

**Data Review and Gap Analysis
for the
New York State Energy Research and Development Authority
Offshore Wind Planning Area**

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Executive Summary

To inform the New York State Energy Research and Development Authority (NYSERDA) in its development of an Offshore Wind Master Plan to help meet the state's Clean Energy Standard renewable energy mandate, Ecology & Environment, Inc. (E & E) conducted this data review and gap analysis of the information currently available for the Offshore Study Area (OSA). This data review catalogs existing datasets of the natural, biological, and cultural marine resources present within the OSA and identifies gaps in current knowledge to prioritize future studies.

Chapter 1 defines the OSA and relevant federal and state permitting requirements for offshore wind energy development, and Chapter 2 provides an overview of the methodology for the data review and gap analysis. The OSA covers the Outer Continental Shelf (OCS) and exclusive economic zone federally regulated under the U.S. Department of the Interior's Bureau of Ocean Energy Management (BOEM). Federal and state permitting and environmental assessments would be needed for proposed siting of offshore wind turbines and associated energy transfer cables. Federal and state permitting requirements that offshore wind energy projects must adhere to under BOEM guidelines are summarized in this report.

Chapter 3 outlines the natural, biological and cultural features pertinent to environmental assessments as part of Site Assessment Plans and Construction and Operations Plans under BOEM guidelines to meet National Environmental Policy Act (NEPA) requirements, as well as other federal and state permitting requirements. These include bathymetry and benthic sediments; water quality and metocean conditions; marine vegetation; invertebrates, corals, and reefs; sea turtles; marine mammals; birds; bats; fish, cultural marine resources and fishing socioeconomic data. Current available data for each of these research areas are discussed in depth in this report. E & E subject matter experts consulted in preparation of this report employed key search terms during the desktop review to provide consistency in data mining references. Lists of key references that explore these research areas are also provided in this report. For each of the natural, biological, and cultural resources detailed, an annotated data catalog has been constructed summarizing the best available data in regards to time since publication, geographic extent, and sample size. Additionally, each resource described in the data catalog and summaries provides full bibliographic reference, contents, accessibility, pros and cons, and relevance to project and BOEM requirements.

Chapter 4 delves into data gaps identified in this review and provides recommendations for future survey and research efforts. The gap analysis was based upon prioritization of unavailable data identified in the data review of each of the natural, biological, and cultural topics detailed in Chapter 3. Categorization and

prioritization of unavailable data is described through relative importance to the topic, urgency of need, potential utility and application, expected longevity of resulting data, and whether the need would be more appropriately addressed by state versus federal agencies, or private developers. A list of recommended surveys and studies was then developed based upon these data gaps.

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Acronyms and Abbreviations

ASMFC	Atlantic States Marine Fisheries Commission
BSEE	Bureau of Safety and Environmental Enforcement
BOEM	Bureau of Ocean Energy Management
CFR	Code of Federal Regulations
COP	construction and operations plan
CWA	Clean Water Act
CZMA	Coastal Zone Management Act
DOI	U.S. Department of the Interior
E & E	Ecology and Environment, Inc.
EA	environmental assessment
EEZ	exclusive economic zone
EFH	essential fish habitat
EPA	U.S. Environmental Protection Agency
ESA	Endangered Species Act
HAPC	habitat areas of particular concern
IHA	Incidental Harassment Authorization
km	kilometers
MARCO	Mid-Atlantic Regional Council on the Ocean
MBTA	Migratory Bird Treaty Act
MMPA	Marine Mammal Protection Act
MSFCMA	Magnuson-Stevens Fishery Conservation and Management Act
MW	megawatts
NEPA	National Environmental Protection Act
NHP	Natural Heritage Program
NHPA	National Historic Preservation Act
nm	nautical miles
NMFS	National Marine Fisheries Service (also known as NOAA Fisheries)
NOAA	National Oceanic and Atmospheric Administration
NREL	National Renewable Energy Laboratory
NSCPO	Naval Seafloor Cable Protection Office
NWR	National Wildlife Refuge
NYSDEC	New York State Department of Environmental Conservation
NYSERDA	New York State Energy Research and Development Agency
OCS	outer continental shelf
OCSLA	Outer Continental Shelf Lands Act
OSA	Offshore Study Area
RSZ	rotor-swept zone

SAP	site assessment plan
SMA	seasonal management areas
USACE	U.S. Army Corps of Engineers
U.S.C.	U.S. Code
USCG	U.S. Coast Guard
USFWS	U.S. Fish and Wildlife Service
WEA	wind energy area

1 Introduction

On August 1, 2016, the New York State Public Service Commission established the Clean Energy Standard mandating that 50 percent of the state’s electricity needs be provided by renewable energy by 2030. Offshore wind will play a critical role in turning this aggressive goal into a reality. To develop this valuable resource responsibly and thoughtfully, New York State is developing an Offshore Wind Master Plan (Master Plan), first outlined by Governor Cuomo in his 2016 State of the State address.

The New York State Energy Research and Development Authority (NYSERDA) is leading the development of both the Master Plan and a Work Plan to support development of the Master Plan. The Work Plan will include the detailed scopes, interdependencies between activities, connections with federal, state, and local authority requirements, and timelines and budgets of all activities required for development of the Master Plan.

This data review and gap analysis is intended to inform the development of the Work Plan to identify what information exists and where the data gaps are regarding the Offshore Study Area (OSA) (see figure 1 below). There are numerous valuable datasets as well as existing information from NYSERDA, other New York State agencies, and federal agencies that provide information that can help inform and shape the work as well as reduce time and cost for developing the various studies that will be included as part of the Master Plan.

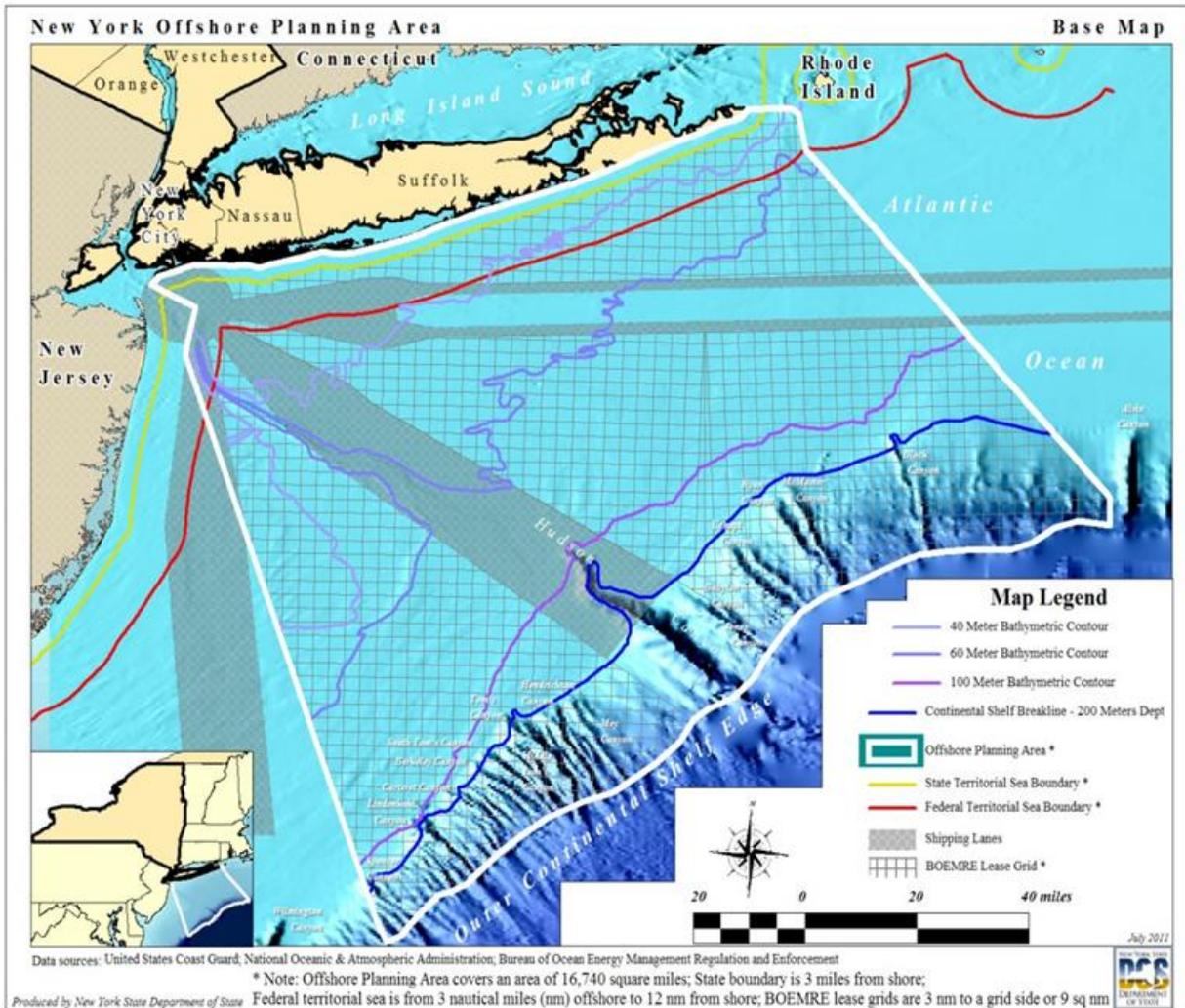


Figure 1: NEW YORK'S MASTER PLAN OFFSHORE STUDY AREA

This data review catalogs the timeframe, extent, and utility of existing datasets with information relevant to natural, biological, and cultural marine resources within the Offshore Study Area. Through this review the team identified where additional information may be needed to support development of the Master Plan. The gap analysis was chiefly predicated on information required by the Bureau of Ocean Energy Management (BOEM) guidelines and other federal and state agencies' permit requirements. Information needed to fulfill agency requirements that was not available was noted as a "gap." This draft report provides a suggested order of priority for filling the identified data gaps with surveys or other studies. However, NYSERDA retains the ultimate prerogative of prioritizing studies, surveys, and other pre-development activities most critical for the Offshore Study Area in developing the Master Plan. This document is intended to be used as a tool rather than the work plan itself. Moreover, we anticipate this

document will evolve as non-governmental organizations and other stakeholders provide input during upcoming outreach activities. In other words, development of this data inventory and gap analysis is intended to be an iterative process.

1.1 Background of Offshore Study Area

Key search terms considered during preparation of this section:

<i>boundary(ies)</i>	<i>BOEM</i>	<i>offshore survey(s)</i>
<i>jurisdiction</i>	<i>coastal energy facilities</i>	<i>wind(speed)</i>
<i>New York (Bight)</i>	<i>baseline</i>	
<i>lease blocks</i>	<i>data gap</i>	

1.1.1 Federal and State Jurisdictions

The Submerged Lands Act of 1953 (43 U.S.C. [United States Code] §§1301 *et seq.*), granted states title to the submerged lands and natural resources within 3 nautical miles (nm) of their coastline (3 marine leagues for Texas and the Gulf Coast of Florida) and preserved federal jurisdiction over submerged lands and resources seaward of states' submerged lands boundary. In the same year, the Outer Continental Shelf Lands Act (OCSLA) (43 U.S.C. §§1331 *et seq.*) defined submerged lands under federal jurisdiction as the outer continental shelf (OCS) and assigned authority for leasing and regulating mineral exploration and development of the OCS to the Secretary of the Interior. This authority is administered by BOEM, an agency within the Department of Interior. In 2005, the Energy Policy Act (42 U.S.C. §13201 *et seq.*) amended OCSLA to clarify uncertainties about offshore wind development and granted ultimate authority over its development to the Secretary of the Interior. In turn, BOEM administers this authority by promulgating rules and guidelines and issuing leases for offshore wind developments on the OCS (Vann 2012).

An additional concept pertaining to jurisdictional waters and submerged lands is the maritime zones recognized under international law, i.e. the 1982 Law of the Sea Convention. Relevant to this discussion is the exclusive economic zone (EEZ) and the baseline from which it and other zones are measured. The EEZ is an internationally recognized area extending up to 200 nm offshore in which a coastal state has sovereign rights to exploit or conserve natural resources and engage in production of energy from water, currents, and winds (National Oceanic and Atmospheric Administration [NOAA] n.d.). Along the continental U.S. Atlantic coast, the EEZ extends the full 200 nm (and by extension, so does the OCS,

defined as U.S. lands under federal jurisdiction). A portion of the EEZ lies on the geologic continental shelf (with depths shallower than 200 meters), while the remainder lies on the continental slope (200 to 2,000 meters) and the abyssal plain (3,000 to 5,000 meters) (Bureau of Safety and Environmental Enforcement [BSEE] n.d.). The baseline from which maritime zones are delineated is defined in the U.S. as the mean of the lower low tides along the coast as depicted on the largest scale NOAA nautical charts (NOAA n.d.). U.S. state waters also are measured from this baseline, which is subject to changes as the coastline accretes and erodes.

States retain authority for administering renewable energy development in state waters, and permitting regimes differ from state to state. However, most offshore wind developers will likely favor sites on the OCS to minimize marine use conflicts and potential environmental impacts and thus will be regulated under the lead agency, BOEM. Still, the majority of offshore wind farms developed in federal waters will have associated cables that must traverse state waters to transmit the energy onshore (Vann 2012). The cables will trigger state-permitting requirements such that environmental assessments associated with offshore wind development will likely need to consider the existing environments in both federal and state waters.

1.1.2 Offshore Wind Energy Development

The National Renewable Energy Laboratory (NREL) [2012a]) estimated the technical potential for capturing offshore wind power (and other renewable energies) in a state-by-state analysis of the U.S. In the state of New York, NREL estimated technically recoverable offshore wind power to be 146 gigawatts (GW), compared with 26 GW of onshore wind power. Wind power estimates were based, in part, on the assumption that suitable offshore wind resources are present where the annual average wind speed is greater than or equal to 6.4 meters per second at a height of 90 meters above sea level (the typical wind turbine hub-height for offshore wind developments). Although wind speeds off the Atlantic Coast are lower than off the Pacific Coast, the shallower depths in the Atlantic Ocean make offshore wind farms more economical to developers in the near-term. In the OSA, estimated wind speeds are approximately 8.5 to 9.0 meters per second (NREL 2012b).

In 2010, Secretary of the Interior Ken Salazar announced a “Smart from the Start” offshore wind energy initiative in the Atlantic OCS to identify priority wind energy areas (WEAs) for potential development, improve coordination with local, state, and federal partners, and simplify the leasing process through regulatory revision (Department of the Interior [DOI] 2016). BOEM leads the process of identifying WEAs by coordinating with state and federal partners and other key stakeholders to delineate offshore

locations that appear highly suitable for wind energy development. The OCS is divided into a grid pattern of lease blocks, and each delineated WEA comprises multiple lease blocks and sub-blocks associated with the offshore region of a particular state (even though WEAs are in federal jurisdictional waters).

New York

Typically, when a state's WEA or WEAs are established, BOEM conducts a lease sale (i.e., auction) of the associated OCS blocks to wind developers. In addition, developers are permitted to submit unsolicited requests for commercial leases on OCS lease blocks. Technically, both types of lease arrangements have occurred in the OCS off the coast of New York. In September 2011, a collaborative consisting of three utilities submitted an unsolicited request for an area of the OCS more than 10 miles off the south shore of Long Island (New York Power Authority 2011). As required by the Outer Continental Shelf Lands Act (OCSLA), BOEM solicited information to determine if competitive interest existed and, finding in the affirmative, BOEM began the competitive leasing process in 2014 (BOEM n.d.[a]). Simultaneously, BOEM prepared an environmental assessment (EA) of site assessment activities in the proposed area and, based on its environmental review and stakeholder input, delineated a WEA in offshore New York that generally matched the area proposed by the utility collaborative. BOEM finalized the WEA boundary in October 2016 and in the same month issued a Final Sale Notice for the area encompassed by the WEA. The auction was scheduled for December 15, 2016 and ran through December 16, 2016. Statoil Wind US, LLC, which bid \$42 million, was the provisional winner of the lease.

The New York WEA measures 79,350 acres (124 square miles) and consists of 5 full OCS blocks and 143 sub-blocks (Federal Register October 31, 2016). At its closest position to shore, the WEA is approximately 11.5 nm south of Jones Beach Island, an outer barrier island along the southern coast of Long Island. The WEA extends 24 nm southeast along its longest portion and resembles an elongated triangle (BOEM n.d.[a]). It is strategically located between two designated traffic lanes within a traffic-separation scheme guiding vessel traffic in and out of Lower New York Bay.

Depths in the majority of the WEA range from 21 to 40 meters. Offshore wind technology has been demonstrated on a commercial scale in depths of 30 meters or less (NOAA 2013). Small-scale projects have been successfully commissioned in depths of 30 to 60 meters, and pilot projects have been demonstrated at depths of 60 to 900 meters. These depth zones may be termed the shallow, transition, and deepwater zones in reference to offshore wind technology.

OCS lease blocks outside WEAs will also be considered for offshore wind development, and the state of New York has designated a 16,740 square mile region extending from its shoreline as an OSA for its Offshore Wind Master Plan. This OSA, comprising both state and federal waters, extends from the south shore of Long Island and New York City to the continental shelf break and is the same OSA examined in this report. Within the OSA, depths range from under 0 meters to more than 100 meters.

The coastal feature known as the New York Bight is partially encompassed by the OSA. A bight is a long, gradual recess in the coastline that forms a large, open bay (NOAA National Ocean Service 2015). As such, the New York Bight refers to the coastal area between Long Island and the New Jersey Coast because the two coasts form a “bight” in the shape of a right angle (U.S. Geological Survey [USGS] December 2016).

Several OCS leases have been issued off the coast of New York, New Jersey, Massachusetts, Maryland, Delaware, Virginia, and the shared offshore region between Rhode Island and Massachusetts. The wind energy lessees are all in the early stages of the planning, siting, and development process. Per their leases, they may conduct preliminary site assessment activities for six years before beginning construction of a wind farm and may extend the pre-construction term by one or more years. Existing offshore wind lessees in the OCS region immediately southwest and northeast of New York’s OCS include the following:

New Jersey

- US Wind Inc. acquired a 183,353-acre lease area in March 2016 about 7 miles off the coast of Atlantic City. Estimated capacity is 1,500 MW (US Wind Inc. 2016, BOEM September 2015a).
- RES American Developments Inc. acquired a 160,480-acre lease area (“Ocean Wind”) with a starting lease date of March 2016 (BOEM September 2015b). DONG Energy took over the lease area in May 2016 (Dvorak May 23, 2016). Estimated capacity is 1,000 MW, and the area is adjacent and north of US Wind’s lease area.

Massachusetts

- DONG Energy acquired a 187,523-acre lease area 15 miles off the coast of Martha’s Vineyard with an initial lease date of April 2015. Bay State Wind LLC, a subsidiary of DONG Energy, intends to build an offshore wind farm, Bay State Wind, capable of generating 1,000 MW (DONG Energy n.d.).
- Offshore MW LLC secured a 166,886-acre lease in April 2015 off the coast of Massachusetts (BOEM n.d. [b]).

Rhode Island/Massachusetts

- Deepwater Wind acquired adjacent lease areas measuring 97,498 acres and 67,252 acres in the shared WEA of Rhode Island and Massachusetts in October 2013 (BOEM 2012). The proposed project, Deepwater ONE, has a phased plan of development and would be capable of generating more than 1,000 MW that would supply power to southern New England and eastern Long Island (Deepwater Wind 2016a).

Deepwater Wind built and operates the first and only offshore wind farm in the United States located in Rhode Island state waters off the southeast coast of Block Island (near Long Island). On-site construction began in 2015, and the wind farm was commissioned in December 2016. The Block Island Wind Farm consists of five turbines with a 30 MW capacity, and although all turbines are within the state's jurisdiction, the transmission cable crosses federal waters (Deepwater Wind 2016b).

1.1.3 Other Offshore Energy Development

Excluding offshore pipelines, no other energy facilities operate in the state or federal waters off the Atlantic coast of New York. This includes oil and gas production wells, deep water LNG ports, marine hydrokinetic facilities, and ocean thermal facilities. Onshore, on Long Island and the coast of New Jersey, coastal energy facilities are numerous. The largest number of electric-generating facilities on Long Island are powered by natural gas, followed by facilities powered by oil. Several biomass facilities are present, as is one solar energy facility. The Atlantic coast of New Jersey is much less densely populated with energy facilities than Long Island and has a more evenly distributed mix of natural gas, solar, biomass, and oil-powered generation facilities.

1.2 Offshore Wind Development Guidelines, Permits, and Requirements

Offshore wind developments in the OCS are primarily regulated by BOEM's development guidelines and required plan documents. However, other federal, state, and local permits apply to offshore wind developments, and in some cases, necessitate different supporting information and analysis. BOEM's guidelines as well as these other permitting requirements largely drove the selection of research areas for this data collection effort.

1.2.1 BOEM Guidelines

Regulations in 30 Code of Federal Regulations (CFR) 585 stipulate the execution of BOEM's OCS Renewable Energy Program, including the four key phases of planning, leasing, site assessment, and

construction and operations. After the leasing phase, an offshore wind energy developer must submit a Site Assessment Plan (SAP) to BOEM for on-site surveying and monitoring activities on a particular lease area for up to five years. BOEM requires the SAP to include a description of all survey and monitoring activities as well as baseline information about natural, biological, cultural, and socioeconomic resources in the marine environment in the vicinity of the lease. In addition, the developer must describe how the proposed site assessment activities may affect those marine resources and discuss environmental protection measures that would be implemented. Before the end of the site assessment period, the developer must submit a Construction and Operations Plan (COP), which would include a detailed project design, construction, and operation plan, and all survey and monitoring data acquired during the site assessment period. The COP must provide sufficient environmental information on the existing and potential impacts of the development to allow BOEM to fulfill its requirements under the National Environmental Policy Act (NEPA).

The environmental information required in the COP references the same natural, biological, cultural, and socioeconomic resources covered in the SAP. Thus, data supporting environmental resource assessments in one plan will likely help support assessments in another (assuming the passage of time does not make the data obsolete). This data collection effort focused primarily on the natural, biological, and cultural resource areas that must be addressed in the SAP and COP, and the selected research areas are discussed in Section 2, “Methodology.” The BOEM SAP and COP permitting requirements are referred to as BOEM guidelines through the remainder of the document.

1.2.2 Other Project Development Permits and Requirements

In addition to BOEM guidelines, other project development requirements were considered during development of this data inventory. Table 1-1 contains other relevant federal and state permits and requirements that would be required for an offshore wind development off the coast of New York State. The table provides a brief summary of the supporting information required in each permit application.

Table 1-1 Federal and New York State Offshore Wind Development Requirements

Agency/Entity	Permit/Approval	Applicable Laws/Regulations	Information Required for Permits, Supporting Studies, and Applicability to Project
Federal			
U.S. Army Corps of Engineers (USACE)	Individual Permits (IPs) – Required for dredge, fill and discharge in navigable waters of the United States, Generally speaking, the USACE IP is always used for projects that propose permanent impact (fill) to greater than 1 acre of wetland or stream.	<ul style="list-style-type: none"> • Section 10 Rivers and Harbors Act of 1899; Section 404 Clean Water Act of 1972; Section 103 of the Marine Protection, Research, and Sanctuaries Act; 33 CFR Part 325 • Section 408 Review 	<ul style="list-style-type: none"> • Pre-application consultation recommended for larger projects. • Describe the overall activity or project. Indicate whether discharge of dredged or fill material is involved. • Describe all effects on the aquatic environment, alternatives available to accomplish the project purpose, measures for reducing the impacts of the project.
United States Fish and Wildlife Service (USFWS) and NOAA/National Marine Fisheries Service	Endangered Species Act – Section 7 Consultation Process; Biological Opinion (BO)-documents USFWS' determination as to the likelihood of impact to listed species	Endangered Species Act of 1973 (ESA) Section 7(a)(1) and (2); ESA Section 10(a)(1); 50 CFR § 402	<ul style="list-style-type: none"> • Section 7 consultation; • Species and habitat-specific surveys as needed; • Biological Assessment • Scientific permit for studies if adverse effects are anticipated.
NOAA/National Marine Fisheries Service	Essential Fish Habitat (EFH) Assessment - regarding an action that may adversely affect	<ul style="list-style-type: none"> • Magnuson-Stevens Fishery Conservation and Management Act (MSFCMA) § 305(b)(4)(A) • 50 CFR § 600.920(a)(3) • 50 CFR § 600.920(e) • 50 CFR § 600.920(k)(1) 	<ul style="list-style-type: none"> • Notification - The federal agency must notify NMFS regarding a proposed action that may adversely affect EFH. • EFH Assessment - This is a written assessment of the effects of the action on EFH. • EFH Conservation Recommendations
NOAA/National Marine Fisheries Service	Marine Mammal Letter of Authorization (LOA) or Incidental Harassment Authorization (IHA) - MMPA prohibits, with certain exceptions, the take of marine mammals in U.S. waters and by U.S. citizens on the high seas, and the importation of marine mammals and marine mammal products into the United States	<ul style="list-style-type: none"> • Marine Mammal Protection Act (MMPA) of 1972 - Section 101(a)(5), see (16 USC 1361-1407) • Incidental Take Regulations 50 CFR Part 216 	All applications for marine mammal incidental take authorizations, whether an LOA or an IHA, must include the sufficient detail for NOAA Fisheries to meet the requirements mandated by section 7 of the Endangered Species Act and the National Environmental Policy Act (NEPA):

Table 1. (Continued)

Agency/Entity	Permit/Approval	Applicable Laws/Regulations	Information Required for Permits, Supporting Studies, and Applicability to Project
NOAA/Office of Ocean and Coastal Resource Management (OCRM)	Coastal Consistency (CCD) Determination Oversight and mediation of CCD review by states under federally- approved CZM Plan	Section 307 of the Coastal Zone Management Act (CZMA) of 1972, as amended (16 USC Part 1451 et seq.)	Submit CCD with the application to the lead federal agency (BOEM) a certification that the proposed activity complies with and will be conducted in a manner consistent with each affected state's CZMA Plan.
US Environmental Protection Agency (EPA)	General Conformity Analysis - requires federal agencies to show that their activities in areas not meeting National Ambient Air Quality Standards (NAAQS) for criteria pollutants will be consistent with the state implementation plans for attainment of the NAAQS.	Clean Air Act of 1977 (section 176(c)(4))	Must prepare standard information for a CAA General Conformity Analysis:
US Environmental Protection Agency (EPA)	New Source Review (NSR) Permit or state equivalent.	<ul style="list-style-type: none"> • Clean Air Act of 1977 - Title I Parts C (PSD) and D (NSR); CAA Title III - Section 328 (42 USC § 7627); 40 CFR Parts 51- 52, 55 • Amendments to Section 328 pending Senate review of 'Jobs and Energy Permitting Act of 2011' (passed in House H.R. 2021 June 2011) 	Arrange pre-construction conference with EPA office to determine need for permit and amount of on-site meteorological data for application.

Table 1. (Continued)

Agency/Entity	Permit/Approval	Applicable Laws/Regulations	Information Required for Permits, Supporting Studies, and Applicability to Project
US Environmental Protection Agency (EPA)	National Pollutant Discharge Elimination System (NPDES) - Stormwater/Multi-Sector General Permit (MSGP) or Individual Permit	Sections 402 and 403 of the Clean Water Act (CWA); 33 U.S.C. §1251 et seq; 40 CFR § 122.26	<ul style="list-style-type: none"> • File MSGP Notice of Intent • Develop a Stormwater Pollution Prevention Plan (SWPPP). • Under the provisions of the CWA, Section 403, the permitting authority can require the permit applicant to provide the information necessary to conduct an evaluation of the impact of a marine discharge on the biological community based on ecological, social, and economic factors.
Bureau of Ocean Energy Management (BOEM) - Lead Agency	Review to evaluate natural and socioeconomic environmental impacts of a project amongst federal agencies (e.g., EPA, USACE, NOAA, USFWS, etc.) according to their legal jurisdictions and relevant Memorandums of Understanding with BOEM.	National Environmental Policy Act of 1969. 42 USC § 4321 and 4331 through 4335. 40 CFR Parts 1500 through 1508	Environmental Assessment/Environmental Impact Statement
BOEM/ Advisory Council on Historic Preservation (ACHP)	NHPA Section 106 Review Evaluate project effects on historical resources through Lead Agency (BOEM) in consultation with appropriate state and local officials, Indian tribes, applicants for federal assistance, and members of the public.	<ul style="list-style-type: none"> • National Historic Preservation Act of 1966, as amended; 36 CFR Part 800 54 U.S.C. 300101 et seq. • Section 106 Implementing Regulations - 36 CFR Part 800 	<ul style="list-style-type: none"> • Determine likelihood of effect on properties that are included in the National Register of Historic Places or that meet the criteria for the National Register. • Obtain concurrence/comments from State Historic Preservation Officer (SHPO) or the Tribal Historic Preservation Officer (THPO). See state-specific sections for more details.
US Coast Guard (USCG)	Private Aid to Navigation (PATON) and Navigation Safety Risk Assessment.	<ul style="list-style-type: none"> • Outer Continental Shelf Lands Act (43 USC 1333); 14 USC 81 et. seq., 33 USC 735; 33 CFR Parts 60-76 • Ports and Waterways Safety Act (33 USC 1221); • Maritime and Transportation Act of 2006; • Navigation and Vessel Inspection Circular (NAVIC) No. 02-07 	NOAA/National Marine Fisheries Service Standard information is required:

Table 1. (Continued)

Agency/Entity	Permit/Approval	Applicable Laws/Regulations	Information Required for Permits, Supporting Studies, and Applicability to Project
State			
New York Department of State (DOS), Division of Coastal Resources	Coastal Zone Management Program Federal Consistency Certification	<ul style="list-style-type: none"> • Coastal Zone Management Act (CZMA) 16 U.S.C 1451 et seq. State Executive Law Article 42; State Executive Law Article 42 • 15 CFR Part 930 and 923 • 19 NYCRR Part 600 and 6 NYCRR Part 617 	Federal actions that affect any use or natural resource of the coastal zone must be consistent with the enforceable policies of a state's federally approved coastal zone program. In New York, the enforceable coastal policies are those in the New York Coastal Management Program (NYCMP), Local Waterfront Revitalization Programs (LWRP), and Long Island Sound Coastal Management Program (LISCMP).
New York State Department of Public Service, Public Service Commission (PSC)	Certificate of Environmental Compatibility and Public Need under Article VII	<ul style="list-style-type: none"> • New York State Public Service Law, Article VII • 16 NYCRR Parts 85-88 	Siting of major utility transmission facilities in New York is under the jurisdiction of the PSC. Applicant must demonstrate compliance with the substantive requirements of all applicable state and local approvals.
New York State Department of Public Service, Board on Electric Generating Siting and the Environment	Siting of Major Electric Generating Facilities - Certificate of Environmental Compatibility and Public Need	<ul style="list-style-type: none"> • New York State Public Service Law, Article 10 • 16 NYCRR Parts 1000-1002 	Requires a full system benefits and environmental impact review of the siting, design, construction, and operation of major electric generating facilities of greater than 25 MW or greater in New York State, including offshore areas within NYS jurisdictional waters.
New York Office of General Services (OGS)	State Submerged Lands Easement	<ul style="list-style-type: none"> • New York Public Lands Law, Article 2, Section 3 • 9 NYCRR Part 270 & 271 	The title to the bed of numerous bodies of water is held in trust for the People of the State of New York under the jurisdiction of OGS. Structures, including fill, located in, on, or above state-owned lands underwater require a license, grant, or easement from the OGS. Pipelines, cables, docks, wharves, moorings and permanent structures, including the wind turbines and transmission cables, require an easement.
New York State Department of Environmental Conservation (NYSDEC)	Article 15 Protection of Waters Permit-Excavation or Placement of Fill in Navigable Water and Their Adjacent and Contiguous Wetlands Permit	<ul style="list-style-type: none"> • Environmental Conservation Act (ECL) Article 15, Title 5 and Article 70 • 6 NYCRR Part 608 and 621 	Installation of transmission cables within New York State waters will require Article 15 permits under the New York Protection of Waters Regulatory Program for the excavation or placement of fill in navigable waters of the state and their adjacent and contiguous wetlands and disturbance of the bed or banks of a protected stream or other watercourse.

Table 1. (Continued)

Agency/Entity	Permit/Approval	Applicable Laws/Regulations	Information Required for Permits, Supporting Studies, and Applicability to Project
NYSDEC	Coastal Erosion Management Permit	<ul style="list-style-type: none"> • ECL Article 70 • 6 NYCRR Part 505 	The construction or placement of a structure, or any action or use of land which materially alters the condition of land, including grading, excavating, dumping, mining, dredging, filling or any disturbance of soil is a regulated activity requiring a coastal erosion management permit.
NYSDEC	Water Quality Certification (WQC) under Section 401 of the Clean Water Act (CWA)	<ul style="list-style-type: none"> • U.S. Clean Water Act Section 401, 16 USC 1451; • ECL Article 15, Title 5 • 6 NYCRR Part 608 	State WQC is required for projects applying for federal permits that may affect state waters, such as the USACE Section 10/404 permit. New York administers its WQC under the Protection of Waters Regulatory Program. WQC has been conditionally granted for USACE NWP's. An individual WQC would be required if the project requires an individual USACE permit.
NYSDEC	State-listed endangered species consultation	<ul style="list-style-type: none"> • ECL Article 11 Section 535 • 6 NYCRR Part 182 	The potential impacts of the proposed project's construction, operation and decommissioning with respect to endangered, threatened and species of concern listed in the State of New York are examined as part of this consultation. Consultation should be with the Division of Fish, Wildlife and Marine Resources – Bureau of Marine Resources on State Shellfish and Marine Fish Habitat; Rare, Threatened and Endangered Marine Species
New York State Office of Parks, Recreation, and Historic Preservation (NYS OPRHP),	Section 106 Consultation under the National Historic Preservation Act (NHPA) and Section 14.09 of the New York State Preservation Office (SHPO) Historic Preservation Act	<ul style="list-style-type: none"> • 16 USC 470 54 U.S.C. 300101 et seq. • 6 NYCRR Part 617 Section §14.09 of the Parks, Recreation and Historic Preservation Law 	The New York SHPO will require an architectural study to identify NRHP sites, state register sites, and other sensitive historical, cultural, and traditional sites within an Area of Potential Effect (APE) from the project. The SHPO Archaeologist will also require archaeological studies to identify potentially significant sites.
New York State Museum	Section 233 Permit	Section 233 of the Education Law	Permits are required for any activity that will "appropriate, excavate, injure, or destroy any object of archeological or paleontological interest, situated on or under lands owned by the State of New York." Under the regulations of the Commissioner of Education, reconnaissance survey projects may also require a permit, even though no excavation of any site is proposed.

2 Methodology

This section provides an overview of the methodology used to identify the availability of existing data that could support the identification and assessment of locations with high wind energy development potential in the OSA for the New York Offshore Wind Master Plan. These data would also support the preparation of SAP and COP applications to BOEM as well as other project development permits and requirements outlined in Table 1-1. In addition, the data review serves to identify data that are not available and, therefore, will need to be obtained. An approach to obtaining outstanding data needs will be addressed in the Work Plan for the Master Plan, as discussed in Chapter 1.

2.1 Approach to Data Collection and Gap Analysis

By assessing the utility of existing datasets this document is intended to be a tool for future research efforts attempting in-depth analyses of various natural, biological, and cultural marine resources. This document is not intended to provide an in-depth marine resource analysis itself. All of the research consisted of desktop investigations of published and gray literature and known, marine data portals. The specific steps for compiling a comprehensive data catalog and gap analysis were established through coordination with NYSERDA. Following the circulation of this draft among various non-governmental organizations and stakeholder groups, subject matter experts anticipate revising and potentially expanding existing data sources, data gaps, and survey priorities, depending on the received feedback.

2.1.1 Selected Research Areas and Key Search Terms

The report addresses research areas that capture the natural, biological and cultural resource information required in SAP and COP applications to assist BOEM in complying with NEPA and other relevant laws. The research areas also cover information that will help fulfill other federal and state permits, described in Section 1.2. Whereas the environmental resource information categories in the SAP and COP are bundled (e.g., “biological resources,” “threatened or endangered species,”), the discreet research topics in this analysis permitted in-depth assessments about the type and breadth of data available for each. In addition, sensitive habitat data associated with each biological resource are discussed within the respective research area. The selected research areas are as follows:

Bathymetry and Benthic Sediments

Water Quality

Marine Vegetation

Marine Mammals

Birds

Bats

Invertebrates, Corals, and Reefs

Fish

Sea Turtles

Cultural Resources

Fisheries Socioeconomic Data

Some topic areas in the SAP and COP are not included in this research area list, e.g., “hazard information,” “social and economic resources,” and “coastal and marine uses.” In coordination with NYSERDA, we determined that this data collection effort should focus on the natural, biological, and cultural resource areas, given the higher potential for spatial and temporal gaps in associated datasets and the need for regional survey collection efforts in the future. Other topics could be the focus of a subsequent study or stakeholder-driven information gathering effort, as needed.

Using professional judgment and familiarity with the various disciplines, subject matter experts identified key terms to be employed during desktop searches within or across research areas. These search terms provided measures of consistency, transparency, and comprehensiveness in the research methodology. Key terms assigned to a research area were employed in general desktop searches and during investigations of all key references and any additional references discovered during the course of data collection. Each research area’s assigned key terms are listed at the beginning of the relevant discussion, including the preceding introduction, which contains general information about offshore wind development in the New York State region. Certain key terms assigned almost universally to the research areas include “density,” “abundance,” and “hotspot.” Other key terms were research area-specific, for example, “submarine canyon,” “demersal,” and “shipwreck.”

2.1.2 Key References

In coordination with NYSERDA, we established a list of key references to be used universally across research efforts for the various natural, biological, and cultural research areas. The key references are a collection of data portals, offshore survey data, and agency reports known to contain some of the most recent, relevant, and/or comprehensive marine resource data pertaining to the New York offshore region. In addition to key references, sources specific to each research area were consulted for relevant data and recorded in a topic-specific data catalog. The full bibliographic citations of the key references are included in the data catalogs in Chapter 3, and a short list of titles and dates is provided below:

KEY REFERENCES	Year(s)
BOEM Renewable Energy Research Completed Studies	2007-2016
Mid-Atlantic Regional Council on the Ocean's Data Portal	Ongoing
Multipurpose Marine Cadastre	Ongoing
New York Department of State's Offshore Atlantic Ocean Study and associated Geographic Information Gateway	Ongoing
Normandeau Associates, Inc. Digital Survey Data	Ongoing
Northeast Ocean Data Portal	Ongoing
NYSERDA offshore wind study (unpublished)	2013

2.2 Overview of Document Structure

Section 3, “Review of Existing Data,” presents the results of the data collection effort for the research areas. Under each research area is a brief summary of best available data, followed by an annotated data catalog of all located references relevant to the topic. Both published and gray literature were investigated for relevant information, as were the key references listed in Section 2.1.2 above. Distinguishing the best available data sources from other sources was largely driven by professional judgment, although certain key characteristics weighed heavily: timeframe (more recent data was typically considered better), geographic extent (depending on resource, a geographically large-scale or small-scale study was considered better), and sample size (large sample size or larger survey effort was considered more accurate).

The data summaries are narratives about key elements and findings, while the data catalogs present information as bulleted items. The catalogs capture the location and content of all relevant references discovered during the course of the data collection, including best available and other relevant data. Key references are also listed in a research area’s data catalog if they provided information relevant to the topic. All datasets listed in the catalog contain information relevant to the New York Bight and offshore region, even though, in many cases, a relevant dataset captures a broader scale (e.g., the Northeast offshore region, Atlantic coast). The following illustrates the format and content of each annotated reference in the catalog:

Full bibliographic reference

- Contents (brief description)
- Accessibility

- Pros and Cons
- Relevance to project requirements (BOEM guidelines or other).

Chapter 4, “Data Gaps and Recommendations,” contains a gap analysis and recommendations for future survey and research efforts. Unavailable information in the data collection effort recorded in Chapter 3 became the basis for the gap analysis.

By prioritizing unavailable data to the extent possible, we assigned data gaps to three priority categories—high, medium, and low priority. Following the prioritization methodology in the NYSERDA (2015) report, we considered the following factors to prioritize research needs:

- Estimated importance of the topic.
- Urgency of the need (e.g., in relation to the current status of development or to allow for the fulfillment of other unmet research needs).
- Potential application (e.g., how useful the resulting data will be for siting, permitting, or detecting change between pre- and post-construction).
- Expected longevity of the resulting data (e.g., how quickly the data are expected to become “out of date” and irrelevant for future decision-making).
- Whether the need would be more appropriately addressed by the state of New York rather than a federal agency or private developers (NYSERDA 2015).
- Whether the data could be addressed in the near-term (less than 6 months) or long-term (after 6 months)

A priority ranking of “low” does not indicate that the outstanding data are not necessary but, rather, indicates something about the timing or the responsibility for producing the data. For example, the completeness data may depend on other outstanding surveys or may not be needed until later in the development process. Likewise, particular data may more appropriately be conducted by a developer or a federal agency, depending on the scale and cost of useful data in that instance.

Based on the data gaps, we developed a suggested list of surveys and studies. The types of surveys necessary to fill the identified data gaps are discussed broadly, with the assumption that survey timelines, equipment, and other specification would be determined in the future.

3 Review of Existing Data

Under each research area is a brief summary of best available data, followed by an annotated data catalog of all located references relevant to the topic. Research areas presented include bathymetry and benthic sediment data (Section 3.1), water quality and metocean conditions (Section 3.2), marine vegetation (Section 3.3), invertebrates, corals and reefs (Section 3.4), fish (Section 3.5), sea turtles (Section 3.6), marine mammals (Section 3.7), birds (Section 3.8), and cultural resources (Section 3.9).

3.1 Bathymetry and Benthic Sediment Data

3.1.1 Summary of Best Available Data

The New York State Geographic Information Gateway provides links to several databases that contain data for bathymetric contours, sediment thickness, hard bottom occurrence, and seafloor sediment type. Data are presented as downloadable data or in easy-to-view maps. These datasets are typically point observations collected over years—or decades—in which models are used to predict coverage for the OSA. These datasets are useful for an overall view of the environment and physical condition; however, additional surveys will be required to obtain specific data.

3.1.2 Data Catalog

This data catalog is organized chronologically, starting with the most recently published references first. References that are mentioned in Section 3.1.1, “Summary of Best Available Data,” are denoted by asterisks next to their bibliographic citations. Following the citation is a brief summary of the reference’s content, accessibility, and utility

Key search terms considered during preparation of this section:

<i>sediment(s)</i>	<i>bathymetry</i>	<i>seabed</i>
<i>substrate</i>	<i>hydrographic</i>	<i>seafloor</i>
<i>depth</i>	<i>submarine canyon</i>	<i>elevation</i>

Future date

The National Centers for Coastal Ocean Science (NCCOS) and BOEM have signed a three-year agreement to “provide technical services and expertise to produce comprehensive seafloor substrate maps

and model validation” of the New York Bight region. <https://coastalscience.noaa.gov/news/ecosystem-management/planning/nccos-boem-support-alternative-energy-development-new-york-bight-2/>

2016

NOAA’s Ocean Service and Office for Coastal Management. United States Interagency Elevation Inventory <https://coast.noaa.gov/inventory/> Accessed December 8, 2016.

- **Contents:** High-accuracy topographic and bathymetric data. Includes LIDAR (light detection and ranging) and interferometric synthetic aperture radar (IfSAR), and bathymetric data, which includes hydrographic surveys, multi-beam data, and bathymetric LIDAR.
- **Accessibility:** Follow the link provided in the above reference.
- **Pros and cons:**
 - **Pros:** Some data layers are updated annually.
- **Relevance to project requirements:** BOEM guidelines indicate seafloor surveys shall be conducted to ensure the project is sited to avoid or minimize potential impacts associated with seafloor instability or other hazards. BOEM guidelines indicate that a project should avoid locating facilities near sensitive seafloor habitats.

NOAA National Centers for Environmental Information. n.d.

<http://www.ngdc.noaa.gov/mgg/coastal/crm.html>. Accessed December 8, 2016

- **Contents:** Offshore bathymetry with land topography. The maps show elevation in meters.
- **Accessibility:** Follow the link provided in the above reference and click on the appropriate volume to access maps. Volume 1 for Northeast Atlantic also includes links to metadata and the ability to download software to view the entire grid.
- **Pros and cons:**
 - **Pros:** Provides general elevation data for the region.
 - **Cons:** The maps do not extend to the edge of the continental shelf.
- **Relevance to project requirements:** BOEM guidelines indicate seafloor surveys shall be conducted to ensure the project is sited to avoid or minimize potential impacts associated with seafloor instability or other hazards. BOEM guidelines indicate that a project should avoid locating facilities near sensitive seafloor habitats.

2015

National Ocean Service Office of Coast Survey US Bathymetric and Fishing Maps. 2015 (may vary for individual maps). https://www.ngdc.noaa.gov/mgg/bathymetry/maps/nos_intro.html Accessed December 5, 2016.

- **Contents:** Topographic maps of the sea floor. The maps show detailed depth contours and portray the size, shape, and distribution of underwater features.

- **Accessibility:** Interactive map viewer can be accessed at the following link:
<https://maps.ngdc.noaa.gov/viewers/fishmaps/>
- **Pros and cons:**
 - **Cons:** Maps must be downloaded individually. No downloadable data.
- **Relevance to project requirements:** BOEM guidelines indicate seafloor surveys shall be conducted to ensure the project is sited to avoid or minimize potential impacts associated with seafloor instability or other hazards. BOEM guidelines indicate that a project should avoid locating facilities near sensitive seafloor habitats.

2014

Woods Hole Coastal and Marine Science Center, USGS East Coast Sediment Texture Database. 2014. Sourced from MarineCadastre.gov. Sediments. <https://marinecadastre.gov/> Accessed December 8, 2016.

- **Contents:** Sediment texture.
- **Accessibility:** From the link provided in the above reference, click the “data” tab. In the search bar enter “sediment.” The dataset “USGS Sediment Texture” will appear. Metadata is available as well as the option to add data to the map or preview map.
- **Pros and cons:**
 - **Pros:** Database contains location, description, and texture samples taken by numerous sampling programs from 1955 to 2014.
 - **Cons:** More data close to shore and fewer data points offshore.
- **Relevance to project requirements:** BOEM guidelines indicate seafloor surveys shall be conducted to ensure the project is sited to avoid or minimize potential impacts associated with seafloor instability or other hazards. BOEM guidelines indicate that a project should avoid locating facilities near sensitive seafloor habitats.

2013

*New York State Geographic Information Gateway. <http://opdgig.dos.ny.gov/#/map/0/%7BB5CC9841-FB71-4F38-898D-D9AFD8150C5C%7D> Accessed December 8, 2016

- **Contents:** Sediment thickness contours in 200-meter intervals for water depths ranging from 0 to 18,000 meters. The contours were derived from the National Geophysical Data Center’s global sediment-thickness grid.
- **Accessibility:** Follow the link provided in the above reference and zoom to the OSA. Click on any contour to see contour and depth data. Downloadable data is also available.
- **Pros and cons:**
 - **Pros:** Data acquired through two methods: seismic profile technologies and through coring at discrete sites.
 - **Cons:** Data is in 200-meter intervals.

- **Relevance to project requirements:** BOEM guidelines indicate seafloor surveys shall be conducted to ensure the project is sited to avoid or minimize potential impacts associated with seafloor instability or other hazards. BOEM guidelines indicate that a project should avoid locating facilities near sensitive seafloor habitats.

*New York State Geographic Information Gateway <http://opdgig.dos.ny.gov/#/map/0/%7B0B53B8ED-736D-4CC0-BC52-494FBC904384%7D> Accessed December 8, 2016

- **Contents:** Bathymetric contours.
- **Accessibility:** Follow the link provided in the above reference and zoom to the OSA. Downloadable data also available.
- **Pros and cons:**
 - **Pros:** Dataset covers the entire project area.
 - **Cons:** Data are presented at large spatial intervals.
- **Relevance to project requirements:** BOEM guidelines indicate seafloor surveys shall be conducted to ensure the project is sited to avoid or minimize potential impacts associated with seafloor instability or other hazards. BOEM guidelines indicate that a project should avoid locating facilities near sensitive seafloor habitats.

2012

*New York State Geographic Information Gateway. <http://opdgig.dos.ny.gov/#/map/0/%7BF2944E84-35F4-441C-8EDE-4B2E5DD3989E%7D> Accessed December 8, 2016

- **Contents:** Seafloor sediment predicted grain size from a sediment spatial model developed for the New York offshore spatial planning area.
- **Accessibility:** Follow the link provided in the above reference and zoom to the OSA. Click on any data point to see the grain size.
- **Pros and cons:**
 - **Pros:** Dataset covers the entire OSA.
 - **Cons:** Data is predicted from a sediment spatial model, not from observed data.
- **Relevance to project requirements:** BOEM guidelines indicate seafloor surveys shall be conducted to ensure the project is sited to avoid or minimize potential impacts associated with seafloor instability or other hazards. BOEM guidelines indicate that a project should avoid locating facilities near sensitive seafloor habitats.

*New York State Geographic Information Gateway. <http://opdgig.dos.ny.gov/#/map/0/%7BD5901495-1F9A-469A-8B4D-8BEC3695F0C9%7D> Accessed December 8, 2016

- **Contents:** Seafloor hard bottom occurrence predictions from a spatial model developed for the New York offshore spatial planning area.

- **Accessibility:** Follow the link provided in the above reference and zoom to the OSA. Click on any data point to see probability.
- **Pros and cons:**
 - **Pros:** Dataset covers the entire project area.
 - **Cons:** Data is predicted from a spatial model, not observable data.
- **Relevance to project requirements:** BOEM guidelines indicate seafloor surveys shall be conducted to ensure the project is sited to avoid or minimize potential impacts associated with seafloor instability or other hazards. BOEM guidelines indicate that a project should avoid locating facilities near sensitive seafloor habitats.

2005

*New York State Geographic Information Gateway <http://opdgig.dos.ny.gov/#/map/0/%7B63DA740E-7618-4913-90DA-CF0C0CB46B9B%7D> Accessed December 8, 2016

- **Contents:** Seafloor sediment type as point coverage of known sediment samplings.
- **Accessibility:** Follow the link provided in the above reference and zoom to the OSA. Click on any data point to get more information, including water depth and grainsize. Downloadable data also available.
- **Pros and cons:**
 - **Pros:** Data acquired from known sediment samplings, inspections, and probings from the usSEABED data collection.
 - **Cons:** Data represents the extracted output of the bdSEABED mining software.
- **Relevance to project requirements:** BOEM guidelines indicate seafloor surveys shall be conducted to ensure the project is sited to avoid or minimize potential impacts associated with seafloor instability or other hazards. BOEM guidelines indicate that a project should avoid locating facilities near sensitive seafloor habitats.

3.2 Water Quality and Metocean Conditions

3.2.1 Summary of Best Available Data

The Marine-life Data Analysis Team (2016) datasets provide layers that describe the regions that have regulatory water quality controls. The Northeastern Regional Association of Coastal Ocean Observing Systems (NERACOOS) Sea Surface Temperature viewer provides satellite information dating back a decade. The most extensive water quality resource is the NERACOOS Ocean Climate Tool, which also allows for real-time data analysis of many buoys that have also been consistently recording data for the past decade. Existing data gaps, including metocean conditions such as wave height, current rates, wind speed and direction, are pending implementation of the Offshore Buoy Deployment.

3.2.2 Data Catalog

This data catalog is organized chronologically, starting with the most recently published references first. References that are mentioned in Section 3.2.1, “Summary of Best Available Data,” are denoted by asterisks next to their bibliographic citations. Following the citation is a brief summary of the reference’s content, accessibility, and utility.

Key search terms considered during preparation of this section:

salinity

sea surface temperature

2016

U.S. Geological Society. Oceanographic Time Series Data: Northeast Atlantic Outer Continental Shelf, Gulf of Maine and Georges Bank Marine Sanctuary. <http://catalog.data.gov/dataset/oceanographic-time-series-data-northeast-atlantic-outer-continental-shelf-gulf-of-maine-and-geo>. Accessed December 13, 2016

- **Contents:** Time-series oceanographic data for the Northeast Atlantic outer continental shelf, the Gulf of Maine, and Georges Bank collected by the USGS or in conjunction with USGS projects. Data include ocean current, temperature, pressure, conductivity, light transmission, and others.
- **Accessibility:** Follow the link provided in the above reference. Data and metadata are available at the link.
- **Pros and Cons:**
 - **Pros:** Provides many data types of interest.
 - **Cons:** Few of the recorded data are within the actual survey area.
- **Relevance to project requirements:** Understanding offshore water quality conditions will assist in the development of construction schedule planning and the application process for permits under the USACE, the United States Coast Guard (USCG), and the New York State Department of Environmental Conservation (NYSDEC).

NERACOOS High Frequency (HF) Radar Surface Currents.

<http://neracoos.org/datatools/forecast/surfacecurrents> . Accessed December 13, 2016.

- **Contents:** Provides current strength in centimeters per second (cm/s) as part of a predicted forecast.
- **Accessibility:** Follow link provided in above reference.
- **Pros and Cons:**
 - **Pros:** Provides general knowledge of current speeds and directions within the survey areas. Time controls allow for +/- hours to review the tidal changes.

- **Cons:** The resolution of the mapper is poor, data are not downloadable, and meta data on the development of this data are unknown.
- **Relevance to project requirements:** Understanding offshore water quality conditions will assist in the development of construction schedule planning and in the application process for permits under the USACE, the USCG, and the NYSDEC

NERACOOS Sea Surface Temperature. <http://neracoos.org/datatools/realtime/SST>. Accessed December 13, 2016

- **Contents:** Provides satellite sea surface temperature images. Data provided by the Satellite Oceanography Data Laboratory, University of Maine.
- **Accessibility:** Follow link provided in above reference.
- **Pros and Cons:**
 - **Pros:** Provides daily sea surface temperature information for each day of each month from 2004 to 2016.
 - **Cons:** the resolution of the mapper is poor, the data are not easily downloadable, and metadata on the development of this data are unknown.
- **Relevance to project requirements:** Understanding offshore water quality conditions will assist in the development of construction schedule planning and the application process for permits under the USACE, the USCG, and the NYSDEC.

Marine-life Data Analysis Team. Marine life summary data products for Northeast ocean planning. Version 1.1. Northeast Ocean Data. <http://www.northeastoceandata.org>. Accessed December 10, 2016

- **Contents:** Data describe the designated boundary of the no discharge zone (NDZ) where the discharge of untreated sewage and pollutants from vessels is prohibited.
- **Accessibility:** Follow the link provided in the above reference: select “data”, then select “data download,” scroll down to Environment and Water Quality and select the dropdown option to view the water quality-related data downloads.
- **Pros and Cons:**
 - **Pros:** Delineates the NDZs.
 - **Cons:** Does not describe the presence or occurrence or density of water pollution.
- **Relevance to project requirements:** Understanding offshore water quality conditions will assist in the development of construction schedule planning, and the application process for permits under the United States Army Corps, the USCG, and the NYSDEC.

United States Department of Agriculture. Natural Resources Conservation Service. Watershed Boundary Dataset. <https://www.nrcs.usda.gov/wps/portal/nrcs/main/national/water/watersheds/dataset/> Accessed December, 13, 2016.

- **Contents:** Hydrologically based definition of the aerial extent of surface water drainage to a point.
- **Accessibility:** Follow the link provided in the above reference and click Geospatial Data Tools.
- **Pros and Cons:**
 - **Pros:** Provides nearshore water-quality mapping regions.
 - **Cons:** Data does not cover the complete survey area
- **Relevance to project requirements:** Understanding offshore water quality conditions will assist in the development of construction schedule planning and the application process for permits under the USACE, the USCG, and the NYSDEC.

Mid-Atlantic Ocean Data Portal. Fronts Probability. <http://portal.midatlanticocean.org/data-catalog/oceanography/> Accessed December 13, 2016.

- **Contents:** Fronts influence the spatial distribution of biological productivity and control the accumulation of marine debris. The NOAA CoastWatch Oceanic Front Probability Index measures the probability of sea surface temperature front formation based on data from NOAA Geostationary Operational Environmental Satellites (GOES).
- **Accessibility:** Follow the link provided in the above reference
- **Pros and Cons:**
 - **Pros:** Data represents seasonal “max” values. Provides spatial distribution of predicted fronts and potentially increased biological activity hotspots.
 - **Cons:** the Oceanic Front Probability index is experimental and is distributed for scientific evaluation. Data only available for 2012 and 2013.
- **Relevance to project requirements:** Understanding offshore water quality conditions will assist in the development of construction schedule planning and the application process for permits under the USACE, the USCG, and the NYSDEC.

2012

NERACOOS Ocean Climate Tool. <http://neracoos.org/datatools/climatologies> Accessed December 13, 2016

- **Contents:** Information about the average meteorological and ocean conditions between 2001 and 2012. Data are collected from NERACOOS buoys that are deployed throughout the north-east and have been collecting hourly weather and ocean data for the past decade.
- **Accessibility:** Follow link provided in above reference.
- **Pros and Cons:**
 - **Pros:** The tool allows toggling between buoys, data types, and time period.
 - **Cons:** Few buoys within or near the study site.

- **Relevance to project requirements:** Understanding offshore water quality conditions will assist in the development of construction schedule planning and the application process for permits under the USACE, the USCG, and the NYSDEC.

3.3 Marine Vegetation

3.3.1 Summary of Best Available Data

Seagrasses, or marine flowering plants, are limited to just two species in the temperate North Atlantic coast of the U.S., *Zostera marina* (common eelgrass) and *Ruppia maritima* (widgeongrass). These species occur primarily in estuaries and lagoons. *Z. marina* may occur at depths of up to 12 meters, and *R. maritima* occurs at shallower depths. (Short et al. 2007). According to the Department of Commerce (DOC) et al. [2015]), there are no seagrasses in the OSA. The nearest known seagrass communities are sheltered by the barrier islands along New Jersey and Long Island. However, the seagrass present in this region will be an important consideration in selecting the landfall location of cables.

3.3.2 Data Catalog

This data catalog is organized chronologically, starting with the most recently published references first. References that are mentioned in Section 3.3.1, “Summary of Best Available Data,” are denoted by asterisks next to their bibliographic citations. Following the citation is a brief summary of the reference’s content, accessibility, and utility.

Key search terms considered during preparation of this section:

<i>density</i>	<i>eelgrass</i>	<i>New Jersey</i>
<i>abundance</i>	<i>widgeon grass</i>	<i>distribution</i>
<i>hotspot</i>	<i>submerged aquatic vegetation</i>	
<i>sensitive habitat</i>	<i>New York</i>	
<i>seagrass</i>		

2015

*Department of Commerce (DOC), National Oceanic and Atmospheric Administration (NOAA), National Ocean Service (NOS), Office for Coastal Management (OCM). 2015. Seagrasses in the continental United States as of March 2015. <http://marinecadastre.gov/data/>. Accessed December 12, 2016.

- **Contents:** Maps known seagrass distribution in the United States.
- **Accessibility:** Follow the link provided in the above reference, then select “Marine Habitat” under “Theme” at the left of the screen. Locate the “Seagrasses” dataset in the right column and select “Add to Map.” Under “My Map” at the top right of the screen, select “Open in National Viewer” to review the data.
- **Pros and Cons:**
 - **Pros:** Provides digital data for all mapped seagrasses in the United States.
 - **Cons:** This is not a complete collection of seagrasses on the seafloor, nor are the locations to be considered exact.
- **Relevance to project requirements:** BOEM guidelines indicate that a project should avoid locating facilities near sensitive seafloor habitats, including seagrass habitats.

2007

*Short, F., T. Carruthers, W. Dennison, and M. Waycott. 2007. Global seagrass distribution and diversity: a bioregional model. *Journal of Experimental Marine Biology and Ecology*, 350(1), 3-20.

- **Contents:** Discusses seagrass distribution and diversity in the North Atlantic United States and around the world.
- **Accessibility:** Review the article for discussions of the Temperate North Atlantic bioregion: <http://faculty.umb.edu/anamarija.frankic/eeos476/Class%20Materials/Habitats/GLOBAL%20Seagrass%20distribution.pdf>.
- **Pros and Cons:**
 - **Pros:** Provides evidence that marine vegetation may be limited to estuaries, lagoons, and coastal areas at depths less than 12 meters.
 - **Cons:** Provides no actual location data for marine vegetation in the OSA.
- **Relevance to project requirements:** BOEM guidelines indicate that a project should avoid locating facilities near sensitive seafloor habitats, including seagrass habitats.

3.4 Invertebrates, Corals, and Reefs

3.4.1 Summary of Best Available Data

Invertebrates

NOAA’s Northeast Fisheries Science Center collected numerous longfin squid (*Loligo paeleii*) and shortfin squid (*Illex illecebrosus*) during their bottom-trawl surveys. Shortfin squid records in the OSA have become more common with increasing proximity to the continental shelf break, particularly in recent years. Longfin squid records occur throughout the OSA but increase nearer the Long Island and New Jersey coast (Ocean Biogeographic Information System [OBIS] 2016).

American lobsters (*Homarus americanus*) in the OSA are part of the Southern New England stock, which has declined steeply since the late 1990s, reaching record low abundances in 2013. The stock is depleted and is experiencing recruitment failure (Atlantic States Marine Fisheries Commission [ASMFC] 2016). NOAA's Northeast Fisheries Science Center collected lobsters during bottom-trawl surveys throughout the OSA, with catch numbers historically higher along the continental shelf break and near the northwestern boundary of the OSA. In recent years catch data have been limited to nearshore areas along southern Long Island (OBIS 2016).

Horseshoe crabs (*Limulus polyphemus*) and Atlantic blue crabs (*Callinectes sapidus*) have most commonly been documented near the mainlands of Long Island and New Jersey. Existing data consist primarily of survey results from the Northeast Fisheries Science Center's bottom trawl surveys and the Virginia Institute of Marine Science's NorthEast Area Monitoring and Assessment Program (OBIS 2016).

Scallop survey data indicate that scallop populations occur throughout the OSA, with the greatest biomass in the southwestern portions of the OSA. Scallop biomass is lowest nearer the mainland of Long Island, although data were not collected in the closest nearshore waters (Shmookler 2016). Ocean quahog (*Arctica islandica*) survey data indicate that the species is most common along the western edge of the OSA (near the Hudson Shelf Valley) and in the northeastern portion of the OSA. Atlantic surfclams (*Spisula solidissima*) are largely found along the northern and western boundaries of the OSA, near mainland Long Island and the Hudson Shelf Valley, respectively (NOAA Fisheries Service, Northeast Fisheries Science Center 2015).

Corals and Reefs

The Northeast Ocean Data (2016) portal, the Marine Cadastre (Bureau of Ocean Energy Management [BOEM]), and the National Oceanic and Atmospheric Administration [NOAA] 2016a) data (both of the latter portals use the same data source) depict most of the OSA as low suitability for cold-water corals; however, the continental shelf break along the southeastern side of the OSA provides medium-low to very high suitability for all of the cold-water corals listed in the data portal. Documented observations of corals are consistent with the predicted habitat suitability along the continental shelf break (Scanlon et al. 2010; NOAA Deep Sea Coral Research and Technology Program 2012). In addition, isolated patches of higher suitability are predicted for some corals in other regions of the OSA, most prominently along the Hudson Shelf Valley near the western boundary of the OSA, but also smaller spots in the center of the OSA and in proximity to Long Island's barrier islands (BOEM and NOAA 2016a; Northeast Ocean Data 2016). There are few observational data of coral in the OSA outside of the continental shelf break, mainly along the

eastern and western boundaries of the OSA (NOAA Deep Sea Coral Research and Technology Program 2012). According to Marine Cadastre (BOEM and NOAA 2016b) data, artificial reefs occur near the northern and northwestern boundaries of the OSA.

3.4.2 Data Catalog

This data catalog is organized chronologically, starting with the most recently published references first. References that are mentioned in Section 3.4.1, “Summary of Best Available Data,” are denoted by asterisks next to their bibliographic citations. Following the citation is a brief summary of the reference’s content, accessibility, and utility.

Key search terms considered during preparation of this section:

<i>density</i>	<i>lobster</i>	<i>quahog</i>
<i>abundance</i>	<i>horseshoe crab</i>	<i>reef</i>
<i>hotspot</i>	<i>surfclam</i>	
<i>sensitive habitat</i>	<i>coral</i>	
<i>Productivity</i>	<i>blue crab</i>	

2016

*Atlantic States Marine Fisheries Commission (ASMFC). 2016. American Lobster. <http://www.asmfc.org/species/american-lobster>. Accessed December 2, 2016.

- **Contents:** Discusses general stock abundance for the American lobster and provides a link to stock assessment reports.
- **Accessibility:** Follow the link provided in the above reference, click on additional links on the page for more detailed information used to prepare the cited page.
- **Pros and Cons:**
 - **Pros:** Provides some indication of the state of lobster fisheries in the OSA.
 - **Cons:** Provides no specific data for the OSA.
- **Relevance to project requirements:** BOEM guidelines indicate that a project should avoid locating facilities near sensitive seafloor habitat. Areas important to American lobsters would likely be considered sensitive seafloor habitat.

*Bureau of Ocean Energy Management (BOEM) and National Oceanic and Atmospheric Administration (NOAA). 2016a. Sourced from NOAA National Centers for Coastal Ocean Science on MarineCadastre.gov. Corals, East Coast. www.marinecadastre.gov. Accessed November 30, 2016.

- **Contents:** Presents predicted habitat suitability for a number of cold-water coral taxa.
- **Accessibility:** Follow the link provided in the above reference; click the “Data” tab. In the data filters on the left side of the page, select “Corals” under “Theme” and “East Coast” under “Region.” The filtered data will appear on the right. Click “Add to Map” for any of the relevant datasets. After adding any pertinent data to the map, click “My Map” to view the data.
- **Pros and Cons:**
 - **Pros:** Maps cold-water coral habitat throughout the OSA.
 - **Cons:** The data are based on predictive modeling, not actual presence/absence data.
- **Relevance to project requirements:** BOEM guidelines indicate that a project should avoid locating facilities near sensitive seafloor habitats such as coral reefs. Coral data may help with project siting and compliance with BOEM best management practices.

*Bureau of Ocean Energy Management (BOEM) and National Oceanic and Atmospheric Administration (NOAA). 2016b. Sourced from MarineCadastre.gov. Marine Habitat, East Coast, Artificial Reefs. www.marinecadastre.gov. Accessed November 30, 2016.

- **Contents:** Presents locations of artificial reefs.
- **Accessibility:** From the link provided in the above reference, click the “Data” tab. In the data filters on the left side of the page, select “Marine Habitat” under “Theme” and “East Coast” under “Region.” The filtered data will appear on the right. Click “Add to Map” for “Artificial Reefs” dataset. After adding any pertinent data to the map, click “My Map” to view the data.
- **Pros and Cons:**
 - **Pros:** Maps artificial reefs throughout the OSA.
- **Relevance to project requirements:** BOEM guidelines indicate that a project should avoid locating facilities near sensitive seafloor habitats such as reefs. Artificial data help with project siting and compliance with BOEM best management practices.

*Northeast Ocean Data. 2016. Biological Habitat. <http://www.northeastoceandata.org/data-explorer/?habitat>. Accessed November 29, 2016.

- **Contents:** The useful portions of this resource include seasonal abundance data for groups of zooplankton, predicted habitat suitability for several taxa of cold-water (deepwater) corals, and abundance data for other benthic fauna (School for Marine Science and Technology).
- **Accessibility:** Follow the link provided in the above reference, click the “Biological” tab underneath the “Habitat” tab at the top (middle) of the screen. In the “Legend” pop-up, use the “Select Type” dropdown menu to view habitat data for several resources. Once a resource type has been selected, the “Legend” gives several further options to view data on the interactive

map. For example, under “cold-water corals”, eight coral types can be viewed (separately) on the interactive map.

- **Pros and Cons:**
 - **Pros:** Provides useful data include zooplankton, cold-water corals, and other benthic fauna (SMAST).
 - **Cons:** Other resources in the dropdown may appear to be useful in name (i.e., eelgrass, shellfish habitat) but do not provide data for the OSA. Zooplankton and “other benthic fauna (SMAST)” data may not prove useful if these resources are not a particular concern in the environmental review process. In addition, corals data are predicted through modeling, and are not actual presence/absence data.
- **Relevance to project requirements:** BOEM guidelines indicate that a project should avoid locating facilities near sensitive seafloor habitats such as coral reefs. Coral and other benthic fauna data may help with project siting and compliance with BOEM best management practices.

*Ocean Biogeographic Information System (OBIS). 2016. Distribution Map. <http://iobis.org/mapper>. Accessed December 2, 2016.

- **Contents:** This data mapper shows data for a number of ocean-dwelling organisms globally. For the purposes of this data review, data were viewed for squid, American lobster, horseshoe crab, and Atlantic blue crab in the OSA. The data can be displayed as a color-coded summary of count ranges or as points.
- **Accessibility:** Follow the link provided in the above reference. The “Data Search” tool on the left can be used to search for the taxa in question and data can be filtered by date and other variables. The “Layers” pulldown at the top right of the data viewer can be used to switch from summary to point data. Use the “Identify” tool to retrieve data attributes for each point.
- **Pros and Cons:**
 - **Pros:** Provides an indication of each taxon’s presence in the OSA, i.e., American lobster, *Illex* squid, *Loligo* squid, horseshoe crab, Atlantic blue crab.
 - **Cons:** Summary data display only works without limiting the date ranges, so higher count areas are not necessarily reflective of more recent data. The point data require pulling up the attributes for each point to determine the count. Recommend coordinating with the NOAA Northeast Fisheries Science Center for electronic data from their survey work.
- **Relevance to project requirements:** BOEM guidelines indicate that a project should avoid locating facilities near sensitive seafloor habitats. Areas important to American lobsters, horseshoe crabs, and Atlantic blue crabs would likely be considered sensitive seafloor habitat. Squid are not part of the seafloor habitats, but are an important commercial fishery, for which impacts would need to be addressed.

*Shmookler, R. 2016. Scallop Biomass (Meat Weight in kilograms,) Northeast United States. Prepared for the Northeast Regional Ocean Council, Northeast Ocean Data. <http://www.northeastoceandata.org/data-explorer/?fish>. Accessed December 1, 2016.

- **Contents:** This dataset contains survey points for scallop catches from NOAA’s Northeast Fisheries Science Center (NEFSC) scallop dredge surveys from 1966 to 2014. Data are presented in ranges of biomass as measured by meat weight in kilograms.
- **Accessibility:** Follow the link provided in the above reference and click the “Scallops” tab underneath the “Fish” tab at the top (middle) of the screen. In the “Legend” pop-up, use the “Select Type” dropdown menu to select “Sea Scallops Biomass.”
- **Pros and Cons:**
 - **Pros:** Provides a good indication of scallop population and density data in the OSA using survey data covering nearly 50 years.
 - **Cons:** Data do not cover the entire OSA, such as the continental shelf break and areas closer to the mainland.
- **Relevance to project requirements:** BOEM guidelines indicate that a project should avoid locating facilities near sensitive seafloor habitats. Scallop data may prove useful in siting a project to meet these BMPs because scallops are important commercially.

2015

*NOAA Fisheries Service, Northeast Fisheries Science Center. 2015. Resource Survey Report, Atlantic Surfclam/Ocean Quahog. http://nefsc.noaa.gov/femad/ecosurvey/mainpage/clam_rsr.html. Accessed December 2, 2016.

- **Contents:** This report summarizes ocean quahog and Atlantic surfclam survey data for the 2015 season with graphic representation of survey counts for each species.
- **Accessibility:** Follow the link provided in the above reference and click “2015” to retrieve the document. The webpage also provides links to previous clam survey reports dating back to 1999.
- **Pros and Cons:**
 - **Pros:** Provides a general idea of clam distribution and abundance for both clam species in the OSA.
 - **Cons:** Data are not digital, and reviewers will be limited to a few black and white figures mapping the data. Suggest contacting the Northeast Fisheries Science Center for electronic data.
- **Relevance to project requirements:** BOEM guidelines indicate that a project should avoid locating facilities near sensitive seafloor habitats. Clam data may prove useful in siting a project to meet these BMPs. Also, clams are one of the most commercially important species in the region.

2012

*NOAA Deep Sea Coral Research and Technology Program. 2012. National Geodatabase of Deep Sea Coral Observations, Version 1.0. Obtained through the Mid-Atlantic Ocean Data Portal. <http://portal.midatlanticocean.org/visualize/#x=-73.26&y=40.11&z=8&logo=true&controls=true&basemap=Ocean&themes%5Bids%5D%5B%5D=2&tab=data&legends=false&layers=true>. Accessed November 30, 2016.

- **Contents:** Database contains observations of presence of cold-water corals from historic survey data.
- **Accessibility:** Follow the link provided in the above reference and zoom to the OSA. On the left side of the screen under the “Data” tab, choose the “Marine Life” dropdown menu, and then select “Coldwater Corals (Observed).” Click on any of the data points to view species information.
- **Pros and Cons:**
 - **Pros:** Data are observed locations and are generally consistent with the predicted habitat-suitability modeling data.
 - **Cons:** Data are based on historical observations and are not confirmed or validated.
- **Relevance to project requirements:** BOEM guidelines indicate that a project should avoid locating facilities near sensitive seafloor habitats such as coral reefs. Coral data may prove useful in siting a project to meet these best management practices.

2010

*Scanlon, K.M., R.G. Waller, A.R. Sirotek, J.M. Knisel, J.J. O'Malley, and S. Alesandrini. 2010. United States Geological Survey Cold-water Coral Geographic Database - Gulf of Mexico and Western North Atlantic Ocean, version 1.0: U.S. Geological Survey Open-File Report 2008-1351. <http://opdgig.dos.ny.gov/#/map/0/%7B591083D2-ABA8-4EE9-9C22-4AD4CE28F641%7D>. Accessed November 30, 2016.

- **Contents:** Database contains observed coral and sponge location data points, mostly from published scientific literature, museum collections, and other databases.
- **Accessibility:** Follow the link provided in the above reference and zoom to the OSA. Click on any data point to see species identification and other associated information.
- **Pros and Cons:**
 - **Pros:** Data are observed locations and are generally consistent with the predicted habitat-suitability modeling data.
 - **Cons:** Data are not from a targeted survey and some data may be quite old and may not necessarily represent existing conditions.

- **Relevance to project requirements:** BOEM guidelines indicate that a project should avoid locating facilities near sensitive seafloor habitats such as coral reefs. Coral data may prove useful in siting a project to meet these best management practices.

3.5 Fish

3.5.1 Summary of Best Available Data

The MDET Team (2017) has created draft models of predicted abundance of fish species for the Mid-Atlantic and Northeast regions as part of regional planning efforts. More specific to the OSA, Normandeau Associates, Inc. (2016) is conducting surveys using ultra-high resolution aerial digital imagery to assess use of the OSA by fish. The Virginia Institute of Marine Science collects data twice a year to determine species occurrence and abundance. Each of the three resources provides a valuable subset of species data that together would support the development of siting offshore energy while avoiding or mitigating potential impacts on fishery resources.

The BOEM COP guidelines strongly encourage preparing a survey plan, which should provide a general description of the biological resources in the project area. Desktop studies for biological resources, including presence, abundance, and distribution, are recommended. Species presence, abundance, and distribution data are available from multiple sources, both in map form and as downloadable data. Additional data specifying regions of unique or significant fishery habitats, e.g., habitat areas of particular concern (HAPC), critical habitats, and EFH are available.

3.5.2 Data Catalog

This data catalog is organized chronologically, starting with the most recently published references first. References that are mentioned in Section 3.5.1, “Summary of Best Available Data,” are denoted by asterisks next to their bibliographic citations. Following the citation is a brief summary of the reference’s content, accessibility, and utility.

Key search terms considered during preparation of this section:

density

sensitive habitat

diadromous

abundance

fish biomass

forage

hotspot

demersal

2017

Marine-life Data Analysis Team. Marine life summary data products for Northeast ocean planning. Version 1.1. Northeast Ocean Data. <http://www.northeastoceandata.org>. Accessed December 10, 2016

- **Contents:** The marine life data products were developed through a partnership with the Marine-Life Data and Analysis Team, who collaborated with the Northeast Regional Planning body, and expert work groups to produce maps characterizing the predicted distribution and abundance of 29 marine mammal species and species guilds, 40 bird species, and the surveyed biomass of 82 fish species. New downloadable data are pending for fish. Currently available data includes sea scallop biomass, highly migratory species EFH overlay, ground fish and shellfish EFH overlay.
- **Accessibility:** Follow the link provided in the above reference, select “data,” then select “data download,” scroll down to “Fish” and select the drop-down option to view the many fish related data sets available. Alternately, follow the link provided in the above reference and click “maps” and then review the options including “managed species” and “individual species”.
- **Pros and Cons:**
 - **Pros:** Provides abundant data on themes such as diadromous, forage, or demersal fish, species and life stage-specific mapped data as well.
 - **Cons:** More data to come with website updates, but not available now. It is not known who the working group members were or how they attained the data presented in the mapper.
- **Relevance to project requirements:** Presence data for fish species, managed species protected under the ESA or the Magnuson-Stevens Fishery Conservation and Management Act (MSFCMA), and information about important habitats is available.

*Normandeau Associates, Inc. 2017. Digital Aerial Baseline Survey of Marine Wildlife in Support of Offshore Wind Energy. https://remote.normandeau.com/nys_overview.php December 10, 2016.

- **Contents:** Includes survey data for high-resolution aerial digital imagery surveys conducted in the OSA to identify marine vertebrates, including marine birds, mammals, sea turtles, and fish.
- **Accessibility:** Follow the link provided in the above reference, click the “Documents” link to review the survey plan. Click the “Results” link to review data points for the summer 2016 surveys. The “export data” link is currently not available. The “Data Portal” link is not currently available, data pending.
- **Pros and Cons:**
 - **Pros:** Occurrence data and subsequent density analyses are gathered specifically for the OSA. Surveys will cover a three-year time span and all four seasons, which should help reduce the risk of including anomalous data.
 - **Cons:** Many unidentified fish species sightings. More data to come with website updates.
- **Relevance to project requirements:** Presence data for fish species, managed species protected under the ESA or the MSFCMA, and information about important habitats is available.

The probability of occurrence data for fishery resources would be useful in analyzing potential impacts on fishery resources and would inform the BOEM-required biological surveys. These data would also be useful for employing conservation measures that help to minimize adverse impacts on protected species.

2016

*Virginia Institute of Marine Science. 2016. Northeast Area Monitoring and Assessment Program http://www.vims.edu/research/departments/fisheries/programs/multispecies_fisheries_research/neama/index.php. Accessed December 10, 2016

- **Contents:** Includes yearly spring and fall fishery independent survey data from Cape Cod, MA, south to Cape Hatteras, NC.
- **Accessibility:** Follow the link provided in the above reference, click the link “Interact with Our Data” and then “Data Request Form.” Must fill out a request form to receive data.
- **Pros and Cons:**
 - **Pros:** Occurrence data for both juvenile and adult fishes.
 - **Cons:** Does not capture egg or larval occurrence data. Data and survey effort are not even across all regions of the coastal survey area, and data are primarily close to shore data.
- **Relevance to project requirements:** Presence data for fish species, managed species protected under the ESA or the Magnuson-Stevens Fishery Conservation and Management Act, and information about important habitats.
The probability of occurrence data for fishery resources would be useful in analyzing potential impacts on fishery resources and would inform the BOEM-required biological surveys. These data would also be useful for employing conservation measures that help to minimize adverse impacts on protected species.

NOAA Marine National Fisheries Service, EFH Mapper. 2016. Sourced from <http://www.habitat.noaa.gov/protection/efh/efhmapper/> Accessed December 10, 2016.

- **Contents:** The data present designated EFH areas where fishing or the use of fishing gears has been restricted or modified in order to minimize the adverse effects of fishing on EFH, as required by Section 303(a)(7) of the Magnuson-Stevens Fishery Conservation and Management Act.
- **Accessibility:** Follow the link provided in the above reference, click the “select region” to select the OSA, and then use the subsequent dropdowns to review EFH for many different species of fish and their several life stages.
- **Pros and cons:**
 - **Pros:** Database contains species-specific habitat preference.
 - **Cons:** Data do not describe abundance or actual presence. Data are not easily downloaded.
- **Relevance to project requirements:** Per BOEM COP recommendations for fish resources and EFH, lessees and grantees should prepare a survey plan to identify important, sensitive, and

unique marine habitats in the vicinity of the project. Special attention should be given to areas that may contain anadromous fish and the timing of migration periods. These EFH areas are protected from fishing, and guidelines describe the importance of the region to each life stage of the fishery resources. These regions are protected from recreational and commercial fishing, and may help to determine the appropriate minimization and mitigation of possible negative impacts on fisheries resources.

2015

Atlantic States Marine Fisheries Commission. 2015. Stock Assessment Reports by Species.

<http://www.asmfc.org/fisheries-science/stock-assessments#StockAssessments>. Accessed December 10, 2016.

- **Contents:** Stock assessments by species are determined on an as-needed basis. Stock assessments are compiled using a wide range of species-specific data-collection methods (trawls and dredges, hook and line, or pots and gill nets), and produce a series of estimates pertaining to the size of the stock. Other information available includes assumptions on species' growth, reproduction, mortality, habitat preferences, and other life history descriptions including migration patterns.
- **Accessibility:** Follow the link provided in the above reference.
- **Pros and Cons:**
 - **Pros:** Descriptions of species occurrence within particular regions and within habitat types.
 - **Cons:** Stock assessments are based on catch data and are calculated estimates based on species-specific assumptions.
- **Relevance to project requirements:** Per BOEM COP recommendations, lessees and grantees shall work cooperatively with commercial/recreational fishing entities and interests to ensure that the construction and operation of a project will minimize potential conflicts with commercial and recreational fishing interests. These stock assessments provide information about the significance of certain fishery resources for the commercial and recreational fishing industries.

The IUCN Red List of Threatened Species. 2015. Red List Spatial Data.

<http://www.iucnredlist.org/technical-documents/spatial-data>. Accessed December 10, 2016.

- **Contents:** Data describe the known range of each IUCN Red Listed species.
- **Accessibility:** Data are available in ESRI shape files. Contents contain known range of each species. Data divided by each subgroup. From the link, click the "Spatial Data Download" tab. Scroll down to view "Marine Fish." Metadata are available.
- **Pros and cons:**
 - **Pros:** Provides range information and supports conservation efforts by describing habitats of preference for species.
 - **Cons:** Website was inoperable at visit. All links to data downloads are broken.

- **Relevance to project requirements:** Per BOEM COP recommendations for information on fish resources and EFH, lessees and grantees should prepare a survey plan to identify important, sensitive, and unique marine habitats in the vicinity of the project. Special attention should be drawn to areas that may contain anadromous fish and the timing of migration periods. These critical habitats describe the occurrence of unique marine habitats that should be avoided when siting an offshore energy resource.

NOAA Marine National Fisheries Service, Artificial Reefs. 2015. Sourced from MarineCadastre.gov. www.marinecadastre.gov. Accessed December 10, 2016.

- **Contents:** The data present artificial reef areas, which are structures made up of intentionally sunk structures, sunken vessels, or hard surfaces where algae and invertebrates such as barnacles, corals, and oysters attach. This accumulation of attached marine life creates habitat space and food for fish populations.
- **Accessibility:** Follow the link provided in the above reference, click the “data” tab. In the search bar enter “fish”. The dataset “Artificial Reefs” will appear. Metadata is available.
- **Pros and cons:**
 - **Pros:** Identifies unique marine habitats
 - **Cons:** Doesn’t provide species-specific information.
- **Relevance to project requirements:** Per BOEM COP recommendations for Fish Resources and Essential Fish Habitats, lessees and grantees should prepare a survey plan to identify important, sensitive, and unique marine habitats in the vicinity of the project. Special attention should be drawn to areas that may contain anadromous fish, and the timing of migration periods. These Artificial Reefs describe the occurrence of unique marine habitats that should be avoided when siting an offshore energy resource.

NOAA Marine National Fisheries Service. 2015. Critical Habitat Designations. Sourced from MarineCadastre.gov. www.marinecadastre.gov. Accessed December 10, 2016.

- **Contents:** The data is a compilation of the NOAA National Marine Fisheries Service and the U.S. Fish & Wildlife Service ESA-listed species critical habitat data for coastal areas. Critical habitat is defined as 1. Specific areas within the geographical area occupied by the species at the time of listing, if they contain physical or biological features essential to conservation and those features may require special management considerations or protection; and 2. Specific areas outside the geographical area occupied by the species, if the agency determines that the area itself is essential for conservation.
- **Accessibility:** Follow the link provided in the above reference, click the “data” tab. In the search bar enter “fish.” The dataset “Critical Habitat Designation” will appear. Metadata are available.
- **Pros and cons:**
 - **Pros:** Identifies unique marine habitats essential for federally and state-listed protected species.

- **Cons:** Data do not indicate species-specific abundance or species-specific distribution data but presents only a layer.
- **Relevance to project requirements:** Per BOEM COP recommendations for fish resources and EFH, lessees and grantees should prepare a survey plan to identify important, sensitive, and unique marine habitats in the vicinity of the project. Special attention should be drawn to areas that may contain anadromous fish and the timing of migration periods. These critical habitats describe the occurrence of unique marine habitats that should be avoided when siting an offshore energy resource.

NOAA Marine National Fisheries Service. 2015. Essential Fish Habitat. Sourced from MarineCadastre.gov. www.marinecadastre.gov. Accessed December 10, 2016.

- **Contents:** Provides information on areas closed to special harvest and information on the agencies that govern those areas.
- **Accessibility:** Follow the link provided in the above reference and click the “data” tab. In the search bar enter “fish.” The dataset “Essential Fish Habitat” will appear. Metadata are available.
- **Pros and cons:**
 - **Pros:** Identifies unique marine habitats essential for fishery resources
 - **Cons:** Data do not indicate species-specific occurrence or distribution data, only the occurrence of habitat type.
- **Relevance to project requirements:** Per BOEM COP recommendations for fish resources and EFH, lessees and grantees should prepare a survey plan to identify important, sensitive, and unique marine habitats in the vicinity of the project. Special attention should be drawn to areas that may contain anadromous fish and the timing of migration periods. These EFH designations describe the occurrence of unique marine habitats that should be avoided when siting an offshore energy resource.

NOAA National Marine Fisheries Service. 2015. Habitat Areas of Particular Concern. Sourced from MarineCadastre.gov. www.marinecadastre.gov. Accessed December 10, 2016.

- **Contents:** HAPCs are discrete subsets of EFH that provide extremely important ecological functions or are especially vulnerable to degradation.
- **Accessibility:** Follow the link provided in the above reference and click the “data” tab. In the search bar enter “fish.” The dataset “Habitat Areas of Particular Concern” will appear. Metadata are available.
- **Pros and cons:**
 - **Pros:** Identifies unique marine habitats essential for fishery resources
 - **Cons:** Data do not indicate species-specific occurrence or distribution data, only the occurrence of habitat type.
- **Relevance to project requirements:** Per BOEM COP recommendations for fish resources and EFH, lessees and grantees should prepare a survey plan to identify important, sensitive, and unique marine habitats in the vicinity of the project. Special attention should be drawn to areas

that may contain anadromous fish and the timing of migration periods. These HAPCs describe the occurrence of unique marine habitats that should be avoided when siting an offshore energy resource.

NOAA National MPA Center. 2015. Marine Protected Area (MPA) Inventory – MPAs by Fishing Restriction. Sourced from MarineCadastre.gov. <https://marinecadastre.gov/data/> Accessed December 10, 2016.

- **Contents:** These data describe the MPA Inventory polygons that symbolize the commercial or recreational fishing prohibitions or restrictions as regulated by individual state or federal laws.
- **Accessibility:** Follow the link provided in the above reference and click the “data” tab. In the search bar enter “fish.” The dataset “MPA Inventory – MPAs by Fishing Restriction” will appear. Metadata is available.
- **Pros and cons:**
 - **Pros:** Identifies unique marine habitats essential to fishery resources.
 - **Cons:** This data concerns only those areas that qualify as an MPA as determined by NOAA's Marine Protected Areas Center and may not be relevant to wind energy lease sites.
- **Relevance to project requirements:** Per BOEM COP recommendations for fish resources and EFH, lessees and grantees should prepare a survey plan to identify important, sensitive, and unique marine habitats in the vicinity of the project. Special attention should be drawn to areas that may contain anadromous fish and the timing of migration periods. These fishing restricted MPAs describe unique marine habitats that should be avoided when siting an offshore energy resource.

2009

Halpin, P.N., A.J. Read, E. Fujioka, B.D. Best, B. Donnelly, L.J. Hazen, C. Kot, K. Urian, E. LaBrecque, A. Dimatteo, J. Cleary, C. Good, L.B. Crowder, and K.D. Hyrenbach. 2009. OBIS-SEAMAP: The world data center for marine mammal, sea bird, and sea turtle distributions. *Oceanography* 22(2):104-115. <http://seamap.env.duke.edu/>. Accessed December 10, 2016.

- **Contents:** This database portal contains observation data collected from various data providers worldwide. The datasets are integrated so that users may search and map by species name, higher taxonomic level, geographic area, depth, time, and environmental parameters.
- **Accessibility:** To obtain .csv or ESRI shapefiles for fish species, click on “Browse Species” and then select “Chondrichthyes.” Also, under Advanced Search type in “Fish” topic. To upload a shapefile of the project area to the map, select “Region” on the toolbar above the map and then select upload. To download data, select “Download” on the tool bar at the bottom of the screen below the map.
- **Pros and Cons:**
 - **Pros:** Long-term data are available and cover the OSA.
 - **Cons:** Although a large database, this website does not represent all available fish data, focusing only on select species, with significant focus on shark species. It contains

unpublished data that are not available to the public. A user must be given an account by the database manager. More data to come with website updates.

- **Relevance to project requirements:** Per BOEM COP recommendations for fish resources and EFH, lessees and grantees should prepare a survey plan to identify important, sensitive, and unique marine habitats in the vicinity of the project. Special attention should be drawn to areas that may contain anadromous fish and the timing of migration periods. Presence data on fishery resources would be useful in analyzing potential impacts and would inform the Fishery Resources Survey Plan. These data would also be useful for employing conservation measures that help to minimize adverse impacts on fishery resources.

2006

NOAA National Fisheries Service. 2006. Industry-Based Surveys (IBS) Data Mapper.

<https://fish.nefsc.noaa.gov/ibs/> Accessed December 10, 2016.

- **Contents:** An interactive web mapper that facilitates the public review of maps and summary data for the industry-based surveys.
- **Accessibility:** Follow the link provided in the above reference and click the “data” tab. In the search bar enter “fish.” The dataset “MPA Inventory – MPAs by Fishing Restriction” will appear. Metadata are available.
- **Pros and cons:**
 - **Pros:** provides catch information
 - **Cons:** Data are not regularly collected and are not collected across a wide range of species.
- **Relevance to project requirements:** Presence data on fishery resources would be useful in analyzing potential impacts and would inform the Fishery Resources Survey Plan. These data would also be useful for employing conservation measures that help to minimize adverse impacts on fishery resources.

Not Dated.

NOAA Marine National Fisheries Service. n.d. EFH Mapper. Sourced from

<http://www.habitat.noaa.gov/protection/efh/efhmapper/> Accessed December 10, 2016.

- **Contents:** The data presents designated EFH areas where fishing or the use of fishing gear has been restricted or modified in order to minimize the adverse effects of fishing on EFH, as required by Section 303(a)(7) of the Magnuson-Stevens Fishery Conservation and Management Act.
- **Accessibility:** Follow the link provided in the above reference; click the grid that encompasses the survey area, and then review each of the following 10 x 10 grids. Each grid will, once clicked, provide a summary table of EFH information. However, the data are not easily downloadable.
- **Pros and cons:**
 - **Pros:** Database contains species-specific habitat preference.

- **Cons:** Data do not describe abundance or actual presence. Data are not easily downloadable.
- **Relevance to project requirements:** Per BOEM COP recommendations for fish resources and EFH, lessees and grantees should prepare a survey plan to identify important, sensitive, and unique marine habitats in the vicinity of the project. Special attention should be drawn to areas that may contain anadromous fish and the timing of migration periods. These EFH areas protected from fishing are guidelines describe the importance of the region to each life stage of the fishery resources, these regions are significant to be protected from recreational and commercial fishing. This would help the interested party to determine the appropriate minimization and mitigation actions against possible negative impacts to fisheries resources.

3.6 Sea Turtles

3.6.1 Summary of Best Available Data

NOAA Fisheries and BOEM are currently conducting a comprehensive study examining the abundance and density of marine mammals, sea turtles, and birds along the East coast (The USFWS is expected to begin participating in this study in 2017). The resulting sea turtle data will be the most comprehensive, reliable source describing sea turtle abundance on the Atlantic coast. Until these data are available, other published reports listed in Section 3.6.2, “Data Catalog” can serve as useful data sources. More specific to the OSA, Normandeau Associates, Inc. (2016) is conducting surveys using ultra-high resolution aerial digital imagery to assess use of the OSA by sea turtles.

All five sea turtles protected under the ESA potentially occur in the OSA: Kemp’s Ridley (*Lepidochelys kempii*), loggerhead (*Caretta caretta*), green (*Chelonia mydas*), leatherback (*Dermochelys coracea*) and the hawksbill (*Eretmochelys imbricata*). None of the sea turtles nest in the nearby beaches and most typically occur in the offshore waters. Because all species of sea turtles are highly migratory and have wide geographic ranges, the occurrence of sea turtles within the OSA is seasonal and short-term.

3.6.2 Data Catalog

This data catalog is organized chronologically, starting with the most recently published references first. References that are mentioned in Section 3.6.1, “Summary of Best Available Data,” are denoted by asterisks next to their bibliographic citations. Following the citation is a brief summary of the reference’s content, accessibility, and utility.

Key search terms considered during preparation of this section:

sea turtles

abundance

sensitive habitat

Density

hotspot

occurrence

2017

*NOAA Fisheries, BOEM, and the USFWS. 2017. Atlantic Assessment Program for Protected Species. [To include sea turtle data].

- **Contents:** BOEM, the USFWS), and the U.S. Navy are developing models and associated tools to provide seasonal, spatially explicit density estimates incorporating habitat characteristics of marine mammals, turtles, and seabirds in the western North Atlantic Ocean. Underlying these data will be broad-scale data, collected by scientists from NOAA Fisheries and the USFWS over multiple years using direct aerial and shipboard surveys, about the seasonal distribution and abundance of these taxa.
- **Accessibility:** Final reports are now available for the years [2010](#), [2011](#), [2012](#), [2013](#), [2014](#) and [2015](#). Or follow the link on this website: <http://www.nefsc.noaa.gov/psb/AMAPPS/>. The final dataset will be available in 2017. The pending sea turtle dataset will be provided on the Northeast Ocean Data Portal, which notes the data as “coming soon.” See the following link: <http://www.northeastoceandata.org/data/data-download/>.
- **Pros and cons:**
 - **Pros:** Study will provide comprehensive abundance and density data, which will have been vetted by three permitting agencies: NOAA, BOEM, and the USFWS.
 - **Cons:** Study will not be available in its completion until 2017.
- **Relevance to project requirements:** These datasets would be useful for understanding the distribution of ESA-listed sea turtle species. These datasets would also inform the BOEM requirements to minimize disruption and disturbance of sea turtles.

2016

*Normandeau Associates, Inc. 2016. Digital Aerial Baseline Survey of Marine Wildlife in Support of Offshore Wind Energy. https://remote.normandeau.com/nys_overview.php Accessed December 8, 2016.

- **Contents:** Includes survey data for aerial imagery surveys conducted in the OSA to identify marine vertebrates, including marine birds, mammals, sea turtles, and large fish.
- **Accessibility:** Follow the line provided in the above reference and click the “Documents” link to review the survey plan. Click the “Results” link to review data points for the summer 2016 surveys. The “Data Portal” link is not currently available.

- **Pros and Cons:**
 - **Pros:** Occurrence data and subsequent density analyses are gathered specifically for the OSA. Surveys cover a three-year time span and all four seasons, which should help reduce the effects of anomalous data.
 - **Cons:** Data are not always able to identify a sea turtle's specific species.
- **Relevance to project requirements:** These datasets would be useful for understanding the distribution of ESA-listed sea turtle species. These datasets would also inform the BOEM guidelines for minimizing disruption and disturbance of sea turtles.

2013

ESS Group, Inc. October 01, 2011 - August 01, 2013. Evaluation of Lighting Schemes for Offshore Wind Facilities and Impacts on Local Environments.

- **Contents:** In order to fully assess the impacts from offshore wind development lighting and address any mitigation or monitoring that may be necessary, BOEM commissioned this study of regulations and lighting schemes that are currently in use at operational offshore wind farms. The study also included a literature review of existing scientific studies related to the potential impacts of lighting on birds, bats, sea turtles, marine mammals and fish. This study assesses the existing state of knowledge on the subject of environmental impacts from offshore wind farm lighting and provides suggested best practices to assist BOEM and other agencies with their decision making as the U.S. offshore wind industry continues to develop. Available products include the final report and technical summary.
- **Accessibility:** Available on BOEM's specialized Marine Cadastre data portal ESPIS at the following link: <http://marinecadastre.gov/espis/#/search/study/23185>
- **Pros and cons:**
 - **Pros:** Study was commissioned by BOEM to help the agency establish and develop mitigation strategies for offshore wind lighting.
 - **Cons:** Study examines the entire East coast but does not target the OSA.
- **Relevance to project requirements:** These data would be useful when designing and implementing conservation measures to help minimize adverse impacts on sea turtle species. These datasets would also inform the BOEM guidelines for minimizing disruption and disturbance of sea turtles.

2012

National Oceanic and Atmospheric Administration, National Marine Fisheries Service, Northeast Fisheries Science Center. October 01, 2008 - December 01, 2012. Literature Search and Data Synthesis for Marine Mammals and Sea Turtles in the US Atlantic from Maine to the Florida Keys.

- **Contents:** The goals and objectives of this study were to (1) create a reference document that includes the latest and best information on marine mammals and sea turtles in the U.S. Atlantic; (2) identify data gaps in the knowledge of marine mammals and sea turtles in the Atlantic; and

(3) identify research priorities recommended by national/regional agencies and groups. The document provides a basis for analysis of potential impacts of BOEM-regulated activities on protected sea turtles and marine mammals as required by NEPA and for Section 7 consultations under the ESA. The document can also help guide future decisions on planning and funding of needed research on sea turtles and marine mammals in the U.S. Atlantic. Available products include a final report and technical summary.

- **Accessibility:** Available on BOEM’s specialized Marine Cadastre data portal ESPIS at the following link: <http://marinecadastre.gov/espis/#/search/study/23162>.
- **Pros and cons:**
 - **Pros:** Comprehensive dataset of ESA-listed species that includes identified data gaps and suggested surveys.
 - **Cons:** Study covers the entire East coast but does not target the OSA.
- **Relevance to project requirements:** These datasets would be useful for understanding the distribution of ESA-listed sea turtle species. These datasets would also inform the BOEM guidelines to minimize disruption and disturbance to sea turtles.

Normandeau Associates, Inc. September 22, 2010 - October 16, 2012. Pilot Study Of Aerial High-Definition Surveys For Seabirds, Marine Mammals And Sea Turtles.

- **Contents:** Pioneering aerial high-resolution imaging surveys in Europe have suggested that this new technique represents a safe, scientifically robust, and cost-effective solution for gathering the type of data needed on birds, marine mammals, and sea turtles. The objective of this study was to develop and test a methodology for conducting surveys of birds, marine mammals, and sea turtles in the offshore environment using state of the art survey techniques that are efficient and provide high quality, reproducible data. Available products include final report and technical summary.
- **Accessibility:** Available on BOEM’s specialized Marine Cadastre data portal ESPIS at the following link: <http://marinecadastre.gov/espis/#/search/study/23168>.
- **Pros and cons:**
 - **Pros:** May serve to supplement existing Normandeau data.
 - **Cons:** Normandeau is completing more current surveys targeting the OSA rendering this dataset obsolete.
- **Relevance to project requirements:** These data would be useful when designing and implementing conservation measures to help minimize adverse impacts on sea turtle species. These datasets would also inform the BOEM requirements for minimizing disruption and disturbance of sea turtles.

University of Rhode Island, Coastal Resources Center. January 01, 2010 - December 31, 2011 (published 2012). Developing Environmental Protocols and Modeling Tools to Support Ocean Renewable Energy and Stewardship.

- **Contents:** The objectives of this study were to develop and test standardized protocols for baseline studies and monitoring to address specific offshore renewable energy (ORE) issues. The study discusses methods for collecting and comparing scientifically valid and other comparable data. It also develops a conceptual framework and approach for cumulative environmental impact evaluations of ORE developments to aid decision-makers. Available products include a final report and technical summary.
- **Accessibility:** Available on BOEM’s specialized Marine Cadastre data portal ESPIS at the following link: <http://marinecadastre.gov/espis/#/search/study/8107>.
- **Pros and cons:**
 - **Pros:** Thorough discussion of data collection, comparison, and monitoring relevant to offshore wind.
 - **Cons:** Data not targeted to the OSA.
- **Relevance to project requirements:** Contains discussion of data collection, comparison, and monitoring relevant to offshore wind projects. These datasets would also inform BOEM guidelines minimizing disruption and disturbance of sea turtles.

Wider Caribbean Sea Turtle Conservation Network. October 01, 2011 - September 01, 2012. Underwater Hearing Sensitivity in the Leatherback Sea Turtle (*Dermochelys Coriacea*): Assessing the Potential Effect of Anthropogenic Noise.

- **Contents:** The objectives of this study were (1) to determine the underwater hearing sensitivity of hatchling leatherback sea turtles using auditory evoked potential techniques; (2) to determine the overlap of the sounds produced by seismic airguns, drilling, shipping, windmills and other anthropogenic sources and the sounds that can be heard by leatherback sea turtles; and (3) to provide the results of this research to BOEM and to oil, gas and offshore energy producers to enable appropriate environmental mitigation for leatherback sea turtles. Leatherback sea turtles were able to detect sounds underwater and in air, responding to stimuli between 50 and 1200 Hz underwater and 50 and 1600 Hz in air. Final Report and technical summary available on website noted in “Accessibility.”
- **Accessibility:** From the link above, click the “Documents” link to review the survey plan. Click the “Results” link to review data points for the summer 2016 surveys. The “Data Portal” link is not currently available. Available on BOEM’s specialized Marine Cadastre data portal ESPIS at the following link: <http://marinecadastre.gov/espis/#/search/study/23170>.
- **Pros and Cons:**
 - **Pros:** Study was commissioned by BOEM to facilitate development of mitigation for noise associated with offshore development.
 - **Cons:** Study covers the entire East coast but does not target the OSA and is limited to the leatherback turtle
- **Relevance to project requirements:** These data would also be useful for employing conservation measures that help to minimize adverse impacts on sea turtles. These datasets would also inform the BOEM guidelines for minimizing disruption and disturbance of sea turtles and avoiding impacts on known nesting beaches.

2010

Anderson, M.G, J. Odell, M. Clark, Z. Ferdaña, and J.K. Greene. 2010. The Northwest Atlantic Marine Ecoregional Assessment: Identifying Conservation Areas in the Northwest Atlantic Marine Region. Phase Two. The Nature Conservancy, Eastern U.S. Division, Boston, MA. NOTE: Subset for the Mid-Atlantic Ocean (MARCO) Portal.

- **Contents:** This data product was created as part of Phase II of the Northwest Atlantic Marine Ecoregional Assessment. The Nature Conservancy developed this science-based ecoregional assessment for the Northwest Atlantic Marine region (Bay of Fundy to Cape Hatteras, North Carolina). This assessment synthesizes information on oceanography, chemistry, geology, biology, and social science to inform decisions about coastal and marine ecosystems. A subset of the data was selected for the MARCO data portal. This subset focused on sea turtle sightings, including the number of sightings for specific species in a region.
- **Accessibility:** Data can be visualized at following link under title of ‘sea turtles’:
<http://portal.midatlanticocean.org/data-catalog/conservation/>. Data cannot be downloaded from the MARCO data portal. Data can be downloaded from Northeast data portal at the following link: <http://www.northeastoceandata.org/data/data-download/>.
- **Pros and cons:**
 - **Pros:** Data provide insight into species expected in the project area, although the time of year when the species would be present is not noted
 - **Cons:** Dataset provides only a proxy for actually presence data. No indication of abundance, core habitat, or sensitive habitat for sea turtles is provided. This particular dataset can only be visualized on data port- it cannot be downloaded.
- **Relevance to project requirements:** Turtle-presence data would be useful for understanding the distribution of ESA-listed sea turtle species. These datasets would also inform the BOEM guidelines minimizing disruption and disturbance of sea turtles and avoiding impacts on known nesting beaches.

2009

Halpin, P.N., A.J. Read, E. Fujioka, B.D. Best, B. Donnelly, L.J. Hazen, C. Kot, K. Urian, E. LaBrecque, A. Dimatteo, J. Cleary, C. Good, L.B. Crowder, and K.D. Hyrenbach. 2009. OBIS-SEAMAP: The world data center for marine mammal, sea bird, and sea turtle distributions. *Oceanography* 22(2):104-115

- **Contents:** OBIS-SEAMAP (Ocean Biogeographic Information System Spatial Ecological Analysis of Megavertebate Populations) is a spatially referenced online database, aggregating marine mammal, seabird, sea turtle and ray and shark observation data from across the globe.
- **Accessibility:** Multiple raw and processed datasets are available at the following link: <http://seamap.env.duke.edu/dataset/list>. Limited processing is available for sea turtles at the following link: <http://seamap.env.duke.edu/swot> and for marine mammals, sea birds, and sea turtles at the following link: <http://seamap.env.duke.edu/search>. Descriptions of full service capabilities offered by the site can be found at the following link:

<http://seamap.env.duke.edu/content/content/services>. Downloading instructions are available at the following link: <http://seamap.env.duke.edu/content/help/download>.

- **Pros and cons:**
 - **Pros:** Data for the OSA is available for a several-year span. The data processing services also help streamline the download process.
 - **Cons:** Data are not available evenly across taxa or time periods. Rather, the data are accumulated from numerous disparate studies. Methods of data collection and survey efforts differ accordingly.
- **Relevance to project requirements:** Presence data for sea turtles, seabirds, and rays and skates may help fulfill ESA requirements. These datasets would also inform the BOEM guidelines for avoiding and minimizing impacts and disruptions of sea turtles.

2008

Research Planning, Inc. September 21, 2006 - January 31, 2008. Worldwide Synthesis and Analysis of Existing Information Regarding Environmental Effects of Alternative Energy Uses on the OCS Workshop

- **Contents:** The project objectives were to identify, collect, evaluate, and synthesize existing information on offshore alternative energy activities for the following topics: (1) existing offshore energy technologies and future trends: how public acceptance of existing projects was or was not achieved; (2) potential direct, indirect, and cumulative environmental impacts of offshore energy technologies; (3) previously used mitigation measures that could avoid, minimize, rectify, eliminate, or compensate for environmental impacts; (4) existing physical and numerical models designed to determine environmental impacts; and (5) information needs to address gaps in the existing understanding of environmental impacts. The project examined benthic resources, fish, marine mammals, sea turtles, aquatic resources, birds, and bat data. Available products include final reports and technical summaries.
- **Accessibility:** Available on BOEM's specialized Marine Cadastre data portal ESPIS at the following link: <http://marinecadastre.gov/espis/#/search/study/635>.
- **Pros and cons:**
 - **Pros:** Study was commissioned by BOEM to help identify gaps in data per their recommendations.
 - **Cons:** Study was not targeted to the OSA.
- **Relevance to project requirements:** Data may help address gaps in the existing understanding of environmental impacts, would be useful when analyzing potential impacts on ESA-protected sea turtles species, and would inform BOEM guidelines for avoiding and minimizing impacts on sea turtles. These data would also be useful for employing conservation measures that also help minimize adverse impacts on sea turtle species.

2007

U.S. Department of the Navy. 2007. Navy OSAREA Density Estimates (NODE) for the Northeast OSAREAs. Prepared for the Department of the Navy, U.S. Fleet Forces Command, Norfolk, Virginia. Contract #N62470-02-D-9997, CTO 0045. Prepared by Geo-Marine, Inc., Plano, Texas.
<http://seamap.env.duke.edu/downloads/resources/serdp/Northeast NODE Final Report.pdf>

- **Contents:** The Cetacean Density and Distribution Mapping Working Group is creating comprehensive and easily accessible regional cetacean density and distribution maps that are time- and species-specific. A data matrix in the report provides information on the year-round presence and absence of cetacean species in each of seven regions. Several geospatial layers of specific species of marine mammal and sea turtle densities derived from the NODE report are available from MarineCadastre.gov (see “Accessibility.”) The data in the NODE report are a subset of a larger dataset being developed via NOAA’s Cetacean and Sound Mapping website.
- **Accessibility:** Data can be found using the following link and searching for ‘turtles’ or selecting ‘Marine Mammals and Turtles’ under the ‘Theme’ filter: <http://marinecadastre.gov/data/>. Data will be credited to ‘U.S. Navy’. Data can also be found on the Cetacean and Sound Mapping website: <http://cetsound.noaa.gov/index.html>.
- **Pros and cons:**
 - **Pros:** Large, comprehensive dataset vetted by multiple agencies. Easily accessed and downloaded. Available for many species, subdivided by region and season.
 - **Cons:** Users of the models must agree to not use the model outputs for research or in any publication, product, or commercial application without prior written consent of the original data provider. The data provider for the density models in the Atlantic and Gulf of Mexico is Joel Bell (joel.t.bell@navy.mil). Data is a subset-complete dataset located elsewhere (see citation regarding CETSOUND database).
- **Relevance to project requirements:** Presence data about sea turtles would be useful for understanding the distribution of ESA-listed sea turtles. Seasonality of data may inform possible seasonal restrictions regarding project development and construction.

1982

University of Rhode Island. September 29, 1978 - December 01, 1982. Characterization of Marine Mammals and Turtles in the Mid- And North Atlantic OCS.

- **Contents:** The Cetacean and Turtle Assessment Program (CETAP) was initiated in June 1978 to characterize marine mammals and turtles in the Mid- and North Atlantic areas of the U.S. OCS. This study presented the cumulative results of CETAP used in decision-making relative to oil and gas exploration and development in these planning areas. The objectives were to (1) determine which species of marine mammals and turtles inhabit and/or migrate through the OSA; (2) identify, delineate, and describe areas of importance (feeding, breeding, calving, etc.) to them; (3) determine their temporal and spatial distribution; and (4) estimate the size and extent of their populations. The study emphasized these characteristics for marine mammal and sea turtle species classified as threatened or endangered.

- **Accessibility:** Available on BOEM’s specialized Marine Cadastre data portal ESPIS at the following link: <http://marinecadastre.gov/espis/#/search/study/9164>.
- **Pros and cons:**
 - **Pros:** May serve as comparison for new baseline data.
 - **Cons:** The data are old and no longer sufficient to serve as baseline data.
- **Relevance to project requirements:** Data outdated. Do not recommend use of this study.

3.7 Marine Mammals

3.7.1 Summary of Best Available Data

NOAA Fisheries and BOEM are conducting a comprehensive study examining the abundance and density of marine mammals along the East coast, using a combination of aerial observation and acoustic detection methods. (Note: The USFWS is expected to begin participating in this study in 2017.) NOAA (2016) is also modeling marine mammal occurrence using a combination of existing data and expert information in addition to models of ambient noise levels resulting from various activities along the U.S. coast. The Duke University MDET Team (2017) has created draft models of predicted abundance of marine mammal species for the Mid-Atlantic and Northeast regions as part of regional planning efforts. More specific to the OSA, Normandeau Associates, Inc. (2016) is conducting surveys using ultra-high resolution aerial digital imagery to assess use of the OSA by marine mammals.

Several protected marine mammal species potentially occur in the OSA (see Table 2-1 below). Three marine mammals protected under the ESA potentially occur in the OSA: the fin whale (*Balaenoptera Physalus*), the North Atlantic right whales (*Eubalaena glacialis*), and sperm whales (*Physter macrocephalus*). All marine mammal species potentially occurring in the OSA are protected under the Marine Mammal Protection Act (MMPA). Marine mammal presence and distribution within the OSA vary by species, but most species have a seasonal component to their potential occurrence within the OSA. Seal haul-out sites do exist in the vicinity of the nearshore portions of the OSA and are utilized by gray seals (*Halichoerus grypus*), harbor seal (*Phoca vitulina*), and, potentially, harp seals (*Phoca groenlandica*), although the latter are rare visitors to the New York area (Riverhead Foundation 2016).

Table 2-1 Marine Mammal Species Potentially in the Region of the New York Bight

Common Name	Scientific Name	Endangered Species Act Status	Marine Mammal Protection Act Status	Time of Year Expected in Northeast Region⁽¹⁾	Presence in Project Area
Pinnipeds					
Gray Seal	<i>Halichoerus grypus</i>	–	–	September- May	Possible
Harbor seal	<i>Phoca vitulina</i>	–	–	September-May	Possible
Harp Seal	<i>Phoca groenlandica</i>	–	–	January-May	Possible
Cetaceans					
<i>Whales</i>					
Fin Whale	<i>Balaenoptera Physalus</i>	Endangered	Depleted	Year-round	Uncommon
Humpback Whale (Gulf of Maine Stock; West Indies DPS)	<i>Megaptera novaeangliae</i>	–	Depleted	Year-round	Uncommon
Minke Whale	<i>Balaenoptera acutorostrata</i>	–	–	Spring/Summer/Fall	Uncommon
North Atlantic Right Whale	<i>Eubalaena glacialis</i>	Endangered	Depleted	November-April	Possible
Sperm whale	<i>Physeter macrocephalus</i>	Endangered	Depleted	Summer-fall	Possible
<i>Dolphins and Porpoises</i>					
Atlantic-White Sided Dolphin	<i>Lagenorhynchus acutus</i>	–	–	Year-round	Uncommon
Bottlenose Dolphin (Western North Atlantic Northern Migratory Stock)	<i>Tursiops truncatus</i>	–	Depleted	July-September	Possible
Harbor Porpoise	<i>Phocoena phocoena</i>	–	–	January-March	Possible
Long-Finned Pilot Whale	<i>Globicephala melas</i>	–	–	Winter-spring	Uncommon
Short-Beaked Common Dolphin	<i>Delphinus delphis</i>	–	–	Mid-January-May	Possible
Short-Finned Pilot Whale	<i>Globicephala macrorhynchus</i>	–	–	Winter-spring	Uncommon

3.7.2 Data Catalog

This data catalog is organized chronologically, starting with the most recently published references first. References that are mentioned in Section 3.7.1, “Summary of Best Available Data,” are denoted by asterisks next to their bibliographic citations. Following the citation is a brief summary of the reference’s content, accessibility, and utility.

Key search terms considered during preparation of this section:

density

hotspot

Biologically Important Areas

Abundance

sensitive habitat

ambient noise

2017

*NOAA Fisheries, BOEM, and the FWS. 2017. Atlantic Assessment Program for Protected Species.

- **Contents:** NOAA, BOEM, USFWS, and the U.S. Navy are developing models and associated tools to provide seasonal, spatially explicit density estimates incorporating habitat characteristics of marine mammals, turtles, and seabirds in the western North Atlantic Ocean. Underlying these data will be broad-scale data, collected by scientists from NOAA Fisheries and the USFWS over multiple years using direct aerial and shipboard surveys, about the seasonal distribution and abundance of these taxa.
- **Accessibility:** Final reports are now available for the years [2010](#), [2011](#), [2012](#), [2013](#), [2014](#) and [2015](#). Or follow the link on this website: <http://www.nefsc.noaa.gov/psb/AMAPPS/>. The final dataset will be available in 2017. The pending marine mammal dataset will be provided on the Northeast Ocean Data Portal, which notes the data as “coming soon.” See the following link: <http://www.northeastoceandata.org/data/data-download/>.
- **Pros and cons:**
 - **Pros:** The study will provide comprehensive abundance and density data, which will have been vetted by three permitting agencies: NOAA, BOEM, and the USFWS.
 - **Cons:** The study will not be available in its completion until 2017.
- **Relevance to project requirements:** Presence data of marine mammals would be useful for an IHA permit per the MMPA. It may also help understand the distribution of ESA-listed marine mammals. These datasets would also inform BOEM guidelines for avoiding and minimizing impacts and disruptions of marine mammals.

*Marine-life Data and Analysis Team. 2017. Draft Cetacean Models for the U.S. Atlantic and Gulf of Mexico. Multiple contributors-details can be found at following link:

http://seamap.env.duke.edu/models/mdat/Mammal/MDAT_Mammal_Summary_Products_v1_1_2016_08_29_Metadata.pdf

- **Contents:** Marine life data products were developed through a partnership with the Marine-life Data and Analysis Team (MDAT), who collaborated with the Northeast Regional Planning Body (RPB) and expert work groups to produce maps characterizing the predicted distribution and abundance for 29 marine mammal species and species guilds. The team developed synthetic maps characterizing the abundance, richness, diversity, and core relative abundance area richness (50%) for these groups of species and for complete taxa. These synthetic map products are meant to supplement the individual species outputs. Specific data sets for species of concern and for sound sensitivity are also available, as are marine mammal data synthesis products.
- **Accessibility:** Drafts can be found on both the MARCO Data Portal and Northeast Data Portal Websites.
 - <http://portal.midatlanticocean.org/data-catalog/conservation/> and <http://www.northeastoceandata.org/data-explorer/>
 - Instructions for download: <http://portal.midatlanticocean.org/data-catalog/> and <http://www.northeastoceandata.org/data/data-download/>
- **Pros and cons:**
 - **Pros:** Recent comprehensive analysis of all marine mammals along the East coast. Vetted by multiple agencies, including BOEM. BOEM has encouraged use of this dataset in offshore wind project development. The sound sensitivity datasets will be particularly useful for IHA permit development.
 - **Cons:** Dataset is still being finalized and only draft versions of data are currently available. However, the dataset will likely be finalized in 2017.
- **Relevance to project requirements:** Presence data of marine mammals would be useful for an IHA permit per the MMPA. The data may also help understand the distribution of ESA-listed marine mammals. These datasets would also inform BOEM guidelines for avoiding and minimizing impacts and disruptions of marine mammals.

2016

Baumgartner, M. and Howard Rosenbaum. 2016. Autonomous Realtime Marine Mammal Detections Woods Hole Oceanographic Institution: New York Bight Buoy.

<http://dcs.whoi.edu/nyb0616/nyb0616.shtml> Accessed November 29, 2016.

- **Contents:** The data present the cetacean recordings made by a single Digital Acoustic Monitor (DMON) acoustic recording device in the New York Bight offshore area, beginning on June 23, 2016. Automated recordings are conducted for sei, fin, humpback, and North Atlantic right whales.
- **Accessibility:** The raw data can be accessed at the following link: http://dcs.whoi.edu/nyb0616/dmon009_html/dmon009_summary.html. Presence/absence,

duration, and species data were available beginning in June 26, 2016. Recordings are made every 15 minutes. Data would need to be collated and analyzed.

- **Pros and cons:**
 - **Pros:** Data is recent and regionally specific to the New York Bight offshore area. Acoustic recorders sometimes detect animals that would not have been identified during visual surveys.
 - **Cons:** Data constitute the acoustic recordings of a single acoustic recorder and as such no localizations are possible. Consequently, there is no way to be certain detected animals were actually present in the OSA. Like all acoustic data, only animals that vocalize would be detected.
- **Relevance to project requirements:** Presence data of marine mammals would be useful for an IHA permit required per the MMPA. It may also help understand the distribution of ESA-listed marine mammals.

*NOAA Fisheries. 2016. CETSOUND. Homepage: <http://cetsound.noaa.gov/index>.

- **Contents:** Includes two sets of data: CETMAP and SOUNDMAP. CETMAP includes numerous regionally and temporally specific datasets for marine mammal species: habitat-based density, stratified density, probability of occurrence, sighting records, expert-based presence, and expert-based likely absence. Regions that NOAA considers biologically important areas (BIAs) are also indicated. SOUNDMAP includes annual average sound fields arising from multiple source types, available on a regional to ocean-basin scale, and shorter term example “events,” which offer a more comprehensive repetition of local sound filed during periods of noisy activity.
- **Accessibility:** CETMAP datasets are available at the following link: <http://cetsound.noaa.gov/cda>. BIAs are also available at Marine Cadastre: <http://marinecadastre.gov/data/>. The SOUNDMAP dataset is available at the following link: http://cetsound.noaa.gov/sound_data.
- **Pros and Cons:**
 - **Pros:** CETMAP data are available for specific regions and time periods. When available, data include several years of observations and/or modeling efforts. Data has been provided and vetted by NOAA.
 - **Cons:** Data resolution and accuracy is not even across all datasets. Data are classified by tiers that indicate their relative quality.
- **Relevance to project requirements:** Presence data of marine mammals would be useful for an IHA permit required per the MMPA. It may also help understand the distribution of ESA-listed marine mammals. The ambient noise data would also be useful for determining impacts on marine mammals and employing conservation measures that help to minimize adverse impacts on marine mammals. These datasets would also inform BOEM guidelines for avoiding and minimizing impacts and disruptions of marine mammals.

NOAA National Marine Fisheries Service. 2016. Marine Mammal Protection Act. Accessed at <http://marinecadastre.gov/data/>.

- **Contents:** Depicts geo-regulatory boundaries of MMPA jurisdiction.
- **Accessibility:** Follow the link provided in the above reference. Metadata are provided here: https://coast.noaa.gov/dataservices/Metadata/TransformMetadata?u=https://coast.noaa.gov/data/Documents/Metadata/MarineCadastre/no_harvest/MarineMammalProtectionAct.xml&f=html.
- **Pros and cons:**
 - **Pros:** Jurisdictional boundaries are provided by authoritative sources.
- **Relevance to project development:** When investigating geo-regulatory boundaries near the boundary edges, users should consult the most up-to-date applicable jurisdictional boundaries from all respective authoritative sources. This dataset provides the agency-approved and updated jurisdictional boundaries for the MMPA.

*Normandeau Associates, Inc. 2016. Digital Aerial Baseline Survey of Marine Wildlife in Support of Offshore Wind Energy. https://remote.normandeau.com/nys_overview.php Accessed December 8, 2016.

- **Contents:** Includes aerial imagery survey data in the OSA that identifies marine vertebrates, including marine birds, mammals, sea turtles, and large fish.
- **Accessibility:** Follow the link provided in the above reference and click the “Documents” link to review the survey plan. Click the “Results” link to review data points for the summer 2016 surveys. The “Data Portal” link is not currently available.
- **Pros and Cons:**
 - **Pros:** Occurrence data and subsequent density analyses are gathered specifically for the OSA. Surveys cover a three-year time span and all four seasons, which should help reduce effects of anomalous data.
 - **Cons:** Data do not always identify marine mammals to species, particularly small odontocetes such as dolphin species. Species-specific presence data in the OSA that is relevant to the MMPA is necessary for project development.
- **Relevance to project requirements:** The probability of occurrence data for mammals would be useful in analyzing potential impacts on ESA- and MMPA-protected marine mammals. These data would also be useful for employing conservation measures that help to minimize adverse impacts on marine mammal species. These datasets would also inform BOEM guidelines for avoiding and minimizing impacts and disruptions of marine mammals.

2014

CSA Ocean Sciences Inc. October 01, 2011 - February 01, 2014. Quieting Technologies for Reducing Noise during Seismic Surveying and Pile Driving Workshop.

- **Contents:** BOEM organized this workshop in 2013 where 140 government, industry, non-governmental organization, and academic experts examined quieting technologies that have the

potential to reduce the impacts of noise generated during offshore exploratory seismic surveys and pile driving and noise from the vessels associated with these activities. An information synthesis document summarizing available literature regarding the status of existing noise-quieting technologies was prepared and made available prior to the workshop. Available products include final report and technical summary.

- **Accessibility:** Available on BOEM’s specialized Marine Cadastre data portal ESPIS at the following link: <http://marinecadastre.gov/espis/#/search/study/23184>.
- **Pros and cons:**
 - **Pros:** The study was commissioned by BOEM to facilitate development of mitigation for industry noise generated in the OCS.
 - **Cons:** The study examines the entire East coast and does not target the OSA.
- **Relevance to project requirements:** These data would be useful for employing conservation measures that help minimize adverse impacts on marine mammal species.

JASCO Applied Sciences. Oct 01, 2008 - Jun 01, 2014. Characterization and Potential Impacts of Noise-Producing Construction and Operation Activities on the Outer Continental Shelf.

- **Contents:** The objective of this study was to record and analyze ambient noise data near the Cape Wind site in Nantucket Sound and at an offshore wind lease site offshore of Delaware Bay being considered by Bluewater Wind. This report describes the recording and analysis program and provides results, discussion, and recommendations to aid offshore wind developments. Available products include final report and technical summary.
- **Accessibility:** Available on BOEM’s specialized Marine Cadastre data portal ESPIS at the following link: <http://marinecadastre.gov/espis/#/search/study/14541>.
- **Pros and cons:**
 - **Pros:** The study was commissioned by BOEM to facilitate development of mitigation for noise associated with offshore wind development.
 - **Cons:** The study sites are not within the OSA.
- **Relevance to project requirements:** These data would be useful for employing conservation measures that help minimize adverse impacts on marine mammal species. These datasets would also inform BOEM guidelines for avoiding and minimizing impacts and disruptions of marine mammals.

2013

ESS Group, Inc. October 01, 2011 - August 01, 2013. Evaluation of Lighting Schemes for Offshore Wind Facilities and Impacts to Local Environments.

- **Contents:** In order to fully assess the impacts from offshore wind development lighting and address any mitigation or monitoring that may be necessary, BOEM commissioned this study of regulations and lighting schemes that are currently in use at operational offshore wind farms. The study also included a literature review of existing scientific studies related to the potential

impacts of lighting on birds, bats, sea turtles, marine mammals, and fish. This study assesses the existing state of knowledge on the subject of environmental impacts from offshore wind farm lighting and provides suggested best practices to assist BOEM and other agencies with their decision-making as the U.S. offshore wind industry continues to develop. Available products include the final report and technical summary.

- **Accessibility:** Available on BOEM's specialized Marine Cadastre data portal ESPIS at the following link: <http://marinecadastre.gov/espis/#/search/study/23185>.
- **Pros and cons:**
 - **Pros:** The study was commissioned by BOEM to help the agency establish and develop mitigation strategies for offshore wind lighting.
 - **Cons:** The study examines the entire East coast and does not target the OSA.
- **Relevance to project requirements:** These data would be useful when designing and implementing conservation measures to help minimize adverse impacts on marine mammal species. These datasets would also inform BOEM for avoiding and minimizing impacts and disruptions of marine mammals.

2012

National Oceanic and Atmospheric Administration, National Marine Fisheries Service, Northeast Fisheries Science Center. October 01, 2008 - December 01, 2012. Literature Search and Data Synthesis For Marine Mammals and Sea Turtles in the U.S. Atlantic from Maine to the Florida Keys.

- **Contents:** The goals and objectives of this study were to (1) create a reference document that includes the latest and best information on marine mammals and sea turtles in the U.S. Atlantic; (2) identify data gaps in the knowledge of marine mammals and sea turtles in the Atlantic; and (3) identify research priorities recommended by national/regional agencies and groups. The document provides a basis for analysis of potential impacts of BOEM-regulated activities on protected sea turtles and marine mammals as required by NEPA and for Section 7 consultations under the ESA. The document can help guide future decisions on planning and funding of needed research on sea turtles and marine mammals in the U.S. Atlantic. Available products include final report and technical summary.
- **Accessibility:** Available on BOEM's specialized Marine Cadastre data portal ESPIS at the following link: <http://marinecadastre.gov/espis/#/search/study/23162>.
- **Pros and cons:**
 - **Pros:** Comprehensive data-set of ESA-listed species that includes identified data gaps and suggested surveys.
 - **Cons:** The study is for the entire East coast and does not target the OSA.
- **Relevance to project requirements:** The probability of occurrence data for mammals would be useful in analyzing potential impacts on ESA- and MMPA-protected marine mammals. The data would also be useful for employing conservation measures that help to minimize adverse impacts on marine mammal species. These datasets would also inform BOEM guidelines for avoiding and minimizing impacts and disruptions of marine mammals.

Normandeau Associates, Inc., September 22, 2010 - October 16, 2012. Pilot Study of Aerial High-Definition Surveys for Seabirds, Marine Mammals, and Sea Turtles.

- **Contents:** Pioneering aerial high-resolution imaging surveys in Europe suggest that this new technique represents a safe, scientifically robust, and cost-effective solution for gathering the type of data needed on birds, marine mammals, and sea turtles. The objective of this study was to develop and test a methodology for surveying birds, marine mammals, and sea turtles in the offshore environment using state-of-the-art survey techniques that are efficient and provide high quality, reproducible data. Available products include a final report and technical summary.
- **Accessibility:** Available on BOEM's specialized Marine Cadastre data portal ESPIS at the following link: <http://marinecadastre.gov/espis/#/search/study/23168>.
- **Pros and cons:**
 - **Pros:** May serve to supplement existing Normandeau data.
 - **Cons:** Normandeau is completing more surveys that are targeting the OSA, rendering this dataset obsolete.
- **Relevance to project requirements:** The probability of occurrence data for mammals would be useful in analyzing potential impacts on ESA- and MMPA-protected marine mammals. These data would also be useful when designing and employing conservation measures to help minimize adverse impacts on marine mammal species. These datasets would also inform BOEM guidelines for avoiding and minimizing impacts and disruptions of marine mammals.

University of Rhode Island, Coastal Resources Center. January 01, 2010 - December 31, 2011 (published 2012). Developing Environmental Protocols and Modeling Tools to Support Ocean Renewable Energy and Stewardship.

- **Contents:** The objectives of this study were to develop and test standardized protocols for conducting baseline studies and monitoring to address specific ORE issues. The study discusses methods for collecting and comparing scientifically valid and other comparable data. It also develops a conceptual framework and approach for cumulative environmental impact evaluations of ORE developments to aid decision-makers. Available products include the final report and technical summary.
- **Accessibility:** Available on BOEM's specialized Marine Cadastre data portal ESPIS at the following link: <http://marinecadastre.gov/espis/#/search/study/8107>.
- **Pros and cons:**
 - **Pros:** Thorough discussion of data collection, comparison, and monitoring relevant to offshore wind.
 - **Cons:** Data do not target a specific OSA.
- **Relevance to project requirements:** Contains discussion of data collection, data comparison, and monitoring relevant to offshore wind projects that may help in developing a Master Plan. These datasets would also inform BOEM guidelines for avoiding and minimizing impacts and disruptions of marine mammals.

2010

Riverhead Foundation. 2010. 'Seal Haul-Outs' under Research Methods.

<http://www.riverheadfoundation.org/researchmethods/> Accessed September 30, 2016.

- **Contents:** The website contains images of known seal haul-out sites in the New York Bight area. Note: no GIS/spatial data are available.
- **Accessibility:** Follow the link provided in the above reference to access a locations and images of seal haul-out sites. No data are available for download.
- **Pros and cons:**
 - **Pros:** The data are cataloged by a local research groups specifically for the New York region.
 - **Cons:** No data available for download.
- **Relevance to project requirements:** During the IHA application process, known seal-haul out sites will need to be cataloged, and the potential effects of noise will need to be analyzed.

2009

Halpin, P.N., A.J. Read, E. Fujioka, B.D. Best, B. Donnelly, L.J. Hazen, C. Kot, K. Urian, E. LaBrecque, A. Dimatteo, J. Cleary, C. Good, L.B. Crowder, and K.D. Hyrenbach. 2009. OBIS-SEAMAP: The world data center for marine mammal, sea bird, and sea turtle distributions. *Oceanography* 22(2):104-115

- **Contents:** OBIS-SEAMAP, Ocean Biogeographic Information System Spatial Ecological Analysis of Megavertebrate Populations, is a spatially referenced online database aggregating marine mammal, seabird, sea turtle, and ray and shark observation data from across the globe.
- **Accessibility:** Multiple raw and processed datasets are available at the following link: <http://seamap.env.duke.edu/dataset/list>. Limited processing is available for sea turtles at the following link: <http://seamap.env.duke.edu/swot>; and for marine mammals, sea birds, and sea turtles at the following link: <http://seamap.env.duke.edu/search>. Descriptions of full service capabilities offered by the site can be found at the following link: <http://seamap.env.duke.edu/content/content/services>. Downloading instructions are available at the following link: <http://seamap.env.duke.edu/content/help/download>.
- **Pros and cons:**
 - **Pros:** Data for the OSA is available for a several-year span. The data processing services also help streamline the download process.
 - **Cons:** Data is not available evenly across taxa or time periods. Rather, it is accumulated from numerous disparate studies. Methods of data collection and survey efforts differ accordingly.
- **Relevance to project requirements:** Presence data of marine mammals would be useful for an IHA permit as per the MMPA and for ESA-listed marine mammals. Presence data for sea turtles, seabirds, and rays and skates may help fulfill ESA requirements. These datasets would

also inform BOEM guidelines for avoiding and minimizing impacts and disruptions of marine mammals.

2008

Research Planning, Inc. September 21, 2006 - January 31, 2008. Worldwide Synthesis and Analysis of Existing Information Regarding Environmental Effects of Alternative Energy Uses on the OCS Workshop

- **Contents:** The project objectives were to identify, collect, evaluate, and synthesize existing information on offshore alternative energy activities for the following topics: (1) existing offshore energy technologies and future trends; (2) how public acceptance of existing projects was or was not achieved; (3) potential direct, indirect, and cumulative environmental impacts of offshore energy technologies; (4) previously used mitigation measures that could avoid, minimize, rectify, eliminate, or compensate for environmental impacts; (5) existing physical and numerical models designed to determine environmental impacts; and (6) information needs to address gaps in the existing understanding of environmental impacts. The project examined benthic, fish, marine mammal, sea turtle, and aquatic resources, and birds and bat data. Final reports and technical summaries are available at the website note in “Accessibility.”
- **Accessibility:** Available on BOEM’s specialized Marine Cadastre data portal ESPIS at the following link: <http://marinecadastre.gov/espis/#/search/study/635>.
- **Pros and cons:**
 - **Pros:** The study was commissioned by BOEM to help identify gaps in data as per their recommendations.
 - **Cons:** The study did not target the specific OSA.
- **Relevance to project requirements:** Data may help address gaps in the existing understanding of environmental impacts. They would be useful when analyzing potential impacts on ESA- and MMPA-protected marine mammals. These data would also be useful for employing conservation measures that help minimize adverse impacts on marine mammal species. The datasets would also inform BOEM guidelines for avoiding and minimizing impacts and disruptions of marine mammals.

2007

Department of the Navy. 2007. Navy OSAREA Density Estimates (NODE) for the Northeast OSAREAs. Prepared for the Department of the Navy, U.S. Fleet Forces Command, Norfolk, Virginia. Contract #N62470-02-D-9997, CTO 0045. Prepared by Geo-Marine, Inc., Plano, Texas.
<http://seamap.env.duke.edu/downloads/resources/serdp/Northeast NODE Final Report.pdf>

- **Contents:** The Cetacean Density and Distribution Mapping Working Group is creating comprehensive and easily accessible regional cetacean density and distribution maps that are time- and species-specific. A data matrix in the report provides information on the year-round presence and absence of cetacean species in each of seven regions. Several geospatial layers of

specific species of marine mammal and sea turtle densities derived from the NODE report are available from MarineCadastre.gov (see “Accessibility.”) The data in the NODE report are a subset of a larger dataset being developed via NOAA’s Cetacean and Sound Mapping website.

- **Accessibility:** Data can be found using the following link and searching for ‘turtles’ or selecting ‘Marine Mammals and Turtles’ under the ‘Theme’ filter: <http://marinecadastre.gov/data/>. Data will be credited to ‘U.S. Navy’. Data can also be found on the Cetacean and Sound Mapping website: <http://cetsound.noaa.gov/index.html>.
- **Pros and cons:**
 - **Pros:** Large, comprehensive dataset vetted by multiple agencies. Easily accessed and downloaded. Available for many species, subdivided by region and season.
 - **Cons:** Users of the models must agree to not use the model outputs for research or in any publication, product, or commercial application without prior written consent of the original data provider. For the density models in the Atlantic and Gulf of Mexico, the data provider is Joel Bell (joel.t.bell@navy.mil). Data is a subset-complete dataset located elsewhere (see citation regarding CETSOUND database).
- **Relevance to project requirements:** Presence data of marine mammals would be useful for an IHA permit as per the MMPA and for ESA-listed marine mammals. Seasonality of data may inform possible seasonal restrictions regarding project development and construction. These datasets would also inform BOEM guidelines for avoiding and minimizing impacts and disruptions of marine mammals.

1991

LGL Ecological Research Associates, Inc. October 01, 1990 - February 01, 1991. Effects of Noise on Marine Mammals.

- **Contents:** The general objective of this literature review was to summarize available evidence concerning the effects of man-made noise on marine mammals. Underwater noise is emphasize, but some attention is given to airborne sounds. Strong emphasis was given to the effects of noise from offshore oil and gas exploration and development, but effects of related types of man-made noise are also taken into account.
- **Accessibility:** Available on BOEM’s specialized Marine Cadastre data portal ESPIS at the following link: <http://marinecadastre.gov/espis/#/search/study/9059>.
- **Pros and cons:**
 - **Cons:** The data are old and, given the recent progress in acoustic science, likely out of date. Study focused on oil and gas exploration rather than offshore wind.
- **Relevance to project requirements:** These data might be useful for developing conservation measures that help to minimize adverse impacts on marine mammal species. However, the data are outdated and not recommended for inclusion in the existing study.

1988

New England Aquarium. December 01, 1984 - September 30, 1988. Surveys for Wintering Right Whales (*Eubalaena Glacialis*) along the Southeastern United States, 1984-1988.

- **Contents:** In 1984, the New England Aquarium initiated a series of coastal aerial surveys in the winter months along the southeastern U.S. to identify the distribution and abundance of right whales in the region. This report summarizes five years of data collection and analyses from these surveys and provides preliminary information on the distribution and demographics of wintering right whales in the region.
- **Accessibility:** Available on BOEM's specialized Marine Cadastre data portal ESPIS at the following link: <http://marinecadastre.gov/espis/#/search/study/10409>.
- **Pros and cons:**
 - **Cons:** The data are old and are no longer sufficient to provide adequate mitigation guidance for the existing NYSERDA project.
- **Relevance to project requirements:** Data outdated. Do not recommend use of this study.

1987

East Coast Ecosystems and the New England Aquarium. October 01, 1985 - September 30, 1987. Right Whales in the Western North Atlantic New England Aquarium Research In 1986.

- **Contents:** This report includes a summary of the Aquarium's field effort in 1986; an analysis of distribution patterns and relative abundance of the right whale in the Bay of Fundy from 1981 to 1986; and a similar analysis for the Nova Scotian Shelf data from 1986. Trends in calf production, demographics and behavior are also discussed— one step in a unified approach to research and management that will hopefully lead to the recovery of this species.
- **Accessibility:** Available on BOEM's specialized Marine Cadastre data portal ESPIS at the following link: <http://marinecadastre.gov/espis/#/search/study/10308>.
- **Pros and cons:**
 - **Cons:** The data are old and no longer sufficient to serve as baseline data.
- **Relevance to project requirements:** Data outdated. Do not recommend use of this study.

1986

University of Rhode Island. August 01, 1983 - March 01, 1986. Distribution and Abundance of Cetaceans in the Vicinity of Human Activities along the Continental Shelf of the Northwestern Atlantic.

- **Contents:** In this study the abundance and distribution of cetaceans in the vicinity of human disturbances along the continental shelf of the northwest Atlantic coast were investigated.
- **Accessibility:** Available on BOEM's specialized Marine Cadastre data portal ESPIS at the following link: <http://marinecadastre.gov/espis/#/search/study/9103>.
- **Pros and cons:**

- **Cons:** The data are old and no sufficient to serve as baseline data.
- **Relevance to project requirements:** Data outdated. Do not recommend use of this study.

1985

University of Maryland, Eastern Shore. January 01, 1983 - December 31, 1985. Relative Marine Productivity of the OCS Planning Areas.

- **Contents:** The objectives of this study were to (1) identify those studies previously conducted in U.S. coastal and OCS waters that dealt with measurements of primary productivity and included reported productivity values and (2) to compile and annotate these references in an annotated bibliography. Products include multiple reports and technical summaries.
- **Accessibility:** Available on BOEM’s specialized Marine Cadastre data portal ESPIS at the following link: <http://marinecadastre.gov/espis/#/search/study/10249>.
- **Pros and cons:**
 - **Pros:** Comprehensive dataset includes both physical, oceanographic, and biological data.
- **Relevance to project requirements:** Data outdated. Do not recommend use of this study

1984

United States Department of the Interior, Minerals Management Service. December 01, 1984 - December 31, 1984. Atlantic OCS Region Studies Program: Marine Mammal Workshops.

- **Contents:** An objective of the Atlantic OCS Regions Studies Program was the dissemination of information obtained through Minerals Management Service (MMS)-funded marine mammal studies. Another objective was the development of programs that will facilitate assessment of potential impacts of OCS activities on marine mammal habitats, populations, and migratory routes. Two Marine Mammal Workshops (MMW I and II) were held in the Atlantic OCS region to present the results of the MMS contract, “Study of the Effects of Oil on Cetaceans” by the University of Guelph, and to discuss future directions of marine mammal research. A final associated report (Fritz 1984) is available for download, but no materials produced by the workshop are available for download.
- **Accessibility:** Available on BOEM’s specialized Marine Cadastre data portal ESPIS at the following link: <http://marinecadastre.gov/espis/#/search/study/9135>.
- **Pros and cons:**
 - **Cons:** The data are old and no longer sufficient to serve as baseline data. The report focused on the impacts of oil and gas.
- **Relevance to project requirements:** Data outdated. Do not recommend use of this study.

1982

University of Rhode Island. September 29, 1978 - December 01, 1982. Characterization of Marine Mammals and Turtles in The Mid- and North Atlantic OCS.

- **Contents:** CETAP was initiated in June 1978 to characterize marine mammals and turtles in the Mid- and North Atlantic areas of the OCS. This study presented the cumulative results of CETAP for use in decision-making relative to oil and gas exploration and development in these planning areas. The objectives were to (1) determine which species of marine mammals and turtles inhabit and/or migrate through the OSA;(2) identify, delineate, and describe areas of importance (feeding, breeding, calving, etc.) to marine mammals and marine turtles in the OSA; (3) determine the temporal and spatial distribution of marine mammals and turtles in the OSA; (4) estimate the size and extent of marine mammal and turtle populations in the OSA; and (5) emphasize the above items for those species classified as threatened or endangered.
- **Accessibility:** Available on BOEM's specialized Marine Cadastre data portal ESPIS at the following link: <http://marinecadastre.gov/espis/#/search/study/9164>.
- **Pros and cons:**
 - **Cons:** The data are old and no longer sufficient to serve as baseline data.
- **Relevance to project requirements:** Date outdated. Do not recommend use of this study.

Naval Ocean Systems Center (NOSC), Hawaii Laboratory. January 01, 1980 - September 01, 1982. Study Of The Effects Of Sound On Marine Mammals.

- **Contents:** Direct observation of cetacean behavior in the vicinity of OCS oil and gas operations was achieved by field teams using questionnaires, identification sheets, and interviews with platform personnel to evaluate or predict potential noise and vibration problems caused by development activities.
- **Accessibility:** Available on BOEM's specialized Marine Cadastre data portal ESPIS at the following link: <http://marinecadastre.gov/espis/#/search/study/9161>.
- **Pros and cons:**
 - **Cons:** The data are old and no longer sufficient to provide adequate mitigation guidance for the existing NYSERDA project.
- **Relevance to project requirements:** Data outdated. Do not recommend use of this study.

No Date

No author. No Date. Marine Mammals Habitat Data layer available on Northeast Data Portal. Layer can be visualized only on the Northeast Data Portal and cannot be downloaded. No details are provided. Do not recommend using.

3.8 Birds

3.8.1 Summary of Best Available Data

Normandeau Associates, Inc. (2016) conducted surveys using ultra-high resolution aerial digital imagery to assess use of the OSA by birds. Several additional studies, unrelated to the project, have analyzed likelihood of occurrence, distribution, abundance, and/or density of marine bird species in the northwestern Atlantic Ocean, which includes the OSA (Menza et al. 2012; DOC et al. 2014; Balderama et al. 2015; Viet et al. 2015; Berlin et al. 2016; Curtice et al. 2016; Kinlan et al. 2016). Likewise, resources such as eBird (2016) provide bird occurrence data for specific locations in the OSA. The above-noted references reveal that bird distributions and abundances in the OSA are idiosyncratic, varying by species, time of year, data sources, and methods of analyses. The majority of the research evaluates marine species, with few resources available to address concerns for terrestrial bird species that may be migrating over the OSA during spring and fall.

A number of special status bird species potentially occur in the OSA. According to the USFWS Information for Planning and Conservation (IPaC) tool (USFWS 2016), three bird species protected under the ESA potentially occur in the OSA: the piping plover (*Charadrius melodus*), red knot (*Calidris canutus rufa*), and the roseate tern (*Sterna dougallii dougallii*). Bald eagles (*Haliaeetus leucocephalus*) and, to a much lesser extent, golden eagles (*Aquila chrysaetos*), are protected under the Bald and Golden Eagle Protection Act (BGEPA) and may occur along the coasts and nearshore waters of the OSA (eBird 2016). Bald eagles are year-round residents and golden eagles are rare visitors during migratory periods and winter. Nearly all bird species potentially occurring in the OSA are protected under the Migratory Bird Treaty Act (MBTA); however, a subset of 45 Birds of Conservation Concern (BCC) designates the species in greatest need of additional conservation (USFWS 2008).

3.8.2 Data Catalog

This data catalog is organized chronologically, starting with the most recently published references first. References that are mentioned in Section 3.8.1, “Summary of Best Available Data,” are denoted by asterisks next to their bibliographic citations. Following the citation is a brief summary of the reference’s content, accessibility, and utility.

Key search terms considered during preparation of this section:

Density

hotspot

Abundance

sensitive habitat

2016

*Berlin, A., S. Ford, A. Gilbert, C. Gray, S. Johnston, W. Montevecchi, G. Olsen, L. Savoy, C. Spiegel, I. Stenhouse. 2016. Satellite Tracking Highlights Use of Ocean Habitat by Diving Bird Species in Federal Waters of the US Mid-Atlantic. Wind Wildlife Research Meeting XI. 29 November 2016 – 2 December 2016.

- **Contents:** Berlin et al. are evaluating the potential for effects on marine birds posed by wind turbines in federal waters (>5.6 kilometers [km] from shore), exposing them to increased mortality through turbine collisions and by altering behavior and flight pathways. The OSA encompasses several proposed wind energy facilities offshore in the U.S. mid-Atlantic federal waters (North Carolina to Long Island, New York). For the study, the team collected information on the fine-scale occurrence and movement patterns of three diving MBTA-protected bird species (northern gannets [*Morus bassanus*], red-throated loons [*Gavia stellata*], and surf scoters [*Melanitta perspicillata*]) with different flight and foraging characteristics. The study tracked the birds using satellite-based tags during their northward migration to their breeding colonies and on their southward migration back to and through the mid-Atlantic region:
- **Accessibility:** This study was presented at the Wildlife Research Meeting XI on November 30, 2016. Data are currently not available online. The abstract for the meeting is available at <http://programme.exordo.com/wworm2016/delegates/presentation/66/>.
- **Pros and Cons:**
 - **Pros:** Conducted over a 16-year period, survey methods were consistent, and the study includes very recent data. There is a chance the project area/BOEM OWA was included in the OSA.
 - **Cons:** Data are not accessible and research covers only three bird species, although impacts and conservation measures may be applicable to many diving birds.
- **Relevance to project requirements:** Occurrence data would be useful for employing conservation measures that help to minimize adverse impacts on MBTA-protected species.

*Curtice, C., J. Cleary, E. Shumchenia., P.N. Halpin. 2016. *Marine-life Data and Analysis Team (MDAT) Technical report on the methods and development of marine-life data to support regional ocean planning and management*. Prepared on behalf of the Marine-life Data and Analysis Team (MDAT) :http://seamap.env.duke.edu/models/MDAT/MDAT-Technical-Report-v1_1.pdf Accessed December 7, 2016.

- **Contents:** This document accompanies Kinlan et al. (2016) below. Document figures and digital versions (<https://www.northeastoceandata.org/data-explorer/?birds> and <http://portal.midatlanticocean.org/>) predict the abundance and distribution of 40 marine bird species in the northwest Atlantic Ocean. The data can be viewed for all birds or divided into various groups based on ecology, spatial factors (nearshore vs offshore), species of concern, or by stressors (i.e., collision and displacement sensitivities).
- **Accessibility:**
 - Follow the report link for Curtice et al. above.
 - Follow the Northeast Ocean Data link provided above.
 - From <http://portal.midatlanticocean.org/>, click on the “Marine Planner” tab. In the planner, open the “Marine Life” menu to the left under the “Data” tab, then open “Birds-Draft.” Select the preferred bird data layers to view.
- **Pros and Cons:**
 - **Pros:** Provides some insight into where certain groups of birds are most abundant
 - **Cons:** Does not provide data for individual species (see Kinlan et al. 2016 below). The data are predictive, not actual count/observation data.
- **Relevance to project requirements:** These datasets would be useful for employing conservation measures that help to minimize adverse impacts on MBTA-protected species and for understanding the distribution of the ESA-listed birds. These datasets would also inform the BOEM-required Avian Survey Plan.

*eBird. 2016. eBird: An online database of bird distribution and abundance [web application]. eBird, Ithaca, New York. Accessed at <http://ebird.org/ebird/explore> on 5 December 2016.

- **Contents:** eBird is the world’s largest repository for bird observation data launched by the National Audubon Society and Cornell Lab of Ornithology in 2002. It houses hundreds of millions of bird observations, with millions more arriving each month. eBird provides information on bird abundance and distribution at various spatial and temporal scales. For each observation, users can retrieve count data as well as date, time, number of observers, location, survey type, and survey effort.
- **Accessibility:** A user must subscribe (at no charge) to eBird to request occurrence data and summary tables. Other data, such as seasonal occurrence/abundance bar charts, arrivals/departures, and high counts by species do not require a subscription. Click the ‘Explore Data’ tab on the eBird homepage to access data including, but not limited to, species maps and seasonal abundance bar charts. Bar charts are particularly useful in showing how commonly birds are recorded throughout the year in specific locations.
- **Pros and Cons:**
 - **Pros:** eBird is the largest repository of bird occurrence data in the world, managed by two highly reputable ornithological institutions.
 - **Cons:** Offshore data are relatively limited compared to data at terrestrial sites; however, the OSA is still relatively well covered given its size and offshore location.

- **Relevance to project requirements:** eBird may provide data and useful insight into the presence and relative abundance of ESA-listed birds, bald eagles and golden eagles, BCCs, and other MBTA-protected species.

*Kinlan, B.P., A.J. Winship, T.P. White, and J. Christensen. 2016. *Modeling At-Sea Occurrence and Abundance of Marine Birds to Support Atlantic Marine Renewable Energy Planning: Phase I Report*. U.S. Department of the Interior, Bureau of Ocean Energy Management, Office of Renewable Energy Programs, Sterling, VA. OCS Study BOEM 2016. A

<https://www.data.boem.gov/PI/PDFImages/ESPIS/5/5512.pdf> Accessed December 2, 2016

- **Contents:** Principal Investigators of this project include individuals from the National Centers for Coastal Ocean Science (NCCOS) Project: NCCOS, U.S. Department of Commerce (DOC), NOAA; National Ocean Service (NOS); and the Marine-life Data and Analysis Team (MDAT) Project: Marine Geospatial Ecology Lab (MGEL) of Duke University; NOAA Northeast Fisheries Science Center (NEFSC) and Loyola University Chicago. This report represents Phase I of a modeling study that examines the spatial distributions (abundance and occurrence) of 40 marine bird species along the entire U.S. Atlantic OCS waters from Florida to Maine. As part of Phase I, the team applied spatial predictive modeling to the visual sighting survey data collected over three decades, contained in the *Compendium of Avian Occurrence Information for the Continental Shelf waters along the Atlantic Coast of the U.S.* database, to develop seasonal and annual predictive maps of the spatial distributions. The modeling framework of Phase I enabled predictions beginning 1 to 2km offshore and extending to the US Exclusive Economic Zone boundary along the entire U.S. Atlantic coast. (Model predictions are not available for nearshore (0 to 2km) areas, embayments, or estuaries, such as Long Island.)
- **Accessibility:**
 - Interactive Mapping Data: <http://mgelmaps.env.duke.edu/mdat/rest/services/MDAT>
 - GeoTIFF files, ArcGIS packages, and Metadata: <https://coastalscience.noaa.gov/projects/detail?key=279>
 - Also available at <http://www.northeastoceandata.org/data-explorer/?birds>
- **Pros and Cons:**
 - **Pros:** Datasets cover the OWA. The maps provide preliminary broad-scale spatial information that can be used to guide future data collection efforts and aid marine spatial planning in the region. The second phase of the project, to be completed by fall of 2017, is in progress and aims to refine, expand, and improve modeling and results.
 - **Cons:** This analysis will not provide predictions of the number of birds expected in a specific location at a specific date or time. The maps represent the spatial distributions of birds averaged over time (e.g., across days within a season and across years for a given season). Interpretation of the maps is more reliable at the regional scale (i.e., 10-100 km).
- **Relevance to project requirements:** These datasets would be useful for employing conservation measures that help to minimize adverse impacts on MBTA-protected species, and for understanding distribution of the ESA-listed birds. These datasets would also inform the BOEM-required Avian Survey Plan.

*U.S. Fish and Wildlife Service (USFWS). 2016. Information for Planning and Conservation (IPaC). Accessed at <https://ecos.fws.gov/ipac/> on 5 December 2016.

- **Contents:** IPaC is an interactive mapping tool that generates lists of endangered, threatened, candidate, or proposed species under the ESA; critical habitat for ESA-listed species; and migratory birds that may be impacted by activities in the OSA. Data also include wetlands and national wildlife refuges in the OSA. This tool allows project developers to quickly and easily identify USFWS-managed resources and suggests conservation measures for their projects.
- **Accessibility:** Follow the link provided in the above reference. The website, located at the link above, guides a user through the process of obtaining an official species list and initiating consultation with the USFWS. Click the “Get Started” icon at the homepage, then define the project area by uploading shapefiles or drawing on the map. Once the project area is defined, continue to the results for the abovementioned lists.
- **Pros and Cons:**
 - **Pros:** Preliminary lists obtained prior to receiving input from the USFWS help users understand the potential for certain listed species, critical habitats, MBTA-protected species, and national wildlife refuges to occur within the project boundaries.
 - **Cons:** This tool does not replace the need for consultation with the USFWS, which may add other species of concern. The tool does not provide occurrence or abundance data for the species listed in the results.
- **Relevance to project requirements:** IPaC results help inform project developers of species to be concerned about in complying with the ESA, BGEPA, and MBTA. Likewise, the information provides a baseline for initiating consultations with the USFWS. Results would also inform the BOEM-required Avian Survey Plan.

*Normandeau Associates, Inc. 2016. Digital Aerial Baseline Survey of Marine Wildlife in Support of Offshore Wind Energy. https://remote.normandeau.com/nys_overview.php Accessed December 8, 2016.

- **Contents:** Includes survey data for aerial imagery surveys conducted in the OSA to identify marine vertebrates, including marine birds, mammals, sea turtles, and large fish.
- **Accessibility:** Follow the link provided in the above reference, click the “Documents” link to review the survey plan. Click the “Results” link to review data points for the summer 2016 surveys. The “Data Portal” link is not currently available.
- **Pros and Cons:**
 - **Pros:** Occurrence data and subsequent density analyses are specific to for the OSA.
 - **Cons:** Data do not address migrant terrestrial birds (e.g., passerines).
- **Relevance to project requirements:** The probability of occurrence data for marine birds would be useful in analyzing potential impacts on ESA- and MBTA-protected birds and would inform the BOEM-required Avian Survey Plan. These data would also be useful for employing conservation measures that help to minimize adverse impacts on MBTA-protected species.

2015

*Balderama, E., B. Gardner, B.J. Reich. 2015. Mapping the distribution, abundance and risk assessment of marine birds in the Northwest Atlantic. North Atlantic Landscape Conservation Cooperative. <http://northatlanticlcc.org/projects/marine-bird-mapping-and-assessment> Accessed December 7, 2016.

- **Contents:** The authors developed maps depicting the probability of observing 24 marine bird species across the northwest Atlantic Ocean (North Carolina to Maine) using existing occurrence data. The maps depict the probability of observing a) one individual during each month and annually, and b) at least one large flock of a species in each month and annually.
- **Accessibility:** The webpage provided in the reference above includes links to the full report, project datasets, all projects maps, and other supplemental information.
- **Pros and Cons:**
 - **Pros:** Provides useful occurrence and distribution data for 24 species that may occur in the OSA.
 - **Cons:** Limited to only 24 marine species. Scale of the data may not be ideal for site-specific analyses because the data predict occurrence probability across a large region.
- **Relevance to project requirements:** The probability of occurrence data for marine birds would be useful in analyzing potential impacts on ESA- and MBTA-protected birds and would inform the BOEM-required Avian Survey Plan. These data would also be useful for employing conservation measures that help to minimize adverse impacts on MBTA-protected species.

*Viet, R.R, H.F. Goyert, T.P. White, M.-C. Martin, L.L. Manne, and A. Gilbert. 2015. *Pelagic Seabirds off the East Coast of the United States 2008-2013*. US Dept. of the Interior, Bureau of Ocean Energy Management, Office of Renewable Energy Programs, Sterling, VA. OCS Study BOEM 2015-024. 186 pp.

- **Contents:** The authors collected data on the distribution and abundance of seabirds from research cruises between 2008 and 2013 and used the data to identify seabird hotspots off the East coast of the United States. They also aimed to compare abundance estimates of some species with historic abundance estimates.
- **Accessibility:** Figures 1 through 8 are perhaps the most useful portion of the document for potential projects in the OSA because they provide count data displayed graphically for eight seabird species off the East coast of the U.S. <https://www.boem.gov/ESPIS-3Qtr-2015/>. Use the third link from the top to download the article.
- **Pros and Cons:**
 - **Pros:** Provides some indication of abundance and distribution for eight seabird species. Determines seabird hotspots off the East coast of the U.S.
 - **Cons:** Limited number of species are analyzed. Does not provide digital data for review on projects in the OSA. Data are best used at a regional scale and may provide little benefit for site-specific analyses of projects in the OSA.
- **Relevance to project requirements:** The document may provide some useful information to inform the BOEM-required Avian Survey Plan.

2014

*Department of Commerce (DOC), National Oceanic and Atmospheric Administration (NOAA), National Ocean Service (NOS), Office for Coastal Management (OCM). 2014. MarineCadastre.gov. *Avian Average Annual Abundance (27 different bird species)*. Accessed at <http://marinecadastre.gov/data/> on 30 November 2016.

- **Contents:** From June 2011 to June 2014, NOAA/NOS/NCCOS, in collaboration with the USGS Patuxent Wildlife Research Center, constructed annual average abundance prediction models to evaluate at-sea occurrence and abundance of marine birds for BOEM. Twenty-seven marine bird species were modeled with up to four seasonal models for each species. The data represent the predicted number of individuals per standardized survey segment for each of the study seabird species. Data are presented on seasonal and annual maps of occurrence probability and relative abundance. The team obtained data from the Compendium of Avian Information database. The 2011 report outlines how the data were collected (<https://tethys.pnnl.gov/publications/compendium-avian-occurrence-information-continental-shelf-waters-along-atlantic-coast>).
- **Accessibility:** Shapefiles for this project can be accessed on the Marine Cadastre website at the following links: <http://marinecadastre.gov/data/> or <ftp://ftp.coast.noaa.gov/pub/MSP/AvianAverageAnnualAbundance.zip>. To obtain shapefiles from the Marine Cadastre website, filter for ‘Birds’ and ‘East Coast.’ Select the cloud icon next to one of the bird species to download shapefiles for all 27 species. To obtain species-specific metadata, click the ‘uses and metadata’ icon for each species. Click on the eyeball icon to access the seasonal and annual maps of occurrence probability and relative abundance.
- **Pros and Cons:**
 - **Pros:** Datasets cover the BOEM offshore wind area. The maps of marine bird occurrence probability and abundance are being used by BOEM, other federal and state agencies, and non-governmental organizations to aid marine spatial planning and offshore energy planning in the mid-Atlantic region. They have been vetted by subject matter experts, and comparisons of historical and recent survey data also are being used to validate newly developed model predictions.
 - **Cons:** Annual abundance is based on the seasons surveyed. Not all birds were surveyed during the four seasons.
- **Relevance to project requirements:** Presence-data on seabirds would be useful in analyzing potential impacts on ESA- and MBTA-protected birds and would inform the BOEM-required Avian Survey Plan. These data would also be useful for employing conservation measures that help to minimize adverse impacts on MBTA-protected species.

2013

*U.S. Geological Survey (USGS) Patuxent Wildlife Research Center. 2013. *Atlantic Offshore Seabird Dataset Catalog*. <https://marinecadastre.gov/dataregistry/search/dataset/7701E1D1-8C12-4F82-A06A-3E64A0A0F893> Accessed December 1, 2016.

- **Contents:** BOEM, the USFWS Division of Migratory Bird Management, and the USGS compiled available information from seabird observation datasets from the Atlantic OCS into the Atlantic Offshore Seabird Dataset Catalog, with the goal of conducting research and informing coastal and offshore planning activities. The database contains ~70 datasets from 1906 to 2013 with more than 300,000 records of seabird observations. Each observation record has a unique point location, date and time, species identification, and observation count. There may also be biological information related to the sighting, such as animal age or behavior.
- **Accessibility:** The raw data are in .csv format, with an associated file detailing the data structure in .csv format. Data can be accessed on NOAA's National Centers for Environmental Information (formerly known as National Oceanographic Data Center [NODC]) website at the following link: <http://www.nodc.noaa.gov/cgi-bin/OAS/prd/accession/download/115356>. The directory view contains the most recent metadata and can be found here: <http://www.nodc.noaa.gov/archive/arc0070/0115356/1.1/data/0-data/>. Another location for the summary data and maps is at this link: https://gis1.usgs.gov/arcgis/rest/services/USGS_Patuxent_WRC
- **Pros and Cons:**
 - **Pros:** Long-term data are available and cover the OSA.
 - **Cons:** The data have been collected from various resources over a 30-year period with no regard for any long-term temporal changes that may have occurred with species or the environment. There is little consistency among survey designs (e.g., strip versus distance sampling). Surveys vary by the type of vessel from which they were conducted (ship or plane), the equipment used, the method of counts made, the width of the area being counted, etc. Therefore, comparing results and making inferences can be difficult.
- **Relevance to project requirements:** Presence-data of seabirds would be useful in analyzing potential impacts on ESA- and MBTA-protected birds and would inform the BOEM-required Avian Survey Plan. These data would also be useful for employing conservation measures that help to minimize adverse impacts on MBTA-protected species.

2012

*Menza, C., B.P. Kinlan, D.S. Dorfman, M. Poti, and C. Caldwell. 2012. *Seabird abundance predictions for the New York offshore spatial planning area*. DOC, NOAA, NOS, NCCOS, Center for Coastal Monitoring and Assessment (CCMA), Biogeography Program. Accessed at New York Geographic Information Gateway. <http://opdgig.dos.ny.gov/#/map> Accessed December 6, 2016.

- **Contents:** Data viewer provides predicted abundance for seabirds generally and for several individual species in the New York offshore spatial planning area.
- **Accessibility:** Follow the link provided in the above reference, type "bird" into the "Search" function, and open the desired layers in the map viewer.
- **Pros and Cons:**
 - **Pros:** Data provides estimates of seabird abundances for the OSA and depict potential hotspots for seabird activity.

- **Cons:** Data examine seabirds collectively but examine only a few species' abundances individually. Data are predicted values, not actual occurrence data.
- **Relevance to project requirements:** Presence data of seabirds would be useful in analyzing potential impacts on ESA- and MBTA-protected birds, and would inform the BOEM-required Avian Survey Plan. These data would also be useful for employing conservation measures that help to minimize adverse impacts on MBTA-protected species.

2010

AWS Truepower, LLC and Energy & Environmental Analysts, Inc. 2010. *Pre-development Assessment of Avian Species for the Proposed Long Island – New York City Offshore Wind Project Area*. Prepared for the New York State Energy Research and Development Authority. Final Report 10-22, Task 3B.

- **Contents:** This report provides an overview of the bird species that may occur in the OSA and evaluates the potential impacts on them associated with constructing and operating offshore wind energy facilities. The report also discusses the regulatory approvals needed, conservation measures, and survey methods for acquiring bird data.
- **Accessibility:** The report can be accessed at the following link:
http://www.linyc offshorewind.com/PDF/10-22_linyc-collaborative-avian-risk.pdf.
- **Pros and Cons:**
 - **Pros:** Provides a good, bird-related overview of the regulatory setting, potential impacts, conservation measures, and data collection strategies involved with developing offshore wind energy in New York.
 - **Cons:** Does not provide digital data of species occurrence, abundance, or density.
- **Relevance to project requirements:** The report summarizes the regulatory requirements associated with birds and provides important discussion for planning (e.g., data collection) and analyzing project impacts.

2009

Halpin, P.N., A.J. Read, E. Fujioka, B.D. Best, B. Donnelly, L.J. Hazen, C. Kot, K. Urian, E. LaBrecque, A. Dimatteo, J. Cleary, C. Good, L.B. Crowder, and K.D. Hyrenbach. 2009. OBIS-SEAMAP: *The world data center for marine mammal, sea bird, and sea turtle distributions*. Oce

- **Contents:** This database portal contains observation data collected from various data providers worldwide. The datasets are integrated so that users may search and map by species name, higher taxonomic level, geographic area, depth, time, and environmental parameters.
- **Accessibility:** Follow the link provided in the above reference. To obtain .csv or ESRI shapefiles for bird species, click on “Browse Species” and then select “Aves.” To upload a shapefile of the project area to the map, select “Region” on the toolbar above the map and then select “Upload.” To download data, select “Download” on the tool bar at the bottom of the screen below the map.
- **Pros and Cons:**

- **Pros:** Long-term data is available and covers the OSA.
- **Cons:** Although a large database, this website does not represent all available bird data. It contains unpublished data that are not available to the public. A user must be given an account by the database manager.
- **Relevance to project requirements:** Presence-data about seabirds would be useful in analyzing potential impacts on ESA- and MBTA-protected birds and would inform the BOEM-required Avian Survey Plan. These data would also be useful for employing conservation measures that help to minimize adverse impacts on MBTA-protected species.

2008

*United States Fish and Wildlife Service (USFWS). 2008. *Birds of Conservation Concern 2008*. United States Department of Interior, Fish and Wildlife Service, Division of Migratory Bird Management, Arlington, Virginia. 85 pp.

- **Contents:** This document identifies the BCCs that may occur in the OSA. BCCs are a subset of MBTA-protected species identified by the USFWS as those in the greatest need of additional conservation action to avoid future listing under the ESA. BCCs have been identified at three geographic scales: national, USFWS regions, and bird conservation regions (BCRs). BCRs are the smallest geographic scale at which BCCs have been identified, and the lists of BCC species at this scale are expected to be the most useful for resource management agencies to consider in complying with the MBTA. The OSA would be located in BCR 30 (New England/Mid-Atlantic Coast), which lists 45 BCCs.
- **Accessibility:** The list of BCCs for BCR 30, in which the OSA lies, is found on Table 28 (page 46) of the document cited above at <https://www.fws.gov/migratorybirds/pdf/grants/BirdsofConservationConcern2008.pdf>.
- **Pros and Cons:**
 - **Pros:** This document identifies 45 species in the OSA for which the USFWS would have the most concern relative to a project's compliance with the MBTA, which protects more than 1,000 species
 - **Cons:** This document does not provide any life history or demographic data for the BCCs designated for BCR 30 or any other BCRs.
- **Relevance to project requirements:** Avoiding or minimizing impacts on the BCCs would be a focus in a project's compliance with the MBTA.

No Date (n.d.)

National Audubon Society. n.d. Important Bird Areas (IBA). <http://netapp.audubon.org/iba/Map/All>. <http://netapp.audubon.org/iba/Map/All> Accessed December 5, 2016.

- **Contents:** The IBA program is a global bird conservation initiative of BirdLife International and is implemented in the United States by the National Audubon Society and its local partners. Its purpose is to identify and conserve sites that provide essential habitats for breeding,

wintering, and/or migrating birds. While all IBAs are recognized for their importance to birds, some are of greater significance than others. IBAs may be prioritized hierarchically as global, continental, or state, based on their significance.

- **Accessibility:** Follow the link provided in the above reference. The IBA site provides an interactive map with GIS layers that represent IBAs. Click on any IBA polygon or point to view the name of the IBA, state, priority, status, a link to a specific IBA’s website, and a link to eBird data collected at the IBA. The IBA-specific website provides a description of the IBA as well as bird species and conservation issues associated with the IBA.
- **Pros and Cons:**
 - **Pros:** The IBA database is a valuable resource that identifies distinct areas that provide essential habitat for one or more species of birds in breeding, wintering, and migration. IBAs are identified through a rigorous scientific process by professionals and help to protect open spaces and habitat and advance restoration, bird monitoring and censuses. The IBA database provides a link to occurrence records for birds that have been documented at the site and reported to eBird.
 - **Cons:** None.
- **Relevance to project requirements:** The IBA database is important to identifying any portions of the OSA that are particularly important to birds, which is essential in complying with the MBTA. The database may also prove useful if any IBAs in the OSA are important to species protected under the ESA or BGEPA. IBA information would also potentially inform the BOEM-required Avian Survey Plan.

3.9 Bats

3.9.1 Summary of Best Available Data

Very little is known about bat movements and habitat use in offshore environments. To date, only a handful of research projects have investigated how bats might use these habitats. Studies conducted by Stantec Consulting Services, Inc. (henceforth, “Stantec”) for the Bureau of Energy Management (Pelletier et al. 2013) and the U.S. Department of Energy (Stantec 2016) are currently the most thorough investigations into bat activity in offshore environments in North America. These studies synthesize what is currently known about this topic, provide additional baseline data for offshore areas in the Gulf of Maine, the Mid-Atlantic, and in parts of the Great Lakes, and outline critical information gaps that require more attention.

3.9.2 Data Catalog

This data catalog is organized chronologically, starting with the most recently published references first. References that are mentioned in Section 3.9.1, “Summary of Best Available Data,” are denoted by

asterisks next to their bibliographic citations. Following the citation is a brief summary of the reference's content, accessibility, and utility.

Key search terms considered during preparation of this section:

Bat(s)

Myotis

Lasiurus

Bat offshore

2016

*Stantec Consulting Services, Inc. 2016. Long-term Bat Monitoring on Islands, Offshore Structures, and Coastal Sites in the Gulf of Maine, Mid-Atlantic, and Great Lakes – Final Report. Prepared for the U.S. Department of Energy. January 15, 2016. 171 pp.

- **Contents:** This study was funded by the U.S. Department of Energy in order to better understand seasonal and spatial distribution of bats in offshore environments. Acoustic surveys were conducted on a variety of islands, offshore structures, and coastal sites in the Gulf of Maine, along the mid-Atlantic coast, and in the Great Lakes regions from 2012 to 2014. The goal of the study was to better understand when and where bats occur offshore in order to assess potential impacts on bat populations from offshore wind energy development.
- **Accessibility:** The report can be accessed at the following link
- Pros and Cons:
 - **Pros:** One of the largest studies on this topic to date, this is a long-term study that focused on a variety of habitats and assessed bat activity relative to spatial, temporal, weather, and other potential variables. Bat activity was documented as far as 130 km from the shore east of New Jersey.
 - **Cons:** Data cannot be gathered on the number of individuals based on acoustics; only a relative index of activity can be ascertained. Activity was recorded nearer to the water's surface (although some sampling locations were 30 meters above ground level), and conclusions about bat activity within airspaces associated with the rotor-swept zone can not be made. Individual bats can not be tracked, so it remains unknown whether bats are attracted to islands or offshore structures and whether these areas act as migratory stopover sites.
- **Relevance to project requirements:** provides fundamental baseline data on a topic that is largely undiscovered. Provides temporal, spatial, and species data relevant to offshore wind development in the Mid-Atlantic region.

2014

Pelletier, S. and T. Peterson. 2014. *Tracking Bats using Nanotags Offshore in the Gulf of Maine*. Research Poster. National Wind Coordinating Collaborative.

- **Contents:** This poster outlines modern radiotelemetry technologies used to gather information about bat movements in offshore environments in the northeastern United States. Data shows that some bats, like the eastern red bat, can move 500 km in a single month. Continued research with this method, paired with acoustic surveys, will provide baseline data pertaining to how bats use or interact with offshore habitat (i.e., coastal islands) and structures (i.e., wind turbines).
- **Accessibility:** This research poster can be accessed at the following link: https://nationalwind.org/wp-content/uploads/2014/04/38_Boucher.pdf
- **Pros and Cons:**
 - **Pros:** presents some data about spatial movements and applicability of using nanotags to study offshore movements of bats.
 - **Cons:** only contains minimal preliminary data. Does not present data immediately relevant to the Mid-Atlantic coast, where the Project is proposed.
- **Relevance to project requirements:** this research demonstrates the mobility of bats and that individuals may move between coastal and offshore habitats. It also provides a brief explanation of potential research techniques viable for determining bat movements and habitat use within the Mid-Atlantic region where the Project is to occur. It also suggests that nanotag receivers mounted to turbine nacelles could help document patterns of risks for tagged bats that pass through the Project area.

Sjollema, A.L., J.E. Gates, R.H. Hilderbrand, and J. Sherwell. 2014. *Offshore Activity of Bats along the Mid-Atlantic Coast*. *Northeastern Naturalist* 21(2):154-163.

- **Contents:** This study documents bat activity in 2009 and 2010 off the mid-Atlantic coast using ultrasonic detectors mounted on ships. It investigated the association between nightly bat activity and weather variables, including wind speed, air temperature, and barometric pressure. In total, 166 bat passes were recorded, primarily (78%) eastern red bats (*Lasiurus borealis*). Maximum detection distance from the shore was approximately 22 km, and mean distance was ~8 km. Bat activity decreased as wind speed increased, but activity did not differ with distance from shore.
- **Accessibility:** This study can be accessed at the following link: [ftp://nris.mt.gov/Maxell/Wind Turbine Bat Impacts/Sjollema_2014_Offshore_Bat_Activity_Naturalist.pdf](ftp://nris.mt.gov/Maxell/Wind_Turbine_Bat_Impacts/Sjollema_2014_Offshore_Bat_Activity_Naturalist.pdf)
- **Pros and Cons:**
 - **Pros:** indicates that several species of bats may have offshore migratory routes, including silver-haired bats (*Lasiurus noctivagans*), hoary bats (*Lasiurus cinereus*), eastern red bats (*L. borealis*), and species in the genus *Myotis*. Potentially 93% of calls recorded were from long-distance migratory tree bats (i.e., hoary bat, silver-haired bat, eastern red bat).

- **Cons:** acoustic data does not provide information regarding the total number of individuals, but only a relative index of activity; therefore, it remains unknown how many bats are using these migratory routes. Additional studies are required. Because acoustic sampling was conducted near the water's surface; conclusions about bat activity within airspaces at greater heights (i.e., within the rotor-swept zone [RSZ]) can not be made. Additional research needs to target RSZ airspaces in order to better quantify potential risk to bats using an offshore environment containing wind turbines.
- **Relevance to project requirements:** long-distance migratory tree roosting bats comprise a large proportion of fatalities found at terrestrial wind energy facilities. Evidence that bats are using offshore migratory routes suggests they could potentially migrate through the Project area. However, this study suggests that activity levels (and thus fatality risk) are low relative to activity documented at onshore wind facilities.

2013

Hatch S.K., E.E. Connelly, T.J. Divoll, I.J. Stenhouse, and K.A. Williams. 2013. *Offshore Observations of Eastern Red Bats (*Lasiurus borealis*) in the Mid-Atlantic United States Using Multiple Survey Methods*. PLoS ONE 8(12): e83803. doi:10.1371/journal.pone.0083803

- **Contents:** This document provides evidence of 12 eastern red bats (*Lasiurus borealis*) flying between 16.9 and 44 km offshore, east of Delaware, New Jersey, and Virginia. It also provides altitudinal flight height data and bat activity relative to environmental conditions (e.g., wind speed).
- **Accessibility:** This document can be accessed at the following link:
<http://journals.plos.org/plosone/article?id=10.1371/journal.pone.0083803>
- **Pros and Cons:**
 - **Pros:** this document presents detailed, species-specific data pertaining to eastern red bat migration in offshore environments. This is the first study to describe flight heights of eastern red bats along an offshore migration route, with heights ranging from 100 to greater than 200 meters above sea level.
 - **Cons:** the study was purely opportunistic in that bat data was gathered incidentally during offshore surveys for birds. Bats were not a targeted species. Overall sample size (i.e., only 12 eastern red bat observations) was small.
- **Relevance to project requirements:** long-distance migratory tree roosting bats, which include eastern red bats, comprise more than 75% of bat fatalities found at terrestrial wind energy facilities in North America (Arnett and Baerwald 2013). Evidence that this species may fly in small “flocks” in an offshore environment during fall migration is largely a new discovery. This information, paired with the observed flight height data, indicates that eastern red bats could potentially migrate through the Project area at flight heights associated with the rotor-swept zone of turbines. Therefore, it is possible that the Project may directly impact bats, but additional research is needed.

*Pelletier, S.K., K. Omland, K.S. Watrous, T.S. Peterson. 2013. *Information Synthesis on the Potential for Bat Interactions with Offshore Wind Facilities – Final Report*. U.S. Dept. of the Interior, Bureau of Ocean Energy Management, Headquarters, Herndon, VA. OCS Study BOEM 2013-01163. 119 pp.

- **Contents:** “This document provides a comprehensive compilation and summary of known available literature and recorded observations related to bats in offshore environments. It examines potential threats related to offshore energy development, and identifies critical gaps in information requiring further research and study. Investigations into the proclivity of bat occurrence offshore and potential turbine collision risk include a compilation and statistical analysis of existing offshore and terrestrial acoustic data sets from which comparisons are drawn regarding bat activity and presence at inland, coastal, and offshore locations.”
- **Accessibility:** This report can be accessed at the following link:
<https://www.data.boem.gov/pi/pdfimages/espis/5/5289.pdf>
- **Pros and Cons:**
 - **Pros:** comprehensive summary of what is known about bats and offshore activity.
 - **Cons:** limited amount of available offshore acoustic data that meet methodological, regional, and seasonal criteria, making it not comparable with larger datasets.
- **Relevance to project requirements:** provides baseline data regarding an understudied topic and provides specific recommendations for future studies. “It further sets a stage for future analysis that will enable a more definitive understanding of offshore bat activities and seasonal presence, and in so doing, support[s] balanced decision-making in the management and development of renewable energy in the offshore arena.”

3.10 Cultural Resources

3.10.1 Summary of Best Available Data

Background on Cultural Resource Administration and Permitting

The state of New York considers its archaeological, architectural, and cultural heritage among its most important environmental assets. As such, the state has a comprehensive historic preservation program that is used to protect, enhance, and preserve these resources, including aboveground, belowground, and submerged cultural resources. This program is administered through the Office of Parks, Recreation, and Historic Preservation (OPRHP), which serves the role of State Historic Preservation Office (SHPO).

As one of its many responsibilities, the SHPO provides environmental reviews for projects requiring federal and/or state permitting, funding, and/or approvals. The SHPO reviews projects with a federal nexus under Section 106 of the National Historic Preservation Act, as amended (NHPA) and those with a state nexus under Section 14.09 of the New York State Historic Preservation Act. At times, a state review is necessitated as part of the State Environmental Quality Review Act or if a permit is required under

Section 233 of the State Education Law, which states that it is unlawful to disturb archaeological resources (including most shipwrecks and underwater archaeological sites) on public lands without first obtaining a permit from the New York State Museum.

As development of an offshore wind farm in federal waters is the most likely scenario, in most cases BOEM would act as the lead federal permitting agency, triggering required compliance with Section 106 of the NHPA. Its main components consist of consultation with appropriate stakeholders, including the SHPO and Indian tribes; identification of historic properties through desktop research and/or on-site surveys; and an assessment and resolution of adverse effects, if present. Developments in New York State that do not trigger Section 106 may be subject to state regulations and thus also would benefit from the data discussed herein.

Several of the data sources in Section 3.9.2, “Data Catalog,” provide guidance on carrying out effective consultation or on-site surveys (including terrestrial and underwater archaeological surveys) rather than information about specific stakeholders or known cultural resources. These were included to provide a starting point for researching potential stakeholders and garnering a sense of what types of resources may be present in a particular geographic area. Original research would likely be conducted for most offshore wind projects as it is not feasible for an agency or consortium to conduct terrestrial or underwater archaeology surveys of the entire OSA in advance of a specific project. Thus, the inclusion of guidance on consultation and cultural resource surveys was considered important for reviewing agencies, project stakeholders, and developers.

Best Available Data for Initial Cultural Assessment

One of the first steps of compliance with Section 106 is determining potential consulting parties, including Indian tribes. The New York SHPO and the Indian Nations of New York State (2016) recently compiled the Indian Nation Areas of Interest map, which shows where federal- and state-recognized Indian Nations may have an interest. The map shows where particular Indian Nations may have ancestral homelands or places or resources that have religious and/or cultural significance. The map identifies the various Indian Nations within New York State that should be consulted, depending on the location of a potential project. While the map depicts onshore locations, tribes with interests within the vicinity of a proposed project may have important views of offshore locations or treaty rights for use of a coastal or offshore area. This map would provide BOEM (or other federal agency) with a good indication of the tribes that should be contacted as part of the Section 106 consultation, although follow-up research and

discussion with local entities would be required. The recent date of the map (November 2016) and Indian Nations' co-authorship suggest the map is a reliable source of information.

The best sources for identifying other appropriate stakeholders, such as community and local historic group websites, are generally location-specific. It should be noted that stakeholder groups beyond New York State boundaries may have an interest in offshore wind farms in the OSA, depending on their location and proximity to neighboring state properties and resources.

Another primary step in complying with Section 106 (or conducting other required cultural assessments) is the identification of historic, archaeological, and tribal resources. In New York, one of the most valuable tools for researching the types and locations of resources for which the state acts as a custodian is the Cultural Resource Information System (CRIS), produced by the New York SHPO and the Division for Historic Preservation within OPRHP. CRIS is a searchable database with a geographic information systems (GIS) component; it includes records of archaeological and architectural surveys, digital images, national and state register documentation, inventory and survey forms and reports, and legacy data. Notably, the database contains reports for submerged resources throughout the state.

Prior to a field survey, CRIS would serve as a primary resource for background research and for determining the sensitivity of a region based on the presence (or absence) of historic resources, as well as those that are listed on the national and/or state registers. Moreover, the comprehensive nature of CRIS makes it a critical tool during the preliminary siting stages.

Cultural resource specialists with secure access accounts to CRIS can obtain archaeological site information and associated site forms and reports. To gain a secure access account, one must first request a NY.gov ID and then provide a written request with qualification information to the OPRHP for archaeological site file information. Archaeological site files are confidential, and some of the information in the files would not be included in public reports. However, this type of information would be important for the cultural resource specialists working within a project team and for agency and applicant decision-makers.

The Google Earth shipwrecks layer is a useful tool for identifying known shipwrecks that could pose obstructions to offshore developments. Shipwrecks often indicate favored locations for other offshore activities, e.g., recreational diving. The benefit of this layer is its accessibility to a broader audience. This is also its limitation; such that specific underwater archaeological studies should be sought elsewhere

(such as state databases) in any preliminary siting investigation. Also, the shipwrecks layer provides each wreck's source information, which may be further investigated.

In addition to the Google Earth shipwrecks layer, the TRC Environmental Corporation (2012) archaeological site assessment contains information about shipwrecks along the Atlantic coast. It also provides an assessment of the potential occurrence of prehistoric sites within the Atlantic. This report includes information in tabular and map formats and would be very helpful during a preliminary review of any cultural resources that may be located in a particular area of the Atlantic.

Tribal resource data, including records prepared by cultural resource specialists and communication with the tribes themselves would be determined on a case-by-case basis. General histories of tribes are often readily available, but discussions of particular cultural sites, items, or landscape views of tribal importance may be confidential. Some tribes may release information only to agency officials, while others may share with cultural resource specialists and project developers. Limited information may be available in site-specific archaeological survey reports or documents created for National Environmental Policy Act (NEPA) compliance.

The annotated data catalog in Section 3-Iii below contains the sources described above as well as other archaeological, historic, and tribal information resources with information relevant to the New York onshore and offshore regions. These resources would be most useful during preliminary cultural assessments. As a project progresses further, more location-specific data and studies would be sought, especially accounts of prehistoric and historic backgrounds of a particular area. These are available for much of the geographic area of offshore New York and are too numerous to catalog here. This type of information, however, could be found in CRIS by identifying existing surveys and records and then following the source information provided in them.

3.10.2 Data Catalog

This data catalog divides references into two broad categories: (1) cultural resource data portals, geospatial layers, reports, and guidelines and (2) tribal nation reports, inventories, geospatial layers, and consultation guidelines. Within each category, references are organized chronologically, starting with a reference that are continually updated (“ongoing”) first. The remaining references are grouped by year of publication, starting with the most recent year and ending with “no date” (n.d.) references. References that are mentioned in Section 3.9.1, “Summary of Best Available Data,” are denoted by asterisks next to

their titles. Following the full bibliographic reference of each resource is a brief summary of its content, accessibility, and utility.

Key search terms considered during preparation of this section:

<i>Shipwreck</i>	<i>listing of tribes</i>	<i>New York archaeological offshore</i>
<i>sacred</i>	<i>Native American</i>	<i>federal tribes</i>
<i>burial ground</i>	<i>Historic Property</i>	<i>New York offshore wind cultural resources</i>
<i>historic</i>	<i>National Register</i>	
<i>(state and federal) tribes</i>	<i>state and federal tribes</i>	

3.10.2.1 Cultural Resource Data Portals, Geospatial Layers, Reports, and Guidelines

Ongoing

*New York State Historic Preservation Office (SHPO) and the New York State Office of Parks, Recreation and Historic Preservation (ORPHP). n.d. Cultural Resource Information System (CRIS). <https://cris.parks.ny.gov/Default.aspx>. Accessed December 5, 2016.

- **Contents:** CRIS is a web-based information system (records and interactive map) that allows access to New York State’s historic and cultural resource databases and digital images. Accessible data types include national and state register documents, building and archaeological inventory forms and survey reports, and legacy data. CRIS also serves as the communication portal for agencies that may need to submit cultural resources projects for review or that would like to submit a state/national register nomination. This site has two versions – a public version and a secure version. The public version provides information about national- and state register-listed properties that are aboveground. The secure version includes archaeological site information. In order to access the secure version, permission must be sought from the New York State Office of Parks, Recreation & Historic Preservation (OPRHP). The service does not require a fee to access information.
- **Accessibility:** Follow the link provided in the above reference. The website requires that in order to access the information, the user agrees to the legal disclaimer. A secure access account will require a user name and password.
- **Pros and Cons:**
 - **Pros:** This database provides the most up to date information held at the OPRHP that has been digitized. It provides a good starting point for determining the background research needed to complete a cultural resource evaluation and to identify locations of known resources.

- **Cons:** In order to search this information, a user must select the method – either by the type of site, geographic area, or specific site name. The search is limited to 500 records at a time, making large areas difficult to search at once. The amount and reliability of information in this database varies, as many of the records were produced by agencies or individuals. Older files may not include as much as those that are more recent due to the manner in which data were input.
- **Relevance to the project requirements:** CRIS provides the most up-to-date records of where surveys already have been conducted and what information is known about previously recorded sites and resources (limited to what has been digitized for older files). This database should be consulted when beginning a study for offshore energy projects in order to determine what previous cultural work has been completed and what the findings of these studies were as well as to identify potential locations of known cultural resources. Later, when an archaeological or architectural history review is required for an offshore wind project to comply with either federal or state regulations in New York, project documentation will be submitted via CRIS.

2014

Department of Commerce, National Oceanic and Atmospheric Administration (NOAA), National Ocean Service (NOS), and Coastal Services Center (CSC). 2014. Artificial Reefs. NOAA's Ocean Service, Coastal Services Center.

<http://opdgig.dos.ny.gov/geoportal/catalog/search/resource/detailsnoheader.page?uuid={9F582C73-382C-4627-A1DB-C7A226177FF8}>. Accessed November 30, 2016

- **Contents:** This data layer shows the location of known artificial reefs, which are human-made structures often used to promote marine life. These artificial reefs can be composed of shipwrecks or other cultural materials such as old cars or other debris that has fallen to the seafloor. For this dataset, the locations of reefs have been collected from several state websites.
- **Accessibility:** Follow the link provided in the above reference to download as a GIS layer file. This layer can be viewed through the interactive viewer on the New York Geographic Information Gateway (<http://opdgig.dos.ny.gov/>).
- **Pros and Cons:**
 - **Pros:** This data provides an easily understandable source of information for quickly seeing the location of potential obstructions as well as possible shipwrecks.
 - **Cons:** The difficulty with using this data is that the layer does not immediately convey which artificial reefs are composed of culturally important materials (e.g., shipwreck debris). To determine if an artificial reef has a cultural component, each record must be inspected to determine if the reef contains shipwreck material or potentially contains other archaeological/cultural materials.
- **Relevance to project requirements:** This data can be used when beginning research to determine the potential for underwater archaeological remains. As it does not provide precise locations, it should be used only as a guide for potential cultural materials, which may later need to be verified by underwater surveys. The identification of archaeological resources would be

required for compliance with either state or federal cultural resources laws such as Section 106 of the NHPA.

National Park Service (NPS). 2014. National Register of Historic Properties (NRHP) - Northeast Region. Accessed November 29, 2016

http://npgallery.nps.gov/nrhp/Download?path=/natreg/docs/Google_Earth_Layers.html.

- **Contents:** This layer is a downloadable KMZ file from the National Park Service (NPS) that is intended primarily for viewing in Google Earth (see Stutts 2014, National Register of Historic Places, in this data catalog for the original geodatabase that can be viewed in a GIS). It shows NRHP-listed properties in the Northeast region as of April 28, 2014, but does not include listed properties with sensitive location information, such as archaeological sites.
- **Accessibility:** Follow the link provided in the above reference. The KMZ file then can be downloaded by members of the public from the website and viewed in Google Earth.
- **Pros and Cons:**
 - **Pros:** This data provides easily understandable information that can be viewed geographically and in Google Earth, thereby providing the ability to measure distances to and from properties and to gauge what types of properties are present within a particular area. Other regions of the country are also available for download.
 - **Cons:** The data is not updated on a regular basis. The last update was in 2014. It only shows those properties that are listed and not those that are determined eligible or recommended as eligible to the NRHP. Moreover, it does not show properties with sensitive location information, such as archaeological sites.
- **Relevance to project requirements:** This information can be used as a first level of review to gauge the potential for the presence of NRHP properties, an important step because of the potential need for Section 106 consultation. Section 106 of the NHPA directs federal agencies to consider the potential of its undertakings to affect historic properties. For the purposes of offshore projects, both below- and aboveground (or above sea level) resources would be considered. Resources aboveground or above sea level, in particular, would be evaluated with regard to the potential for visual impacts.

Weaver, Katherine. 2014a. National Register of Historic Places (Points). Northeast United States.

November 25. <http://www.northeastoceandata.org/data/data-download/>. Accessed December 5, 2016

- **Contents:** This geospatial layer provides information on locations and attributes of historic sites and properties (including landmarks) for Maine, Massachusetts, and Rhode Island, within 10 km of the coastal shoreline. It was created for the Northeast Ocean Planning Baseline Assessment by Katherine Weaver of the Eastern Division Conservation Science Office of the Nature Conservancy.
- **Accessibility:** Follow the link provided in the above reference and download as part of the database under the “Culture” heading. It can also be viewed in the interactive map provided on the Northeast Ocean Data Portal (<http://www.northeastoceandata.org/data-explorer/?culture>). Metadata is provided here:

<http://www.northeastoceandata.org/files/metadata/Themes/Culture/NationalRegisterHistoricPlacesPoints.pdf>.

- **Pros and Cons:**
 - **Pros:** This data can serve as a baseline of information for identifying NRHP properties within the geographic areas of Maine, Massachusetts, and Rhode Island, as well as within 10 km of the coastal shoreline.
 - **Cons:** The data is limited to three states in the Northeast ocean-planning region and does not contain NRHP locations in New York or New Jersey, which are considered part of the Mid-Atlantic ocean-planning region. These data also represent a compilation from state databases, and the associated metadata advises that some properties may be missing because the states were working on updating their databases and datasets at the time data was acquired.
- **Relevance to project requirements:** This layer would be useful for investigating historic sites and landmarks in the Massachusetts offshore region near the OSA boundary. For developments within the OSA near the border between the two states' offshore regions, a cultural resource investigation's area of potential effect (APE) may include submerged lands on the Massachusetts side of the boundary.

Weaver, Katherine. 2014b. National Register of Historic Places (Polygons). Northeast United States. November 25. <http://www.northeastoceandata.org/data/data-download/>. Accessed December 5, 2016.

- **Contents:** This geospatial layer provides information regarding the locations of historic districts and large properties (as opposed to historic sites and properties in the point file) for Maine, Massachusetts, Rhode Island, and New York within 10 km of the coastal shoreline. It was created for the Northeast Ocean Planning Baseline Assessment by Katherine Weaver of the Eastern Division Conservation Science Office of the Nature Conservancy. Metadata is provided here:
<http://www.northeastoceandata.org/files/metadata/Themes/Culture/NationalRegisterHistoricPlacesPolygons.pdf>.
- **Accessibility:** Follow the link provided in the above reference and download as part of database under the "Culture" heading. It can also be viewed in the interactive map provided on the Northeast Ocean Data Portal (<http://www.northeastoceandata.org/data-explorer/?culture>).
- **Pros and Cons:**
 - **Pros:** Unlike the point file of NRHP sites on the Northeast Ocean Data Portal (<http://www.northeastoceandata.org/data-explorer/?culture>), this layer includes historic districts and large properties in New York. Its recommended use is for establishing baseline information.
 - **Cons:** This data represents a compilation from state databases, and the associated metadata advises that some properties may be missing because the states were working on updating their databases and datasets at the time data was acquired.
- **Relevance to project requirements:** This layer would be useful for investigating historic districts and large properties within the OSA and in the Massachusetts offshore region near the

OSA boundary. For developments within the OSA near the border between the two states' offshore regions, a cultural resource investigation's "area of potential effect" may include submerged lands on the Massachusetts side of the boundary.

2012

Klein, Joel I., M.D. Harris, W.M. Tankersley, R. Meyer, G.C. Smith, and W.J. Chadwick. 2012a.

Evaluation of visual impact on cultural resources/historic properties: North Atlantic, Mid-Atlantic, South Atlantic, and Florida Straits. Volume I: Technical report of findings. U.S. Dept. of the Interior, Bureau of Ocean Energy Management, Gulf of Mexico OCS Region, New Orleans, LA. OCS Study BOEM 2012-006. 24 pp. Accessed December 5, 2016. <https://www.boem.gov/Renewable-Energy-Completed-Studies/>.

Klein, Joel I., M.D. Harris, W.M. Tankersley, R. Meyer, G.C. Smith, and W.J. Chadwick. 2012b.

Evaluation of visual impact on cultural resources/historic properties: North Atlantic, Mid-Atlantic, South Atlantic, and Florida Straits. Volume II: Appendices. U.S. Dept. of the Interior, Bureau of Ocean Energy Management, Gulf of Mexico OCS Region, New Orleans, LA. OCS Study BOEM 2012-007. 10 appendices. Accessed December 5, 2016. <https://www.boem.gov/Renewable-Energy-Completed-Studies/>.

- **Contents:** This report (Vol. 1) and its appendices (Vol. 2) includes the findings of a study by two consultant teams tasked with the preparation of a GIS database of known cultural resources/historic properties that could be impacted by the introduction of off-shore energy facilities along the East coast of the United States. The purpose of the study was to provide a baseline of cultural information that could help agencies make informed decisions regarding the location of offshore renewable energy facilities in the Atlantic region. The OSA was defined as a continuous coastal strip beginning at a defined shoreline and extending inland for a distance of 0.25 mi (0.4 km). As shown in this report, the methodology included obtaining information for New York cultural resources documented through 2009 (the year data were obtained from the OPRHP). The information was gathered from publicly available sources for both aboveground data and shipwrecks.
- **Accessibility:** Follow the links provided in the above references. This report (Vol. 1) and its appendices can be accessed via BOEM's Renewable Energy Research Completed Studies, under the heading of Cultural and Archaeological Resources. However, the data for the appendices (Vol. 2) are not available online.
- **Pros and Cons:**
 - **Pros:** The report and its appendices contain a significant amount of information on the Mid-Atlantic and include a collection of municipal, public, Native American, and SHPO data.
 - **Cons:** The most relevant part of the data is noted as part of Vol. 2, which contains the geographic information and photographs. This information, however, is not available on the BOEM website; only a portion of Vol. 2 is provided. To access the geographic information and photographs referenced in Vol. 2, the full report must be purchased from BOEM by referencing OCS Study BOEM 2012-006.

- **Relevance to project requirements:** As part of this study, information was collected from the state of New York. The report contains maps and other information relevant to the Offshore Study Area. Specifically, the report examines cultural resources and historic properties near or along the shore of New York and determines for each whether a) its maritime setting was a historically significant characteristic and b) if its views to the sea were a historically significant characteristic. This type of information would be important if a federal and/or state cultural resources review were needed (e.g., a Section 106 review).

*TRC Environmental Corporation. 2012. Inventory and analysis of archaeological site occurrence on the Atlantic outer continental shelf. U.S. Dept. of the Interior, Bureau of Ocean Energy, Gulf of Mexico OCS Region, New Orleans, LA. OCS Study BOEM 2012-008. 324 pp. Accessed December 5, 2016.<https://www.boem.gov/Renewable-Energy-Completed-Studies/>.

- **Contents:** BOEM contracted a study for the Atlantic OCS that included information on historic shipwrecks and an assessment of the potential occurrence of prehistoric sites based on reconstruction of past landscapes, human settlement patterns, and site formation and preservation conditions, particularly during the period of coastal transgression. In turn, the potential occurrence indicated an area's sensitivity ranking (i.e., none, low, or high). The study also provides a historic context and database for historic shipwrecks within the Atlantic OCS region.

Information was collected for areas offshore of New York and New Jersey, including those within the OSA. Topics discussed include the regional geology, relative sea level changes, marine transgression and site preservation, and archaeological sensitivity and preservation potential.

The study also provides recommended methodologies for conducting archaeological investigations of offshore areas. The suggested methods can be useful for determining an appropriate scope of work, which is helpful guidance for both agencies and developers.

- **Accessibility:** Follow the link provided in the above reference. This report can be accessed via BOEM's Renewable Energy Research Completed Studies – under the heading of Cultural and Archaeological Resources.

- **Pros and Cons**

- **Pros:** The shipwreck discussion includes a description of the types of ships that one may find, which is very helpful to a reader/practitioner who is not familiar with this topic.
- **Cons:** This report provides a large amount of information regarding various regions along the Atlantic and no one region is a particular focus. The discussion content is kept at a high level for each of the regions. Maps are provided, but their scale limits their utility.

- **Relevance to project requirements:** As part of this study, the archaeological sensitivity of the OCS near the OSA was evaluated. Based on a map in this report (Figure 5.3), the level of sensitivity within the planning area can be readily viewed. The map shows the highest sensitivity closest to shore. This type of information would be important if a federal and/or state cultural resources review were needed (e.g., a Section 106 review).

2011

Department of Commerce, National Oceanic and Atmospheric Administration, National Ocean Service, and Coastal Services Center. 2011. Office of Coast Survey's Automated Wreck and Obstruction Information System. Accessed December 1, 2016 <http://www.northeastoceandata.org/data/data-download/>.

- **Contents:** This data layer shows wrecks, obstructions, and other significant charted features in coastal waters of the United States subject to National Ocean Service (NOS) Hydrographic Surveys. Metadata is provided here: <http://www.northeastoceandata.org/files/metadata/Themes/Culture/WrecksandObstructions.htm>.
- **Accessibility:** Follow the link provided in the above reference and download database under the “Culture” heading (contains layer, “Wrecks and Obstructions”).
- **Pros and Cons:**
 - **Pros:** This data provides a quick way to see the potential locations of underwater remains that may impact future development.
 - **Cons:** The layer cannot be viewed in the Northeast Ocean Data Portal’s web-based interactive viewer; however, it is not currently available for viewing in the interactive map.
- **Relevance to project requirements:** These data can be used when beginning research to determine the potential for underwater archaeological remains. It should be used only as a guide for potential cultural materials, which may later need to be verified by an underwater survey. The identification of archaeological resources would be required for compliance with either state or federal cultural resources laws, such as Section 106 of the NHPA.

Spinelli, Dominic. 2011. Historic Preservation and Offshore Wind Energy: Lessons Learned from the Cape Wind Saga. *Gonzaga Law Review*. Vol. 46:3. Accessed December 5, 2016. <http://blogs.gonzaga.edu/gulawreview/files/2011/09/Spinelli.pdf>.

- **Contents:** This article focuses on lessons learned from the Cape Wind Project with regard to historic preservation. The author presents a description of the project, its proposed purpose, a summary of the legal cases brought against the project, a description of the permitting process (including Section 106), and information about what could be used to help offshore wind projects avoid complications with historic resources in the future.
- **Accessibility:** Follow the link provided in the above reference.
- **Pros and Cons:**
 - **Pros:** This article provides a general understanding of potential issues that may come about with the development of an offshore wind farm.
 - **Cons:** The article addresses a specific wind farm, which was among one of the first within the United States. As such, many of the critiques of the project were related to this inexperience. This article also presents only one view of how future wind farms should be addressed. In this sense, the article expresses some opinions rather than facts about what can be done in the future.

- **Relevance to project requirements:** This article helps provide an understanding of when advance and early planning is needed with regard to cultural resources. It highlights potential pitfalls due to the lack of early consultation with tribes and other interested parties.

2009

Department of Commerce, National Oceanic and Atmospheric Administration (NOAA) Office of Coast Survey. 2009. Wrecks and Obstructions. Accessed December 5, 2016.

<http://www.marinecadastre.gov/data/>

- **Contents:** This data layer, similar to the Wrecks and Obstructions 2011 data layer, shows wrecks, obstructions, and other significant charted features in coastal waters of the United States subject to NOS Hydrographic Surveys. Both the 2009 and 2011 layers were produced by NOAA's Office of Coast Survey for the same purpose; one is simply more recently published than the other. Metadata are provided here: http://www.ncddc.noaa.gov/approved_recs/nos_de/ocs/ocs/ocs/AWOIS.html.
- **Accessibility:** Follow the link provided in the above reference and search for "Wrecks and Obstructions" to download. It also can be viewed in the Marine Cadastre National Viewer, a web-based interactive viewer (<http://marinecadastre.gov/nationalviewer/>).
- **Pros and Cons:**
 - **Pros:** These data are similar to the Wrecks and Obstructions 2011 reference listed in this data catalog and provides a similar advantage of being able to see data in a geographically broad region.
 - **Cons:** If the data are viewed in the web-based viewer only, wrecks and obstructions (represented by points) may be missed by visual inspection, given how numerous they are. Also, this dataset was published in 2009, whereas a more recently published dataset is available on the Northeast Data Ocean Portal.
- **Relevance to project requirements:** This data can be used when beginning research to determine the potential for underwater archaeological remains. It should be used only as a guide for potential cultural materials, which may later need to be verified by underwater survey. The identification of archaeological resources would pertain to compliance with either state or federal cultural resources laws, such as Section 106 of the NHPA.

2006

New York State Historic Preservation Office. 2006. New York State Historic Preservation Office Guidelines for Wind Farm Development Cultural Resources Survey Work. March 8. Accessed December 5, 2016. <http://www.nysparks.com/shpo/environmental-review/documents/CulturalResourceSurveyGuideWindProjects.pdf>.

- **Contents:** This document provides guidelines for the development of wind farms in the state of New York. The document primarily refers to onshore development. It provides suggestions for the establishment of an APE and brief methodology for architectural and archaeological survey.

- **Accessibility:** Follow the link provided in the above reference. This document can be found on the SHPO website under the “Environmental Review” heading.
- **Pros and Cons:**
 - **Pros:** The information provides a basis for determining what types of surveys may be needed for the onshore portion of a project area.
 - **Cons:** The guidance does not specifically indicate that it is for onshore wind development; however, since it references methodology for terrestrial archaeology, the assumption can be made that the guidelines are not for offshore projects.
- **Relevance to project requirements:** The information contained as part of these guidelines can be used as a suggestion for a preliminary OSA when evaluating cultural resources, especially if onshore components of a project will be present. The APE of approximately 5 miles for onshore wind farms was established, although taller offshore wind turbines could constitute a larger APE.

No date (n.d.)

*Google Earth – Shipwrecks. n.d. Accessed November 30, 2016.

- **Contents:** Google Earth provides several built-in geospatial layers that can be accessed through its primary database. Among these layers is one entitled “Oceans.” This layer contains shipwrecks – many with a source noted as Shipwrecks Central. The layer is publicly available. INSERT URL
- **Accessibility:** This data layer can be viewed in Google Earth by turning on the “Shipwrecks” layer under the “Ocean” tab.
- **Pros and Cons:**
 - **Pros:** This layer is an easy way to view known shipwrecks that have been identified by divers or documentary resources. The data box that accompanies each location provides general information about how the ship was wrecked, as well as information about the ship itself.
 - **Cons:** The downside of this viewer is that the level of detail varies, and the source of information may or may not be reliable. The viewer also is sensitive to how one zooms in and out within an area. The shipwreck icon may appear to disappear and reappear depending on how close one zooms in and out.
- **Relevance to project requirements:** This data layer can be used as a first level of review for the potential occurrence of underwater archaeological remains. As the layer is geographically based, one can measure distances from shipwrecks to shore or other known points and quickly see their distribution.

3.10.2.2 *Tribal Nation Reports, Inventories, Geospatial Layers, and Consultation Guidelines*

2016

National Conference of State Legislatures. 2016. Federal and State Recognized Tribes. Electronic Resource. Accessed December 5, 2016 <http://www.ncsl.org/research/state-tribal-institute/list-of-federal-and-state-recognized-tribes.aspx#State>.

- **Contents:** This website provides a listing of federally and state-recognized tribes. It is sorted by state and includes a brief definition of each type of recognition and is typically regularly updated.
- **Accessibility:** Follow the link provided in the above reference.
- **Pros and Cons:**
 - **Pros:** This listing provides information on each state through October 2016 and is anticipated to be regularly updated.
 - **Cons:** As with any source of tribal information, additional resources should be checked because the listing can change often. While this listing is a recognized source of information, the listing should always be double-checked against multiple sources as it provides only the recognition type, but not necessarily the ancestral territory.
- **Relevance to project requirements:** This listing provides a good starting point for determining the names of tribes that may have a potential interest in a particular project area. The identification of tribes would pertain to compliance with Section 106 of the NHPA, state regulations, or other government-to-government consultation needs.

National Park Service (NPS). 2016. State Submerged Resources. New York. Accessed December 5, 2016 <https://www.nps.gov/archeology/sites/statesubmerged/newyork.htm>

- **Contents:** This short article identifies the basic elements of New York State's submerged archaeological program. It includes a discussion of the maritime heritage, the types of sites that are underwater, the custodians of the resources, the permits that are needed to study underwater resources, and the presence of underwater parks within the state.
- **Accessibility:** Follow the link provided in the above reference. This article can be viewed as part of the National Park Service Archaeology Program.
- **Pros and Cons:**
 - **Pros:** This article provides a short and easy-to-understand overview of what is needed if there is potential for finding underwater archaeological resources.
 - **Cons:** The article is limited to information that is compiled from other sources. While the date of the website page is shown as 2016, the actual date of the information is not known.
- **Relevance to project requirements:** This article provides important background information regarding how to learn more about underwater archaeological sites in the state of New York. It provides a listing of agencies that are responsible for the preservation of underwater resources,

and thereby, a list of agencies that should be consulted if there is a potential to disturb these types of resources.

*New York State Historic Preservation Office (SHPO) and Indian Nations of New York State. 2016. Indian Nation Areas of Interest. Map. Published November 2016. Accessed December 5, 2016 <http://www.nysparks.com/shpo/environmental-review/documents/IndianNationAreasofInterest.pdf>.

- **Contents:** This map provides information regarding the locations of federally and state-recognized tribes in the state of New York. The map identifies areas, by tribal organization, that may be of interest for the purposes of tribal consultation.
- **Accessibility:** Follow the link provided in the above reference. This document can be found on the SHPO website under the Environmental Review heading.
- **Pros and Cons:**
 - **Pros:** The information presented in the map was compiled in conjunction with the Delaware Tribe, the Haudenosaunee Standing Committee on Burial Rules and Regulations, the Oneida Indian Nation, and the Stockbridge-Munsee Community Band of Mohican Indians. Thus, the map accounts for both SHPO opinions on ancestral locations, as well as some of the tribes themselves.
 - **Cons:** The information presented in the map is limited to New York State; tribes that are not located within the State of New York also may request consultation.
- **Relevance to project requirements:** This map can be used to identify the location of potential tribes that may have an interest in projects to be sited within the planning area. This information may be indicative of traditional use areas that could be affected by nearby development. Consultation with tribes may be needed as result of state and/or federal regulations.

Wikgren, Brooke. March 2, 2016. Federally Recognized Tribal Locations. Northeast United States. March 2. Accessed December 5, 2016 <http://www.northeastoceandata.org/data/data-download/> [download database under the “Culture” heading].

- **Contents:** This layer provides information regarding the locations of federally recognized tribes in the Northeast. It was created for the Northeast Ocean Planning Baseline Assessment by Brooke Wikgren of the New England Aquarium. Metadata are provided here: <http://www.northeastoceandata.org/files/metadata/Themes/Culture/FedRecTribalLocations.pdf>.
- **Accessibility:** Follow the link provided in the above reference to download layer. It can also be viewed in the interactive map provided on the Northeast Ocean Data Portal. (<http://www.northeastoceandata.org/data-explorer/?culture>).
- **Pros and Cons:**
 - **Pros:** These data represents the best available from the EPA Region 1 Tribal Program, which the author retrieved December 17, 2015. While the status of tribes is not likely to change, the data should be checked with the EPA Region 1 Tribal Program for confirmation.
 - **Cons:** These data show only the general locations of federally recognized tribes. Other tribes, e.g., state-recognized tribes, that may be important parties to a development would not be identified through the use of this information.

- **Relevance to project requirements:** This layer can be used to identify the location of potential tribes that may have an interest in projects sited within the planning area. This information may be indicative of traditional use areas that could be affected by nearby development. Consultation with tribes may be needed as result of state and/or federal regulations.

2015

Ball, David et al. 2015. A Guidance Document for Characterizing Tribal Cultural Landscapes. OCS Study BOEM 2015-047. November 30. Accessed December 5, 2016 <https://www.boem.gov/2015-047/>.

- **Contents:** This document provides guidance for federal agencies to consult with tribes. The focus is on federally recognized tribes, as this is a requirement of federal agencies, but the application of the information can be used for other tribes as well. The guidance also focuses on understanding cultural landscapes, which often blur the boundary between cultural and natural.
- **Accessibility:** Follow the link provided in the above reference. This report can be accessed via BOEM's Renewable Energy Research Completed Studies – under the heading of Cultural and Archaeological Resources.
- **Pros and Cons:**
 - **Pros:** This report provides one approach to understanding tribal cultural landscapes. The document provides a solid base for understanding what types of tribal resources an offshore wind farm could adversely affect, either culturally or visually. A helpful part of this document is the inclusion of a glossary, which is very useful to non-cultural resource practitioners who may be involved in the development of offshore projects.
 - **Cons:** The limit of this document is that it conveys the best case scenarios for consultation. It does not help practitioners address unique cases, such as when multiple interests are present that may be in conflict.
- **Relevance to project requirements:** As explained in this document, new guidance from the NPS indicates their understanding of cultural resources is no longer limited to historic “properties” (i.e., sites listed or eligible for listing on the NRHP), but now includes “places,” a more fitting category for cultural landscapes. This allows a more holistic approach to evaluating cultural resources because it does not limit them to sites with specific boundaries. Although landscapes do not have specific boundaries, they are often important cultural resources, especially to tribes. Cultural landscapes with views of the ocean will be an important consideration when siting and developing offshore wind farms.

The Whitener Group, Mid-Atlantic Regional Council on the Ocean (MARCO), Rutgers University, Virginia Coastal Zone Management Program, and the Nature Conservancy. 2015. Tribal Headquarters. Mid-Atlantic Regional Council on the Ocean Data Portal. Accessed November 30, 2016 <http://portal.midatlanticocean.org/data-catalog/administrative/>.

- **Contents:** This geospatial layer provides information about existing tribal headquarters. The data are represented by point locations.

- **Accessibility:** Follow the link provided in the above reference to download the layer. It can also be viewed in the Mid-Atlantic Regional Council on the Ocean Data Portal interactive viewer, called “Marine Planner.” <http://portal.midatlanticocean.org/visualize/#x=-73.24&y=38.93&z=7&logo=true&controls=true&basemap=Ocean&tab=data&legends=false&layers=true>. Search for the “tribal headquarters” layer and make active.
- **Pros and Cons:**
 - **Pros:** These data provide information graphically that helps to orient viewers to the locations of tribes.
 - **Cons:** The data for the planning area is represented only by two points. The names of the tribes are provided as labels, thereby providing limited information.
- **Relevance to project requirements:** The tribal headquarters layer can be used to identify the location of tribes that may have an interest in projects to be sited within the planning area. This information may be indicative of traditional use areas that could be affected by nearby development. Consultation with tribes may be needed as result of state and/or federal regulations.

2014

Herter, Jeffrey. 2014. Shinnecock Nation Offshore Use Areas - NY, Atlantic Ocean. New York Department of State, Office of Planning and Development, Research & Development Project Manager. Accessed November 30, 2016.
<http://opdgig.dos.ny.gov/geoportal/catalog/search/resource/detailsnoheader.page?uuid={C6A8BD4D-2F5B-4C4A-AD4B-6167B48A21B0}>.

- **Contents:** This data includes offshore areas important to the Shinnecock Nation, which is a federally recognized tribe with land located on Long Island.
- **Accessibility:** Follow the link provided in the above reference to download layer. This layer can be also be viewed in the interactive viewer provided at the New York Geographic Information Gateway (<http://opdgig.dos.ny.gov/>).
- **Pros and Cons:**
 - **Pros:** These data provide information on the location of the Shinnecock Nation.
 - **Cons:** The data is not updated frequently and is limited to the Shinnecock Nation. However, this is useful because this federally recognized tribe is located near the planning area.
- **Relevance to project requirements:** The Shinnecock Nation Offshore Use Areas include portions of Shinnecock Bay and the Hampton Bays near the OSA. This tribe may have an interest in offshore wind developments that have the potential to affect traditional use areas, and consultation may be required by state and/or federal regulations.

2013

Bureau of Indian Affairs. 2013. Coastal Tribal Lands. Accessed December 12, 2016.
<http://marinecadastre.gov/data/>.

- **Contents:** This dataset includes location information, selected demographics, and other associated data for American Indian Reservations Alaska Native Villages Federally Recognized Tribal Entities (FPublic Domain Allotments and off-reservation trust lands. Metadata are provided here: <http://opdgig.dos.ny.gov/geoportal/catalog/search/resource/detailsnoheader.page?uuid={6562D66F-B620-4EF3-B1C9-CF162BFAE6A2}>).
- **Accessibility:** Follow the link provided in the above reference to download the layer. It can also be viewed in interactive web-based viewers hosted on the following sites by turning on the “Coastal Tribal Lands” layer: Marine Cadastre National Viewer (<http://marinecadastre.gov/nationalviewer/>); New York Geographic Information Gateway interactive viewer (<http://opdgig.dos.ny.gov/#/map>); Northeast Ocean Data Portal Data Explorer (<http://www.northeastoceandata.org/data-explorer/>)
- **Pros and Cons:**
 - **Pros:** The dataset provides an overview of where tribal lands are located. This information can be used to determine which tribes may have an interest within the planning area.
 - **Cons:** The dataset is not a complete collection of tribal lands, and some of the locations are not considered to be exact. The presence and location of the tribal lands was derived from multiple sources in order to compile this layer.
- **Relevance to project requirements:** This data can be used when beginning research to determine where tribal lands may be and which tribes may have an interest in the project location. As it does not provide precise locations, it should be used only as a guide for locating tribal lands. These lands should be confirmed as part of the consultation process, which would occur as a result of Section 106 of the NHPA or other state/federal regulations.

3.11 Fisheries Socioeconomic Data

3.11.1 Summary of Best Available Data

Working with state fisheries divisions and NOAA Fisheries, commercial fishing data can be collected on general landings by fishery or gear type on monthly or annual basis. Data can be further separated by landing port and may be able to be quantified on shorter temporal scales, such as weekly, depending on the type of information available. However, NOAA Fisheries data is generally classified by large offshore statistical blocks, making it difficult to determine exactly where landings were caught. Available information includes the types of gear used (this example includes Lobster Pots, Whelk Pots, Fish Pots, Crab Pots, and Eel Pots), average number of fishers using that gear classification, average amount of gear per fisher, and average total amount of gear. All data is generally broken down on a per year basis. Additionally, when there are less than 3 fishers per area/gear type the detailed information is considered confidential and would require working in partnership with NYSDEC or other agencies to get permission from the fishers to share the information.

Recreational fishing data is not well captured throughout the state and region. Traditional methods for collecting recreational fishing data include dockside, mail, and telephone surveys of anglers and charter/party boat owners. In 2011 NOAA Fisheries began a National Saltwater Angler Registry which created a database of U.S. recreational fishermen gathered from state-based saltwater fishing license and registration information. However, despite these programs fine-scaled details on areas used for recreational fishing, recreational fishing community demographics, and recreational fishery landings and economics are limited.

Additionally, because both commercial and recreational fishers often travel beyond state boundaries to reach prime fishing areas, coordination is needed from multiple states throughout the Northeast and Mid-Atlantic. Fishers utilizing waters off of New York waters are likely coming from and landing their catch in ports from Massachusetts to North Carolina, if not further.

3.11.2 Data Catalog

This data catalog is organized chronologically, starting with the most recently published references first. References that are mentioned in Section 3.10.1, “Summary of Best Available Data,” are denoted by asterisks next to their bibliographic citations. Following the citation is a brief summary of the reference’s content, accessibility, and utility.

No key search terms were used during preparation of this section.

*NOAA Office of Science and Technology. Includes recreational and commercial fisheries statistics, socioeconomic studies, stock assessments, and other fisheries-related data.

<https://www.st.nmfs.noaa.gov/index>. Accessed December 21, 2016.

- **Contents:** NOAA Office of Science and Technology provides an extensive catalog of data and reports such as downloadable landings data by state, species, and/or year, cooperative research programs, fisheries economics, and local community profiles.
- **Accessibility:** From the link above tabs on various data sectors can be accessed from tabs along the left panel, including but not limited to: recreational fisheries statistics, commercial fisheries statistics, cooperative research, stock assessments, economics, and human dimensions.
- **Pros and Cons:**
 - **Pros:** Multiple types of data and reports can be quickly downloaded in multiple formats.
 - **Cons:** Data can be difficult to obtain outside of the “standard” queries. Contact information for NOAA staff to assist with data queries is difficult to obtain.
- **Relevance to project requirements:** Socioeconomic data on commercial and recreational fisheries.

MARCO Data Portal. Compilation of ocean planning data resources for the Mid-Atlantic region. <http://portal.midatlanticocean.org/ocean-stories/every-map-tells-a-story/>. Accessed December 21, 2016.

- **Contents:** Examples of available data:
 - Fish biomass from multiple sources
 - Benthic habitat data
 - Essential fish habitat data
 - Artificial reef locations
 - Commercial fishing Vessel Monitoring System (VMS) data by species and speed (low speed generally indicative of active fishing)
 - Commercial fishing Vessel Trip Report (VTR) data by gear category (trawl, gillnet, etc.)
 - Recreational fishing data from party/charter boat surveys
 - Recreational boater survey data
 - Human Use Data Synthesis information, such as heat maps of use intensity of fishing data
- **Accessibility:** Using the link above, click on “Data” tab at top for detail on data catalog and resources. Click on “marine planner” for interactive mapping tool.
- **Pros and Cons:**
 - **Pros:** Extensive catalog of data, user-friendly interface, much of the data can be downloaded as shapefiles with metadata, maps can be created in portal and saved and shared, Portal team easy to contact and responsive to questions
 - **Cons:** Not all data shapefiles can be downloaded, some data is relatively low-resolution (large area blocks), only one layer in a data category can be activated at a time in marine planner, points of contact for individual data layers can be difficult to obtain.
- **Relevance to project requirements:** Primary resources for compiled/mapped VMS/VTR data since these maps were created by Rutgers and other partners directly for the Data Portal.

*New York Geographic Information Gateway. State-based compilation of coastal spatial data and mapping resources. <http://opdgig.dos.ny.gov/#/map>. Accessed December 21, 2016.

- **Contents:** Some data overlap with other resources above, but also includes additional data including but not limited to NY-specific commercial fisheries data.
- **Accessibility:** Above link leads to interactive mapping program which can be used to visualize New York-specific spatial data.
- **Pros and Cons:**
 - **Pros:** Catalog of NY spatial data from multiple sectors and sources.
 - **Cons:** Much of the data is the same as in the MARCO data portal and interface not as user-friendly
- **Relevance to project requirements:** Contains New York commercial fishery data compiled from NYSDEC and NOAA fisheries data.

NYSDEC Division of Marine Resources. Manages marine fisheries, shellfisheries, and marine habitat for the state of New York. <http://www.dec.ny.gov/about/796.html>. Accessed December 21, 2016

- **Contents:** Limited information available publicly, mainly summary data about the division.
- **Accessibility:** Link above only includes general summary information and does not include downloadable data or reports or individual contact information. Detailed information and data must be obtained through known contacts within the division.
- **Pros and Cons:**
 - **Pros:** Extensive local fisheries knowledge. Good working relationship with Ecology & Environment staff.
 - **Cons:** Need to know individual points of contact for data area and request specific data/information.
- **Relevance to project requirements:** Primary resource for state fisheries data, recommendations for points of contact in regional and federal fisheries agencies, as well as the recreational and commercial fishing industries.

Cornell Cooperative Extension Commercial Fisherman Ocean Usage Mapping. New York State Department of State (NYS DOS) funded a project by Cornell Cooperative Extension to map ocean uses by commercial fishers. <http://ccesuffolk.org/marine/fisheries/new-york-ocean-usage-mapping>. Accessed December 21, 2016.

- **Contents:** Report on commercial fisher usage of New York Offshore Study Area.
- **Accessibility:** Final report accessible through link above.
- **Pros and Cons:**
 - **Pros:** Detailed compilation of commercial data for coastal New York
 - **Cons:** Report date unclear, but data seems to be through 2010 or 2012.
- **Relevance to project requirements:** Summation of commercial fishing data for New York region.

Stone Environmental Report on Spatial Characterization of Marine Fisheries to Support Coastal and Marine Planning in New York. Report prepared for NYSDOS in 2010 on marine species abundance in New York. http://docs.dos.ny.gov/communitieswaterfronts/ocean_docs/Stone_Report_Groundfish.pdf. Accessed December 21, 2016.

- **Contents:** Report contains limited text and primarily contains temporal figures of abundance data separated by year and species.
- **Accessibility:** PDF of report is available through link above.
- **Pros and Cons:**
 - **Pros:** Multiple figures of temporal species abundance data.
 - **Cons:** Limited text in report, therefore details on goals, methods, and outcomes are unclear. Follow up is needed with NYSDOS or Stone Environmental for more information.

- **Relevance to project requirements:** Contains species abundance data, but more detailed and user-friendly resources are likely available.

4 Data Gaps and Recommendations

4.1 Identified Data Gaps

After cataloging and analyzing the existing data that are available to federal and state agencies and private entities in support of offshore wind development, subject matter experts identified data gaps and recommendations for future survey and research efforts. Information that was not available during the data collection effort (see Chapter 3) became the basis for the gap analysis. These data gaps are summarized in Table 4-1 and ranked as high, medium, or low priority. Following the methodology discussed in Chapter 2, the following factors were considered during the ranking process:

- Estimated importance of the topic to offshore wind energy siting and development
- Urgency of the need (e.g., in relation to the current status of development or to allow for the fulfillment of other unmet research needs)
- Potential application (e.g., how useful the resulting data will be for siting, permitting, or detecting change between pre- and post-construction)
- Expected longevity of the resulting data (e.g., how quickly the data are expected to become “out of date” and irrelevant for future decision-making)
- Whether the need would be more appropriately addressed by the state of New York rather than a federal agency or private developers
- Whether the data could be addressed in the near-term (less than 6 months) or long-term (after 6 months)

The table includes a brief description of the project development requirements each data gap would fulfill. In addition, each gap is categorized as missing information that would facilitate either identification or assessment of areas with high wind energy development potential in the Offshore Study Area. Generally, identification-level data gaps consist of broad-scale missing information, while assessment-level data gaps consist of data that is finer scale. Once a potential wind development area is located, a more thorough assessment will be conducted to investigate its suitability. Certain research needs cannot be adequately assessed without a specific project proposal and as such were not included in the list.

Table 4-1 Existing Data Gaps

Data Gap (Priority level)	Gap Description	Project Development Requirement	Identification or Assessment Level Gap^(a)
Regional Bathymetry (Medium)	Existing bathymetry, depth, and elevation data is typically portrayed in contours in large intervals. Finer-scale data will be necessary for project development requirements. Hydrographic data is very sparse and typically close to shore.	BOEM guidelines indicate seafloor surveys shall be conducted to ensure the project is sited to avoid or minimize potential impacts associated with seafloor instability or other hazards.	Assessment level
Sediments and Substrates Within OSA (Medium)	Existing sediment and substrate data is generalized. Data typically collected from points and spatial models are used to create maps through interpolation, resulting in uncertainty in interpolated regions.	BOEM guidelines indicate that a project should avoid locating facilities near sensitive seafloor habitats. Projects also need to minimize scour and sediment suspension and resuspension.	Assessment level
Benthic Habitats (High)	Most existing studies focus on large-scale distribution or modeled information and so are suboptimal for siting potential offshore wind farms. OSA-specific data on benthic communities is lacking.	BOEM guidelines indicate that a project should avoid locating facilities near sensitive seafloor habitats, including seagrass habitats and coral reefs.	Identification level
Water Quality and Metocean Conditions Data (Low)	Water-quality data specific to the OSA is lacking and will be needed for several project development requirements, but surveys could be conducted at the individual project level.	Understanding offshore water-quality conditions will assist in construction schedule planning and the application for permits from the United States Army Corps, the United States Coast Guard, and the New York State Department of Environmental Conservation.	Assessment level
Primary Productivity (Medium)	Existing studies look at primary productivity along entire US east coast- finer scale regional level studies will be necessary	Understanding how primary productivity could have relevance to higher trophic levels and help identify sensitive habitats	Assessment level
Deep Sea Corals (Low)	Existing data based on modeled deep sea coral habitat rather than in situ surveys.	BOEM guidelines indicate that a project should avoid locating facilities near sensitive seafloor habitats, including deep sea coral reefs.	Assessment level
Ambient Noise Levels (Low)	Existing ambient noise data are based on models of certain types of offshore activities. Measurements of regional noise levels will be needed to verify modeled ambient noise levels.	These datasets would be useful for employing conservation measures that help to minimize adverse impacts on MMPA-protected species and for understanding the distribution of the ESA-listed marine mammals. These datasets would also inform the BOEM guidelines for minimizing disruption and disturbance of marine life from sound emissions.	Assessment level
Sea Turtle Distribution and Occurrence in OSA (Low)	Most existing studies focus on the large-scale distribution sea turtles; more regional-scale data will be needed to supplement the existing knowledge.	These datasets would help characterize the distribution of ESA-listed sea turtle species. These datasets would also inform the BOEM guidelines for minimizing disruption and disturbance of sea turtles.	Assessment level

Data Gap (Priority level)	Gap Description	Project Development Requirement	Identification or Assessment Level Gap^(a)
Seasonal Marine Mammal Occurrence in OSA (Medium)	Most existing studies focus on the large-scale distribution of marine mammals; more regional scale data will be needed to supplement the existing knowledge. Finer scale temporal information will also help inform project development.	These datasets would be useful for employing conservation measures that help to minimize adverse impacts on MMPA-protected species and for understanding the distribution of the ESA-listed marine mammals. These datasets would also inform the BOEM guidelines for avoiding and minimizing impacts and disruptions of marine mammals.	Assessment level
Avian Vulnerability Assessment (Medium)	Existing data on terrestrial birds migrating through the OSA, particularly nocturnal migrant passerines, is lacking for this region.	These datasets would be useful for employing conservation measures that help to minimize adverse impacts on MBTA-protected species and for understanding the distribution of the ESA-listed birds. These datasets would also inform the Avian Survey Plan as per the BOEM guidelines.	Assessment level
Roseate Tern Data (<i>Sterna dougallii</i>) (Low)	Existing occurrence data for the roseate tern, an ESA-listed bird, is lacking for the OSA. Occurrence data with temporal and spatial granularity will inform project development requirements.	These datasets would be useful for understanding the distribution of an ESA-listed bird species. These datasets would also inform the Avian Survey Plan required in the BOEM guidelines.	Assessment level
Seasonal Bat distribution and Occurrence in OSA (Medium)	Very little data for offshore bat distribution and occurrence currently exists	These datasets would be useful for understanding the distribution of an ESA-listed bat species and would help ensure the project minimizes impact to bats.	Assessment level
Fisheries Socioeconomic Data (High)	Consistent criticism of fisheries socioeconomic data includes underestimation of fisheries landings data, especially when related to specific small-scale areas, and the underestimation of use of areas by fishers. Additional data should be collected from fishers through stakeholder engagement efforts and existing data should be further analyzed in a manner that is more relevant to the area identification process.	These dataset would be useful for facilitating stakeholder outreach and would help ensure project minimizes impact to fisheries.	Identification level
Cumulative Impacts Assessment (Medium)	No data existing examining the potential cumulative impacts of offshore wind development in New York in regards to ongoing or planned development	This information would be useful for understanding the cumulative impacts of offshore wind development in New York and avoid and minimize impacts to sensitive species and habitats	Identification level
Phase 1A Cultural Resource Assessment (Medium)	Mapping of cultural resources is non-uniform and incomplete	These dataset would be useful for understanding the presence of cultural resources in the OSA and ensure siting would avoid and minimize impacts to cultural resources	Identification level

Data Gap (Priority level)	Gap Description	Project Development Requirement	Identification or Assessment Level Gap^(a)
Preliminary Onshore Site Assessment (Medium)	Fine-scale, site-specific data of onshore resources will be necessary to assess the potential impacts of cable landings	These dataset would allow for the identification of sensitive terrestrial components and facilitate the siting of cable landings	Identification level

Note: a) Refers to whether the missing data would help identify or assess areas with high wind energy development potential in the New York Offshore Wind Master Plan OSA.

4.2 Recommended Surveys and Research Efforts

To address the identified data gaps, subject matter experts have suggested several future surveys and studies that could feasibly be conducted on the scale of the Offshore Study Area and in the time available as part of the area identification process for the Master Plan. While these recommendations are not always directly correlated to the areas designated as a “high” priority in the table above, they are studies and surveys that are feasibly accomplished, considering time and scale. Other studies and surveys could still be executed once the Master Plan is published at the end of 2017. These studies and surveys are described below. Specific details regarding the potential survey methods, such as proposed timelines, equipment specifications, and definitive spatial scales, have not been addressed at this stage. It is assumed this document will serve as a starting point for the development of a more thorough, executable survey plan to be incorporated in a future planning efforts for the Offshore Study Area.

Geophysical/Hydrographic Survey

In order to comply with BOEM guidelines and facilitate the safe and efficient installation of offshore wind turbines, finer-scale bathymetry and hydrographic data will be required for assessment of potential wind areas, and hydrographic data may help understand navigation concerns and assist in adhering to USACE permits. In addition, seafloor topographic data can sometimes be used to predict the distribution of marine wildlife. Two types of technology are typically employed to identify depth and seafloor features: side-scan sonar and multi-beam sonar. These technologies rely on sound waves to image the seafloor and determine depth and are typically deployed from survey vessels. Some vessels may also use single-beam echo sounders as an alternative technology. In addition, the new LIDAR remote-sensing technology uses laser beams to measure the distance to objects and generate images of the seafloor and is typically deployed via aircraft. LIDAR is more accurate than sonar, but also more expensive. These data will be a longer-term data need (i.e. not within six months) and are considered less urgent.

Sediment Profile Survey

In order to comply with BOEM guidelines to avoid locating facilities near sensitive seafloor habitats and minimize scour and sediment suspension and resuspension, finer-scale sediment data will be required for assessment of potential wind areas. Two types of technology are typically employed to characterize surficial sediments: vibracoring and sediment profile imaging (SPI). Other methods, including piston coring, box coring, and rotary core boring, are also available although less common. Vibracoring uses a vibrating mechanism to reduce friction while inserting a collection tube into the substrate. Vibracoring is typically cost-efficient for large numbers of sediment samples and preserves the core characteristics effectively, with little distortion. SPI uses a special camera inserted into the substrate to capture high-resolution cross-sectional images of the upper 20 centimeters (cm) of the seafloor, which are converted to maps of physical, geochemical, and ecological features. The imaging technology can also detect epibenthic and infaunal organisms to determine abundance and characterize benthic community composition (see discussion below). SPI can survey a large area quickly and is considered a minimally invasive technology. These data will be a longer-term data need (i.e. not within six months) and are considered less urgent. However, because benthic habitat is considered a more urgent data need and requires similar surveys, these data may be acquired in the near-term regardless (see below for discussion of surveys to address benthic habitat data gaps).

Water Quality and Metocean Conditions Studies

Water quality data specific to the OSA will be necessary for several project development requirements and will be necessary for assessment of potential wind areas (see Table 4-1, “Existing Data Gaps”). Water quality and metocean conditions data for local or regional areas is typically acquired by deploying buoys with arrays of sensors to detect sea surface temperature (SST), salinity, wind speeds, and other oceanic conditions. Note that acoustic Doppler profilers and meteorological towers may also be used to measure parameters such as currents, wave heights, and wind speeds, though these devices are not currently proposed as part of the NYSERDA study. These data will be a longer-term data need (i.e. not within six months) and are considered less urgent.

Assessment of Relationships Among Environmental Processes, Primary Productivity, and Upper Trophic Level Species Distribution

Primary productivity data and its relationship to higher trophic levels would help identify potential wind areas. To perform this study, GIS models can analyze historical satellite imagery to identify the timing and location of high primary productivity and relate the results to environmental covariate and upper

trophic level data, such as historical fisheries data. Furthermore, groups like the Duke University GIS team have developed models that account for additional factors such as bathymetry, environmental data (e.g. sea surface temperature), and other indicators of primary productivity fronts along the entire east coast. These models could be refined for the offshore waters in the New York region. While these data are not required for offshore wind area identification, they would provide valuable information and could be generated within a short time scale (i.e. within six months).

Benthic Substrate and Habitat Surveys

In order to comply with BOEM guidelines to avoid locating facilities near sensitive seafloor habitats, including seagrass habitats and coral reefs, finer-scale benthic habitat data are required for the OSA. This urgent data need is required for potential wind area identification and could be addressed in the near term (i.e. within the next six months). Three types of technology are typically employed to characterize benthic substrate and habitat: remotely operated vehicle (ROV) video surveys, benthic grabs, and SPI. Drop cameras are also commonly used as a cost-effective alternative to ROV in areas where currents are not too strong or unpredictable. ROV video surveys use high-resolution video cameras to capture images of the epibenthic seafloor to determine percent coverage for marine vegetation and organisms and to characterize the general composition of benthic communities (primarily epibenthic). Grab-sampling involves collecting specimens from specific points along a determined survey route. Grab-sampling can be adjusted to capture epibenthic and infaunal organisms to determine abundance and characterize the composition of both these communities, however, data collection is limited to the discrete, pre-determined points such that interpolation would be required for large surveys areas. As described under the recommended Sediment Profile Survey, SPI technology can also be used to characterize benthic communities. SPI can survey a large area quickly, is considered a minimally invasive technology, would be an effective tool in helping to identify potential wind areas, and could be generated within a short time scale (i.e. within six months).

Ambient Underwater Noise Survey

An ambient noise study would be a useful, but not mandatory, dataset in to order comply with the BOEM guidelines to minimize disruption and disturbance of marine life from sound emissions and to ensure adverse impacts on MMPA-protected and certain ESA-protected species are minimized or avoided. To determine if impacts from specified noise-generating activities, such as pile-driving, are occurring, it is sometimes necessary to understand the pre-existing ambient noise conditions. Passive acoustic monitoring (PAM) systems use hydrophones to record sounds in the environment, either continuously or

on a sampling cycle. The systems can be deployed from either mobile or stationary platforms and can record up to several months depending on the battery life and sampling cycle of devices. For ambient noise, stationary platforms are preferred over mobile ones to eliminate vessel noise. By analyzing ambient noise in the PAM recordings, experts can identify noise-generating activities in specific areas and characterize each noise type's properties (e.g., frequency). The size of the PAM array can vary based on the needs of the study. There are existing efforts to characterize ambient noise levels in the area and efforts should be made to coordinate with those programs. The systems would be most useful for assessing potential wind areas once they have been identified and are a longer-term consideration however is a tool available for near-term deployment and could be considered for identification level efforts (i.e. in the next six months).

PAM systems could also be configured to detect marine mammals in order to supplement ongoing visual surveys for marine mammals. Acoustic surveys can detect animals missed by visual surveys when an animal vocalizes but does not surface (or rise to shallow enough water to be seen). Acoustic-detection methods are able to identify marine mammals to species level and localize the position of the vocalizing animals if an array of three or more hydrophones are deployed simultaneously.

Marine Mammal and Sea Turtle Targeted Boat Surveys

To supplement ongoing surveys for marine mammals and sea turtles, additional targeted boat surveys may be necessary for assessment of potential wind areas. The needs and scale of the studies depend on the results of the ongoing Normandeau Associates, Inc. aerial survey, collaborative NOAA Fisheries, BOEM, and USFWS surveys, and Duke MDET Team models. Once these studies are complete, any remaining data gaps will need to be identified. Most likely, the remaining gaps will be spatially localized and able to be addressed through targeted boat surveys. During these surveys, observers can catalog marine mammal and sea turtle sightings, which can supplement the existing data. It should be noted that the New York State Department of Environmental Conservation, in collaboration with the New York Natural Heritage Program, National Oceanic and Atmospheric Administration (NOAA) and Northeast Fisheries Science Center (NEFSC), has developed a New York Bight Whale Monitoring Program that will coordinate two surveys in the New York Bight, an aerial and passive acoustic survey. The purpose of the study is to determine the distribution and estimate relative abundance/density of each of six species of large whales in the New York Bight, record data about the behaviors of sighted whales, and record sightings of marine sea turtles. The results from this study will need to be considered before any further marine mammal surveys are undertaken to avoid duplicating effort. Consequently, these data are a longer-term data need (i.e. not within six months) and are considered less urgent.

Fine-scale Bird Surveys

Targeted vessel-based visual surveys of migratory birds would help characterize terrestrial and marine bird use of specific sites within the OSA during daylight hours, providing data that are currently lacking. These data would help assess previously identified potential wind areas. Other types of surveys are needed to document nocturnal migrating birds (especially passerines), particularly during spring and fall migration periods. Nocturnal migrant birds may be at an increased risk of collision with offshore turbines because their vision is impaired by darkness. Radar and thermal imaging surveys, using deployed instruments such as a buoy or from vessels, are effective methods of evaluating nocturnal activity and identifying potential areas of concern for constructing offshore wind turbines.

Targeted surveys of the endangered roseate tern's use of the OSA may benefit offshore wind energy planning. Roseate terns breed at a few locations in eastern Long Island and nearshore islands. In Long Island, roseate terns more often forage in shallow nearshore waters but may also forage in pelagic waters, which would put them at risk of collisions with turbines if constructed in their foraging areas. For this reason, radio-tagging and tracking roseate terns may provide valuable information about the species' use of the OSA and help define potential areas to avoid. The USGS is conducting an ongoing study radio-tagging and tracking Roseate Terns from Faulkner Island, located north of Long Island. The OSA for the USGS study does not completely cover the areas under consideration for offshore wind in New York, but may serve as a good starting place for any further tagging studies. Studies should be coordinated in order to avoid duplication of efforts. These data are a longer-term data need (i.e. not within six months) and are considered less urgent.

Offshore Bat Distribution and Occurrence Surveys

To supplement ongoing surveys for bats, additional surveys of bat distribution and occurrence may be necessary for identification of potential wind areas. The needs and scale of the studies depend on the results of the ongoing Normandeau Associates, Inc. aerial survey, collaborative NOAA Fisheries, BOEM, and USFWS surveys, and Duke MDET Team models. Once these studies are complete, any remaining data gaps will need to be identified. Most likely, the remaining gaps will be spatially localized and able to be addressed through targeted surveys using visual, acoustic, and thermal imaging detection methods. During these surveys, observers can catalog bat sightings, which can supplement the existing data. As the need for supplemental bat surveys is dependent on the ongoing Normandeau, et al. surveys, to avoid duplicating efforts, NYSERDA should not initiate any surveys until the ongoing ones are complete.

Consequently, these data are a longer-term data need (i.e. not within six months) and are considered less urgent.

Visual Resource Assessment

To estimate the visual effect of offshore wind farms on cultural resources (both onshore and offshore), it is important to demonstrate the visibility of wind turbines in offshore areas considered for development under a range of lighting and visibility scenarios. Priority areas for study would be offshore areas closest to shore. Studies should create realistic photomontages by graphically inserting digitally simulated turbines into photographs of the relevant areas of the Offshore Study Area. These studies would help identify potential wind areas and can be conducted in the near-term (i.e. next six months) for any areas already under consideration.

Fisheries Economic Data

The criticism of fisheries socioeconomic data is a long-standing issue in fisheries management. Stakeholder engagement is likely to be the best method to improve this data. Lessons can be learned from other wind energy planning efforts in Rhode Island, Massachusetts, Virginia, and Europe. Discussions with agencies and the commercial fishers themselves to capture additional data and perform new analysis of existing data will help advance the identification of future wind energy areas. Ultimately, a relationship of trust must be established with the commercial and recreational fishing communities to foster a partnership that allows for improved data sharing in a way that allows fishers to keep sensitive fishing area and economic data confidential. Collection and analysis of these data will be necessary in order to identify potential wind areas. These data are urgently needed and studies should be conducted in the short-term (i.e. within six months).

Cumulative Impacts Assessment

Understanding cumulative impacts is an important data gap. An impacts assessment study should be conducted, which would include review of each resource, a summary of impacts, and overall rating of impacts as negligible, minor or greater, or beneficial. The analysis should consider resource level impacts and identify types of environmental or socioeconomic impacts associated with development activities. Furthermore, the analysis should identify and consider general development trends in the area and relevant public scoping comments. Ultimately, the study should analyze each resource area to: 1) identify the number and type of overlapping activities, 2) briefly summarize the project impacts, 3) analyze the activity impacts by type qualitatively and/or quantitatively, 4) conclude whether the activities and the

project present a cumulative impact, and 5) assess the project's incremental contribution to the total cumulative impacts. This assessment would be an important step towards understanding the impacts of offshore wind in the OSA and surrounding environment, and could be completed in the short term (i.e. in the next six months).

Phase 1A Cultural Resource Assessment

There are a variety of cultural resources in the OSA, but mapping of the resources is non-uniform with certain resources well represented in available data repositories while others are absent. A desktop assessment should be conducted to determine the scope of available and missing data, which include both state and federal consultation. In general, this desktop study would identify shipwrecks and other obstructions in the future wind energy areas. The proposed study would involve conducting high-level background research to examine existing work including shipwreck databases, unexploded ordnance data bases, NOAA and navigation charts in order to compile a complete overview of available regional data. The study should also provide a geological analysis of the presence, extent, and depth of paleo landforms. This assessment would be an important step towards the nature and cultural resources present in the OSA and surrounding environment, and could be completed in the short term (i.e. in the next six months).

Preliminary Onshore Site Assessment

Offshore wind projects ultimately make landfall; therefore, data that informs understanding of sensitive terrestrial resources will be necessary to complete the Offshore Wind Master Plan. A desktop assessment of onshore resources should be conducted to determine the scope of available and missing data, and include both state and federal consultation. This scoping would inform the development of a desktop critical issues analysis (CIA) of substations, horizontal directional drilling locations, upland corridors, potential port facilities, and any other upland facilities. The desktop study would also incorporate existing critical issues, such as known piping plover habitat or contaminated areas. As a follow up to the desktop analysis, additional data collection should include site visits in order to ground-truth the findings of the CIA report. The follow-up data collection should also include any surveys that are season-dependent, such as initial wetlands screening, threatened and endangered species review, etc, which need to occur at specific times of year when the flora and fauna are present in the environment. This assessment would be an important step towards understanding the upland environment which would potentially be impacted by offshore wind projects in the OSA, and could be completed in the short term (i.e. in the next six months).

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