. We mapped all shorebird location records from the Offshore Atlantic Bird Compendium, and all U.S. Atlantic shorebird locations from the Avian Knowledge Network collected between 1990 and 2010. These maps are included as part of this report. The Offshore Atlantic Bird Compendium contained over 2,500 shorebird location records. Most of these records ($> 94\%$) were phalaropes in the OCS zone. Shorebirds comprised less than 0.6% of all bird records in the database, which were largely seabirds and seaducks. We located over 240,000 shorebird locations in the Avian Knowledge Network. There were very few shorebird locations within the OCS zone, since most data in the Avian Knowledge comes from land-based surveys.

STUDY PRODUCT(S): Spiegel, C. S., and S. Johnston. 2011. Compendium of Avian Occurrence Information for the Continental Shelf Waters along the Atlantic Coast of the United States, Shorebird Data Section. A final report for the U.S. Department of Interior, Bureau of Ocean Energy Management Regulation and Enforcement Atlantic OCS Region, Herndon, VA. Contract No. NT-08-03. 35 pp.

* P.I.’s affiliation may be different than that listed for Project Manager(s)



Study area for the Compendium of Avian Occurrence Information for the Continental Shelf Waters along the Atlantic Coast of the United States, Shorebird Data Section. The Outer Continental Shelf (OCS) extends from 3 nautical miles to the shelf break off the coast of each listed state.