New York State Area for Consideration for the Potential Locating of Offshore Wind Energy Areas

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This document is the result of work undertaken by the New York State Energy Research and Development Authority (NYSERDA), the New York Department of State (DOS), and the New York Department of Environmental Conservation (DEC). The Area for Consideration presented in this document fulfills one of the key goals of the New York State Offshore Wind Master Plan.

The New York State Offshore Wind Master Plan, which will be completed by the end of 2017, is a joint effort between NYSERDA, DOS, DEC, the New York State Department of Labor, the New York State Department of Public Service, Empire State Development, Long Island Power Authority, New York Power Authority, and Office of Parks, Recreation, and Historic Preservation.

NOTICE

The State's submission of this document is intended to provide information for BOEM to initiate BOEM's Area Identification and assessment process to locate new WEAs offshore New York. No State or Federal agency or entity has committed to any specific course of action with respect to the development of such future wind projects. Neither this submission, nor the studies associated with it commits any governmental entity to any specific course of action. In the event BOEM conducts an auction and awards a future lease at a new WEA, that lease will be required to meet all additional State and Federal permit or license approvals prior to proceeding with the development of an offshore wind project. The site identifications contained in this document are not a substitute review or a pre-determination of the outcome for any State or Federal law, including but not limited to the Coastal Zone Management, and other possible State or Federal permits or licenses that will be required upon any successful award of a new Wind Energy Area lease.

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ACRONYMS AND ABBREVIATIONS

AIS	Automatic Identification System
BOEM	U.S. Bureau of Ocean Energy Management
COD	Commercial Operations Date
COP	Construction and Operations Plan
EFH	Essential Fish Habitat
ESA	Endangered Species Act
FAA	Federal Aviation Administration
GW	gigawatt
HDD	horizontal directional drilling
HVAC	high-voltage alternating current
Km	kilometer
LCOE	levelized cost of energy
m	meter
Master Plan	Offshore Wind Master Plan
MBES	multibeam echosounder
MW	megawatt
NEXRAD	next-generation radar
nm	nautical mile
NOAA	the National Oceanic and Atmospheric Administration
NREL	National Renewable Energy Laboratory
NRHP	National Register of Historic Places
NYSERDA	New York State Energy Research and Development Authority
OCS	outer continental shelf
OSA	Offshore Study Area
SPI/PV	sediment profile imaging with plan view
TCP	Traditional Cultural Property
TDWR	terminal Doppler weather radar
TSS	Traffic Separation Scheme
USCG	United States Coast Guard
WEA	Wind Energy Area
WTG	Wind Turbine Generator

The State's offshore wind energy goal is to develop 2,400 megawatts (MW) —enough to power up to 1.2 million homes—by 2030.

EXECUTIVE SUMMARY

The State of New York identifies in this document an area in the Atlantic Ocean south of Long Island that, based on the State's extensive and thorough compilation and analysis of scientific, stakeholder, and analytical data, is the most desirable for future offshore wind development. The State requests that the Bureau of Ocean Energy Management (BOEM) consider this area and then expeditiously initiate the necessary steps to lease new Wind Energy Areas (WEAs) therein.

The State's offshore wind energy goal is to develop 2,400 megawatts (MW)—enough to power up to 1.2 million homes—by 2030. Utilizing New York's offshore wind energy resource will provide renewable, locally produced, resilient, and low-cost energy; stimulate the State, regional, and national economies; and help create a new American industry employing tens of thousands of workers.

As a framework for this effort, the State is preparing an Offshore Wind Master Plan to ensure New York's offshore wind resources are developed responsibly and cost-effectively. To support the Master Plan, the State has conducted more than 20 studies to gather data on environmental, social, economic, regulatory, and infrastructure issues relevant to offshore wind development. Collectively, these studies inform the State's assessment of the most efficient and least impactful means to achieve our goals. The State has conducted studies on marine wildlife, the ocean floor and benthic environment, birds and bats, environmental sensitivity and risk analysis, fish and fisheries, marine mammals and sea turtles, metocean (wind, waves, and current), sand and gravel, aviation and radar, grid connection, health and safety, shipping and navigation, marine archaeology and cultural resources, onshore permitting constraints, marine recreational uses, visual impacts, pipelines and cables, ports and supply chain, jobs and economic benefits, vessels, and project cost projections.

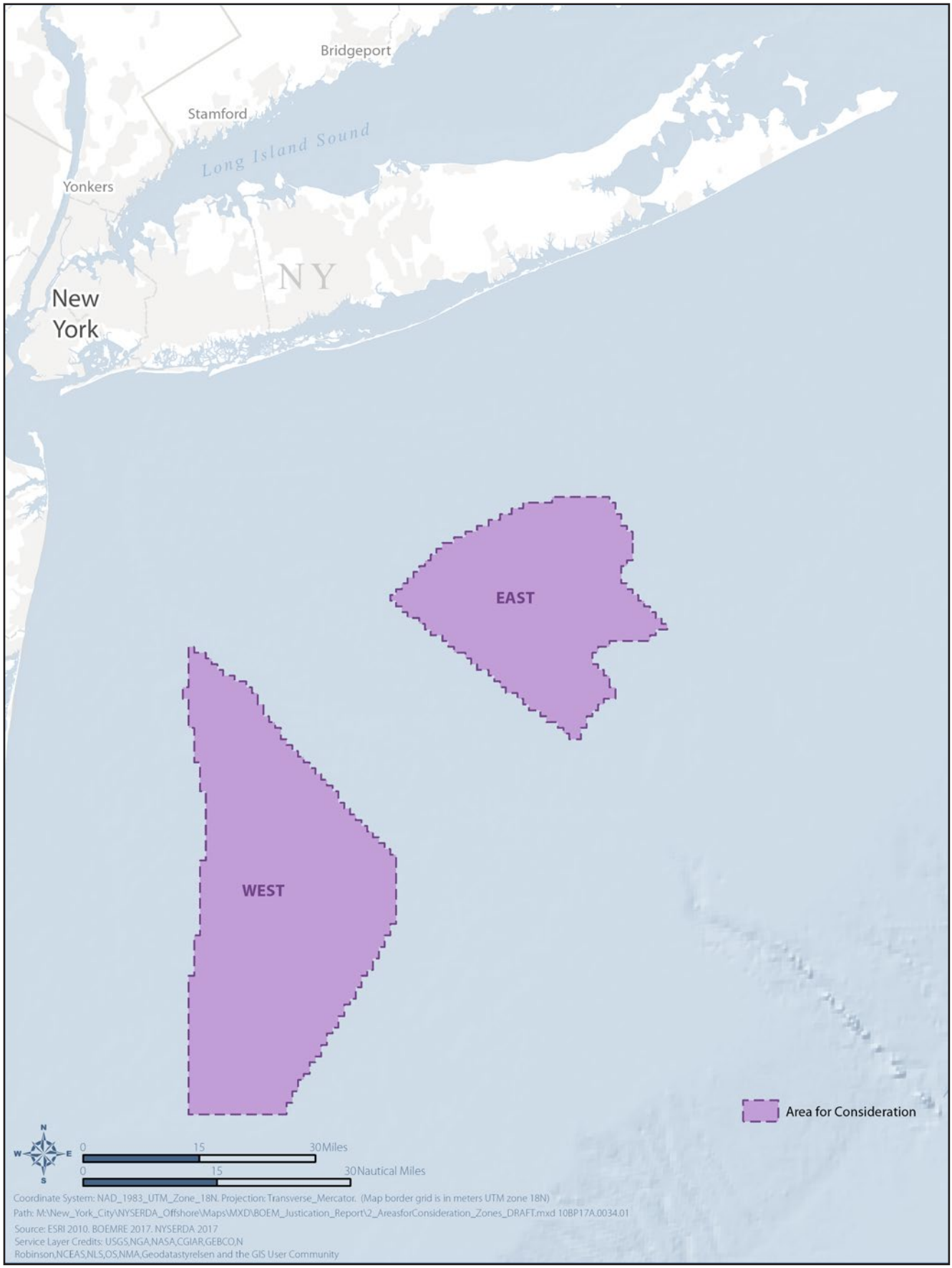
The State has also conducted extensive public outreach pursuant to a formal Stakeholder Engagement Plan. In addition to hosting six widely publicized public information sessions throughout the region, the State identified and regularly consulted with a wide range of stakeholders, including coastal, maritime, and fishing communities; labor and business organizations; private industry; governmental entities and elected officials; non-governmental organizations, including environmental groups; and ratepayer advocates. Drafts of all studies were provided to multiple and diverse stakeholders, and the State considered the concerns and input provided by all stakeholders throughout the planning process. These studies, together with public and stakeholder input, give the State unparalleled insight into how present-day conditions and potential concerns can best be balanced when advancing potential future offshore wind development in this region.

Upon consideration and robust analysis of the collective body of information assembled, the State has identified the Area for Consideration shown on Figure ES-1 as the most desirable area for future offshore wind development. The Area for Consideration presents the fewest conflicts with ocean users, natural resources, infrastructure, and wildlife, and has the greatest potential for the cost-effective development of offshore wind energy to meet the State's goals.

The State's Area for Consideration for BOEM's Area Identification process and the locating of new WEAs is comprised of two areas south of Long Island. The East Area is located between the Ambrose-to-Nantucket Safety Fairway to the north and Hudson Shelf Valley to the south, measures 389,280 acres, and is 26.5 statute miles from land at its closest point. The West Area is located between the Hudson Shelf Valley to the northeast and the Barnegat-to-Ambrose Traffic Lane to the west, measures 672,522 acres, and is 21.1 statute miles from land at its closest point. Together, these two areas measure 1,061,802 acres.

To achieve the offshore wind goals established for New York, the State respectfully requests that BOEM expeditiously consider this submission, and then delineate and lease at least four new WEAs within the Area for Consideration, each capable of siting at least 800MW of offshore wind.

Figure ES-1. Area for Consideration.



1.0 INTRODUCTION

1.1 OVERVIEW

Developing a domestic offshore wind industry would offer significant economic and environmental benefits and enhance the nation's security. The State seeks to continue its collaboration with the U.S. Bureau of Ocean Energy Management (BOEM) to develop the vast, untapped wind resources off New York's coastline. To further this collaboration, the State has gathered extensive data and engaged in significant community consultations to promote offshore wind development and ensure that the resource is advanced as responsibly and cost-effectively as possible.

New York has ideal conditions for the development of offshore wind energy given the State's unique combination of abundant, shallow offshore acreage and high wind speeds. In January of 2017, Governor Andrew M. Cuomo committed New York State to developing 2,400 megawatts (MW) of offshore wind by 2030, enough to power up to 1.2 million homes. The development of this resource would provide reliable, abundant, low-cost energy to New York City and Long Island and would further the goal of the United States and New York to introduce home-grown, renewable, low-carbon sources of energy to the grid. In addition, it would diversify and grow the New York State and national economies by stimulating the development of an emerging industry and creating tens of thousands of new skilled jobs. Finally, the development of these offshore wind resources is vital if New York is to meet its commitment under the Clean Energy Standard, which requires that, by 2030, half of the State's electricity come from renewable energy sources such as offshore wind.

The identification and leasing of offshore areas for energy production falls within BOEM's jurisdiction. This document represents the State's perspective on the siting of wind development offshore New York, and provides data that may assist BOEM in its consideration of options for developing the State's offshore wind resources. More specifically, in this document the State summarizes the information it has gathered during its Offshore Wind Master Plan (Master Plan) study process, which is described below, and identifies the offshore areas that, according to the best available data, appear to hold the most promise for responsible offshore wind development. These areas pose the fewest potential conflicts with existing infrastructure, shipping lanes, fishing interests, marine mammals and other wildlife, as well as other studied relevant uses and conditions, while holding the most promise for development and supporting the growth of this new industry.

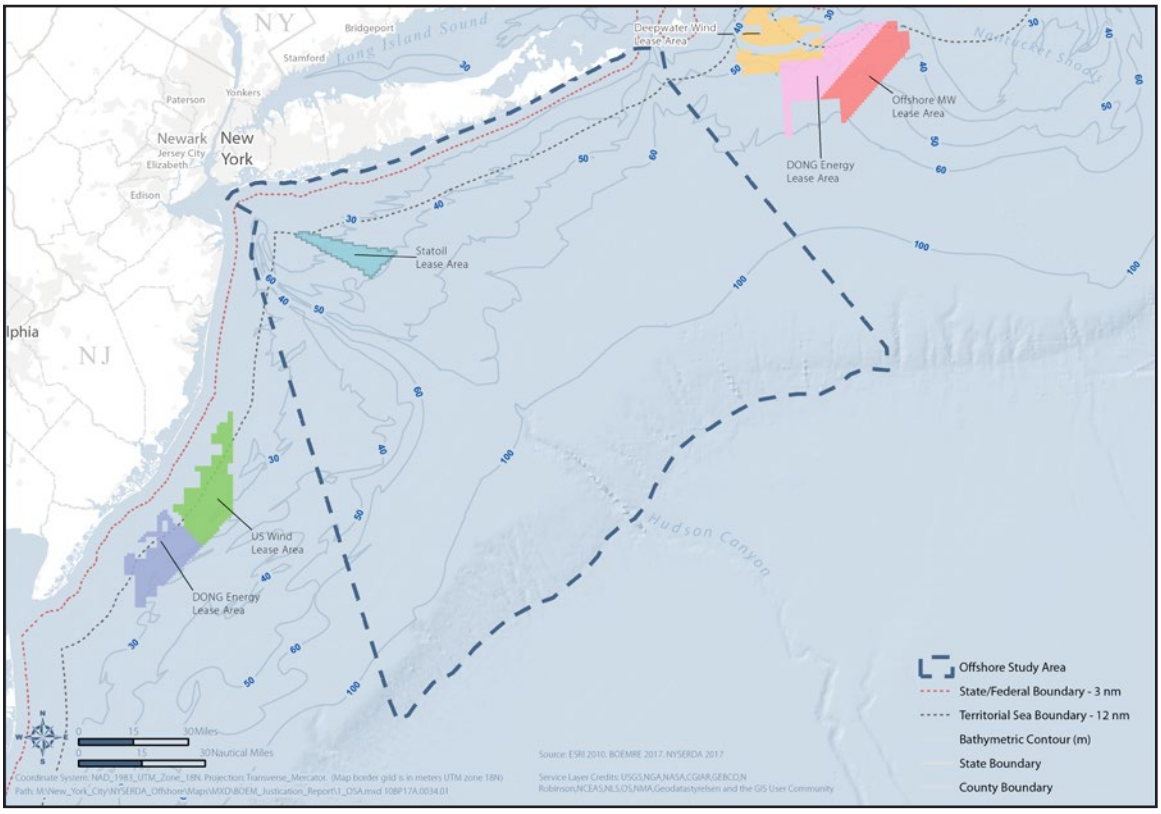
The State of New York appreciates BOEM's critical role in this endeavor. The State respectfully requests that BOEM, using the extensive information provided in this document as part of its analysis, and after due consideration and in compliance with applicable requirements, expeditiously delineate and lease at least four new Wind Energy Areas (WEAs) offshore New York.

1.2 NEW YORK STATE OFFSHORE WIND MASTER PLAN

The objectives of the State's Master Plan are to (1) identify areas for BOEM to consider for future offshore wind development off New York's Atlantic Coast, (2) recommend measures that could be implemented with future offshore projects to mitigate potential impacts, and (3) offer ways to purchase offshore wind energy to ensure the lowest costs to ratepayers. The Master Plan will be issued by the end of 2017.

The Master Plan is a joint effort of the New York State Energy Research and Development Authority (NYSERDA), the New York State Department of Environmental Conservation, the Department of Labor, the Department of State, the Department of Public Service, Empire State Development, the Long Island Power Authority, the New York Power Authority, and the Office of Parks, Recreation and Historic Preservation. In support of its Master Plan, the State conducted over 20 studies that assessed a 16,740-square-mile area of the ocean and adjacent areas, from the south shore of Long Island and New York City to the continental shelf break (the "offshore study area (OSA)"). The goal of these studies was to obtain information related to a variety of environmental, social, economic, regulatory, and infrastructure-related issues implicated in planning for future offshore wind energy development. Figure 1 shows a map of this area[1], and Table 1 provides a list of the studies conducted and their general categorization. Further discussion of the studies contributing to the identified Area for Consideration is provided in Section 2.

Figure 1. Offshore Study Area.



1 The Offshore Study Area matches the NYS Department of State's "Offshore Planning Area" in the 2013 "New York Department of State Offshore Atlantic Study," http://docs.dos.ny.gov/communitieswaterfronts/ocean_docs/NYSDOS_Offshore_Atlantic_Ocean_Study.pdf

Table 1. Studies and Surveys Conducted for the Offshore Wind Master Plan

Aviation and Radar	Marine Archaeology and Cultural Resources	Ports and Supply Chain
Birds and Bats	Marine Mammals and Sea Turtles	Project Cost Projections
Environmental Sensitivity and Permitting Risk Analysis	Marine Recreational Uses	Sand and Gravel Resources
Fish and Fisheries	Marine Wildlife Survey	Seafloor and Benthic Survey
Grid Connection	Metocean (Wind, Waves and Current) Characterization	Shipping and Navigation
Health and Safety	Onshore Permitting Constraints	Vessels
Jobs and Economic Benefits	Pipelines, Cable and Third-Party Infrastructure	Visual Simulation

Stakeholder engagement has been a critical component of the Offshore Wind Master Plan process. This engagement contributed to a more-balanced evaluation of potential offshore WEAs and the potential effects of future offshore wind development. The State engaged with the following stakeholder groups, beginning in the fall of 2016:

- State and Federal Agencies
- Elected Officials
- Long Island and New York City Communities
- Labor and Business Organizations
- Commercial and Recreational Fishing Interests
- Maritime Communities
- Non-Governmental Organizations
- Offshore Wind Energy Industry
- Submarine Cable and Offshore Infrastructure Industry

The State also met with the federally recognized indigenous nations in New York State, as well as the Unkechaug Indian Nation on Long Island.

To facilitate stakeholder engagement, the State held six public information meetings related to the Master Plan:

- July 10, 2017: Long Island Association, Melville, New York
- July 11, 2017: Long Beach Public Library, Long Beach, New York
- July 12, 2017: Southampton Inn, Southampton, New York
- August 14, 2017: Queens Library at Peninsula, Rockaway Beach, New York
- August 15, 2017: New York Public Library, St. George Library Center, Staten Island, New York
- August 16, 2017: New York Aquarium, Brooklyn, New York

The State solicited and considered comments from a wide variety of stakeholders for every draft study. Details of the stakeholder engagement process are provided in Appendix A.

1.3 PUBLIC POLICY CONTEXT

The 2015 New York State Energy Plan advanced a new strategy, known as Reforming the Energy Vision, or REV, to build a clean, resilient, and affordable energy system. REV aims to transform New York State energy policy by creating a marketplace centered on clean, locally produced power. In furtherance of these initiatives, the State developed a Clean Energy Standard mandating that 50 percent of the State's energy come from renewable sources by 2030.

Offshore wind is an important renewable energy resource for New York State to achieve its State Energy Plan targets and Clean Energy Standard mandate. According to the National Renewable Energy Laboratory, New York State has 39 gigawatts (GW) of potential offshore wind power between 12 and 50 nautical miles (nm) from its shores and in waters less than 200 feet deep.

In 2017, New York committed to developing 2,400 MW of offshore wind by 2030 and directed NYSERDA to oversee completion of the Master Plan. The predevelopment initiatives undertaken as part of the Master Plan's development—including in-field resource assessments, baseline environment studies, and area characterization—will reduce overall project and ratepayer costs for New York offshore wind. The data from this predevelopment work will be disseminated to the market in order to reduce project risks and overall development costs and increase interest and competition to develop New York offshore wind at the lowest possible price. Through this policy framework, the State is working to ensure that offshore wind energy will become a major source of affordable, renewable power for New York State, especially for Long Island and New York City.

1.4 REQUEST FOR WIND ENERGY AREAS

A critical element of meeting New York's clean energy and offshore wind policy objectives most cost-effectively and responsibly is the existence of sufficient supply of offshore WEAs suitable to meet New York's energy demand. As shown on Figure 1, there is currently only one leased WEA offshore of New York that can contribute to New York State's offshore wind energy goals. This WEA was leased by Statoil Wind US in 2016. WEAs associated with other nearby states, shown on Figure 1, also may be able to deliver offshore wind power to New York; however, these areas are likely to primarily support the renewable energy goals of those other Northeastern or Mid-Atlantic states, and the costs associated with long-distance transmission to New York can increase overall costs substantially. While it is clear that offshore wind is very much a regional resource for which a single WEA may meet the demands of multiple states, it is also critical that new WEAs be identified and leased offshore of New York State to ensure an adequate supply of areas to meet New York's demand at the least cost.

Therefore, New York requests that BOEM undertake its own process to expeditiously identify and lease at least four new WEAs offshore of New York within the Area for Consideration described below, each capable of supporting at least 800 MW of offshore wind. In making this request, the State will work with BOEM to review leasing actions in as coordinated and efficient a manner as possible, pursuant to the State's Coastal Zone Management Act authority and other regulatory reviews. New WEAs would allow multiple developers to compete in New York's offshore wind procurements, which would drive down ratepayer costs. Four new WEAs could also provide New York with ample capacity to meet its goal of 2,400 MW of offshore wind by 2030, even if some of the areas remained undeveloped, are only partially developed, or serve other markets in part or in whole.

Given New York's goals and the timelines involved in developing, permitting, and constructing offshore wind projects, New York further requests that four new WEAs be identified and leased as soon as possible, without sacrificing the necessary federal and State assessments and public input required. Having all four areas simultaneously available would also help maximize free market competition in the State's offshore wind procurements.

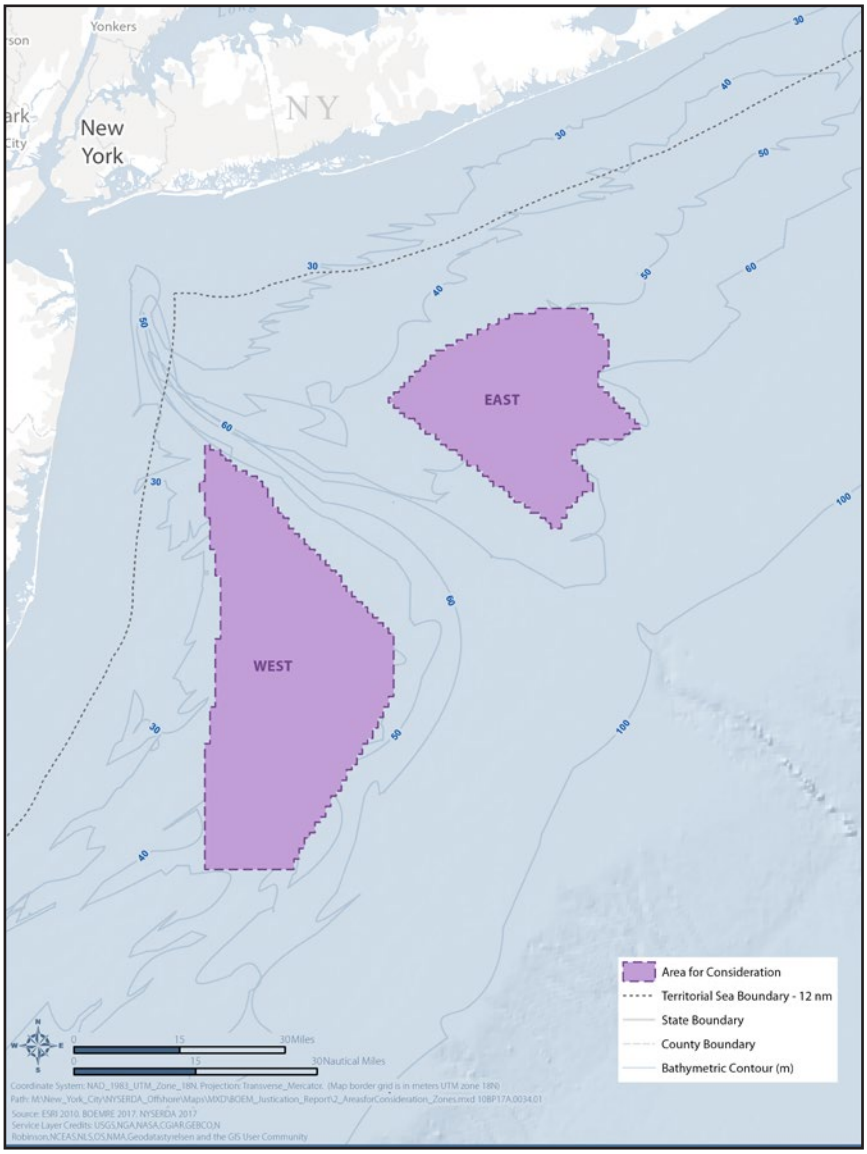
Based on the analysis, fieldwork, and stakeholder outreach conducted for the Master Plan, New York has developed an Area for Consideration for BOEM to consider in its Area Identification process and the locating of new WEAs off New York's Atlantic Coast.

2.0 AREA FOR CONSIDERATION

2.1 AREA FOR CONSIDERATION FOR BOEM'S AREA IDENTIFICATION PROCESS AND THE LOCATING OF NEW WIND ENERGY AREAS

The Area for Consideration for BOEM's Area Identification process and the locating of new WEAs is comprised of two areas south of Long Island. The East Area is located between the Ambrose-to-Nantucket Safety Fairway to the north and Hudson Shelf Valley to the south, measures 389,280 acres, and is 26.5 statute miles from land at its closest point. The West Area is located between the Hudson Shelf Valley to the northeast and the Barnegat-to-Ambrose Traffic Lane to the west, measures 672,522 acres, and is 21.1 statute miles from land at its closest point. Together, these two areas measure 1,061,802 acres. This Area for Consideration provides ample space for identifying enough Indicative Wind Energy Areas of adequate size (each 800 MW site requires approximately 80,000 acres) to allow BOEM to further refine areas based on stakeholder concerns while ensuring that 2,400 MW of projects will be developed. Figure 2 shows a map of the Area for Consideration.

Figure 2. Area for Consideration.

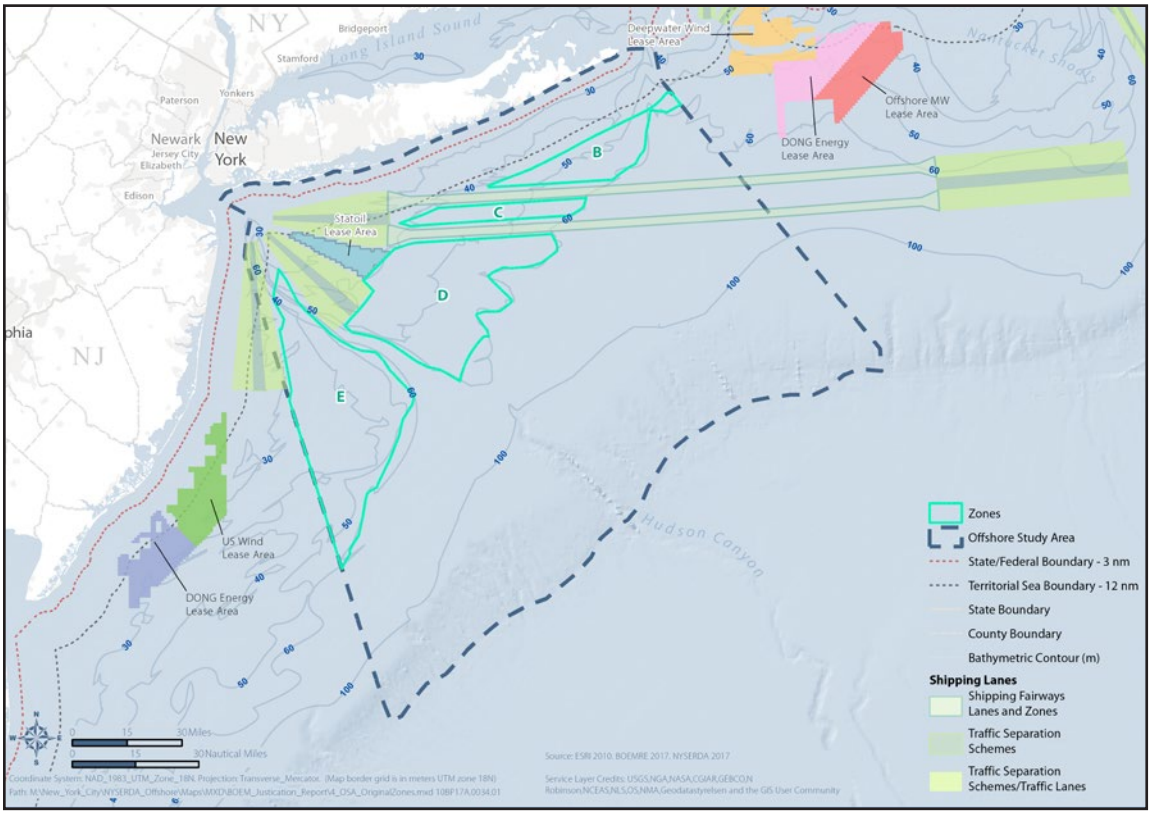


Appendix B includes the blocks and partial blocks within official Protraction Diagram NK18-12 and NJ18-03 for the Area for Consideration. The East and West Areas include 1,027 and 1,868 aliquots respectively, totaling 2,895 aliquots.

2.2 AREA FOR CONSIDERATION SELECTION PROCESS

Spatial Data Assembly Process. New York State Agencies and Authorities (Collectively the "State"[2]) used a multi-layered approach to determine its Area for Consideration for BOEM's Area Identification process and the potential locating of new WEAs. Initially the State identified basic constraints to offshore wind energy development within the OSA, which included navigation and shipping traffic separation schemes (TSS) and fairways, a distance from shore of 17.3 statute miles (15nm), a maximum technical depth of 60 meters, and any Department of Defense precluded areas within the OSA. This resulted in the identification of four Zones as shown in Figure 3, identified from east to west as B, C, D and E (Zone A comprises the area that is now the Statoil Lease Area). The State developed topical studies and held direct consultations with ocean users and advocates to identify potential infrastructure and physical constraints, potential environmental constraints, and potential human use constraints.

Figure 3. Zones Considered for Potential Offshore Wind Development.



2 *Independent and group consultations were held with the following entities: New York State Energy Research and Development Authority, New York State Department of State, New York State Department of Environmental Conservation, New York State Department of Parks Recreation and Historic Preservation, New York State Department of Public Service, and Long Island Power Authority..*

The following topical studies covering the region formed the basis for considering relative potential risks associated with offshore wind energy development in and around the OSA:

- Aerial Baseline Survey of Marine Wildlife
- Aviation and Radar
- Benthic Environment: Sediment Profile Imaging and Multi-Beam Echo Sounder Survey
- Birds and Bats
- Environmental Sensitivity
- Fish and Fisheries
- Marine Archaeology and Cultural Resources
- Marine Mammals and Sea Turtles
- Marine Recreational Uses
- Pipelines, Cable, and Third-party Infrastructure
- Project Cost Projections
- Sand and Gravel Resources
- Shipping and Navigation
- Visual Simulation

Not all studies covered the full spatial extent of the OSA, while others extended beyond the OSA. Some studies assessed areas farther from shore (e.g., Archaeology and Cultural Heritage), and others did not assess as far offshore as the continental shelf (e.g., Geological and Physical Environment). A number of studies (e.g., Fisheries and Marine Mammals) assessed a broader region. All studies covered at least the area beginning 15nm from the coast and extending out to the 60-meter depth contour. Some studies also applied to onshore elements of offshore wind farm development, such as points of gird connection and port facilities.

The studies were developed by assembling and synthesizing existing data, modeling data in new ways, reviewing new unpublished data, and consulting with expert ocean users and advocates. Drafts of all studies were provided to multiple stakeholder reviewers (generally 8–20 separate entities) comprising a wide range of perspectives, including but not limited to: ocean users (e.g., commercial fishers, marine recreational users), indigenous nations, environmental non-governmental organizations, public advocacy non-governmental organizations, New York State regulators, Federal regulators, and compensated third-party peer reviewers. Additional consultations were held with elected officials, organized labor, environmental organizations, the fishing community, and other stakeholders to gather additional feedback relating to their interests and concerns. Comments from the draft studies were received in time to be considered in the spatial assessment of the OSA. Appendix A catalogs the full details of the stakeholder engagement activities associated with the Master Plan and considered in the identifying of the areas for offshore wind development.

Data Assessments for Determination of Area for Consideration.

Infrastructure and other physical constraints, potential environmental constraints, and human use of the OSA were assessed by conducting literature reviews, evaluating data, holding consultations with ocean users, and conducting surveys to assist the State in identifying an Area for Consideration. More details on the resources studied are provided in Section 7 of this submittal. This section provides an overview of the various potential constraints considered in identifying the Area for Consideration, as informed by the State's topical studies and consultations with ocean users. The goal was to identify an Area presenting the least potential for conflict with ocean users, natural resources, infrastructure, and wildlife and the lowest risk to the cost-effective development of offshore wind energy.

Based in part on feedback from stakeholders from the commercial fishing industry, an area adjacent to Zone E, extending west of the Zone boundary toward the Ambrose to Barnegat TSS, was considered as an area that may have a relatively low potential for adverse effects on commercial fishing, reducing the need for areas within the Zones with more potential for conflict. A review of data and additional study of this area agreed with information provided by stakeholders. Therefore, that area was added to Zone E for further consideration.

Some of the resources or activities were relatively consistent across the Zones (e.g., sediment structure, radar interference) and thus did not specifically indicate concerns with any specific Zone or area. Other activities or resources could generally coexist with offshore wind development (e.g., some marine recreational uses) or would best be addressed at the time of choosing the specific location of turbines in the area (e.g., archaeological features) and so were not drivers for identifying an area. Resources located outside of the Zones, but closer to shore (e.g., sand and gravel resources), were also not a driving factor in in identifying an area. Ultimately, the State considered in detail a more limited number of factors to identify the areas for submission to BOEM for consideration. Those factors and how they were considered are described in more detail below, in no particular order.

Potential Infrastructure and Other Physical Constraints

Shipping and navigation. Vessel traffic within the OSA was studied to evaluate and compare areas for relative conflict between shipping and navigation and offshore wind energy development. An Automatic Identification System (AIS) data analysis was conducted to determine the types and frequencies of vessels and identify typical routes. Best practices with respect to navigational safety from the U.S. Coast Guard and Europe were also reviewed to determine setbacks for shipping lanes.

To reduce the potential for conflicts with commercial shipping and navigation, logical extensions of TSS lanes between Zone D and Zone E and the TSS lanes west of Zone E where excluded from consideration. Additionally, a one (1) nautical mile navigation setback from the outer edges of all of the TSS's was excluded from consideration for additional maritime safety.

Pipelines, cables, and other third-party infrastructure. Existing submarine cables, pipelines, and other infrastructure (e.g., buoys) were identified and mapped to understand how they traversed the OSA and where they are concentrated. While processes and methods are available to cross new offshore wind power cables with existing cables, each crossing increases costs and the possibility of cable protection devices becoming snags for commercial fishing, since the standard method of cable protection at cable crossing locations is surface-laid concrete mattresses. As a result, avoidance of areas with a higher relative density of existing submarine cables makes both economic and practical sense. While all Zones have some level of cable crossings, some areas within Zones have a lower overall density.

Aviation and Radar. The Aviation and Radar study identified areas within the OSA where wind turbines may pose a potential conflict with civil and military aviation assets and radar systems. Through this study, aviation and military assets were inventoried, including locations of airports, radar systems, special-use airspace, and key routes used by the military for training and operational missions. While some exclusion areas were identified for both radar and military operations, they were not extensive. The degree of potential interference is fairly consistent across the OSA, particularly in areas where there is technical development potential. As a result, development of offshore wind energy at any location would require consultation and coordination with the appropriate authorities and was not a major consideration in identifying the Area for Consideration.

Grid Connection. Grid connection opportunities on the eastern half of Long Island are more limited than those on the middle and western end of Long Island and near New York City. As a result, areas on the eastern side of the OSA (Zone B) will require longer transmission lines for grid connection than those more centrally located within the OSA (Zone D). The southern extents of Zone E also require longer transmission lines. Longer transmissions lines increase both the project development cost and project footprint.

Potential Environmental Constraints

Marine mammals. Existing data were used to examine marine mammal use of the OSA and the relative potential sensitivities of species and species groups to potential offshore wind farm development. While marine mammals may occur throughout the OSA, the best available data indicate that marine mammal use is greatest along the continental shelf break and slope, Hudson Canyon, the Hudson Shelf Valley, and the areas closest to the coast where North Atlantic right whales, humpback whales, fin whales, and harbor seals use nearshore habitat. A high-use area for some baleen whales and harbor porpoises is in the northwestern corner of the OSA. Northern species, such as the harbor porpoise, tend to move further south into the OSA in cold months. The relative potential sensitivities of different groups of marine mammals to the three stages of offshore wind energy development were considered in the Environmental Sensitivities analysis described below.

Sea turtles. Existing data were used to examine sea turtle use in the OSA. Sea turtles tend to migrate northward into the OSA in summer, when waters are warmer. Loggerhead turtles are the most often observed species. Leatherbacks, though not very common, may be more common in the fall. Although density predictions place most loggerheads in the southeastern corner of the OSA, recent summer surveys of the OSA suggest they are also found across the continental shelf. These surveys also suggest green turtles are rare, and leatherbacks occur in small numbers across the shelf. Although density predictions place the highest density of Kemp's ridley turtles near the Hudson Canyon, they are more common closer to Long Island in coastal waters. The relative potential sensitivities of sea turtles to the three stages of offshore wind energy development (pre-construction/site assessment, construction and post-construction/operations) were considered in the Environmental Sensitivities analysis.

Birds and bats. A variety of existing data were used to examine bird and bat use in the OSA and the relative potential sensitivities of species and species groups to potential offshore wind farm-related impacts. While birds may occur anywhere in the OSA, data indicate that bird use is greatest in three core areas of the OSA: shallower waters along the northern and northwestern boundaries of the OSA, the Hudson Canyon and Hudson Shelf Valley, and the continental shelf break. Regularly occurring species are generally concentrated in one or more these core areas. No Endangered Species Act (ESA) or State-listed species regularly occur within the OSA; however, on-going studies of some of these species in offshore waters (BOEM 2017a) may provide future insight on these species' use of the OSA. There are insufficient data to identify higher use areas for bats in the OSA. However, based on the data available, bat occurrence in offshore waters generally appear to be relatively low and concentrated during migratory periods. The relative potential sensitivities of birds to the three stages of offshore wind energy development were considered in the Environmental sensitivities analysis.

Fish. Fish species, distributions, abundance, and essential fish habitat (EFH) in the OSA, along with their relative sensitivity to potential offshore wind development, were examined. This work was informed by data sources from State and Federal agencies, regional fisheries councils and commissions, academic institutions, and non-governmental organizations. The Study identified that the OSA lies within designated offshore EFH for 47 species in the Atlantic Ocean. Also occurring within the OSA are two fish species that are protected under the ESA, one species that is a candidate for listing, and one species that is proposed for listing under the ESA, and nine species listed by the National Oceanic and Atmospheric Administration Fisheries Service (NOAA Fisheries) as species of special concern.

Existing literature and case studies on potential risk and sensitivities of fish and fisheries to offshore wind development were reviewed and categorized into pre-construction, construction, and post-construction stages. These include potential risks such as sensory disturbances to fish, habitat impacts, and changes to local fishing practices. Fish biomass tends to be highest along the coast and shows a general increasing pattern moving across the OSA from the southwest to the northeast. EFH is fairly consistent over the OSA but shows an increase in the northeastern corner of the OSA. The relative sensitivities of fish species and EFH to the three stages of offshore wind energy development were considered in the Environmental Sensitivities analysis.

Environmental Sensitivity. Exclusion of areas heavily used by wildlife, or the use of which for offshore wind development could present a relatively high risk to wildlife based on existing data, was considered in identifying the Area for Consideration through a comprehensive environmental sensitivity weighting study. This study developed a weighting system and set of map products that allows for a comparative analysis of the potential risks to marine resources during pre-construction, construction, and operation of future offshore wind facilities. It examined seasonal differences in areas used by migratory species (as data allow) and considered potential environmental risk to marine resources. Differences among offshore wind activities, or stressors (e.g., new structures, pile driving), were captured in risk assessment matrices. The risk assessment matrices differentiate relative risks among stressors on key marine resources, or receptors, to provide a relative level of risk for each Zone. Receptors are groups of species that are expected to respond similarly to a stressor.

Fish, marine mammals and sea turtles, and birds were considered as part of the environmental sensitivity analysis. Based on the outputs of the analysis, the general trends in the data show wildlife tends to be relatively consistent across Zones, with some trend toward increasing concentrations to the northeast (Zone B). Additionally, marine wildlife also concentrates along the continental shelf break, within approximately 20 statute miles from the coast, along the Hudson Canyon and the Hudson Shelf Valley. To avoid relatively greater potential for wildlife impacts, any area within 20 statute miles of the coast was eliminated from inclusion in the Area for Consideration. Additionally, the edges of the Hudson Shelf Valley also presented a relatively higher potential for impacts. Based on the analysis, the State determined that a setback of 2.3 statute miles (2nm) from the Hudson Shelf Valley would avoid a majority of this risk. As such, these areas were removed from further consideration.

Benthic. Physical and biological characterization of the seafloor is critical for future offshore wind development in the OSA. While full characterization of any areas ultimately proposed for development would occur at the project development stage, improved reconnaissance-scale understanding of the seafloor characteristics in the OSA study area was undertaken to inform New York's Offshore Wind Master Plan process. During the summer of 2017, the State conducted a multibeam echosounder (MBES) and sediment profile imaging with plan view (SPI/PV) survey of the OSA. The overall objective of the benthic survey was to provide planning-level characterization of the geological (sediment size and type), geotechnical (density of bottom), and benthic (animal habitat) characteristics of potential offshore wind energy development areas. Based on the preliminary review of all MBES and SPI/PV survey results, all areas surveyed appear to be suitable for future offshore windfarm development with respect to surficial geology and benthic habitat resources. As such, seafloor characteristics were not a driving factor in identification of the Area for Consideration.

Potential Human Use Constraints

Fisheries. Commercial fishing is widespread throughout the OSA. Most of New York's commercial fishing fleet is located on the eastern side of the OSA and have home ports out of Montauk and Shinnecock. Vessels from these ports are generally smaller day boats that fish the eastern half of the OSA. Fishing intensity in this area is relatively high for both mobile and stationary gear. The eastern side of the OSA is also used by fishers from other states, including Rhode Island and Massachusetts, with catches made up of sea scallops, groundfish, and monkfish. The central portion of the OSA is the most heavily fished region in the OSA, especially for the mobile-gear fishery, such as the scallop fishery. Other fisheries in this zone include scup, black sea bass, summer flounder, monkfish, and long-fin squid.

The western portion of the OSA has the lowest relative use by both mobile and stationary gear, with limited fishing occurring in the farthest western portion, which was identified by fishers from various states as being the least fished area in the entire OSA. Based in part on feedback from the commercial fishing industry, the extension to Zone E was added for consideration as some within the industry stated that it presented the least potential for conflict. Additionally, the southern portion of Zone E includes the Mid-Atlantic Scallop Access Area, part of the scallop access rotational program. To reduce some of the potential for conflicts with

scallop fishing, this area within Zone E was removed from consideration. Finally, it is also generally believed that many of the fisheries targeted by the commercial fishing community are trending toward deeper waters farther offshore where cooler water temperatures can be found. As a result, nearer shore waters may present fewer conflicts in the future.

Marine Recreational Uses. A variety of marine recreational uses occur within the OSA and were studied in detail to understand how they may be impacted by future offshore wind development. Based on the geospatial data and literature review, five prevalent marine recreational use categories were identified: wildlife viewing (bird watching and whale watching), underwater activities, surface water activities, recreational boating, and cruise ship tourism. If sufficient data were available, each use category was assessed in terms of its spatial extent, frequency, seasonality, and relative demand. The wind farm activities with the greatest potential to result in impacts on marine recreational uses during the future development, construction, and operation of offshore wind energy facilities were identified through a review of environmental documentation of offshore wind farms in the U.S. and Europe. These include conflicts with wind farm vessel traffic during all three phases, displacement by construction activities, displacement by project, and public safety concerns. All risks to marine recreational uses were assessed to be low or moderate and did not present a substantive influence over identifying the Area for Consideration.

Archaeology and Cultural Heritage. Previous geophysical and geotechnical offshore surveys conducted along the Atlantic Outer Continental Shelf (OCS) have allowed researchers to pinpoint landforms that could have supported human habitation during the Paleo and Early Archaic Periods, when sea levels were much lower than today. These landforms may hold submerged resources associated with early indigenous hunting and gathering societies. To date, no areas or material remains associated with any indigenous societies have been identified within the OSA; however, future field studies would need to be performed by future offshore wind farm developers to determine whether remains are present. Submerged historic resources could include shipwrecks and their associated debris fields, planes, cable routes, and pipelines. Since the OSA overlays the historic maritime approaches to New York and New Jersey, additional unrecorded historical resources are likely to exist within the OSA, with the area nearest to shore being most sensitive. To date, the approximate locations of 135 shipwrecks have been identified within the OSA; nine historic submarine telecommunication cable routes that extended from Long Island to the Azores and Europe may also exist within the OSA.

A review was conducted of readily available historical maps, aerial photographs, and other public and private collections. Although archaeological and cultural resources potentially exist throughout the OSA, proper planning, surveying, and choosing the specific areas to locate each wind turbine can help ensure there is little to no impact on such resources during future offshore wind development in the OSA. As such, archaeology and cultural heritage did not present a substantive influence over identifying the Area for Consideration.

Cost. A variety of data were used to analyze the cost of constructing and operating offshore wind facilities within the OSA. Conditions such as water depth, wind speed, and distance to shore were used to model construction costs and project performance. Capital costs and operating costs were also based on industry data from existing European offshore wind facilities, as well as the Block Island Wind Farm project. Learning curves were developed for each cost component, reflecting an offshore wind supply chain that is expected to develop in the U.S. as the national industry grows in scale. A spatial analysis was prepared, calculating the relative cost of energy between locations within the OSA. Minimizing the cost of energy, and the resulting ratepayer impact, is a significant consideration in identifying WEAs. Analysis shows the northern end of Zone E would have the lowest overall cost of all of the Zones, followed by Zones C and D, which are nearly equal. As areas within the zones move farther from shore, the relative ranking of these three zones changes; however, the difference in cost between the three Zones C, D, and E is minimal (within 1% of each other). Zone B consistently presented a substantially higher cost (~10%) of development in comparison to other Zones.

Visual Impacts. Based on a Visual Impact study and consultations, it was determined that development of wind energy projects at a distance greater than 20 statute miles (17.4nm) from shore, rather than the initially considered 17.3 statute miles (15nm) used in the development of the Zones, would be most prudent. While even greater distances may significantly reduce the potential for visibility of turbines, setting a minimum distance of 20 miles is feasible for these sites, would not significantly impact cost or other important considerations, and would ensure no discernable or visible impacts on the casual viewer a vast majority of the time. As a result, the Area for Consideration was constrained to areas more than 20 statute miles from shore.

Determination of Area for Consideration

The resources and ocean uses described above are based upon the best currently available information. Upon consideration and discussion of all of these, the State determined that the Area for Consideration presents, on balance, the overall least potential conflict with ocean users, natural resources, infrastructure, and wildlife and the lowest relative risk to the responsible, cost-effective development of offshore wind energy. Specifically, the Area for Consideration consists of the northern and western portions of Zone E (including part of the extension) and a portion of Zone D. In addition to avoiding or balancing conflicts, these areas are spatially separated from the existing Statoil Lease Area, thereby minimizing the potential for turbine wake losses, and therefore energy losses, between the Statoil area and any new WEAs in the Area for Consideration. The Area of Consideration is able to provide energy to the areas along the coast with the highest load and is also well situated for development using the ports and facilities in New York and its skilled workforce.

3.0 INDICATIVE WIND ENERGY AREAS

The Area for Consideration provided for BOEM's potential use in its Area Identification process is larger than required for New York's request for at least four new WEAs offshore of New York. Four Indicative WEAs in four example configurations are depicted on Figures 4, 5, 6, and 7 within the Area for Consideration, each capable of supporting at least 800 MW of future offshore wind development. No individual figure represents a "best-case" scenario or priority preference for potential leasing with regard to siting.

Four Indicative WEA configurations were drawn with the goal of minimizing costs, providing flexibility in transmission to Long Island and New York City, maximizing the potential for competitive bids between eventual lease holders, and making use of areas that are less used by commercial fishing and other ocean users. The Indicative WEAs are provided for illustrative purposes and may be shifted, reshaped, or both within the Area for Consideration. New York recommends that BOEM use these Indicative WEAs or similar example areas to elicit public comment, particularly from maritime, fishing, environmental, and offshore wind industry stakeholders. The subsequent BOEM process may result in alternate layouts and further analysis to fully understand concerns from the diverse stakeholders.

Figure 4. Indicative Wind Energy Areas – Configuration A.

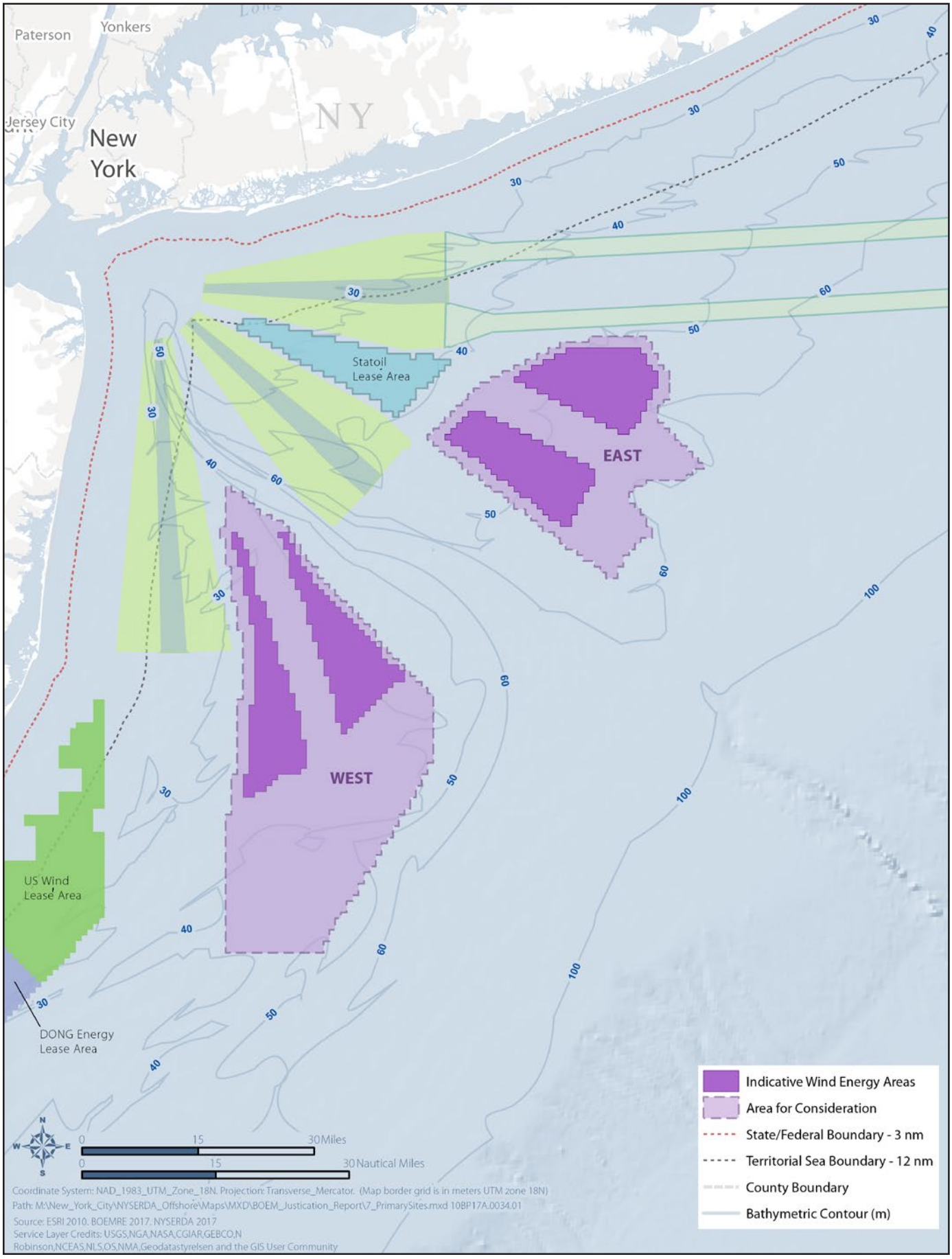


Figure 5. Indicative Wind Energy Areas – Configuration B.

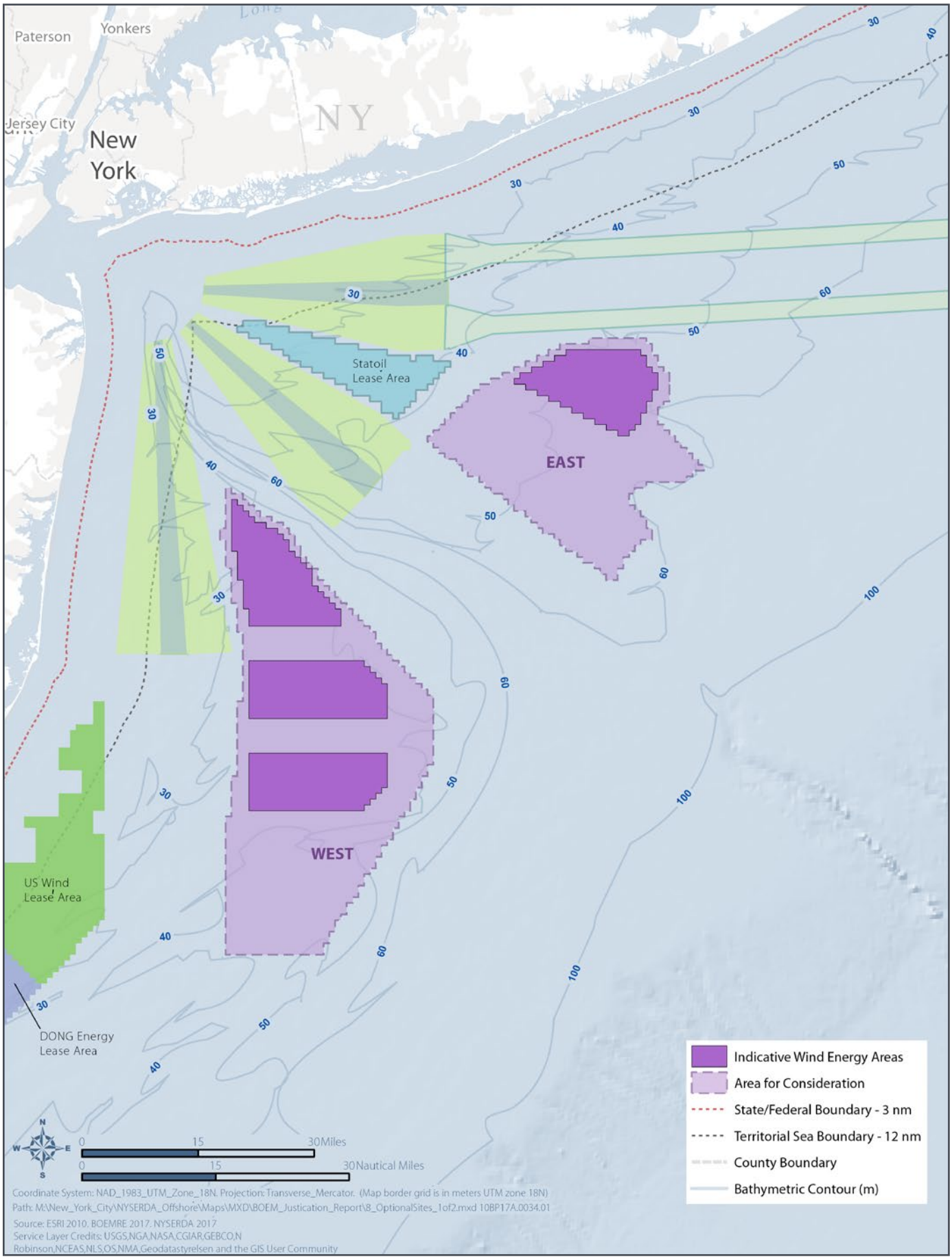


Figure 6. Indicative Wind Energy Areas – Configuration C.

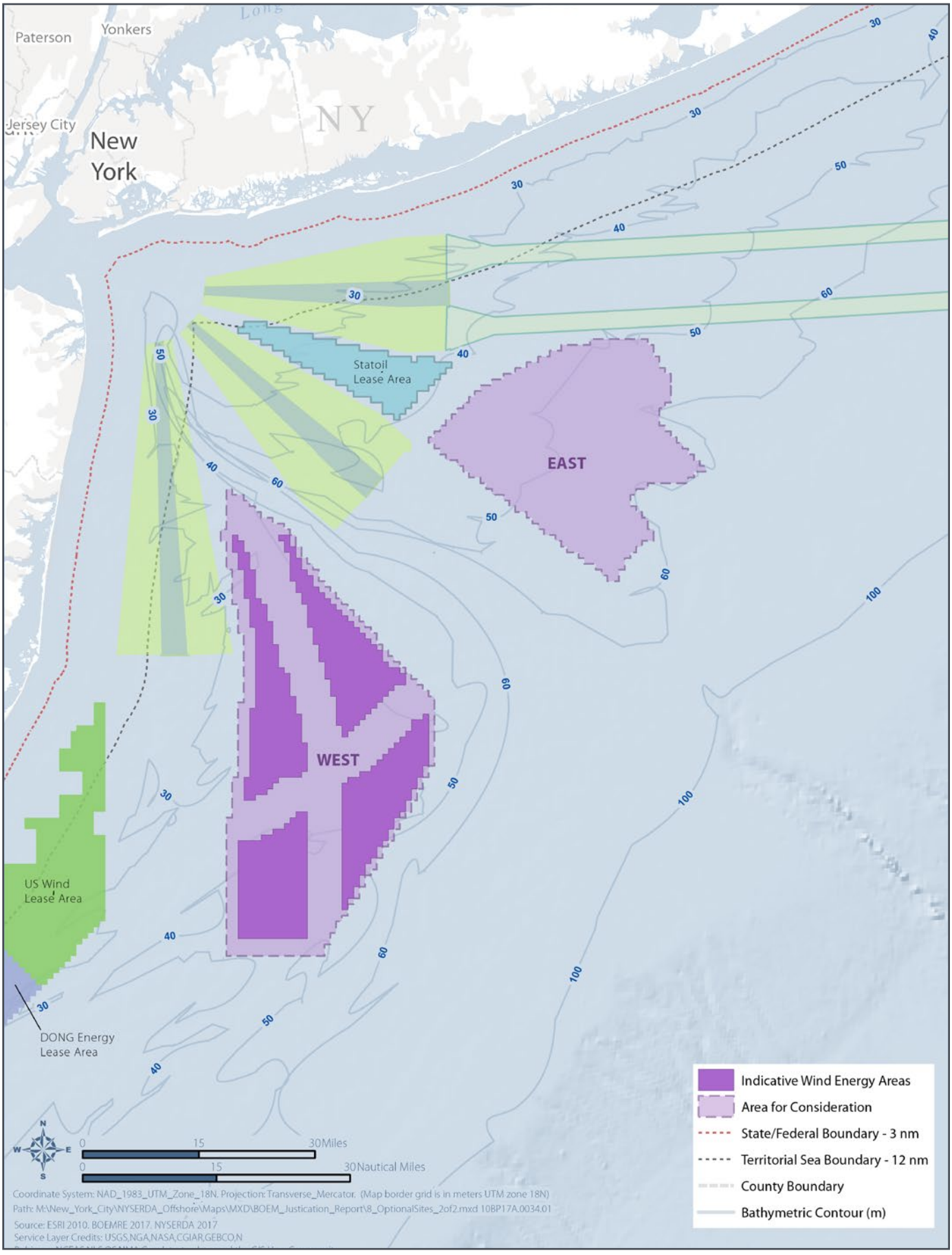
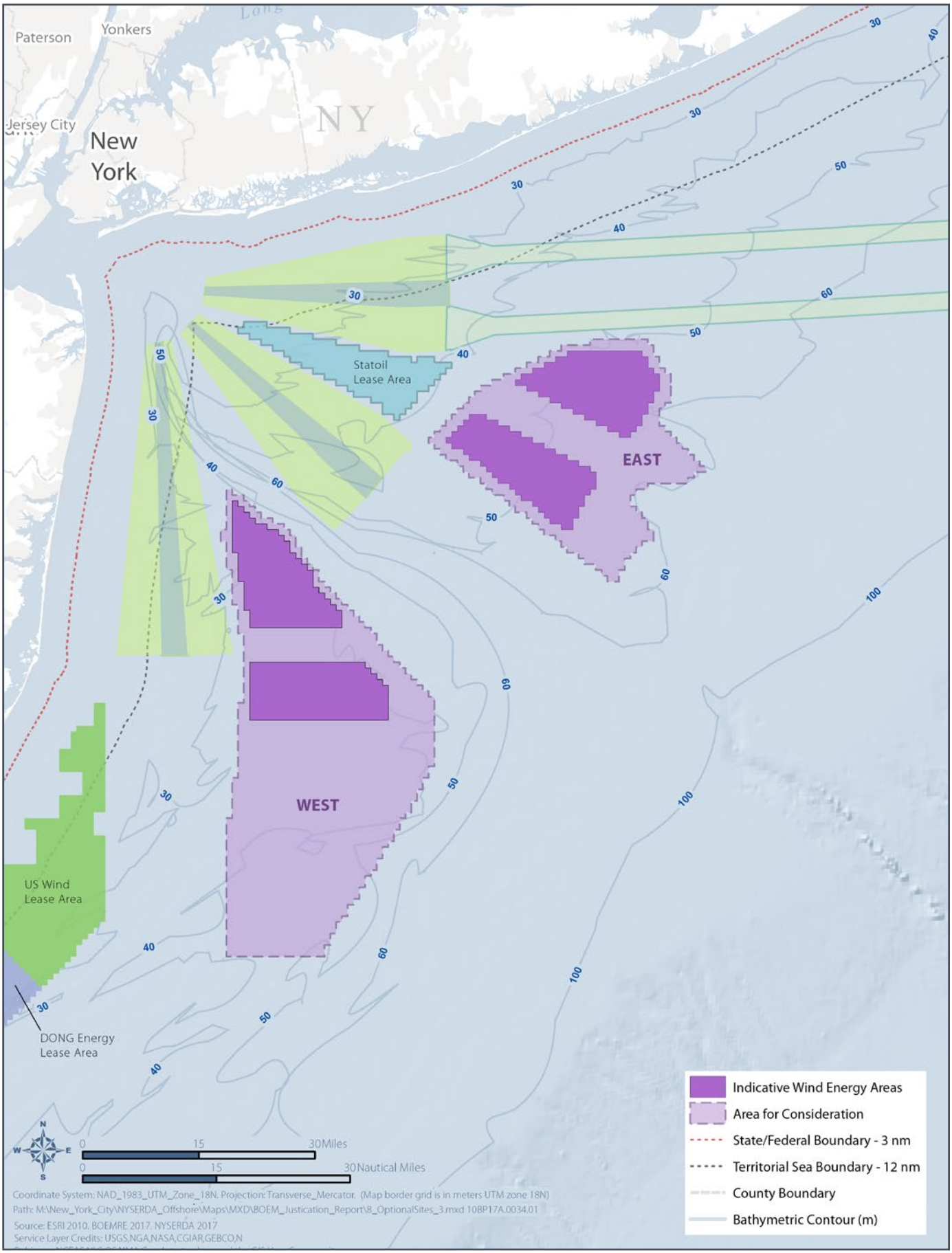


Figure 7. Indicative Wind Energy Areas – Configuration D.



When locating WEAs, the State recommends that BOEM consider the following, which are listed in alphabetical order:

- Competition between WEAs, reducing costs for New York ratepayers
- Energy output based on wake modeling
- Existing cables and pipelines
- Fishing
- Grid connection
- Levelized cost of energy based on wind speed, depth, distance from shore, and other factors
- Navigation

As shown, space between Indicative WEAs is included for vessel traffic, fishing, and other marine recreational uses, and to minimize turbine wake losses, and therefore energy losses, between projects in different Indicative WEAs. New York suggests that, unlike WEAs offshore of other states, spaces be included between new future WEAs offshore of New York. These inter-WEA spaces should be designed to minimize energy losses due to turbine wake effects among WEAs and provide for safe navigation. Although fishing can take place within offshore wind farms, inter-WEA spaces may also improve access to and use of specific fishing grounds.

A target area of 80,000 acres was used for each Indicative WEA. This area was selected after reviewing the turbine layouts of the latest and largest European offshore wind farms as they were considered to represent current industry best practice.[3] While less area may ultimately be required, 80,000 acres appears to provide a sufficient margin for geophysical, oceanographic, and seabed constraints and options in offshore wind farm layouts such as larger than typical spacing for commercial fishing, avoidance of existing subsea cables, and minimization of wake effects.

3 The Forewind Creyke Beck C and Creyke Beck D wind farms, which, at 1,200 MW each, are the largest consented offshore wind farms to date in Europe and have a power density of 0.01 MW/acre. Such a figure was assumed for the Indicative WEAs.

4.0 GENERAL SCHEDULE OF PROPOSED ACTIVITIES

New York State foresees an indicative development and construction schedule to achieve the State's goal of 2,400 MW of offshore wind by 2030 as depicted in Figure 8.

Several factors can affect this schedule, including the amount of time needed to identify the requested new WEAs and award leases, the political and regulatory dynamics at the state and federal levels, as well as permitting and supply chain lead times, activity durations and constraints, and broader economic conditions.

Generally, the schedule of activities follows the sequence below. Some of these activities are within BOEM's responsibility, others the purview of New York State, and others solely up to the individual leaseholders.

Leasing

This phase of development commences publicly when a Call for Information and Nominations is issued by BOEM using the Area for Consideration proposed by New York State or other area and ends with executed leases. BOEM's leasing process includes a stakeholder comment period, a Proposed Sale Notice, submission of bidder qualifications, a Final Sale Notice, and a lease auction resulting in a lease award execution. This leasing phase should take 1–2 years.

Offtake

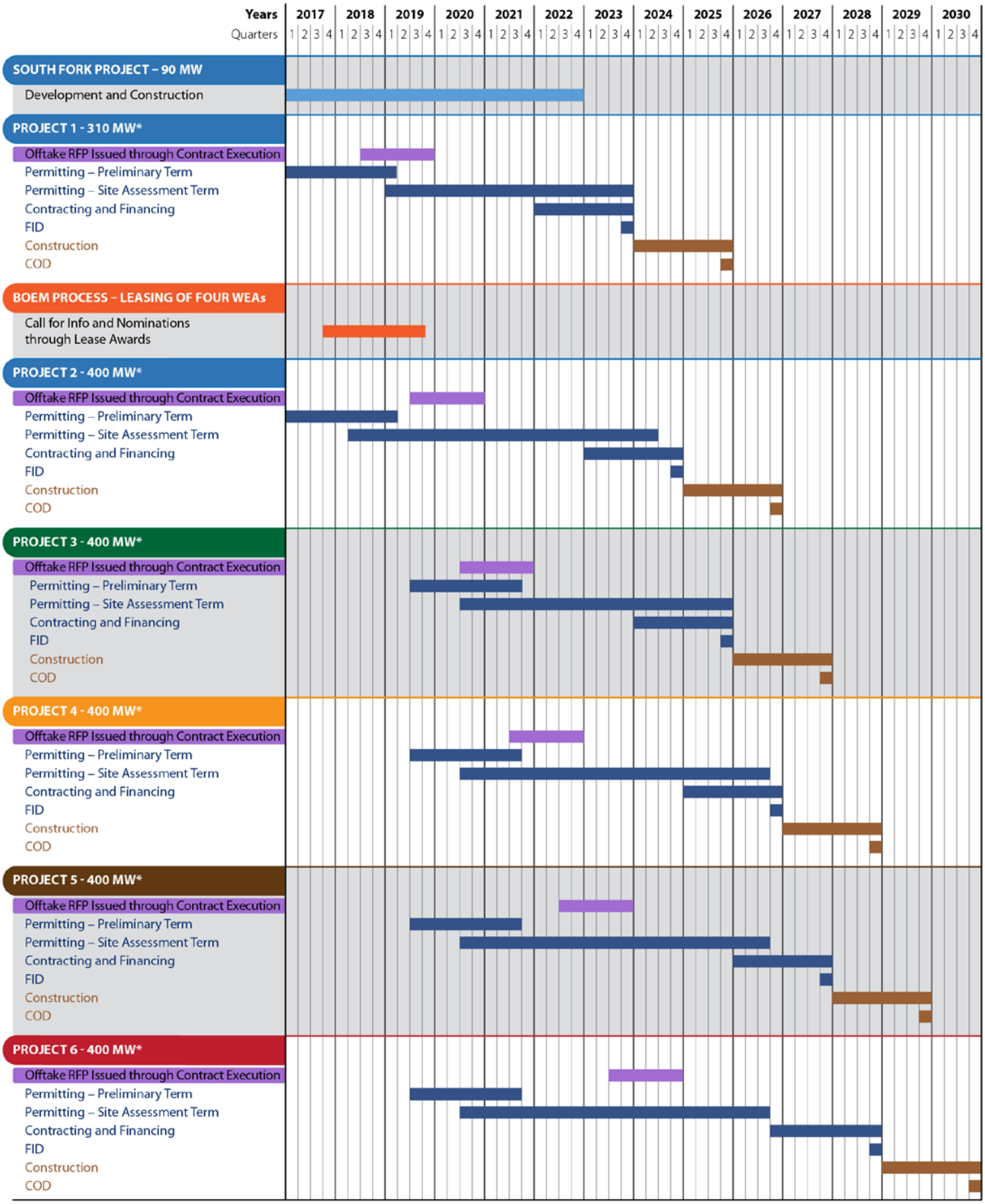
A parallel process to consider the most cost-effective way to integrate offshore wind into New York's Clean Energy Standard will be initiated at the New York State Public Service Commission by NYSERDA in 2017. Because of New York's goal of 2,400 MW by 2030 and the timeline required for BOEM to award new leases offshore New York, the State expects that there will be multiple, competitive offtake procurements spread over a number of years. New York's objective is to commence offshore wind solicitations in late 2018 or early 2019 and expects that the early solicitation(s) may result in offtake agreements awarded to projects within pre-existing Lease Areas rather than those identified through the proposal described herein.

Project-specific activities

The primary factors that influence the schedule of individual projects are the timing of site control, the period after site control before offtake proposal, and the time required to file with BOEM and receive approval of a Construction and Operations Plan (COP).

New York State expects that BOEM will execute at least four new leases, each capable of supporting at least 800 MW. Once site control is obtained, developers have 5 years to submit a COP, which must be preceded by significant development expense. Therefore, the primary differentiator among projects built in newly leased areas is the amount of time between offtake award and COP submission.

Figure 8. Indicative Schedule for Developing 2,400 MW by 2030.



**The project capacities and dates provided for individual line items within this schedule are indicative and subject to change*

Permitting and development

This project phase begins when a developer obtains development rights to an area through a competitive auction. Developers must meet several milestones to receive approvals of plans and major permits (e.g., a Site Assessment Plan (SAP) and COP) and must receive approvals from a variety of relevant regulatory agencies proceeding with construction. This phase ends when the project sponsor reaches Final Investment Decision (FID, and has executed contracts for construction and operations work; generally, projects must secure fixed revenue contracts and other economic incentives to be financially viable.

This phase also includes project engineering, contracting, and financing, all of which are needed prior to FID and construction. The permitting and development period is estimated to last between five and seven years, but may be shorter or longer under certain circumstances.

Construction

The construction phase starts once contractors receive the Notice to Proceed, at or around the same time as FID, and ends on the Commercial Operations Date (COD) when the project has been connected to the power grid and the turbines fully commissioned. The actual construction of a 400 MW offshore wind farm is estimated to take approximately two years.

Operations

The operations phase commences when a project has been connected to the power grid and all units are fully commissioned; and COD has been achieved.

The operations period is estimated to be between 20 and 25 years.

Decommissioning

The decommissioning phase starts when the project has begun a formal process to decommission and stops feeding power to the grid and ends when the area has been restored and lease payments are no longer being made, or if the wind farm has been repowered.

5.0 GENERAL DESCRIPTION OF OBJECTIVES AND FACILITIES

5.1 OBJECTIVES

The Area for Consideration has been selected in light of the characteristics of the projects that may ultimately be built within them.

The identified Indicative WEAs are each able to accommodate up to 800 MW. Therefore, each Indicative WEA could be developed as a single 800 MW project, an 800 MW project developed in two 400 MW phases, or two or more 400 MW or smaller projects. To meet New York's goal of 2,400 MW of offshore wind capacity, a total of 160 to 300 turbines between 8 and 15 MW each will need to be installed.

Each project would have its own offshore substation and export cable circuit(s) to shore, so there would be from three to six offshore substations (and export cable circuits), depending on the capacity awarded in each offtake solicitation. The minimum distance between projects would be determined by BOEM by its defining of the new WEAs. Developers, in consultation with stakeholders and in accordance with any siting requirements included in the terms of an offtake agreement, would choose the best spacing and layout of turbines and other components. Regardless of the locations of WEAs and potential projects within them, offshore wind farm infrastructure would be deliberately spread out so that turbines do not experience energy losses caused by the wake effects of other turbines. This in turn would allow ample room within wind farms for safe navigation and fishing access and use.

These WEAs and subsequent project development activities would be subject to a lengthy review and permitting process, involving input from a variety of stakeholders before projects are granted approval for construction and operations.

5.2 OFFSHORE PRODUCTION FACILITIES AND SUBSTATIONS

Overview of existing turbine technology

Depending on the timing of project construction, New York expects that wind farms built offshore the state would use existing or future horizontal-axis turbine technology.

To assess the impacts that changes to offshore wind turbine sizes and rated capacities would have on project designs until 2030, the evolution of Wind Turbine Generators (WTG) dimensions to date was studied and extrapolated to estimate the size of turbines through a commercial operation date of 2030. The assumed size of turbines over time is provided in Table 2.

Table 2. Wind Turbine Size Estimate Through 2030

Commercial Operation Date	2018	2022	2026	2030
MW	8	10	12	15
Rotor (m)	164.0	177.0	194.0	217.0
Tip Height (m)	187.0	202.0	222.0	247.0
Hub Height (m)	105.0	113.5	125.0	138.5
Water to blade clearance (m)	23.0	25.0	28.0	30.0
Rotor/Gap ratio	0.14	0.14	0.14	0.14

The above analysis provides a forecast for the rated capacities of commercially available offshore wind turbines over time, but the number of turbines to be installed in support of New York's goal of 2,400 MW depends on actual commercial availability at the time of each project's financing. Developers would be responsible for choosing the size and manufacturer of wind turbines to be used in their projects, a decision that is subject to a variety of other factors, including supply chain availability, performance characteristics of the machines, and other commercial terms and conditions.

Overview of existing substation technology.

New York expects that the wind farms would be built using existing offshore substation technology consisting of a topside (containing step-up transformers and other electrical components) installed on a fixed-bottom foundation structure. Each project's topside would connect to multiple "strings" of array cables and transform the electricity collected to a higher voltage before transmitting it to shore via one or more export cables. It is also expected that each project would have its own offshore substation and export cable circuit(s), and that projects may make use of emerging technologies such as offshore transmission modules, which would combine a turbine and a substation on a single fixed-bottom structure.

Overview of existing foundation technology

Projects would use conventional fixed-bottom foundation technology to support the towers and turbines. Potential fixed-bottom foundations designs include monopiles, jackets, suction bucket, and gravity based. Some foundation types, such as monopiles, may require some form of scour protection. The specific design used would be determined by the developer based on geophysical conditions, environmental constraints, supply chain availability, and other factors.

While new floating foundation technologies are being developed and deployed in waters deeper than 60 meters, these technologies have yet to be commercially proven (beyond prototype and pilot projects). However, if floating technologies achieve commercial viability in the near future and provide cost savings and deployment advantages, they may also be used to achieve the State's goals. See Appendix C for a full discussion of this topic.

5.3 POWER TRANSMISSION AND GRID CONNECTION

Overview of power cables

Array cables

New York expects that wind farms built offshore of the state would use conventional array cable technology, with cables buried by jet plow to a reasonable depth based on the risk of damage that exists at each location and the requirements of any permits. Each project would contain multiple strings of array cables connected to one or more offshore substations. The locations of array cable strings and specific design of the array cable would be the developer's responsibility. While the Area for Consideration was selected, in part, to minimize interactions with pre-existing submarine cables and pipelines, cable layouts for individual projects may require one or more cable/pipeline crossings and the use of concrete mattresses to protect cables at crossing locations. Developers would need to consult with existing infrastructure owners to determine appropriate cable/pipeline proximity and crossing criteria.

Export cables

As with the array cables installation described above, wind farms built offshore of the State would be expected to use conventional export cable technology, with cables buried by jet plow to a reasonable depth based on the risk of damage that exists at each location and the requirements of any permits. The locations of export cable circuits and specific design of the export cable would be the developer's responsibility. Export cable routes between projects and their landfall points may require one or more cable or pipeline crossings and the use of concrete mattresses to protect cables at crossing locations. Developers would need to consult with existing infrastructure owners to determine appropriate cable/pipeline proximity and crossing criteria.

All portions of the Area for Consideration can be connected to both New York City and Long Island substations with a high-voltage alternating current (HVAC) transmission system. Projects in areas farthest from shore within the RAC (beyond 71 statute miles [62nm]), such as the southern end of the West area, would likely require HVAC transmission solutions that include offshore reactive compensation stations located approximately halfway to shore. Long Island substations can connect to a larger portion of the RAC with a traditional HVAC transmission system than those in New York City.

Horizontal directional drilling and other typical landfall procedures

It is expected that offshore wind farms built offshore of New York would use conventional methods of landing export cables, such as performing horizontal directional drilling (HDD) between a nearshore cofferdam and a landfall transition vault where the export cable is spliced with the upland transmission cable. This would be done to minimize environmental impacts and disruption to beaches and the shoreline. The determination of an appropriate landfall point would be the developer's responsibility following consultation with regulating federal, state, and local agencies.

Existing substations

As part of the Master Plan, an analysis of integrating 2,400 MW of offshore wind at connection points in load Zones J (New York City) and K (Long Island) is currently being conducted. Generally, there are more substations in the western portion of Long Island and New York City where the demand for electricity is greater. The determination of an appropriate connection point, and upland transmission cable route between landfall point and injection point will be the developer's responsibility following consultation with regulating federal, state, and local agencies.

5.4 ONSHORE SUPPORT FACILITIES AND STAGING AREAS

New York State has exceptional port and manufacturing facilities and a highly skilled workforce and thus is well suited for offshore wind development.

Ports and Facilities

New York State expects that offshore wind farms built to achieve the State's 2,400 MW goal can be built using ports and waterfront facilities within New York State, based on the findings of a Port Study conducted as part of the Master Plan. The Port Study reviewed the technical requirements for all aspects of offshore wind farm development, including component manufacturing, staging, construction, and operations, and compared them against the specifications of existing facilities in New York Harbor, around Long Island, and up the Hudson River.

Supply Chain

A Supply Chain study that evaluated the potential of New York companies and workers with respect to the offshore wind supply chain found that the State has a variety of manufacturing capabilities, facilities, and resources well suited for the required component manufacturing and construction. New York State's skilled labor force can be mobilized in a variety of areas to support offshore wind development. As part of the Master Plan, jobs studies were conducted to evaluate the potential for New York workers to participate in offshore wind farm component manufacturing, construction, operations, and maintenance and to inform a coordinated state-wide collaborative effort to ensure that New York's workforce and manufacturers are best prepared for offshore wind development.

6.0 RENEWABLE ENERGY AND ENVIRONMENTAL CONDITIONS

NYSERDA has conducted a number of studies to provide information related to a variety of environmental, social, economic, regulatory, and infrastructure-related issues implicated in planning for future offshore wind energy development off the coast of New York State. The studies assessed an area comprising a 16,740-square-mile area of the ocean and adjacent areas, from the south shore of Long Island and New York City to the continental shelf break (the OSA).

These studies provide current information about potential environmental and social sensitivities, economic and practical considerations, and regulatory requirements associated with any future offshore wind energy development in the identified Area for Consideration.

A list of references for the studies is provided in Appendix D.

6.1 ARCHAEOLOGY AND CULTURAL HERITAGE

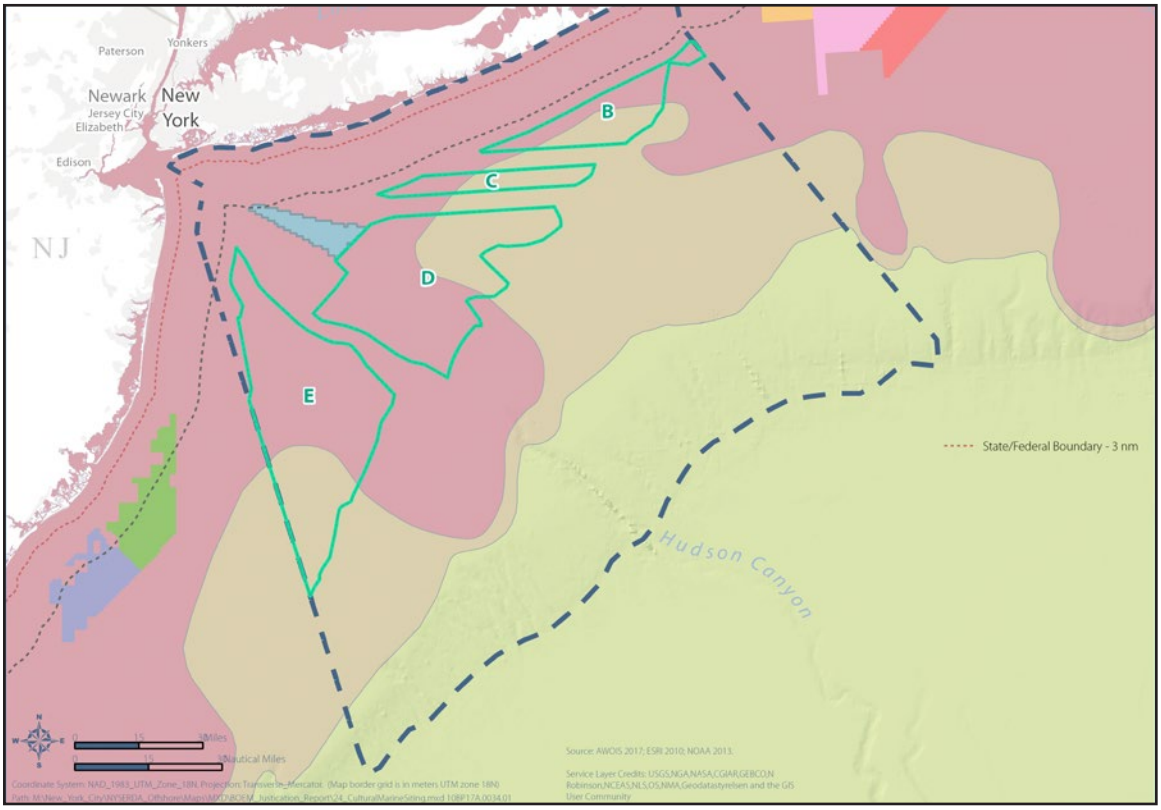
Cultural resources within and adjacent to the OSA are grouped in four categories: submerged resources associated with indigenous people, submerged historic resources, onshore/nearshore resources, and Traditional Cultural Properties (TCPs). Previous geophysical and geotechnical offshore surveys conducted along the Atlantic OCS have allowed researchers to pinpoint landforms that could have supported human habitation during the Paleo and Early Archaic Periods, when sea levels were much lower than today, and which may hold submerged resources associated with indigenous hunting and gathering societies. To date, no areas or material remains associated with these indigenous people have been identified within the OSA; however future field studies would need to be performed by future offshore wind farm developers to determine whether remains are present. Future geophysical and geotechnical surveys associated with wind farm development would include geomorphological and geoarchaeological assessments of the submerged landscape on the OCS and perhaps would provide further insight into the settlement patterns of the earliest inhabitants of North America.

Submerged historic resources could include shipwrecks and their associated debris fields, planes, cable routes, and pipelines. Since the OSA overlays the historic maritime approaches to New York and New Jersey, additional unrecorded historical resources are likely to exist within the OSA, with the area nearest to shore being most sensitive. To date, the approximate locations of 135 shipwrecks have been identified within the OSA; nine historic submarine telecommunication cable routes that extended from Long Island to the Azores and Europe may also exist within the OSA.

Current data have revealed 106 archaeological areas and sensitivity zones within the study area. Of these, 34 are associated with contexts related to indigenous people and 67 are associated within historical contexts, four of which are beached shipwrecks. Six archaeological areas have been listed on the NRHP, and five areas are currently considered eligible for listing. In regards to historic architectural resources listed on the NRHP, 32 resources were identified, including 12 historic districts and 20 individual resources. Figure 9 illustrates the cultural and archaeological resources described above that are known to occur within and adjacent to the OSA.

To date, no TCPs that are listed on the NRHP or that are considered eligible for listing have been identified within the study area. Subsequent consultations with the Shinnecock and Unkechaug Nations could provide further insight into eligible TCPs such as ceremonial and sacred areas located adjacent to the OSA.

Figure 9. Cultural and Archaeological Resources.



6.2 AVIATION AND RADAR

There are 26 airports within 50 miles of the OSA, including a mix of commercial, reliever, and general aviation airports. The major facilities (commercial and reliever) include John F. Kennedy International Airport, LaGuardia Airport, Newark Liberty International Airport, Philadelphia International Airport, Farmingdale Republic Airport, Long Island MacArthur Airport, and Atlantic City International Airport.

The DOD manages numerous air bases throughout the U.S. and abroad that typically function with high air traffic volumes related to training and operational missions taking place. Francis S. Gabreski Air National Guard Base is co-located on Francis S. Gabreski Airport, a general aviation airport approximately 20 miles north of the nearest OSA boundary, and is the closest facility to the OSA with military flight operations. The closest dedicated military air base is Joint Base McGuire–Dix–Lakehurst located 18 miles southeast of Trenton, New Jersey and approximately 45 miles from the western OSA boundary.

Aircraft at United States Coast Guard (USCG) stations are used for maritime safety, homeland security, national defense, and environmental protection purposes. The USCG's 1st District Headquarters in Boston is responsible for the region encompassing northern New Jersey, New York, Connecticut, Rhode Island, Massachusetts, New Hampshire, Vermont, and Maine. The 1st District units include USCG Air Station Cape Cod, which is located at Joint Base Cape Cod and is the main USCG aviation facility in the northeast. USCG Air Station Cape Cod operates both helicopter and fixed-wing aircraft for various missions such as ocean search and rescue and homeland security. The USCG's 5th District operates a sector field office at Air Station Atlantic City, which is located at the William J. Hughes FAA Technical Center at the Atlantic City International Airport, New Jersey.

Areas of controlled and uncontrolled airspace are classified as special use areas. Aircraft operations within the special use areas are deemed hazardous to civil aircraft using the area and, as a result, operations must be confined and civil aircraft use in the area may be restricted or limited. Special use areas overlying the OSA include warning areas, military training routes, military operations areas, alert areas, prohibited areas, restricted areas, and aerial refueling routes.

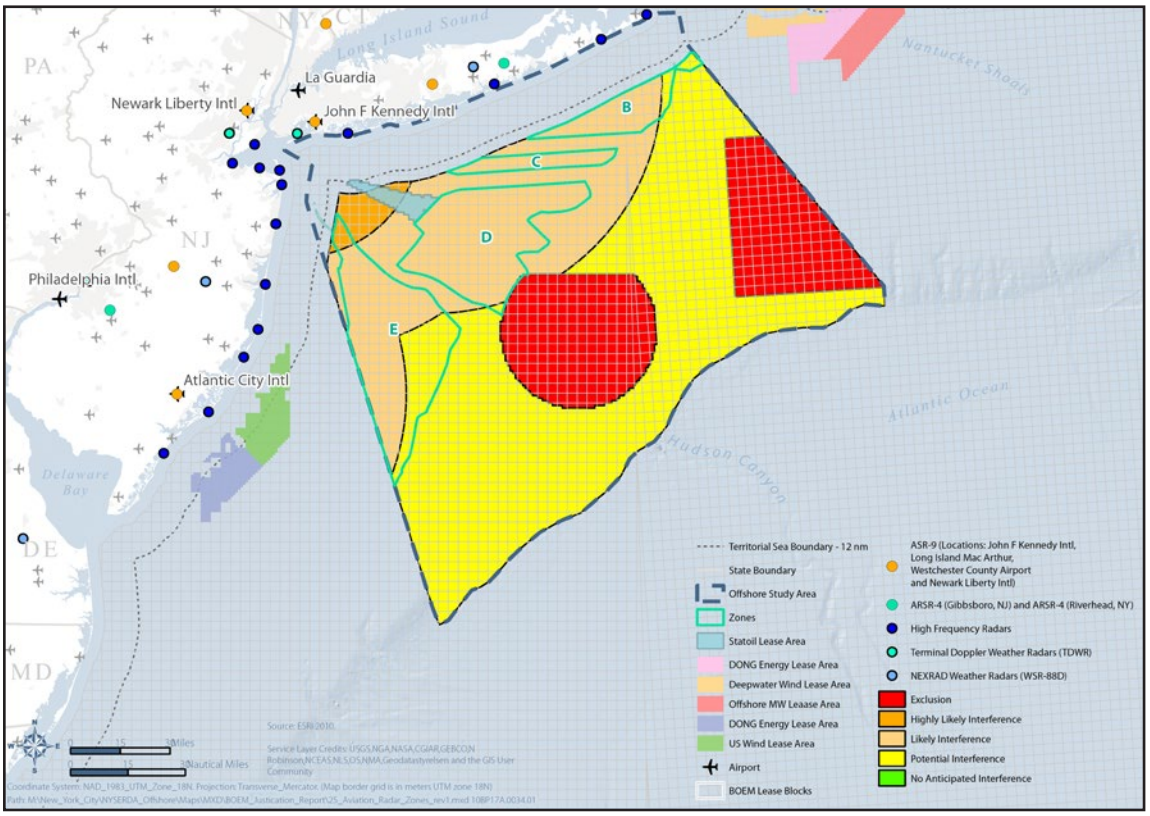
An ASR-11 is located at Wrightstown-McGuire AFB in Wrightstown, New Jersey. ASR-9s and ASR-11s are airport surveillance radars with ranges of approximately 60nm that display weather and aircraft simultaneously. LaGuardia Airport uses the ASR-9 onsite at John F. Kennedy Airport. Additional aviation radars relevant to the OSA include long-range Air Route Surveillance Radars (ARSR-4), which are located in Riverhead, New York, and Gibbsboro, New Jersey.

A Terminal Doppler Weather Radar (TDWR) is located in Brooklyn, New York, and on-site at Linden Airport in New Jersey (Bock 2017). The nearest next-generation radar (NEXRAD) is located in Brookhaven, Connecticut; however, the OSA is outside the NOAA's consultation/screening zones. The 37-mile impact zone of the TDWR located in Brooklyn overlaps the northwest corner of the OSA. Twenty high-frequency coastal radar sites are located adjacent to the OSA and are presented in Table 3. Figure 10 illustrates areas of potential interference to aviation and radar systems in the OSA.

Table 3. NOAA's IOOS Program High-Frequency Coastal Radar Sites Adjacent to the OSA

Name/Location	Average Range	Maximum Range	Affiliation
Amagansett, NY (AMAG)	200 km	200 km	Rutgers University
Bradley Beach, NJ (BRAD)	90 km	200 km	Rutgers University
Brigantine, NJ (BRIG)	175 km	200 km	Rutgers University
Brant Beach, NJ (BRNT)	82 km	200 km	Rutgers University
Hempstead, NY (HEMP)	200 km	200 km	Rutgers University
Sandy Hook, NY (HOOK)	200 km	200 km	Rutgers University
Loveladies, NY (LOVE)	200 km	200 km	Rutgers University
Moriches, NY (MRCH)	200 km	200 km	Rutgers University
Martha's Vineyard, MA (MVCO)	200 km	200 km	Rutgers University
Nantucket Island, MA (NANT)	200 km	200 km	Rutgers University
Old Bridge Waterfront Park, NJ (OLDB)	30 km	200 km	Rutgers University
Port Monmouth, NJ (PORT)	20 km	200 km	Rutgers University
Strathmere, NJ (RATH)	90 km	200 km	Rutgers University
Sea Bright, NJ (SEAB)	90 km	200 km	Rutgers University
Seaside Park, NJ (SPRK)	90 km	200 km	Rutgers University
Staten Island, NY (SILD)	30 km	200 km	Staten Island Technical School
Nauset, MA (NAUS)	175 km	200 km	University of Massachusetts Dartmouth
Block Island, RI (BISL)	42 km	200 km	University of Massachusetts Dartmouth
Montauk, NY (MNTK)	42 km	200 km	University of Rhode Island
Long Point Wildlife Refuge, MA (LPWR)	95 km	200 km	Woods Hole Oceanographic Institution

Figure 10. Potential Aviation and Radar Interference Prediction.

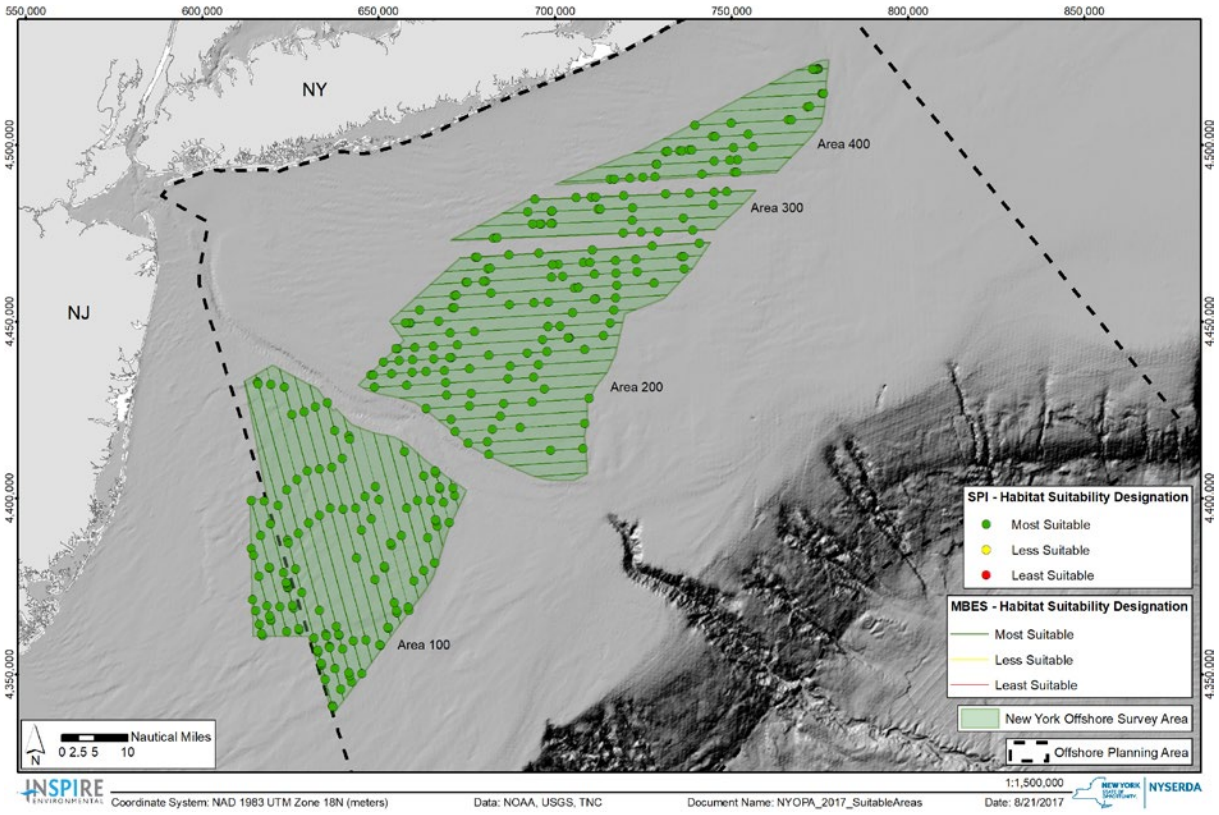


6.3 BENTHIC ENVIRONMENT

Physical and biological characterization of the seafloor is a critical path for future offshore wind development in the OSA. Based on a two-phase MBES and SPI/PV imaging survey that serves to provide planning-level characterization of the geological (sediment size and type), geotechnical (density of bottom), and benthic (animal habitat) characteristics, a total of 51 planned track lines, spaced 1.9 nm (3.5 km) apart, were surveyed within four previously defined survey zones. An additional 1,051 nm of MBES data were collected during transit between survey zones and SPI/PV stations (Figure 11).

No sensitive benthic habitats were observed in either the acoustic or optical data (hard bottom with attached epifauna or epiflora). Based on the preliminary review of all MBES and SPI/PV data collected, all areas surveyed appear to be suitable for offshore windfarm development with respect to surficial geology and benthic habitat resources.

Figure 11. Benthic Habitat Suitability

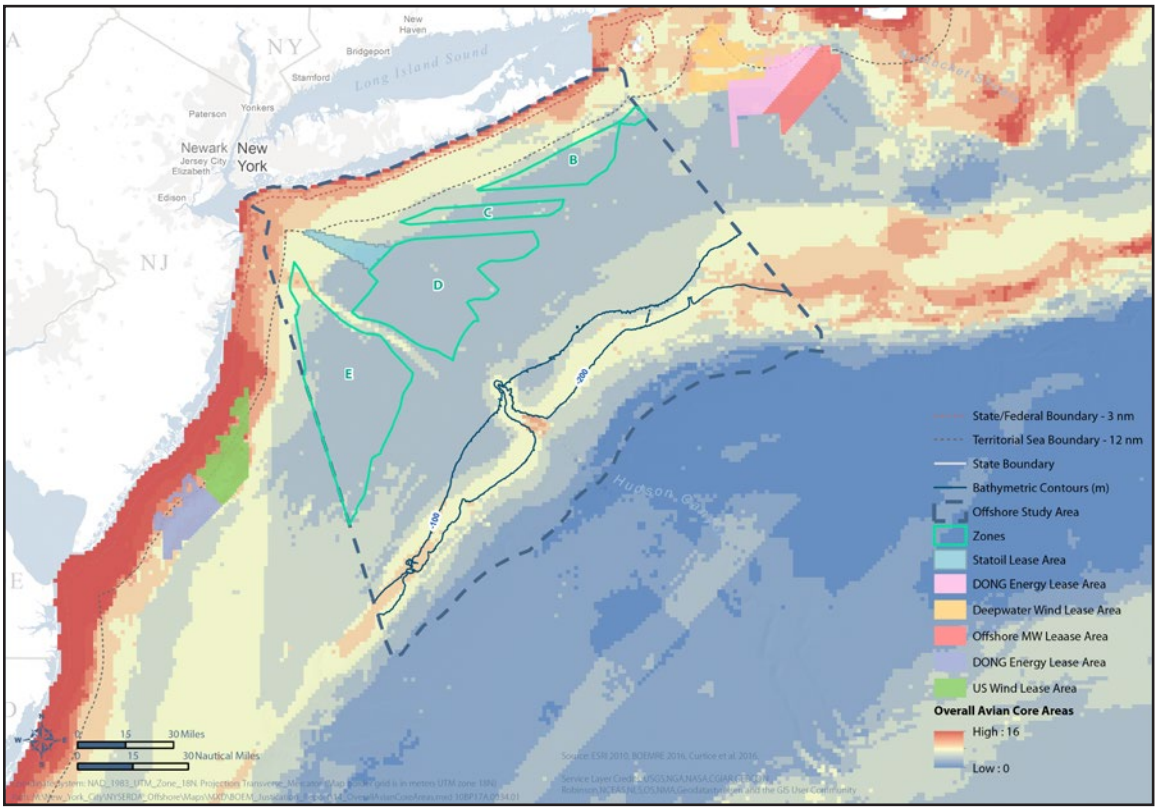


6.4 BIRDS AND BATS

Approximately 39 regularly documented bird species are known to occur within OSA annually. While birds may occur anywhere in the OSA, data indicate that overall bird use is greatest in three core areas of the OSA: shallower waters along the northern and northwestern boundaries of the OSA, the Hudson Shelf Valley, and the continental shelf break (Figure 12). Regularly occurring species are generally concentrated in one or more of these core areas. For example, Surf Scoters' (and waterfowl in general) use of the OSA is generally concentrated in shallow waters in the northern OSA and the shallower portions of the Hudson Canyon. Conversely, Wilson's Storm-Petrels (and pelagic birds in general) are most commonly observed near the continental shelf breaks. No ESA- or state-listed species regularly occur within the OSA; however, on-going studies of rufa Red Knots (*Calidris canutus rufa*), Roseate Terns (*Sterna dougallii*), Common Terns (*Sterna hirundo*), Piping Plovers (*Charadrius melodus*), and northern long-eared bats (*Myotis septentrionalis*) in offshore waters (BOEM 2017a) may provide insight on these species' use of the OSA in the future.

There are insufficient data to identify higher use areas for bats in the OSA; based on the data available (Stantec 2016), bat occurrence in offshore waters in general appears to be relatively low and concentrated during migratory periods.

Figure 12. Avian Use Areas.



6.5 ENVIRONMENTAL SENSITIVITY MAPPING

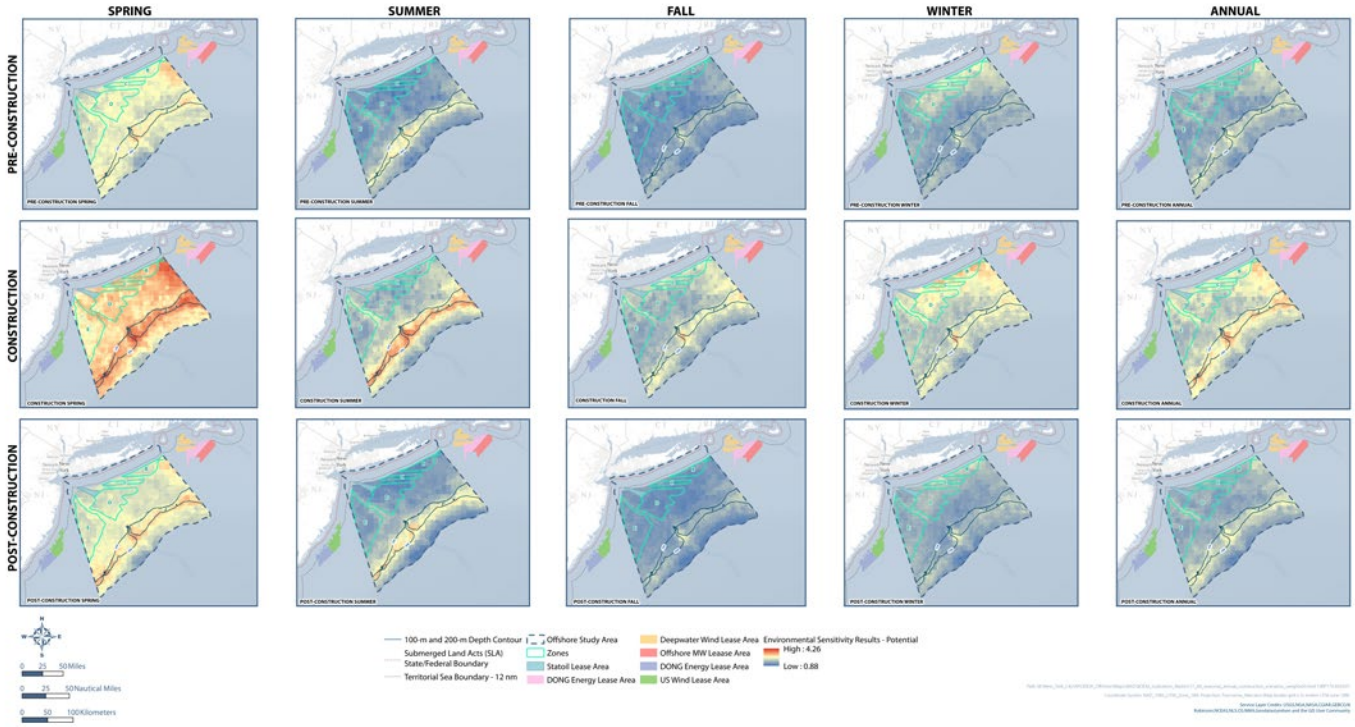
Existing seasonal and spatial data were used to assess relative potential risk and examine the sensitivity of marine resources to potential stressors during the three phases of offshore wind development (i.e., pre-construction, construction, and post-construction). The marine resources, or receptors, include marine mammals, sea turtles, fish, and birds. Sensitivity was evaluated within relative risk matrices to differentiate relative risks and facilitate future decision-making. These risk matrices used defined criteria to assign risk scores of 1 through 5 to the receptor groups for each potential stressor. This assessment process

considered the probability of impact from an identified stressor and the vulnerability of the receptor group to the potential stressor. Weight values of 1 through 5 were determined for receptor groups for each phase of offshore wind development based on the risk assessment, regulatory context, permitting requirements, BOEM recommendations, seasonality, and other additional factors.

After preliminary evaluation, the Linear Weighted Model (Weighted Sum method) was used and included comprehensive data sets that represented relative occurrence and temporal trends of the receptor groups within the OSA. This selection of input data was informed by concurrent studies.

The mapping outputs identify areas with the lowest potential risk for biological impact in the OSA (Figure 13). The output maps displayed seasonal sensitivity shifts for all receptor groups. Sensitivity was lower throughout the OSA during the fall and higher during the spring. Sensitivity was also consistently greater along the continental shelf slope and Hudson Canyon.

Figure 13. Environmental Sensitivity by Season and Development Stage.



6.6 FISH AND FISHERIES

Eight fishery-dependent surveys, three research set aside programs, and one aerial survey overlap with the OSA. The OSA lies within designated offshore EFH for 47 species in the Atlantic Ocean, and 16 of these species have designated EFH for every life stage (Table 4). Additionally, within the OSA are two fish species that are protected under the ESA, one that is a candidate for listing, and one that is proposed for listing under the ESA (Table 5). There are also nine species of special concern listed by NOAA Fisheries, including Atlantic bluefin tuna (*Thunnus thynnus*), dusky shark (*Carcharhinus obscurus*), sand tiger shark (*Carcharias Taurus*), cusk, porbeagle shark (*Lamna nasus*), river herring species, thorny skate (*Amblyraja radiata*), rainbow smelt (*Osmerus mordax*), and Atlantic wolfish (*Anarhichas lupus*). There are no sensitive habitats within the OSA, as it does not encompass any seagrass beds, coral reefs, nurseries, sanctuaries, national marine sanctuaries, or national estuarine research reserves.

Table 4. Fish with Essential Fish Habitat within Offshore Study Area
Sources: NOAA Fisheries n.d.[a]; NOAA Fisheries GARFO n.d.[a], n.d.[b]; Page et al. 2013

Species	
Surf clam (*Spisula solidissima*)	*Offshore hake (*Merluccius albidus*)
Ocean quahog (*Artica islandica*)	Pollock (*Pollachius virens*)
Atlantic sea scallop (*Placopecten magellanicus*)	Red hake (*Urophycis chuss*)
Red crab (*Chaceon quinquedens*)	*Atlantic cod (*Gadus morhua*)
Long-finned squid (*Loligo pealeii*)	Haddock (*Melanogrammus aeglefinus*)
*Short-finned squid (*Illex illecebrosus*)	Whiting (*Merluccius bilinearis*)
White shark (*Carcharodon carcharias*)	*Offshore hake (*Merluccius albidus*)
Shortfin mako shark (*Isurus oxyrinchus*)	Pollock (*Pollachius virens*)
*Sand tiger shark (*Carcharias taurus*)	Monkfish (*Lophius americanus*)
Common thresher shark (*Alopias vulpinus*)	Black sea bass (*Centropristis striata*)
Basking shark (*Cetorhinus maximus*)	Bluefish (*Pomatomus saltatrix*)
Porbeagle shark (*Lamna nasus*)	Cobia (*Rachycentron canadum*)
Dusky shark (*Carcharhinus obscurus*)	Scup (*Stenotomus chrysops*)
Sandbar shark (*Carcharhinus plumbeus*)	Ocean pout (*Macrozoarces americanus*)
Tiger shark (*Galeocerdo cuvieri*)	Atlantic mackerel (*Scomber scombrus*)
Blue shark (*Prionace glauca*)	King mackerel (*Scomberomorus cavalla*)
Scalloped hammerhead shark (*Sphyrna lewini*)	Spanish mackerel (*Scomberomorus maculatus*)
Smooth dogfish (*Mustelus canis*)	Albacore (*Thunnus alalunga*)
Spiny dogfish (*Squalus acanthias*)	Yellowfin tuna (*Thunnus albacares*)
Little skate (*Raja erinacea*)	Bluefin tuna (*Thunnus thynnus*)
Rosette skate (*Leucoraja garmani*)	Skipjack tuna (*Katsuwonus pelamis*)
Winter skate (*Leucoraja ocellata*)	Atlantic butterfish (*Peprilus triacanthus*)
Clearnose skate (*Raja eglanteria*)	Swordfish (*Xiphias gladius*)
Atlantic sea herring (*Clupea harengus*)	Windowpane flounder (*Scophthalmus aquosus*)
*Atlantic salmon (*Salmo salar*)	Summer flounder (*Paralichthys dentatus*)
Red hake (*Urophycis chuss*)	Witch flounder (*Glyptocephalus cynoglossus*)
*Atlantic cod (*Gadus morhua*)	*American plaice (*Hippoglossoides platessoides*)
Haddock (*Melanogrammus aeglefinus*)	Yellowtail flounder (*Limanda ferruginea*)
Whiting (*Merluccius bilinearis*)	Winter flounder (*Pseudopleuronectes americanus*)

Notes:

a. Area of analysis includes 39 distinct 10-minute square grids within the following latitudes and longitudes that comprise the four corners of the OSA:
• 38.436363, -73.125475 • 39.757354, -70.568939 • 40.907352, -71.604009 • 40.004856, -73.725339

** Species was found in two or fewer grid squares and thus is less likely to be found within the OSA.*

Table 5. NOAA Fisheries Protected, Candidate, and Proposed Species under the Endangered Species Act
Sources: NOAA Fisheries 2017b, 2017c

Species	Status	Likely Presence within Offshore Study Area
Atlantic sturgeon (Acipenser oxyrinchus oxyrinchus)	E/T[a]	No
Scalloped hammerhead shark (Sphyrna lewini)	E/T[b]	Yes
Cusk (Brosme brosme)	C	Yes
Oceanic whitetip shark (Carcharhinus logimanus)	P	Yes

Note:
a The Atlantic sturgeon has five Distinct Population Segments (DPS). The New York Bight, Chesapeake Bay, Carolina, and South Atlantic DPS are Endangered; the Gulf of Maine DPS is Threatened.
b The scalloped hammerhead shark has four DPS. The Eastern Atlantic DPS and Eastern Pacific DPS are Endangered; the Central and Southwest Atlantic DPS and Indo-West Pacific DPS are Threatened.

Key:
C = candidate for listing
E = endangered
P = proposed for listing
T = threatened

Available commercial, recreational, and for-hire fishery information was reviewed to determine what is known about the fisheries in the OSA, including the spatial use of the area, the species fished, the common vessel and gear types, and a general understanding of the industry dynamics and relative revenue in the region. The OSA also contains fishing grounds for fishing boats landing in New York, New Jersey, Rhode Island, Massachusetts, and elsewhere, including major fishing ports such as Cape May, New Jersey; Point Judith, Rhode Island; and New Bedford, Massachusetts. These vessels target a variety of species, such as scallops, squid, flounders, skates, herring, and clams, and use a variety of fishing gear, including rod and reel, longlines, gillnets, seines, beam trawls, otter trawls, paired midwater and bottom trawls, spears, pots and traps, and dredges. Additionally, over 50 publicly available maps were reviewed to help determine how different fisheries and fishing gear types utilize the OSA and how this data can best be interpreted for preliminary master planning efforts. Figures 14 through 21 provide a summary of the analyzed data that describe the presence, distribution, and use patterns of fish and fisheries in the OSA.

Figure 14. Fish Core Biomass.

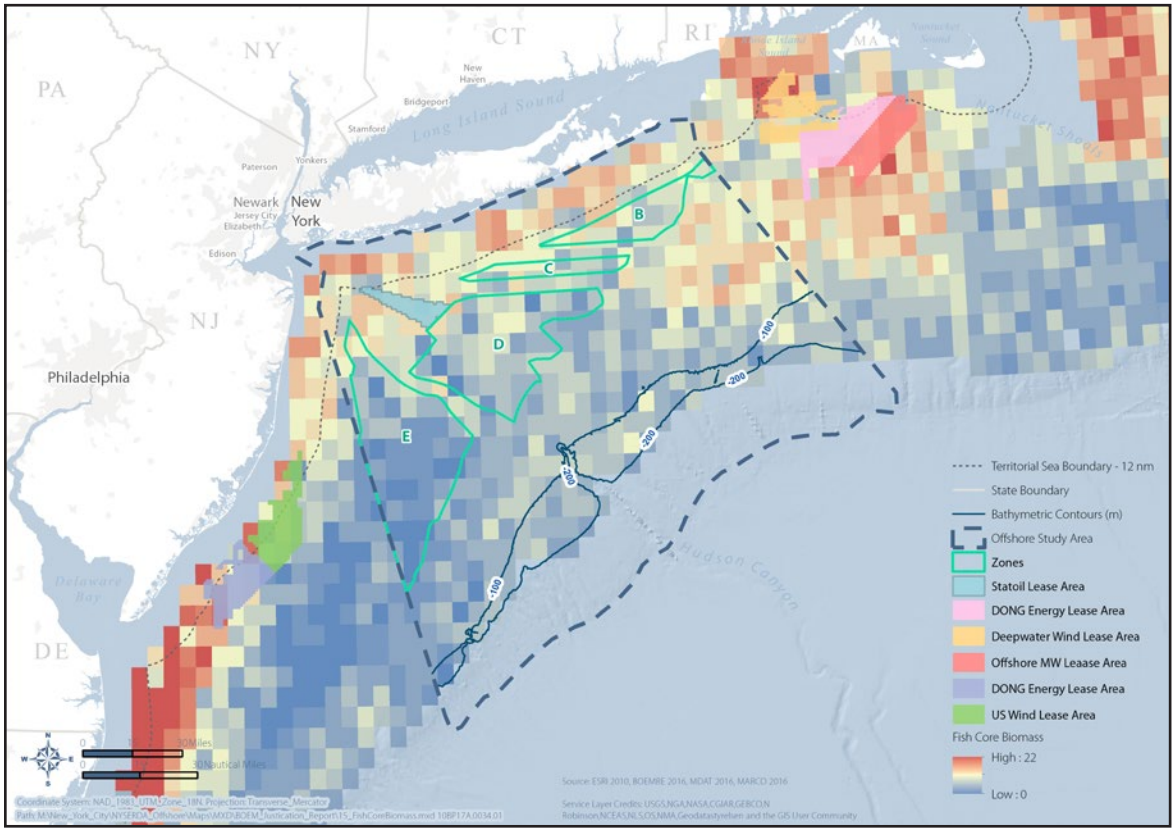


Figure 15. Essential Fish Habitat.

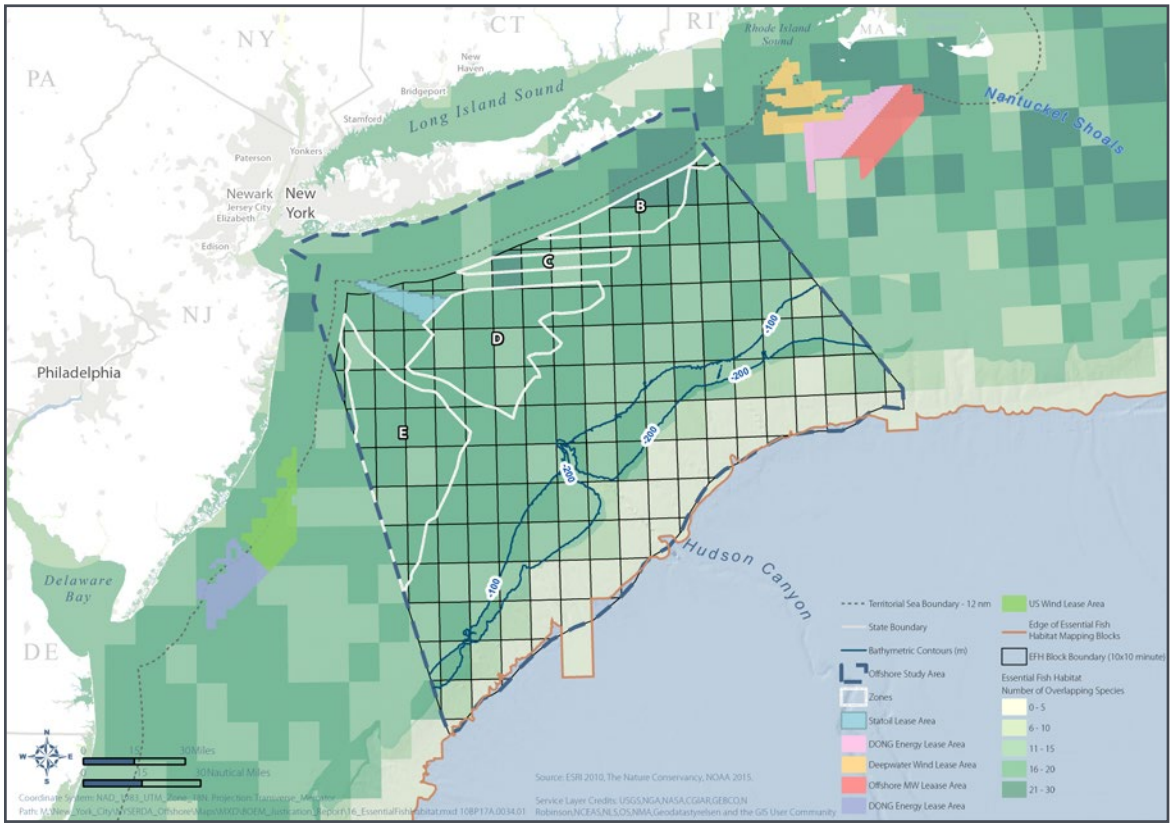
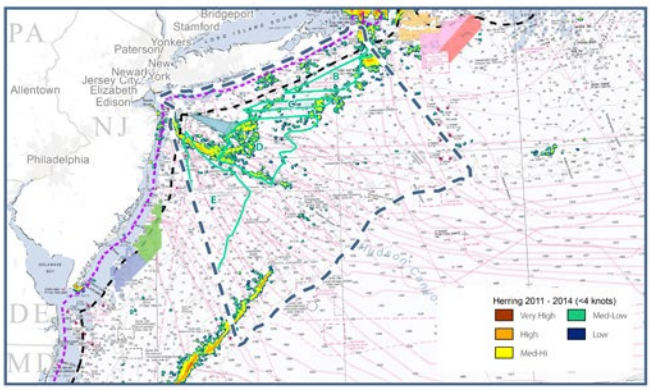
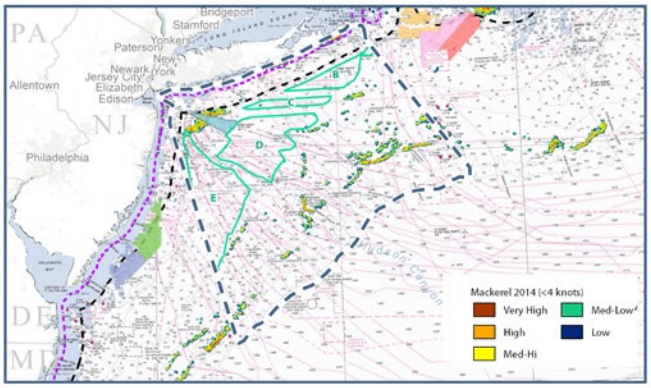
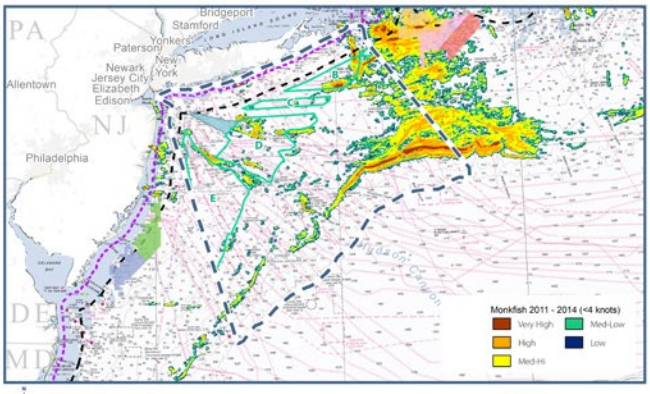
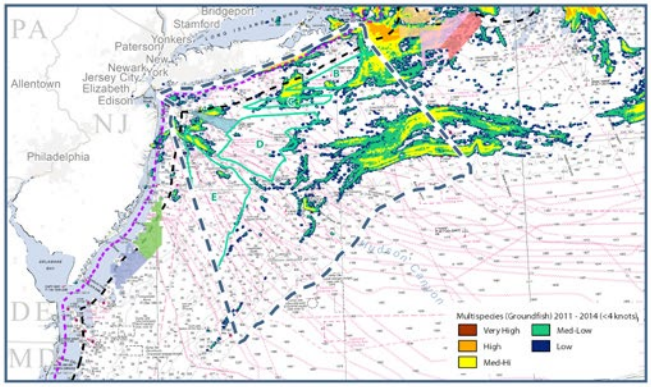


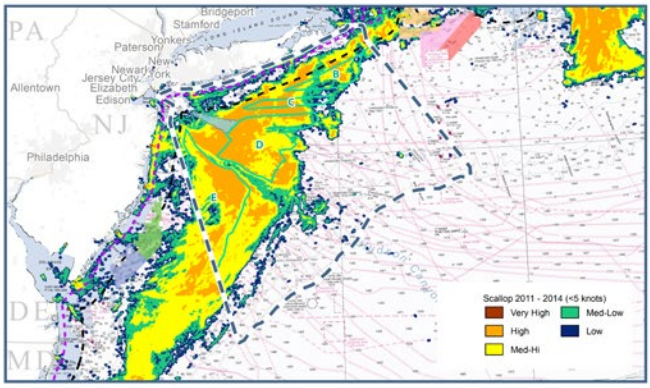
Figure 16. Vessel Monitoring Data for Major Fisheries.

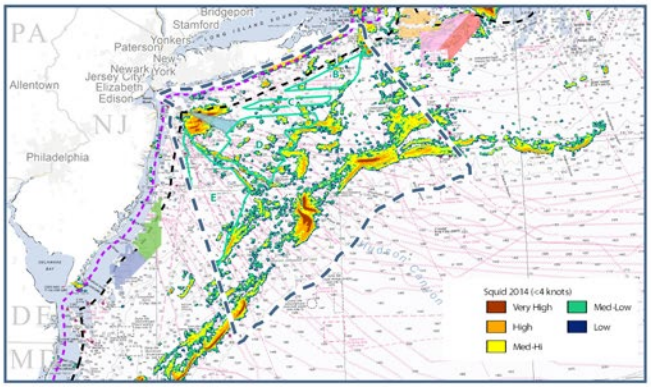












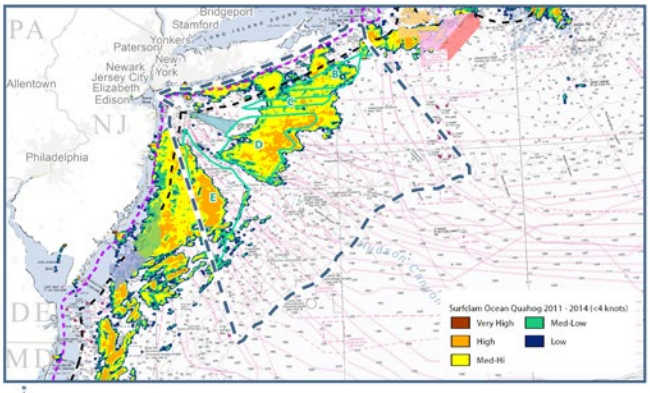


Figure 17. NOAA Fishing Observer Data.

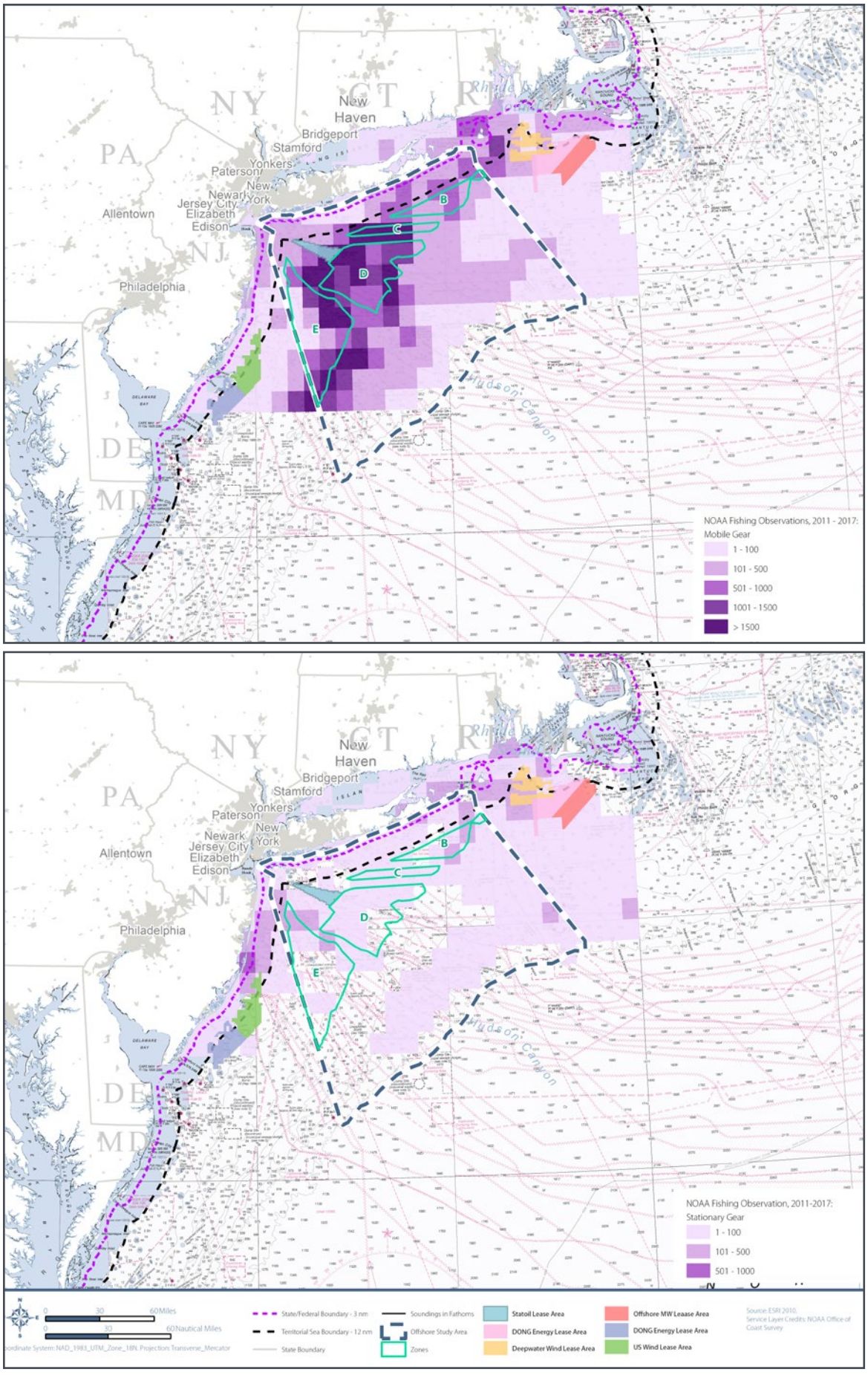


Figure 18. Stakeholder-provided Fishing Data.

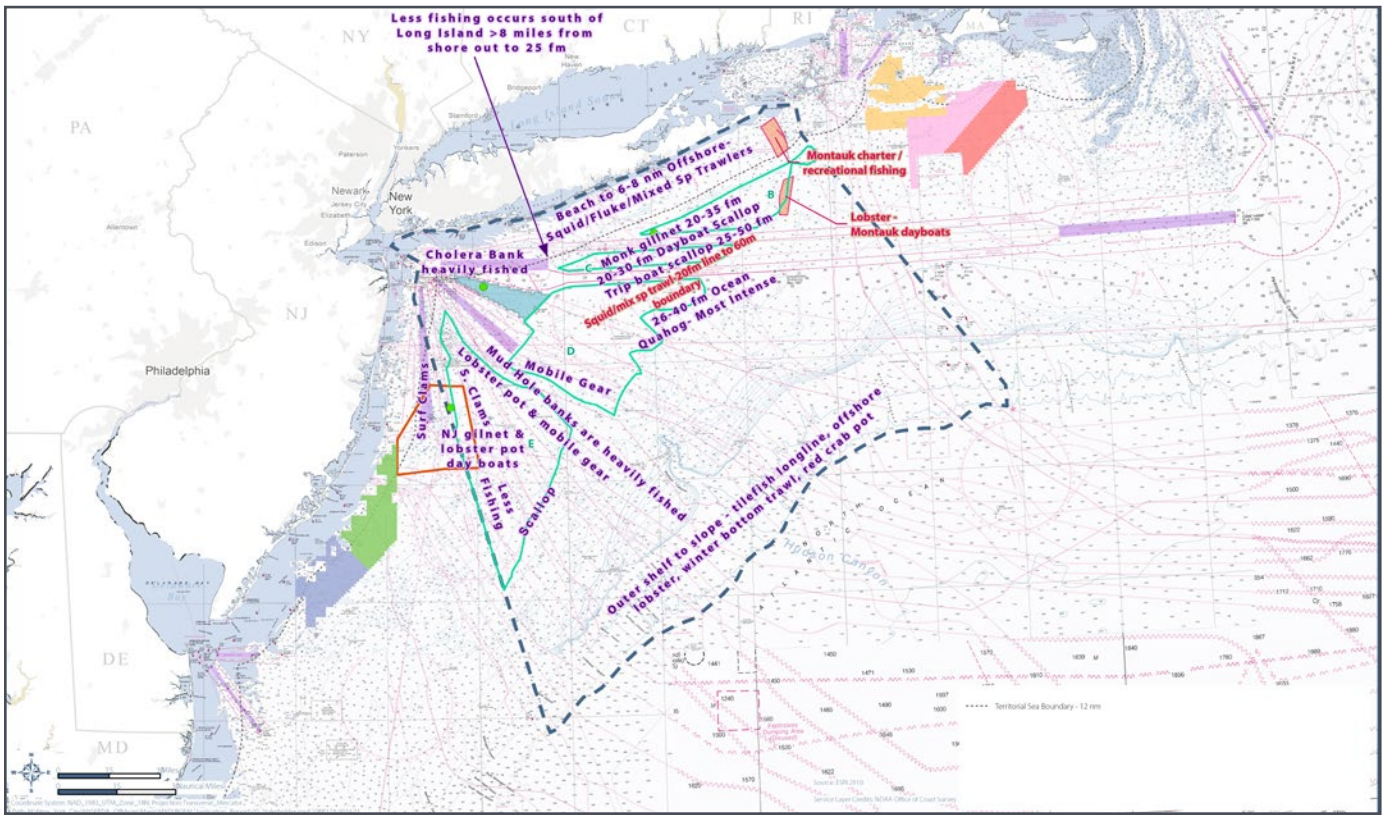


Figure 19. Observer Data for Major Fisheries.

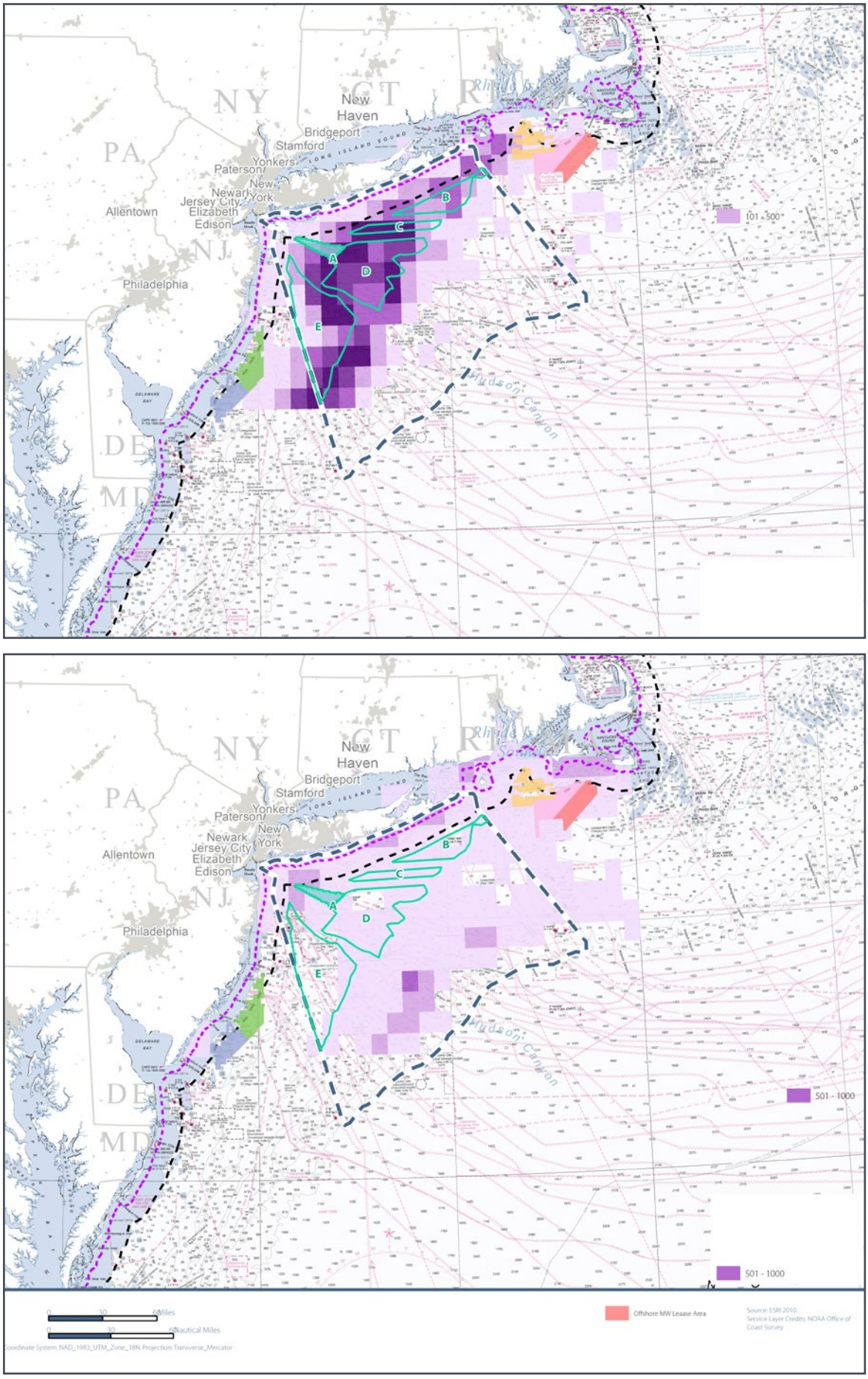
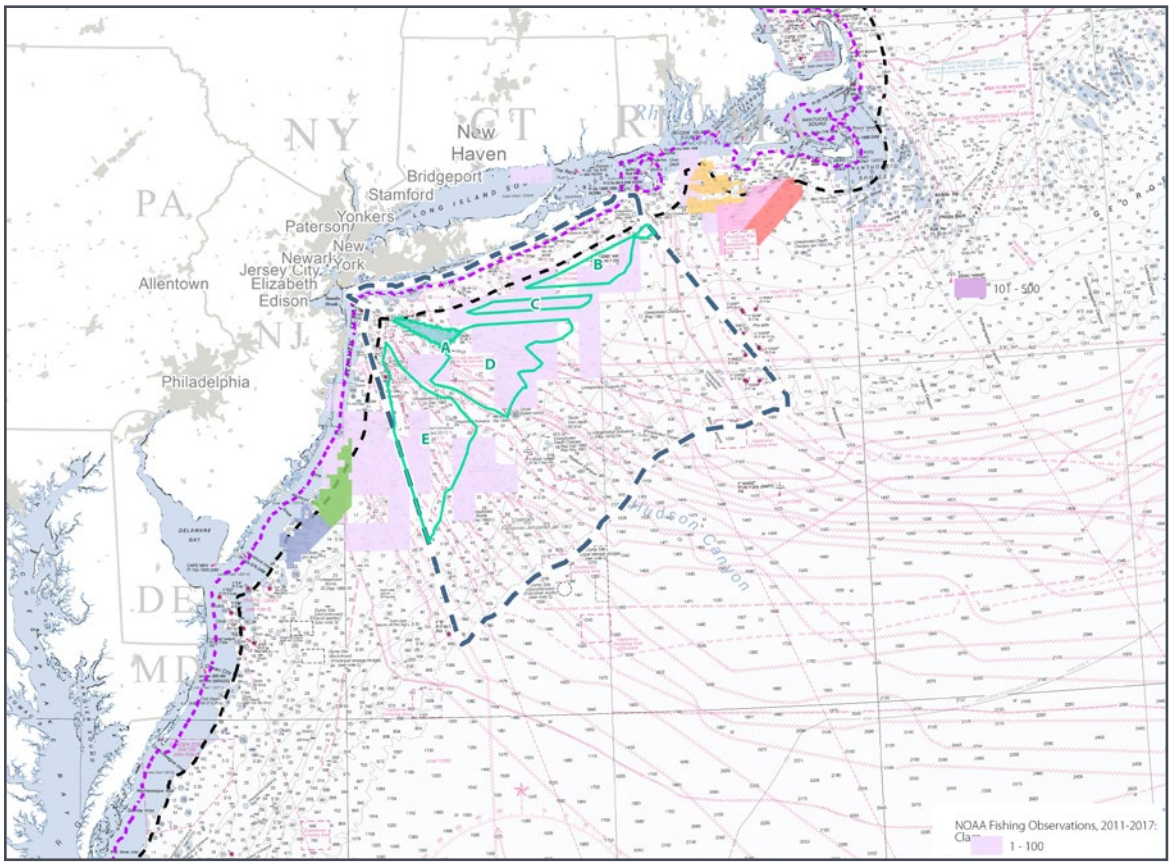


Figure 20. Observer Data Aggregated by Mobile and Stationary Gear Types.



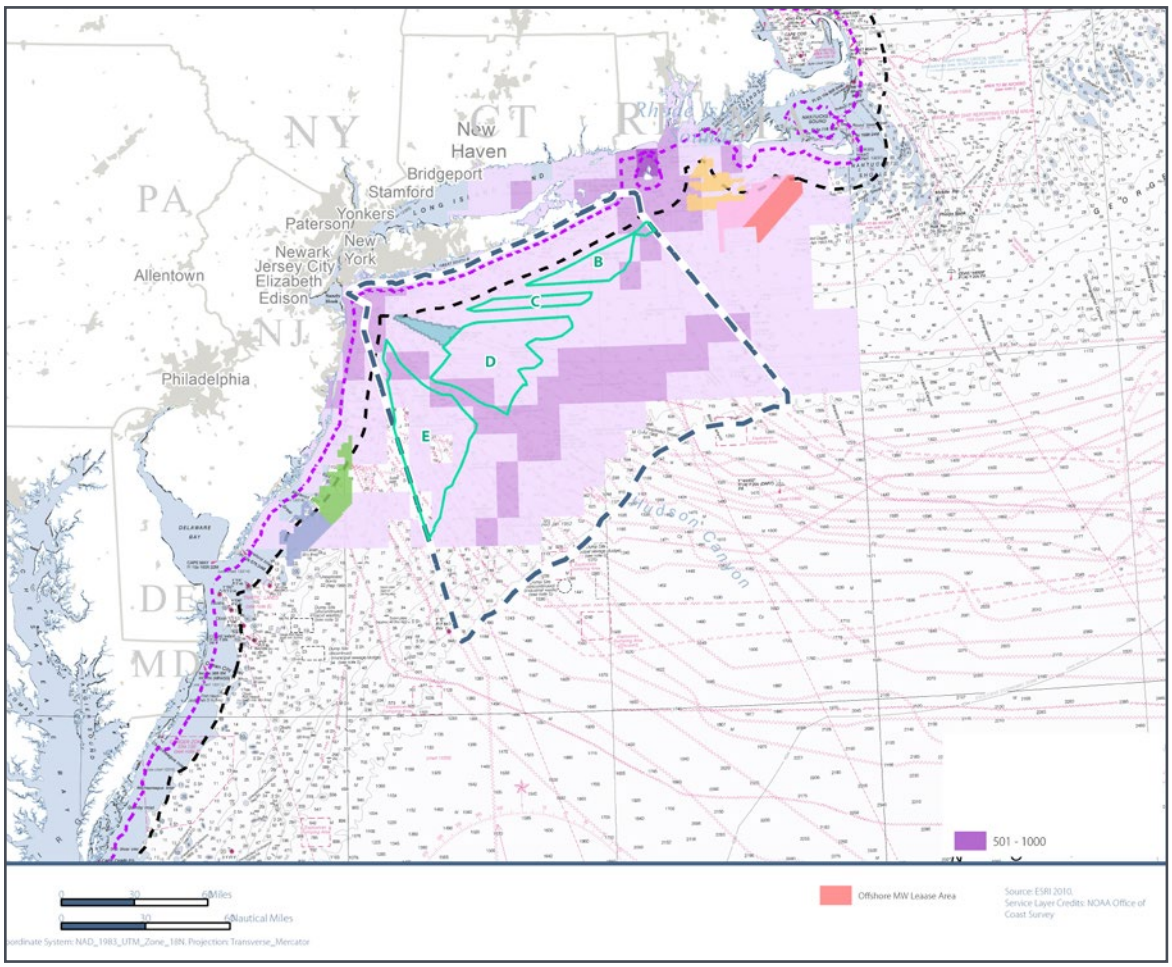
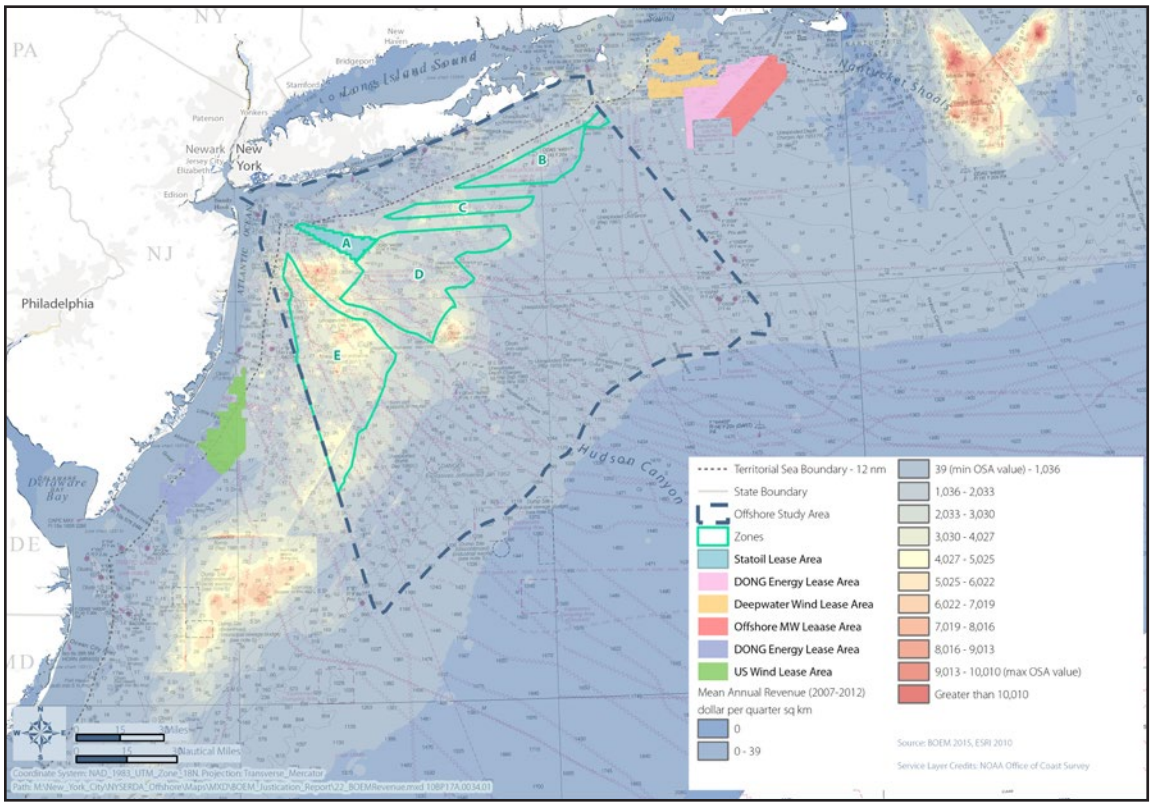


Figure 21. Commercial Fishing Revenue Intensity based on Vessel Trip Report Data.



6.7 MARINE MAMMALS AND SEA TURTLES

At least 37 species of marine mammals and four species of sea turtles are known to occur within the OSA. Of these, seven species are listed under the ESA as endangered and two are listed as threatened. Table 6 includes ESA-listed species that are known to occur within the OSA.

Table 6. ESA-listed Species Known to Occur Within the OSA.

Common Name	Scientific Name	ESA Status
Cetaceans		
Blue Whale	*Balaenoptera musculus musculus*	Endangered
Fin Whale	*Balaenoptera physalus physalus*	Endangered
Sei Whale	*Balaenoptera borealis borealis*	Endangered
North Atlantic Right Whale	*Eubalaena glacialis*	Endangered
Sperm Whale	*Physeter macrocephalus*	Endangered
Sea Turtles[a]		
Loggerhead Turtle (Northwest Atlantic Ocean Distinct Population Segmentb)	*Caretta caretta*	Threatened
Leatherback Turtle	*Dermochelys coriacea*	Endangered
Kemp's Ridley Turtle	*Lepidochelys kempii*	Endangered
Green Turtle (North Atlantic Distinct Population Segment[b])	*Chelonia mydas*	Threatened

a Hawksbill turtles are also listed as threatened under ESA but are extremely uncommon in the OSA.
b Loggerhead turtles are split into nine Distinct Population Segments (DPSs) and green turtles into 11 DPSs under the ESA, with each listed separately.

The best available data indicate that overall marine mammal use is greatest along the continental shelf break and slope, Hudson Canyon, and the areas closest to the coast where North Atlantic right whales, humpback whales, fin whales, and harbor seals use nearshore habitat. A high-use area for some baleen whales, harbor porpoise, and seals is in the northwestern corner of the OSA. Sea turtles tend to migrate northward into the OSA in summer, when waters are warmer. Loggerhead turtles are the most often observed species. Leatherbacks, though not very common, may be more common in the fall. Although density predictions place most loggerheads in the southeastern corner of the OSA, recent summer surveys of the OSA suggest they are also found across the continental shelf. These surveys also suggest green turtles are rare, and leatherbacks occur in small numbers across the shelf. Although density predictions place the highest density of Kemp's ridley turtles near the Hudson Canyon, they are more common closer to Long Island in coastal waters. Northern species, such as harbor seals and harbor porpoise, tend to move further south into the OSA in cold months.

For purposes of habitat-based density mapping to evaluate receptor hotspots, marine mammals were grouped into the following receptor groups: high-, mid-, and low-frequency cetaceans; deep- and shallow-diving cetaceans; endangered cetaceans; and North Atlantic right whales. Additionally, seals and sea turtles were both considered receptor groups. Receptor groups were developed relative to potential stressors of noise, increased/different vessel traffic, and permanent structures in the water. Endangered cetaceans and North Atlantic right whales were considered independently based on their potentially higher sensitivity and risk due to low abundance and already stressed populations. Figures 22 through 27 present high-, mid-, and low-frequency cetaceans, North Atlantic right whales, seals, and sea turtles scaled to the highest annual density within the OSA.

Figure 22. High-Frequency Cetaceans: Scaled to Highest Annual Density.

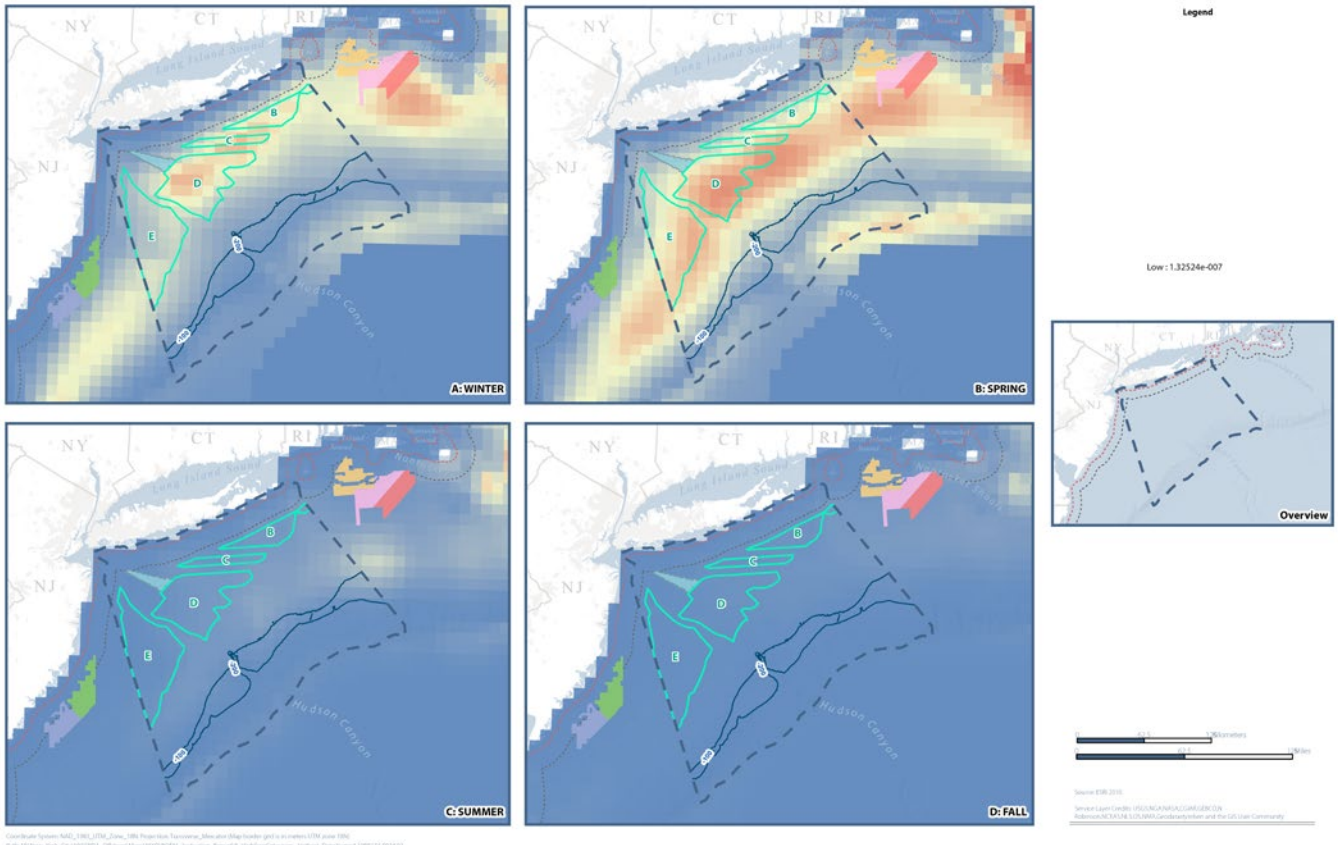


Figure 23. Mid-Frequency Cetaceans: Scaled to the Highest Annual Density.

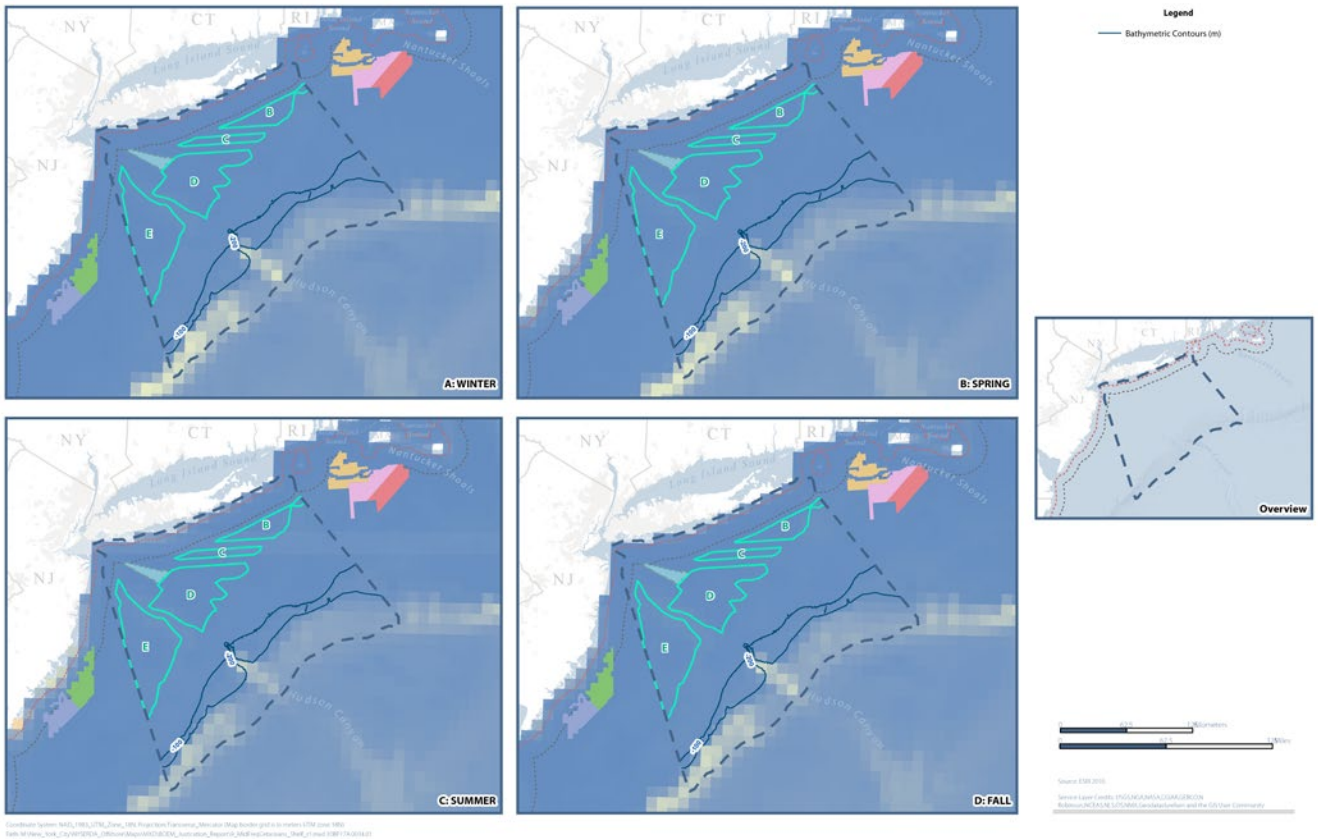


Figure 24. Low-Frequency Cetaceans: Scaled to the Highest Annual Density.

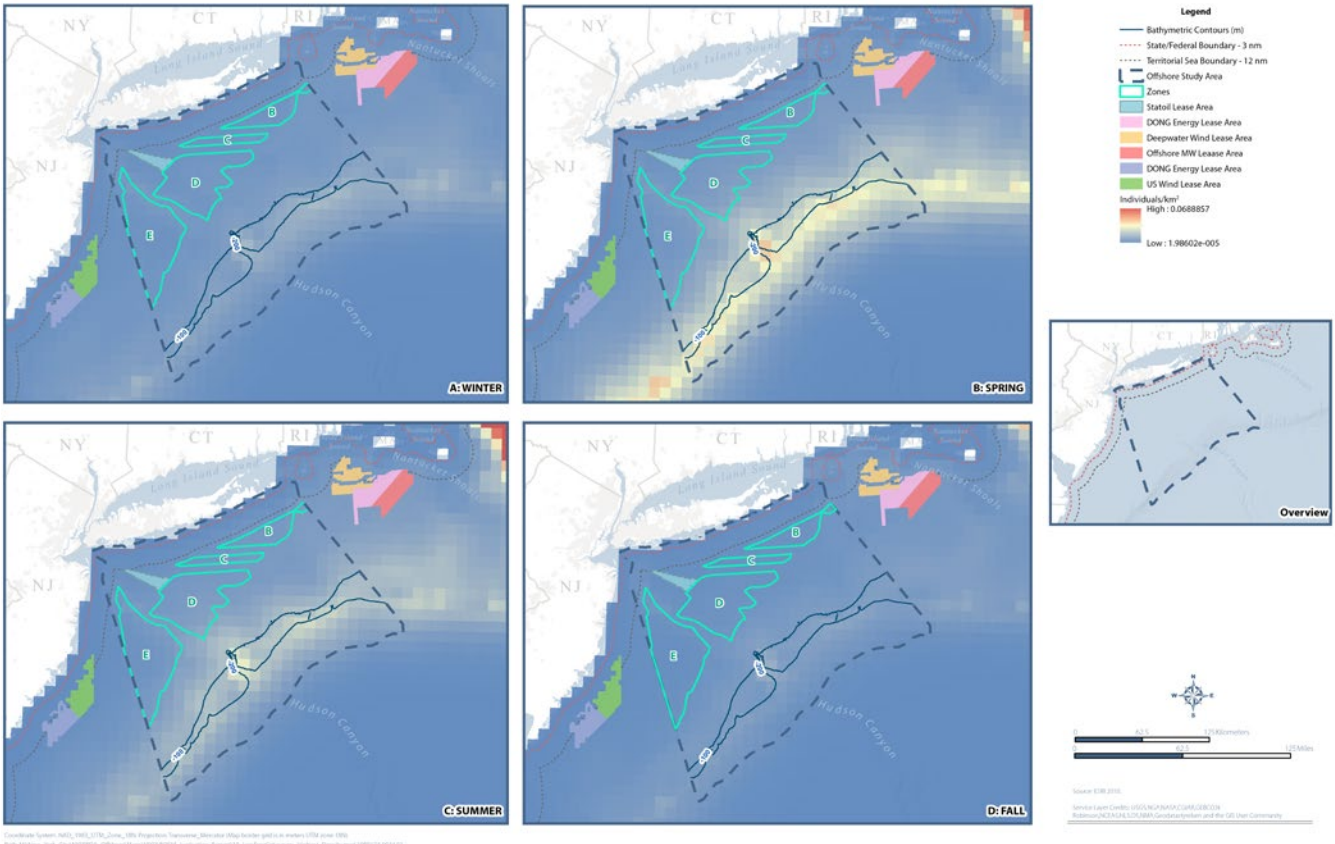


Figure 25. North Atlantic Right Whales: Scaled to the Highest Annual Density.

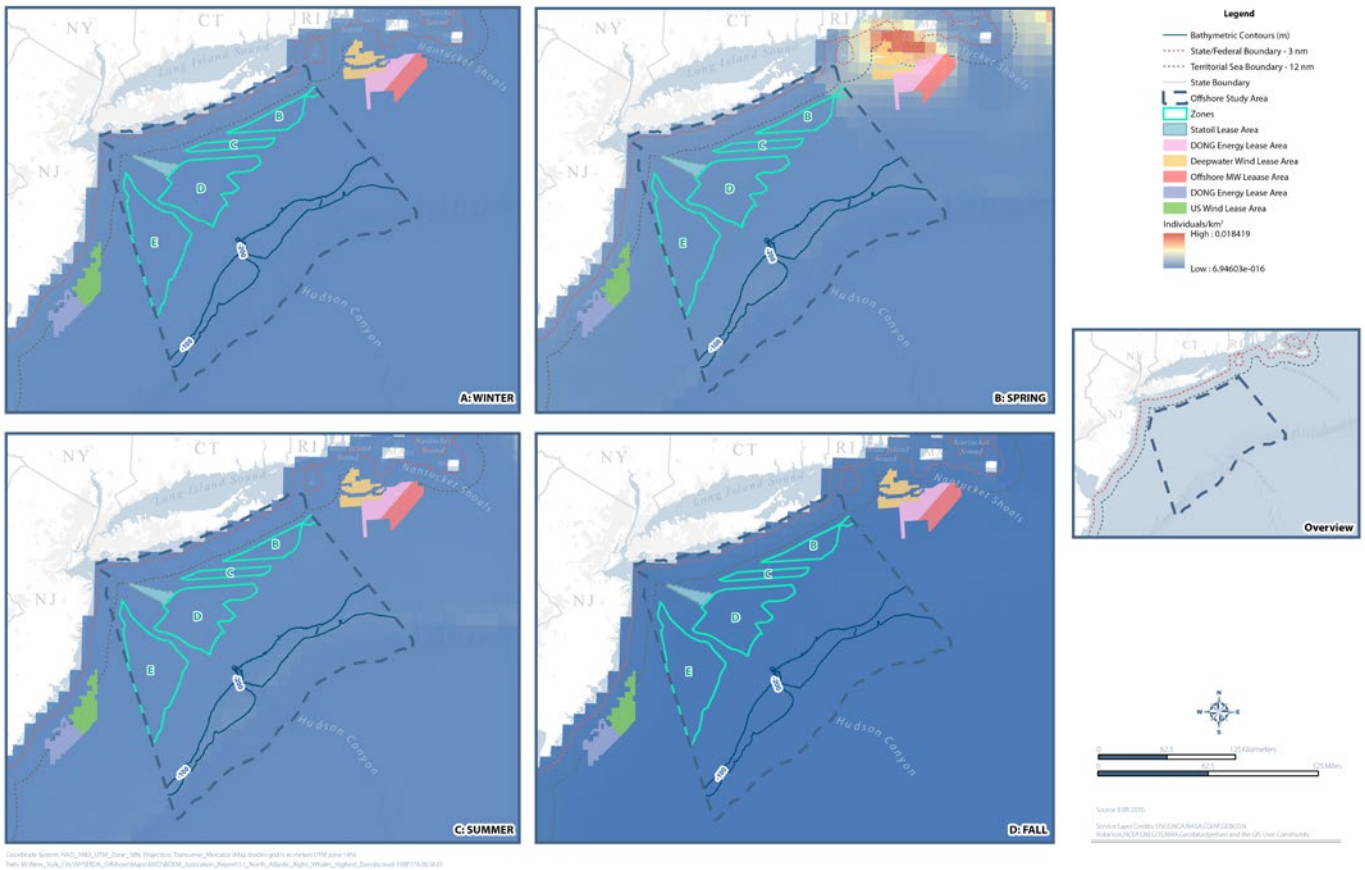


Figure 26. Seals: Scaled to the Highest Annual Density.

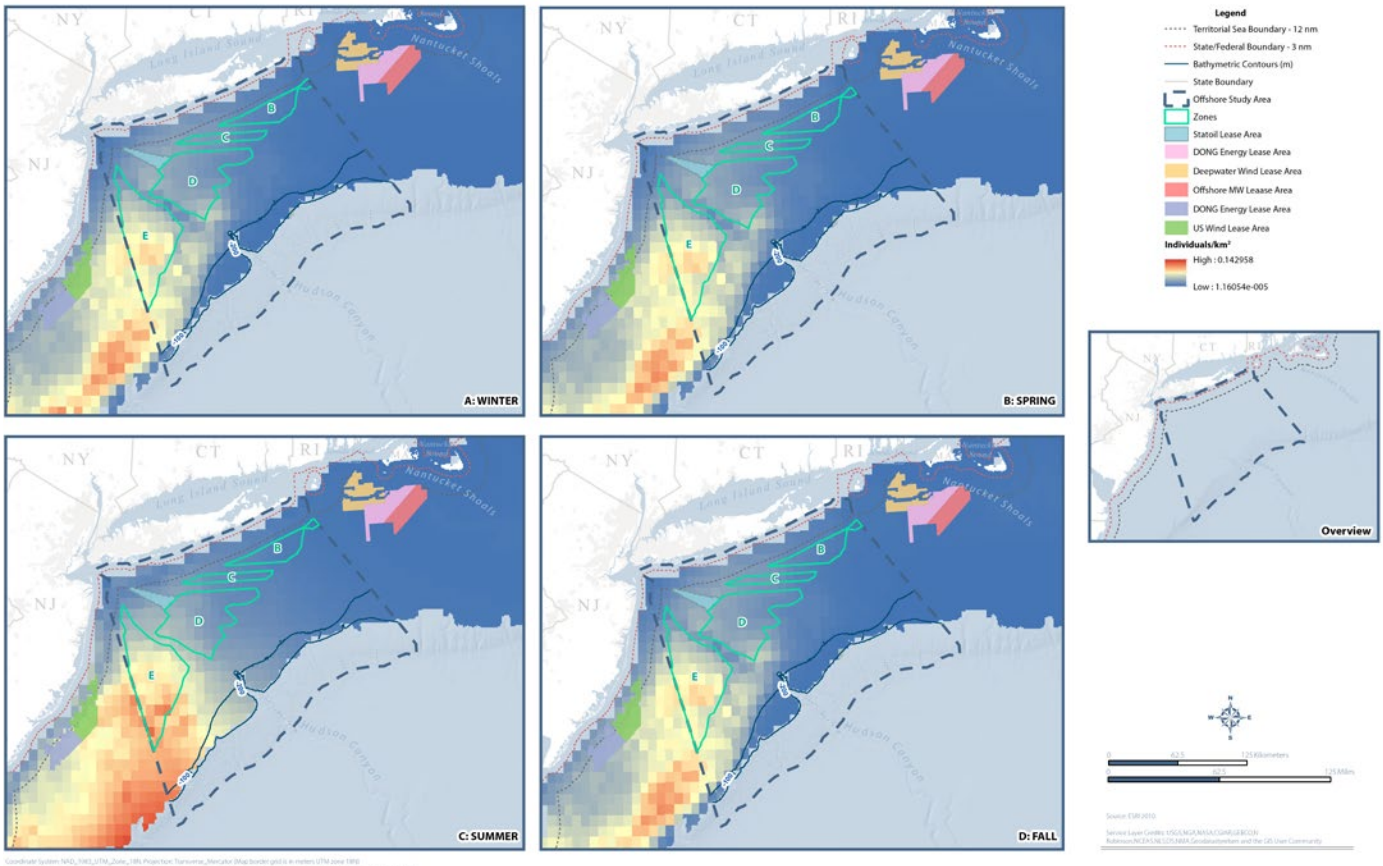
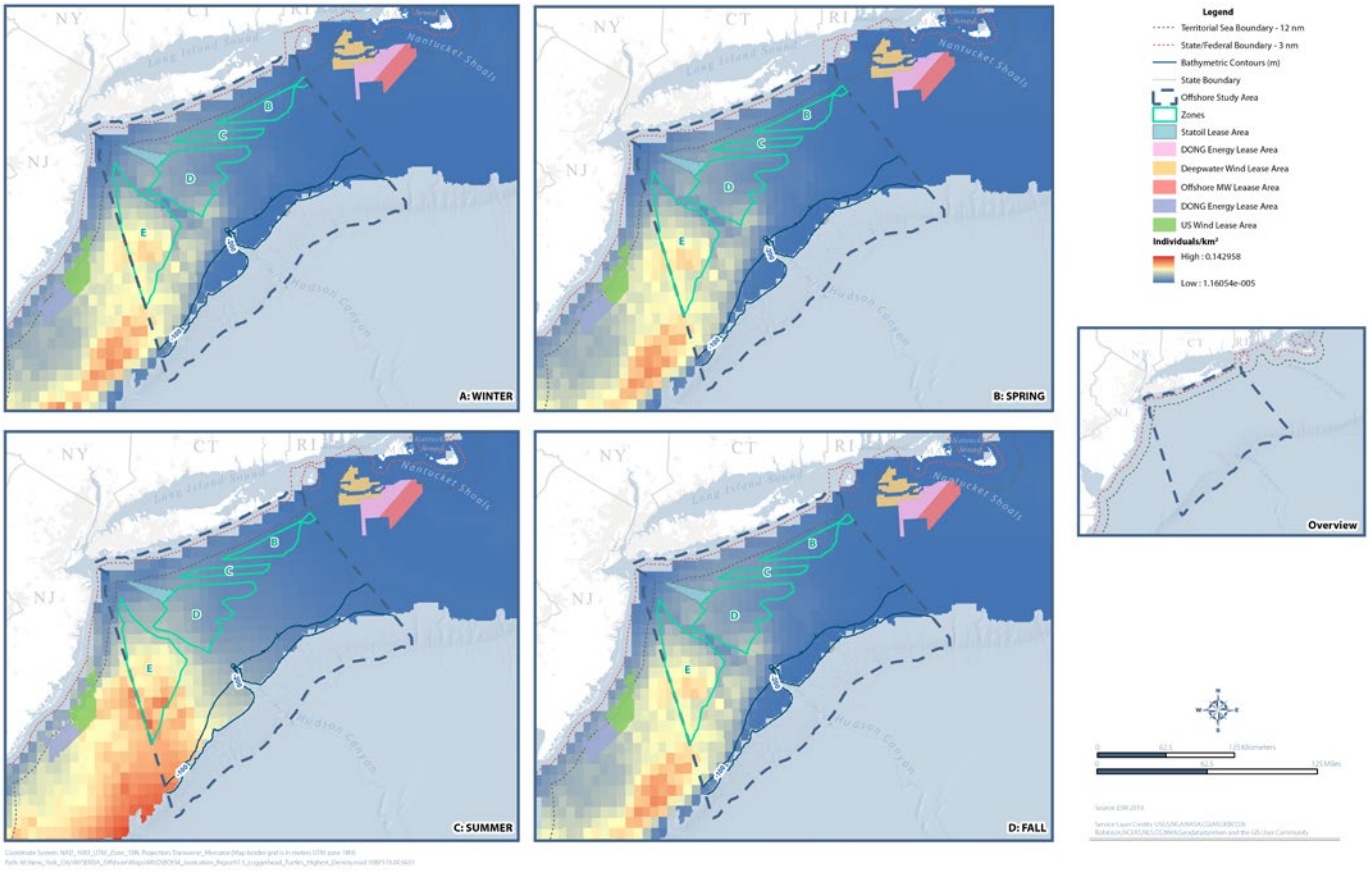


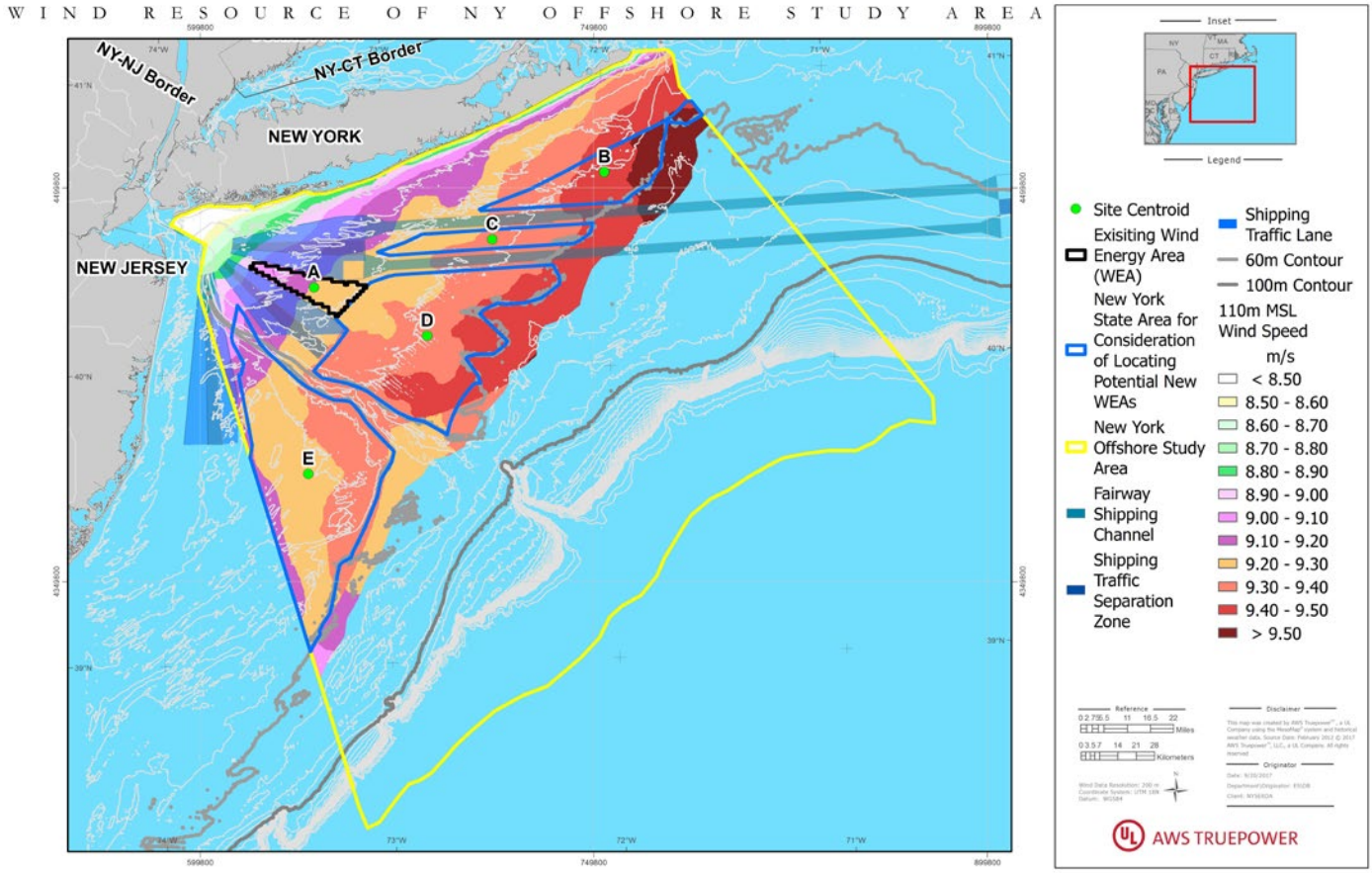
Figure 27. Loggerhead Turtles: Scaled to the Highest Annual Density.



6.8 WIND RESOURCE

According to the National Renewable Energy Laboratory (NREL), New York State has 39 GW of offshore wind capacity potential between 12 and 50nm offshore in waters less than 200 feet deep. Not only is there an abundance of acreage off the New York coast suitable for offshore wind, but the wind in these areas is among the strongest in the country. Figure 28, prepared by NREL, shows the annual average wind speeds for both land-based and offshore wind in the United States. The combination of high wind speeds and abundant offshore acreage with shallow water depths make the waters off New York State ideal for offshore wind development.

Figure 28. Wind Resource Offshore New York.



Average wind speed is the primary driver of annual electricity generation for wind projects, which in turn directly impacts the cost of energy. Wind speed should therefore be considered when identifying WEAs. Within the OSA and Zones examined, however, there is only moderate geographic variability in wind conditions, as shown in Table 7. Therefore, for offshore wind energy development purposes, wind conditions should be considered primarily in the context of potential wake loss effects. Given the average wind direction in the OSA, WEAs should be oriented, and spaced at a sufficient distance between each other such that wake effects between zones are minimal.

Table 7. Average Annual Wind Conditions in Zones

Zone	Average Wind Speed	Average Wind Direction
B	20.9 mph	213°
C	20.6 mph	211°
D	20.7 mph	209°
E	20.5 mph	206°

6.9 COST

Cost of offshore wind varies between Zones according to several key variables, which include wind speed, water depth, and distance to shore, among others. These characteristics vary not only between Zones but also within each Zone. Large Zones, such as Zone E, have more dynamic characteristics than smaller Zones, such as Zone B, leading to a wider range of potential costs. Each Zone was therefore broken down into three sub-zones: "low", "medium" and "high." To model the effective delivered cost of energy from each Zone, the characteristics of the centroids of each sub-zone were used as representative conditions. The characteristics for the centroids of the four "medium" sub-zones were used to represent average conditions within each Zone and are presented in Table 8.

Table 8. Average site characteristics for each medium sub-zone

Medium Sub-Zones	Zone B	Zone C	Zone D	Zone E
Avg. Wind Speed (mph)	21.0	20.8	20.8	20.8
Avg. Water Depth (ft)	164	151	171	118
*Distance to Shore – LI (mi)	66	42	43	70
Distance to Shore – NYC (mi)	131	103	96	98

** Distance to Shore is used to calculate transmission distances. Long Island grid connection is assumed at a central substation and is identical for all project locations.*

Due to the large acreage of the four Zones, the "medium" characteristics may not be representative of the areas that would be developed, as project owners would be expected to build in areas that would minimize costs. When considering the "near" sub-zones, the characteristics change to the following in Table 9.

Table 9. Average site characteristics for each low sub-zone

Low Sub-Zones	Zone B	Zone C	Zone D	Zone E
Avg. Wind Speed (mph)	20.8	20.6	20.8	20.6
Avg. Water Depth (ft)	154	131	151	115
Distance to Shore – LI (mi)	50	25	34	48
Distance to Shore – NYC (mi)	115	86	82	65

Table 10 ranks the four Zones from lowest cost to highest cost, when considering both "low" and "medium" sub-zones.

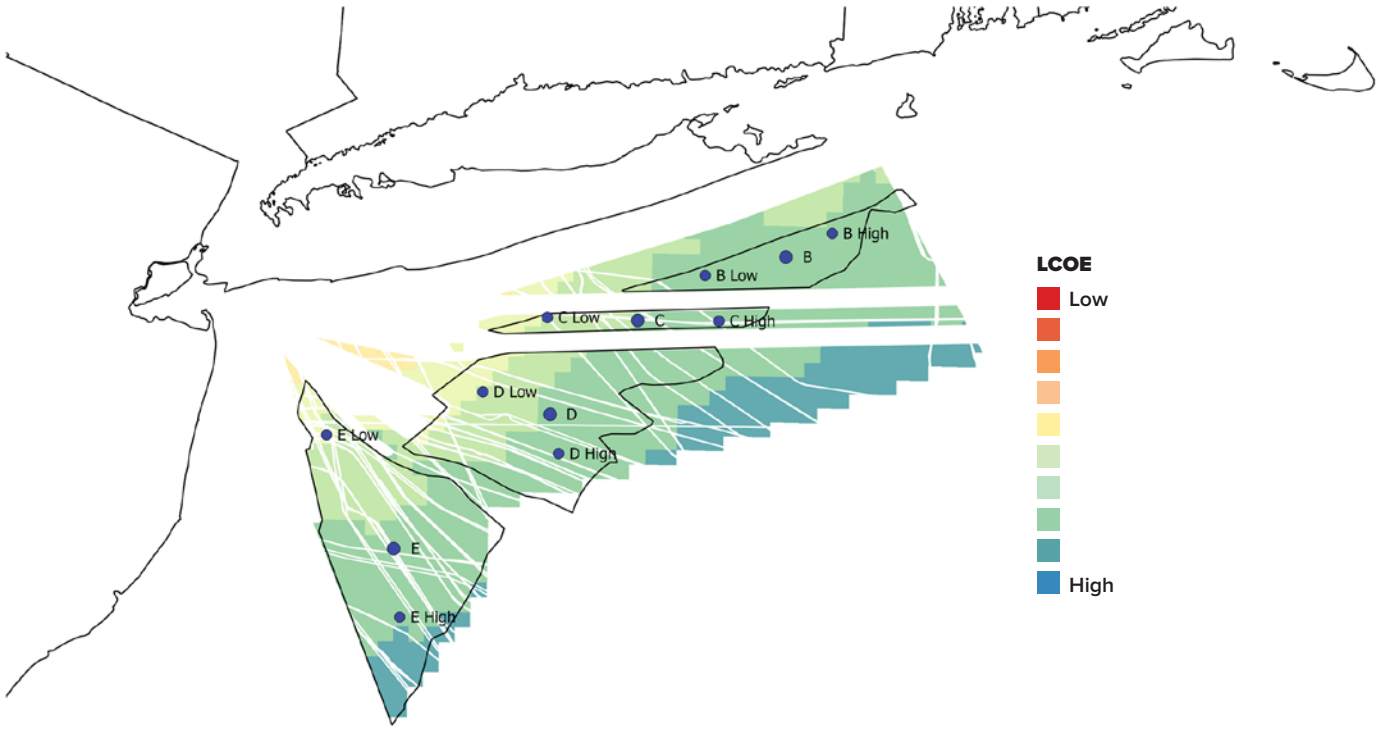
Table 10. Relative cost comparison between medium and low sub-zones

Cost Ranking	Low Sub-Zone		Medium Sub-Zone	
	Zone	Cost Increase vs. Rank #1 (%)	Zone	Cost Increase vs. Rank #1 (%)
1 (low cost)	E	n/a	C	8
2	C	1	D	8
3	D	2	E	9
4 (high cost)	B	12	B	18

The “low” sub-zones are expected to be the best representation of near-term areas, as these areas tend to result in lower costs than alternative sub-zones and are, therefore, more likely to be developed. The actual costs of energy would depend significantly on many presently unknown variables, such as procurement model and construction timing. However, the above rankings designate only relative costs between sub-zones and, therefore, are not expected to be materially affected by these undetermined factors.

Based on the above figures, Zones C, D, and E are cost-competitive, while Zone B is a significant cost outlier. Therefore, the selection of the Area for Consideration within Zones D and E is supported by the cost analysis. Figure 29 below shows the spatial representation of project cost across the four Zones. As many presently undetermined variables drive nominal levelized cost of energy (LCOE) values, this map should only be referenced for relative cost differences between Zones.

Figure 29. Levelized Cost of Energy Offshore New York.



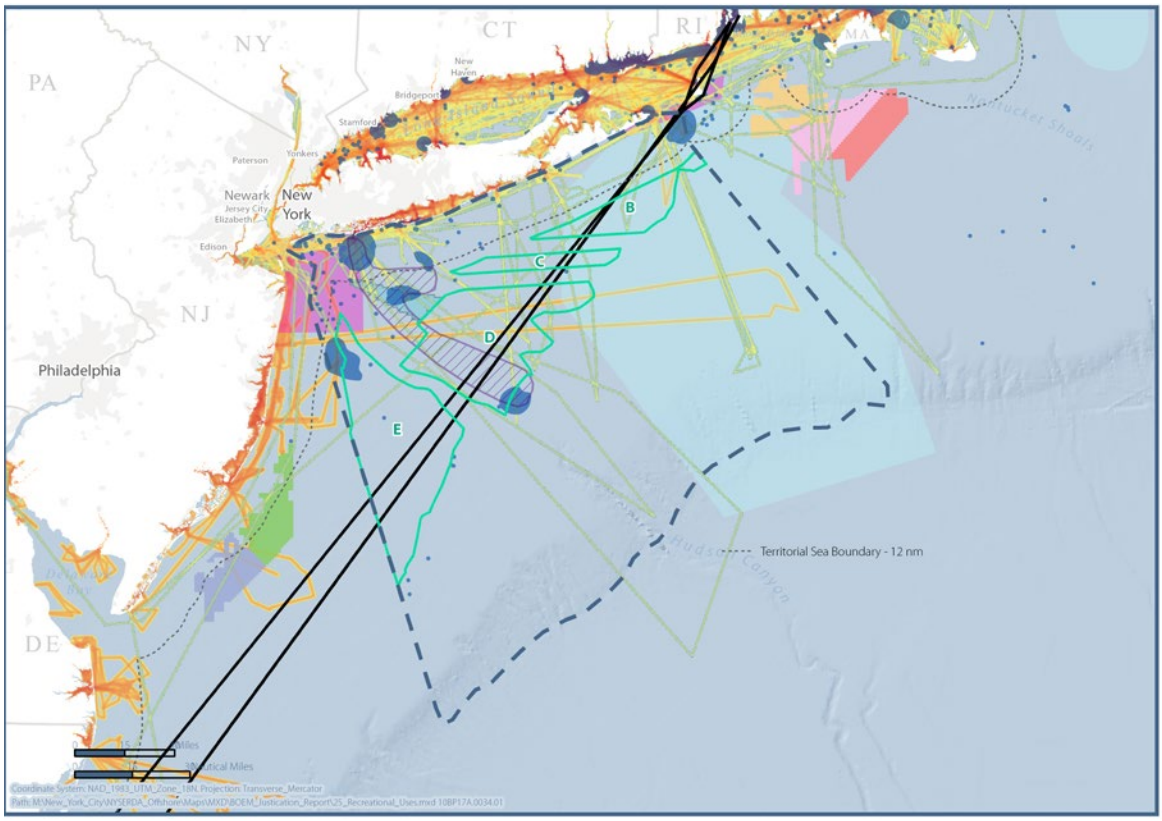
When considering WEAs within the Area for Consideration, each of the Indicative WEA configurations were considered in terms of relative cost. Configurations A and D were found to be the least expensive layouts, with Configuration B within 1% and Configuration C resulting in an average LCOE increase of 6%, over the least expensive. Generally, and as illustrated in Figure 29, project costs can be expected to decrease as areas move into shallower water that is closer to shore, allowing these characteristics to serve as simplified indicators of relative cost between potential locations.

6.10 MARINE RECREATIONAL USES

There are five prevalent marine recreational use categories occurring within and adjacent to the OSA: wildlife viewing (bird watching and whale watching), underwater activities, surface water activities, recreational boating, and cruise ship tourism. Each use category is associated with a specific spatial extent, frequency, seasonality, and relative demand. Figure 30 illustrates the marine recreational uses known to occur within each Zone.

In terms of spatial extent, frequency, and seasonality of the five categories of marine recreational uses, the identification, construction, and operation phases of offshore wind development present various sensitivities and risks of potential conflicts to these uses. In addressing sensitivity and risk, the chief factors that determine the sensitivity of marine recreational uses to conflict/impacts are distance from a potential WEA within the OSA and/or from an activity associated with the wind farm, geographic extent of the recreational activity, and seasonality of its occurrence. The wind farm activities with the greatest potential to result in impacts on marine recreational uses included conflicts with wind farm vessel traffic during all three phases; displacement by construction activities; displacement by project facilities (i.e., the footprints of the wind turbines and electric service platforms); and public safety concerns. All risks to marine recreational uses are low or moderate.

Figure 30. Marine Recreational Uses.



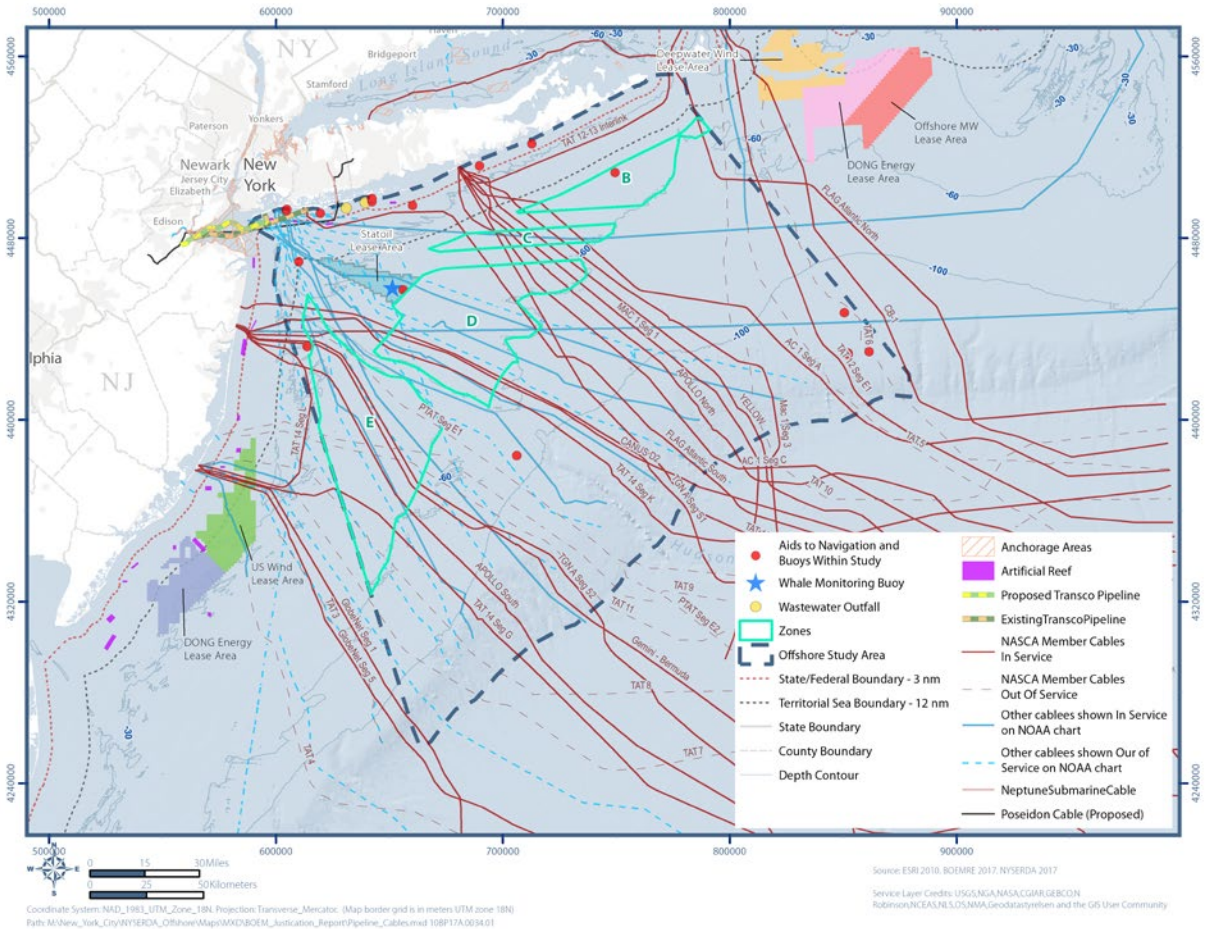
6.11 PIPELINES, CABLES, AND THIRD-PARTY INFRASTRUCTURE

Submarine cables, gas pipelines, and other infrastructure (collectively referred to as “infrastructure”) are located within the OSA. Future offshore wind farm developers could approach potential interactions with this infrastructure through different means to mitigate interference with other users of the OSA. For example, protection systems may be installed as part of an offshore wind project. Figure 31 illustrates the location of pipelines, cables and other third-party infrastructure within and adjacent to the OSA.

The guidance provided by The Crown Estate in the United Kingdom, European Subsea Cable Association, and the International Cable Protection Committee is based, in part, on experiences from European wind farm developments. A key takeaway from this guidance is that early dialogue with cable owners and operators and other users within one nautical mile should reduce many of the risks and challenges that projects face with respect to these issues. If possible, developers should avoid third-party infrastructure, either as part of the siting process for the offshore wind farm(s) itself or the planning of its export cable route(s). Additionally, developers are encouraged to conduct risk assessments to determine the area-specific requirements for cable crossings and other infrastructure interactions.

Ultimately, future offshore wind farm developers and the owners of existing infrastructure may benefit by developing crossing and proximity agreements due to the high number of cables present in the OSA. These agreements should define the specific procedures and methods by which the crossings should occur and define the buffer areas within which other protective measures (such as rock armor or mattresses, or additional surveys) may be required. These buffers will be site-specific and depend on the site conditions and requirements of the owners of the existing assets.

Figure 31. Cables, Pipelines, and Other Infrastructure.



6.12 SHIPPING AND NAVIGATION

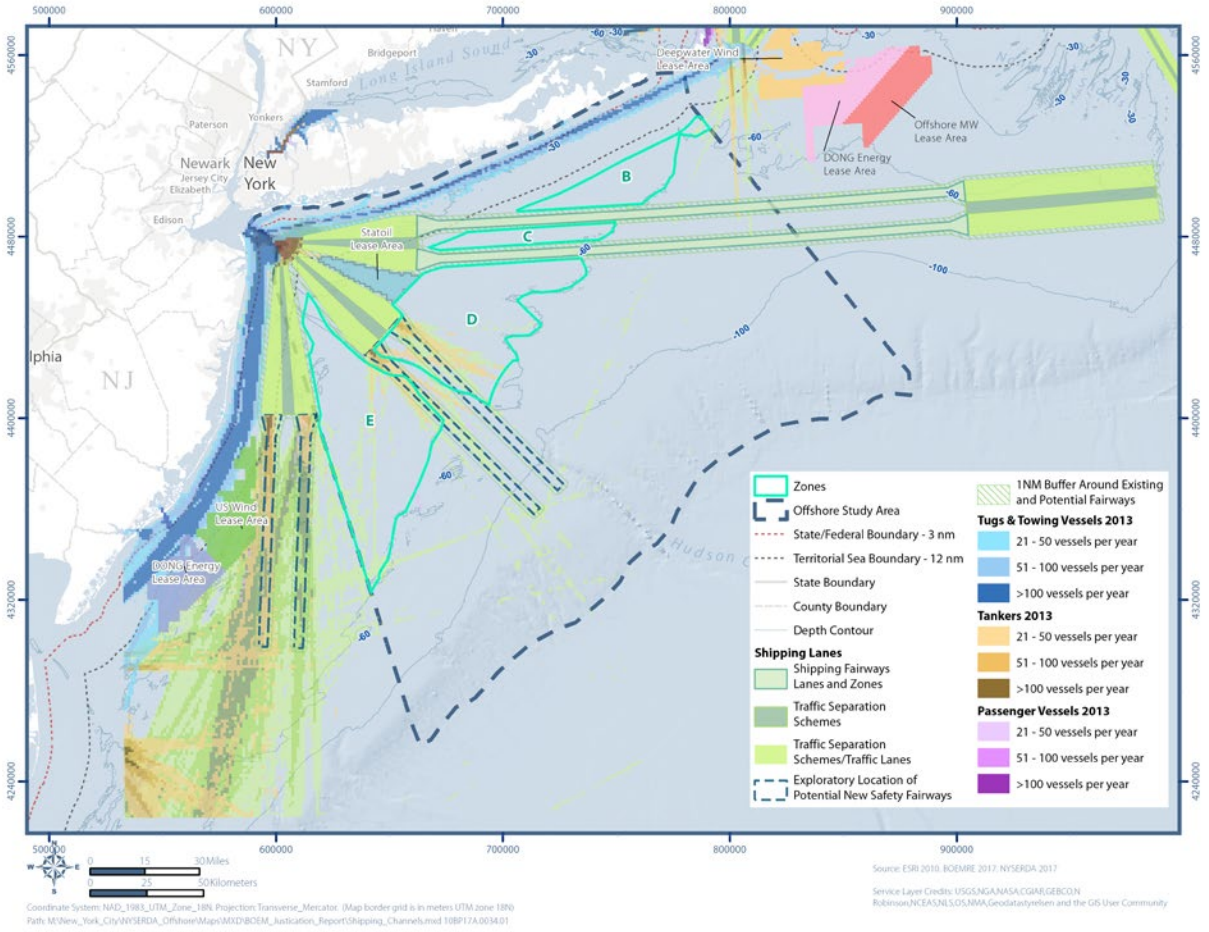
There are potential implications on shipping and navigation in the region when locating offshore wind within each of four Zones within the OSA. New York's marine waters are economically important for commercial shipping of goods and commodities. Three busy commercial shipping Traffic Separation Schemes (TSSs) are in force for large international and U.S. commercial vessels and passenger ships inbound or outbound from New York. In 2013, total voyages were >28,000, with cargo ships accounting for 51% and tankers accounting for 24%.

Seven main vessel routes intersect the OSA in accordance with the Maritime and Coastguard Agency guidance MGN 543. The most prominent feature of these routes was the high concentration of vessels in the inbound and outbound Hudson Canyon-to-Ambrose and Ambrose-to-Hudson Canyon TSSs. Navigation safety principles, guidance, and European case studies help determine a safe minimum distance between offshore wind farms and shipping and navigation uses. A Navigation Risk Assessment is required before a wind farm is constructed, which would ensure that specific safety buffers are implemented in the area.

Several areas have moderate risks to navigation, with the main region of concern being the Hudson Canyon-to-Ambrose and Ambrose-to-Hudson Canyon TSS entrance and exit. The vessel traffic outside of the middle and south TSS does not disperse in all directions but tends to follow paths extending from these TSS, as if there were "fairways." This potentially reduces the need for 5nm buffer zones around the TSS entrances as proposed in the U.S. Coast Guard Atlantic Port Coast Access Route study. Major vessel traffic routes determined from vessel automatic identification system data are shown in Figure 32.

The navigation corridors around offshore wind farms in Europe demonstrate that the most common passing distance from a wind farm is around 1nm and the smallest distance is 0.3nm. The MGN 543 guidance states that, using the principles of As Low As Reasonably Practicable, a minimum distance of 0.5nm is tolerable. Given Zone boundaries are intended to afford sufficient flexibility to accommodate space for future WEA identification, BOEM's 1nm buffer, as previously used, is considered a prudent minimum distance between shipping lanes or routes and offshore wind farm infrastructure.

Figure 32. Major Vessel Traffic Routes.



6.13 VISUAL

Hypothetical 800 MW wind farms with turbines up to 15 MW were analyzed from 13.2 to 30 miles south of Long Island. The most significant environmental variables that affect potential daytime visual impact at the distances under consideration are visibility (less than 10 miles, or greater than 10 miles), background sky conditions (clear, partly cloudy, and overcast), and time of day/sun angle (morning, mid-day, afternoon). Additionally, at distances beyond 20 miles, curvature of the Earth becomes a significant factor in physically screening substantial portions of the turbines, when visible.

Due to the combined effects of visibility and background sky conditions, visibility of turbines at a distance of 20 miles from shore would be substantially reduced for the casual viewer during the majority of the year. Visibility out to 10 miles would occur during approximately 83% of daylight hours, annually; during approximately 16% of daylight hours, visibility is less than 10 miles, indicating that turbines at any distance beyond 10 miles from shore would not be visible for this duration. Of those hours with visibility over 10 miles, overcast conditions (cloud cover of 70% or greater) occur 72% of the time. The lack of light contrast presented by overcast conditions can be a factor in significantly reducing turbine visibility under most lighting conditions. Specifically, overcast conditions substantially diminish visibility of the turbines beyond 20 miles, to a point at which they are difficult to discern against the horizon. Photographic and personal observations of the constructed Block Island Wind Farm support this finding.

Turbines may be visible at distances greater than 20 miles from shore during approximately 28% of daylight hours during a given year under clear and partly cloudy conditions. However, because visibility does not necessarily equate to visual impact, the turbines would be very difficult to discern at these distances due to the effects of curvature of the Earth (substantial portions of the turbines fall below the physical horizon) and atmospheric effects.

When considering meteorological conditions, it is likely that viewing conditions would limit visual impacts to within 20 miles from shore approximately 50% to 70% of available daylight hours. Stated differently, a project located approximately 20 miles from shore would only have varying degrees of visibility during 30 to 50% of daylight hours. Therefore, it is reasonable to assume that both visibility and visual impacts would be substantially reduced when observing turbines near or beyond the 20-mile distance threshold under the majority of viewing conditions (Table 11).

Table 11. Frequency of Occurrence of Various Time of Day/Weather Scenarios for Projects South of Long Island

Time of Day	Distance From Viewer (Miles)				
	13.2	15	20	25	30
Morning	Clear 8.1%	Clear 8.1%	Clear 8.1%	Clear 8.1%	Clear 8.1%
	Partly Cloudy 2.2%	Partly Cloudy 2.2%	Partly Cloudy 2.2%	Partly Cloudy 2.2%	Partly Cloudy 2.2%
	Overcast 23.0%	Overcast 23.0%	Overcast 23.0%	Overcast 23.0%	Overcast 23.0%
Midday	Clear 4.1%	Clear 4.1%	Clear 4.1%	Clear 4.1%	Clear 4.1%
	Partly Cloudy 1.7%	Partly Cloudy 1.7%	Partly Cloudy 1.7%	Partly Cloudy 1.7%	Partly Cloudy 1.7%
	Overcast 16.3%	Overcast 16.3%	Overcast 16.3%	Overcast 16.3%	Overcast 16.3%
Afternoon	Clear 5.1%	Clear 5.1%	Clear 5.1%	Clear 5.1%	Clear 5.1%
	Partly Cloudy 1.8%	Partly Cloudy 1.8%	Partly Cloudy 1.8%	Partly Cloudy 1.8%	Partly Cloudy 1.8%
	Overcast 20.9%	Overcast 20.9%	Overcast 20.9%	Overcast 20.9%	Overcast 20.9%
Visibility less than 10 miles	16.8	16.8	16.8	16.8	16.8
Total Daylight Hours	100%	100%	100%	100%	100%
Visible	Not Readily Discernable	Very Difficult to Discern/Not Visible			

If Aircraft Detection Lighting Systems lighting is utilized, it is unlikely that the FAA lights would have any impact on visibility. FAA light activation, based on the frequency of flights in the offshore study area, would occur over approximately 0.03% to 0.08% of the available annual nighttime hours, or approximately 72 to 201 minutes per year. This finding suggests that nighttime FAA lighting would not be visible to onshore viewers during the vast majority of nighttime hours. This information was not referenced to weather data due to the insignificant amount of time the lights would be activated. Additionally, depending on viewer elevation, the lights would likely be screened by the curvature of the Earth once beyond 30 miles from shore.

Project-specific design characteristics may also affect the degree of visual impacts associated with any given project. While turbines located less than 20 miles from shore are likely to be visible a majority of the time, project-specific visualization studies should be undertaken to determine project-specific impacts.

7.0 CONCLUSION

The State of New York is fortunate to have among the best offshore wind potential, as well as one of the most ambitious energy goals, in the nation. Responsible development of New York's and the nation's offshore wind resources will further critical objectives shared by the Federal government and the State, including the creation of locally-produced, resilient and low-cost energy. At the same time, the State, regional and national economies will benefit from investment in critical infrastructure, and the creation of a new industry with tens of thousands of new skilled jobs.

At this moment, the private sector is poised as never before to invest in the offshore wind farms that will help to power New York's – and America's – energy future. New York State's commitment to developing 2,400 MW of offshore wind capacity by 2030 will require the achievement of several administrative milestones. By this document, the State has provided BOEM with a summary of the data gathered during New York's ongoing Master Plan process and, based upon the best-available information, has identified the most promising offshore areas for BOEM's consideration. We hope that the information set forth herein will enable BOEM expeditiously to delineate and lease at least four new WEAs, each capable of supporting at least 800 MW of offshore wind capacity.

The State is looking forward to working cooperatively with BOEM as the site identification process unfolds, and will continue to prioritize this State-Federal collaboration so that together we can shepherd the development of a robust American offshore wind industry.

APPENDIX A. STAKEHOLDER ENGAGEMENT SUMMARY

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LIST OF TABLES

ACRONYMS AND ABBREVIATIONS

Blueprint	Blueprint for the New York State Offshore Wind Master Plan
BOEM	Bureau of Ocean Energy Management
LIPA	Long Island Power Authority
MAFMC	Mid-Atlantic Fishery Management Council
Master Plan	New York State Offshore Wind Master Plan
MRAC	Marine Resources Advisory Council
NASCA	North American Submarine Cable Association
NGO	Non-governmental organization
NOAA	National Oceanic and Atmospheric Administration
NYPA	New York Power Authority
NYS	New York State
NYSDEC	New York State Department of Environmental Conservation
NYSDOS	New York State Department of State
NYSDPS	New York State Department of Public Service
NYSERDA	New York State Energy Research and Development Authority
NYSOGS	New York State Office of General Services
SEP	Stakeholder Engagement Plan

1. INTRODUCTION

Stakeholder engagement is a critical component of the New York State (NYS) Offshore Wind Master Planning process. These activities were lead by the New York State Energy Research and Development Authority (NYSERDA). A wide variety of stakeholders are interested in the development of offshore wind projects, and throughout the development of the Master Plan, it is a goal of New York State to ensure key stakeholder input is actively solicited and fully considered. The results will contribute to a more balanced evaluation of potential offshore wind sites and the responsible development of offshore wind projects.

In fall 2016, New York State completed and published a Blueprint for the New York State Offshore Wind Master Plan (Master Plan). The Blueprint outlines the process to develop a Master Plan and describes how stakeholder input and feedback will inform the Master Plan. From October 2016 through September 2017, the State completed a rigorous stakeholder outreach process as part of the Master Planning process. To provide a framework for the Master Plan stakeholder engagement process, the State developed and implemented a Stakeholder Engagement Plan (SEP). The SEP identified key stakeholder groups, set forth outreach objectives, described tools and tactics for outreach, and outlined a timeline for stakeholder engagement. The SEP also included tailored stakeholder engagement plans for key stakeholder groups.

New York State held six public information meetings throughout New York City and Long Island related to the Master Plan and its associated studies. Each event was widely advertised to ensure that a broad cross-section of the community had the opportunity to engage with the relevant State agencies and authorities. Each of the six public information meetings included presentations about the Master Plan and supporting studies, a public question and answer period, and one-on-one meetings with any individuals who cared to discuss issues. The six public information meetings were held:

- July 10, 2017: Long Island Association, Melville, New York
- July 11, 2017: Long Beach Public Library, Long Beach, New York
- July 12, 2017: Southampton Inn, Southampton, New York
- August 14, 2017: Queens Library at Peninsula, Rockaway Beach, New York
- August 15, 2017: New York Public Library St. George Library Center, Staten Island, New York
- August 16, 2017: New York Aquarium, Brooklyn, New York

The following stakeholder groups were identified for targeted outreach:

- Coastal communities
- Commercial and recreational fishermen
- Labor and business organizations
- State and federal agencies
- Maritime communities
- Elected officials
- The offshore wind energy industry
- Non-governmental organizations
- Ratepayer advocates
- The submarine cable and offshore infrastructure industry

In addition, the State reached out to all federally recognized indigenous nations in New York State, as well as the Unkechaug Nation.

The State's proactive public involvement strategy invites stakeholders to participate throughout the development of the Master Plan. Importantly, the State's efforts have established close relationships with stakeholders, through which continued dialogue and collaboration will be possible. The public involvement process for the Master Plan provided opportunities for stakeholders to participate in a meaningful and timely dialogue, obtain information of interest, express concerns and provide input, and have those concerns considered by NYSERDA as part of the planning process.

2. STAKEHOLDER OUTREACH - AGENCY PARTICIPATION AND INDIGENOUS NATION COORDINATION

2.1 AGENCY PARTICIPATION

State and federal agencies are responsible for the planning, siting, and permitting of activities in the offshore space. As such, state and federal agencies are critical partners in developing the Master Plan. The U.S. Department of Defense, Bureau of Ocean Energy Management (BOEM), Nation Oceanic and Atmospheric Administration (NOAA), U.S. Army Corps of Engineers, U.S. Fish and Wildlife Service, U.S. Environmental Protection Agency (EPA), and U.S. Coast Guard are among the federal agencies consulted as part of this stakeholder engagement effort. In regard to New York State agencies, consultations were held with and between NYSERDA and the Department of State (NYSDOS); Department of Environmental Conservation (NYSDEC); Department of Public Service (NYSDPS); Office of General Services (NYSOGS); Office of Parks, Recreation and Historic Preservation; Long Island Power Authority (LIPA); New York Power Authority (NYPA); Empire State Development; and Department of Labor. Additionally, NYSERDA sought feedback from the Rhode Island Department of Environment Management and Massachusetts Division of Marine Fisheries regarding commercial fishing data and stakeholder engagement. The New Jersey Department of Environmental Protection was consulted regarding the Cumulative Effects Study and the Benthic Study.

In early April 2017, NYSERDA provided New York State agencies with background information on the Master Plan and invited them to participate in the planning process. On April 28, 2017, NYSERDA contacted agencies seeking input on a data review and analysis synthesis that catalogued existing datasets of the natural, biological, and cultural marine resources present within the offshore planning area and identified topics that would benefit from further study. During the summer, NYSERDA contacted agencies for input on the draft Environmental Sensitivity and Risk Analysis (June 14, 2017) and information on reasonably foreseeable projects in the offshore planning area to inform the cumulative impact analysis (August 1, 2017). In addition, a variety of state and federal agencies received draft Master Plan studies throughout the first half of August to review and provide feedback. Attachment 1: Agency Meetings presents a list of agency meetings and interactions.

NYSDOS and NYSDEC have been key partners in developing the Master Plan. In fact, it was NYSDOS's own "offshore planning area" that was used as the basis for the Master Plan's offshore planning area.

NYSERDA and NYSDOS interacted on a regular basis, including scheduled bi-weekly calls, to further ensure coordination and to capture NYSDOS's historical knowledge of the planning area and the subject matter of offshore wind development. NYSDOS and NYSDEC, along with other agencies, played a large role in the public information meetings by sharing knowledge on the Master Plan and answering stakeholder questions. In addition, NYSDOS and NYSDEC have a long history of interacting with the commercial fishing community in New York and around the region. NYSERDA wanted to build on those relationships and experience as the planning process progressed.

The primary goal of agency coordination was to reach a consensus regarding content of Master Plan studies and surveys, as well as coordinate the State's recommendations to BOEM regarding the site nomination process. Through agency outreach, NYSERDA created an open dialogue in which agencies could share knowledge, data, and best management practices. Specific accomplishments of engagement included:

- Agency review and comment on the data review and analysis synthesis
- Discussion of scopes of work regarding studies and surveys for the Master Plan
- Developing outreach plans for public meetings
- Participation in the public meetings
- Developing outreach plans for commercial fishing stakeholders
- Soliciting feedback on studies and surveys for the Master Plan
- Coordinating on areas for consideration by BOEM

2.2 INDIGENOUS NATION COORDINATION

Indigenous Nations

Based on a review of previous onshore and offshore wind development reports and findings within the United States, indigenous nations generally have noted concerns when development has the potential to impact their traditional resources and indigenous treaty rights; archaeological and architectural resources; visual resources, including views within and to/from landscapes or seascapes; terrestrial and marine habitats; ambient noise levels; and socioeconomic conditions; and when compounding impacts may occur as a result of several simultaneous or consecutive projects. To address these types of concerns, NYSERDA provided consultation opportunities and consulted with indigenous nations. Throughout the Master Plan process, NYSERDA has reached out to the following indigenous nations:

- Cayuga Nation
- Delaware Nation
- Delaware Tribe of Indians
- Oneida Nation of New York
- Onondaga Nation
- Saint Regis Mohawk Tribe
- Shinnecock Indian Nation
- Seneca Nation of Indians
- Stockbridge-Munsee Band of Mohican Nation
- Tonawanda Band of Seneca Indians
- Tuscarora Nation
- Unkechaug Indian Nation

NYSERDA sent outreach letters to these indigenous nations on April 7, 2017, to initiate contact and introduce the Master Planning process. Due to a response from that initial communication indicating an interest, NYSERDA continued engagement with the Delaware Tribe of Indians during a conference call on June 8, 2017. On August 10, 2017, NYSERDA sent a draft copy of the Cultural Resources Assessment to indigenous nations seeking feedback. Additionally, NYSERDA traveled to Long Island, New York, on August 22, 2017, and met with the Shinnecock Indian Nation and the Unkechaug Indian Nation to discuss the Cultural Resources Assessment and provide updates on the Master Plan.

Issues raised during the discussions included:

- Being recognized for participation in the Master Plan process
- Potential impacts on the marine environment
- Disruption of cultural resources due to potential development
- Compliance with Section 106 of the National Historic Preservation Act of 1966

NYSERDA assured indigenous nations that the Master Plan would include discussion of their contributions, capture their concerns, and address their comments on the Cultural Resources Assessment.

3. STAKEHOLDER OUTREACH – ELECTED OFFICIALS, COMMUNITY AND INDUSTRY LEADERS, NONGOVERNMENTAL ORGANIZATIONS, AND COMMERCIAL FISHING

3.1 ELECTED OFFICIALS

NYSERDA reached out to elected officials throughout the Master Planning process. On April 25, 2017, NYSERDA sent letters to town leaders on Long Island to provide information on offshore wind development and requesting the opportunity to meet to further discuss any interests, questions or concerns. On July 3 and July 28, 2017, NYSERDA sent letters to local elected officials from New York City and Long Island, New York State Assembly, New York State Senate, U.S. House of Representatives, and U.S. Senate. These letters announced the State's public information meetings on Long Island and in New York City and welcomed the opportunity to speak further regarding the Master Plan. Additionally, emails were sent the elected officials in New York City and Long Island throughout the engagement process to provide updates on the Master Plan (Attachment 2: Elected Officials Contact List).

In addition to written correspondence, NYSERDA met with community-elected officials to provide information on the Master Plan. Elected officials expressed views about potential impacts on the environment, ratepayers, the fishing industry, the tourism industry, and visibility. Elected officials also recognized the benefits of offshore wind development for New York State, and expressed a desire to move away from

the use of fossil fuels, increase energy security, and create jobs. NYSERDA conducted meetings with local elected officials prior to public outreach events to generate local interest in the upcoming public meetings and inform elected officials in advance of questions they might receive from constituents during or following public meetings. NYSERDA provided elected officials with information to aid conversations with constituents regarding the Master Plan.

3.2 INDUSTRY LEADERS

NYSERDA consulted with experienced professionals in the offshore wind industry to understand more fully the challenges surrounding offshore work and engaging stakeholders in the offshore space. NYSERDA formed a Market Advisory Group that included representatives from companies that develop offshore infrastructure, manufacturers of wind energy equipment, offshore wind industry groups, engineering firms, and law firms. Around 20 members participated in each of the six webinars, which covered topics such as public outreach, visual assessments, benthic surveys, offtake provisions, New York State policies and incentives, and lessons learned from the European experience in offshore wind energy development (Table 1).

Table 1 Industry Leaders Meetings

Industry Leaders	Type of Meeting	Date
Market Advisory Group	Webinar	April 26, 2017
Market Advisory Group	Webinar	May 10, 2017
Market Advisory Group	Webinar	May 24, 2017
Market Advisory Group	Webinar	June 7, 2017
Market Advisory Group	Webinar	August 2, 2017
Market Advisory Group	Webinar	August 23, 2017
NASCA, AT&T, Global Cloud Xchange, Global Marine Systems, TE SubCom	In-person / Conference Call	June 29, 2017

Besides the Market Advisory Group, representatives from the North American Submarine Cable Association (NASCA) and companies that install, maintain, or own submarine telecommunications cables were consulted, in addition to industry leaders and labor and business organizations that have contributed to the Master Planning process. Meetings with labor and business leaders provided opportunities to voice concerns and share ideas. NYSERDA hosted a Long Island Labor Union Leadership Roundtable on July 27, 2017, in Hauppauge, New York and an Offshore Wind New York City Briefing and Roundtable with Labor Leaders on August 31, 2017 at NYSERDA's New York City Office. Participants included representatives from local labor unions, building trade councils, the Teamsters, The Workforce Development Institute, Department of Labor, and chambers of commerce (Attachment 3: Labor Leaders Meetings).

3.3 NON-GOVERNMENTAL ORGANIZATIONS

From conception of the Master Plan, NYSERDA engaged with environmental and public advocacy focused non-governmental organizations (NGOs). These organizations included, but were not limited to: Audubon New York, Citizens Campaign for the Environment, National Wildlife Federation, Natural Resources Defense Council, New York City Audubon, Renewable Energy Long Island, Sane Energy, Sierra Club, South Shore Audubon, Surfrider Foundation, The Nature Conservancy, Uprose and the Wildlife Conservation Society. During meetings and consultations with these organizations (Table 2), NYSERDA delivered updates on the Master Plan; solicited feedback on studies, surveys, data, and stakeholder outreach; and gathered concerns related to offshore wind area site selection.

Engagement with NGOs provided the following benefits:

- Feedback on studies and surveys
- Suggestions regarding NGO outreach in advertisement of public meetings
- Collaboration on best management practices for offshore wind energy development and stakeholder engagement
- Value or concerns relating to various datasets
- General interest or concerns with OSW development

Table 2 Non-governmental Organization Meetings

Non-governmental Organizations	Type of Meeting	Date
Alliance for Clean Energy New York, Natural Resources Defense Council, National Wildlife Federation, Citizens Campaign for the Environment, Audubon New York, Special Initiative on Offshore Wind, The Nature Conservancy, Renewable Energy Long Island	In-person	November 9, 2016
Alliance for Clean Energy New York, Natural Resources Defense Council, National Wildlife Federation, Citizens Campaign for the Environment, Litz Energy Strategies on behalf of Audubon New York, The Nature Conservancy, Sierra Club, Sane Energy	In-person	February 23, 2017
Natural Resources Defense Council, National Wildlife Federation	Conference Call	June 9, 2017
Natural Resources Defense Council, National Wildlife Federation	Conference Call	June 20, 2017
Audubon New York	Conference Call	July 17, 2017
Natural Resources Defense Council, National Wildlife Federation, The Nature Conservancy, Wildlife Conservation Society	Conference Call	August 3, 2017

In addition to in-person meetings and conference calls, NYSERDA disseminated a questionnaire to NGOs. The intention of the questionnaire was to gather relevant contact information and background information on each NGO; understand the organization's interest and/or experience in offshore wind energy development and ocean planning; identify potential gaps in the Master Plan areas of study; and inquire about the organization's interest in engaging throughout the Master Planning process. NYSERDA sent the questionnaire to nearly 50 NGO contacts and received responses from 350Brooklyn, Jewish Climate Action Network-New York, All Our Energy, Sane Energy Project, The Nature Conservancy, and New York Offshore Wind Alliance. Overall, responses indicated general support for offshore wind and experience in outreach and environmental education, data collection, and analysis surrounding environmental impacts of offshore activities. Collectively, NGOs suggested NYSERDA focus on the following areas in its Master Planning efforts:

- Ratepayers and vulnerable populations
- Jobs and training for transitional workers
- Supply chain development
- Stakeholder engagement (education, involvement, and knowledge sharing)
- Environmental impacts
- Shipping and navigation impacts
- Visual impacts
- Potential offtake mechanisms

3.4 COMMERCIAL FISHING

New York State hosts a diverse commercial and recreational fishing industry in its marine waters. The Blueprint for the Master Plan recognizes the importance of the fishing industry to New York State. The Blueprint identifies the fishing community as one of the key stakeholder groups whose views should be actively solicited and fully considered as plans for offshore wind development move forward.

New York's diverse fishing industry has concerns over impacts from offshore wind development on fisheries resources, including habitat, noise, socioeconomics, and cumulative impacts. It has been essential to engage fishing community stakeholders early in the development of the Master Plan to ensure concerns and ideas can be addressed early and throughout the process.

It should be noted that, although the commercial fishing industry is identified as the primary fisheries stakeholder, concerns of the recreational fishing community are recognized as well. These groups are often considered together, particularly when considering the ecological impacts on species and habitats. Commercial and recreational fishing stakeholders often participate in the same formal and informal groups. However, it is acknowledged that the goals, concerns, and resources of these two groups are not identical and are sometimes at odds with each other.

3.4.1 Commercial Fishing Notification/Communication

A range of tools were used during efforts to reach out to the fishing community. NYSERDA appointed a fisheries liaison (as described below in Section 3.4.2) to communicate directly with stakeholders. The State's outreach included phone and email correspondence, attendance at state and regional fisheries meetings, site visits to fishing docks, and public meetings. Notices regarding public meetings were sent through state and regional electronic mailing lists, such as the New York Marine Resources Advisory Council (MRAC) list and the Mid-Atlantic Fishery Management Council (MAFMC) list. Notifications regarding the offshore wind Master Planning process and meetings specifically related to fishery outreach was provided through the NYSERDA offshore wind webpage (https://www.nyserda.ny.gov/offshorewind), as described in Section 4.1.1.

3.4.2 Commercial Fishing Liaison

A key part of the outreach strategy for local fishing communities was the appointment of Stephen Drew of Sea Risk Solutions LLC, an industry-respected Fisheries Liaison, to help advise and facilitate communication strategies and interactions with fisheries stakeholders NYSERDA appointed a liaison in May 2017. Mr. Drew has served as a mediator between NYSERDA and fisheries stakeholders to assist in the development of outreach activities. The credentials and role of the Fisheries Liaison are described below:

- Knowledgeable about commercial and recreational fisheries in the offshore planning area
- Able to communicate effectively with industry representatives and fishing groups
- Provides advice and assistance to NYSERDA in implementing communication strategies with industry representative and fishing grouping, such as initiating stakeholder contacts, disseminating meeting information, and gathering sensitive industry data
- Assists in organizing meetings to solicit input and comments on the project, available and recommended datasets, and future research needs
- Assists in the identification and collection of available fisheries data to inform project planning and offshore wind facility siting decisions, with the goal of identifying potential sites for offshore wind development during the Master Plan process in 2017
- Met with industry representatives and fishing groups in New York and other states

- Advises NYSERDA on strategies to mitigate potential adverse project construction and operation impacts based on stakeholder input and knowledge of local fisheries
- Assists in the ongoing development of a stakeholder list, including relevant fishery community individuals, officials, and organizations
- Ensures bilateral communication between NYSERDA and industry representatives and fishing groups and timely distribution of information between groups

The Fishing Liaison's outreach efforts have included over 200 in-person meetings, conference calls, webinars, and conservations via email. Key companies, agencies, and organizations engaged throughout the process included the following:

- Alice's Fish Market
- Alyssa Ann Sportfishing
- Atlantic Capes Fisheries
- Charterboat OH Brother
- Commercial Fisheries Research Foundation
- Coonamessett Farm Foundation
- Dong Energy
- Double D Charters
- Fisheries Survival Fund
- Fishermen's Dock Cooperative, Inc.
- Fishing Vessel Illusion
- Fishing Vessel Patriot
- Garden State Seafood Association
- Long Island Commercial Fishing Association
- Lund's Fisheries
- Massachusetts Division of Marine Fisheries
- Mid-Atlantic Fishery Management Council
- National Oceanic and Atmospheric Administration
- New England Fishery Management Council
- New York State Department of Environmental Conservation
- Other Offshore Wind Fisheries Liaisons
- Sea Keeper, LLC
- Seafreeze Shoreside, Inc.
- Surfside Foods, LLC
- Weejack Charters

In-person meetings with fisheries stakeholders and their representatives occurred at many events and through on-site meetings at or near fishing ports (Table 3).

Table 3 Portside Meeting Dates with Fisheries Stakeholders/Representatives for the New York State Offshore Wind Master Plan

Date	Location
June 16, 2017	Greenport, NY
June 17, 2017	Shinnecock, NY
June 23-24, 2017	Shinnecock, NY
July 11, 2017	Freeport, NY
July 12, 2017	Shinnecock, NY
July 13, 2017	Montauk, NY
July 14, 2017	East Hampton, NY
July 15, 2017	Shinnecock, NY
July 24, 2017	Cape Cod, MA
July 24, 2017	Narragansett, RI
July 25, 2017	Fairhaven, MA
July 28, 2017	Point Judith, RI
July 28, 2017	Jamestown, RI
August 4, 2017	Point Pleasant, NJ
August 15, 2017	Cedar Beach, NY
August 18, 2017	East Hampton, NY
August 21, 2017	Patchogue, NY
August 28, 2017	Belford, NJ
August 30, 2017	Point Judith, RI
August 31, 2017	New Bedford, MA

3.4.3 Commercial Fishing Meetings

The State participated in numerous regional and local fisheries meetings to gather input from fisheries stakeholders (Table 4).

Table 4 Fishery-Focused Meeting Dates and Locations for the New York State Offshore Wind Master Plan

Date	Meeting	Location
November 15, 2016	New York MRAC	East Setauket, NY
December 6, 2016	Long Island Traditions	Port Washington, NY
December 12, 2016	MAFMC	Baltimore, MD
January 17, 2017	MRAC	East Setauket, NY
April 17, 2017	MAFMC	Avalon, NJ
April 18, 2017	MRAC	East Setauket, NY
May 10, 2017	Fisheries Survival Fund	New York, NY
May 19, 2017	Mid-Atlantic Regional Planning Body Ecologically Rich Areas Workshop	Dover, DE
May 31, 2017	NYSERDA/NYSDEC/NYSDOS	Conference call
June 15, 2017	NYSERDA/NYSDEC/NYSDOS/BOEM	Conference call
June 22, 2017	East Hampton Trustees Meeting	East Hampton, NY
June 27, 2017	Fisheries Survival Fund	New York, NY
August 9-10, 2017	Fisheries Open House at MAFMC	Philadelphia, PA
August 16, 2017	Fisheries Open House	Shinnecock, NY
August 17, 2017	Fisheries Open House	Montauk, NY
August 28, 2017	Fish & Fisheries Study Stakeholders	Webinars

Key:
BOEM – Bureau of Ocean Energy Management
MAFMC – Mid-Atlantic Fishery Management Council
MRAC – Marine Resources Advisory Council
NYSDEC – New York State Department of Environmental Conservation
NYSDOS – New York State Department of State

The State's representatives participating in fisheries outreach were also present at public outreach meetings (outlined in Sections 3 and 4.1) to engage with stakeholders expressing fisheries concerns. Additionally, three meetings identified in Table 4 were held in direct response to stakeholder feedback regarding concerns that time and locations of public meetings were not conducive for the schedules of active fisheries stakeholders. In response, NYSERDA coordinated with the MAFMC, NYSDEC, and stakeholders to hold several days of fisheries-focused open house meetings in August. Meetings were held during the MAFMC meeting in Philadelphia, PA, on August 8-9, 2017; in Shinnecock, NY, on August 17, 2017; and in Montauk, NY, on August 18, 2017. State representatives staffed these meetings for 8 to 11 hours per day, allowing stakeholders to visit at their convenience, ask questions, and provide input to the State.

3.4.4 Commercial Fishing Comments

In meetings, calls, and emails with fishermen and their representatives from ports from New Jersey to Massachusetts, many diverse ideas have been expressed, including the following points. Fishermen identified important fishing grounds on charts, as well as areas where they believed impacts of offshore wind may be minimized.

Fisheries stakeholders expressed concerns over the following potential issues:

- Access to fishing grounds
- Economic impacts on commercial fishing
- Thoroughness of consideration of public comments in development of plans to implement offshore wind energy development
- Cumulative effects of multiple offshore wind areas and regulatory actions
- Effects on fish and fishery resources
- Environmental impacts
- Safety, technical, and economic challenges regarding feasibility of fishing among turbine towers

Fisheries stakeholders made the following suggestions for enhancing the compatibility of offshore wind energy development and fishing:

- Fishermen want “a seat at the table” in planning, implementing, and operating offshore wind energy projects.
- Before construction, develop plans for implementing research and monitoring, using inputs from fishermen and scientists.
- Prior to construction, develop plans for identifying potential impacts, and for compensation in case such impacts occur. Compensation may focus on fishery enhancement for the benefit of affected fishermen.
- Arrange turbines in straight lines to reduce obstacles to towing trawls and dredges. A single straight line would be ideal, allowing towing on both sides. A few long, straight rows may be better than a square array of turbines.
- Align rows of turbines along a consistent water depth where feasible, since mobile gear is often towed along a consistent depth.
- Increased distance between turbines may make fishing among them more feasible.
- Several recreational fishermen believe that turbines will increase and improve fishing opportunities by providing structure that attracts fish.
- Bury cables at least 6 feet into the sediment.
- Minimize the number of cables across towing lanes between turbine rows.
- Consider lining up turbines along Loran or latitude/longitude lines, similar to reference lines that static and mobile gear fishermen use to reduce conflict (static gear between certain turbines as markers may be an alternative).
- In addition to latitude and longitude, provide information to fishermen using Loran reference lines since many continue using Loran reference frames.
- Consider employing fishermen and their vessels in service to construction and maintenance of offshore wind facilities

4. STAKEHOLDER OUTREACH - PUBLIC PARTICIPATION

Public participation is a fundamental part of the stakeholder outreach process. NYSERDA has conducted numerous public information meetings throughout the communities of interest, including targeted meetings with the commercial fishing industry. NYSERDA considers all comments received during the public outreach process in preparing the Master Plan. Comments and stakeholder discussions help determine the topics that should be studied and given careful consideration. Additionally, stakeholder feedback often provides more up-to-date information about marine resources that can be provided through existing datasets.

4.1 PUBLIC INFORMATION MEETINGS

4.1.1 Public Notifications

A range of notification tools were used during public outreach efforts to: (1) publicize the Master Planning process; (2) provide details on the times, dates, and locations of meetings; and (3) describe ways to comment/participate. The NYSERDA offshore wind webpage (https://www.nyserda.ny.gov/offshorewind) has served as the central repository for information to notify and update stakeholders throughout the project. The public website provides an option to join the mailing list, review information as it becomes available, stay current on upcoming events, and provide comments. Aside from updates to the public website and emails blasts to the mailing lists, public notification tools include mailings; phone calls to elected officials and community/industry leaders; newspaper display advertisements; digital advertisements; press releases; and social media (Table 5).

Table 5 Summary of Public Notifications for the NYS Offshore Wind Master Plan

Notification Method	July 2017 Meetings (Long Island)	August 2017 Meetings (New York City)
	Total for July Meetings	Total for August Meetings
Newspapers with paid advertisements	13	16
Paid print advertisements (days)	16	17
Paid digital advertisements (days)	8	13

Print ads for July public meetings appeared in the following papers: *East Hampton Star*; *Fire Island News*; *Long Island Business News*; *Long Island Herald*; *Newsday*; *The Wave*; *Islip Bulletin*; *Suffolk County News*; *Long Island Advance*; *Southampton Press* (Eastern and Western); *East Hampton Press*; and *Dan's Papers*. For July public meetings, online newspapers ran digital ads in communities along the south shore of Long Island. Total of 3,171,882 impressions (number of times the ad is displayed on a web page).

Print ads for August public meetings appeared in the following papers: *New York Daily (Island Zone)*; *Staten Island Advance*; *The Wave*; *Queens Chronicle* (South, Southeast, and Eastern editions); *Bay News/Brooklyn Graphic*; *Mil Basin/Marine Park Courier*; *Bay Ridge Courier*; *Times Ledger*; *South Shore Record*; *Rockaway Journal*; *Nassau Herald*; *Jewish Star*; *Queens Courier*; *Brooklyn Home Reporter*; *Brooklyn Spectator and Spectator News*; and *The Press of Southeast Queens*. For August public meetings, online newspapers ran digital ads in communities along Staten Island, Southern portions of Brooklyn and Queens, and within the five towns of Nassau County. Total of 2,265,801 impressions (number of times the ad is displayed on a web page).

4.1.2 Public Information Meetings

NYSERDA held two sets of public information meetings (Table 6):

Table 6 Public Information Meeting Dates and Locations for the New York State Offshore Wind Master Plan

Date	Location
July 10, 2017	Long Island Association - Melville, New York
July 11, 2017	Long Beach Public Library - Long Beach, New York
July 12, 2017	Southampton Inn - Southampton, New York
August 14, 2017	Queens Library at Peninsula - Rockaway Beach, New York
August 15, 2017	New York Public Library, St. George Library Center - Staten Island, New York
August 16, 2017	New York Aquarium - Brooklyn, New York

The State employed a two-fold approach for each public information meeting, which were designed to enhance public understanding of the project and allow members of the public to identify issues and concerns they would like to see addressed in the Master Plan. All meetings included a prepared presentation given by NYSERDA offshore wind team leads with a facilitated question-and-answer session. The second portion of the meeting was the open-house portion during which attendees could speak individually with NYSERDA offshore wind team representatives and submit written and oral comments. Public meeting materials were made available in electronic data files available for download from the project website. Meetings ran from 6 pm to 8 pm to accommodate travel for regional community attendance, public transportation schedules, and peak hours for public attendance. Across all six public information meetings, a total of 475 individuals were counted in attendance, including federal and state elected officials, the media, city government agencies, NGOs, and local community planning groups.

4.1.3 Public Comments

Comments to support identification of a wind energy area for New York State to submit for BOEM consideration were received from elected officials, federal regulatory and state resource agencies, business and community leaders, organizations, and individuals. Comments received were provided through one or more of the following comment-submittal methods:

- In writing while attending one of the meetings
- Orally while attending one of the meetings
- Electronically via the project website (https://www.nyserda.ny.gov/offshorewind)
- Electronically via email

NYSERDA accepted comments relating to identification of a wind energy area for New York State to submit for BOEM consideration from June 22 to August 31, 2017. Table 7 summarizes the total public comments submitted through all methods made available to the public during the public outreach process.

Table 7 Summary of Comment Type and Number of Comments Received

Method of Comment Submittal	Number of Comments Received
Written Comments Submitted at Public Meetings	17
Oral Comments Received at Public Meetings	84
Comments Submitted via the Website	61
Comments Emailed	1
Signed Petition Emailed	1,009 Signees

4.1.4 Summary of Public Comment Issues and Commenters

Table 8 provides a summary of comments received by issue or topic area across public outreach efforts. The primary topics identified include (1) a shift away from fossil fuels towards renewable energy; (2) labor/jobs, supply chain development, and development of ports; (3) wildlife; and (4) general support for offshore wind. Overall, comments were supportive, with 79 comments in support of offshore wind, 72 comments posing questions with a neutral tone, and 12 comments with a negative view on offshore wind. Additionally, the majority of negative comments highlighted impact that should be mitigated rather than simply stating opposition to offshore wind.

Table 8 Comment Issue Summary from Public Comments for the New York State Offshore Wind Master Plan

Topic/Issue/Concern	Number of Times Mentioned
In Support of Offshore Wind	
1. Shift from fossil fuels to renewable energy	38
2. Labor/jobs, supply chain development, development of ports	23
3. General support for offshore wind	14
4. Need even higher gigawatt offshore wind goal	12
5. Stakeholder engagement/community benefit agreements	10
6. Wildlife	6
7. Environment	4
8. Permitting process	3
9. Must consider locations closer to shore	2
10. Commercial/recreational fishing	2
11. Policy incentives	2
12. Energy storage	1
13. Shipping and navigation	1
14. Concerns about robustness of data / technical analysis	1
15. Nuclear bailout/other unrelated	1
Opposed to Offshore Wind	
1. Impacts on the environment	5
2. Commercial/recreational fishing	4
3. Visual	3
4. Wildlife	2
5. Must consider locations closer to shore	2
6. Stakeholder engagement/community benefit agreements	1
7. Transmission	1
8. Concerns about robustness of data/technical analysis	1

Topic/Issue/Concern	Number of Times Mentioned
Neutral (General Questions)	
1. General technology and siting questions (lifespan of turbines, turbine siting, substation siting, etc.)	13
2. Wildlife	12
3. Labor/jobs, supply chain development, development of ports	12
4. Permitting process	10
5. Consumer/ratepayer	8
6. Commercial/recreational fishing	6
7. Policy incentives	5
8. Reliability	4
9. Transmission	3
10. Robustness of data/technical analysis	3
11. Stakeholder engagement/Community benefit agreements	2
12. Health and safety	2
13. Interference with other offshore projects	2
14. Security	2
15. European experience	2
16. Nuclear bailout/other unrelated	2
17. Need even higher gigawatt offshore wind goal	1
18. Shift from fossil fuels to renewable energy	1
19. Environment	1
20. Energy storage	1
21. MetOcean	1
22. Visual	1

Additionally, NYSERDA received one petition submitted by the National Wildlife Federation on behalf of 1,009 signees. The petition stated support of New York's offshore wind goals, citing environmental, health, and economic benefits.

Public meetings successfully educated communities about offshore wind, provided details of the Master Plan studies and surveys, delivered information on potential public input opportunities, and addressed concerns and/or questions. NYSERDA learned that most community members were supportive of offshore wind, especially due to the increase in job creation and transition from fossil fuels. In fact, several community members expressed a desire for a higher state goal regarding production of electricity from offshore wind. NYSERDA also learned that the major concerns from communities were environmental impacts and commercial/recreational fishing.

5. ATTACHMENTS

5.1 ATTACHMENT 1: AGENCY MEETINGS

Agency	Type of Meeting	Date
Federal Agencies		
BOEM	In person	October 26, 2017
BOEM	In person	May 9, 2017
Department of Defense	Webinar	May 12, 2017
NOAA	Conference call	June 6, 2017
NOAA	Conference call	July 17, 2017
U.S. Coast Guard	Conference call	July 27, 2017
Department of Defense	Conference call	July 27, 2017
BOEM	In person	September 22, 2017
BOEM	Conference calls	Weekly, throughout the planning process
State Agencies		
NYSDEC, NYSDOS, NYSDPS, New York State Parks, Recreation and Historic Preservation, Empire State Development, New York State Department of Labor	Webinar	April 26, 2017
NYSDEC; NYSDOS; NYSDPS; Office of Parks, Recreation and Historic Preservation; Empire State Development; Department of Labor; NYSOGS; LIPA; NYPA	Webinar	May 11, 2017
NYSDEC, NYSDOS	Conference Call	May 31, 2017
New York State Department of Labor, Empire State Development	Conference Call	July 12, 2017
NYSDOS	In-person	September 7, 2017
NYSDPS	In-person	September 7, 2017
NYSDEC	In-person	September 8, 2017
LIPA	In-person	September 8, 2017
New York State Executive Chamber, NYSDEC, NYDOS, NYSDPS, LIPA	In-person / Conference Call	September 12, 2017

Key:
AWEA – American Wind Energy Association
BOEM – Bureau of Ocean Energy Management
LIPA – Long Island Power Authority
NOAA – New York Power Authority
NYPA – New York Power Authority
NYSDEC – New York State Department of Environmental Conservation
NYSDOS – New York State Department of State
NYSDPS – New York State Department of Public Service
NYSOGS – New York State Office of General Services

5.2 ATTACHMENT 2: ELECTED OFFICIALS CONTACT LIST

Affiliation	Elected Official
United States Officials	
U.S. Senate	Senator Charles Schumer
U.S. Senate	Senator Kristen Gillibrand
U.S. House of Representatives	Representative Yvette Clarke
U.S. House of Representatives	Representative Joseph Crowley
U.S. House of Representatives	Representative Daniel Donovan, Jr.
U.S. House of Representatives	Representative Eliot Engel
U.S. House of Representatives	Representative Adriano Espaillat
U.S. House of Representatives	Representative Hakeem Jeffries
U.S. House of Representatives	Representative Peter King
U.S. House of Representatives	Representative Carolyn Maloney
U.S. House of Representatives	Representative Gregory Meeks
U.S. House of Representatives	Representative Grace Meng
U.S. House of Representatives	Representative Jerrold Nadler
U.S. House of Representatives	Representative Kathleen Rice
U.S. House of Representatives	Representative José Serrano
U.S. House of Representatives	Representative Thomas Suozzi
U.S. House of Representatives	Representative Nydia Velázquez
U.S. House of Representatives	Representative Lee Zeldin
New York State Officials	
New York State Senate	State Senator Joseph Addabbo, Jr.
New York State Senate	State Senator Marisol Alcantara
New York State Senate	State Senator Tony Avella
New York State Senate	State Senator Jamaal Bailey
New York State Senate	State Senator Brian Benjamin
New York State Senate	State Senator Philip Boyle
New York State Senate	State Senator John Brooks
New York State Senate	State Senator Leroy Comrie
New York State Senate	State Senator Thomas Croci
New York State Senate	State Senator Rubén Díaz, Sr.
New York State Senate	State Senator Martin Malave Dilan
New York State Senate	State Senator Simcha Felder
New York State Senate	State Senator John Flanagan
New York State Senate	State Senator Michael Gianaris
New York State Senate	State Senator Martin Golden
New York State Senate	State Senator Jesse Hamilton
New York State Senate	State Senator Kemp Hannon
New York State Senate	State Senator Brad Hoylman
New York State Senate	State Senator Andrew Lanza

Affiliation	Elected Official
New York State Senate	State Senator Kenneth P. LaValle
New York State Senate	State Senator Todd Kaminsky
New York State Senate	State Senator Jeffrey D. Klein
New York State Senate	State Senator Liz Krueger
New York State Senate	State Senator Carl Marcellino
New York State Senate	State Senator Velmanette Montgomery
New York State Senate	State Senator Kevin S. Parker
New York State Senate	State Senator Jose Peralta
New York State Senate	State Senator Roxanne Persaud
New York State Senate	State Senator Elaine Phillips
New York State Senate	State Senator Gustavo Rivera
New York State Senate	State Senator James Sanders, Jr.
New York State Senate	State Senator Diane Savino
New York State Senate	State Senator José M. Serrano
New York State Senate	State Senator Daniel Squadron
New York State Senate	State Senator Toby Ann Stavisky
New York State Assembly	Assembly Member Peter Abbate
New York State Assembly	Assembly Member Carmen Arroyo
New York State Assembly	Assembly Member Jeffrion Aubry
New York State Assembly	Assembly Member Brian Barnwell
New York State Assembly	Assembly Member Charles Barron
New York State Assembly	Assembly Member Michael Benedetto
New York State Assembly	Assembly Member Rodneyse Bichotte
New York State Assembly	Assembly Member Michael Blake
New York State Assembly	Assembly Member Edward Braunstein
New York State Assembly	Assembly Member Robert Carroll
New York State Assembly	Assembly Member Ronald Castorina
New York State Assembly	Assembly Member William Colton
New York State Assembly	Assembly Member Vivian Cook
New York State Assembly	Assembly Member Marcos Crespo
New York State Assembly	Assembly Member Brian Curran
New York State Assembly	Assembly Member Michael Cusick
New York State Assembly	Assembly Member Steven Cymbrowitz
New York State Assembly	Assembly Member Anthony D'Urso
New York State Assembly	Assembly Member Maritza Davila
New York State Assembly	Assembly Member Michael DenDekker
New York State Assembly	Assembly Member Carmen De La Rosa
New York State Assembly	Assembly Member Inez Dickens
New York State Assembly	Assembly Member Erik Dilan

Affiliation	Elected Official
New York State Assembly	Assembly Member Jeffrey Dinowitz
New York State Assembly	Assembly Member Steven Englebright
New York State Assembly	Assembly Member Herman Farrell
New York State Assembly	Assembly Member Michael Fitzpatrick
New York State Assembly	Assembly Member Andrew Garbarino
New York State Assembly	Assembly Member Mark Gjonaj
New York State Assembly	Assembly Member Deborah Glick
New York State Assembly	Assembly Member Richard Gottfried
New York State Assembly	Assembly Member Alfred Graf
New York State Assembly	Assembly Member Pamela Harris
New York State Assembly	Assembly Member Carl Heastie
New York State Assembly	Assembly Member Andrew Hevesi
New York State Assembly	Assembly Member Dov Hikind
New York State Assembly	Assembly Member Earlene Hooper
New York State Assembly	Assembly Member Alicia Hyndman
New York State Assembly	Assembly Member Brian Kavanagh
New York State Assembly	Assembly Member Ron Kim
New York State Assembly	Assembly Member Christine Pellegrino
New York State Assembly	Assembly Member Victor M. Pichardo
New York State Assembly	Assembly Member Kimberly Jean-Pierre
New York State Assembly	Assembly Member Latoya Joyner
New York State Assembly	Assembly Member Charles Lavine
New York State Assembly	Assembly Member Joseph Lentol
New York State Assembly	Assembly Member Chad Lupinacci
New York State Assembly	Assembly Member Nicole Malliotakis
New York State Assembly	Assembly Member David McDonough
New York State Assembly	Assembly Member Thomas McKevitt
New York State Assembly	Assembly Member Melissa Miller
New York State Assembly	Assembly Member Michael Miller
New York State Assembly	Assembly Member Michael Montesano
New York State Assembly	Assembly Member Walter Mosley
New York State Assembly	Assembly Member Francisco Moya
New York State Assembly	Assembly Member Dean Murray
New York State Assembly	Assembly Member Yuh-Line Niou
New York State Assembly	Assembly Member Catherine Nolan
New York State Assembly	Assembly Member Daniel O'Donnell
New York State Assembly	Assembly Member Félix Ortiz
New York State Assembly	Assembly Member Anthony Palumbo
New York State Assembly	Assembly Member N. Nick Perry
New York State Assembly	Assembly Member Stacey Pheffer Amato

Affiliation	Elected Official
New York State Assembly	Assembly Member Dan Quart
New York State Assembly	Assembly Member Edward Ra
New York State Assembly	Assembly Member Andrew Raia
New York State Assembly	Assembly Member Philip Ramos
New York State Assembly	Assembly Member Diana Richardson
New York State Assembly	Assembly Member Jose Rivera
New York State Assembly	Assembly Member Robert Rodriguez
New York State Assembly	Assembly Member Linda Rosenthal
New York State Assembly	Assembly Member Nily Rozic
New York State Assembly	Assembly Member Rebecca Seawright
New York State Assembly	Assembly Member Luis R. Sepúlveda
New York State Assembly	Assembly Member Michael Simanowitz
New York State Assembly	Assembly Member Jo Anne Simon
New York State Assembly	Assembly Member Aravella Simotas
New York State Assembly	Assembly Member Michaelle Solages
New York State Assembly	Assembly Member Michele Titus
New York State Assembly	Assembly Member Fred Thiele
New York State Assembly	Assembly Member Matthew Titone
New York State Assembly	Assembly Member Clyde Vanel
New York State Assembly	Assembly Member Latrice Walker
New York State Assembly	Assembly Member Helene Weinstein
New York State Assembly	Assembly Member David Weprin
New York State Assembly	Assembly Member Jaime Williams
New York State Assembly	Assembly Member Tremaine Wright
Local Officials	
City of Long Beach	City Manager Jack Schnirman
City of Glen Cove	Mayor Reginald Spinello
New York City Council	Council Member Deborah Rose
New York City Council	Council Member Eric Ulrich
New York City Council	Council Member Mark Treyger
Town of Babylon	Supervisor Rick Schaffer
Town of Brookhaven	Supervisor Ed Romaine
Town of East Hampton	Supervisor Larry Cantwell
Town of Hempstead	Supervisor Anthony Santino
Town of Huntington	Supervisor Frank Petrone
Town of Islip	Supervisor Angie Carpenter
Town of North Hempstead	Supervisor Judi Bosworth
Town of Oyster Bay	Supervisor Joe Saladino
Town of Riverhead	Supervisor Sean Walter
Town of Shelter Island	Supervisor James Dougherty

Affiliation	Elected Official
Town of Smithtown	Supervisor Patrick Vecchio
Town of Southampton	Supervisor Jay Schneiderman
Town of Southold	Supervisor Scott Russell
Brooklyn Community Board 13	District Manager Eddie Mark
Brooklyn Community Board 13	Barbara Santonas
Brooklyn Community Board 13	Shirley Grant
Brooklyn Borough President's Office	Borough President Eric Adams
Staten Island Community Board 1	District Manager Joseph Carroll
Staten Island Community Board 1	Lisa Crosby
Staten Island Community Board 1	Linda Maffeo
Staten Island Borough President's Office	Borough President James Oddo
Queens Community Board 14	District Manager Jonathan Gaska
Queens Community Board 14	Mary Dunning
Queens Community Board 14	Deborah Somme
Queens Borough President's Office	Borough President Melinda Katz

5.3 ATTACHMENT 3: LABOR LEADERS MEETINGS

Meeting Attendees	Date
Long Island Labor Leaders Roundtable	**July 27, 2017**
NYSERDA	
Long Island Federation of Labor	
Building Trades Council of Nassau and Suffolk Counties	
International Brotherhood of Electrical Workers - International	
International Brotherhood of Electrical Workers Local 25	
International Brotherhood of Electrical Workers Local 1049	
District Council 9 Painters and Allied Trades	
Operating Engineers Local 138	
Steamfitters Local 638	
General Building Laborers Local 66	
Sheet Metal Workers Local 28	
New York City District Council of Carpenters	
Teamsters Local 282	
Ironworkers Local 361	
Workforce Development Institute	
Opportunities Long Island	
New York City Labor Leaders Roundtable	**August 31, 2017**
NYSERDA	
New York State Executive Chamber	
New York State Department of Labor	
International Union of Operating Engineers Local 30	
Utility Workers Union of America Local 1-2	
New York State Incarcerated Workers Organizing Committee	
Millwright and Machinery Erectors Local Union 740	
New York City District Council of Carpenters	
New York City District Council of Carpenters Dockbuilders Local 1556	
32BJ Service Employees International Union	
International Association of Heat and Frost Insulators and Allied Workers Local 12	
International Brotherhood of Electrical Workers - International	
International Brotherhood of Electrical Workers Local 3	
Workforce Development Institute	
Construction and General Building Laborers Local 79	

APPENDIX B.
OCS BLOCKS LIST (FULL AND PARTIAL)

#	Official Protraction	Block Number	Partial Block (Aliquot) Designation	Quantity of Aliquots
East Area for Consideration				
1	NK18-12	6719	L,N,O,P	4
2	NK18-12	6720	I,J,K,L,M,N,O,P	8
3	NK18-12	6721	E,F,G,H,I,J,K,L,M,N,O,P	12
4	NK18-12	6722	E,F,G,H,I,J,K,L,M,N,O,P	12
5	NK18-12	6723	E,F,I,J,K,M,N,O	8
6	NK18-12	6767	L,N,O,P	4
7	NK18-12	6768	D,F,G,H,I,J,K,L,M,N,O,P	12
8	NK18-12	6769	A-P	16
9	NK18-12	6770	A-P	16
10	NK18-12	6771	A-P	16
11	NK18-12	6772	A-P	16
12	NK18-12	6773	A-P	16
13	NK18-12	6774	I,M,N	3
14	NK18-12	6815	P	1
15	NK18-12	6816	D,F,G,H,I,J,K,L,M,N,O,P	12
16	NK18-12	6817	A-P	16
17	NK18-12	6818	A-P	16
18	NK18-12	6819	A-P	16
19	NK18-12	6820	A-P	16
20	NK18-12	6821	A-P	16
21	NK18-12	6822	A-P	16
22	NK18-12	6823	A-P	16
23	NK18-12	6824	A,B,E,F,I,J,M,N	8
24	NK18-12	6864	P	1
25	NK18-12	6865	C,D,F,G,H,I,J,K,L,M,N,O,P	13
26	NK18-12	6866	A-P	16
27	NK18-12	6867	A-P	16
28	NK18-12	6868	A-P	16
29	NK18-12	6869	A-P	16
30	NK18-12	6870	A-P	16
31	NK18-12	6871	A-P	16
32	NK18-12	6872	A-P	16
33	NK18-12	6873	A-P	16
34	NK18-12	6874	A	1

#	Official Protraction	Block Number	Partial Block (Aliquot) Designation	Quantity of Aliquots
East Area for Consideration				
35	NK18-12	6914	C,D,F,G,H,I,J,K,L,N,O,P	12
36	NK18-12	6915	A-P	16
37	NK18-12	6916	A-P	16
38	NK18-12	6917	A-P	16
39	NK18-12	6918	A-P	16
40	NK18-12	6919	A-P	16
41	NK18-12	6920	A-P	16
42	NK18-12	6921	A-P	16
43	NK18-12	6922	A-P	16
44	NK18-12	6923	A-P	16
45	NK18-12	6924	A,E,F,I,J,K,M,N,O,P	10
46	NK18-12	6964	C,D,H	3
47	NK18-12	6965	A,B,C,D,E,F,G,H,J,K,L,O,P	13
48	NK18-12	6966	A-P	16
49	NK18-12	6967	A-P	16
50	NK18-12	6968	A-P	16
51	NK18-12	6969	A-P	16
52	NK18-12	6970	A-P	16
53	NK18-12	6971	A-P	16
54	NK18-12	6972	A-P	16
55	NK18-12	6973	A-P	16
56	NK18-12	6974	A-P	16
57	NK18-12	6975	A,E,F,I,J,K,M,N,O,P	10
58	NK18-12	7015	D	1
59	NK18-12	7016	A,B,C,D,F,G,H,K,L,P	10
60	NK18-12	7017	A-P	16
61	NK18-12	7018	A-P	16
62	NK18-12	7019	A-P	16
63	NK18-12	7020	A-P	16
64	NK18-12	7021	A-P	16
65	NK18-12	7022	A-P	16
66	NK18-12	7023	A,B,C,D,E,F,G,H,I,J	10
67	NK18-12	7024	A,B,C,D,E,F,G,H	8
68	NK18-12	7025	A,B,E	3
69	NK18-12	7067	B,C,D,G,H,L	6
70	NK18-12	7068	A,B,C,D,E,F,G,H,I,J,K,L,N,O,P	15
71	NK18-12	7069	A-P	16
72	NK18-12	7070	A-P	16
73	NK18-12	7071	A-P	16

#	Official Protraction	Block Number	Partial Block (Aliquot) Designation	Quantity of Aliquots
East Area for Consideration				
74	NK18-12	7072	A,B,C,E,F,G,I,J,K,L,M,N,O,P	14
75	NK18-12	7073	M	1
76	NK18-12	7118	C,D,H	3
77	NK18-12	7119	A,B,C,D,E,F,G,H,I,J,K,L,O,P	14
78	NK18-12	7120	A-P	16
79	NK18-12	7121	A-P	16
80	NK18-12	7122	A-P	16
81	NK18-12	7123	A,B,E,F,I,J,K,M,N,O	10
82	NJ18-03	6021	A-P	16
83	NJ18-03	6019	D	1
84	NJ18-03	6020	A,B,C,D,E,F,G,H,I,J,K,L,P	13
85	NJ18-03	6022	A,B,C,D,E,F,G,H,I,J,K,M,N	13
86	NJ18-03	6023	A	1
87	NJ18-03	6071	B,C,D,G,H,L	6
88	NJ18-03	6072	A,B,E,I	4
Quantity of Aliquots in East Area				**1,027**
West Area for Consideration				
1	NK18-12	7005	N	1
2	NK18-12	7055	B,C,D,F,G,H,J,K,L,N,O,P	12
3	NK18-12	7056	E,I,J,M,N,O	6
4	NK18-12	7105	B,C,D,F,G,H,I,J,K,L,M,N,O,P	14
5	NK18-12	7106	A-P	16
6	NK18-12	7107	A,E,F,G,I,J,K,L,M,N,O,P	12
7	NK18-12	7108	M	1
8	NJ18-03	6005	B,C,D,F,G,H,J,K,L,N,O,P	12
9	NJ18-03	6006	A-P	16
10	NJ18-03	6007	A-P	16
11	NJ18-03	6008	A,E,F,I,J,M,N,O	8
12	NJ18-03	6055	B,C,D,G,H,K,L,O,P	9
13	NJ18-03	6056	A-P	16
14	NJ18-03	6057	A-P	16
15	NJ18-03	6058	A-P	16
16	NJ18-03	6059	E,I,M,N	4
17	NJ18-03	6105	C,D,G,H,K,L,P	7
18	NJ18-03	6106	A-P	16
19	NJ18-03	6107	A-P	16
20	NJ18-03	6108	A-P	16
21	NJ18-03	6109	A,B,C,E,F,G,H,I,J,K,L,M,N,O,P	15

#	Official Protraction	Block Number	Partial Block (Aliquot) Designation	Quantity of Aliquots
West Area for Consideration				
22	NJ18-03	6110	I,M,N	3
23	NJ18-03	6155	D,H,L,P	4
24	NJ18-03	6156	A-P	16
25	NJ18-03	6157	A-P	16
26	NJ18-03	6158	A-P	16
27	NJ18-03	6159	A-P	16
28	NJ18-03	6160	A,B,C,E,F,G,H,I,J,K,L,M,N,O,P	15
29	NJ18-03	6161	I,M,N	3
30	NJ18-03	6206	A-P	16
31	NJ18-03	6207	A-P	16
32	NJ18-03	6208	A-P	16
33	NJ18-03	6209	A-P	16
34	NJ18-03	6210	A-P	16
35	NJ18-03	6211	A,B,C,E,F,G,I,J,K,L,M,N,O,P	14
36	NJ18-03	6212	M	1
37	NJ18-03	6256	A-P	16
38	NJ18-03	6257	A-P	16
39	NJ18-03	6258	A-P	16
40	NJ18-03	6259	A-P	16
41	NJ18-03	6260	A-P	16
42	NJ18-03	6261	A-P	16
43	NJ18-03	6262	A,B,E,F,G,I,J,K,L,M,N,O,P	13
44	NJ18-03	6263	M	1
45	NJ18-03	6306	A-P	16
46	NJ18-03	6307	A-P	16
47	NJ18-03	6308	A-P	16
48	NJ18-03	6309	A-P	16
49	NJ18-03	6310	A-P	16
50	NJ18-03	6311	A-P	16
51	NJ18-03	6312	A-P	16
52	NJ18-03	6313	A,B,E,F,G,I,J,K,L,M,N,O,P	13
53	NJ18-03	6314	M	1
54	NJ18-03	6355	D,H,L,P	4
55	NJ18-03	6356	A-P	16
56	NJ18-03	6357	A-P	16
57	NJ18-03	6358	A-P	16
58	NJ18-03	6359	A-P	16
59	NJ18-03	6360	A-P	16

#	Official Protraction	Block Number	Partial Block (Aliquot) Designation	Quantity of Aliquots
West Area for Consideration				
60	NJ18-03	6361	A-P	16
61	NJ18-03	6362	A-P	16
62	NJ18-03	6363	A-P	16
63	NJ18-03	6364	A,E,I,M	4
64	NJ18-03	6405	D,H,L,P	4
65	NJ18-03	6406	A-P	16
66	NJ18-03	6407	A-P	16
67	NJ18-03	6408	A-P	16
68	NJ18-03	6409	A-P	16
69	NJ18-03	6410	A-P	16
70	NJ18-03	6411	A-P	16
71	NJ18-03	6412	A-P	16
72	NJ18-03	6413	A-P	16
73	NJ18-03	6414	A,E,I,M	4
74	NJ18-03	6455	D,H,L,P	4
75	NJ18-03	6456	A-P	16
76	NJ18-03	6457	A-P	16
77	NJ18-03	6458	A-P	16
78	NJ18-03	6459	A-P	16
79	NJ18-03	6460	A-P	16
80	NJ18-03	6461	A-P	16
81	NJ18-03	6462	A-P	16
82	NJ18-03	6463	A-P	16
83	NJ18-03	6464	A,E,I	3
84	NJ18-03	6505	D,G,H,K,L,O,P	7
85	NJ18-03	6506	A-P	16
86	NJ18-03	6507	A-P	16
87	NJ18-03	6508	A-P	16
88	NJ18-03	6509	A-P	16
89	NJ18-03	6510	A-P	16
90	NJ18-03	6511	A-P	16
91	NJ18-03	6512	A-P	16
92	NJ18-03	6513	A,B,C,D,E,F,G,I,J,K,M,N	12
93	NJ18-03	6555	C,D,G,H,K,L,O,P	8
94	NJ18-03	6556	A-P	16
95	NJ18-03	6557	A-P	16
96	NJ18-03	6558	A-P	16
97	NJ18-03	6559	A-P	16

#	Official Protraction	Block Number	Partial Block (Aliquot) Designation	Quantity of Aliquots
West Area for Consideration				
98	NJ18-03	6560	A-P	16
99	NJ18-03	6561	A-P	16
100	NJ18-03	6562	A-P	16
101	NJ18-03	6563	A,B,E,I	4
102	NJ18-03	6605	B,C,D,F,G,H,J,K,L,N,O,P	12
103	NJ18-03	6606	A-P	16
104	NJ18-03	6607	A-P	16
105	NJ18-03	6608	A-P	16
106	NJ18-03	6609	A-P	16
107	NJ18-03	6610	A-P	16
108	NJ18-03	6611	A-P	16
109	NJ18-03	6612	A,B,C,E,F,G,I,J,M,N	10
110	NJ18-03	6655	B,C,D,F,G,H,J,K,L,N,O,P	12
111	NJ18-03	6656	A-P	16
112	NJ18-03	6657	A-P	16
113	NJ18-03	6658	A-P	16
114	NJ18-03	6659	A-P	16
115	NJ18-03	6660	A-P	16
116	NJ18-03	6661	A,B,C,D,E,F,G,H,I,J,K,L,M,N,O	15
117	NJ18-03	6662	A	1
118	NJ18-03	6705	B,C,D,F,G,H,J,K,L,N,O,P	12
119	NJ18-03	6706	A-P	16
120	NJ18-03	6707	A-P	16
121	NJ18-03	6708	A-P	16
122	NJ18-03	6709	A-P	16
123	NJ18-03	6710	A-P	16
124	NJ18-03	6711	A,B,C,E,F,I,M	7
125	NJ18-03	6755	B,C,D,F,G,H,J,K,L,N,O,P	12
126	NJ18-03	6756	A-P	16
127	NJ18-03	6757	A-P	16
128	NJ18-03	6758	A-P	16
129	NJ18-03	6759	A-P	16
130	NJ18-03	6760	A,B,C,D,E,F,G,H,I,J,K,M,N	13
131	NJ18-03	6805	B,C,D,F,G,H,J,K,L,N,O,P	12
132	NJ18-03	6806	A-P	16
133	NJ18-03	6807	A-P	16
134	NJ18-03	6808	A-P	16
135	NJ18-03	6809	A-P	16

#	Official Protraction	Block Number	Partial Block (Aliquot) Designation	Quantity of Aliquots
West Area for Consideration				
136	NJ18-03	6810	A,B,E	3
137	NJ18-03	6855	B,C,D,F,G,H,J,K,L,N,O,P	12
138	NJ18-03	6856	A-P	16
139	NJ18-03	6857	A-P	16
140	NJ18-03	6858	A-P	16
141	NJ18-03	6859	A,B,C,E,F,G,I,J,M,N	10
Quantity of Aliquots in West Area				**1,868**
Total Quantity of Aliquots in Recommended Area				**2,895**

APPENDIX C. 60M MEMO

JUSTIFICATION OF MAXIMUM TECHNICAL DEPTH OF 60 METERS

INTRODUCTION

The Renewables Consulting Group examined the current technical limits for commercial scale offshore wind projects and recommends the use of the 60-meter (m) depth contour line as the outer boundary for the wind energy areas considered in the New York State Offshore Wind Master Plan. Based on a review of 415 global offshore wind projects either constructed to date or under development, 60m is a reasonable 'cut-off' point for the use of traditional bottom-fixed foundation designs that have been successfully deployed to date. While there is an emergence of floating foundation technologies being deployed in deeper waters, notwithstanding the smaller scale of such projects, to date there has been one demonstrator project at 50m [1] and then a gap between 60m and 100m (See Appendix 1) until deeper waters around 100m+. Technologies currently targeting depths greater than 60m have yet to be commercially proven, however, this could happen in the near future and a review of the technical limit for the Master Plan may be required at a later date.

EVIDENCE TO DATE OF OFFSHORE WIND PROJECT DEPTHS

From an analysis of all global offshore wind projects constructed to date or under development (see Appendix 1) of the 118 offshore wind projects that are either operational or under construction, 96.7% are in depths of 60m or less. Of the projects that are under development, 95.3% of these are in depths of 60m or less.

COST ANALYSIS OF CURRENT FOUNDATION VS FLOATING/ALTERNATIVES

From an analysis of the cost of fixed offshore wind farm sub-structures (see Appendix 2 for an illustrative cost scenario) the Levelized Cost of Energy for deeper projects increases significantly beyond water depths of >40m as the likely foundation type changes from a monopile option to a jacket. Due to other factors, such as an attractive wind resource, projects in deeper waters with jacket foundations may still be economical. The floating wind sector beyond 60m is still in the relatively early phases of development. Costs for projects using floating foundations (structure plus mooring) are currently expected to be higher than those with fixed-bottom foundations, although costs are not sufficiently benchmarked now for inclusion in the analysis. If these deep-water designs prove to be economically and commercially viable in the future, then consideration of deeper sites, suitable for the particular floating technology, should be made at that time.

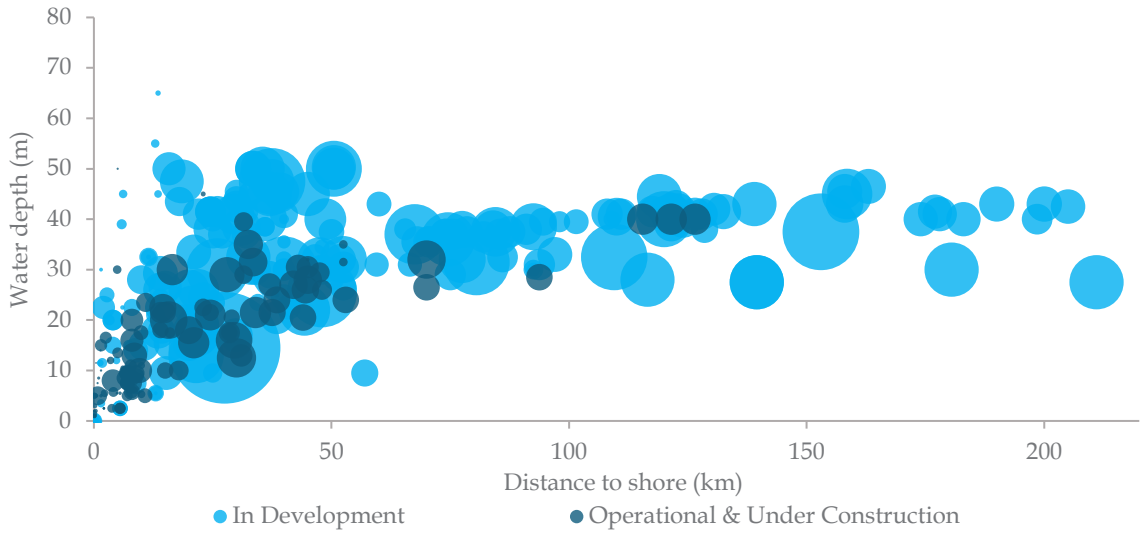
SUMMARY RECOMMENDATION

Review of current commercial projects and sub-structure costs shows the use of the 60m contour line is a realistic technical depth limit for the waters offshore New York. There is sufficient area in waters less than 60m offshore New York to achieve the State's 2,400 MW by 2030 goal.

[1] http://www.principlepowerinc.com/en/key-markets-projects?location=8

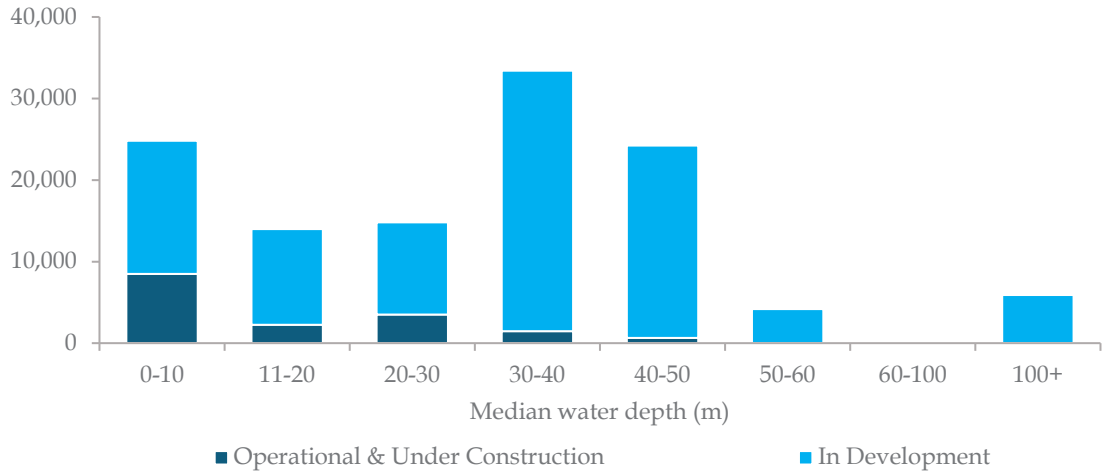
APPENDIX 1: GLOBAL OFFSHORE WIND PROJECTS BY DEPTH

Global Portfolio – Water Depth (m) vs Distance to Shore (km)



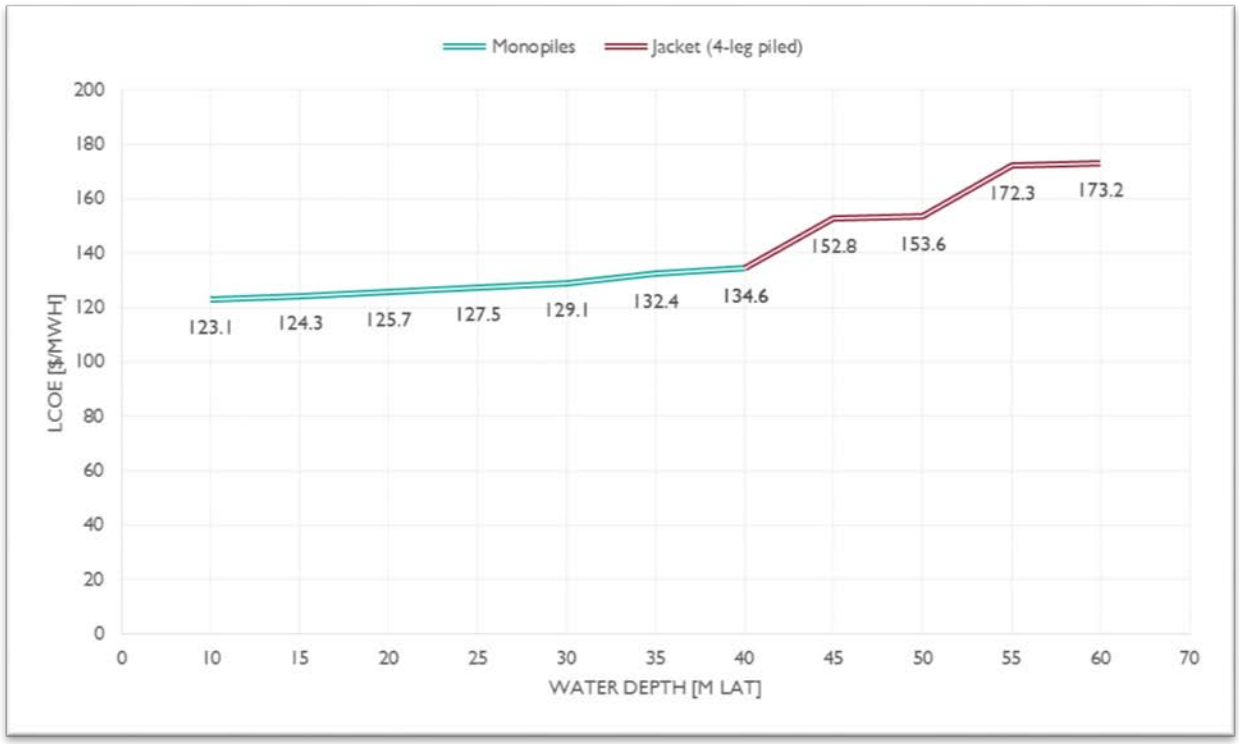
*Size of bubbles = project capacity (MW)

Global Portfolio by Water Depth (m)



APPENDIX 2: COST OF OFFSHORE WIND SUB-STRUCTURES BY DEPTH

Illustrative cost scenario for fixed offshore wind farm sub-structures



- This assumes a 504MW wind farm with 8MW.
- This assumes a change from monopile foundations to jacket foundations (4-leg, pin-pile) at 40m depth.
- This assumes that 40m & 50m represent tipping points in water depths that require more expensive installation vessels.

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