

BOEM OCEAN SCIENCE

THE SCIENCE & TECHNOLOGY JOURNAL OF THE BUREAU OF OCEAN ENERGY MANAGEMENT

VOLUME 9 ISSUE 1 • JANUARY/FEBRUARY/MARCH 2012



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Energy Program:
Smart Initiatives Lead
to Offshore Progress**

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Offshore Renewable Energy:
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Answers to a Sea of
Development Questions**

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Visual Impacts on Historic
and Cultural Resources**

**Spotlight on Studies:
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BOEM OCEAN SCIENCE is published quarterly by the Bureau of Ocean Energy Management to communicate recent ocean science and technological information and issues of interest related to offshore energy recovery and ocean stewardship.

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An east view of the Atlantic Ocean from Manteo, North Carolina. Photo by John Milner Associates, Inc.

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FREQUENTLY USED ABBREVIATIONS

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| BOEM | Bureau of Ocean Energy Management |
| DOI | Department of the Interior |
| OCS | Outer Continental Shelf |
| NOAA | National Oceanic and Atmospheric Administration |
| REN | Renewable Energy |
| WEA | Wind Energy Area |

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FOR MORE INFORMATION

Check out the Bureau of Ocean Energy Management website at www.boem.gov.



Tommy P. Beaudreau, *Director*

THE DIRECTOR'S MESSAGE

It is my pleasure to launch the newly redesigned *BOEM Ocean Science* magazine and the first issue since the establishment of the Bureau of Ocean Energy Management. BOEM is now the Federal government's leading ocean energy science organization with responsibility for the environmentally and economically responsible management of offshore energy resources.

Central to our commitment to balanced decisionmaking and scientific integrity is the selection of Dr. Alan Thornhill as BOEM's first Chief Environmental Officer. Dr. Thornhill brings outstanding scientific credentials, experience, and judgment to our agency. He assumed a leadership role in the development of the Interior Department's Scientific Integrity Policy released last year and is responsible for overseeing BOEM's environmental science programs. Dr. Thornhill's position is essential in setting our scientific agenda to inform offshore energy decisions. I have selected Robert LaBelle to fill the role previously held by Dr. Thornhill as Science Advisor to the BOEM Director.

This first issue of *BOEM Ocean Science* is dedicated to the ongoing development of offshore renewable energy programs. Our renewable energy mission is directly supported by the President's emphasis on regional and national planning for ocean resources and activities. As more scientific, geographic, and economic information is made widely available to all constituents, decisionmaking on which areas are optimal to support offshore renewable energy development is better informed and more transparent.

BOEM conducts consultations required by the Energy Policy Act of 2005 mainly through intergovernmental task forces. These efforts are augmented by regional planning groups such as the Northeast Regional Ocean Council, the Mid-Atlantic Regional Council on the Ocean, and the West Coast Governors Alliance. These groups will be implementing the new national ocean policies.

These are exciting times for BOEM. By working with our interagency State partners and other stakeholders, we will pursue an unwavering commitment to sound decisionmaking based on world-class science. Renewable energy development has emerged as an opportunity to establish significant sources of clean energy power to the Nation. Our science and research programs within BOEM are fully engaged in supporting our renewable energy program. Please enjoy reading this first issue of the redesigned *BOEM Ocean Science*. Our focus on renewable energy reflects the importance of this issue at a pivotal time in our Nation's energy history.

Tommy P. Beaudreau, Director

Smart from the Start

The "Smart from the Start" wind energy initiative was introduced in November 2010. Initiated by DOI Secretary Ken Salazar, the initiative's intent is to facilitate the environmentally responsible development of renewable energy (REN) through a more efficient permitting process, described by Salazar as "unburdened by needless red tape." By way of proper and thorough planning *from the start*, the development of REN resources can occur sooner as the leasing process will take less time, thanks to smart planning, early environmental reviews, and improved coordination with partners. The initiative includes regulatory change that simplifies the leasing process, eliminating redundancies and saving time.

For this initiative, BOEM and its partners identify Wind Energy Areas (WEAs)—high priority offshore areas that appear most suitable for the development of wind energy—to focus data collection and leasing efforts. The identification of a WEA does not authorize construction or operations, but initiates environmental review and analysis of the potential impacts associated with lease issuance, site characterization surveys, and site assessment activities (e.g., installation and operation of meteorological towers and buoys).

The "Smart from the Start" initiative will be fully integrated with President Obama's Executive Order on coastal marine spatial planning efforts.

FOR MORE INFORMATION

BOEM's Environmental Studies Program
www.boem.gov/Studies/

BOEM's Environmental Studies Program Information System (ESPIS), searchable database of completed study reports
www.data.boem.gov/homepg/data_center/other/espis/espismaster.asp?appid=1

BOEM's Renewable Energy Program: Smart Initiatives Lead to Offshore Progress

On April 22, 2009, Earth Day was celebrated in a special way, as President Obama and Secretary of the Interior Ken Salazar announced the final framework to govern the OCS Renewable Energy (REN) Program. BOEM, through the Secretary of the Interior and the Energy Policy Act of 2005, has the regulatory authority to regulate REN development on the OCS. Now, advancements are underway to make offshore REN possible in the near future. With BOEM's authority to grant leases, easements, and rights-of-way, recent initiatives and developments are making REN extracted from offshore sources a reality.

In order to advance offshore REN development, BOEM's Office of Renewable Energy Programs coordinates with coastal states using Federal-State task forces. These intergovernmental task forces include Federal and State agencies, local governments, and Tribes to ensure that concerns are identified during initial planning stages, promoting responsible development with reduced environmental and use conflicts. Task forces discuss important topics such as lease and grant issuance, planning and operations oversight, environmental compliance and safety monitoring, and decommissioning of facilities.

Three main sources of REN are anticipated on the OCS: offshore wind, ocean wave, and ocean current energy. Technology for wave and current power is making important advances, and offshore wind power is well established with more than 50 projects operating worldwide. The U.S. took an important step toward utilizing its vast offshore REN resources when BOEM issued the first commercial lease approving the Cape Wind Energy Project in 2010. Then, in April 2011, BOEM published an environmental assessment and approved Cape Wind's Construction and Operation Plan, to allow the eventual construction and development of the project. The project will be built in Federal waters offshore Cape Cod, Massachusetts, where the winds could potentially provide 75 percent of the electricity needed to power Cape Cod, Martha's Vineyard, and Nantucket Island. Wind projects such as these have the capacity to generate great amounts of energy, conceivably providing over 1,000 gigawatts of electricity from offshore Atlantic winds alone.

In July 2011 BOEM held the Atlantic Wind Energy Workshop, attended by nearly 150 participants representing Federal and State regulatory and resource agencies, Tribes, researchers, and industry. This workshop served an important purpose for the REN Program, as the Department of the Interior and the Department of Energy share a Memorandum of Understanding to coordinate environmental monitoring and baseline studies for the evaluation of potential REN project sites. As part of the "Smart from the Start" wind energy initiative (see sidebar, page 3), the workshop identified key data needs, prioritized research gaps, and collected knowledge from partners who shared environmental, socioeconomic, technology, and safety



Ocean wave and ocean current energy are two sources of REN on the OCS.



An offshore wind facility.

information to assist BOEM in environmental review and evaluation of offshore project sites.

The interest in REN, especially wind power development along the Atlantic coastline, has been enormous and BOEM has been working with its Federal-State task forces to identify appropriate areas for leasing and development. Within the bureau, BOEM's Environmental Studies Program provides support to the REN program by funding studies that inventory and compile available information, identify knowledge gaps, and analyze potential impacts to natural and cultural resources from REN development. Ensuring that REN resources are developed in a safe and environmentally responsible manner is a major focus for BOEM. The bureau seeks public input throughout the planning and leasing processes, and the information and comments received help BOEM consider all environmental and use conflicts when making leasing decisions.

FOR MORE INFORMATION

Atlantic Wind Energy Workshop Report and Presentations
www.boem.gov/Renewable-Energy-Program/Atlantic-Wind-Energy-Workshop.aspx

BOEM's Renewable Energy Program
www.boem.gov/Renewable-Energy-Program/index.aspx

Renewable Energy on the Outer Continental Shelf Fact Sheet
www.boem.gov/uploadedFiles/Fact%20Sheet%20BOEM%20Renewable%20Energy.pdf

Smart from the Start
www.boem.gov/Renewable-Energy-Program/Smart-from-the-Start/Index.aspx

Roundup of State Activities

BOEM's Office of Renewable Energy Programs (OREP) has seen tremendous interest in planning and development on the OCS, and 2012 promises to be another busy year. BOEM continues to work closely with coastal states interested in REN resources through Federal-State task forces. Here is a quick summary of current developments:

NORTHEAST

Maine: BOEM convened the second intergovernmental task force meeting in December 2011 to evaluate the unsolicited lease request submitted by Statoil North America to build a 4-turbine pilot project for floating wind turbines in the Gulf of Maine, in waters deeper than 100 m (330 ft). The next step for BOEM is to issue a Request for Competitive Interest in the *Federal Register*.

Massachusetts: BOEM recently published a Call for Information and Nominations (Call) and Notice of Intent (NOI) to prepare an environmental assessment to solicit expressions of interest in commercial wind energy leasing and other environmental information. BOEM held public meetings in Martha's Vineyard and Boston to answer questions about the Call and NOI and solicit additional public input. The next step will be to analyze the results of the Call and NOI as well as input from the task force, public information meetings, and other stakeholder meetings for Area Identification. **Rhode Island:** BOEM recently announced Area Identification off Rhode Island and Massachusetts. BOEM considered comments from the previously issued Call and NOI as well as input from the joint Rhode Island and Massachusetts task forces, public information meetings, and other stakeholder meetings in delineating the WEA and developing a range of potential alternatives and mitigation measures for analysis in the environmental assessment. **New York:** BOEM received an unsolicited lease request from the New York Power Authority to build a wind power facility 13 miles offshore Rockaway Beach, NY. The lease request is currently under review, and BOEM will hold a task force meeting to discuss and evaluate the proposed project in April.

MID-ATLANTIC

New Jersey: BOEM issued a Call in 2011, and determined that competitive interest exists in the potential leasing area. BOEM anticipates publishing a Proposed Sale Notice in 2012, which will formally set the schedule for a commercial wind lease sale. **Delaware:** BOEM issued a determination of no competitive interest in 2011, and is working toward issuing a commercial lease to NRG Bluewater Wind for an offshore wind facility. **Maryland and Virginia:** BOEM issued a Call for both states in February 2012. Competitive interest has been determined for the Maryland WEA. For Virginia, based on the nominations received, BOEM will evaluate whether



An offshore wind turbine.

competitive interest exists. **Atlantic Wind Connection:** BOEM recently published a notice seeking comments on the unsolicited lease request from Atlantic Grid Holdings for a right-of-way grant to develop a high-voltage direct current transmission system that would collect power generated by wind turbine facilities off the coasts of New York, New Jersey, Delaware, Maryland, and Virginia. BOEM is analyzing comments received by the public, and anticipates holding a multi-state task force meeting to discuss the proposed project and determine the next steps.

SOUTHEAST

North Carolina: BOEM is currently working with the North Carolina Task Force to delineate areas offshore that may be suitable for potential commercial wind development, and anticipates publishing two notices that will address five areas offshore in early 2012. **South Carolina:** BOEM is establishing an intergovernmental task force with South Carolina and preparing for the first meeting scheduled for the end of March. **Florida:** BOEM is currently reviewing an application from Florida Atlantic University for testing marine hydrokinetic technology.

PACIFIC

Washington: The State is conducting marine spatial planning and BOEM continues coordination through the West Coast Governors Alliance on Ocean Health. **Oregon:** BOEM is planning a scientific marine REN workshop for Oregon in September 2012 and is working with the task force to identify areas on the OCS with high REN potential. **California:** BOEM has had preliminary discussions with potential developers interested in offshore wave and wind projects. BOEM is working closely with the State through the West Coast Governors Alliance on Ocean Health. **Hawaii:** The first Hawaii Task Force meeting was held in March 2012. Hawaii is interested in OCS research leases and commercial wind development offshore Oahu and the Big Island. BOEM continues its work as a cooperating agency on a programmatic environmental impact statement (EIS) for the Hawaii Interisland Renewable Energy Program: Wind. The EIS includes analysis of a potential OCS subsea power cable for inter-island energy transmission.

FOR MORE INFORMATION

For an updated summary of State-by-State offshore renewable energy activities and announcements, see OREP's website at: www.boem.gov/Renewable-Energy-Program/State-Activities/Index.aspx

BOEM and Partners to Study Offshore Renewable Energy: Collaboration Pursues Answers to a Sea of Development Questions

As the U.S. wades into the development of REN offshore, BOEM is diving into new research studies to help ensure the safe and environmentally responsible use of the ocean's vast resources.

To more efficiently consider potential impacts of REN development, BOEM has partnered with the Department of Energy (DOE) and NOAA under the National Oceanographic Partnership Program for a collection of joint research studies. This collaboration provides for almost \$5 million in funding and will benefit these agencies and inform decision makers as a result of resource sharing and partnership support that ultimately eliminates redundancy from the start. The studies described below will address siting and permitting of offshore wind energy facilities, as well as energy harnessed from waves, tides, currents, and thermal gradients. An overview of each study follows.

Bayesian Integration for Ocean Planning and Renewable Energy Siting. As the need for REN extends into the aquatic frontier, location is everything. Placement of new facilities must properly account for cumulative effects, ecosystem services, and the tradeoffs associated with alternative human uses of the ocean. To assist BOEM and other decision makers in properly evaluating offshore REN siting proposals, Parametrix will conduct this study to develop an analysis system that incorporates oceanographic, ecological, and human use data; stakeholder inputs; and cumulative impacts. Bayesian Integration refers to the assembly of complex scientific data, measures of uncertainty, and critical stakeholder values to model the probabilities of various interrelationships of the marine and human environment with marine REN sites to better support ocean planning decisions. The data gathered will help better position REN project sites, thus, minimizing environmental impacts while maximizing ocean energy potential.

Characterization and Potential Impacts of Noise Producing Construction and Operation Activities on the OCS. Of all the offshore REN sources, wind energy is currently seeing the greatest interest because of its proven technology and success in Europe. But, harnessing wind power from the offshore environment is new to the U.S. As new offshore facilities are constructed and operations begin, an additional sound source is introduced to the environment, possibly affecting sea life (marine mammals, sea turtles, fish, etc.). To better understand the cumulative effects of the noise on the marine environment, the field study conducted by the Cornell University Lab of Ornithology will characterize both specific sources of noise associated with the construction and operation of an offshore REN facility, as well as ambient noise



Wind turbines at sunset.

measurements. This study is a follow-up to one conducted by JASCO Applied Sciences for BOEM. These data will help quantify the relative contribution to ambient noise levels and consequently, the potential impact(s) to marine resources from the introduction of sound into the marine environment.

Once the underwater acoustics are identified, measured, and analyzed, BOEM will better understand the acoustic environment and potential preliminary inputs from construction and operation of offshore wind facilities.

Developing Environmental Protocols and Modeling Tools to Support Ocean Renewable Energy and Stewardship. As REN development moves forward, it is imperative to collect extensive environmental data that can be used for comparative analyses, applicable for the needs of regulatory agencies and developers. This study, conducted by the University of Rhode Island, will seek out methods to standardize study and monitoring protocols pertaining to REN data collection. Researchers will also establish a framework for evaluating cumulative environmental impacts of offshore REN development.

Evaluating Acoustic Technologies to Monitor Aquatic Organisms at Renewable Energy Sites. To assess risks and mitigate REN impacts, an understanding of the biological and physical environment of the area species is an important

component of responsible development. Led by the University of Washington, this study will use acoustic technology to quantify the composition and distribution of nekton—all macroinvertebrates and pelagic fish species able to move independent of fluid motions—at Admiralty Head, a potential hydrokinetic site in Puget Sound, Washington.

Echosounders, multibeam sonar, and an acoustic camera will collect stationary data, and a mobile acoustic and midwater trawling survey will be used to characterize aquatic species. The data from each instrument will be used to evaluate their strengths and weaknesses and determine the best methods for data collection at tidal and wave energy sites. The results of this study will help in the design of a warning system to alert when high densities of small organisms are being carried along in the current of the turbine, endangered species are too close, or a large animal is in the path of colliding with a device.

Protocols for Baseline Studies and Monitoring for Ocean Renewable Energy. In order to effectively manage offshore wind, wave, and tidal energy projects, a significant amount of environmental data needs to be collected in baseline and pre-construction studies and in operational monitoring. Currently, no standards exist to ensure that data collection methods produce scientifically valid and comparable data. Standard protocols for the collection and comparison of data are needed for offshore REN. Funded through a partnership of BOEM, DOE, and NOAA, Pacific Energy Ventures and several subcontractors are creating a Protocol Framework for offshore REN projects. To ensure protocols are accepted by both regulatory agencies and developers alike, and to reduce potential conflicts, two teams were created: the Product Development Team and the Stakeholder Advisory Team. Teams are working together to prioritize resource issues, to identify existing acceptable protocols, and to design a consensus path for creating new protocols.

The framework will ultimately be used for final process recommendations that will aid BOEM in environmental reviews, providing guidance on how to collect baseline and pre-construction data consistently in the development of offshore REN projects.

Renewable Energy Visual Evaluations. One facet of BOEM's environmental review is the visual impact of REN



Kemp's Ridley Turtle (*Lepidochelys kempii*). Photo courtesy of NOAA.

installations, especially on coastal historic properties. Argonne National Laboratories and the University of Arkansas Center for Advanced Spatial Technologies are developing a GIS-based computer tool that will help assess potential visual impacts from offshore construction on a coastal view, including the structures themselves and lighting. This tool will be capable of creating 3D computer models of wave, wind, tidal flow, and ocean current facilities, providing decision makers with a preview of the offshore viewshed before any construction takes place.

Roadmap: Technologies for Cost Effective, Spatial Resource Assessments for Offshore Renewable Energy.

This study will develop a technology roadmap for applying advanced spatial survey technologies for assessment and post-construction monitoring of offshore wind and hydrokinetic REN resources. The University of Massachusetts-Dartmouth Marine Renewable Energy Center is partnering with several laboratories and institutions to analyze and evaluate the performance and scientific approach of survey technologies, including radar, lidar, sonar, and autonomous underwater vehicles. Through modeling and field testing, the study will cover wind profiling, characterization of REN resources, spatial imaging and mapping of phenomena, geological surveys, and data management.

Each of these joint studies will help improve BOEM's decisionmaking concerning offshore REN development projects—incorporating mitigation procedures from the start that will reduce the environmental risks and regulatory uncertainties—and moving forward on the Nation's journey to provide new sources of clean, renewable energy.



South view of the Atlantic Ocean from the Watch Hill Historic District, Rhode Island. Photo by John Milner Associates, Inc.

FOR MORE INFORMATION

BOEM Press Release - Joint Environmental Research Projects

www.boem.gov/BOEM-Newsroom/Press-Releases/2010/press1026.aspx

BOEM Ongoing Studies

www.boem.gov/Environmental-Stewardship/Environmental-Studies/Renewable-Energy/Renewable-Energy.aspx

Evaluating Potential Visual Impacts on Historic and Cultural Resources

Many of BOEM's responsibilities are well-known: managing the exploration and development of offshore energy resources in ways that appropriately balance energy independence, economic development, and environmental protection.

This includes understanding and taking into consideration the effects that the bureau's actions, and the actions that it permits, may have on resources in the marine environment.

Typically, the term natural resources brings to mind flora and fauna such as marine animals, corals, and seabirds. But BOEM is also responsible for considering the effects of bureau-permitted activities on cultural and historic resources. Archaeological resources, such as shipwrecks, are perhaps the most publicly recognized. But there are other types.

A historic resource (a place or property) can be a building (Abraham Lincoln Birthplace), a district (Bonneville Dam Historic District), a site (Gettysburg Battlefield, U.S. Arizona), a structure (Cape Hatteras Lighthouse), or an object (Statue of Liberty).

As exploration of offshore REN sources begins, BOEM is conducting numerous studies on natural and cultural resources that may be affected by such development as wind and wave energy. The Nation's coastlines are dotted with historic resources that could be visually impacted by offshore energy development.

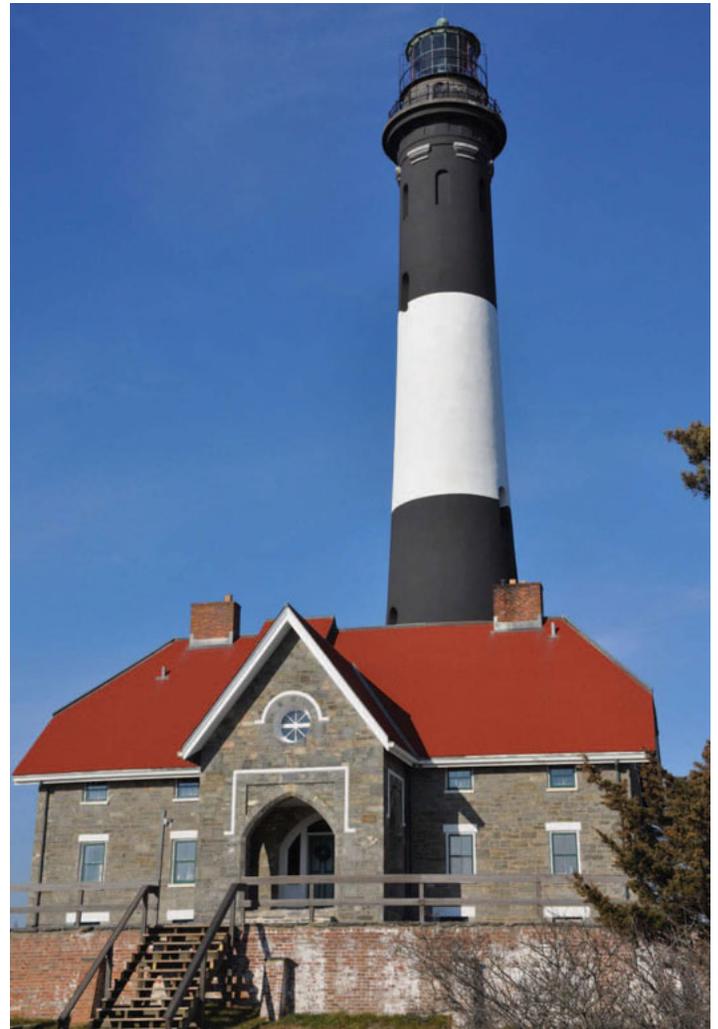
Two of BOEM's current studies focus on aspects of the potential visual impact that REN development, such as wind turbines, may have on historic and cultural resources. Collecting information and developing tools for analysis are crucial steps in complying with the National Historic Preservation Act (NHPA) of 1966, as amended, a Federal law enacted to ensure that cultural heritage is properly managed and protected.

The NHPA has three major functions: (1) authorizes the expansion and maintenance of the National Register of Historic Places (NRHP) by the National Park Service; (2) establishes the Section 106 review process; and (3) imposes stewardship obligations on Federal agencies that include preserving prehistoric and historic resources that are owned, administered, or controlled by the Federal government.

Section 106 requires that Federal agencies, before issuing a permit or approving Federal funds for a project, take into account how an action may affect resources that are listed or are eligible for listing on the NRHP. Also, an agency must give the Advisory Council on Historic Preservation a reasonable opportunity to comment on such undertaking. The Section 106 review has been described as a "stop, look, and listen" process.

Section 106 compliance includes four steps. The agency must

1. determine if Section 106 applies to the project;
2. identify historic and cultural resources that may be in the area of potential effect of proposed activities;



The Fire Island Light Station in New York listed on the National Register in 1984. Photo by John Milner Associates, Inc.

3. determine whether the project will adversely impact any identified historic properties; and
4. enter into discussions about possible mitigation and try to reach a Memorandum of Agreement with the affected State Historic Preservation Office or Tribal Historic Preservation Officers, affected Native American tribes, and other interested parties.

If no agreement can be reached after all of the procedural requirements of Section 106 have been met, the head of the agency in charge of reviewing the application has the authority to approve or deny the application.

To be listed on the National Register, a resource must meet one of these four criteria:

- (a) be associated with events that have made a significant contribution to the broad patterns of our history;
- (b) be associated with the lives of significant persons in our past;
- (c) embody the distinctive characteristics of a type, period, or method of construction, or that represent the work of a master, or that possess high artistic values, or that

represent a significant and distinguishable entity whose components may lack individual distinction; or
(d) have yielded, or may be likely to yield, information important in prehistory or history.

One BOEM study nearing completion, “Evaluation of Visual Impacts on Historic Properties,” is amassing some of the information that is needed for the second step of the Section 106 requirements. Researchers are identifying places along the Atlantic seaboard that could be affected if the view of the ocean is altered, including those that generate revenue and are open to the public, because a change in the view may affect its use.

These include places that are listed on, or are potentially eligible for listing on, the NRHP, such as Traditional Cultural Properties, sacred sites, historic structures, and historic and prehistoric archaeological sites.

The determination of whether a resource may be adversely impacted is required by Section 106 (see #3 on page 8). The basis for that determination depends on the description in the property listing. If that description includes the rationale for listing the property (or for its potential eligibility) and includes the visual aspect as a key element of the setting and surroundings, then that property may be considered to be adversely impacted by visual disruption.

This study gathered, from each state along the eastern seaboard, information about historic resources as a means of anticipating potential impacts that might affect these resources from a company’s proposed project offshore. The result will be a searchable GIS database with some of the information needed for Section 106 determinations.

Another BOEM study is “Renewable Energy Visual Evaluations” (see page 7). As discussed previously, this study will develop a GIS-based computer tool to help assess potential visual impacts from offshore construction on a coastal view. The tool will be able to create 3D computer model renderings of wave, wind, tidal flow, and ocean current facilities, within the viewshed of historic properties along the coast to assist BOEM with analyzing potential visual impacts.

Viewshed analyses are relatively new to many people. By simulating how a view would change under certain situations and in various conditions (such as fog), they help planners evaluate potential impacts on resources. For example, viewshed analyses are often carried out by the U.S. Forest Service to accompany forest thinning, road-building, or recreational site project proposals.

These and other studies are building our knowledge base so that balanced decisions can be made, and so that other interested parties and agencies can make use of the results.

FOR MORE INFORMATION

National Historic Preservation Act

www.achp.gov/docs/nhpa%202008-final.pdf

National Register of Historic Places, National Park Service

www.nps.gov/nr/

Press release about renewable energy studies, October 26, 2010

www.boem.gov/BOEM-Newsroom/Press-Releases/2010/press1026.aspx



View from the Fort Point Light Station, Maine, listed on the National Register in 1988. Photo by John Milner Associates, Inc.

What’s a viewshed analysis?

The term “viewshed” describes an individual’s field of vision from a given point.

A viewshed analysis calculates how a project may affect the visibility of a landscape, seascape, or even an airspace. They are often used to assess how a project will alter or affect what an individual may see in a particular 3D space. The assessment follows a simulation of the view of the post-project sea or landscape from several perspectives and under several conditions. Imagine the Golden Gate Bridge in heavy fog and then in bright sunlight.

A viewshed analysis usually involves two procedures. First, the viewpoint locations are selected. Source photographs are taken from those locations using correct camera focal point length to simulate human eyesight and should include information on the atmospheric conditions, time of day, and sun angles occurring at the time the photos were taken. Second, visual analysts superimpose information about the project onto the source photos. In the case of wind turbines, information may include turbine color and height, blade length, the array configuration, and brightness of lights.

Next, photos are rendered by digitally casting them against a simulation of the project. For example, simulations may illustrate how sunlight will hit the turbines, what shadows may result at different times of day, or how the lighting may appear to people onshore, sea-going vessels, and birds, and under a range of conditions, such as haze, fog, or snow. The simulations may also illustrate projects at different distances from onshore locations.

A viewshed analysis can shed light on the potential visibility of a project from several recreational and historical points in various conditions. However, it cannot assign values to or judge the significance of a project’s potential impacts on the visual character, culture, heritage, or tradition of that viewscape or on recreational resources present within that viewscape.

Spotlight on a Scientist:

Dr. Sally Valdes, Ecologist



Dr. Sally Valdes.

How did you come to work with BOEM?

I was impressed by the contributions of the former Minerals Management Service (MMS) to ocean science that were highlighted at a Capitol Hill Oceans Week that I attended. So when the Coastal Impact Assistance Program advertised a grant position—and two

people sent me the announcement saying perhaps I should apply—I thought, “Why not?”

The Chief of the Environmental Assessment Branch (now Division), saw my application and contacted me to see if I might want to interview for a different job, a fishery biologist position. I said yes. That interview resulted in a job offer and I’ve been with MMS/BOEM ever since.

What do you do, specifically?

I work in the Environmental Assessment Division at the BOEM headquarters office in Herndon, Virginia. My primary subject matter responsibilities are fish and fisheries issues, including Essential Fish Habitat consultations with the National Marine Fisheries Service, but I also work on a number of other topics including birds and benthic habitats. Before we hired an avian biologist in Environmental Assessment I also had primary responsibility for avian issues.

A large part of my job is reviewing National Environmental Policy Act (NEPA) and other documents to improve their accuracy, completeness, and readability. In the case of NEPA documents I am responsible for making sure that impacts of proposed actions to fish, fisheries, and other resources (as assigned) are thoroughly evaluated and appropriately mitigated. I have also represented BOEM on various intra- and inter-agency working groups including, for example, the National Ocean Policy Plan’s Regional Ecosystem Protection and Restoration working group and a DOI biodiversity group that provides input to U.S. international biodiversity policy.

Another important part of my job is to provide support to BOEM’s research program. For example, I have been the Contract Officer’s Representative on an interagency agreement with the U.S. Geological Survey, which supported development of the Compendium of Avian Information and Comprehensive GIS Geodatabase. In February 2008, I organized and ran a workshop on Birds and Offshore Wind Development, involving Federal, State, academic, industry, non-government organizations, and international participants. On a regular basis I provide input on proposed research plans and priorities and serve on review panels for research proposals.

What is your background?

I earned my BA in biology from Western Michigan University, and my MA, also in biology, from the University of Michigan. My Ph.D., from Cornell University, is in aquatic ecology with minors in natural resource policy and ecosystem ecology.

I have worked more than 20 years for the Federal government at various agencies. My prior Federal experience includes jobs with the Congressional Research Service (Library of Congress), the Department of State (as an American Association for the Advancement of Science fellow), the Environmental Protection Agency, and the Fish and Wildlife Service (FWS). At FWS I worked in both the Endangered Species and Habitat Conservation Programs. I’ve been in my current position at BOEM for five years.

How has your background helped prepare you for the work you do?

Having worked on environmental issues and science policy for several Federal agencies, I came to the bureau with considerable experience. I had reviewed and written regulations, policy documents, and testimony. My experience working with and implementing a number of environmental laws and Executive Orders, including NEPA and the Endangered Species Act, continues to be applicable to my job.

Bird conservation is a major focus of FWS. My FWS experience and contacts helped me contribute to developing a greater avian component to our bureau’s assessment of impacts and research efforts.

My “aquatic ecology” training was a mixture of freshwater and marine. Throughout my career I had opportunities to learn more about coastal and marine issues. At EPA I served on a Marine Protection, Research, and Sanctuaries Act workgroup and organized a workshop on managing toxic sediments in freshwater and marine environments. At FWS I worked on various coastal conservation issues: serving as the FWS representative to the Estuaries Restoration Act interagency group; managing FWS Coastal Barrier Resources Act responsibilities; providing staff support to the Coastal Program (which focuses protection and restoration efforts in specific geographic areas); and coordinating the National Coastal Conservation Grants Program.

As an ecologist I have always been interested in a wide range of topics, in part because I can’t help but see how issues are connected. The “library” of information that I have collected comes in handy when reviewing NEPA documents and also study plans and profiles.

What do you find most exciting about your work?

I enjoy the interaction with our in-house experts on technical and policy topics. It is an environment which fosters learning, and that is a major benefit of the job. I have the opportunity to work on a range of topics, which keeps things interesting. I also hope to make a positive difference in the quality of assessments, mitigation, and research through my efforts.

Spotlight on Studies:

Compendium of Avian Information and Comprehensive GIS Database for the Atlantic

BOEM is responsible for managing development of offshore renewable resources such as wind energy in Federal waters. In the near future, development of offshore wind energy is most likely to occur in the Atlantic OCS.

One concern with developing wind energy resources on the OCS is the construction and operation of wind energy facilities and their potential impact on birds. More and better knowledge about the numbers and distribution of birds and their use of the OCS is necessary. To help achieve this goal, BOEM and the U.S. Geological Survey (USGS), with assistance from the U.S. Fish and Wildlife Service, have been working together to develop the Avian Compendium and Comprehensive GIS Geodatabase.

While BOEM, other Federal and State agencies, and other parties collect and compile data on many coastal and marine birds, this data is widely dispersed and of varying quality. The objectives of the first Avian Compendium study (2008–2011) were to: help ongoing efforts to retrieve, compile, organize, and standardize existing data for the Atlantic OCS; model distributions and evaluate the effects of various factors on specific species populations; and make the data available in a usable GIS Geodatabase.

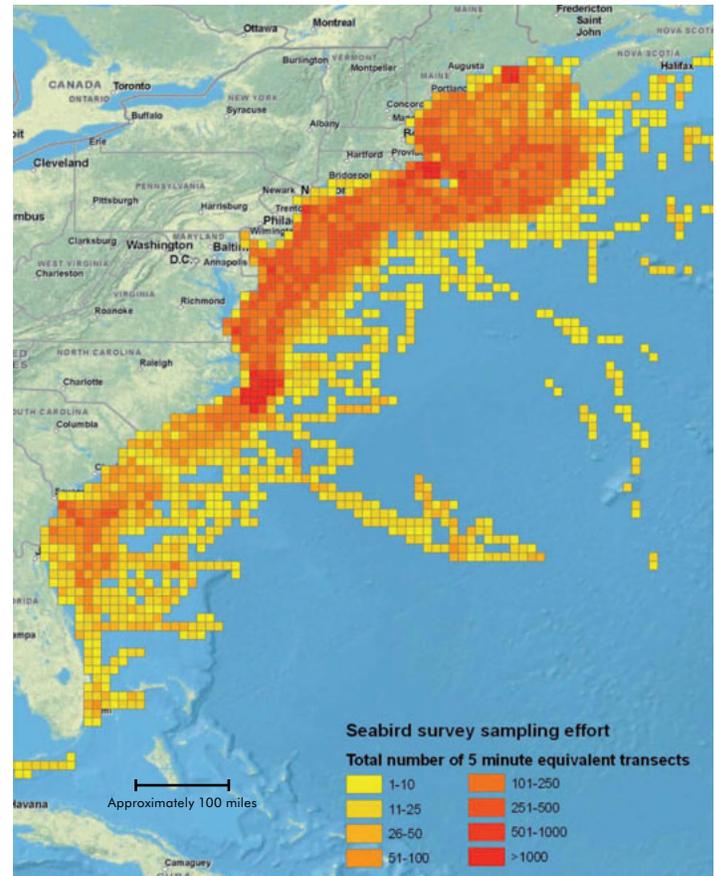
Through the efforts of this partnership, more than 265,000 seabird occurrence records from 1906 to 2009 were assembled. Nearly 230,000 of these records are useful for developing seasonal occurrence maps for multiple species and for modeling seabird occurrence.

As the map indicates, some areas have been sampled repeatedly while others were sampled less frequently or not at all. The information collected by the Avian Compendium also identifies geographic, temporal, and species data gaps that can help identify future research needs.

Results of this initial effort have been made available through publications (see Zipkin et al. 2010, "Distribution patterns of wintering sea ducks in relation to the North Atlantic Oscillation and local environmental characteristics" in *Oecologia* 163(4):893-902), presentations at major conferences including the First Annual World Seabird Conference in 2010, and an online catalog of seabird data.

Beginning in 2011, an expanded effort includes new partners such as NOAA's National Ocean Service Biogeography Branch. This partnership is bringing in new sources of seabird information and will focus modeling efforts in the Mid-Atlantic area, where there is considerable interest in wind energy development.

The new sources of information include surveying efforts by several states (Delaware, New Jersey, and Rhode Island), BOEM-supported surveys such as the Atlantic Marine Assessment Program for Protected Species (AMAPPS) (see article on page 14), and surveys onboard NOAA's National Marine Fisheries Service research vessels. These survey efforts will help fill information gaps and provide more current data on bird use of the Atlantic OCS.



Seabird survey sampling effort, 1978–2009. Each colored block represents an area of approximately 17.25 square miles. From the USGS Patuxent Wildlife Research Center.

Models are only as good as the data that goes into them. New data will be important for improving the accuracy of model outputs and our ability to understand how bird distributions are affected by different physical, chemical, and biological factors. This could include: habitat effects on distribution, how distributions have changed over time (as effects of climate change or other factors), and the relationship of the distance from shore on the distribution of different species of concern.

The modeling results will be mapped so that they are accessible by decisionmakers and the public.

FOR MORE INFORMATION

Seabird Catalog (1906-2009)

www.data.gov/communities/node/237/data_tools/5913

1st Annual World Seabird Conference

www.worldseabirdconference.com/main.cfm?cid=1813

Oecologia publication abstract

www.springerlink.com/content/mm151g5452348v41/

For the Birds:

An Overview of Renewable Energy-Related Avian Studies

One concern associated with wind energy development is its potential impact on birds. To prevent or minimize impacts to birds it is important to have a better understanding of how they use the Atlantic OCS. In addition to the Compendium of Avian Information and Comprehensive GIS Geodatabase studies, BOEM continues to work with other partners to update our knowledge of Atlantic seabirds through new studies.

Surveying for Marine Birds in the Northwest Atlantic

Working in partnership, BOEM, FWS, NOAA, USGS, the College of Staten Island/City University of New York, and the Manomet Center for Conservation Sciences have been collecting data on marine bird distribution and abundance in portions of the offshore environment in the Atlantic Ocean. While aboard research vessel cruises ecologists collect data identifying which seabird species are present or absent, and determine the areas where they tend to congregate. They then correlate the distance from shore, water depth, and bottom type where these seabird clusters are found. Data collection includes field observations for the presence/absence of birds offshore, identifying birds to species where possible, and from shipboard, utilizing trained observers with vision-enhancing equipment. The long-term survey data collected in this study is needed to help define areas of high bird concentrations as well as areas with the fewest birds. This information will be critical for decisions regarding placement of offshore facilities.

FOR MORE INFORMATION

Surveying for Marine Birds in the Northwest Atlantic

www.boem.gov/uploadedFiles/BOEM/Environmental_Stewardship/Environmental_Studies/Renewable_Energy/SurveyingMarineBirds.pdf

Pilot Study of Aerial High-Definition Surveys for Seabirds, Marine Mammals, and Sea Turtles on the Atlantic OCS

BOEM's publication of the Framework for Renewable Energy Development on the U.S. Outer Continental Shelf in 2009 has resulted in significant interest in leases for both wind energy development and oil and gas activities along the Atlantic Coast, the Gulf of Mexico, and Alaska. This interest has created not only a critical need for environmental analyses of proposed energy sites and their impact on bird use of the OCS, but also a need for important analyses such as visual, thermal, and vocal monitoring of the seasonal and annual variability in marine mammal and sea turtle use of the OCS.

In the past, worldwide monitoring of offshore birds has been expensive and limited because of difficulty of access. Prior methods, such as boat transect surveys, placing bird observers on NOAA research vessels that will be in the area, and traditional aerial surveys have been subject to potentially

large sampling errors and were too costly. In Europe, high-definition cameras mounted on aircraft show great promise as a means to conduct aerial surveys of birds offshore with minimal error and without disturbance to birds on the ocean's surface below the aircraft. The U.S. is experimenting with more affordable and effective high-definition aerial technology that could provide rapid, broad-area surveys of birds, marine mammals, and sea turtles on the OCS.

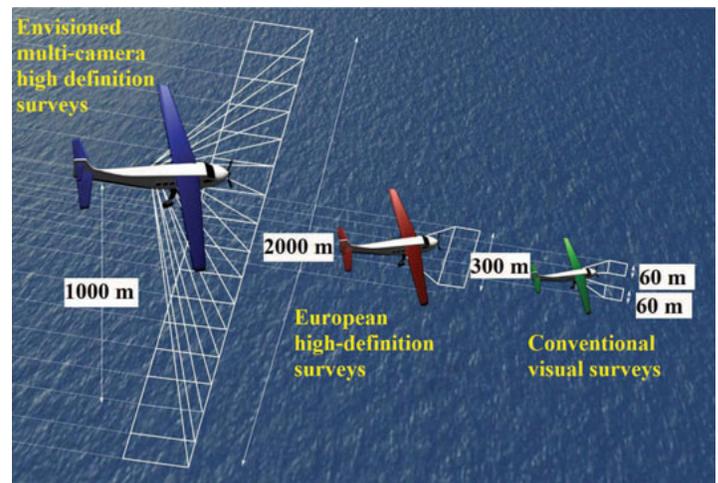
FOR MORE INFORMATION

Pilot Study of Aerial High-Definition Surveys for Seabirds, Marine Mammals, and Sea Turtles on the Atlantic OCS

www.boem.gov/uploadedFiles/BOEM/Environmental_Stewardship/Environmental_Studies/Renewable_Energy/PilotStudyAerialHighDefinitionSurveys.pdf

Automated Analysis of Bird Vocalization Recordings and Acoustic/Thermographic Monitoring of Temporal and Spatial Abundance of Birds Near Structures on the Atlantic OCS

In addition to aerial high-definition surveys, a second effective and economical method to monitor bird presence offshore is the use of remotely operated microphones attached to offshore structures such as meteorological towers or wind turbines. But first, software development is currently underway to automate the analysis of digitally recorded bird vocalizations made over extensive periods of time and with lengthy intervals between vocalizations. In addition, software algorithms are also being developed to convert call counts to abundance and/or passage rates for bird species of the Atlantic Coast. Using the extensive library of bird sounds at Cornell University Laboratory of Ornithology, analysis of bird vocalizations,



Comparison of aerial high-definition survey flight heights. Image courtesy of Normandeau Associates and Boulder Imaging.

species, and types made over extensive periods of time can be made efficiently, expeditiously, and economically.

A third method is the use of specially designed and positioned remotely operated acoustic/thermographic detection devices attached to offshore structures. Acoustic detection devices could provide an additional means to monitor vocalizations throughout the year, while thermographic cameras positioned to obtain stereoscopic images could enable the determination of bird flight heights, vital information when assessing the risk to birds from wind turbines. This study, conducted by Pandion Systems, is currently determining the optimal number and positioning of these devices on offshore structures. This technique could provide information for monitoring birds, marine mammals, and sea turtles virtually day and night, year-round, and in any weather condition, especially when used in combination with automated acoustic surveys that gather information only for specific point locations. Once effective and efficient methods are established for both acoustic surveys and for aerial surveys using high definition imagery, it will be possible to document seasonal and annual variability in presence and abundance of birds across wide regions on the OCS.



Northern Gannet, a migratory seabird. Image copyright Miraslov Hlavko, 2012, under license from Shutterstock.com.

ducks were tracked at their summer nesting areas. Additional ducks were tagged during the winter of 2009. The results will help provide a baseline estimate of the numbers and movements of wintering sea ducks in and around the area should a wind project be built.

FOR MORE INFORMATION

Automated Analysis of Bird Vocalization Recordings

www.boem.gov/uploadedFiles/BOEM/Environmental_Stewardship/Environmental_Studies/National/NT09x18.pdf

Acoustic/Thermographic Monitoring of Temporal and Spatial Abundance of Birds Near Structures on the Atlantic OCS

www.boem.gov/uploadedFiles/BOEM/Environmental_Stewardship/Environmental_Studies/Renewable_Energy/AcousticThermographicMonitoringTemporal.pdf

FOR MORE INFORMATION

Determining Distributions and Movements of Long-tailed Ducks Using Satellite Telemetry

www.boem.gov/uploadedFiles/BOEM/Environmental_Stewardship/Environmental_Studies/National/NT09_04.pdf

Determining Night-time Distribution of Long-tailed Ducks Using Satellite Telemetry

www.data.boem.gov/PI/PDFImages/ESPIS/4/4823.pdf

Determining Distributions and Movements of Long-tailed Ducks Using Satellite Telemetry

The passage of the Energy Policy Act of 2005 brought with it a focused need to study and develop the information necessary to determine the impact of wind energy on birds in Nantucket Sound, specifically the hundreds of thousands of long-tailed ducks that congregate in the region from November through March every year. This study builds upon a previous study that captured, tagged, and tracked long-tailed ducks in and around Nantucket Sound to determine movement patterns and congregation areas. The objective of the current study is to more clearly determine the use of the Sound by long-tailed ducks. Using satellite tags, three



A female long-tailed duck with a satellite tag attached. Photo taken by Matthew Perry, USGS.

Surveys and Spatial Distribution of Protected Species in the Atlantic

As attention turns to the U.S. Atlantic coast and offshore area for potential energy resources such as wind energy, researchers have begun extensive studies on the marine mammals (cetaceans and pinnipeds), seabirds, and sea turtles that depend on the Atlantic coastal and marine environments for some or much of their lifespan. The better BOEM understands these species and their life history, the better we can protect them and mitigate any potential effects from bureau-permitted activities.

A 5-year, \$7.6 million multi-agency study program, the Atlantic Marine Assessment Program for Protected Species (AMAPPS) is developing a comprehensive assessment of the abundance and spatial distribution of several species that may be affected by activities associated with offshore energy exploration and development such as seismic surveys.

AMAPPS is a joint project between BOEM; NOAA's National Marine Fisheries Service Southeast Fisheries Science Center and Northeast Fisheries Science Center; the U.S. Fish and Wildlife Service; and the U.S. Navy.

Partially funded by BOEM and conducted by NOAA's National Marine Fisheries Service and other agencies, AMAPPS will also develop models and tools for efficiently collecting seasonal distribution and abundance estimates of species.

The central purpose of the study is to gather new data and to fill critical information gaps in the understanding of the marine life and habitats of this area. In the past, the usual tools—aerial and shipboard surveys and passive acoustic monitoring—have collected data on specific stocks of marine mammals and seabirds at a smaller seasonal scale, rather than at larger year-round and regional scales.

The last comprehensive, year-round surveys of the Atlantic coast were conducted in the southeast during the late 1970s and the northeast during the early 1980s. Also, abundance assessments of seabirds and pinnipeds (such as harbor and gray seals) in U.S. Atlantic waters have been relatively limited.

The information gathered from previous surveys has been critical for managing specific stocks of protected species. Focused on large spatial scales, those studies were the basis for spatially explicit models used for impact assessments. But those aerial and shipboard surveys and passive acoustic monitoring were carried out mainly during the summer months, and only occasionally during the winter.

Data for the spring, fall, and winter months is needed to predict seasonal spatial distribution. Seabirds, especially, disperse widely during the nonbreeding season and they use the marine environment differently depending on the season. To better predict seasonal distribution, then, seabird surveys need to be consistently carried out during the full year.

Over the course of the study, researchers will use aerial and



Common dolphins (*Delphinus delphis*) observed during the 2011 AMAPPS cruise. Photo courtesy of the NOAA National Marine Fisheries Service.

shipboard surveys to collect broad-scale data on the seasonal distribution and abundance of cetaceans and pinnipeds, marine turtles, and seabirds. At several specific sites, acoustic and visual surveys will provide similar data at a finer scale.

Also, within surveyed regions, researchers will carry out tag telemetry studies on marine turtles, pinnipeds, and seabirds. AMAPPS data will help provide a more accurate picture of how these species use these habitats—such as how long and how often they stay and what they do there—and their life-history. For example, time depth recorders on sea turtle tags log how much time they spend at various depths in the water column.

During 2011, from Maine to Florida, scientists conducted winter and summer abundance surveys in the northeast and southeast areas of the Atlantic, gray seal and sea turtle tagging, large whale biology data collection, and seal radio tracking and photo surveys. Activities were carried out in small planes (Twin Otters); NOAA's research vessels *Delaware II*, *Gordon Gunter*, and *Henry B. Bigelow*; and small boats.

Before permitting development of offshore energy resources, BOEM needs information to inform decisions that may have impacts on Atlantic coastal and offshore marine life. Marine-based REN projects such as wind farms and wave energy for the Atlantic coastal and offshore areas are in the planning stages. Other types of marine resources, such as sand and gravel for beach renourishment projects, will continue to be utilized.

Though there may be differences among potential impact-producing activities from wind, wave, or tidal energy production or sand and gravel extraction, as compared to oil and gas exploration and development, the detailed information that AMAPPS will provide is important for analysis and mitigation of potential impacts caused by these activities.

FOR MORE INFORMATION

NOAA Northeast Fisheries Science Center, Satellite Tracking, Wildlife Tracking

www.wildlifetracking.org/index.shtml?project_id=537

NEFSC Research Cruises, AMAPPS blog

<http://nefsc.wordpress.com/category/amapps/>

In Memoriam:

Dr. Melanie J. Stright

On June 28, 2011, BOEM lost our friend and colleague, Dr. Melanie J. Stright. Melanie served as the first Federal Historic Preservation Officer for the former Minerals Management Service (MMS, now BOEM) and retired in January 2010 after 33 years of Federal service. She was responsible for ensuring that the agency comply with Federal historic preservation law and consider the potential effects of agency-permitted activities on cultural resources.

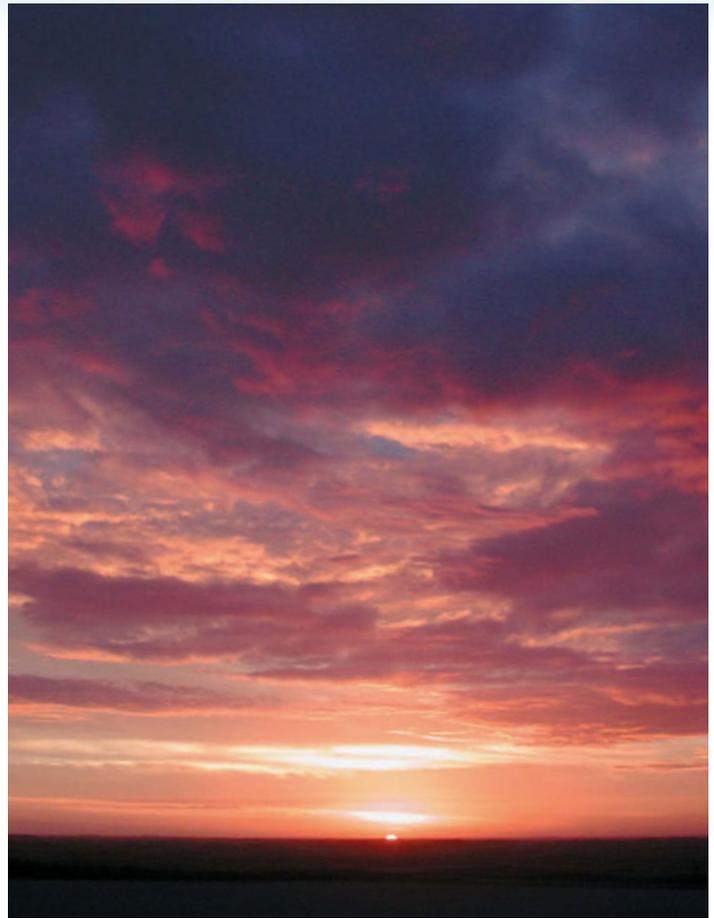
Born in Nelsonville, Ohio, in 1954, Melanie received her Bachelor's degree from The Ohio State University and Ph.D. from American University in Washington, DC, both in Archaeology. She began her career as an Archaeologist for the Bureau of Land Management (BLM) in Wyoming in 1976. In 1978, she was reassigned to the New Orleans OCS Environmental Assessment Division of the bureau. BLM later realigned to form the MMS in 1982. In 1989, after spending one year with the Pacific OCS Office in Los Angeles in the Leasing & Environmental Assessment Section, she moved to the MMS Headquarters Environmental Operations Branch in Herndon, Virginia.

The Secretary of the Interior recognized Melanie for her work in cultural and archaeological resource protection for the OCS programs with the Meritorious Service Award in 2006. As the first Archaeologist for the BLM OCS Mineral Leasing Program, she focused on improving the quality and utility of marine archaeological survey data and reports, and on expanding the program to include the assessment and protection of submerged prehistoric sites. She was instrumental in guiding the development of the agency's historic preservation program. Internationally recognized, she developed policy for handling naturally-occurring radioactive materials and drafted London Convention guidelines for the disposal of platforms at sea.

She was a member of the Society for American Archeology, Society for Historical Archeology, Geological Society of America, and was an elected member of the Advisory Council on Underwater Archaeology Board of Directors. She was a contributor to and editor of many scientific publications and represented the Department of the Interior in seminars and lectures dealing with marine archeology throughout the world.

Melanie was a leading expert in Gulf of Mexico submerged prehistory and authored or co-authored several important publications that contributed to the field. During her last years with the agency, Melanie focused primarily on the Cape Wind Energy Project in Nantucket Sound, Massachusetts. She worked to ensure that the agency's participation in the Section 106 process, including the responsibility to consult and work with the Native American Tribes, was accomplished with due diligence to incorporate the Tribes' comments and concerns related to this process and the overall project. During this time she cultivated a deep and sincere friendship with tribal leaders and worked closely with the Mashpee Wampanoag Tribe.

Demonstrating a lifelong dedication to historic preservation and profound respect for Native American culture and heritage, Melanie requested that, upon her death, memorials be made to



the Mashpee Wampanoag Youth Scholarship Program in lieu of flowers. Through this program, a scholarship is awarded to a Mashpee Wampanoag youth who will go to college in her honor.

Melanie's notable publications include:

Stright, M.J. 1986. "Evaluation of Archaeological Site Potential on the Gulf of Mexico Outer Continental Shelf Using High-Resolution Seismic Data." *Geophysics* 51(3):605-622.

<http://geophysics.geoscienceworld.org/content/51/3/605.abstract>

Stright, M.J. 1986. "Human Occupation of the Continental Shelf During the Late Pleistocene/Early Holocene: Methods for Site Location." *Geoarchaeology* 1(4):347-363.

<http://onlinelibrary.wiley.com/doi/10.1002/gea.3340010402/abstract>

Dunbar, J.S., S.D. Webb, M.K. Faught, R.J. Anuskiewicz, and M.J. Stright, 1989. Archaeological Sites in the Drowned Tertiary Karst Region of the Eastern Gulf of Mexico. *Underwater Archaeology Proceedings of the Society for Historical Archaeology Conference*, Baltimore, MD.

www.boem.gov/environmental-stewardship/archaeology/archaeology-sites-in-drowned-tertiary-karst-region.aspx

Stright, M.J., E.M. Lear, and J.F. Bennett. 1999. Spatial Data Analysis of Artifacts Redeposited by Coastal Erosion: A Case Study of McFaddin Beach, Texas. Report prepared for the U.S. Department of the Interior, Minerals Management Service, Herndon, VA. MMS 99-0068.

www.boem.gov/environmental-stewardship/archaeology/99-0068-vol1.aspx

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New Waves

Late-Breaking News & Information

Recent Offshore Renewable Energy Milestones

Recently, there have been several significant milestones announced in regards to offshore REN.

In November 2010, DOI Secretary Ken Salazar launched the “Smart from the Start” wind energy initiative for the Atlantic OCS to facilitate siting, leasing, and construction of new projects. A critical piece of “Smart from the Start” includes the identification of Wind Energy Areas (WEAs) by BOEM in consultation with the bureau’s intergovernmental task forces and other Federal agencies. Also important are the preparation of environmental assessments and development of a standard lease form to simplify the leasing process.

On Feb. 2, Secretary Salazar and BOEM Director Tommy P. Beaudreau shared the news that the department’s REN initiative had cleared an important environmental review, allowing DOI to move forward with the process for wind energy lease sales off Maryland, Virginia, and New Jersey, and non-competitive lease issuance off Delaware. BOEM’s National Environmental Policy Act assessment found that there would be no significant environmental and socioeconomic impacts from issuing wind energy leases in designated OCS areas off the mid-Atlantic Coast. BOEM also published Calls for Information and Nominations for Maryland and Virginia to solicit lease nominations from industry and request public comments regarding site conditions, resources, and multiple uses of the WEA.



Pictured L-R: Maryland Gov. Martin O’Malley, BOEM Director Tommy P. Beaudreau, and DOI Secretary Ken Salazar.

“We are moving toward commercial-scale offshore wind energy leasing in the mid-Atlantic and adding the necessary tools to offer those leases,” said Director Beaudreau. “We considered public input and conducted a thorough analysis to ensure future projects are sited in the right places, where the wind energy potential is significant, and where environmental effects and conflicts with other uses can be minimized and managed.”