Final Generic Environmental Impact Statement for Procurement of Offshore Wind

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List of Exhibits

List of Abbreviations and Acronyms

ADLS	aircraft detection lighting system
AIS	Automatic identification system
BOEM	Bureau of Ocean Energy Management
CES	Clean Energy Standard
CO_2	carbon dioxide
COBRA	Co-Benefits Risk Assessment
Commission	Public Service Commission
Cumulative Study	New York State Offshore Wind Master Plan Consideration of Potential Cumulative Effects
EFH	Essential Fish Habitat
EIS	environmental impact statement
EPA	United States Environmental Protection Agency
GEIS	Generic Environmental Impact Statement
GHG	greenhouse gas
GW	gigawatts
GWh	gigawatt hours
IPCC	Intergovernmental Panel on Climate Change
ISO-NE	Independent System Operator-New England
Master Plan	New York State Offshore Wind Master Plan
MW	megawatts
m/s	meters per second
NAAQS	National Ambient Air Quality Standards
NEPA	National Environmental Policy Act
nm	nautical miles
NOAA	National Oceanic and Atmospheric Administration
NO_X	nitrous oxides
NRHP	New York's State Register of Historic Places
NYCRR	New York Codes, Rules and Regulations

List of Abbreviations and Acronyms (cont.)

NYISO	New York Independent System Operator
NYSEP	New York State Energy Plan
NYSERDA	New York State Energy Research and Development Authority
OCS	Outer Continental Shelf
OCSLA	Outer Continental Shelf Lands Act
Options Paper	Offshore Wind Policy Options Paper
PJM	Pennsylvania New Jersey Maryland
$PM_{2.5}$	particulate matter < 2.5 microns
RES	Renewable Energy Standard
REV	Re-forming the Energy Vision
SEQRA	New York State Environmental Quality Review Act
SIP	State Implementations Plans
SO_2	sulfur dioxide
TSSs	traffic separation schemes
USACE	United States Army Corps of Engineers
USCG	United States Coast Guard
USFWS	United States Fish and Wildlife Service
VMS	Vessel Monitoring System
ZEC	Zero Emission Credit

Executive Summary

In August 2016, the Public Service Commission (Commission) issued an Order Adopting a Clean Energy Standard (CES or CES Order).[1] In the CES Order, the Commission recognized the development of offshore wind generation as one of numerous avenues required to achieve the State's renewable energy goals. The Commission requested the New York State Energy Research and Development Authority (NYSERDA) to identify the appropriate mechanisms and best solutions the Commission and State may wish to consider in developing an offshore wind program and maximizing the potential for offshore wind in New York.

On January 29, 2018, NYSERDA filed a report titled "Offshore Wind Policy Options" paper (Options Paper). The Options Paper is a component of New York State's Offshore Wind Master Plan,[2] developed after two years of in-depth research, analysis, and outreach by NYSERDA, to inform a path for meeting a goal of 2,400 megawatts (MW) of offshore wind energy generation by 2030. The Options Paper proposes the procurement would occur in phases, beginning with two initial annual offshore wind procurement rounds of at least 400 MW each in 2018 and 2019. The Options Paper includes various procurement program design features intended to broadly apply to the development of multiple projects, over time, in different locations that will result in the installation of 2,400 MW of offshore wind generation capacity by 2030 with the ability to deliver electricity to be consumed by New Yorkers.

This Generic Environmental Impact Statement (GEIS), prepared pursuant to the New York State Environmental Quality Review Act (SEQRA), analyzes the potential environmental impacts associated with the State's procurement of this 2,400 MW of offshore wind energy by 2030, and builds upon and incorporates by reference relevant material from NYSERDA's Offshore Wind Master Plan. The offshore wind procurement contemplated by the Offshore Options paper is a separate action and procurement program from the Renewable Energy Standard (RES) or the Zero Emission Credit (ZEC) programs previously approved by the Commission. The environmental review conducted for the Commission pursuant to the "Reforming the Energy Vision" (REV) proceeding and the RES and ZEC pro-

[1] Case 15-E-0302, Proceeding to Implement a Large-Scale Renewable Program and a Clean Energy Standard, Order Adopting a Clean Energy Standard (issued August 1, 2016).

[2] Additional information regarding the Offshore Wind Master Plan can be found at https://www.nyserda.ny.gov/offshorewind.

grams, did consider the impacts of offshore generation and where relevant the information contained in those documents is also incorporated herein. However, the previous environmental reviews did not contemplate a standalone procurement of offshore wind at the scale now being proposed, necessitating the development and consideration of this GEIS.

The Proposed Action under consideration is the procurement by 2030 of 2,400 MW of offshore wind energy capacity through a competitive mechanism with the ability to deliver energy into New York. The procurement contemplated by the Proposed Action is meant to encourage the development of new offshore wind energy projects in the Atlantic Ocean. However, those projects, if developed, could be undertaken in a broad range of scenarios with countless variables, including the geographic area of the marine environment (offshore between Maine and North Carolina), project timing (2018 to 2030), project scale, and project technology. Therefore, it is not possible at this stage to meaningfully assess the specific potential environmental impacts of future offshore development pursuant to SEQRA.

Given these circumstances, and consistent with SEQRA regulations, 6 New York Codes, Rules and Regulations (NYCRR) §617.10(a), this GEIS is broader and more general than a site- or project-specific EIS, and identifies potential areas where environmental impacts could be caused by the construction and operation of new offshore wind energy projects. The Commission anticipates that these areas of potential impact will be studied in the future, as part of the environmental review conducted for offshore wind energy development and/or transmission projects at the time they are proposed. Those project-specific reviews would assess, at a site-specific level, all relevant potential environmental impacts as required under SEQRA.

The environmental setting of this GEIS focuses primarily on the marine environment, which includes the submerged lands, subsoil, seabed, and water under States' jurisdiction and federal jurisdiction (termed the Outer Continental Shelf [OCS]). The marine environment also includes the geographic regions defined by the Bureau of Ocean Energy Management (BOEM) as the North Atlantic OCS and Mid-Atlantic OCS. These are the offshore areas from which offshore wind energy can reasonably be expected to be transmitted to New York State. Where applicable, the environmental setting includes not only the broad geographic area described above but also waters offshore of New York State.

The generic analysis addresses those resource areas potentially impacted by development of offshore wind energy, including biological resources (benthic communities, marine mammals and sea turtles, fish, and birds), marine commercial and recreational uses and vessel traffic, cultural resources, socioeconomics, and visual and aesthetic resources. Potential impacts are balanced with regulatory requirements for avoidance, minimization, and mitigation strategies. Although specific projects could potentially impact any of these resource areas, those potential impacts would be evaluated on a project-specific evaluation. This identification of potential impacts does not reflect the screening out of other potential impacts that

could occur depending on the location and other attributes of a specific offshore wind energy project. This GEIS identifies potential cumulative impacts using a hypothetical scenario whereby all 2,400 MW of offshore wind energy projects are built offshore of New York. On a generic level, the potential for cumulative impacts includes: the displacement, disturbance, or loss of habitat for marine mammals and sea turtles; sensory disturbance to fish; conflict with use of space for commercial and recreational vessels; and displacement, disturbance, or loss of habitat and mortality/injury to birds.

The Proposed Action could result in direct benefits in the form of economic development, workforce employment, and the avoidance of adverse health outcomes. The Proposed Action also has the potential to lead to secondary benefits in the form of development of emerging technologies, a new source of coastal tourism, indirect jobs associated with construction and operation, purchases of local products and services, and new and increased tax payments by employees and facilities.

The Commission identified the No Action alternative as the reasonable alternative to the Proposed Action, wherein the State would not implement the procurement of 2,400 MW of offshore wind energy by 2030. In the No Action alternative scenario, the State still expects to achieve its "50 by 30" goal by employing a variety of resources, including offshore wind – though less of it -- in the renewable generation portfolio. There could be more or fewer potential impacts on the environment, depending on the other types of renewable energy sources that ultimately would be used under the No Action alternative to achieve the "50 by 30" goal. However, under the No Action alternative, offshore wind energy development may still occur, and impacts on the marine environment would likely still occur.

This GEIS also considers the unavoidable impacts, irreversible and irretrievable commitment of resources, and effects on energy consumption. Since the Proposed Action of a GEIS is not site- or project-specific, there are no unavoidable adverse impacts or irreversible and irretrievable commitment of resources associated with the Proposed Action. Any resulting development of offshore wind energy encouraged by the Proposed Action would consider site- or project-specific potential impacts during the federal and state approval processes for offshore wind energy development. Furthermore, while the Proposed Action may affect the State's electric generation portfolio, it is not expected to directly or indirectly affect the amount of electricity used in the State or the amount of energy conserved in the State.

The Commission, as lead agency, provided notice of completion and acceptance of the Draft GEIS on February 22, 2018. The public notice provided in Docket 18-E-0071 and the Environmental Notice Bulletin identified the type of EIS, the contact person, and where to obtain copies of the document. Comments on the Draft GEIS were requested to be filed by April 9, 2018. On April 17, 2018, in response to requests from members of the public, the Commission extended the deadline for written comments from April 9, 2018 to May 9, 2018. Comments were submitted by interested parties in the case as well as other organizations and individuals. Appendix A provides the responses to comments received on the

Draft GEIS. Revisions made to the Draft GEIS based on public comments are shown in the text in boldface font (as in this paragraph) and summarized in Appendix B.

1 SEQRA and Description of the Proposed Action

In August 2016, the Public Service Commission (Commission) issued an Order Adopting a Clean Energy Standard (CES or CES Order).[3] In the CES Order, the Commission stated recognized the development of offshore wind generation as one of numerous avenues required to achieve the State's renewable energy goals. The Commission requested the New York State Energy Research and Development Authority (NYSERDA) to identify the appropriate mechanisms and best solutions the Commission and State may wish to consider in developing an offshore wind program and maximizing the potential for offshore wind in New York.

On January 29, 2018, NYSERDA filed a report titled "Offshore Wind Policy Options" (Offshore Options) paper. The Offshore Options paper is a component of New York State's Offshore Wind Master Plan,[4] developed after two years of in-depth research, analysis, and outreach by NYSERDA, to inform a path for meeting a goal of 2,400 megawatts (MW) of offshore wind energy generation by 2030, which would introduce renewable, low-carbon sources of energy to the electrical grid, thereby advancing energy independence and helping implement the State's goal that 50 percent of all electricity consumed in New York be supplied by renewable resources by the year 2030 (the "50 by 30" goal). The Offshore Options paper proposes the procurement would occur in phases, beginning with two initial annual offshore wind procurement rounds of at least 400 MW each in 2018 and 2019. The Offshore Options paper includes various procurement program design features intended to broadly apply to the development of multiple projects, over time, in different locations that will result in the installation of 2,400 MW of offshore wind generation capacity by 2030 with the ability to deliver electricity to be consumed by New Yorkers.

This Generic Environmental Impact Statement (GEIS), prepared pursuant to the New York State Environmental Quality Review Act (SEQRA), identifies and describes the potential areas of environmental impact that could be associated with the State's procurement of 2,400 MW of offshore wind energy by 2030, and

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[3] Proceeding on Motion of the Commission to Implement a Large-Scale Renewable Program and a Clean Energy Standard, Case 15-E-0302, "Order Adopting a Clean Energy Standard", issued and effective August 1, 2016. http://documents.dps.ny.gov/public/Common/ViewDoc.aspx?DocRefId={44C5D5B8-14C3-4F32-8399-F5487D6D8FE8}

[4] Additional information regarding the Offshore Wind Master Plan can be found at https://www.nyserda.ny.gov/offshorewind.

therefore must be assessed when future offshore wind energy projects are undertaken or approved. This GEIS builds upon and incorporates by reference relevant material from the Master Plan and Options Paper.

The Options Paper does not propose a particular offshore wind energy facility or site from which the State would procure energy. Rather, the Options Paper includes various procurement program design features intended to broadly apply to the procurement of energy from any number of projects developed over time in different locations that will result in a total of 2,400 MW by 2030 of offshore wind generation capacity with the ability to deliver electricity to be consumed by New Yorkers. Therefore, the Commission at present is unable to assess environmental impacts that are likely to occur at any particular location, or otherwise conduct a project-specific or site-specific environmental review.

The offshore wind procurement contemplated by the Options Paper is a separate action and procurement program from the Renewable Energy Standard (RES) or the Zero Emission Credit (ZEC) programs previously approved by the Commission. The environmental review conducted for the Commission's pursuit of the "Reforming the Energy Vision" proceeding and the RES and ZEC programs did consider the impacts of offshore generation, and where relevant the information contained in those documents is also incorporated herein.[5] However, the previous environmental reviews did not contemplate a stand-alone procurement of offshore wind at the scale now being proposed, necessitating the development and consideration of this GEIS.

For these reasons, the Commission is undertaking this GEIS in order to analyze and consider, in general and conceptual terms, the manner in which the State may fulfill its goal of procuring 2,400 MW of offshore wind energy. This GEIS also identifies and describes, in general terms, the environmental areas that could be impacted by the Proposed Action, so that those potential impacts can be assessed in the future, when specific off-shore wind energy projects are undertaken or approved.

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[5] See "Final Generic Environmental Impact Statement In CASE 14-M-0101- Reforming the Energy Vision and CASE 14-M-0094- Clean Energy Fund." Prepared by Industrial Economics, Incorporated and Optimal Energy, Incorporated. Accessed January 4, 2018. http://www3.dps.ny.gov/W/AskPSC.nsf/All/71BF9B959E12F08A85257FC5005E0679?OpenDocument and "Final Supplemental Environmental Impact Statement In CASE 15-E-0302- Proceeding on Motion of the Commission to Implement a Large-Scale Renewable Program and a Clean Energy Standard; CASE 14-M-0101- Proceeding on Motion of the Commission in Regard to Reforming the Energy Vision; CASE 14-M-0094- Proceeding on Motion of the Com-mission to Consider a Clean Energy Fund; CASE 13-M-0412- Petition of New York State Energy Research and Development Authority to Provide Initial Capitalization for the New York Green Bank; CASE 10-M-0457- In the Matter of the System Benefits Charge IV; CASE 07-M-0548- Proceeding on Motion of the Commission Regarding an Energy Efficiency Portfolio Standard; CASE 03-E-0188- Proceeding on Motion of the Commission Regarding Retail Renewable Portfolio Standard." Prepared by Industrial Economics, Incorporated and Optimal Energy, Incorporated. Accessed January 4, 2018. http://documents.dps.ny.gov/public/MatterManagement/CaseMaster.aspx?MatterCaseNo=15-e-0302

1.1 The New York State Environmental Quality Review Act

SEQRA, as set forth in Article 8 of the Environmental Conservation Law, declares that it is the State's policy to:

"… encourage productive and enjoyable harmony between man and his environment; to promote efforts which will prevent or eliminate damage to the environment and enhance human and community resources; and to enrich the understanding of ecological systems, natural, human and community resources important to the people of the state."

The purpose of SEQRA is to incorporate the consideration of environmental factors into the planning, review, and decision-making processes of State, regional, and local government agencies at the earliest possible time. Consistent with this intent, SEQRA requires agencies to identify the adverse impacts that could result from their actions and to consider how those impacts might be avoided or minimized. If the agency determines that an action may have a significant adverse impact, then the agency must prepare an environmental impact statement (EIS).

Preparation of a Generic Environmental Impact Statement

When an EIS is required under SEQRA, that requirement may be satisfied by the preparation of a GEIS in several circumstances, including, as here, when the proposed action, as defined in Section 1.2, involves an entire program or plan having wide application, or would restrict the range of future alternative policies or projects.[6] A GEIS may be broader and more general than a site- or project-specific EIS, should include the logic and rationale of the choices advanced, and may be based on conceptual information. A GEIS also may identify the important elements of the natural resource base, as well as existing and projected cultural features, patterns, and character. SEQRA requires that a draft GEIS be made available for public comment. The lead agency then must consider the comments and prepare a final GEIS before reaching a decision on the action being considered.

SEQRA further contemplates that after preparing a GEIS for a broader program, the appropriate state, local, or federal agency may need to conduct additional, project- or site-specific environmental review when specific components of the program are proposed. As the state agency that serves to carry out the Commission's legal mandates, the Department of Public Service serves as the lead agency under SEQRA for the Commission's procurement of offshore wind energy that is the subject of this GEIS. In this case, the Commission anticipates that environmental review would be conducted for future offshore wind energy development and/or transmission projects at the time they are proposed, which would assess, at a site-specific level, all relevant potential environmental impacts. This GEIS's identification and discussion of the potential impacts of the Proposed Action do not substitute for future site-specific analyses of potential environmental impacts for particular projects.

[6] 6 NYCRR § 617.10(a)(4). The required contents of an EIS are listed in the regulations that implement SEQRA (6 NYCRR §§ 617.9 and 617.10).

The Commission, as lead agency, provided notice of completion and acceptance of the Draft GEIS on February 22, 2018. The public notice provided in Docket 18-E-0071 and the Environmental Notice Bulletin identified the type of EIS, the contact person, and where to obtain copies of the document. Comments on the Draft GEIS were requested to be filed by April 9, 2018. On April 17, 2018, in response to requests from members of the public, the Commission extended the deadline for written comments from April 9, 2018 to May 9, 2018. Comments were submitted by interested parties in the case as well as other organizations and individuals. Appendix A provides the responses to comments received on the Draft GEIS. Revisions made to the GEIS based on public comments are shown in the text in boldface font (as in this paragraph) .

1.2 Description of the Proposed Action

The 2015 New York State Energy Plan (NYSEP) sets forth the State's long-term goal to provide 50 percent of its electricity from renewable resources by 2030. The NYSEP includes an offshore wind initiative to promote programmatic and regulatory efforts to create a system conducive for at-scale offshore wind projects. The Proposed Action would implement the offshore wind component of the NYSEP and advance the attainment of the "50 by 30" goal.[7] The Proposed Action is the procurement by 2030 of 2,400 MW of offshore wind energy capacity through a competitive mechanism with the ability to deliver energy into New York.[8]

1.3 Purpose and Benefits of Offshore Wind Energy Procurement

This section describes, consistent with 6 New York Codes, Rules and Regulations (NYCRR) § 617.9(b)(5)(i), the public purpose and benefits that may result from the Proposed Action. The purpose of the Proposed Action is to support the achievement of the "50 by 30" goal. Depending on the site- or location-specific aspects of offshore wind energy development that results from the Proposed Action, increasing the supply of offshore wind energy resources to 2,400 MW is expected to result in the following general public benefits:

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[7] New York State Energy Planning Board. 2015. "New York State Energy Plan. Volume 1: The Energy to Lead." Accessed January 19, 2018. https://energyplan.ny.gov/Plans/2015.

[8] For electricity to be eligible, it must be demonstrated to the satisfaction of the Commission or its designee that the electrical output of the generation facility was 1) scheduled into a market administered by the NYISO for end-use in New York State; or 2) delivered through a wholesale meter under the control of a utility, public authority or municipal electric company such that it can be measured, and such that consumption within New York State can be tracked and verified by such entity or by the NYISO; or 3) delivered through a facility dedicated generation meter, which shall be approved by and subject to independent verification by the DPS or its designee, to a customer in New York State whose electricity was obtained through the NYISO/utility system. For any facility seeking to satisfy the electricity delivery requirement through options 2 or 3 above, all costs associated with measurement, tracking, and verification, to the satisfaction of DPS staff or its designee, and for participation in the New York Generation Attribute Tracking System must and will be borne by the facility owner/developer.

- ***Public health benefits*** due to avoided emissions of greenhouse gases and criteria air pollutants. As increased use of renewable energy sources, such as offshore wind, would lead to improved air quality, society benefits from reduced negative health impacts and increased employee productivity. For example, as air quality improves, state health care expenditures for treatment of asthma, acute bronchitis, and respiratory conditions may be reduced.[9]
- ***Climate change benefits*** related to the reduction in reliance on fossil fuel energy. Climate change projections indicate increased temperatures between 4° Fahrenheit (F) and 10° F by the year 2100 for the northeastern and southeastern United States. As a result, it is projected that the northeast will see increases in total precipitation, frequency of heavy precipitation, sea level rise, and storm surge, which in turn are expected to increase flooding and coastal erosion and further strain aging infrastructure. Extreme heat events and longer summer droughts also are expected in the region as a result of climate change. Similarly, the southeast is projected to experience heavy precipitation, sea level rise, more intense hurricanes and storm surge, and periods of extreme drying.[10,11]
- ***Ecosystem services benefits*** due to reduced impacts on land and water uses, as renewable energy sources displace fossil fuel sources from New York's energy supply portfolio. For example, wind turbines require nearly no water to operate and thus "do not pollute water resources or strain supply by competing with agriculture, drinking water systems, or other important water needs."[12]
- ***Fuel diversity benefits***. The Proposed Action would likely serve to maintain fuel diversity by spurring investment in offshore wind energy development. The addition of new renewable electricity supplies also would reduce the State's reliance on natural gas.
- ***Economic development benefits***. Offshore wind energy development spurred by the Proposed Action is expected to create net regional economic benefits. These benefits can take the form of manufacturing of wind energy equipment; job and revenue creation; stable, sustained wages, as the lifespan of an offshore wind facility is at least 25 years; and the effects of spending throughout local economies.[13]

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9 NYSERDA. 2018. "New York State Offshore Wind Master Plan: Charting a Course to 2,400 Megawatts of Offshore Wind Energy." Report 17-25. Accessed January 29, 2018. https://www.nyserda.ny.gov/All-Programs/Programs/Offshore-Wind/New-York-Offshore-Wind-Master-Plan/Area-for-Consideration.

10 EPA. 2016a. "Climate Impacts in the Northeast." Accessed January 10, 2018. https://19january2017snapshot.epa.gov/climate-impacts/climate-impacts-northeast_.html.

11 EPA. 2016b. "Climate Impacts in the Southeast." Accessed January 10, 2018. https://19january2017snapshot.epa.gov/climate-impacts/climate-impacts-southeast_.html.

12 Union of Concerned Scientists. 2017. Benefits of Renewable Energy Use. Accessed 4 January 2018. https://www.ucsusa.org/clean-energy/renewable-energy/public-benefits-of-renewable-power#.Wk5ZW9qWzIU.

13 New York State. 2018. "The Workforce Opportunity of Offshore Wind in New York." In New York State Offshore Wind Master Plan. Accessed January 2018. [pending publication].

- *Accelerated cost reductions for offshore wind technologies*. Offshore wind energy development spurred by the Proposed Action is expected to contribute to significant cost reductions for the underlying technology.

1.4 Location Affected by the Action

The Proposed Action has the potential to affect varying locations, including New York, depending on the specific activities and their specific locations. At a generic, non-site specific level, this GEIS identifies the broad potential impact that could be caused by the types of activities that could result from the procurement of 2,400 MW of offshore wind energy.

1.5 Relationship to Other Plans and Programs

The offshore wind energy procurement will interact with a number of additional energy-related programs and plans. Many of these programs are described in the New York State Energy Plan (NYSEP) and include, for example, initiatives contemplated under the Reforming the Energy Vision regulatory docket. Offshore wind energy development will potentially interact with some of these plans and programs, such as the Master Plan, NYSERDA's Clean Energy Fund, the New York Green Bank, and/or the Regional Greenhouse Gas Initiative. Under the "No Action" scenario (Chapter 6), these current programs are maintained and continue towards working to achieve New York State's "50 by 30" goal without developing a specific procurement program for offshore wind energy.

2 The Electric Industry in New York State

Consistent with NYCRR § 617.9(b)(5)(ii), this chapter provides baseline information about the State's current energy industry, including existing state programs, as it relates to the implementation an offshore wind generation procurement. The background information presented in this chapter and in Chapter 3 provides the baseline condition for assessing the potential impacts of the Proposed Action (Chapters 5 through 10). The information presented below becomes part of the No Action scenario (Chapter 6), and may assist in understanding the likely impacts of the Proposed Action.

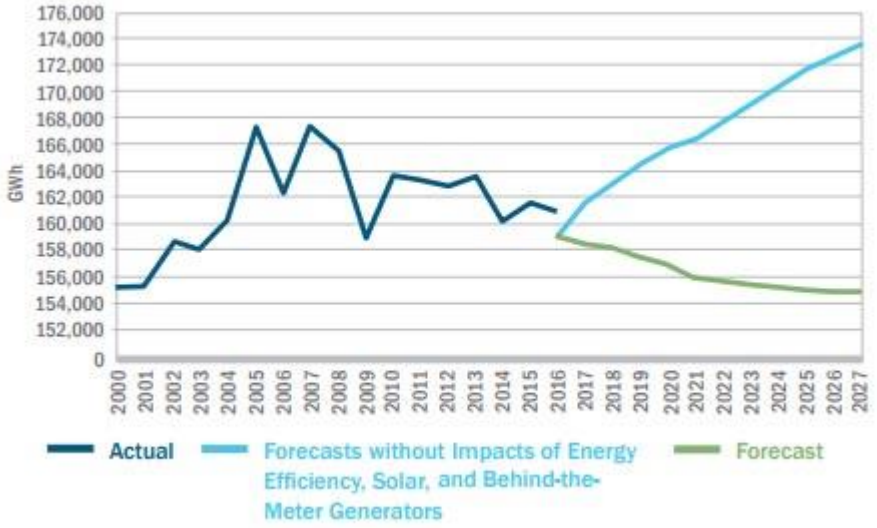
2.1 Trends in Electricity Demand and Generation

The first 15 years of the 21st century can be characterized as a time of transition in electricity use in New York State. Exhibit 2-1 presents the historical trends in the State's electric energy demand. From 2000 through 2008, annual electricity use increased from about 155,000 gigawatt hours (GWh) per year to almost 170,000 GWh per year.[14] In more recent years, annual electricity use generally declined; however, annual electricity use in 2016 still surpassed that of 2000 with an overall increase of about 5,000 GWh per year. This same variation occurred in demand forecasts of energy usage. As recently as 2014, long-term forecasts of energy usage projected 10-year average growth at 0.16% per year. However, as of 2017, New York Independent System Operator (NYISO) forecasts that energy usage in New York will decrease at an annual average rate of 0.23% based on the projected use of energy efficiency, behind-the-meter solar, and other customer-based distributed energy resources.[15]

[14] NYISO. 2017. "Power Trends 2017: New York's Evolving Electric Grid." Accessed January 9, 2018. https://www.nyiso.com/public/webdocs/media_room/publications_presentations/Power_Trends/Power_Trends/2017_Power_Trends.pdf

[15] *Ibid.*

Exhibit 2-1 New York State Electric Energy Usage Trends, Actual and Forecast



Source: NYISO. 2017. "Power Trends 2017: New York's Evolving Electric Grid." Accessed January 9, 2018. https://www.nyiso.com/public/webdocs/media_room/publications_presentations/Power_Trends/Power_Trends/2017_Power_Trends.pdf

Peak demand is the maximum amount of energy use for a one-hour period during the year, and while it represents a small fraction of annual overall electrical energy use, it is an important metric because it defines the amount of energy-producing resources, or power capacity, that must be available to serve maximum customer energy demand. Reducing peak demand provides the NYISO with flexibility within the transmission system to incorporate and utilize new, large generation sources such as offshore wind energy developments.

Since 2000, the addition of 11,733 MW of new generating capacity in New York State reflect a significant shift in energy use and technology in New York. Most of the new generation is powered by onshore wind and natural gas. Wind power, virtually non-existent in the State in 2000, grew to 5% of New York State's generating capability in 2017. Land-based wind-powered generating capacity in New York State grew from 48 MW in 2005 to 1,827 MW in 2017. Electricity generated by wind power increased from 101 GWh in 2005 to 3,943 GWh in 2016. According to NYISO, 4,807 MW of land-based wind projects are currently in development in the NYISO region.[16] The portion of New York's generating capability from natural gas and dual-fuel facilities grew from 47% in 2000 to 57% in 2017. In contrast, New York's generating capability from coal-fired power plants declined from 11% in 2000 to 3% in 2017, and generating capability from oil-fired power plants similarly dropped from 11% in 2000 to 6% in 2017.[17]

[16] NYISO. 2017. "Power Trends 2017: New York's Evolving Electric Grid." Accessed January 9, 2018. https://www.nyiso.com/public/webdocs/media_room/publications_presentations/Power_Trends/Power_Trends/2017_Power_Trends.pdf

[17] *Ibid.*

This dramatic transition was facilitated by the redesign of New York's wholesale electricity markets, including changes to market rules, centralized wind forecasting, and pioneering the economic dispatch of wind energy. These and other market initiatives supported and continue to support the growth of New York's wind energy resources.

2.2 Import and Export of Electricity

To meet its electricity demand, New York State imports a portion of its electricity from the existing transmission grid. New York State's main external grid connections are with Hydro-Québec, Ontario Hydro, Independent System Operator-New England (ISO-NE), and the Pennsylvania New Jersey Maryland (PJM) Interconnection. The ISO-NE includes the coastal states of Connecticut, Maine, Massachusetts, New Hampshire, and Rhode Island; and the PJM Interconnection includes the coastal states of Delaware, Maryland, New Jersey, North Carolina, and Virginia. The majority of New York State's electricity imports come from Canada, with about 50 percent of New York's net imports during peak hours provided solely by Hydro-Québec.[18] New York exports electricity mainly to the ISO-NE.[19]

Transmission projects connecting to New York's electric system since 2000, primarily interregional high-voltage direct-current projects, include:

- The Cross-Sound Cable, linking Long Island with ISO-NE;
- The Neptune Regional Transmission System, connecting Long Island with PJM;
- The Hudson Transmission Project, connecting Manhattan with PJM; and
- The Linden Variable Frequency Transformer Line, also linking New York with PJM.[20]

NYISO manages these interfaces on the transmission grid to allow access to power in other regions; the interfaces also provide cost control and capacity flexibility during typical operations and emergency or high-peak demand situations. In the case of offshore wind energy resources, transmission interfaces allow some flexibility in that offshore wind energy resources can be located beyond the reach of the NYISO system yet still provide power back to New York State.

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18 Potomac Economics. 2015. "2014 State of the Market Report for the New York ISO Markets." Accessed January 17, 2016. http://www.nyiso.com/public/webdocs/markets_operations/documents/Studies_and_Reports/Reports/Market_Monitoring_Unit_Reports/2014/NYISO2014SOMReport__5-13-2015_Final.pdf

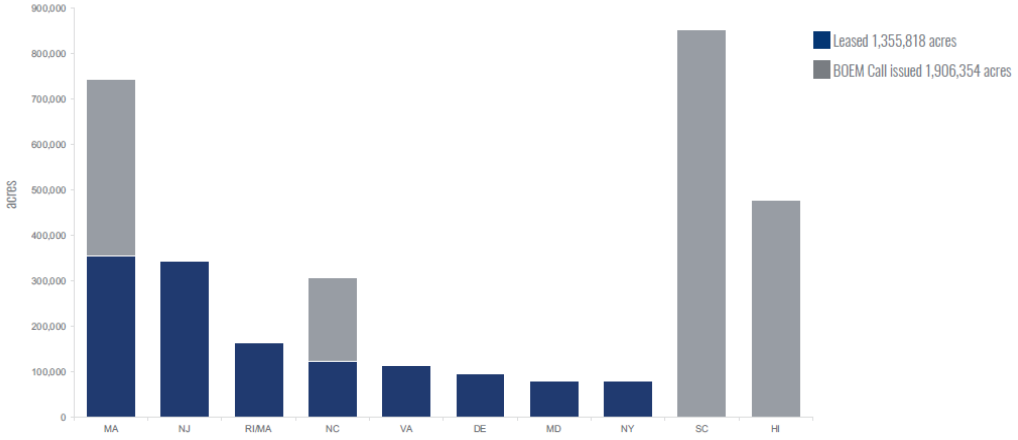
19 Potomac Economics. 2016. "2016 State of the Market Report for the New York ISO Markets." Accessed January 9, 2018 http://www.nyiso.com/public/webdocs/markets_operations/documents/Studies_and_Reports/Reports/Market_Monitoring_Unit_Reports/2016/NYISO_2016_SOM_Report_5-10-2017.pdf

20 NYISO. 2017. "Power Trends 2017: New York's Evolving Electric Grid." Accessed January 9, 2018. https://www.nyiso.com/public/webdocs/media_room/publications_presentations/Power_Trends/Power_Trends/2017_Power_Trends.pdf.

2.3 Potential Offshore Wind Energy Projects

Offshore wind energy development continues to expand across the globe, including in the United States, which has the potential for 2,000 GW of offshore wind energy using existing technologies. As shown in Exhibit 2-2, the Bureau of Ocean Energy Management (BOEM) leased almost 1.4 million acres in the Outer Continental Shelf (OCS) for offshore wind energy development, with nearly 2 million additional acres are under consideration. Most of the U.S. lease areas are located off the Atlantic Coast, primed for offshore wind energy development given the area's sustained high winds, shallow waters, and high electricity demand.

Exhibit 2-2 BOEM Leasing Activity by State



Source: NYSERDA. 2018. "New York State Offshore Wind Master Plan: Charting a Course to 2,400 Megawatts of Offshore Wind Energy." Report 17-25. Accessed January 29, 2018. https://www.nyserda.ny.gov/All-Programs/Programs/Offshore-Wind/New-York-Offshore-Wind-Master-Plan/Area-for-Consideration.

The Proposed Action is the procurement of 2,400 MW of offshore wind energy by 2030. The Proposed Action would not include specific procurements from any existing or planned facilities, nor would it include any kind of express or implied approval for the construction or operation of any specific facility. There are a number of potential offshore wind energy projects in various stages of development, including those described below, that could provide some or all of the electricity procured by the Proposed Action. It is also possible that at least some of the procurement contemplated by the Proposed Action would be obtained from offshore wind energy projects that have not yet been proposed or constructed.

Block Island Wind Farm, located off the coast of Rhode Island, is the first offshore wind farm in the United States with a 30 MW capacity, which began commercial operations in December 2016.[21] In January 2017, Long Island Power Authority approved South Fork Wind Farm, New York's first offshore wind farm

[21] Deepwater Wind. 2018. "Clock Island Wind Farm: America's First Offshore Wind Farm." Accessed January 15, 2018. http://dwwind.com/project/block-island-wind-farm/.

with an expected operational date of 2022. South Fork Wind Farm is a 90 MW development southeast of Montauk, which will help New York State meet the "50 by 30" goal.[22] Exhibit 2-3 provides an overview of offshore wind energy lease areas that, if ultimately developed, could be wind farms from which New York State could procure additional offshore wind energy.

Exhibit 2-3 Offshore Wind Energy under Development in the Region

Name	Description	Construction Start Date	Operation Date	Off the Coast of
Empire Wind (Statoil)[23]	Parcel at 80,000 acres. Won in December 2016. Lease secured April 1, 2017. Potentially could accommodate 1,000–**1,500** MW.	TBD	TBD (potentially mid-2020s)	New York
PNE Wind AG/ Statoil[24]	Two parcels (OCS-A 0502 and OCS-A 0503) at 248,015 acres and 140,554 acres respectively. Competitive interest by both PNE and Statoil. PNE proposes two 400 MW wind farms. Statoil proposes overall potential of the area is anywhere from 3,000 to 15,000 MW. BOEM will proceed with a competitive leasing process.[25]	TBD	TBD	Massachusetts
Bay State Wind (Ørsted and Eversource)[26]	Parcel at 187,523 acres (OCS-A 500). Awarded in 2015. Up to 2,000 MW capacity. Site Assessment Plan approved by BOEM on June 29, 2017.	TBD	TBD (potentially early 2020s)	Massachusetts
U.S. Wind Inc. (New Jersey Project)[27]	Parcel at 183,353 acres (OCS-A0499) with 1,500 MW capacity. Lease purchased.	TBD	TBD	New Jersey
Ocean Wind (RES America and Ørsted)[28]	Parcel at 160,480 acres with 1,000 MW capacity.	TBD	TBD	New Jersey

22 New York State. 2017. "Governor Cuomo Announces Approval of Largest Offshore Wind Project in the Nation." Accessed January 15, 2018. https://www.governor.ny.gov/news/governor-cuomo-announces-approval-largest-offshore-wind-project-nation.

23 Statoil. 2017. "Statoil's Empire Wind." Accessed January 15, 2018. https://www.empirewind.com/.

24 Hill, J. 2017. "European Developers Propose Offshore Wind Farms Off Long Island, Martha's Vineyard". Clean Technica. Accessed January 15, 2018. https://cleantechnica.com/2017/03/13/european-developers-propose-offshore-wind-farms-off-long-island-marths-vineyard/.

25 BOEM. n.d. "Unsolicited Lease Requests." Accessed February 6, 2018. https://www.boem.gov/Unsolicited-Lease-Requests/.

26 Bay State Wind. n.d. "Project Overview". Accessed January 15, 2018. http://www.baystatewind.com/en/about-us.

27 U.S. Wind, Inc. 2017. "Our Projects." Accessed January 15, 2018. http://www.uswindinc.com/our-projects/.

28 BOEM. 2015. "Commercial Lease of Submerged Lands for Renewable Energy Development on the Outer Continental Shelf. RES America Developments Inc." Accessed January 15, 2018. https://www.boem.gov/NJ-SIGNED-LEASE-OCS-A-0498/.

Exhibit 2-3 Offshore Wind Energy under Development in the Region

Name	Description	Construction Start Date	Operation Date	Off the Coast of
Vineyard Wind (Copenhagen Infrastructure Partners and Avangrid Renewables)[29]	Parcel at 166,886 acres (OCS-A 501) with 1,600 MW capacity. Lease secured in April 2015.	TBD	2027	Massachusetts
Deepwater ONE (Deepwater Wind)[30]	Two adjacent parcels at 97,498 acres and 67,252 acres with 1,000 MW capacity.	TBD	TBD	Rhode Island and Massachusetts
Revolution Wind Farm and Battery Storage System (Deepwater Wind and Tesla)[31]	Pair a 144 MW offshore wind farm with a 40 MWh battery storage system. Construction is anticipated to be finished in 2022.	TBD	2023	Massachusetts
Skipjack Wind Farm (Deepwater Wind)[32]	120 MW capacity. Construction planned to start as early as 2021, with an operational start of 2022.	2021	2022	Maryland
Dominion Energy[33]	Parcel at 112,799 acres (OCS-A 0483) with more than 2,000 MW capacity.	TBD	TBD	Virginia
Kitty Hawk (Avangrid Renewables)[34]	Parcel at 122,405 acres with 2,500 MW capacity.	TBD	TBD	North Carolina
Garden State Offshore Energy (Deepwater Wind and PSEG Renewable Generation)[35]	350 MW capacity.	TBD	TBD	New Jersey
U.S. Wind Inc. (Maryland Project)[36]	Parcel at 80,000 acres with 750 MW capacity.	TBD	TBD	Maryland

Key:
MW = megawatts
RES = Renewable Energy Standard
TBD = to be determined

29 Vineyard Wind. 2017. "The Project". Accessed January 2018. https://www.vineyardwind.com/new-page/.

30 Deepwater Wind. 2017. "Deepwater ONE". Accessed January 15, 2018. http://dwwind.com/project/deepwater-one/.

31 Shallenberger, K. 2017. "Deepwater, Tesla to pair offshore wind farm with 40 MWh battery storage system." Utility Dive. Accessed January 15, 2018. http://www.utilitydive.com/news/deepwater-tesla-to-pair-offshore-wind-farm-with-40-mwh-battery-storage-sys/448364/.

32 Deepwater Wind. 2018. "Skipjack Wind Farm." Accessed January 15, 2018. http://dwwind.com/project/skipjack-wind-farm/.

33 BOEM. 2017. "Commercial Lease for Wind Energy Offshore Virginia." Accessed January 15, 2018. https://www.boem.gov/Renewable-Energy-Program/State-Activities/VA/Commercial-Lease-for-Wind-Energy-Offshore-Virginia.aspx.

34 American Wind Energy Association. 2017. "Bidding ends at $9 million for Kitty Hawk Wind Rights." Accessed January 15, 2018. https://www.awea.org/MediaCenter/pressrelease.aspx?ItemNumber=10059.

35 4C Offshore. 2016. "Garden State Offshore Energy." Accessed January 15, 2018. http://www.4coffshore.com/windfarms/bluewater-wind-delaware-united-states-us19.html.

36 U.S. Wind, Inc. 2017. "Our Projects." Accessed January 15, 2018. http://www.uswindinc.com/our-projects/.

3 Environmental Setting

Consistent with the requirement set forth in the SEQRA regulations at 6 NYCRR §617.9(b)(5)(ii), this chapter provides a "concise description of the environmental setting of the areas to be affected, sufficient to understand the impacts of the proposed action and alternatives." The environmental setting described in this chapter provides the baseline condition for assessing the potential impacts of the Proposed Action, as described in Chapters 5 through 10.

The description of the environmental setting focuses primarily on the marine environment, which includes the submerged lands, subsoil, seabed, and water under States' jurisdiction and federal jurisdiction (termed the OCS).[37] The marine environment under federal jurisdiction include the geographic regions defined by BOEM as the North Atlantic OCS and Mid-Atlantic OCS. The Energy Policy Act of 2005 amended Section 8 of the Outer Continental Shelf Lands Act (OCSLA) to give BOEM the authority to identify offshore wind development sites within the OCS and to issue leases, easements, and rights-of-way to allow for renewable energy development on the OCS. The Energy Policy Act of 2005 provided a general framework for BOEM to follow when authorizing these renewable energy activities, discussed further in Chapter 4.

The North Atlantic OCS includes the planning area off the coasts of Maine, New Hampshire, Massachusetts, Connecticut, Rhode Island, New York, and New Jersey, while the Mid-Atlantic OCS includes the planning area off the coasts of Delaware, Maryland, Virginia, and North Carolina.[38] As described in Chapter 2, the existing transmission grid within the United States connects New York to the PJM Interconnection and the ISO-NE, which includes these states. These are the offshore areas from which offshore wind energy can reasonably be expected to be transmitted to New York State. Transmission from other potential offshore areas would require such extensive construction of transmission infrastructure that it is not a reasonably foreseeable consequence of the Proposed Action.

The environmental setting considered herein includes the broad geographic area described above and specifically New York State. Where applicable, this chapter provides specific information on the resources in New York.

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37 BOEM. n.d. "Outer Continental Shelf." Accessed January 10, 2018. https://www.boem.gov/Outer-Continental-Shelf/.

38 BOEM. 2014. "Outer Continental Shelf (OCS) Planning Area Boundaries." Accessed January 9, 2018. https://www.boem.gov/Atlantic-OCS-Plannning-Area.

3.1 Physical Resources

The marine environment is characterized, in part, by seabed, sediments, water depths, physical oceanography, and winds. Sediments experience ongoing change as a result of sorting and mixing by tides, currents, waves, and storm events. Surficial sediments can undergo biogenic mixing from human or other biological activity.[39] While the shallow substrate of the benthic environment exists in a highly dynamic setting, anthropogenic and biogenic factors have little effect on seabed composition.[40]

Seabed is characterized in terms of slope and position. The marine environment largely consists of low-slope formations, high-flat formations (e.g., banks, shoals, flats), depressions, and mid-flat formations (e.g., shelves, plateaus, flat terraces) until reaching the shelf break, where the seabed shifts to high-slope formations as water depths rapidly increase. The seabed off the coasts of Maine, New Hampshire, and northern Massachusetts is primarily composed of depressions and high-flat formations. The seabed off the coasts of southern Massachusetts, Rhode Island, Connecticut, New York, New Jersey, Delaware, Maryland, Virginia, and North Carolina is interspersed with mid-flat formations, high-flat formations, and depressions.[41]

Sediment composition varies throughout the marine environment. Sediment off the coasts of Maine and New Hampshire is primarily sandy silt and clay around the territorial sea boundary, with areas along the shore consisting of sand and gravel deposits. Farther offshore, the sediment transitions to gravel and sand. Northern Massachusetts generally follows the same sediment pattern as Maine and New Hampshire, with the addition of bedrock close to shore and deposits of sand and gravel around the territorial sea boundary. Sediment off the coasts of southern Massachusetts, Rhode Island, and Connecticut consists primarily of sand and gravelly sediment. Sediment off the coasts of New York, New Jersey, Delaware, Maryland, Virginia, and North Carolina follows the same sorting pattern, with sediment largely consisting of sand dispersed with areas of gravel before transitioning to finer sand, silt, and clay farther east from shore.[42]

Water depths over most of the marine environment range from 10 meters to 50 meters around the territorial sea boundary and extending farther east until the

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39 Roche, K.R., A.F. Aubeneau, M. Xie, T.C. Aquino, D. Bolster, and A.I. Packman. 2016. "An Integrated Experimental and Modeling Approach to Predict Sediment Mixing from Benthic Burrowing Behavior." *Environmental Science and Technology*. DOI: 10.1021/acs.est.6b01704.

40 Ostrowski, R. and Z. Pruszak 2011. "Relationships Between Coastal Processes and Properties of the Nearshore Sea Bed Dynamic Layer." *ScienceDirect*. Accessed January 5, 2017. http://www.sciencedirect.com/science/article/pii/S0078323411500284.

41 The Nature Conservancy (TNC). 2010. "Seabed Forms." Accessed January 5, 2017. http://portal.midatlanticocean.org/data-catalog/oceanography/#layer-info-seabed-forms.

42 USGS, USGS Continental Margin Mapping Program (CONMAP). 2005. "Atlantic Seafloor Sediment." Accessed January 5, 2018. https://cmgds.marine.usgs.gov/publications/of2005-1001.

shelf break, where depths drop to 400 meters. This pattern extends along most East Coast states, with a few exceptions, such as increasing depths around the Hudson Canyon off the New York and New Jersey coasts. Additionally, the waters off the coasts of Maine, New Hampshire, and northern Massachusetts are deeper than along other states, with depths generally reaching 100 meters to 150 meters near the territorial sea boundary.[43]

The energy produced by wind is proportional to the cube of wind speed, thus stronger wind indicates the potential for a lot more power. Increased wind speeds of only a few meters per second (m/s) can produce significantly higher amounts of electric generation. Wind speeds generally increase with distance from shore, and wind speeds along the Atlantic coast vary, with higher wind speeds along the northern Atlantic coast compared to the southern Atlantic coast. At a height of 100 meters above mean sea level, which is the approximate hub height of an offshore wind turbine, wind speeds range from about 8.25 m/s to greater than 10 m/s over the North Atlantic OCS and from approximately 7.75 m/s to 9.75 m/s over the Mid-Atlantic OCS.[44]

3.2 Sensitive Biological Resources

The federal and state governments identify ("list") the sensitive biological species potentially present in the marine environment within their respective jurisdictions. Currently, 18 federally listed species have the potential to occur within the OCS, 13 of which are endangered and 6 are threatened.[45] Of these, the piping plover (*Charadrius melodus*), North Atlantic right whale (*Eubalaena glacialis*), Atlantic sturgeon (*Acipenser oxyrinchus*), and loggerhead sea turtle (*Caretta caretta*) have designated critical habitat within the marine environment. Exhibit 3-1 identifies all federally listed species with the potential to occur within the OCS.

Exhibit 3-1 Federally Endangered and Threatened Species Potentially Occurring within the OCS

Species	Federal Status	Critical Habitat?
Mammals		
North Atlantic right whale (*Eubalaena glacialis*)	E	Yes
Sei whale (*Balaenoptera borealis*)	E	No
Blue whale (*Balaenoptera musculus*)	E	No
Fin whale (*Balaenoptera physalus*)	E	No
Sperm whale (*Physeter microcephalus*)	E	No
Indiana bat (*Myotis sodalis*)	E	No
Northern long-eared bat (*Myotis septentrionalis*)	T	No

[43] NOAA Fisheries. Office for Coastal Management (OCM). 2018. "Bathymetric Contours." Accessed January 5, 2018. https://inport.nmfs.noaa.gov/inport/item/48852.

[44] BOEM. n.d. "Offshore Wind Energy." Accessed January 5, 2018. https://www.boem.gov/Offshore-Wind-Energy.

[45] NOAA Fisheries. n.d. "Endangered and Threatened Marine Species under NMFS' Jurisdiction." Accessed January 8, 2018. http://www.nmfs.noaa.gov/pr/species/esa/listed.htm.

Exhibit 3-1 Federally Endangered and Threatened Species Potentially Occurring within the OCS

Species	Federal Status	Critical Habitat?
Reptiles		
Green sea turtle (*Chelonia mydas*) [a]	T	No
Hawksbill sea turtle (*Eretmochelys imbricata*)	E	No
Leatherback sea turtle (*Dermochelys coriacea*)	E	No
Loggerhead sea turtle (*Caretta caretta*)[a]	T	Yes
Kemp's Ridley sea turtle (*Lepidochelys kempii*)	E	No
Fish		
Atlantic sturgeon (*Acipenser oxyrinchus*)[b]	E	Yes
Shortnose sturgeon (*Acipenser brevirostrum*	E	No
Scalloped hammerhead shark (*Sphyrna lewini*)	T	No
Birds		
Piping plover (*Charadrius melodus*)[c]	E, T	Yes
Red knot (*Calidris canutus rufa*)	T	No
Roseate Tern (*Sterna dougalli dougalli*)	E	No

Notes:

[a] Under the ESA, loggerhead turtles are split into nine distinct population segments, and green turtles are split into 11 distinct population segments, with each listed separately.

[b] Atlantic sturgeons have five distinct population segments. The New York Bight, Chesapeake Bay, Carolina, and South Atlantic distinct population segments are listed as Endangered; the Gulf of Maine distinct population segment is listed as Threatened.

[c] The piping plover has a distinct population segment within New York State that is listed as Endangered, while a known Atlantic Coast and Northern Great Plains distinct population segment, also located within New York State, is listed as Threatened.

Key:
E = Endangered
T = Threatened

Other sensitive biological resources that could exist within the marine environment include marine mammals protected under the Marine Mammal Protection Act, fish with designated Essential Fish Habitat (EFH), coral reefs, marine sanctuaries, and migratory birds protected under the Migratory Bird Treaty Act. EFH are "those waters and substrate necessary to fish for spawning, breeding, feeding, or growth to maturity" as dictated under the Magnuson-Stevens Fisheries Conservation and Management Act.[46] EFH may include all types of aquatic habitats, including offshore and coastal waters, wetlands, coral reefs, seagrasses, and rivers.[47] National Oceanic and Atmospheric Administration (NOAA) Fisheries designates EFH in 10-minute by 10-minute grid blocks in coastal and offshore waters for various life stages of nearly 1,000 federally managed species.

[46] NOAA Fisheries n.d. "What is Essential Fish Habitat?" Accessed January 8, 2018. http://www.habitat.noaa.gov/protection/efh/.

[47] NOAA Fisheries n.d. "Endangered and Threatened Marine Species under NMFS' Jurisdiction." Accessed January 8, 2018 http://www.nmfs.noaa.gov/pr/species/esa/listed.htm.

Two federally designated National Marine Sanctuaries off the coasts of the Northeast and Mid-Atlantic States include Stellwagen Bank and Monitor. These sanctuaries are located at the mouth of Massachusetts Bay and off the coast of North Carolina, respectively.[48] Additionally, the New York State Department of State has designated 250 Significant Coastal Fish and Wildlife Habitat sites statewide, including many within the bays and shores of Long Island, and in the Hudson River estuary.[49]

Migratory birds potentially occurring in the vicinity of the OCS are identified in Exhibit 3-2 along with their associated conservation status. The U.S. Fish and Wildlife Service and its partners manage migratory birds based largely on routes the birds follow as they migrate between nesting and wintering areas. The Atlantic Flyway migratory corridor stretches from the eastern Arctic islands, along the east coast of the United States, and down to the Caribbean Sea.

It should further be noted that not all of the sensitive biological resources identified above may occur in the location of a specific offshore wind energy project. Similarly, this identification of sensitive biological resources does not reflect the screening out of other species that may occur at a particular location of a specific offshore wind energy project. The identification of species would depend substantially on the specific offshore wind energy facility and the local setting of the affected area(s). For example, as shown in Exhibit 3-3, 84 state-listed animal species occur in the state of New York.[50] Exhibit 3-3 identifies animal species occurring on land and in the marine environment and does not include plant species. Identification of sensitive biological resources on land would be unique to the location of a specific offshore wind energy project and its connection to the onshore electric grid. Therefore, it is anticipated that as part of the environmental review for any specific proposed project, that review would need to consider sensitive species that could be affected.

Exhibit 3-2 Migratory Bird Species Potentially Occurring in the Area of the OCS

Species	Conservation Status
American oystercatcher (*Haematopus palliates*)	BCC Rangewide
Arctic tern (*Sterna paradisaea*)	Non-BCC Vulnerable
Audubon's shearwater (*Puffinus lherminieri*)	BCC Rangewide
Bald eagle (*Haliaeetus leucocephalus*)	Non-BCC Vulnerable
Band-rumped storm-petrel (*Oceanodroma castro*)	BCC Rangewide
Black rail (*Laterallus jamaicensis*)	BCC Rangewide
Black scoter (*Melanitta nigra*)	Non-BCC Vulnerable
Black skimmer (*Rynchops niger*)	BCC Rangewide
Black-legged kittiwake (*Rissa tridactyla*)	Non-BCC Vulnerable

[48] NOAA. n.d. "National Marine Sanctuaries Northeast Region." Accessed January 8, 2018. https://sanctuaries.noaa.gov/about/northeast.html.

[49] New York State Department of State Planning & Development. n.d. Significant Coastal Fish & Wildlife Habitats. Accessed February 1, 2018. https://www.dos.ny.gov/opd/programs/consistency/scfwhabitats.html.

[50] New York Natural Heritage Program. 2017. "Rare Animal Status List, October 2017." Accessed January 16, 2018 http://www.dec.ny.gov/docs/wildlife_pdf/rareanimal2017.pdf.

Exhibit 3-2 Migratory Bird Species Potentially Occurring in the Area of the OCS

Species	Conservation Status
Bonaparte's gull (*Chroicocephalus philadelphia*)	Non-BCC Vulnerable
Brown pelican (*Pelecanus occidentalis*)	Non-BCC Vulnerable
Clapper rail (*Rallus crepitans*)	BCC-BCR
Common eider (*Somateria mollissima*)	Non-BCC Vulnerable
Common loon (*Gavia immer*)	Non-BCC Vulnerable
Common tern (*Sterna hirundo*)	Non-BCC Vulnerable
Cory's shearwater (*Calonectris diomedea*)	Non-BCC Vulnerable
Double-crested cormorant (*Phalacrocorax auritus*)	Non-BCC Vulnerable
Dovekie (*Alle alle*)	Non-BCC Vulnerable
Eastern whip-poor-will (*Antrostomus vociferus*)	BCC Rangewide
Golden eagle (*Aquila chrysaetos*)	Non-BCC Vulnerable
Great black-backed gull (*Larus marinus*)	Non-BCC Vulnerable
Great shearwater (*Puffinus gravis*)	Non-BCC Vulnerable
Gull-billed tern (*Gelochelidon nilotica*)	BCC Rangewide
Henslow's sparrow (*Ammodramus henslowii*)	BCC Rangewide
Herring gull (*Larus argentatus*)	Non-BCC Vulnerable
Kentucky warbler (*Oporornis formosus*)	BCC Rangewide
King rail (*Rallus elegans*)	BCC Rangewide
Least tern (*Sterna antillarum*)	BCC Rangewide
Lesser Yellowlegs (*Tringa flavipes*)	BCC Rangewide
Long-tailed duck (*Clangula hyemalis*)	Non-BCC Vulnerable
Magnificant frigatebird (*Fregata magnificens*)	BCC Rangewide
Manx shearwater (*Puffinus puffinus*)	Non-BCC Vulnerable
Marbled godwit (*Limosa fedoa*)	BCC Rangewide
Nelson's sparrow (*Ammodramus nelson*)	BCC Rangewide
Northern gannet (*Morus bassanus*)	Non-BCC Vulnerable
Parasitic jaeger (*Stercorarius parasiticus*)	Non-BCC Vulnerable
Pomarine jaeger (*Stercorarius pomarinus*)	Non-BCC Vulnerable
Prairie warbler (*Dendroica discolor*)	BCC Rangewide
Prothonotary warbler (*Protonotaris citrea*)	BCC Rangewide
Purple sandpiper (*Calidris maritima*)	BCC Rangewide
Razorbill (*Alca torda*)	Non-BCC Vulnerable
Red phalarope (*Phalaropus fulicarius*)	Non-BCC Vulnerable
Red-breasted merganser (*Mergus serrator*)	Non-BCC Vulnerable
Red-headed woodpecker (*Melanerpes erythrocephalus*)	BCC Rangewide
Red-necked phalarope (*Phalaropus lobatus*)	Non-BCC Vulnerable
Red-throated loon (*Gavia stellate*)	BCC Rangewide
Ring-billed gull (*Larus delawarensis*)	Non-BCC Vulnerable
Roseate tern (*Sterna dougallii*)	Non-BCC Vulnerable
Royal tern (*Thalasseus maximus*)	Non-BCC Vulnerable
Rusty blackbird (*Euphagus carolinus*)	BCC Rangewide
Seaside sparrow (*Ammodramus maritimus*)	BCC Rangewide
Semipalmated sandpiper (*Calidris pusilla*)	BCC Rangewide
Short-billed dowitcher (*Limnodromus griseus*)	BCC Rangewide

Exhibit 3-2 Migratory Bird Species Potentially Occurring in the Area of the OCS

Species	Conservation Status
Sooty tern (*Onychoprion fuscatus*)	Non-BCC Vulnerable
Surf scoter (*Melanitta perspicillata*)	Non-BCC Vulnerable
Swallow-tailed kite (*Elanoides forficatus*)	BCC Rangewide
Thick-billed murre (*Uria lomvia*)	Non-BCC Vulnerable
Whimbrel (*Numenius phaeopus*)	BCC Rangewide
White-winged scoter (*Melanitta fusca*)	Non-BCC Vulnerable
Willet (*Tringa semipalmata*)	BCC Rangewide
Wilson's plover (*Charadrius wilsonia*)	BCC Rangewide
Wilson's storm-petrel (*Oceanites oceanicus*)	Non-BCC Vulnerable
Wood thrush (*Hylocichla mustelina*)	BCC Rangewide

Notes:
BCC Rangewide = Birds of Conservation Concern (BCC) that are of concern throughout their range anywhere within the US.

BCC-BCR = Birds that are BCC's but are of concern only in particular bird conservation regions (BCRs) in the continental US.

Non-BCC Vulnerable = Birds that are not BCC species within the defined project area (in our case, the OCS), but appear on the generated list because of either the Eagle Act requirements or potential susceptibilities in offshore areas from certain types of development or activities.

Exhibit 3-3 New York State Listed Endangered and Threatened Animal Species Believed or Known to Occur in New York

Species	New York State Status
Mammals	
North Atlantic right whale (*Eubalaena glacialis*)	E
Sei whale (*Balaenoptera borealis*)	E
Blue whale (*Balaenoptera musculus*)	E
Fin whale (*Balaenoptera physalus*)	E
Sperm whale (*Physeter microcephalus*)	E
Indiana bat (*Myotis sodalis*)	E
Northern long-eared bat (*Myotis septentrionalis*)	T
Allegheny woodrat (*Neotoma magister*)	E
Eastern cougar (*Puma concolor couguar*)[a]	E
Gray wolf (*Canis lupus*)[a]	E
Canada lynx (*Lynx canadensis*)[a]	T
Birds	
Piping plover (*Charadrius melodus*)	E
Roseate Tern (*Sterna dougalli dougalli*)	E
Spruce grouse (*Falcipennis canadensis*)	E
Pied-billed grebe (*Podilymbus podiceps*)	T
Black rail (*Laterallus jamaicensis*)	E
King rail (*Rallus elegans*)	T
Upland sandpiper (*Bartramia longicauda*)	T
Black tern (*Chlidonias niger*)	E
Common tern (*Sterna hirundo*)	T

Exhibit 3-3 New York State Listed Endangered and Threatened Animal Species Believed or Known to Occur in New York

Species	New York State Status
Least tern (*Sternula antillarum*)	T
Least bittern (*Ixobrychus exilis*)	T
Golden eagle (*Aquila chrysaetos*)	E
Northern harrier (*Circus cyaneus*)	T
Bald eagle (*Haliaeetus leucocephalus*)	T
Short-eared owl (*Asio flammeus*)	E
Peregrine falcon (*Falco peregrinus*)	E
Henslow's sparrow (*Ammodramus henslowii*)	T
Loggerhead shrike (*Lanius ludovicianus*)	E
Sedge wren (*Cistothorus platensis*)	T
Reptiles	
Bog turtle (*Clemmys muhlenbergii*)	E
Eastern massasauga (*Sistrurus catenatus*)	E
Fence lizard (*Sceloporus undulatus*)	T
Queen snake (*Regina septemvittata*)	E
Timber rattlesnake (*Crotalus horridus*)	T
Eastern Massasauga (*Sistrurus catenatus catenatus*)	E
Blanding's turtle (*Emydoidea blandingii*)	T
Eastern mud turtle (*Kinosternon subrubrum*)	E
Amphibians	
Northern cricket frog (*Acris crepitans*)	E
Tiger salamander (*Ambystoma tigrinum*)	E
Fish	
Shortnose sturgeon (*Acipenser brevirostrum*)[a]	E
Lake sturgeon (*Acipenser fulvescens*)	T
Mooneye (*Hiodon tergisus*)	T
Gravel chub (*Erimystax x-punctatus*)	T
Silver chub (*Macrhybopsis storeriana*)	E
Pugnose shiner (*Notropis anogenus*)	E
Lake chubsucker (*Erimyzon sucetta*)	T
Round whitefish (*Prosopium cylindraceum*)	E
Spoonhead sculpin (*Cottus ricei*)	E
Deepwater sculpin (*Myoxocephalus thompsonii*)	E
Mud sunfish (*Acantharchus pomotis*)	T
Banded sunfish (*Enneacanthus obesus*)	T
Northern sunfish (*Lepomis peltastes*)	T
Eastern sand darter (*Ammocrypta pellucida*)	T
Bluebreast darter (*Etheostoma camurum*)	E
Swamp darter (*Etheostoma fusiforme*)	T
Spotted darter (*Etheostoma maculatum*)	T
Gilt darter (*Percina evides*)	E
Longhead darter (*Percina macrocephala*)	T
Oceanic whitetip shark (*Carcharhinus longimanus*)	T

Exhibit 3-3 New York State Listed Endangered and Threatened Animal Species Believed or Known to Occur in New York

Species	New York State Status
Mollusks	
Clubshell (*Pleurobema clava*)	E
Dwarf wedgemussel (*Alasmidonta heterodon*)	E
Rayed bean (*Villosa fabalis*)	E
Brook floater (*Alasmidonta varicose*)	T
Pink mucket (*Lampsilis abrupta*)[a]	E
Wavyrayed lampmussel (*Lampsilis fasciola*)	T
Green floater (*Lasmigona subviridis*)	T
Fat pocketbook (*Potamilus capax*)[a]	E
Chittenango ovate amber snail (*Succinea chittenangoensis*)	E
Insects	
Karner blue butterfly (*Lycaeides Melissa samuelis*)	E
Tomah mayfly (*Siphlonisca aerodromia*)	E
Little bluet (*Enallagma minusculum*)	T
Scarlet bluet (*Enallagma pictum*)	T
Pine barrens bluet (*Enallagma recurvatum*)	T
Northeastern beach tiger beetle (*Cicindela dorsalis dorsalis*)[a]	T
American burying beetle (*Nicrophorus americanus*)[a]	E
Arogos skipper (*Atrytone arogos arogos*)	E
Persius duskywing (*Erynnis persius persius*)	E
Southern grizzled skipper (*Pyrgus Wyandot*)	E
Hessel's hairstreak (*Callophrys hesseli*)	E
Frosted elfin (*Callophrys irus*)	T
Regal fritillary (*Speyeria idalia*)	E
Bogbean buckmoth (*Hemileuca sp. 1*)	E
Pine pinion moth (*Lithophane lepida lepida*)	E

Note:
[a] Species that are federally listed but are not included in the USFWS list of protected species for New York State.[51]

Key:
E = Endangered
T = Threatened

3.3 Marine Commercial and Recreational Uses

The marine environment provides for a variety of commercial and recreational uses. Commercial uses include infrastructure placement, sand and gravel mining, ocean disposal sites, and commercial fishing. Infrastructure in the form of submarine cables (telecommunication and power cables), natural gas pipelines, and other infrastructure (e.g., buoys) is present throughout the marine environment.

[51] Information for Planning and Consultation. 2017. "IPaC: Explore Location, Resource List." Accessed January 5, 2017. https://ecos.fws.gov/ipac/location/E2KWZNXMAZBF3BM3WK5YWXU74U/resources.

Exhibit 3-4 shows locations of infrastructure mapped by NOAA Fisheries and the North American Submarine Cable Association. Submarine cables and natural gas pipelines provide energy and natural gas between states, and are located at varying depths at or below the seabed until they make landfall to connect to onshore distribution facilities.

Telecommunications cables may be armored and buried when located closer to shore. Three international transatlantic fiber optic cables that make landfall in Virginia Beach are currently under construction and therefore are not shown on Exhibit 3-4.[52]

In addition to submarine cables and natural gas pipelines, buoys are present throughout the marine environment. Marine buoys measure a range of oceanographic parameters or serve as aids to navigation, marking navigation channels and shipping lane approaches.[53]

Sand and gravel mining occurs or formerly occurred at various sites, called borrow areas, within the marine environment. Sand and gravel mined offshore is used primarily for construction material; however, in recent decades, beach nourishment projects (to replace sand after storm events or other erosional causes) have become more common.[54,55] The majority of the active or former borrow areas are located along the East Coast between the coast and the territorial sea boundary (12 nautical miles (nm)); the farthest offshore mining site is located approximately 14 nm from shore. According to BOEM, there are no active or proposed federal OCS sand and gravel borrow lease areas north of Point Pleasant, New Jersey.[56]

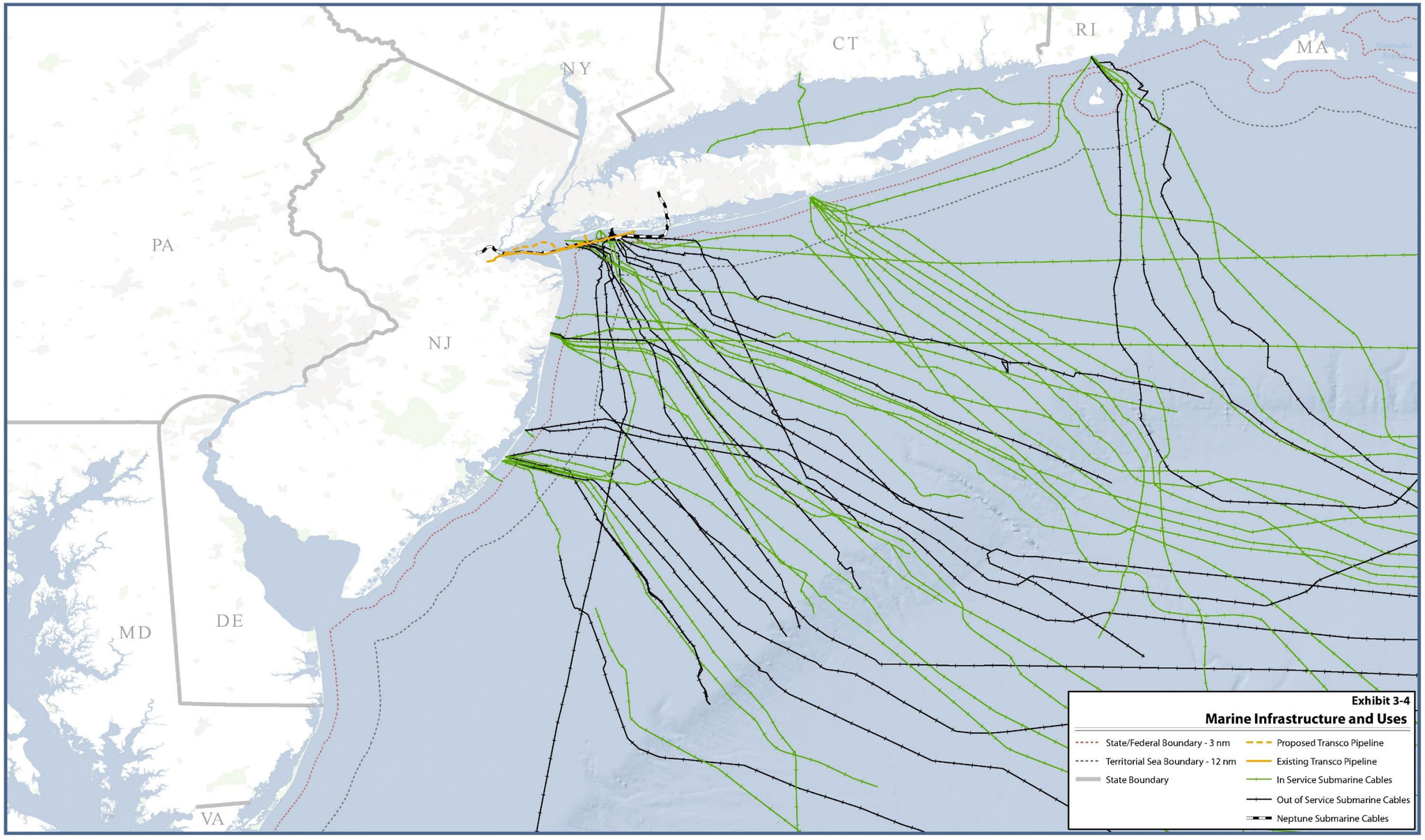
[52] Huawei Marine Networks. 2017. "TeleGeography Submarine Cable Map." Accessed January 11, 2018. https://www.submarinecablemap.com/#/.

[53] NYSERDA. 2017. "Cables, Pipelines, and Other Infrastructure Study." Report 17-25f. Accessed January 29, 2018. https://www.nyserda.ny.gov/All-Programs/Programs/Offshore-Wind/New-York-Offshore-Wind-Master-Plan/Area-for-Consideration.

[54] Garel, E., W. Bonne, and M.B. Collins. 2009. "Offshore Sand and Gravel Mining." *ResearchGate*, DOI: 10.4043/4495-MS.

[55] American Shore and Beach Preservation Association. 2006. "Beach Replenishment and the Impact of Global Warming and Sea Level Rise." Accessed June 2017. http://asbpa.org/wpv2/wp-content/uploads/2016/04/globalwarmingandsealevelrise_rev3.pdf.

[56] BOEM Minerals Management Program. 2016. "Federal OCS Sand and Gravel Borrow Areas (Lease Areas)." Accessed January 5, 2018. https://marinecadastre.gov/data/.


NY
CT
RI
MA
Nantucket
PA
NJ
MD
DE
VA
Exhibit 3-4
Marine Infrastructure and Uses
State/Federal Boundary - 3 nm
Territorial Sea Boundary - 12 nm
State Boundary
Proposed Transco Pipeline
Existing Transco Pipeline
In Service Submarine Cables
Out of Service Submarine Cables
Neptune Submarine Cables
0 25 50 Miles
0 25 50 Nautical Miles
Coordinate System: GCS_North_American_1983
Path: M:\New_York_City\NYSERDA_OffshoreWaps\MXD\GIS_Supplement_rev1\Exhibit3-4_Marine Infrastructure and Uses.mxd
Source: BOEM 2016c; ESRI 2010; RCG 2017
Service Layer Credits: USGS,NGA,NASA,CGIAR,GEBCO,N Robinson,NCEAS,NLS,OS,NMA,Geodatastyrelsen and the GIS User Community

Ocean disposal sites, both active and discontinued, are located throughout the marine environment and range from just offshore (less than 0.5 nm) to more than 100 nm offshore. These sites are or formerly were used for the purposes of spoil disposal, contaminated dredged material disposal, and regular dredged material placement.[57,58] The United States Environmental Protection Agency (EPA) is responsible for the designation of ocean disposal sites, which generally are placed in areas where disposal will not have a significant impact on various resources such as fisheries, coral reefs, endangered species, or shipping, fishing, and recreational uses.[59]

The marine environment provides habitat for a diverse array of fish species and supports both commercial and recreational fisheries. Commercial fishing is defined as "fishing in which the fish harvested, either in whole or in part, are intended to enter commerce or enter commerce through sale, barter or trade." Recreational fishing is defined as "fishing for sport or pleasure."[60] Fishing grounds exist throughout the marine environment for a variety of fish and shellfish species, including scallops, squid, monkfish, mackerel, summer and winter flounder, skates, herring, clams, crabs, lobster, bluefish, black sea bass, spiny dogfish, scup, cod, pollock, and striped bass, as well as highly migratory species such as tunas and sharks. Exhibit 3-5 presents the locations of some major commercial fishing activities based on vessel monitoring system (VMS) data and a relative scale of use ranging from very high to low.[61] These maps provide a representative depiction of some of the fishing grounds used by commercial fishing boats landing up and down the Northeast coast, including major fishing ports such as Cape May, New Jersey; Point Judith, Rhode Island; and New Bedford, Massachusetts.NOAA Fisheries collects and maintains VMS data, which uses a satellite surveillance system to monitor the location and movement of commercial fishing vessels in the waters of certain federally managed fisheries. On-board transceiver units send position reports that include vessel identification, time, date, and location once an

57 USACE. 2018. "Ocean Disposal Database." Accessed January 5, 2018. https://odd.el.erdc.dren.mil/ODMDSSearch.cfm.

58 NOAA Office for Coastal Management. 2016. "Ocean Disposal Sites." Accessed January 5, 2018. https://www.marinecadastre.gov/data/.

59 EPA. 2018. "Ocean Disposal Site Criteria." Accessed January 10, 2018. https://www.epa.gov/ocean-dumping/ocean-disposal-site-designation.

60 NOAA Office of General Counsel. 1997. "A Guide to the Sustainable Fisheries Act: Public Law 104-297." Accessed August 7, 2017. http://www.nmfs.noaa.gov/sfa/sfaguide/102.htm.

61 Mid-Atlantic Regional Council on the Ocean (MARCO) Mid-Atlantic Ocean Data Portal. n.d. Marine Planner, Commercial Fishing-VMS. Accessed 14 August 2017. http://portal.midatlanticocean.org.

hour.[62] Exhibit 3-5 shows VMS records below a speed threshold, which are indicative of active fishing rather than vessel transit.[63] Exhibit 3-6 provides a representation of some of the recreational fishing areas in New York and New Jersey.[64,65,66] Additional commercial and recreational fishing activities occur off of the Mid-Atlantic coast, including off the coasts of Ocean City, Maryland; Virginia Beach, Virginia, and the Outer Banks of North Carolina.

A variety of fishing gear is used both commercially and recreationally, including rod and reel, longlines, gillnets, seines, beam trawls, otter trawls, paired mid-water and bottom trawls, spears, pots and traps, and dredges.[67] According to NOAA Fisheries' *Marine Recreational Information Program National Query*, there were over 5.6 million total marine anglers in 2016 across the East Coast.[68]

Wildlife viewing, underwater activities, and recreational boating also occur in the marine environment. Wildlife viewing includes both bird watching and whale watching, which takes place aboard charter vessels of various sizes and occurs closer to shore and in the marine environment, especially in the case of whale watching. Vessels that offer whale watching range from small, semi-private charters accommodating up to six passengers that conduct a single voyage per day, to large charters carrying up to 400 passengers that conduct three to five trips per day.[69]

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62 NOAA Fisheries. n.d. Vessel Monitoring System Program. Accessed 14 August 2017. http://www.nmfs.noaa.gov/ole/about/our_programs/vessel_monitoring.html.

63 Shmookler, R. 2015. Vessel monitoring systems (VMS) commercial fishing density; northeast and mid-Atlantic regions. Accessed 14 August 2017. http://www.northeastoceandata.org/files/metadata/Themes/CommercialFishing/VMSCommercialFishingDensity.pdf. Prepared for: Northeast Regional Ocean Council (NROC); Northeast ocean data.

64 Mid-Atlantic Regional Council on the Ocean (MARCO) Mid-Atlantic Ocean Data Portal. n.d. Marine Planner, New York Recreational Fishing. Accessed 14 August 2017. http://portal.midatlanticocean.org.

65 Mid-Atlantic Regional Council on the Ocean (MARCO) Mid-Atlantic Ocean Data Portal. n.d. Marine Planner, *NJDEP Sport Ocean Fishing Grounds*. Accessed 14 August 2017. http://portal.midatlanticocean.org.

66 Mid-Atlantic Regional Council on the Ocean (MARCO) Mid-Atlantic Ocean Data Portal. n.d. Marine Planner, Artificial Reefs. Accessed 25 April 2018. http://portal.midatlanticocean.org.

67 Scotti, J., J. Stent, and K. Gerbino. n.d. "New York Commercial Fisherman Ocean Use Mapping: Final Report. Accessed August 7, 2017. https://docs.dos.ny.gov/communitieswaterfronts/ocean_docs/Cornell_Report_NYS_Commercial_Fishing.pdf. Cornell Cooperative Extension Marine Program.

68 NOAA Fisheries. 2016. "Marine Recreational Information Program National Query." Accessed January 5, 2018. http://www.st.nmfs.noaa.gov/recreational-fisheries/data-and-documentation/queries/index.

69 Point97, Surfrider Foundation, and SeaPlan. 2015. "Characterization of Coastal and Marine Recreational Activity in the U.S. Northeast." Developed for the Northeast Regional Planning Body. Accessed January 29, 2018. http://archive.neoceanplanning.org/wp-content/uploads/2015/10/Recreation-Study_Final-Report.pdf.

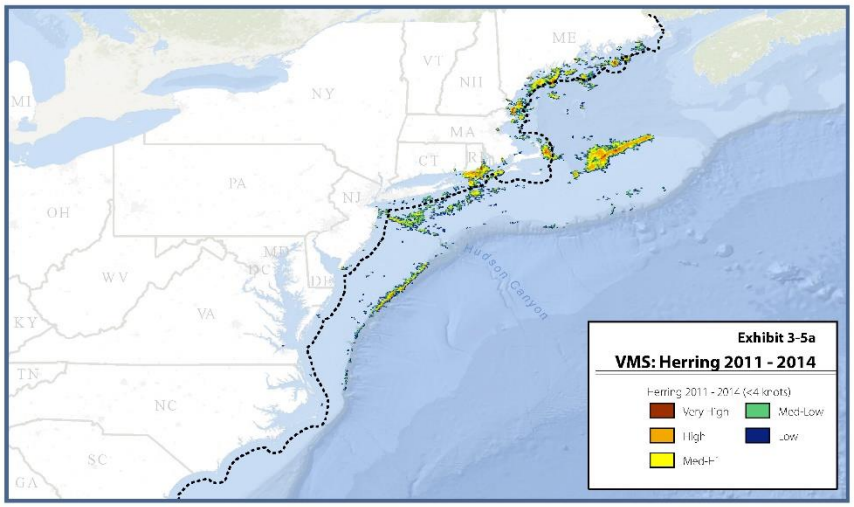


Exhibit 3-5a
VMS: Herring 2011 - 2014
Herring 2011 - 2014 (<4 knots)
Very High
Med-Low
High
Low
Med-Hi
Hudson Canyon

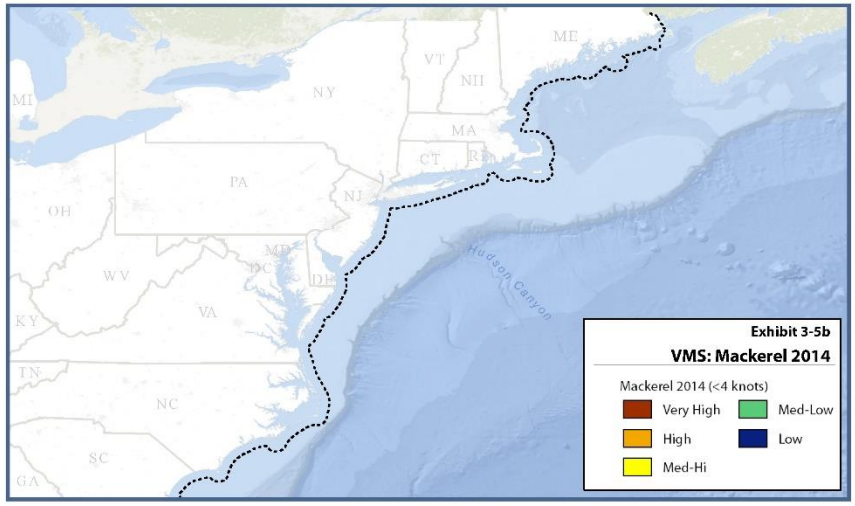


Exhibit 3-5b
VMS: Mackerel 2014
Mackerel 2014 (<4 knots)
Very High
Med-Low
High
Low
Med-Hi
Hudson Canyon

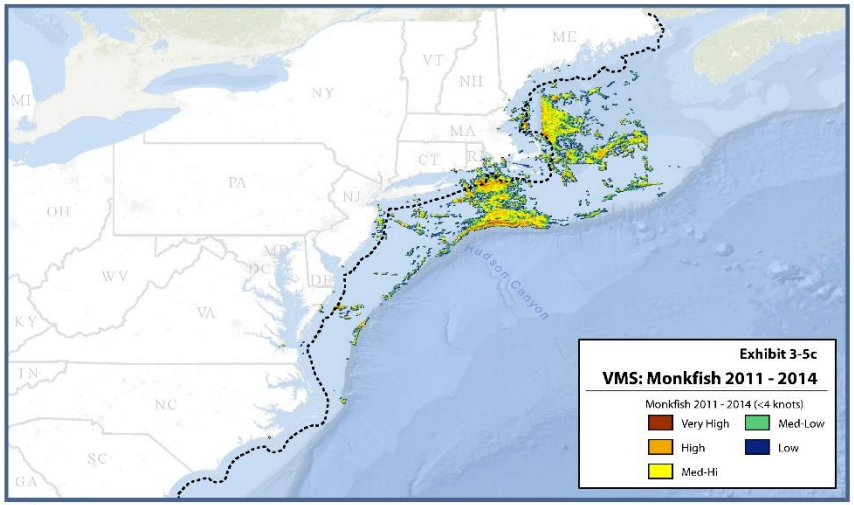


Exhibit 3-5c
VMS: Monkfish 2011 - 2014
Monkfish 2011 - 2014 (<4 knots)
Very High
Med-Low
High
Low
Med-Hi
Hudson Canyon

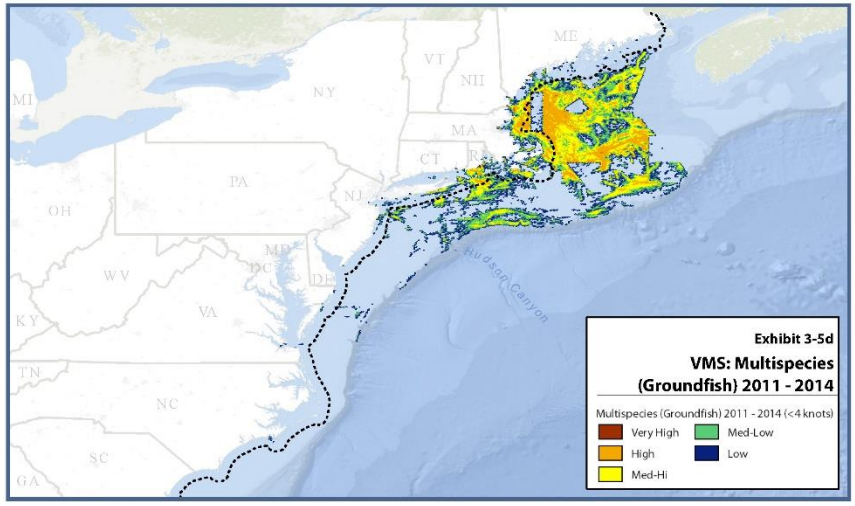


Exhibit 3-5d
VMS: Multispecies
(Groundfish) 2011 - 2014
Multispecies (Groundfish) 2011 - 2014 (<4 knots)
Very High
Med-Low
High
Low
Med-Hi
Hudson Canyon

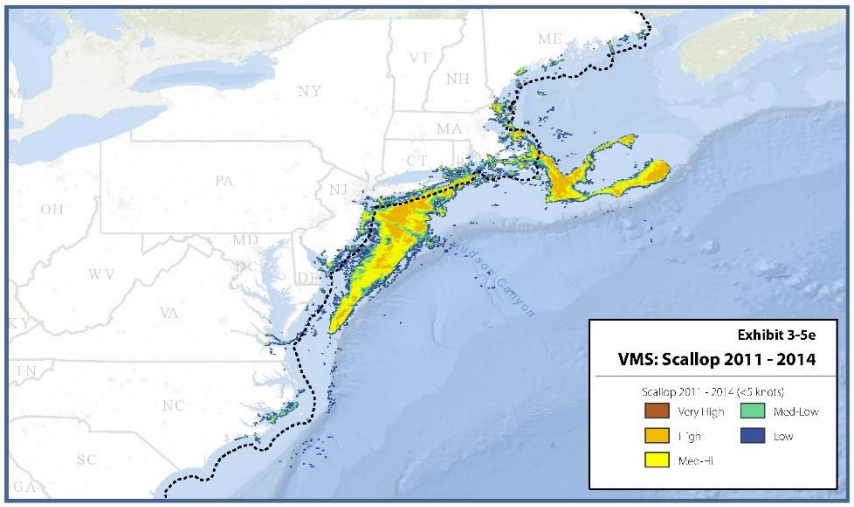


Exhibit 3-5e
VMS: Scallop 2011 - 2014
Scallop 2011 - 2014 (<5 knots)
Very High
Med-Low
High
Low
Med-Hi
Hudson Canyon
ME
VT
NH
NY
MA
CT
PA
NJ
OH
MD
DC
DE
WV
VA
KY
TN
NC
SC
GA

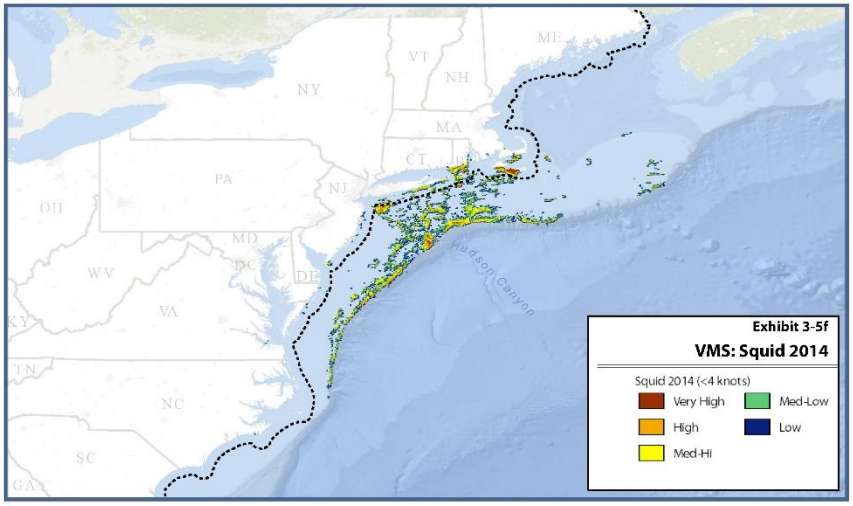


Exhibit 3-5f
VMS: Squid 2014
Squid 2014 (<4 knots)
Very High
Med-Low
High
Low
Med-Hi
Hudson Canyon
ME
VT
NH
NY
MA
CT
PA
NJ
OH
MD
DC
DE
WV
VA
KY
TN
NC
SC
GA

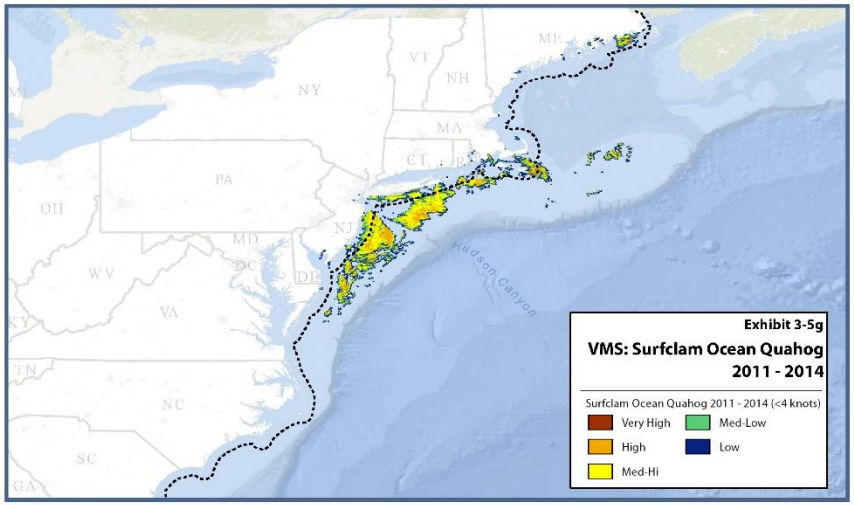
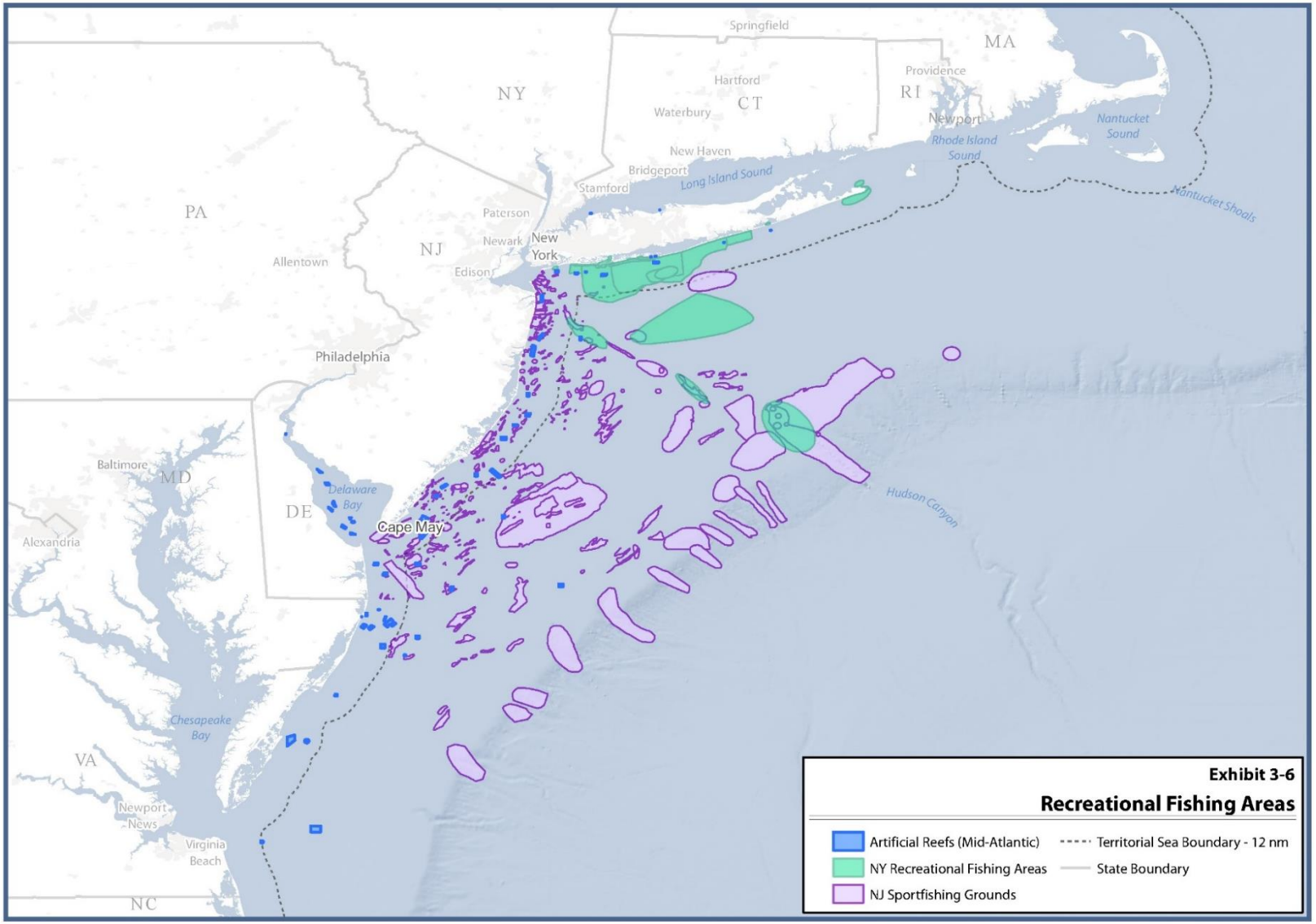


Exhibit 3-5g
VMS: Surfclam Ocean Quahog 2011 - 2014
Surfclam Ocean Quahog 2011 - 2014 (<4 knots)
Very High
Med-Low
High
Low
Med-Hi
Hudson Canyon
ME
VT
NH
NY
MA
CT
PA
NJ
OH
MD
DC
DE
WV
VA
KY
TN
NC
SC
GA


0 50 100Miles
0 50 100Nautical Miles


Territorial Sea Boundary - 12 nm
State Boundary


Springfield
MA
Providence
RI
Hartford
CT
Waterbury
NY
Newport
Nantucket Sound
Rhode Island Sound
New Haven
Bridgeport
Long Island Sound
Stamford
Nantucket Shoals
PA
Paterson
Newark
New York
NJ
Allentown
Edison
Philadelphia
Baltimore
MD
Delaware Bay
DE
Cape May
Alexandria
Hudson Canyon
Chesapeake Bay
VA
Newport News
Virginia Beach
NC
Exhibit 3-6
Recreational Fishing Areas
Artificial Reefs (Mid-Atlantic)
NY Recreational Fishing Areas
NJ Sportfishing Grounds
Territorial Sea Boundary - 12 nm
State Boundary
N
W
E
S
0 25 50 Miles
0 25 50 Nautical Miles
Coordinate System: GCS_North_American_1983
Path: M:\New_York_City\NYSERDA_Offshore\Maps\MXD\GEIS_Supplement_rev1\Exhibit3-6_Rec_Fishing_Areas_8x11.mxd
Source: ESRI 2010; MARCO Mid-Atlantic Ocean Data Portal n.d.[d,e]; DOS n.d.
Service Layer Credits: USGS,NGA,NASA,CGIAR,GEBCO,N Robinson,NCEAS,NLS,OS,NMA,Geodatastyrelsen and the GIS User Community

Underwater activities in the marine environment consist of shore- and boat-based scuba diving, free diving, and snorkeling.[70,71] Scuba diving occurs near shipwrecks, artificial reefs, and other distinct areas of the offshore environment. Surface water activities can consist of swimming, windsurfing, surfing, and kayaking/paddling. These marine recreational uses predominantly occur near the coast and are correlated with beach activities.

Recreational boating includes personal and pleasure craft and includes both motorized recreational boats and sailboats. Recreational boating is described in more detail in Section 3.5.

Some of the marine recreational uses are more seasonally dependent than others. For example, whale watching occurs from spring through fall, with a peak in July and August; diving activity occurs year-round but is concentrated during the months of May through October; and most recreational boating activity occurs during the summer months.

3.4 Cultural Resources

Cultural resources located in the marine environment can generally be divided into three broad categories: submerged indigenous archaeological sites; shipwrecks or other objects, which may consist of aircraft remains and a variety of objects purposely or unintentionally disposed of in the marine environment; and submerged architectural or other built resources, such as piers, docks, weirs, pipelines, telecommunication cables, and artificial reefs. Relevant cultural resources may also include terrestrial cultural resources such as buildings, structures, or other areas; cultural or historic landscapes or seascapes; traditional cultural properties; or Native American resources that are associated with indigenous nations with an interest in the marine environment. These various types of cultural resources are associated with the prehistory and history of the marine environment.

Cultural resources can include resources that are listed, or determined eligible for listing, in a State Register, such as New York State Register of Historic Places, if a state maintains such a register and when the cultural resource is determined to be of particular importance to understanding the history of that state. Usually properties listed in the New York State Register of Historic Places are also listed in a National Register of Historic Places (NRHP). Such State Register-listed or -eligible cultural resources are typically considered when projects require state permits, approval, or funding and are reviewed by state agencies in accordance with

[70] Surfrider Foundation, Point 97, Nature Conservancy, and Monmouth University Urban Coast Institute. 2014. "U.S. Mid-Atlantic Coastal and Ocean Recreation Study." Prepared in collaboration with the Mid-Atlantic Regional Council on the Ocean (MARCO). Accessed January 29, 2018. http://surfridercdn.surfrider.org/images/uploads/publications/MidAtlanticCoastalandOceanRecreationStudyReport.pdf.

[71] Point97, Surfrider Foundation, and SeaPlan. 2015. "Characterization of Coastal and Marine Recreational Activity in the U.S. Northeast." Developed for the Northeast Regional Planning Body. Accessed January 29, 2018. http://archive.neoceanplanning.org/wp-content/uploads/2015/10/Recreation-Study_Final-Report.pdf.

state laws and regulations pertaining to cultural resources or historic preservation.[72]

Similarly, cultural resources can include historic properties, which are defined as any prehistoric or historic district, site, buildings, structure or object that is included (listed) or determined to be eligible for listing in the NRHP because they meet NRHP-eligibility criteria and, thus, have been determined to be of particular importance to understanding the history of the nation.[73] Cultural resources that are historic properties may also include properties that have been designated National Historic Landmarks because of their exceptional value to the nation as a whole. The term "historic properties" includes artifacts, records, and remains that are related to and located within such properties. The term also includes properties that are of traditional religious and cultural importance to an Indian tribe and meet NRHP-eligibility criteria.[74] National Register-listed or –eligible historic properties are typically considered when projects require federal permits, approval, or funding and are reviewed by federal agencies in accordance with federal laws and regulations pertaining to cultural resources or historic preservation.

Submerged indigenous archaeological sites would be located in offshore areas that were once associated with onshore (terrestrial) settings but are now submerged due to rising sea levels. Shipwrecks and other objects would be located in offshore areas with a variety of settings, depending on their unintentional disposal underwater because of storms, warfare, or other accidental or deliberate deposition. Submerged architectural or other built resources would be located in offshore areas that were intentionally selected as part of project development and construction activities. Terrestrial cultural resources, such as buildings, structures, or other areas, would typically be located in or near the shoreline and their significance, in whole or in part, would be associated with the marine environment. Traditional cultural landscapes or other marine areas of interest or concern to indigenous nations are typically large areas and may include submerged lands on offshore, nearshore, or shoreline locations, as well as terrestrial areas.

3.5 Transportation (Vessel Traffic)

Existing marine transportation includes a variety of commercial vessel uses, including the operation of vessels for import and export services, construction work, fishing, and cruise ship tourism, as well as recreational vessels. Recreational vessels may include charter boats used for general boating, whale-watching, fishing, birding, scuba diving, and/or snorkeling. Exhibits 3-4, 3-5, 3-6, 3-7, and 3-8 illustrate general vessel activity, including marine infrastructure and use, major com-

[72] New York State Office of Parks, Recreation and Historic Preservation. 2018. "Federal & State Preservation Legislation." Accessed January 22, 2108. https://parks.ny.gov/shpo/environmental-review/preservation-legislation.aspx.

[73] Advisory Council on Historic Preservation. 2004. *36 CFR Part 800 – Protection of Historic Properties (incorporating amendments effective August 5, 2004)*. Accessed November 7, 2017. http://www.achp.gov/regs-rev04.pdf.

[74] *Ibid*.

mercial fishing activities based on VMS data, recreational fishing areas, an overall AIS heat map showing general vessel activity from Maryland to Maine, and recreational boating routes, respectively.

Marine transportation in the offshore environment is supported by a network of navigation features, including shipping lanes, fairways, traffic separation schemes (TSSs), and features such as navigational aids, which facilitate safe navigation. TSSs are used to ensure safe passage for large commercial vessels and passenger ships. Navigation in the vicinity of the ports is guided by designated shipping lanes, as shown in Exhibit 3-7.

Cargo vessels predominantly follow fairways and TSSs and, in the absence of other constraints, generally take the most direct passage between waypoints to reduce transit time and fuel costs.[75] Similarly, tanker traffic and passenger vessels follow fairways and TSSs.[76]

The largest ports on the East Coast include the Port of New York and New Jersey, Baltimore, and Boston. Container vessels, cargo vessels, tankers, and other vessel types combined account for over 6,900 vessel calls to these three ports.[77]

Cruise ship traffic also utilizes the shipping channels and the offshore marine environment. The three major East Coast ports—Port of New York and New Jersey, Baltimore and Boston—anticipate over 600 cruise ship departures in 2018.[78,79,80]

In addition to commercial vessel traffic, recreational boaters also utilize the marine environment. Just over half of marine recreational boating activity occurs within 1 mile of the coasts of the Northeast and Mid-Atlantic states. Long distance, offshore recreational boating routes are present throughout the offshore

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75 Toke, D. 2011. "The UK Offshore Wind Power Programme: A Sea-change in UK Energy Policy?" *Energy Policy* 39(2). pp. 526–534.

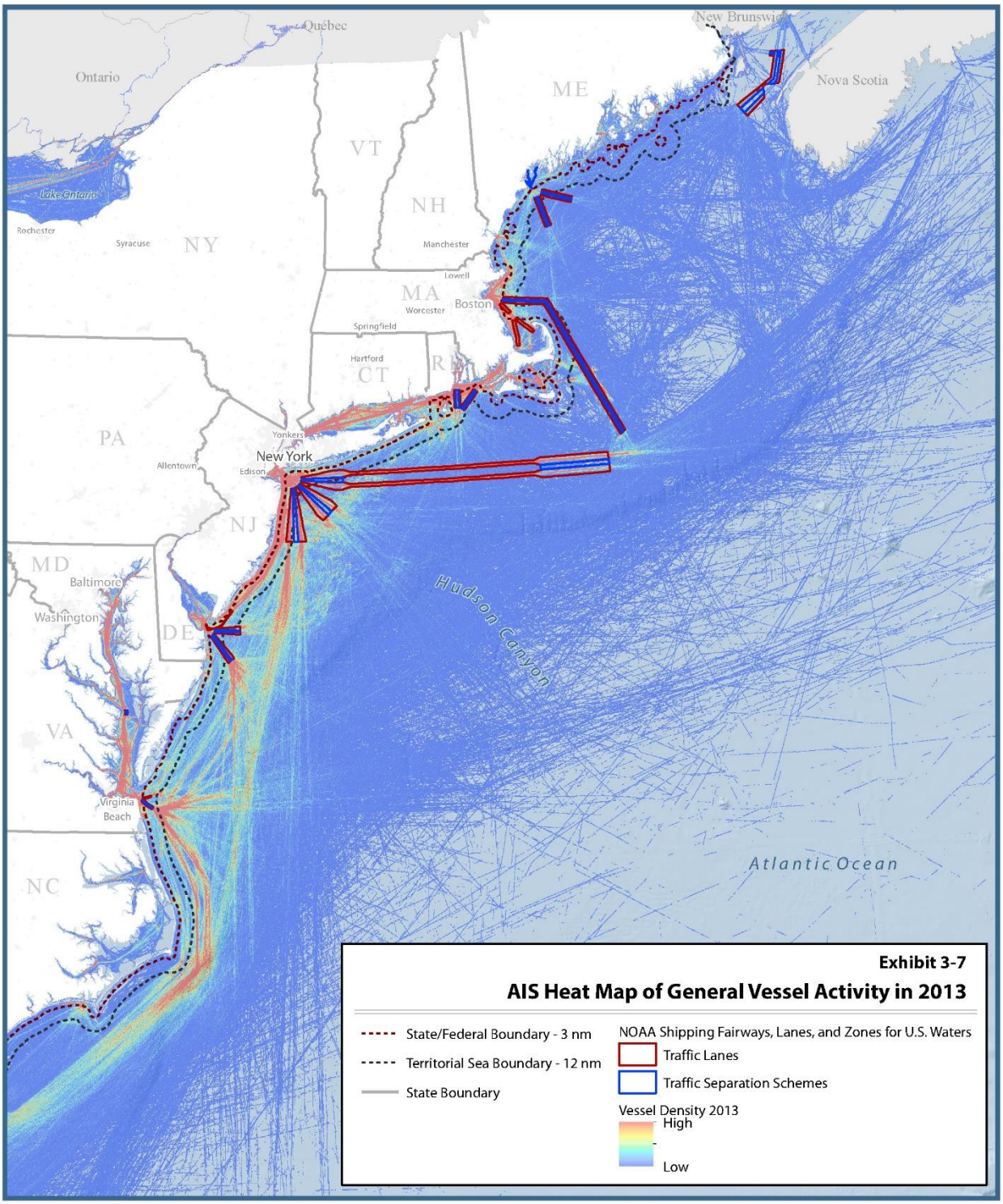
76 NYSERDA. 2017. "New York State Offshore Wind Master Plan Shipping and Navigation Study" Report 17-25g. Accessed January 29, 2018. https://www.nyserda.ny.gov/All-Programs/Programs/Offshore-Wind/New-York-Offshore-Wind-Master-Plan.

77 U.S. Department of Transportation, Maritime Administration. 2015. "2015 Vessel Calls in U.S. Ports, Selected Terminals and Lightering Areas." Accessed January 8, 2018. Available at: https://www.marad.dot.gov/wp-content/uploads/pdf/DS_VesselCalls_2015.pdf.

78 Flynn Cruiseport Boston. 2018. "Cruise Schedule." Accessed January 29, 2018. http://www.massport.com/cruiseport/cruise-directory/cruise-schedule/.

79 Crew Center. 2018. "Cruise Ship Schedule." Accessed January 29, 2018. http://crew-center.com/baltimore-maryland-cruise-ship-schedule-2018.

80 NYCRUISE. 2018. "Schedule." Accessed January 29, 2018. https://www.nycruise.com/schedule/.


Québec
New Brunswick
Ontario
Nova Scotia
ME
VT
NH
Lake Ontario
Rochester
Syracuse
NY
Manchester
Lowell
MA
Worcester
Boston
Springfield
Hartford
CT
RI
PA
Yonkers
New York
Allentown
Edison
NJ
MD
Baltimore
Washington
DE
Hudson Canyon
VA
Virginia Beach
NC
Atlantic Ocean
Exhibit 3-7
AIS Heat Map of General Vessel Activity in 2013
State/Federal Boundary - 3 nm
Territorial Sea Boundary - 12 nm
State Boundary
NOAA Shipping Fairways, Lanes, and Zones for U.S. Waters
Traffic Lanes
Traffic Separation Schemes
Vessel Density 2013
High
Low
0 50 100 Miles
0 50 100 Nautical Miles
Coordinate System: GCS_North_American_1983
Path: M:\New_York_City\NYSERDA_Offshore\Maps\MXD\GEIS_Supplement_rev1\Exhibit3-7_AIS_rev04.mxd
Source: ESRI 2010; BOEM 2016c; DOC, NOAA, NOS, OCM 2015
Service Layer Credits: USGS,NGA,NASA,CGIAR,GEBCO,N Robinson,NCEAS,NLS,OS,NMA,Geodatastyrelsen and the GIS User Community

marine environment but at a lower density.[81,82,83] For example, low- to medium-density routes originate from multiple points along the New York coast, including, Long Beach, Mystic Beach, Hampton Bays, and Montauk; along the New Jersey coast from places such as Atlantic City and Point Pleasant; and from the Rhode Island Sound, Boston, and along the coast of Maine. Additionally, as shown on Exhibit 3-8, medium- to high-density routes originate from Lewes and Rehoboth Beach, Delaware, and from Ocean City, Maryland. Long distance sailing races also occur, including races beginning in Annapolis, Maryland, and ending in Newport, Rhode Island, as well as the Bermuda One Two, the Volvo Ocean Race, the Marian to Bermuda Race, the Corinthians, the Stamford Vineyard Race, and others. These races involve low- to medium-density routes due to their limited occurrence.

To provide a visual summary of the vessel traffic in the marine environment, automatic identification system (AIS) data from 2013 were used to create a heat map showing the use of a portion of the East Coast marine environment for the *Shipping and Navigation Study* developed for the Master Plan.[84] AIS refers to an automated vessel-tracking system intended primarily to maintain safety and avoid collisions; ships equipped with AIS transponders automatically transmit location and identification information to other vessels and shore-based facilities. At this time, only relatively large commercial vessels are required to carry AIS equipment. The United States Coast Guard (USCG) requires vessels with a gross tonnage of 300 tons or more, passenger ships with a gross tonnage over 150 tons, and commercial self-propelled fishing vessels of 65 feet or more to carry AIS equipment.[85] However, some owners of smaller vessels voluntarily install AIS transponders, including owners of pleasure craft and sailing vessels. The heat map converts locational data into geospatial density in transit-route pathways. Exhibit 3-7 shows vessel use of a portion of the marine environment based on numbers of vessels per year.[86] Vessels types include cargo, tanker, tug and towing, passenger,

81 Mid-Atlantic Ocean Data Portal. 2017. "Recreation." Accessed January 11, 2018. http://portal.midatlanticocean.org/data-catalog/recreation/.

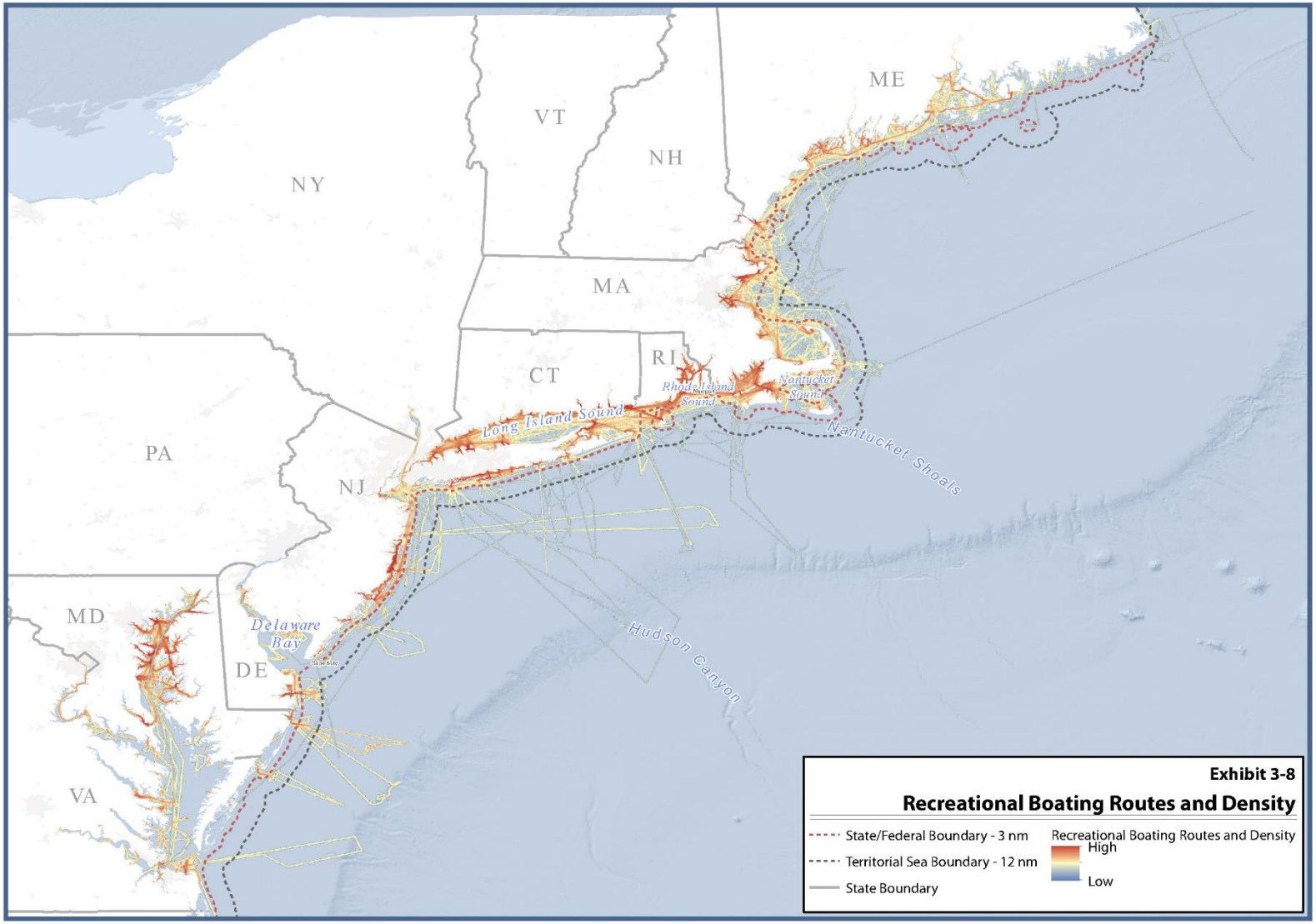
82 SeaPlan. 2013. "2012 Northeast Recreational Boater Survey: A Socioeconomic and Spatial Characterization of Recreational Boating in Coastal and Ocean Waters of the Northeast United States." Technical Report. Document 121.13.10, Boston, Massachusetts. p.105. Accessed June 13, 2017. https://www.openchannels.org/sites/default/files/literature/2012%20Northeast%20Recreational%20Boater%20Survey.pdf.

83 SeaPlan. 2013. "Northeast Recreational Boater Route Density." [metadata]. Accessed June 5, 2017. http://www.northeastoceandata.org/files/metadata/Themes/Recreation/RecreationalBoaterRouteDensity.pdf.

84 NYSERDA. 2017. "New York State Offshore Wind Master Plan Shipping and Navigation Study." Report 17-25q. Accessed January 29, 2018. https://www.nyserda.ny.gov/All-Programs/Programs/Offshore-Wind/New-York-Offshore-Wind-Master-Plan.

85 USCG Navigation Center. 2017. "AIS Requirements." Accessed June 5, 2017. http://www.navcen.uscg.gov/?pageName=AISRequirementsRev.

86 NYSERDA. 2017. "New York State Offshore Wind Master Plan Shipping and Navigation Study." Report 17-25q. Accessed January 29, 2018. https://www.nyserda.ny.gov/All-Programs/Programs/Offshore-Wind/New-York-Offshore-Wind-Master-Plan.


ME
VT
NH
NY
MA
CT
RI
PA
NJ
MD
DE
VA
Long Island Sound
Rhode Island Sound
Nantucket Sound
Nantucket Shoals
Hudson Canyon
Delaware Bay
Exhibit 3-8
Recreational Boating Routes and Density
State/Federal Boundary - 3 nm
Territorial Sea Boundary - 12 nm
State Boundary
Recreational Boating Routes and Density
High
Low
0 25 50 Miles
0 25 50 Nautical Miles
Coordinate System: GCS_North_American_1983
Path: M:\New_York_City\NYSERDA_Offshore\Maps\MXD\GEIS_Supplement_rev1\Exhibit3-8_RecBoating.mxd
Source: ESRI 2010; Monmouth University 2013; SeaPlan & NROC 2012
Service Layer Credits: USGS,NGA,NASA,CGIAR,GEBCO,N Robinson,NCEAS,NLS,OS,NMA,Geodatastyrelsen and the GIS User Community

fishing, military, and recreational. Red and orange areas correspond to the highest vessel use, whereas blue and purple areas correspond to the lowest vessel use. Exhibit 3-7 shows that highest vessel use occurs closest to shore.

3.6 Socioeconomics

The following presents overall socioeconomic characteristics of the shoreline counties in the United States, using the Federal Emergency Management Agency's 452 designated shoreline counties.[87] These shoreline counties include those along the Atlantic Coast, Pacific Coast, Gulf of Mexico, and Great Lakes. With access to the waterfront, many of the employment sectors within shoreline communities are associated with industries and businesses of the offshore environment, including, but not limited to, shipping, boating, tourism, and recreation.

In a study conducted in 2013, NOAA evaluated population and housing trends of shoreline counties from 1970 to 2020. Population trends in shoreline counties have been rising since the 1970s and are projected to continue rising into 2020. Of the 313 million people living in the United States in 2010, 39% lived in shoreline counties. Since shoreline counties also account for less than 10% of total land in the United States, population density (446 persons/square mile) in shoreline counties is high when compared to the United States' average population density (105 persons/square mile).

Shoreline counties tend to have a larger concentration of wealth than inland counties. Residents of shoreline counties accounted for 52% of the share of U.S. households making more than $150,000 per year. The percentage of the population living in poverty in these counties was 13%, keeping with the 2010 national average. A larger percentage of shoreline county households made $75,000 per year and over when compared to inland counties.[88] In 2014, coastal counties employed 54.6 million people whose earned wages totaled $3.2 trillion.[89]

The total number of housing units in shoreline counties in 2010 was 49.9 million, which amounted to 39% of total housing units in the United States. Between 2000 and 2010, the total number of housing units in shoreline counties increased by 8%.[90] When comparing shoreline counties of the Atlantic Coast, Pacific Coast, and Gulf of Mexico between 1960 and 2008, Atlantic shoreline counties experienced the largest growth of in terms of total number of housing units, adding 8.8

87 NOAA. 2013. "National Coastal Population Report. Population Trends from 1970 to 2020." Accessed January 6, 2018. https://coast.noaa.gov/digitalcoast/training/population-report.html.

88 NOAA. 2013. "National Coastal Population Report. Population Trends from 1970 to 2020." Accessed January 6, 2018. https://coast.noaa.gov/digitalcoast/training/population-report.html.

89 NOAA. 2017. "Fast Facts: Economics and Demographics." Accessed January 8, 2018. https://coast.noaa.gov/states/fast-facts/economics-and-demographics.html.

90 NOAA. 2013. "National Coastal Population Report. Population Trends from 1970 to 2020." Accessed January 8, 2018. https://coast.noaa.gov/states/fast-facts/economics-and-demographics.html.

million units.[91] A large number of housing units in shoreline counties are seasonal. New York and New Jersey were among the leading states in number of seasonal housing units in 2010.[92]

Employment opportunities vary in shoreline counties, with opportunities including, but not limited to, shipping, boating, tourism, and recreation. Access to the waterfront is one of the distinctive features setting shoreline counties apart from inland counties. Several industries and businesses utilize this access to the waterfront, as well as access to port facilities, for a variety of activities.

The port industry facilitates a wide range of activities, primarily around shipping, transportation, and trade. Workers in port facilities are required to process shipments and move shipments from distribution facilities to industrial facilities. The processing and movement of goods include vessel activities (pilotage, tugs, provisions, fuel, crew shore leave); terminal activities (crane, stevedoring, yard handling, cargo manipulation, inspections); transaction activities (banking, insurance, data processing); and inland movement activities (trucking, rail, barge, pipeline).[93]

The Port of New York and New Jersey is the nation's third-largest port, with large ocean-going vessels using three major traffic separation corridors in and out of New York Harbor. A 31-county region in New York, New Jersey, and Pennsylvania is closely tied economically to the Port, including 12 counties in New York State: Bronx, Dutchess, Kings, Nassau, New York, Orange, Putnam, Queens, Richmond, Rockland, Suffolk, and Westchester.[94]

In 2016, the region's port facilities handled nearly 6.3 million twenty-foot equivalent containers; close to 663,000 vehicles; nearly 47.4 million tons of bulk cargo; almost 140,000 tons of breakbulk cargo; and 260 cruise vessels. The region's port facilities supported nearly 400,000 total jobs in 2016, an increase from 336,600 in 2014. These jobs accounted for $25.7 billion in personal income and more than $64.8 billion in business income. Occupancy rates in buildings nearby ports grew substantially from 2014 to 2016, as businesses sought distribution space in close proximity to the region's consumer markets brought in through ports.[95]

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91 U.S. Census Bureau. 2010. "Coastline Population Trends in the United States: 1960 to 2008. Population Estimates and Projections." Accessed January 6, 2018. https://www.census.gov/library/publications/2010/demo/p25-1139.html.

92 NOAA. 2013. "National Coastal Population Report. Population Trends from 1970 to 2020." Accessed January 6, 2018. https://coast.noaa.gov/states/fast-facts/economics-and-demographics.html.

93 New York Shipping Association. 2017. "The Economic Impact of the New York-New Jersey Port Industry." Accessed January 18, 2018. http://nysanet.org/wp-content/uploads/NYSAEconomicImpact2017Report.pdf.

94 New York Shipping Association. 2017. "The Economic Impact of the New York-New Jersey Port Industry." Accessed January 18, 2018. http://nysanet.org/wp-content/uploads/NYSAEconomicImpact2017Report.pdf.

95 *Ibid.*

Within the areas of New York Harbor, the Hudson River, and the coast of Long Island, 65 port facilities exist that could support offshore wind energy development and the local supply chain. Sites along New York Harbor are suitable for many elements associated with offshore wind development, including manufacturing, assembly, and staging activities. Hudson River sites are suitable for the manufacturing and assembly of items such as turbine blades, towers, and cables, while Long Island is positioned best for operations and maintenance facilities.[96]

3.7 Community Character

A community's character is comprised of a number of elements, including local natural features, commercial and recreational uses (Section 3.3), development patterns, population growth and density, and regional socioeconomic patterns (Section 3.5). Community character, however, is not defined only by such patterns. The more intangible characteristics that define a community include the visual landscape, demographics, open space, air quality, and traffic patterns. For instance, developed shoreline can be classified as a type of community. Shoreline communities are defined with open water being the dominant feature. They may include natural beaches, bulkheads, docks, piers, boats, ports, and marinas. Prominent industries in shoreline communities include offshore energy and other infrastructure development, sand and gravel mining, commercial fishing, tourism and recreation, shipping activities, and real estate development. Development in these communities includes a range of commercial and residential uses, and these communities often include seasonal businesses and residences. The visual landscape and air quality are also important elements of a shoreline community's character.

The visual landscape, which refers to aesthetic resources and scenic quality, is typically defined by a combination of landscape characteristics and viewer activity and sensitivity. Some of these resources enjoy official designation, while others are simply perceived as attractive or sensitive to visual change. Existing aesthetic quality is often described by considering landscape character types, the expectations of different viewer groups, and official designations—typically assigned by some governmental body—recognizing a resource or site as having aesthetic value or sensitivity. Owing in part to the unique visual and aesthetic landscape and resources, tourism is an important industry throughout Atlantic coastal communities. Recognition of aesthetic quality also occurs at the local level. Counties, towns, and villages may consider local parks and recreation facilities, heavily used roads, local scenic overlooks/corridors, water bodies, and public gathering places as visually sensitive resources and may officially designate them as such in local planning documents.

As a reflection of community character, air quality refers to pollutants that directly affect health and the environment. The effects of air quality on human health and the environment can result in medical treatment, premature deaths, and

[96] NYSERDA. 2017. "The Workforce Opportunity of Offshore Wind in New York." Report 17-25t. Prepared by BVG Associates, Stantec, and GLWN. Accessed January 29, 2018. https://www.nyserda.ny.gov/All-Programs/Programs/Offshore-Wind/New-York-Offshore-Wind-Master-Plan/Studies-and-Surveys#x.

lost work days. Most of the largest individual emission sources continue to be electric generating plants. Many quality control regions along the Atlantic coast are considered nonattainment or maintenance regions for one or more of the National Ambient Air Quality Standards (NAAQS),[97] and as a result are subject to State Implementations Plans (SIP) to control and reduce emission of pollutants.[98]

The emissions of greenhouse gases such as carbon dioxide contribute to the trend of rising average global carbon dioxide concentrations and temperatures. Combustion of fossil fuels (coal, oil, and natural gas) to generate energy is the greatest contributor to atmospheric carbon dioxide (CO_2) levels. Compared with other states in 2017, New York had the lowest carbon dioxide emissions per capita of any state in the nation. This is attributable to a smaller proportion of New York's electric energy needs being met by coal-fired power plants, and also to the widespread use of public transportation in the State's larger cities.[99]

97 EPA. 2017. "Counties Designated 'Nonattainment' or 'Maintenance' for Clean Air Act's National Ambient Air Quality Standards (NAAQS) as of 12/31/2017." Accessed January 10, 2018. https://www3.epa.gov/airquality/greenbook/map/mapnmpoll.pdf

98 EPA. 2017. "Basic Information about Air Quality SIPs." Updated September 29, 2017. Accessed January 10, 2018. https://www.epa.gov/sips/basic-information-air-quality-sips.

99 U.S. Energy Information Administration. 2017. "New York State Profile Analysis." Accessed January 10, 2018. https://www.eia.gov/state/analysis.php?sid=NY#53.

4 Regulatory Framework and Mitigation of Potential Adverse Impacts

Consistent with 6 NYCRR §§617.9(b)(5)(iv) and 617.11(d)(5) of SEQRA, this chapter identifies federal and state regulations that will help ensure, to the maximum extent practicable, avoidance, minimization, or mitigation of adverse environmental impacts that may occur due to the Proposed Action's procurement of 2,400 MW of offshore wind energy.

4.1 Federal and State Regulations and Guidance Relevant to Offshore Wind Energy Development Activities

According to Section 8 of the OCSLA, BOEM has the authority to identify offshore wind development sites within the OCS and to issue leases on the OCS for activities that are not otherwise authorized by the OCSLA, including wind farms. Therefore, development projects in the OCS are subject to review and decision-making by BOEM and other federal agencies.

Each state authority has its own laws, regulations, and review processes, and offshore wind farm developers will also be expected to adhere to these project-specific and site-specific regulations and permitting processes. For example, in New York State, the key laws and regulations applicable to the development of offshore wind energy projects include site-specific permitting, the SEQRA process, and, potentially though unlikely, Article 10 of the New York State Public Service Law. If proposed major generating facilities would be located within the jurisdictional waters of New York State, (within three miles of the shoreline), Article 10 would apply. The Master Plan suggests that future wind energy area development will be sought at least 20 miles from shore, which is also well beyond state waters, and siting is subject to federal leasing program. Under Article 10, the New York State Siting Board on Electric Generation and the Environment (the Siting Board) is responsible for siting and permitting any LSR generating project with a generating capacity equal to or greater than 25 MW. The Siting Board is required to enforce State and local environmental laws and standards, except for local ordinances that the Siting Board specifically determines should not be applied to a

particular project.[100] Therefore, for proposed projects located within federal waters, Article 10 does not apply. Article VII of the New York State Public Service Law applies to major transmission lines within New York State waters and upland areas.[101]

Exhibit 4-1 includes federal and New York State regulations, permits, review, and guideline processes potentially applicable to offshore wind energy development. In addition, for state agency actions, consideration, conformance and application of the State's Coastal Policies and Local Waterfront Revitalization Programs are required by NYS Executive Law Article 42 and implementing regulations (19 NYCRR 600.1 et. seq.); and for actions reviewed pursuant to State Environmental Quality Review Act. In the consideration of the present action, a detailed assessment of consistency with the full range of Coastal Area Policies included in the NYS Coastal Program cannot be made until individual offshore wind project locations and designs have been advanced. Specific information regarding the Coastal Area locations where transmission and interconnection facilities including electric cables, substations, switchyards, and energy storage or converter stations are proposed to be located is needed to assess the full range of resource impacts.

The State permitting process for major electric transmission facilities siting and construction is Public Service Law Article VII. The State Coastal Policies acknowledge Article VII as requiring analysis and findings that are "entirely consistent with the general coastal zone policies derived from other laws, particularly the regulations promulgated pursuant to the Waterfront Revitalization of Coastal Areas and Inland Waterways Law."[102] State Coastal Policy 27 requires

> Decisions on the siting and construction of major energy facilities in the coastal area will be based on public energy needs, compatibility of such facilities with the environment, and the facility's need for a shorefront location.

[100] New York State Board on Electric Generation Siting and the Environment. n.d. "Siting Board – Home." Accessed on January 17, 2018. http://www3.dps.ny.gov/W/PSCWeb.nsf/All/1392EC6DD904BBC285257F4E005BE810?OpenDocument

[101] New York State Public Service Commission. 2017. "The Certification Review Process for Major Electric and Fuel Gas Transmission Facilities. Under Article VII of the New York Public Service Law." Accessed January 26, 2018. http://www3.dps.ny.gov/W/PSCWeb.nsf/96f0fec0b45a3c6485257688006a701a/a021e67e05b99ead85257687006f393b/$FILE/19336071.pdf/Article%20VII%20Guide%20Web%2011-17%20Final.pdf.

[102] National Oceanic and Atmospheric Administration, Office of Coastal Zone Management, and New York State Department of State, 2017. New York State Coastal Management Program and Final Environmental Impact Statement; pg. 92.

As described in this EIS above, the State Energy Plan 2015 and subsequent policy decisions have identified the need to pursue at least 2,400 MW of Offshore Wind to meet the State's clean energy goals. Any generation or transmission facilities to be sited within the designated Coastal Area would have to meet the review requirements, including coastal policy consideration, through Article VII, Article 10, or SEQRA, depending on project size and configuration.

Other policy provisions that may be applicable to any specific offshore wind-related developments include Policies 3, 9, 10 and 29. Policy 3 encourages appropriate development of the State's ports for waterborne transport of cargo and people. Offshore wind development is reliant on waterfront port facilities for support functions, procurement and transfer of materials and workforce to offshore locations. As described below in Chapter 9, development of equipment supply chain at existing ports and nearby locations, and associated increases in employment opportunities may result as a secondary effect of advancing offshore wind development. These results would advance the interests of the State's port facilities and conform to the intent of Policy 3. Policies 9 and 10 relate to potential impacts on recreational and commercial fisheries respectively.

Policy 29 directly addresses consideration of offshore wind development:

> The development of offshore uses and resources, including renewable energy resources, shall accommodate New York's long-standing ocean and Great Lakes industries, such as commercial and recreational fishing and maritime commerce, and the ecological functions of habitats important to New York.

This policy and the associated explanation of policy summarizes the review processes, jurisdictional considerations, and impact analysis and applicable to offshore wind or other energy resource development.[103]

[103] NYS Dept. of State, *State Coastal Policies*, pp. 41 – 43; at https://www.dos.ny.gov/opd/programs/pdfs/CoastalPolicies.pdf.) These are considerations that would be addressed by NYS Dept. of State in review of Offshore Wind Projects located in Coastal Areas, in the context of leasing proposals and project development plans subject to federal licensing proceedings.

Exhibit 4-1 Federal and New York State Regulations and Permits and Review and Guidance Processes Potentially Applicable to Offshore Wind Energy Development

Agency/Entity	Permit, Review, or Guideline	Applicable Law/ Regulations
General		
Bureau of Ocean Energy Management – Lead Agency	■ Leasing and approval of site assessment and construction and operations plans. ■ National Environmental Policy Act (NEPA) review to evaluate the potential environmental impacts of the project, in coordination with other agencies.	■ Energy Policy Act of 2005 amended Section 8 of the Outer Continental Shelf Lands Act of 1953; 43 U.S.C. Chapter 29, Subchapter III ■ NEPA of 1969; 42 U.S.C. § 4321et seq.; regulations at 40 CFR Parts 1500–1508,
National Park Service	■ Right-of-Way – Required for utilities to pass over, across, or through a National Park System, which includes areas of land and water administered by the National Park Service.	■ 54 U.S.C. 100902(a) ■ 54 U.S.C. 100902(b)
New York State agencies taking discretionary actions with respect to offshore wind development	■ State Environmental Quality Review Act (SEQRA) review to evaluate the potential environmental impacts of the project, in coordination with other agencies.	■ SEQRA regulations at 6 NYCRR Part 617
New York State Department of State Office of Planning and Development	■ Coastal Zone Management Program Federal Consistency Certification	■ Coastal Zone Management Act, 16 U.S.C. §1451 et seq. regulations at 15 CFR Parts 923 and 930 ■ State Executive Law Article 42, § 910 et seq. ■ 19 NYCRR Part 600
New York State Department of State Office of Planning and Development	■ Policy 29- The development of offshore uses and resources, including renewable energy resources, shall accommodate New York's long-standing ocean and Great Lakes industries, such as commercial and recreational fishing and maritime commerce, and the ecological functions of habitats important to New York.	■ State Executive Law Article 42 ■ 19 NYCRR Part 600; Policy 29
New York State Department of State Office of Planning and Development	■ Harbor Management Plan	■ State Executive Law Article 42 ■ 19 NYCRR Part 600, 601.1, and 603)
New York Office of General Services	■ State Submerged Lands Easement – required for structures, including fill, located in, on, or above state-owned lands underwater.	■ New York Public Lands Law, Article 2, Section 3 ■ 9 NYCRR Parts 270 and 271

Exhibit 4-1 Federal and New York State Regulations and Permits and Review and Guidance Processes Potentially Applicable to Offshore Wind Energy Development

Agency/Entity	Permit, Review, or Guideline	Applicable Law/ Regulations
New York State Department of Public Service	■ Certificate of Environmental Compatibility and Public Need under Article VII and Article 10	■ New York State Public Service Law, Section 120–130 and 16 NYCRR Parts 85–88 (Article VII) ■ New York State Public Service Law, Section 160–167 and 16 NYCRR Parts 1000–1002 (Article 10)
Water Quality and/or Sediments		
U.S. Environmental Protection Agency	■ National Pollutant Discharge Elimination System – Stormwater/Multi-Sector General Permit or Individual Permit	■ Sections 402 and 403 of the Clean Water Act; 33 U.S.C. §1251 et seq.; 40 CFR §122.26
U.S. Army Corps of Engineers	■ Water quality and dredge-and-fill permits ■ NEPA review to evaluate the potential environmental impacts of the project, in coordination with other agencies.	■ Clean Water Act Section 404; Rivers and Harbors Act of 1899 Section 10 ■ Section 103 of the Marine Protection, Research, and Sanctuaries Act of 1972; 33 CFR Part 325
New York State Department of Environmental Conservation and New York State Department of State Office of Planning and Development	■ Tidal Wetlands Permit ■ Freshwater Wetlands Permit	■ 19 NYCRR Part 600.5 (g); Policy 44 ■ Tidal Wetlands Act, ECL Article 25; 6 NYCRR Part 661 ■ Freshwater Wetlands Act, ECL Article 24
New York State Department of Environmental Conservation and New York State Department of State Office of Planning and Development	■ Coastal Erosion Management Permit (New York State Department of Environmental Conservation) ■ Flooding and Erosion Hazard Policies (New York State Department of State)	■ ECL Article 34 Coastal Erosion Hazard Areas ■ ECL Article 70 ■ 6 NYCRR Part 505 ■ 19 NYCRR Part 600.5(g); Policies 12 and 15
New York State Department of Environmental Conservation	■ Article 15 Protection of Waters Permit- Excavation or Placement of Fill in Navigable Water and Their Adjacent and Contiguous Wetlands Permit	■ ECL Article 15, Title 5 and Article 70 ■ 6 NYCRR Parts 608 and 621
New York State Department of Environmental Conservation	■ Special Groundwater Protection Areas	■ ECL Article 55
New York State Department of Environmental Conservation	■ Long Island Pine Barrens Maritime Reserve Act	■ ECL Article 57

Exhibit 4-1 Federal and New York State Regulations and Permits and Review and Guidance Processes Potentially Applicable to Offshore Wind Energy Development

Agency/Entity	Permit, Review, or Guideline	Applicable Law/ Regulations
New York State Department of Environmental Conservation	■ Water Quality Certification – required for projects that require a United States Army Corps of Engineers Section 404 permit	■ U.S. Clean Water Act Section 401; 33 U.S.C. 13411 ■ 6 NYCRR Part 608 and 621.
New York State Department of State Office of Planning and Development	■ State water quality, general water State Pollutant Discharge Elimination System permit, and coastal/inland waterways review	■ 6 NYCRR Parts 608 and 701–704 ■ 19 NYCRR Part 600.5(h); Policies 31, 33-35
Air Quality		
U.S. Environmental Protection Agency	■ General Conformity Analysis – requires federal agencies to show that their activities in areas not meeting National Ambient Air Quality Standards (NAAQS) for criteria pollutants will be consistent with the state implementation plans for attainment of the NAAQS	■ Clean Air Act of 1977 (section 176(c)(4))
	■ Code of Federal Regulations for New Source Review (NSR) and Prevention of Significant Deterioration (PSD) and National Emission Standards for Hazardous Air Pollutants: Stationary Sources (construction)	■ Clean Air Act as Amended in 1990 - Title I Parts C (PSD) and D (NSR); CAA Title III - Section 328 (42 U.S.C. § 7627); 40 CFR Parts 51- 52, 55, 60, 63
New York State Department of Environmental Conservation	■ New York State Codes, Rules, and Regulations for Air Quality	■ 6 NYCCR Parts 201, 227, 231, 242, and 251
Wildlife		
U.S. Fish and Wildlife Service and NOAA Fisheries	■ Endangered Species Act (ESA) – Section 7 Consultation Process. ■ Biological Opinion – documents United States Fish and Wildlife Service determination if likelihood to adversely affect a listed species/critical habitat; may result in Incidental Take Statement, measures to minimized, and terms and conditions.	■ ESA of 1973 Section 7(a)(1) and (2); 50 CFR § 402 ■ ESA Section 10(a)(1)
NOAA Fisheries	■ Essential Fish Habitat Assessment – regarding an action that may adversely affect essential fish habitat. Requires consultation with NOAA.	■ Magnuson-Stevens Fishery Conservation and Management Act § 305(b)(4)(A) ■ 50 CFR § 600.920(a)(3) ■ 50 CFR § 600.920(e) ■ 50 CFR § 600.920(k)(1)

Exhibit 4-1 Federal and New York State Regulations and Permits and Review and Guidance Processes Potentially Applicable to Offshore Wind Energy Development

Agency/Entity	Permit, Review, or Guideline	Applicable Law/ Regulations
U.S. Fish and Wildlife Service and NOAA Fisheries	■ Marine Mammal Letter of Authorization or Incidental Harassment Authorization	■ Marine Mammal Protection Act of 1972 - Section 101(a)(5), see (16 U.S.C. 1361-1407) ■ Incidental Take Regulations 50 CFR Part 216
NOAA Fisheries/Office of Ocean and Coastal Resource Management	■ Coastal Consistency Determination (CCD) oversite and mediation of CCD review by states under federally approved Coastal Zone Management Plan	■ Section 307 of the Coastal Zone Management Act of 1972, as amended (16 U.S.C. Part 1451 et seq.)
NOAA Fisheries	■ Interagency consultation between NOAA and federal agency regarding the potential to destroy, cause the loss of, or injure a sanctuary resource.	■ Section 304(d) of the National Marine Sanctuaries Act; Title 16, Chapter 32, 16 U.S.C. 1434
New York State Department of Environmental Conservation	■ Guidelines for Conducting Bird and Bat Studies at Commercial Wind Energy Projects	■ ECL Articles 1, 3, and 11
U.S. Fish and Wildlife Service	■ Migratory Bird Treaty Act (MBTA) review; informal consultation to minimize potential impacts	■ MBTA (16 U.S.C. 703–712), listed migratory birds, ■ 50 CFR § 10.13, regulations 40 CFR Parts 13 and 21
New York State Department of Environmental Conservation	■ State-listed endangered species consultation	■ ECL Article 11 Section 535 ■ 6 NYCRR Part 182
New York State Department of Environmental Conservation	■ Wildlife and habitat regulations	■ 6 NYCRR Subpart 360–3, Part 373, Part 364 ■ Incidental Take Permit, and Local Land Use Planning and Zoning
New York State Department of Environmental Conservation	■ Marine fisheries conservation and management regulations.	■ ECL Article 15, Title 5 (Clean Water Act Section 401, 16 U.S.C. 1451)
New York State Department of State Office of Planning and Development	■ Significant Coastal Fish and Wildlife Habitats	■ 19 NYCRR 600.5(b)(1); Policy 7

Exhibit 4-1 Federal and New York State Regulations and Permits and Review and Guidance Processes Potentially Applicable to Offshore Wind Energy Development

Agency/Entity	Permit, Review, or Guideline	Applicable Law/ Regulations
Cultural and Visual		
Bureau of Ocean Energy Management or other federal permitting agency	■ National Historic Preservation Act (NHPA) Section 106 Review – Evaluate project effects on historical resources through Lead Agency (Bureau of Ocean Energy Management) in consultation with appropriate state and local officials, Indian tribes, applicants for federal assistance, and members of the public for those projects that require federal permits, funding, or other approval.	■ NHPA of 1966, as amended; 36 CFR Part 800 54 U.S.C. 300101 et seq. ■ Section 106 Implementing Regulations - 36 CFR Part 800 ■ 43 U.S.C. 2101–2106
New York State Office of Historic Preservation	■ Review to ensure that impacts or effects on cultural resources and historic properties are considered as part of project planning, including, but not limited to, resources that are listed, or determined eligible for listing, in the State or National Registers of Historic Places	■ Section 14.09 of the New York State Historic Preservation Act of 1980 (for projects that require only state permits, funding, or approval) ■ Section 106 of the National Historic Preservation Act of 1966, as amended, 54 U.S.C. 300101 et seq., and implementing regulations at 36 CFR 800 (for project that require federal permits, funding, or approval).
New York State Museum	■ State Lands Permit – required for activities that have the potential to disturb archaeological or geological resources on states lands, which include submerged lands under state waters	■ Section 233 of the New York State Education Law ■ 23 U.S.C. § 170
New York State Department of State Office of Planning and Development	■ Scenic Areas of Statewide Significance	■ 19 NYCRR Part 600.5(d); Policy 24
New York State Department of Environmental Conservation	■ Environmental Justice and Permitting	■ Commissioner Policy 29
New York State Department of State Office of Planning and Development	■ Local Waterfront Revitalization Programs	■ Article 42 of the Executive Law, N.Y. Town Law §28-a; ■ N.Y. Town Law §272-a ■ N.Y. Village Law §7–700 et seq.

Exhibit 4-1 Federal and New York State Regulations and Permits and Review and Guidance Processes Potentially Applicable to Offshore Wind Energy Development

Agency/Entity	Permit, Review, or Guideline	Applicable Law/ Regulations
Navigation		
Federal Aviation Administration	■ Notice of Proposed Construction or Alteration; use Federal Aviation Administration-approved marking and lighting to maintain daytime and nighttime visibility	■ 14 CFR 77 ■ AC 70/7460-1L Standards
U.S. Coast Guard	■ Private Aid to Navigation and Navigation Safety Risk Assessment	■ Outer Continental Shelf Lands Act (43 U.S.C. 1333); 14 U.S.C. 81 et. seq., 33 U.S.C. 735; 33 CFR Parts 60-76 ■ Ports and Waterways Safety Act (33 U.S.C. 1221) ■ Maritime and Transportation Act of 2006 ■ Navigation and Vessel Inspection Circular No. 02-07
Transportation		
New York State Department of Transportation	■ Highway Work Permit	■ NYS Highway Law, Article 3
New York State Department of Transportation	■ Highway Use and Occupancy Permits	■ 17 NYCRR Part 131
New York State Department of Motor Vehicles	■ Any motor-driven vessel that operates within State public waterways is required to be registered with the Department of Motor Vehicles.	■ Vehicle and Traffic Law, Article 49

Key:

CFR = Code of Federal Regulations
ECL = Environmental Conservation Law
NOAA = National Oceanic and Atmospheric Administration
NYCRR = New York Codes, Rules and Regulations
U.S.C. = United States Code

4.2 Avoiding, Minimizing, and Mitigating Potential Impacts

The required avoidance, minimization, and mitigation of potential environmental impacts from future offshore wind development would occur at a site-specific level. As part of the permitting process for any specific offshore wind energy development, federal and state laws and regulations require the developer to consult with the appropriate agencies to ensure project-specific desktop and field surveys

and activities comply with guidelines and regulations for offshore wind development. For instance, the developer is required to submit a survey plan to BOEM for review that describes the required geophysical and geological surveys, hazards surveys, archaeological surveys, and biological baseline collection studies for developing a site-specific design. Exhibit 4-1 identifies additional consultation requirements. The following are examples of measures that would avoid, minimize, or mitigate, to the extent practicable, potential impacts on environmental resources from offshore wind energy development:

- Appropriate siting of development projects to avoid, to the extent practicable, impacts on protected or sensitive resources and existing or planned ocean uses and development.
- Implementation of federal and state regulatory requirements, guidelines and best management practices to minimize and mitigate potential impacts. Limit construction activity to specified times and/or seasons to reduce potential impacts on sensitive receptors (e.g., community facilities, recreation).
- Adhere to appropriate setbacks to minimize potential operational and visual impacts.
- Conduct proper assessment of existing resources and potential impacts on resources.
- Develop plans to protect natural resources (e.g., emergency response plans, erosion/scour control plans).
- Utilize appropriate lighting design and controls to minimize off-site illumination.

Exhibit 4-2 further summarizes measures required by regulation or developed through agency consultations based on site-specific conditions that avoid, minimize, or mitigate, to the extent practicable, potential impacts on environmental resources from offshore wind energy development. The measures required by regulation are subject to revision if determined necessary by the responsible issuing agency, organization, or entity. Existing guidance or regulations may be updated or revised and/or new guidance or regulations may be developed after publication of this GEIS.

Exhibit 4-2 Potential Avoidance, Minimization, and Mitigation Measures for Offshore Wind Development

Resource(s)	Potential Avoidance, Minimization, and Mitigation Measures	References
Benthic Fish Marine Mammals Sea Turtles	Develop a project-specific marine mammal and sea turtle survey plan to guide survey activities, including characterization of marine mammal and sea turtle local and regional distribution and density/abundance and habitat use. Avoid locating near or anchoring on known sensitive seafloor habitats, including EFH, by performing appropriate siting and assessing baseline data. Use scour protection. Use soft starts, pingers, and sound-reducing materials during construction. Avoid using explosives during construction. Monitor for the presence of protected species within the exclusion zone radius established during the permitting process to avoid incidental take of threatened or endangered species. Conduct vessel-based and aerial surveys for marine mammal and sea turtle species, and passive acoustic monitoring for marine mammals. During construction and ongoing maintenance operations, travel at reduced speeds and maintain a reasonable distance when whales, small cetaceans, and sea turtles are present. Use proper electrical shielding on installed cables to minimize electromagnetic fields.	BOEM Office of Renewable Energy Programs. 2016. *Commercial Wind Lease Issuance and Site Assessment Activities on the Atlantic Outer Continental Shelf Offshore New York: Final Environmental Assessment.* BOEM. 2016a. *Guidelines for Information Requirements for a Renewable Energy Site Assessment Plan (SAP).* BOEM. 2016b. *Guidelines for Information Requirements for a Renewable Energy Construction and Operations Plan (COP).* Minerals Management Service. 2009. *Cape Wind Energy Project Final Environmental Impact Statement*. MMS EIS-EA, OCS Publication No. 2008-040. USACE. 2014. *Deepwater Wind Block Island Environmental Assessment and Statement of Findings*. September 17, 2014. Accessed on June 7, 2017. http://www.nae.usace.army.mil/Portals/74/docs/Topics/DeepwaterWind/EA17Sep2014.pdf. Virginia Coastal Zone Management Program. 2016. *Collaborative Fisheries Planning for Virginia's Offshore Wind Energy Area*. United States Department of the Interior, Bureau of Ocean Energy Management, Office of Renewable Energy Programs, Herndon. OCS Study BOEM 2016-040. 129 pp. NOAA Fisheries. 2004. *Essential Fish Habitat Consultation Guidance.* National Marine Fisheries Service, Office of Habitat Conservation, Silver Spring, Maryland. 80 pp.

Exhibit 4-2 Potential Avoidance, Minimization, and Mitigation Measures for Offshore Wind Development

Resource(s)	Potential Avoidance, Minimization, and Mitigation Measures	References
	Avoid construction activities during species-specific migration, foraging, and breeding periods.	
	Comply with NMFS Regional Viewing Guidelines while in transit and NOAA vessel strike avoidance measures. Perform pile driving generally during daylight hours, starting 30 minutes after dawn and ending 30 minutes prior to dusk. Use dynamic-positioning vessels and jet plow embedment to minimize sediment disturbance and alteration during cable-laying process.	Deepwater Wind. 2012. *Block Island Wind Farm and Block Island Transmission System Environmental Report/Construction and Operations Plan*. Prepared by TetraTech EC, Inc.
	Use noise-reduction technologies during pile driving to reduce the sound levels in water.	BOEM. 2016. *Guidelines for Information Requirements for a Renewable Energy Site Assessment Plan (SAP) and Guidelines for Information Requirements for a Renewable Energy Construction and Operations Plan (COP).* Lucke, K., U. Siebert, P.A. Lepper, and M.A. Blanchet. 2011. "The use of an air bubble curtain to reduce the received sound levels for harbor porpoises (*Phocoena phocoena*)." *Journal of the Acoustical Society of America* 130(5): 3406-3412.

Exhibit 4-2 Potential Avoidance, Minimization, and Mitigation Measures for Offshore Wind Development

Resource(s)	Potential Avoidance, Minimization, and Mitigation Measures	References
Birds and Bats	Evaluate areas of dense bird and bat use and design projects to minimize or mitigate the potential for bird strikes and habitat loss. Conduct project-specific field surveys through the use of observers on boats and airplanes or through the use of high-resolution digital aerial surveillance/photography to identify avian species in a proposed project area, including their occurrence (e.g., annual, seasonal, day/night). Use low-intensity, radar-controlled strobe lights on turbines, and identify other measures to discourage birds from perching on equipment during operation. Design turbine structures to minimize the potential for perching and roosting. Operational controls can be implemented to avoid or minimize impacts on migratory species. There are commercially available bird and bat RADAR monitoring systems available for identifying migratory avian presence and enabling operational adjustment (i.e., curtailment of wind turbine operation) to avoid significant impacts on flocks of migratory avian species.	BOEM Office of Renewable Energy Programs. 2016. *Commercial Wind Lease Issuance and Site Assessment Activities on the Atlantic Outer Continental Shelf Offshore New York: Final Environmental Assessment.* BOEM. 2016. *Guidelines for Information Requirements for a Renewable Energy Site Assessment Plan (SAP) and Guidelines for Information Requirements for a Renewable Energy Construction and Operations Plan (COP).* BOEM. 2017. *Guidelines for Providing Avian Survey Information for Renewable Energy Development on the Outer Continental Shelf.* Pursuant to 30 CFR Part 585. BOEM is currently drafting Lighting and Marking Guidelines for offshore wind developments; these are anticipated to be available in 2018. DeTect, Inc. 2018. Wind Energy Bird & Bat Radars. Available at: http://detect-inc.com/wind-energy-bird-bat-radars/. Accessed on May 18, 2018.
Cultural Resources	Proper siting of project components to avoid resources/sites identified through surveys, such as submerged archaeological sites, shipwrecks or submerged built resources. Implement an Unanticipated Discovery Plan, including stop work and notification procedures, to address the inadvertent discovery of a previously unidentified submerged archaeological resource, shipwreck, or submerged built resource.	BOEM. 2016. *Guidelines for Information Requirements for a Renewable Energy Site Assessment Plan (SAP) and Guidelines for Information Requirements for a Renewable Energy Construction and Operations Plan (COP).*

Exhibit 4-2 Potential Avoidance, Minimization, and Mitigation Measures for Offshore Wind Development

Resource(s)	Potential Avoidance, Minimization, and Mitigation Measures	References
Visual Resources	Evaluate key design elements, including visual uniformity, use of tubular towers, and proportion and color of turbines. Use USCG-approved lights at the base of towers that have a maximum visible range of 4.6 miles.	BOEM. 2016. *Guidelines for Information Requirements for a Renewable Energy Site Assessment Plan (SAP) and Guidelines for Information Requirements for a Renewable Energy Construction and Operations Plan (COP).* Deepwater Wind. 2012. *Block Island Wind Farm and Block Island Transmission System Environmental Report/Construction and Operations Plan*. Prepared by TetraTech EC, Inc.
Commercial and Recreational Uses	Provide advance notifications to mariners and boaters of construction activities and vessel movements. Burying cables, where practicable, to avoid conflict with fishing vessels and gear operation.	BOEM Office of Renewable Energy Programs. 2016. *Commercial Wind Lease Issuance and Site Assessment Activities on the Atlantic Outer Continental Shelf Offshore New York: Final Environmental Assessment.* BOEM. 2016. *Guidelines for Information Requirements for a Renewable Energy Site Assessment Plan (SAP) and Guidelines for Information Requirements for a Renewable Energy Construction and Operations Plan (COP).*
	Communicate with commercial and recreational fishing agencies to identify ways to minimize potential project construction and operation impacts on their interests.	MMS. 2009. *Cape Wind Energy Project Final Environmental Impact Statement.* MMS EIS-EA, OCS Publication No. 2008-040.
	Facilitate communication of construction activities and vessel movements through a project website, public notices to mariners and vessel float plans, and a fisheries liaison. Request that fishing gear be deployed away from well-marked construction areas.	Deepwater Wind. 2012. *Block Island Wind Farm and Block Island Transmission System Environmental Report/Construction and Operations Plan*. Prepared by TetraTech EC, Inc.
Air Quality	Incorporate state, federal, and international guidelines on vessel emissions.	BOEM Office of Renewable Energy Programs. 2016. *Commercial Wind Lease Issuance and Site Assessment Activities on the Atlantic Outer Continental Shelf Offshore New York: Final Environmental Assessment.* BOEM. 2016. *Guidelines for Information Requirements for a Renewable Energy Site Assessment Plan (SAP).*

Key:
BOEM= Bureau of Ocean Energy Management

5 Areas of Potential Environmental Impact

Consistent with 6 NYCRR §617.10(a), this GEIS is broader and more general than a site- or project-specific EIS and discusses the concepts, logic and rationale for the choices advanced. As described in Chapter 3, the procurement contemplated by the Proposed Action would likely encourage the development of new offshore wind energy projects in the Atlantic Ocean. Those projects, if developed, could be undertaken in a broad range of scenarios with variables, including, but not limited to, the geographic area of the marine environment (offshore between Maine and North Carolina), project timing (2018 to 2030), scale, and technology, with countless permutations for the development of the full complement of 2,400 MW of wind energy. Therefore, although a GEIS "may" include an assessment of specific impacts if such details are available, and can make such an assessment based on hypothetical scenarios, no such assessment would be useful for the Proposed Action.

Any future offshore wind energy project developed as a result of this Proposed Action will require multiple federal and state permits and approvals, including site-specific environmental reviews under the National Environmental Policy Act (NEPA), SEQRA, and/or other state equivalents. Accordingly, consistent with 6 NYCRR §617.10(c), this chapter identifies the environmental areas that could be impacted by the Proposed Action and, therefore, must be assessed when future offshore wind energy projects are undertaken or approved. Where available from the Master Plan studies or elsewhere, additional information regarding the nature of potential impacts is provided; however, these qualitative discussions do not substitute for project-specific environmental reviews.

GEISs are useful tools for examining cumulative impacts of multiple potential projects on a particular resource. This GEIS incorporates by reference the New York State Offshore Wind Master Plan Consideration of Potential Cumulative Effects (Cumulative Study) assessing the hypothetical development of 2,400 MW of offshore wind energy as a series of projects within a particular area offshore of New York.[104] This study can be considered an examination of a reasonable

[104] NYSERDA. 2017. "New York State Offshore Wind Master Plan Consideration of Potential Cumulative Effects." Report 17-25g. Accessed January 29, 2018. https://www.nyserda.ny.gov/All-Programs/Programs/Offshore-Wind/New-York-Offshore-Wind-Master-Plan.

"worst-case" scenario as concerns cumulative impacts on New York State from procurement of 2,400 MW of offshore wind energy, as it assumed that all of the contributing projects would be located in the waters offshore of New York, which would be in relatively close proximity compared to the marine environment from Maine to North Carolina.

The construction and operation of a specific facility are not the subject of this GEIS. The applicability, magnitude, duration, intensity, etc., of the types of impacts identified below would depend substantially on the specific offshore wind energy facility, setting, local species, and local communities of the affected area(s). It should further be noted that, depending on the location and other attributes of a specific offshore wind energy project, that project may have additional types of impacts not enumerated below. This identification of potential impacts does not reflect the screening out of other potential impacts that are not set forth below but that could be implicated in particular circumstances.

5.1 Overview of Offshore Wind Energy Development and Impact Analysis

This Chapter examines the environmental impact areas that could be affected by offshore wind energy development resulting from the Proposed Action. For purposes of this Chapter, "offshore wind energy" refers to the components of new or existing offshore wind energy facilities and their construction and operation, as further described below.

Offshore wind turbines are larger than land-based turbines and are designed to withstand the harsher conditions associated with the marine environment. Offshore turbines are designed to resist corrosion, and their foundations are designed to withstand natural ocean conditions such as storm waves, hurricane-force winds, and ice flows.[105] Globally in 2015, the average turbine installed offshore had a nameplate capacity of approximately 4 MW, a hub height of approximately 90 meters, and a rotor diameter of nearly 120 meters.[106] Offshore wind turbine technology is developing at a fast pace. It is projected that by 2022, the average offshore turbine will have a nameplate capacity of 10 MW, a hub height of 113.5 meters, and a rotor diameter of 177 meters. By 2030, the average offshore turbine is projected to have a nameplate capacity of 15 MW, a hub height of 138.5 meters, and a rotor diameter of 217 meters.[107]

Various pre-construction siting studies would be required prior to wind energy development. Siting studies would be undertaken at different times during the year

105 BOEM. n.d. "Offshore Wind Energy." Accessed January 5, 2018. https://www.boem.gov/Offshore-Wind-Energy/.

106 National Renewable Energy Laboratory. 2015. "2014-2015 Offshore Wind Technologies Market Report." Accessed January 11, 2018. https://www.nrel.gov/docs/fy15osti/64283.pdf.

107 NYSERDA. 2017. "Area for Consideration for the Potential Locating of Offshore Wind Energy Areas." Report 17-25u. Accessed January 4, 2018. https://www.nyserda.ny.gov/All-Programs/Programs/Offshore-Wind/New-York-Offshore-Wind-Master-Plan/Area-for-Consideration.

and likely would include geological, geotechnical, archaeological, benthic, and/or biological surveys, as well as meteorological data collection. Performance of these studies would require vessel transits to and from ports and within the affected offshore marine environment. For example, the *Commercial Wind Lease Issuance and Site Assessment Activities on the Atlantic Outer Continental Shelf Offshore New York Environmental Assessment*[108] estimates that 200 to 540 vessel trips could be associated with pre-construction siting studies for any offshore wind energy, depending on the length of survey (i.e., 24 hours versus 10-hour days). Survey vessels would likely use smaller ports for staging and departure, and vessels associated with the installation of infrastructure to support siting studies, such as a meteorological tower, would likely depart from larger ports.

The components of a typical offshore wind energy facility include wind turbines and foundations, an electrical service platform, and inter-array cables.[109] A grid array of buried cables would collect electricity and direct it to the offshore electrical service platform, which would connect to the onshore electric grid through a transmission cable buried in the sea floor and upland to an interconnection substation.

The current design of wind turbine structures likely to be used on the Atlantic Coast includes monopile and jacket foundations. In general, monopile foundations are used at depths less than 98 feet, while jacket foundations are generally used in deeper waters. Before installing any foundations for wind turbines or an electrical service platform, some seabed preparation may be necessary, particularly if the seabed is soft due to the presence of loose sand. A pile-driving ram or vibratory hammer would be used to install the foundations into the seabed. Pile driving for monopile and jacket foundations would occur one at a time, sequentially, in appropriate sea and weather conditions. A jet plow would be used to install the cables below the seafloor, and the depth could vary, depending on the substrate encountered. This method of laying and burying the cables would ensure the placement at the target burial depth with minimum bottom disturbance.

Vessel traffic associated with any specific offshore wind energy would use existing port facilities and established shipping corridors. Vessel traffic would include a wide variety of vessel types and sizes associated with the various stages of construction and operation, including large vessels, specialized vessels, barge traffic, and smaller vessels. Most of these vessels would be stationary or slow-moving barges and tugs conducting or supporting the installation. Vessels would also

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108 BOEM. 2016. *Commercial Wind Lease Issuance and Site Assessment Activities on the Atlantic Outer Continental Shelf Offshore New York Environmental Assessment*. OCS EIS/EA BOEM 2016-042. Accessed January 29, 2018. https://www.boem.gov/NY-Public-EA-June-2016/.

109 NYSERDA. 2017. "New York State Offshore Wind Master Plan Consideration of Potential Cumulative Effects." Report 17-25g. Accessed January 29, 2018. https://www.nyserda.ny.gov/All-Programs/Programs/Offshore-Wind/New-York-Offshore-Wind-Master-Plan.

serve as construction platforms for installation of various components, stabilized on location. Support vessels may transit back and forth on a daily basis.

The construction of an offshore wind energy project typically takes several years from planning through commissioning, depending on the size of the facility. The operating life ranges from 20 to 25 years.[110] Operation includes daily maintenance activities, periodic inspections and servicing, and as-needed repairs.[111] At the end of any offshore wind energy project's life, decommissioning activities would take place, with activities and potential impacts similar to those during construction.

5.2 Biological Resources

The biological resources that could be affected by offshore wind energy development include benthic communities, marine mammals and sea turtles, fish, and birds.

5.2.1 Benthic Communities

Offshore wind energy development has the potential to impact benthic resources due to habitat disturbance. The installation of foundations would occur individually and sequentially in benthic habitat, which would temporarily create suspended sediment. Benthic communities include worms, clams, crabs, lobsters and other crustaceans, sponges and other bottom-dwelling organisms. Benthic fauna generally adapt to such minor, temporary increases in suspended sediments by physiological mechanisms such as expelling filtered sediments or reducing filtration rates.[112] The installation of foundations also would cause a loss of benthic habitat proportional to the surface area replaced by physical structures on the sea floor. In the footprint of pile-driving and excavation activities, mortality could occur from direct contact, removal, or smothering. Similar to habitat disturbance, the magnitude of any impact from direct injury and mortality would also depend on the area affected. Impacts to benthic communities generally would be proportional to the sea floor area occupied by offshore wind energy structures, which is small compared to the available sea floor. During operation, beneficial impacts on benthic communities due to benthic habitat conversion can occur. Benthic communities typically recolonize after construction activities, with colonization beginning within hours or days.[113,114,115] The recolonization of communities on bot-

110 BOEM. 2007. "Alternative Energy Programmatic EIS." Page 5–7.

111 *Ibid*. Pages 5–7, Page 5–69.

112 Clarke, D.G., and D.H. Wilbur. 2000. "Assessment of Potential Impacts of Dredging Operations Due to Sediment Resuspension." *DOER Technical Notes Collection.* U.S. Army Engineer Research and Development Center, Vicksburg, Mississippi.

113 Andersson, M.H., B. Berggren, D. Wilhelmsson, and M.C. Öhman. 2009. "Epibenthic Colonization of Concrete and Steel Pilings in a Cold-temperate Embayment: A Field Experiment." *Helgoland Marine Research* 63:249–260.

114 Golani, D., and A. Diamant. 1999. "Fish Colonization of an Artificial Reef in the Gulf of Elat, Northern Red Sea." *Environmental Biology of Fishes* 54:275-82.

115 Wilhelmsson, D., S.A.S. Yahya, and M.C. Öhman. 2006. Effects of High Structures on Cold Temperate Fish Assemblage: A Field Experiment." *Marine Biology Research* 2:136–147.

tom habitat disturbed for the burial of subsea cables would depend on construction materials, shape of the foundations, and the spacing of turbines.[116,117] Offshore wind energy could also provide a potential increase in benthic communities because the turbine foundations would make new surface area available for growth and development of benthic communities.[118] Depending on site specific conditions, the increase in benthic communities could include introduction of invasive species.[119,120]

The Master Plan includes a Benthic Survey Report[121] provides the results of a Multibeam Echo Sounder and Sediment Profile Image and Plan View survey conducted in 2017. The survey provided planning-level characterization of the geological, geotechnical, and benthic characteristics of potential offshore wind energy in select areas offshore of New York State. These surveys revealed a range of bedforms and surface sediment features, as well as associated benthic biotic communities; all were characterized as soft substrata subject to episodic sediment transport events. Therefore, similar impacts from habitat disturbance described above could occur to existing benthic communities likely to be present offshore New York.

Benthic communities may be affected by exposure to contaminated sediments dislodged from the sea bed by construction of turbine foundations and electric cable installations. Avoidance of contaminated sediments is determined through sediment sampling and testing that occurs in detailed facility siting investigations.

5.2.2 Marine Mammals and Sea Turtles

Offshore wind energy development has the potential to impact marine mammals and sea turtles due to displacement, disturbance, loss, and conversion of habitat, as well as injury or mortality.

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116 Raoux, A., S. Tecchio, J.P. Pezy, G. Lassalle, S. Degraer, D. Wilhelmsson, M. Cachera, B. Ernade, C. Le Guen, M. Haraldsson, K. Grangere, F. Le Loc'h, J.C. Dauvin, and N. Niquil. 2017. "Benthic and Fish Aggregation Inside an Offshore Wind Farm: Which Effects on the Trophic Web Functioning?" *Ecological Indicators* 72:33-46.

117 Andersson, M.H., and M.C. Öhman. 2010. "Fish and Sessile Assemblages Associated with Wind-turbine Constructions in the Baltic Sea." *Marine and Freshwater Research* 61:642–650.

118 Elliott, M., and C.J. Wilson. 2009. "The Habitat-creation Potential of Offshore Wind Farms." *Wind Energy* 12:203-212.

119 Andersson, M.H. 2011. Offshore wind farms – ecological effects of noise and habitat alteration on fish. Department of Zoology, Stockholm University, Doctoral Dissertation

120 Ørsted, Vattenfall, Danish Energy Authority, The Danish Forest and Nature Agency. 2006. Danish offshore wind - key environmental issues. ISBN: 87-7844-625-0. https://tethys.pnnl.gov/sites/default/files/publications/Danish_Offshore_Wind_Key_Environmental_Issues.pdf

121 NYSERDA. 2017. "New York State Offshore Wind Master Plan Analysis of Multibeam Echo Sounder and Benthic Survey Data." Report 17-25a. Accessed January 29, 2018. https://www.nyserda.ny.gov/All-Programs/Programs/Offshore-Wind/New-York-Offshore-Wind-Master-Plan.

5.2.2.1 Displacement, Disturbance, Loss, or Conversion of Habitat

Pile-driving and excavation activities are likely to temporarily displace species from their typical habitat due to the associated noise disturbance; this disturbance may additionally lead to changes in typical foraging and reproductive behaviors, and may mask important acoustic signals.[122,123,124,125] Increased vessel traffic may also disturb marine mammals and sea turtles, leading to their displacement into areas of higher vessel traffic, such as nearby shipping corridors, some of which are shown in Exhibit 3-7. Sensitive marine mammal and sea turtle species known to occur in offshore waters of the United States could experience an increased chance of collision with vessels. Operation generally would result in minimal noise and vessel traffic, and the spacing of wind turbines could be arranged to allow most marine mammals and sea turtles to experience typical foraging and reproductive behaviors, thereby minimizing loss of habitat. Studies on how operational noise may impact marine mammals and sea turtles are ongoing. Rice et al. (2012) and Madsen et al. (2006) indicated that operation-related noise has been determined to be unlikely or minimal compared to ambient noise of surrounding areas. Smaller marine mammals and sea turtles in particular are likely to return to prior habitat after construction, particularly if the presence of offshore wind energy leads, as expected, to new habitat and increases benthic and fish communities.[126,127,128,129]

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122 Nowacek, D.P., L.H. Thorne, D.W. Johnston, and P.L. Tyack. 2007. "Responses of Cetaceans to Anthropogenic Noise." *Mammal Review* 2007(37.2):81-115.

123 Southall, B.L., A.E. Bowles, W.T. Ellison, J.J. Finneran, R.L. Gentry, C.R. Greene, Jr., D. Kastak, D.R. Ketten, J.H. Miller, P.E. Nachtigall, W.J. Richardson, J.A. Thomas, and P.L. Tyack. 2007. "Marine Mammal Noise Exposure Criteria: Initial Scientific Recommendations." *Aquatic Mammals* 33(4):411-509.

124 Rhode Island Coastal Resources Management Council. 2010. "Rhode Island Ocean Special Area Management Plan." Volume 1, Chapter 8, Section 850. Prepared by Jennifer McCann for the Rhode Island Coastal Resources Management Council. Accessed January 29, 2018. http://seagrant.gso.uri.edu/oceansamp/.

125 World Wildlife Fund. 2014. "Norway, Environmental Impacts of Offshore Wind Power Production in the North Sea, A Literature Overview." Accessed January 22, 2018. http://awsassets.wwf.no/downloads/wwf_a4_report___havvindrapport.pdf.

126 Bergstrom, L., L. Kautsky, T. Malm, R. Rosenberg, M. Wahlberg, N. Åstrand Capetillo, and D. Wilhelmsson. 2014. "Effects of Offshore Windfarms on Marine Wildlife—A Generalized Impact Assessment." *Environmental Research Letters* 9:034012.

127 Deepwater Wind. 2012. Block Island Wind Farm and Block Island Transmission System Environmental Report/Construction and Operations Plan. Prepared by TetraTech EC, Inc.

128 European Commission. 2015. MaRVEN – Environmental Impacts of Noise, Vibrations and Electromagnetic Emissions from Marine Renewable Energy. RTD-KI-NA-27-738-EN-N. Final study report.

129 Goldbogen J. A., B. L. Southall, S. L. DeRuiter, J. Calambokidis, A. S. Friedlaender, E. L. Hazen, E. A. Falcone, G. S. Schorr, A. Douglas, D. J. Moretti, C. Kyburg, M. F. McKenna, and P. L. Tyack. 2013 "Blue Whales Respond to Simulated Mid-Frequency Military Sonar." Proceedings of the Royal Society B, 280, 20130657.

The Master Plan Marine Mammal and Sea Turtle Study reviewed and summarized the best available existing data regarding marine mammal and sea turtle occurrence, density, and distribution.[130] The Marine Mammal and Sea Turtle Study concluded that high-frequency cetaceans (marine mammals with hearing ranges greater than 180 kilohertz) are broadly distributed in offshore waters along the northeastern Atlantic Coast during the spring months, and could experience displacement impacts from construction–related noise during this time. High frequency cetaceans have the highest potential risk for noise-related impacts from the loud, high-frequency components of pile driving, although the majority of noise generated by pile driving is actually low-frequency, or less than 1 kilohertz.[131,132] Mid-frequency cetaceans are less likely to be adversely affected by noise generated by pile-driving, as the expected frequencies occur in the lower portion of mid-frequency cetacean generalized hearing ranges.[133] There are few studies on frequency range sensitivities of low-frequency cetaceans; in one, the range of maximum sensitivity in humpback whales was determined to be 2 to 6 kilohertz,[134] or well above the typical pile driving noise frequency.

5.2.2.2 Injury/Mortality

Injury or mortality of marine mammals and sea turtles could occur due to noise during pile driving and an increased potential for collision with vessels. The potential risk of noise-related injury, or behavioral changes from noise, would be highest for high-frequency cetaceans due to their sensitivity to noise generated by pile driving. Less is known about sea turtle hearing and thresholds; however, sea turtles may be protected from pile driving and other impulsive noise because of their rigid external shell, which may protect the organs inside the shell area.[135]

With respect to waters offshore New York State, impacts to the North Atlantic right whale (*Neobalaenid glacialis*), fin whale (*Balaenoptera physalus*) and

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130 NYSERDA. 2017. "New York State Offshore Wind Master Plan Marine Mammal and Sea Turtle Study." Report 17-25l. Accessed January 29, 2018. https://www.nyserda.ny.gov/All-Programs/Programs/Offshore-Wind/New-York-Offshore-Wind-Master-Plan.

131 Illingworth and Rodkin, Inc. 2007. *Compendium of Pile Driving Sound Data*. Report for the California Department of Transportation. Petaluma, CA.

132 Dahl, P. H., D. R. Dall'Osto, and D. M. Farrell. 2015. "The Underwater Sound Field from Vibratory Pile-Driving." *Journal of the Acoustical Society of America* 137(6):3544–3554.

133 NOAA 2016. *Technical Guidance for Assessing the Effects of Anthropogenic Sound on Marine Mammal Hearing: Underwater Acoustic Thresholds for Onset of Permanent and Temporary Threshold Shifts.* U.S. Department of Commerce, NOAA. NOAA Technical Memorandum NMFS-OPR-55.

134 Houser, Dorian S.; David A. Helweg and Patrick W. B. Moore. 2001. "A Bandpass filter-bank model of auditory sensitivity in the humpback whale." *Aquatic Mammals*; 27.2, pp.82-91. January 2001.

135 Popper, A.N., A.D. Hawkins, R.R. Fay, D.A. Mann, S. Bartol, T.J. Carlson, S. Coombs, W.T. Ellison, R.L. Gentry, M.B. Halvorsen, S. Løkkeborg, P.H. Rogers, B.L. Southall, D.G. Zeddies, W.N. Tavolga. 2014. "Sound Exposure Guidelines for Fishes and Sea Turtles: A Technical Report Prepared by ANSI-Accredited Standards Committee S3/SC1 and Registered with ANSI." Springer and ASA Press, Cham, Switzerland.

humpback whale (*Megaptera novaeangliae*) could occur due to vessel collision.[136] Recent surveys indicate that sea turtles are also common across the OCS waters offshore New York in summer. Although sea turtles show a potential preference for the slope of the OCS and coastal areas, they may be present in waters offshore New York State. [137,138]

5.2.3 Fish

Offshore wind energy development may impact fish due to displacement, disturbance, loss, or conversion of habitat, as well as injury or mortality.

5.2.3.1 Displacement, Disturbance, Loss, or Conversion of Habitat

During construction, the installation of foundations would temporarily create suspended sediment. The majority of sediments would settle quickly, minimizing turbidity, and fish would generally relocate to nearby habitats to avoid impacts. Impacts on fish from turbidity during construction would be expected to be temporary. Pile-driving and excavation activities are likely to displace fish from regular swimming, foraging, and spawning habitats, and the fish may relocate to nearby habitats due to sensory disturbances. The majority of fish would temporarily relocate to ample available nearby habitat, and would likely return to pre-existing habitats after construction.[139,140,141,142]

Offshore wind energy development may also lead to the conversion of open water to an artificial reef-like habitat. Added structures (i.e. turbine foundations) would create a new hard-bottom habitat similar to an artificial reef, which could cause a shift in species presence and diversity. As described above in Section 5.2.1, the colonization of benthic communities in areas with installed structures may increase available food for larger pelagic predators. Artificial reef-like habitats may

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136 Laist, D.W., A.R. Knowlton, J.G. Mead, A.S. Collet and M. Podesta. 2001. "Collisions Between Ships and Whales." *Marine Mammal Science* 17:35-75.

137 Normandeau Associates, Inc. and APEM, Inc. 2016. "Digital Aerial Baseline Survey of Marine Wildlife in Support of Offshore Wind Energy." Summer 2016 taxonomic analysis summary report prepared for New York State Energy Research and Development Authority.

138 Tetra Tech and Smultea Environmental Sciences. 2017. "March 2017 Survey Report of New York Bight Whale Monitoring Aerial Surveys." Provided by the New York State Department of Conservation.

139 Bergstrom, L., L. Kautsky, T. Malm, R. Rosenberg, M. Wahlberg, N. Åstrand Capetillo, and D. Wilhelmsson. 2014. "Effects of Offshore Windfarms on Marine Wildlife—A Generalized Impact Assessment." *Environmental Research Letters* 9:034012.

140 Deepwater Wind. 2012. Block Island Wind Farm and Block Island Transmission System Environmental Report/Construction and Operations Plan. Prepared by TetraTech EC, Inc.

141 European Commission. 2015. MaRVEN – Environmental Impacts of Noise, Vibrations and Electromagnetic Emissions from Marine Renewable Energy. RTD-KI-NA-27-738-EN-N. Final study report.

142 Pearson, W.H., J.R. Skalski, and C.I. Malme. 1992. Effects of Sounds from a Geophysical Survey Device on Behavior of Captive Rockfish (Sebastes spp.) Canadian Journal of Aquatic Sciences 49: 1343-1356.

attract new fish species to the area that may use the structures as a refuge from predators.[143]

New York State's Offshore Wind Master Plan Fish and Fisheries Study describes representative, sensitive, and federally protected fish species likely to occur offshore New York.[144] Construction and operation impacts on the ESA-listed Atlantic sturgeon (*Acipenser oxyrinchus oxyrinchus*), other species proposed for listing (*Brosme, Carcharhinus logimanus, Manta birostris*), and species with designated EFH could occur from habitat disturbance within this area.

Fish communities may be affected by electromagnetic fields (EMF) emitted from buried electric cables.[145,146,147,148] The exposure to EMF could theoretically displace fish from the area, which could impact migration, foraging, and reproductive behaviors.[149,150] However, existing and ongoing studies indicate little or no

143 Copping, A., L. Hanna, J. Whiting, S. Geerlofs, M. Grear, K. Blake, A. Coffey, M. Massaua, J. Brown-Saracino, and H. Battey. 2013. "Environmental Effects of Marine Energy Development around the World: Annex IV Final Report." Prepared by Pacific Northwest National Laboratory (PNNL) for Ocean Energy Systems (OES). Accessed January 22, 2018. http://tethys.pnnl.gov/publications/environmental-effects-marine-energy-development-around-world-annex-iv-final-report.

144 NYSERDA. 2017. "New York State Offshore Wind Master Plan Fish and Fisheries Study" Report 17-25j. Accessed January 29, 2018. https://www.nyserda.ny.gov/All-Programs/Programs/Offshore-Wind/New-York-Offshore-Wind-Master-Plan/Studies-and-Surveys#m.

145 Bergstrom, L., L. Kautsky, T. Malm, R. Rosenberg, M. Wahlberg, N. Åstrand Capetillo, and D. Wilhelmsson. 2014. "Effects of Offshore Windfarms on Marine Wildlife—A Generalized Impact Assessment." *Environmental Research Letters* 9:034012.

146 Emeana, C.J., T.J. Hughes, J.K. Dix, T.M. Gernon, T.J. Henstock, C.E.L. Thompson, and J.A. Pilgrim. 2016. "The Thermal Regime around Buried Submarine High Voltage Cables." *Geophysical Journal International* 206:2.

147 Meißer, K., H. Schabelonbk, J. Bellebaum, and H. Sordyl. 2006. "Impacts of Submarine Cables on the Marine Environment: A Literature Review." Prepared by the Institute of Applied Ecology Ltd. for the Federal Agency of Nature Conservation, Germany. Accessed January 28, 2018. https://www.bfn.de/fileadmin/BfN/meeresundkuestenschutz/Dokumente/BfN_Literaturstudie_Effekte_marine_Kabel_2007-02_01.pdf.

148 World Wildlife Fund. 2014. "Norway, Environmental Impacts of Offshore Wind Power Production in the North Sea, A Literature Overview." Accessed January 22, 2018. http://awsassets.wwf.no/downloads/wwf_a4_report___havvindrapport.pdf.

149 Electric Power Research Institute. 2013. "EPRI Workshop on EMF and Aquatic Life." Accessed January 31, 2018. http://tethys.pnnl.gov/publications/epri-workshop-emf-and-aquatic-life.

150 Gill, A.B., I. Gloyne-Phillips, K.J. Neal, J.A. Kimber. 2005. "Electromagnetic Fields Review: The Potential Effects of Electromagnetic Fields Generated by Sub-sea Power Cables Associated with Offshore Wind Farm Developments on Electrically and Magnetically Sensitive Marine Organisms. *Sea Life: Cowrie* 2005:1-89.

behavioral responses to EMF.[151,152,153,154] Typically, cable burial and sheathing materials shield direct EMF.[155,156,157,158,159] These impacts would occur in small areas within the footprint of an electric cable.

5.2.3.2 Injury/Mortality

Noise associated with pile driving could potentially exceed the NOAA Fisheries criteria for cumulative sound exposure level, and may cause injury and/or mortality to some fish species. Eggs, larvae, and demersal species may not have the ability to avoid sensory disturbances, and as described above in Section 5.2.3.1, other sensitive species such as federally protected species and those with designated EFH may be more affected than other fish. The increase in noise is likely to disrupt foraging and reproductive behaviors, and could also cause disorientation and tissue damage, mask biologically important sounds, and even cause death. Herring in particular are sensitive to noise, and have designated larval, juvenile, and adult EFH offshore New York.[160]

5.2.4 Birds and Bats

Offshore wind energy may impact birds and bats due to displacement, disturbance, or loss of habitat, and injury or mortality.

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151 Kavet, R., M.T. Wyman, and A.P. Klimley. 2016. "Assessment of Potential Impact of Electromagnetic Fields from Undersea Cable on Migratory Fish Behavior." Accessed January 31, 2018. https://www.boem.gov/2016-041/.

152 Woodruff, D.L., I.R. Schultz, K.E. Marshall, J.A. Ward, and V.I. Cullinan. 2012. "Effects of Electromagnetic Fields on Fish and Invertebrates - Task 2.1.3: Effects on Aquatic Organisms Fiscal Year 2011 Progress Report." Accessed January 31, 2018. https://www.pnnl.gov/main/publications/external/technical_reports/PNNL-20813Final.pdf.

153 BOEM. 2017. "Potential Impacts of Submarine Power Cables on Crab Harvest (PC-14-02)." Accessed January 31, 2018. https://www.boem.gov/pc-14-02/.

154 BOEM. 2016. "Renewable Energy In Situ Power Cable Observation." Accessed January 31, 2017 from https://www.boem.gov/2016-008/.

155 Claisse, J.T., D.J. Pondella, C.M. Williams, L.A. Zahn, and J.P. Williams. 2015. "Final Technical Report: Current Ability to Assess Impacts of Electromagnetic Fields Associated with Marine and Hydrokinetic Technologies on Marine Fishes in Hawaii." Report DE-EE0006390.0000, OCS Study BOEM 2015-042.

156 Normandeau Associates, Inc. and APEM, Inc. 2016. "Digital Aerial Baseline Survey of Marine Wildlife of Support of Offshore Wind Energy: Summary of Summer 2016 Digital Survey #1." Accessed January 31, 2018. Available at: https://remote.normandeau.com/docs/Summary%20of%20Summer%202016%20Survey%201.pdf.

157 Dunlop, E.S., S.M. Reid, and M. Murrant. 2016. "Limited Influence of a Wind Power Project Submarine Cable on a Laurentian Great Lakes Fish Community." *Journal of Applied Ichthyology* 32:18031.

158 Deepwater Wind. 2012. "Block Island Wind Farm and Block Island Transmission System Environmental Report/Construction and Operations Plan." Prepared by TetraTech EC, Inc. Accessed January 31, 2018. http://dwwind.com/wp-content/uploads/2014/08/Environmental-Report-Exec-Summary.pdf.

159 BOEM. 2016. "Guidelines for Information Requirements for a Renewable Energy Site Assessment Plan (SAP)." Accessed January 31, 2018. https://www.boem.gov/Final-SAP-Guidelines/.

160 NYSERDA. 2017. "New York State Offshore Wind Master Plan Fish and Fisheries Study." Report 17-25j. Accessed January 29, 2018. https://www.nyserda.ny.gov/All-Programs/Programs/Offshore-Wind/New-York-Offshore-Wind-Master-Plan/Studies-and-Surveys#m.

5.2.4.1 Displacement, Disturbance, Loss, or Conversion of Habitat

Increased noise, human presence, vessel traffic, and the presence of large structures are likely to displace species from their typical habitat. This displacement may result in long-term habitat loss if new conditions are unsuitable to certain species, and may result in birds avoiding areas of increased activity and structures, affecting migration and other movements.[161] Construction activities may also temporarily displace birds from migrating, breeding, foraging, and nesting areas, and could contribute to over-crowding and competition at alternative foraging sites. Furthermore, impacts to other species such as fish (discussed in Section 5.2.3) may cause changes in available fish prey. These impacts would be temporary and likely to only occur in small areas within the footprint of offshore wind energy.

During operation, the presence of the wind turbines may create a physical barrier in a migratory flight path, or barrier effect, converting the existing habitat.[162] Multiple bird species migrate offshore, including shorebirds, marine birds, and waterfowl, as well as raptors and potential passerines displaced offshore by weather events. Avian species displaced by the barrier effect are likely to experience indirect impacts of increased energy expenditure in order to alter migratory patterns and paths. Indirect impacts can also include changes in breeding success and predator-prey behavior if a decrease in prey availability or an increase in energy expenditure occurs. The impact of habitat disturbance on avian species is dependent on siting, the distance between the wind turbines and the migratory flight path and the distance to suitable foraging areas. Birds also exhibit high variability in their sensitivity to habitat displacement.

The Master Plan Birds and Bats Study summarizes bird and bat use, including use by special status species, based on the best available data and literature. The study finds that overall bird use is greatest in three core habitat areas in offshore waters of New York State: shallower waters along the northern and northwestern offshore waters of New York State, the Hudson Shelf Valley, and the continental shelf break.[163] For example, waterfowl use is generally concentrated in shallow waters in the north and the shallower portions of the Hudson Shelf Valley. Conversely, pelagic birds are most commonly observed near the continental shelf break. As noted in the Birds and Bats Study, the known occurrence of bats in offshore waters is relatively low and mainly concentrated during migration periods. Their general lack of presence in offshore waters makes impacts on either individual species or the population of bats unlikely.

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161 Fox, A.D., M. Desholm, J. Kahlert, T.K. Christensen, and I.K. Petersen. 2006. "Information Needs to Support Environmental Impact Assessment of the Effects of European Offshore Wind Farms on Birds." *Ibis* 148: 129–144.

162 NYSERDA. 2017. "New York State Offshore Wind Master Plan Birds and Bats Study." Report 17-25d. Accessed January 29, 2018. https://www.nyserda.ny.gov/All-Programs/Programs/Offshore-Wind/New-York-Offshore-Wind-Master-Plan/Studies-and-Surveys#m.

163 *Ibid*.

5.2.4.2 Injury/Mortality

The presence of wind turbines may lead to avian injury or mortality due to direct collision. The potential for collision depends on many factors, including the dimensions and height of the wind turbines and their placement (i.e., in feeding or breeding areas, along migration corridors), as well as species-specific flight and feeding behavior.[164] Additionally, birds, especially those that migrate at night, may become disoriented by or attracted to lit structures, and are particularly attracted to red and white lights, increasing the potential for collision risk.[165] The majority of avian collisions with structures take place at night and during inclement weather events, and are often influenced by season.[166]

The Atlantic Flyway migratory corridor stretches from the eastern Arctic islands, along the eastern coast of the United States, and down to the Caribbean Sea. As such, offshore wind energy from Maryland to Maine would occur within the Atlantic Flyway during times of the year that birds utilize this corridor. The Master Plan Birds and Bats Study indicates that the Atlantic Flyway migratory corridor is located within and near offshore New York State.[167]

5.3 Marine Commercial and Recreational Uses and Vessel Traffic

The marine commercial and recreational uses, and marine transportation affected by offshore wind energy development would include recreational boating activities, other general vessel traffic, and commercial and recreational fishing. Primary potential impacts to these resources would be potential conflicts with the use of the same area.

5.3.1 Recreational Activities

Vessel traffic and temporary exclusion areas are likely to have some degree of restriction on the recreational activities such as wildlife viewing, offshore diving, and recreational boating. Noise and other sensory disturbances may temporarily displace wildlife, and recreational wildlife viewing may therefore be temporarily displaced to other areas. Temporary exclusion zones may be implemented for safety if a project specific area encompasses known dive sites. Additionally, as discussed in Section 5.2, construction activities could temporarily displace marine

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164 Drewitt, A.L., and R.H.W. Langston. 2008. "Collision Effects of Wind-power Generators and Other Obstacles on Birds". *Annals of the New York Academy of Sciences* 1134:233-266. DOI:10.1196/annals.1439.015.

165 Poot, H., B.J. Ens, H. de Vries, Donners, A.H. Maurice, M.R. Wernand, and J.M. Marquenie. 2008. "Green Light for Nocturnally Migrating Birds." *Ecology and Society* 13(2):47.

166 Kerlinger, P., J.L. Gehring, W.P. Erickson, R. Currey, and A. Jain. 2010. "Night Migrant Fatalities and Obstruction Lighting at Wind Turbines in North America." *The Wilson Journal of Ornithology* 122(4): 744-754.

167 NYSERDA. 2017. "New York State Offshore Wind Master Plan Birds and Bats Study." Report 17-25d. Accessed January 29, 2018. https://www.nyserda.ny.gov/All-Programs/Programs/Offshore-Wind/New-York-Offshore-Wind-Master-Plan/Studies-and-Surveys#m. Because of the brief seasonal presence of bats offshore and the limited overlap of bat habitat in the marine environment, bats were not considered further in this analysis.

species (i.e., fish, marine mammals, and sea turtles) causing divers to avoid certain areas due to the temporary displacement of marine life. Other recreational boating activities such as sailing, kayaking, power boating, and other rental or personal boating activities would be affected in the same ways as wildlife viewing and offshore diving activities. Recreational boaters may be displaced from areas of construction and associated vessel traffic, and recreational activities may be displaced from the footprint of a specific project.

5.3.2 Vessel Traffic

Vessel traffic would increase during construction, and some temporary diversions of commercial and recreational vessel traffic could occur. During operation, exclusion areas may be imposed around each wind turbine, which would exclude or divert vessel traffic. As described in Chapter 3, the Port of New York and New Jersey is one of the largest ports on the East Coast. As such, a large volume of commercial and recreational vessels provide import and export services, construction work, recreational whale watching, and cruises.

The USCG evaluates the need for exclusion measures on a case-by-case basis, taking into account the navigational risk assessment required for a specific project. Increases in vessel traffic during construction would be temporary. Overall, the volume of vessel traffic associated with construction and operation of a future project would be expected to be small in comparison to existing traffic in and out of the major ports that would service offshore wind energy development.

5.3.3 Commercial and Recreational Fishing

Potential impacts to commercial and recreational fishing could result from conflicts with the use of the space that displaces commercial and recreational vessels from fishing areas, and/or displacement of fish from the areas accessible by commercial and recreational vessels. Fish may also temporarily avoid construction areas as described in Section 5.2, which could temporarily alter typical fish catch. These impacts would depend on project- or site-specific conditions and the size, number, and distribution of turbines proposed. Offshore wind energy may limit certain fishing practices, restrict access to fish, or displace fish from traditional fishing areas. To avoid the potential risks associated with fishing within or near offshore wind energy, commercial and recreational fishers may choose to travel farther than they would otherwise, which would increase fuel costs, and potentially reduce the number of landings and catch due to a more limited fishing timeframe. Depending on the depth at which cables are buried, trawl fishing and vessel anchoring may be restricted.

The USCG, in partnership with the United States Army Corps of Engineers (USACE) in state waters and BOEM in federal waters, would determine the need for exclusion areas around specific wind turbines. There is no current formal policy to limit fishing around and through offshore wind farms, and the USCG evaluates the need for exclusion areas on a case-by-case basis. However, the potential for some conflicts with use of space may not be entirely avoidable.

5.4 Cultural Resources

Offshore wind energy could potentially result in impacts on submerged and terrestrial cultural resources. Potential impacts could include physical and visual impacts; however, the level of impact would depend on the location of infrastructure relative to the cultural resource, as well as the significance of the cultural resource (i.e., listed or potentially eligible for listing on the NRHP).

Submerged cultural resources may experience impacts, including vessel collisions during surveys, construction activities, and the inadvertent disturbance of cultural remains. Similarly, potential visual impacts on cultural resources include impacts on the views, viewsheds, and/or setting of onshore (terrestrial) architectural or other built resources, landscapes, seascapes, and traditional cultural properties. The potential effect of the introduction of offshore wind energy infrastructure into the visual setting for any historic or architecturally significant property depends on a number of factors such as distance, visual dominance, orientation of views, viewer context and activity, and the types and density of modern features in the existing view. Section 5.6 discusses potential visual impacts.

5.5 Socioeconomic Impacts

The procurement of 2,400 MW of offshore wind energy could result in direct socioeconomic impacts in the form of economic development, workforce employment, and the avoidance of adverse health outcomes. These socioeconomic benefits could occur at local, county, state, and/or regional levels.

As discussed in Section 3.6, the existing workforce in New York port and shoreline communities consists of many trained trade workers and assemblers,[168] such that the workforce in these communities is well positioned to respond to offshore wind development. In addition, growth in the supply chain of the offshore wind energy industry, including manufacturing facilities and the shipment of supplies, may benefit communities throughout the Atlantic coastal region associated with the marine environment. In particular, those communities in proximity to port facilities may benefit from offshore wind energy. This growth may lead to broader, coastal region economic development and job creation.

Workforce opportunities would include jobs in manufacturing, construction, and operation. Job opportunities are likely to be concentrated in areas nearest to port facilities. Of these jobs, many would be in operations and maintenance, which create steady job opportunities throughout the typical 25-year lifespan of offshore wind turbines. The proximity of workers to offshore wind energy development is crucial, as operations and maintenance workers must be able to move to and from a project location efficiently. Port communities closest to development are therefore expected to gain these baseline jobs (i.e., jobs created locally). The procurement of offshore wind energy would also create jobs through the expansion of the

[168] The Institute of Marine Engineering, Science and Technology. n.d. "Working in Ports." Accessed January 18, 2018. https://www.imarest.org/membership/education-careers/careers-in-the-marine-profession/how-about-working-in-ports.

coastal region supply chain for offshore wind energy development. Along the Atlantic coast and up the Hudson River, domestic and international component manufacturers would be attracted to the region as a location for manufacturing operations. Port facilities along the Atlantic coast and along New York's waterways would be attractive locations for these types of operations given their current industrial base, which provides core manufacturing competencies, and an ideal geographic location for transporting goods. Manufacturing operations would include the production of components such as blades, towers, nacelles, steel, fiberglass, and copper wire.

NYSERDA assessed the workforce benefits of offshore wind energy development in "The Workforce Opportunity of Offshore Wind in New York" study.[169] The study estimated that New York could realize nearly 5,000 new jobs in manufacturing, installation, and operation of offshore wind facilities, with a regional commitment to scale development of the resource. Nearly 3,500 of these jobs would be expected to support New York offshore wind facilities associated with the 2,400 MW goal, with the remaining supporting regional projects. Of these jobs, nearly 2,000 would be in operations and maintenance. Shoreline communities would be best equipped to realize the operations and maintenance jobs given their proximity to the specific projects. Project management and construction would represent approximately 580 additional baseline jobs. During development of offshore wind energy, the study estimated New York's manufacturing sector could support up to 2,250 jobs, while the construction sector could support up to 220 jobs, all of which could have more coastal region economic benefits.[170,171] The study did not consider the economic impacts associated with any changes in the retail price of electricity as well as the impacts associated with the cancellation or closure of any new or existing power plants made unnecessary by the offshore wind facilities.

Reducing pollution by even modest amounts in highly populated areas would be an additional benefit, resulting in significant socioeconomic benefits. As discussed in Section 3.7 Community Character, air quality affects the public health of shoreline communities. NYSERDA's Options Paper uses the EPA's Co-Benefits Risk Assessment (COBRA) Health Impacts Screening and Mapping Tool to estimate how the emission reductions from implementation of 2,400 MW of offshore wind energy would affect ambient air quality and adverse health impacts throughout the coastal region. This COBRA tool estimates how changes in ambient air quality affect public health outcomes, and then estimates the monetary value of the public health impacts. The screening-level analysis found that the implementation of 2,400 MW of offshore wind energy would result in 8 to 18 fewer premature deaths annually and would avoid multiple adverse health outcomes in

169 NYSERDA. 2017. "The Workforce Opportunity of Offshore Wind in New York." Accessed January 29, 2018. https://www.nyserda.ny.gov/All-Programs/Programs/Offshore-Wind/New-York-Offshore-Wind-Master-Plan/Studies-and-Surveys#v.

170 *Ibid.*

171 *Ibid.*

2030 across the northeast United States. The model estimated the monetary value of the total health benefits to be between $73M and $165M in 2030. However, these benefits should continue well beyond 2030, and the total health benefits from the procurement of 2,400 MW of offshore wind energy could be on the order of $1B.[172]

5.6 Visual and Aesthetic Resources

Offshore wind energy could affect visual resources, although whether an impact would be caused, and the extent of that impact, would depend on the viewshed, as well as the human use of and response to changes in that viewshed. Coastal areas include parks, recreation areas, and high-value properties, which are considered sensitive viewsheds. Visibility and visual impacts would depend on a variety of factors, including:

- Distance and angle of the viewer;
- Viewer sensitivity;
- Landscape/seascape character and sensitivity;
- Time of day/sun angle;
- Number of turbines;
- Size of turbines;
- Arrangement of turbines; and
- Weather conditions.

Visual impact assessment typically relies on an evaluation of the specific sensitivity of the viewer, the viewshed, and the physical conditions that define visibility. Weather conditions and distance are primary factors in determining potential visibility. In general, wind turbines visible from designated sensitive or significant resources, or viewed by a large number of people, or viewed with more regularity or for longer periods of time may have a more pronounced impact on aesthetic resources. Increased distance from shore generally reduces the visibility because the wind turbines look smaller when farther away and because of the curvature of the Earth. When viewing a wind turbine from a beach-level position 20 miles away, the curvature of the Earth alone would screen approximately 142 feet of the lower portion of a typical wind turbine. At 25 miles, only the uppermost portions of the wind turbine would be visible, and at 30 miles, the curvature of the Earth would partially to completely screen the center of the wind turbine.[173]

[172] *Ibid.*

[173] NYSERDA. 2017. "New York State Offshore Wind Master Plan Visibility Threshold Study Final Draft Report." Report 17-25s. Accessed January 29, 2018. https://www.nyserda.ny.gov/All-Programs/Programs/Offshore-Wind/New-York-Offshore-Wind-Master-Plan/Studies-and-Surveys#v.

Visual impacts also could result from the presence of construction equipment (e.g., jack-up barges and cranes), commuting vessels, and wind turbine components. The majority of construction activities would occur during daytime hours. At night, vessels would use USCG-regulated lights in addition to work lights, angled downward, for worker safety. Wind turbines would be equipped with Federal Aviation Administration-required obstruction lighting designed to be visible even in poor visibility conditions. To meet Federal Aviation Administration requirements, projects could employ permanent and continuous lighting, which produces flashing red lights visible from long distances, or an aircraft detection lighting system (ADLS), which would activate turbine lighting only when aircraft are within visual range.

The Master Plan includes the study of a hypothetical typical wind energy development offshore of Long Island, New York. The Master Plan Visibility Threshold Study[174] assesses a hypothetical 800 MW wind energy project consisting of one hundred 8 MW turbines at various distances from shore under a variety of historical meteorological conditions. Historical weather data and computer-assisted visual simulations based on a variety of hypothetical project parameters were evaluated to determine the potential visual impact under a variety of distance and sky conditions. Turbines may be visible under clear or partly cloudy conditions. The analysis of historical meteorological conditions determined that daylight hours consisted of 16% to 18% clear conditions, and 5% to 7% partly cloudy conditions, depending on the season. The predominant sky condition is overcast, occurring 55% to 65% of the time, during which visibility of offshore turbines would be difficult. Furthermore, the New York State Offshore Wind Master Plan Visibility Threshold Study found that during 16% of daylight hours, visibility would be less than 10 miles, meaning that turbines located beyond 10 miles would not be visible. However, as noted in the Visibility Study, impacts on viewer experience depends on the observers' visual acuity, viewer activity, and a variety of environmental factors.

The Master Plan includes an Aviation and Radar Assets Study.[175] Researchers evaluated the potential duration of aircraft warning light activation for turbines equipped with an ADLS. The results suggest that aircraft warning light activation would occur during 0.03% to 0.08% of the available annual nighttime hours, for a total of approximately 72 to 201 minutes per year. If an ADLS is not used, permanent and continuous lighting in the form of flashing red lights likely would be visible at long distances during nighttime hours and clear sky conditions.

5.7 Air Quality and Climate Change

The primary direct impacts on air quality from offshore wind energy would result from vessel emissions. Vessels transporting equipment, materials, and employees would be powered by fossil fuel combustion and would emit air pollutants. The

174 *Ibid.*

175 NYSERDA. 2017. "New York State Offshore Wind Master Plan Aviation and Radar Assets Study." Report 17-25c. Accessed January 29, 2018. https://www.nyserda.ny.gov/All-Programs/Programs/Offshore-Wind/New-York-Offshore-Wind-Master-Plan/Studies-and-Surveys#v.

number of vessel trips associated with the construction and operation of offshore wind energy would be small compared to existing vessel traffic, and the resulting emissions would be comparably small.

As noted in Chapter 3, anthropogenic emissions of CO_2 contribute to the trend of rising average global CO_2 concentrations and temperatures. The combustion of fossil fuels (coal, oil, and natural gas) to generate energy contributes significantly to rising atmospheric CO_2 levels. Therefore, the replacement of fossil fuel-fired generation with renewable energy, including offshore wind, would contribute to a reduction in emissions of CO_2. The Options Paper predicts that achieving the goal of 2,400 MW of offshore wind energy capacity would result in a cumulative reduction of carbon emissions in New York by more than 5 million short tons of CO_2 equivalents by 2030, representing about a third of the cumulative CO_2 emissions projected to be achieved under the "50 by 30" goal.

It is difficult to predict precisely how the addition of 2,400 MW of offshore wind energy capacity would affect the trend of rising average global CO_2 concentrations and temperatures. However, evidence for global, national, and regional effects of climate change has been growing. In 2016, the EPA released the fourth report describing trends related to the causes and effects of climate change. In the Northeast, rising air temperatures caused by climate change will intensify water cycles through increased evaporation and precipitation. In New York State and throughout the Atlantic coast region, more intense water cycles lead to water impacts such as increases in localized flash and coastal flooding and increases in the frequency and intensity of extreme precipitation events. Rising ocean temperatures and sea level rise also affect Atlantic coastal areas through loss of wetlands and shoreline, an increase in severe coastal storms, storm surges, and higher tides.

The Intergovernmental Panel on Climate Change (IPCC) and the EPA have stated that climate change is impacting oceans, resulting in increasing overall and surface ocean temperatures, rising sea levels, and ocean acidification.[176,177] EPA also identified changes in marine species distribution as an indicator of climate change.[178] How climate change will ultimately impact wildlife is not clearly defined; however, the success of many species will depend on their ability to adapt to these changes.

Renewable energy, including offshore wind energy, provides benefits for air quality and public health, and reductions in greenhouse gas emissions, because renewably-sourced energy reduces reliance on combustion-based electricity generation.

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176 IPCC. 2013. Climate change 2013: The physical science basis. Working Group I contribution to the IPCC Fifth Assessment Report. Cambridge, United Kingdom: Cambridge University Press. Available at: www.ipcc.ch/report/ar5/wg1.

177 USEPA. 2016. Climate Change Indicators in the United States, Fourth Edition. August 2016. Available at: https://www.epa.gov/climate-indicators/downloads-indicators-report. Accessed April 24, 2018.

178 *Ibid.*

These benefits vary dramatically by region and over time depending on the generation portfolio in each region.

NYSERDA assessed the air quality benefits that could occur from offshore wind energy in the Options Paper.[179] The assessment analyzed the potential impact of 2,400 MW of offshore wind capacity interconnected to New York City and Long Island replacing other renewable energy technologies. The modeling of changes in the electricity sector produced county-level data for emissions of nitrous oxides (NO_X), sulfur dioxide (SO_2), and particulate matter < 2.5 microns ($PM_{2.5}$) subsequently used in health impacts screening modeling. The health impacts modeling estimated how the inclusion of offshore wind capacity might improve ambient air quality and reduce adverse health impacts. The modeling included assumptions for energy and peak demand, gas prices, firmly planned capacity expansion and retirement in New York and neighboring states, reliability-related dispatch proxy, and emissions limits. The Options Paper analysis shows that 2,400 MW of offshore wind energy capacity would reduce air pollution, even compared to the implementation of different renewable energy technologies. Based on the analysis, offshore wind energy would avoid an estimated 1,800 tons of NO_X, 780 tons of SO_2, and 180 tons of $PM_{2.5}$ in 2030 when compared to a scenario without offshore wind. The public health impacts from $PM_{2.5}$ and ozone, for which NO is a precursor, include respiratory and cardiovascular disease. In New York City, $PM_{2.5}$ at levels higher than background is associated with over 2,000 premature deaths, 4,800 emergency department visits for asthma and 1,500 hospitalizations for respiratory and cardiovascular disease each year.[180]

5.8 Cumulative Impacts

This GEIS identifies potential cumulative impacts where such impacts may be "applicable and significant." Cumulative impacts are two or more individual environmental effects that, when taken together, become environmentally significant or may compound or increase other environmental effects. Cumulative impacts are most likely to occur when the impacts of a proposed action are added to other past, present, or reasonably foreseeable actions. Cumulative impacts can result from individually-minor but collectively-significant actions that take place over time. For cumulative impacts to occur, incremental impacts must be greater than negligible.

As noted above, the Cumulative Study assessing cumulative impacts analysis of 2,400 MW of offshore wind energy within a particular area offshore of New York, which is incorporated here by reference and briefly summarized below. This study provides an analysis of a hypothetical reasonable "worst-case" scenario as far as potential cumulative impacts are concerned, as it contemplates all

[179] NYSERDA. 2018. "Offshore Wind Policy Options Paper." Accessed January 29, 2018. https://www.nyserda.ny.gov/All-Programs/Programs/Offshore-Wind/New-York-Offshore-Wind-Master-Plan.

[180] New York City Health. 2013. "New York City Trends in Air Pollution and its Health Consequences." Accessed January 25, 2018. https://www1.nyc.gov/assets/doh/downloads/pdf/environmental/air-quality-report-2013.pdf.

2,400 MW of offshore wind energy projects being constructed offshore New York, which would be in relatively close proximity compared to the marine environment from Maine to North Carolina. However, projects located in other areas may have different or greater cumulative impacts depending on their size, proximity, technology used, and individual impacts. The Cumulative Study also assumed some common Best Management Practices to avoid or minimize impacts which may not be practicable for every project. Therefore, environmental review conducted for individual projects should consider whether they could contribute to cumulative impacts with other offshore wind energy projects and/or other marine activities. The Cumulative Study found that the resources for which potential unavoidable adverse impacts may occur and therefore potential cumulative impacts could occur include: (1) displacement, disturbance, or loss of habitat for marine mammals and sea turtles; (2) sensory disturbance to fish; and (3) conflict with use of space for commercial and recreational vessels. In addition, this GEIS considers the potential for cumulative impacts to occur on birds from displacement, disturbance, or loss of habitat and mortality/injury.

5.8.1 Displacement, Disturbance, Loss, or Conversion of Habitat for Marine Mammals and Sea Turtles

Cumulative impacts may occur on marine mammals and sea turtles from increased vessel traffic and sensory disturbance activities and the potential increase in the probability of disturbance and displacement. The future installation and operation of turbines would also result in the removal of previously available open water habitat, reducing the ability for larger marine mammals to maneuver in those areas. The North Atlantic right whale is a particularly sensitive species because of its low population level, estimated at approximately 440 within the Stock Assessment Report based on the maximum number of photo-identified individuals in 2012.[181,182] Activities associated with construction and operation of specific offshore wind energy projects would follow consultation with state and federal agencies and comply with the Marine Mammal Protection Act and the Endangered Species Act. Activities expected to cause similar noise and displacement impacts on marine mammals and sea turtles include existing marine cables, military use, dredging, ocean disposal of dredged materials, and vessel traffic. The marine environment provides sufficient alternative habitat to allow marine mammals and sea turtles to avoid impacts from sensory disturbance and displacement. The potential impacts on marine mammals and sea turtles from avoidance behavior, such as energy expenditure, increased predation, increased competition risk, use of a lower quality habitat or food source, and stress would be dependent on site specific conditions. The overall spatial coverage of 2,400 MW of offshore

[181] Rolland, R. M., R. S. Schick, H. M. Pettis, A. R. Knowlton, P. K. Hamilton, J. S. Clark, and S. D. Kraus. 2016. "Health of North Atlantic Right Whales (*Eubalaena glacialis*) over Three Decades: From Individual Health to Demographic and Population Health Trends." *Marine Ecology Progress Series* 542:265–282.

[182] Hayes, S. A., E. Josephson, K. Maze-Foley, and P.E. Rosel (eds.). 2017. *U.S. Atlantic and Gulf of Mexico Marine Mammal Stock Assessments – 2016*. NOAA Technical Memorandum NMFS-NE-241.

wind energy would not significantly reduce or modify marine mammal and sea turtle habitat, and based on current studies, it is anticipated that most species would avoid the structures or use other nearby available habitat.[183,184,185,186,187] Given the spatial distribution of offshore wind energy, the available habitat in the marine environment, and agency consultations, significant adverse cumulative impacts to marine mammals and sea turtles would not be expected.

5.8.2 Sensory Disturbance to Fish

Cumulative impacts to fish may occur from the temporary increase of noise and other sensory disturbances from pile driving, excavating, and increased vessel traffic associated with construction. The potential for injury to all fish species depends on peak sound pressure level, cumulative sound exposure level, and the weight of the individual fish.[188] During construction of offshore wind energy, noise impacts from pile driving could potentially exceed NOAA's Fisheries cumulative sound exposure level criteria, and fish would be expected to temporarily relocate outside construction areas. Pile driving for foundations would occur in isolated areas during a temporary timeframe. Most affected fish species would be expected to relocate to surrounding areas, experiencing disturbances less frequently or of lower magnitude. Given the spatial distribution of offshore wind energy, and the available habitat, significant adverse cumulative impacts to fish would not be expected.

5.8.3 Spatial Conflicts with Commercial and Recreational Fishing

Cumulative impacts may occur from conflict with use of the same space with commercial and recreational fishing activities. Potential adverse impacts may include gear and vessel damage, financial risk, exclusion from typical areas and types of fishing, navigational hazards, and the alteration of existing fish populations. Activities expected to cause similar impacts on commercial and recreational fishing include existing marine cables and vessel traffic. As noted in Section 5.3.1, there is no current formal policy to limit fishing around and through offshore wind farms. Ultimately, fishing within or near offshore wind energy would

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183 Goldbogen J. A., B. L. Southall, S. L. DeRuiter, J. Calambokidis, A. S. Friedlaender, E. L. Hazen, E. A. Falcone, G. S. Schorr, A. Douglas, D. J. Moretti, C. Kyburg, M. F. McKenna, and P. L. Tyack. 2013 "Blue Whales Respond to Simulated Mid-Frequency Military Sonar." Proceedings of the Royal Society B, 280, 20130657.

184 Buck, J. R. and P. L. Tyack. 2000. "Response of Gray Whales to Low Frequency Sounds." Journal of the Acoustical Society of America 107(5):2774.

185 Southall, B.L., A.E. Bowles, W.T. Ellison, J.J. Finneran, R.L. Gentry, C.R. Greene, Jr., D. Kastak, D.R. Ketten, J.H. Miller, P.E. Nachtigall, W.J. Richardson, J.A. Thomas, and P.L. Tyack. 2007. "Marine Mammal Noise Exposure Criteria: Initial Scientific Recommendations." Aquatic Mammals. 33(4):411–509.

186 McCauley, R.D., J. Fewtrell, A.J. Duncan, C. Jenner, M.N. Jenner, J.D. Penrose, R.I.T. Prince, A. Adhitya, J. Murdoch, and K. McCabe. 2000. Marine Seismic Surveys – A Study of Environmental Implications. APPEA Journal. 40:692–708.

187 USACE. 1997. Sea Turtle Research Program Summary Report. Technical Report CHL-97-31.

188 Buehler, P.E., R. Oestman, J. Reyff, K. Pommerenck, and B. Mitchell. 2015. "Technical Guidance for Assessment and Mitigation of the Hydroacoustic Effects of Pile Driving on Fish." CTHWANP-RT-15-306.01.01. Prepared for California Department of Transportation, Division of Environmental Analysis. Accessed July 3, 2017. http://www.dot.ca.gov/hq/env/bio/fisheries_bioacoustics.htm.

be based on site specific conditions and the decision of the vessel operator, including any arrangements, agreements, or mitigation measures to reduce the risk of spatial conflicts. However, the Cumulative Study's conservative estimates concluded that the construction and operation of 2,400 MW of offshore wind energy would restrict or exclude fishing within only approximately 3% of the geographic scope of analysis (an area offshore of New York identified by the State as most likely to accommodate offshore wind energy development), leaving large areas available without conflicts for fishing.

5.8.4 Displacement, Disturbance, Loss, or Conversion of Habitat and Injury/Mortality to Birds

Cumulative impacts on birds may result from the potential increase in the probability of disturbance and displacement due to noise, human presence, vessel traffic, and the presence of newly introduced large structures. Cumulative impacts on birds may also result from direct collision with construction cranes and turbines. As many bird populations are highly migratory, the Atlantic Flyway represents the likely area over which cumulative impacts may occur. The future installation and operation of turbines would occupy previously available open water habitat, which birds may avoid during migration. However, within the potential cumulative impact area, there is sufficient alternative habitat available to allow birds to avoid impacts from sensory disturbance and displacement. The overall spatial coverage of 2,400 MW of offshore wind energy development relative to the potential impact area would not significantly reduce or modify avian habitat, as birds are expected to avoid the structures and use other nearby available habitat. In addition, as noted in Exhibit 4-2, the location of the turbines would avoid areas of known dense avian use based on siting studies, and design of turbines may be altered to minimize perching or roosting potential. Activities associated with construction and operation of offshore wind energy projects would follow consultation with state and federal agencies and comply with the Migratory Bird Treaty Act and the Endangered Species Act to avoid, minimize and mitigate potential impacts. Impacts to birds would occur at an individual level, and are not expected to occur at a population level. Given the spatial distribution of offshore wind energy development, the available habitat in the marine environment, and agency consultations, significant adverse cumulative impacts on birds would not be expected.

6 Alternatives Considered

Consistent with 6 NYCRR §617.9(b)(5)(v) of the SEQRA regulations, this chapter provides a description and evaluation of the range of reasonable alternatives to the Proposed Action that are feasible, considering the objectives and capabilities of the project sponsor.

The Commission has identified the No Action alternative as the reasonable alternative to the Proposed Action. The No Action alternative evaluates the adverse or beneficial changes that are likely to occur in the reasonably foreseeable future, in the absence of the Proposed Action.

In the No Action alternative scenario, the State still expects to achieve its "50 by 30" goal by employing a variety of resources, including offshore wind, in the renewable generation portfolio. However, under the No Action alternative, the State would not implement the procurement of 2,400 MW of offshore wind energy by 2030; instead, while some amount of offshore wind energy could ultimately be procured, how much energy and when the procurement would occur would remain less certain. The No Action alternative likely would result in less potential development of offshore wind energy, and perhaps less diversity in generation type, in the State's renewable generation portfolio. In connection with that reduction, there could be greater or fewer potential impacts on the environment, depending on the other types of renewable energy sources that ultimately would be used under the No Action alternative to achieve the "50 by 30" goal.

Although the Commission's analysis can only be generic at this early stage, the No Action alternative likely would result in a State renewable generation portfolio that contains more land-based renewable energy generation and less offshore wind development in order to meet the "50 by 30" goal. There could be a range of scenarios utilized to meet that goal, and each scenario would result in a different composition of renewable energy and, potentially, a different range of environmental impacts. For example, under the No Action alternative, grid solar energy and onshore wind energy would be expected to comprise a greater percentage of the renewable energy generation portfolio, than if the Proposed Action is implemented. Such a No Action scenario would require more grid solar and onshore wind energy development, which would likely result in greater potential land use and other land-based environmental impacts. In addition, new structures and transmission components of land-based renewables could require permanent clearing of habitat and tree removal to create open spaces, as well as temporary disturbances during construction.

Under the No Action alternative, environmental conditions would not change from the current baseline described in Chapter 3. The impacts on the marine environment described in Chapter 5 may be less likely to occur under the No Action alternative, or may occur to a lesser degree. For example, the No Action alternative could result in fewer potential impacts on marine commercial and recreational uses, if development of less offshore wind infrastructure (e.g., wind turbines, offshore transmission cables) occurs. The potential land-based impacts associated with other renewable energy technologies would continue to occur under the No Action alternative, and as noted, may occur to a greater extent in order to achieve the "50 by 30" goal.

However, it should be noted that under the No Action alternative, development of offshore wind energy development may still occur, and impacts to the marine environment would still occur. Under the No Action alternative, development could occur offshore New York State and its electricity would be procured by other states. Some amount of offshore wind energy could be developed through procurement from other states, although how much energy and when the development would occur remains less certain.

Benefits to air quality under the No Action alternative would change, and may be reduced. The potential air quality benefits that could be derived from renewable energy depend upon a variety of factors, including, but not limited to, location, time of year, time of day, and the type of renewable energy deployed. The State conducted a screening-level analysis of the air quality benefits of developing 2,400 MW of offshore wind energy. That analysis concluded that the development of 2,400 MW of offshore wind energy would result in the avoidance of 1,800 tons of NO_X, 780 tons of SO_2, and 180 tons of $PM_{2.5}$ in 2030. Thus, the No Action alternative would change, or reduce, the corresponding health benefits of reduced emissions.[189]

Similarly, the benefits associated with the Proposed Action's procurement of 2,400 MW of offshore wind, would change, and may be reduced. The Master Plan demonstrates that 2,400 MW of offshore wind energy development would reduce air pollution and create jobs. The workforce analysis estimated that 5,000 new jobs in manufacturing, installation and operation offshore wind facilities would result from the development, construction and operation of 2,400 MW of offshore wind in New York and other regional states, with 3,500 of these jobs expected to support New York offshore wind projects.[190] The No Action alternative would change, or reduce these socioeconomic benefits.

189 NYSERDA. 2018. "Offshore Wind Policy Options Paper." Accessed January 29, 2018. https://www.nyserda.ny.gov/All-Programs/Programs/Offshore-Wind/New-York-Offshore-Wind-Master-Plan.

190 *Ibid.*

7 Unavoidable Adverse Impacts

Consistent with 6 NYCRR §617.9(b)(5)(iii)(b), SEQRA requires an analysis of unavoidable adverse impacts. Unavoidable adverse impacts are impacts that, if the Proposed Action is implemented, cannot be avoided or adequately mitigated. Chapter 5 discusses, at a generic level, the potential impacts that may result from the procurement of offshore wind energy to help New York meet 50 percent of its electricity demand from renewable sources by 2030. As previously discussed, adverse environmental impacts could result from individual but as-yet unidentified projects implemented in the future.

This GEIS is not intended to evaluate specific energy projects and their potential site-specific environmental impacts. However, this GEIS is required to identify whether the Proposed Action or alternatives could pose unavoidable adverse impacts. As set forth in Chapter 5, there are no unavoidable adverse impacts that could not be mitigated through one or more of the mechanisms discussed in Chapter 4 (Regulatory Framework and Mitigation of Potential Adverse Impacts). Similarly, as discussed in Chapter 6, the No Action alternative presents no such unavoidable adverse impacts either.

8 Irreversible and Irretrievable Commitment of Resources

Pursuant to 6 NYCRR §617.9(b)(5)(iii)(c), SEQRA requires an assessment of the irreversible and irretrievable commitments of environmental resources associated with the Proposed Action. An irreversible commitment of resources occurs when an action's impacts would limit future use options, if the change cannot be reversed, reclaimed, or repaired. Commitments of nonrenewable resources, such as minerals or cultural resources, and resources that are renewable only over long time spans, such as soil productivity, are irreversible commitments. An irretrievable commitment of resources occurs when the used or consumed resource is neither renewable nor recoverable for use by future generations without reclamation. Irretrievable commitments are not necessarily irreversible, and can include the loss of production or harvest of natural resources.

The Proposed Action would help the State meet its "50 by 30" goal, and would not directly result in an irreversible or irretrievable commitment of resources because no specific project site would be endorsed, approved or constructed. As discussed in Chapter 1, the procurement process does not guarantee that any specific offshore wind energy project would be built, and it is possible that any such project, even if ultimately slated for construction, may be terminated before any resources are affected.

The future construction and operation of new offshore wind energy farms that may occur in response to the Proposed Action, could result in irreversible and irretrievable commitments of resources; however, such commitments would be identified in site-specific environmental analyses and avoided or minimized in accordance with applicable law and regulations, as discussed in Chapter 4 (Regulatory Framework and Mitigation of Potential Adverse Impacts). The principal commitment of resources for the construction and operation of a new offshore wind energy project is any portion of the marine environment that would be occupied by a project. Chapter 5 (Environmental Impacts of Proposed Action) describes the potential impacts and resource commitments associated with offshore wind energy development.

9 Growth-Inducing Aspects and Socioeconomic Impacts

9.1 Impacts on Growth and Community Character

Pursuant to 6 NYCRR §617.9(b)(5)(iii)(d), SEQRA requires the identification and discussion of the potential growth-inducing impacts of the Proposed Action. Growth-inducing aspects generally refer to "secondary" impacts, or the potential for an action to trigger further development. Although the Proposed Action would not endorse or approve any specific offshore wind energy project, the Proposed Action would provide an incentive for the development of such projects, which in turn could induce growth in New York's shoreline communities and beyond. Site-specific environmental reviews should address the potential growth-inducing impacts of particular offshore wind projects on the relevant communities. However, this analysis considers the potential cumulative indirect and growth inducing effect of procuring, and potentially developing, 2,400 MW of offshore wind energy. The Proposed Action has the potential to lead indirectly to development of emerging technologies, a new source of coastal tourism, employment associated with construction and operation, purchases of local products and services, and new and increased tax payments by employees and facilities.

The Proposed Action could result in the development of emerging technologies, potentially accelerating the commercialization of offshore wind energy. As a result, the region could experience the development of economies of scale for regional offshore wind energy, which would have the effect of advancing applicable technologies, increasing local knowledge, and reducing the cost of offshore wind energy development and ratepayers' energy costs.[191]

The Proposed Action could result in indirect job creation associated with construction and The Proposed Action could potentially lead to additional tourism. A 2012 study by BOEM explored the potential impacts of offshore wind energy development on tourism and recreational economies in the Atlantic region.[192]

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191 NYSERDA. 2018. "Offshore Wind Policy Options Paper." Accessed January 29, 2018. https://www.nyserda.ny.gov/All-Programs/Programs/Offshore-Wind/New-York-Offshore-Wind-Master-Plan.

192 Garcia, F., D. Gouveia, E. Healy, E. Johnston, and K. Schlichting. 2012. "Atlantic Region Wind Energy Development: Recreation and Tourism Economic Baseline Development." Prepared for the Bureau of Ocean Energy Management (BOEM). Accessed January 23, 2018. https://www.boem.gov/ESPIS/5/5228.pdf.

Coastal tourism could benefit from the development of offshore wind energy facilities by providing a new source of coastal attractions. Potential new sources of tourist attractions include offshore wind energy facility boat tours, diving at turbine foundations that serve as artificial reefs, and education and information centers related to offshore wind energy. While there are limited data and research on this potential new source of coastal tourism in the United States due to the infancy of the offshore wind industry, the European experience can provide some insight on potential growth-inducing impacts for the coastal tourism industry. For example, Scroby Sands Information Centre in the U.K. operates a tourist center as well as boat tours to offshore wind energy facilities. The tourist center attracted approximately 30,000 visitors in the first six months of opening.[193] In the United States, the Block Island Ferry, as well as some private charter boats, are operating facility tours to the Block Island Wind Farm, the first offshore wind energy facility in the United States.[194,195] Additional tourism would also generate corresponding benefits on businesses that support tourism and recreational economies in the Atlantic region.

The Proposed Action could result in indirect job creation associated with construction and operation. The socioeconomic benefits of offshore wind energy, discussed in Chapter 5, are primarily associated with workforce development and increased activities surrounding existing port facilities. The ports would experience increased activities to accommodate all components of the supply chain for development, construction, and operation of offshore wind energy. The indirect benefits of workforce development and the utilization of existing port facilities would primarily occur through the increased purchases of local goods and services and added tax revenue to local economies. These new jobs could generate new residents, daily workers, and visitors. This new growth in turn could require transportation improvements and other services, and could lead to development of new housing closer to development locations and/or ports.

The Proposed Action could also result in offsetting indirect job impacts associated with any changes in the retail price of electricity as well as the impacts associated with the cancellation or closure of any new or existing power plants made unnecessary by the offshore wind facilities.

The Proposed Action could result in the purchase of locally available materials and services for offshore wind energy development. This could create temporary indirect benefits for suppliers in the relevant industries and transporting of materi-

193 Garcia, F., D. Gouveia, E. Healy, E. Johnston, and K. Schlichting. 2012. "Atlantic Region Wind Energy Development: Recreation and Tourism Economic Baseline Development." Prepared for the Bureau of Ocean Energy Management (BOEM). Accessed January 23, 2018. https://www.boem.gov/ESPIS/5/5228.pdf.

194 Block Island Ferry. 2018. "Block Island Wind Farm Tours." Accessed January 23, 2018. http://biwindfarmtours.com/.

195 Snappa Charters. n.d. "Block Island Wind Farm Sightseeing Tours." Accessed January 23, 2018. http://www.snappacharters.com/block-island-windfarm.html.

als to the region. Additionally, locally hired personnel may create economic benefits in their communities of residence by supporting local businesses. By building the local supply chain for offshore wind energy and utilizing local port facilities, investment from outside of the region could filter into New York and other Atlantic coast states.[196]

Furthermore, the Proposed Action could result in new and increased tax payments by employees using local and regional office space, residences, goods, and services. Local building owners would benefit from renting and selling office space. Regional development offices would also contribute tax revenue, which would add to the local tax base and provide communities with increased funds for public services and amenities.

9.2 Potential Program Costs

The Options Paper includes an offshore wind cost analysis. The analysis includes an evaluation of both deployments of up to 800 MW of capacity procured in 2018 and 2019 and full deployment of 2,400 MW of offshore wind by 2030. Program costs are presented as a range and are dependent on a number of key factors. Many factors influence the range of program costs, some of which are largely outside of New York's control, such as wholesale energy prices (which are driven by natural gas prices) and financing costs.

As shown in Exhibit 9-1, cost projections for the full 2,400 MW under various procurement methods are provided in the form of the following cost indicators:

1. Gross program costs are calculated as the incremental revenue, on top of energy and capacity, that allows projects to reach their cost of capital. They are presented as a net present value of incremental performance-based incentive payments over time, inclusive of Tier 1 REC payments.
2. Net program costs are defined as the gross program costs minus the net present value of the carbon value associated with the offshore wind deployment. Carbon value is calculated as the societal value of avoided CO_2 emissions in excess of the value already included in the electricity price through Regional Greenhouse Gas Initiative.

196 NYSERDA. 2017. "New York State Offshore Wind Master Plan Consideration of Potential Cumulative Effects." Report 17-25g. Accessed January 29, 2018. https://www.nyserda.ny.gov/All-Programs/Programs/Offshore-Wind/New-York-Offshore-Wind-Master-Plan/Area-for-Consideration.

Exhibit 9-1 Cost and Benefit Projections for Offshore Wind Energy Development

Cost Indicator	1. Fixed REC	2./4. Bundled/Split PPA	3. Utility-Owned Generation	5. Market OREC	6. Index OREC	7a. Forward OREC, Conservative	7b. Forward OREC, Aggressive
Gross Program Cost	$4.6B cost	$1.9B cost	$0.7B cost	$1.9B cost	$2.1B cost	$3.9B cost	$2.5B cost
Carbon Benefit	$1.9B benefit	$1.9B benefit	$1.9B benefit	$1.9B benefit	$1.9B benefit	$1.9B benefit	$1.9B benefit
Net Program Cost	$2.7B cost	$0.1B cost	$1.1B benefit	$0.1B cost	$0.2B cost	$2.0B cost	$0.6B cost

9.3 Potential Program Benefits

9.3.1 Greenhouse Gas Reduction Benefits

Successful implementation of the Offshore Procurement program will provide a wide range of benefits including improving generation diversity; economic growth, job creation, public health improvements and greenhouse gas (GHG). As Exhibit 9-1 above demonstrates, the benefits related to GHG reductions alone are approximately equal to the cost of the Offshore Procurement program depending on the procurement design option chosen.

9.3.2 Public Health Benefits

The Offshore Procurement program is expected to provide significant beneficial impacts related to public health. Levels of fine particles (PM 2.5) and ozone remain at health significant levels in the New York City metropolitan area including the Counties of Bronx, Kings, Nassau, New York, Queens, Richmond, Rockland, Suffolk, and Westchester. Public health impacts associated with these two air pollutants include respiratory and cardiovascular disease and premature deaths. High levels of $PM_{2.5}$ can lead to emergency department visits and hospitalizations related to asthma and other ailments.

NYSERDA's screening-level analysis that 2,400 MW of offshore wind capacity feeding into the New York City metro area would lead to significantly lower levels of $PM_{2.5}$ and ozone. Levels of NO_X, and SO_2, would also be reduced significantly. These changes in ambient air quality are expected to lead to significant reductions in hospitalizations, emergency department visits and pre-mature deaths. The Offshore Options paper indicates that health benefits through 2030 of procuring 2,400 MW of offshore wind could range from $73 million to $165 million. Because the health benefits are expected to persist well beyond 2030, the total health benefits associated with procuring 2,400 MW of offshore wind generation could be on the order of $1 billion.

9.3.3 Workforce Benefits

Procurement of 2,400 MW of offshore wind capacity can complement the State's existing clean energy programs and continue the expansion of New York's quickly expanding clean energy industry and increasing job opportunities related to renewable energy.[197] The analysis NYSERDA conducted related to offshore wind and the workforce opportunity in New York indicates a number of benefits related to the creation of jobs and expansion of the renewable energy workforce.[198]

Specifically, New York's existing infrastructure is well positioned to support offshore wind development regionally and New Yorkers possess many of the skills required by the industry. Together with a continued commitment to skill development, these factors are likely to attract offshore manufacturers and developers.

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197 2017 New York Clean Energy Industry Report, NYSERDA 2017.

198 NYSERDA. 2017. "New York State Offshore Wind Master Plan, The Workforce Opportunity of Offshore Wind in New York." Accessed February 6, 2018. https://www.nyserda.ny.gov/media/Files/Publications/Research/Biomass-Solar-Wind/Master-Plan/17-25t-Workforce-Opportunity-Study.pdf

Regional commitment to scale offshore wind development could lead to nearly 5,000 jobs in the manufacturing, installation, and operation of offshore wind facilities. Nearly 3,500 of those jobs are expected to support New York wind farms. Many of these jobs, approximately 1,800, are in operations and maintenance and are expected to be long-term employment opportunities with facility lifespans potentially exceeding 25 years.

9.3.4 Economies of Scale Benefits

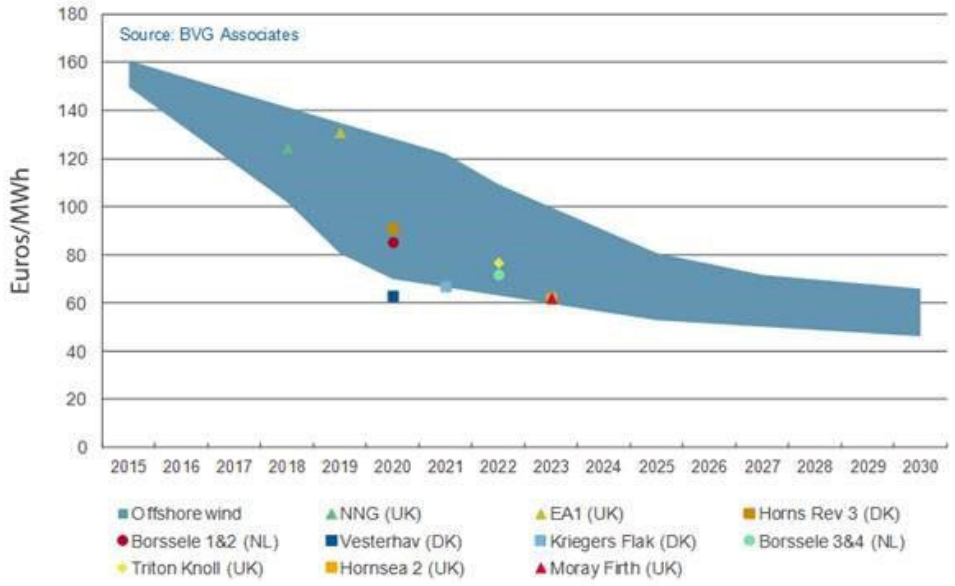
The Proposed Action could result in the State capitalizing on both the expected cost reductions that will come with building a regional U.S. industry of a sufficient scale to replicate declining cost trajectories observed in European offshore wind markets, and the corresponding economic benefits from becoming a "hub" for the emerging domestic offshore wind industry.

While the relative cost of the first offshore wind projects in the U.S. is still projected to be higher than that of typical land-based projects, the offshore wind sector has experienced dramatic cost reductions over the past few years in Europe -- to the point where in many cases the technology is cost-competitive with land-based renewables projects. Cost reductions are thus a key aspect of the successful development of offshore wind energy in New York. The cost reductions seen in Europe have depended to a material extent on local learning and local infrastructure, including supply chain scale economies; in order to unlock such cost reductions for New York, deployment at scale in the region is a prerequisite.

NYSERDA's analysis in the Offshore Options paper indicates that the Proposed Action could be expected to achieve this objective, with projected costs to procure offshore wind in 2030 lower than the cost of Tier 1 RECs associated with other large-scale renewable technologies.

The European offshore wind industry started over twenty years ago, and currently has over 12,000 MW of offshore wind in commercial operation. As depicted in Exhibit 9-2, between 2015 and the present, the offshore wind industry has experienced significant declines in the cost of actual projects and bids on projects in the development pipeline in Europe. The decline being experienced in Europe is widely attributed to industrialization of the offshore wind industry, increasing turbine size and rating, declines being realized in several key cost components, and competition among project developers as a key component of the selection process. For example, in the UK, the most recent auction results in September 2017 achieved new prices that were (on average) 47% lower than the prior UK auction results in 2015.

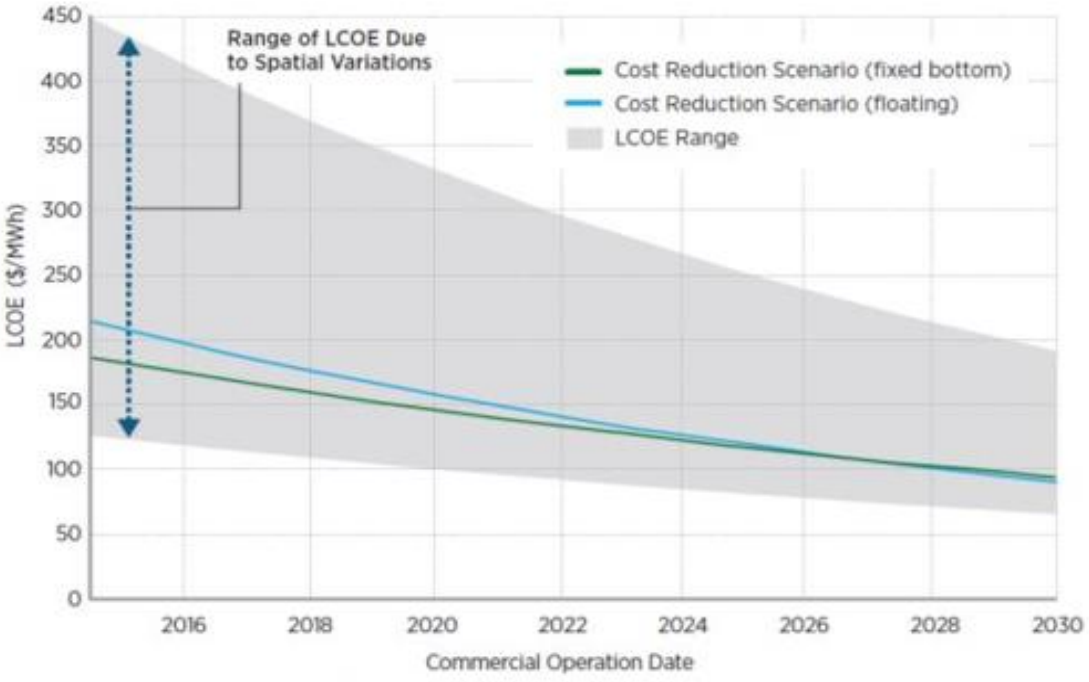
Exhibit 9-2 Decline in Levelized Cost of Electricity for Offshore Wind Projects in Europe (Euros/MWh)



Note: Based on the current exchange rate, 1 Euro equals 1.23 US Dollars.

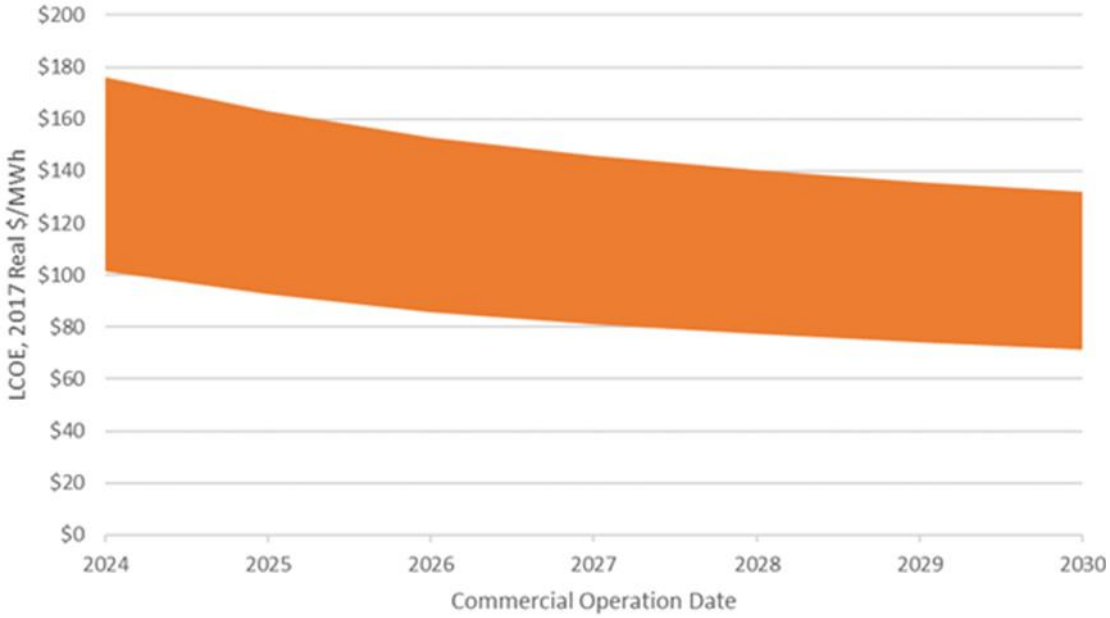
It may take several years for the U.S. offshore wind industry to mature sufficiently to realize significant scale-related reductions in costs. As shown in Exhibit 9-3, recent U.S. studies indicate that activities to drive market scale, market visibility, scale economies, construction, operating and financing experience, development of local supply chain, and competition are projected to lead to rapidly falling offshore wind prices in the U.S. as well.

Exhibit 9-3 Levelized Cost of Electricity for Potential Offshore Wind Projects throughout the U.S. Technical Resource Areas ($/MWh)



As part of the Options Paper, NYSERDA conducted a study of expected offshore wind technology cost developments between 2024, when NYSERDA anticipates the first project being deployed, and 2030, when the state seeks to achieve its goal of 2,400 MW of installed offshore wind projects. The results are summarized in Exhibit 9-4, and are in line with those for wider U.S. projections shown in Exhibit 9-3.

Exhibit 9-4 New York State Projected Levelized Cost of Electricity for Potential Offshore Wind Projects



10 Effects on Energy Consumption

Consistent with 6 NYCRR §617.9(b)(5)(iii)(e) of the SEQRA regulations, this chapter considers the Proposed Action's potential impacts on the State's energy consumption. While the Proposed Action may affect the State's electric generation portfolio, the procurement of 2,400 MW of offshore wind energy by 2030, to the extent it does not significantly impact retail prices, is not expected to directly or indirectly affect the amount of electricity used in the State or the amount of energy conserved in the State.

Rather, the Proposed Action is expected to foster greater penetration and adoption of renewable energy at the grid scale. The Proposed Action could result in the installation of new renewable sources, and thus effect the characteristics of the supply sources that will be available to meet the State's electricity demand. In that manner, the Proposed Action could expand offshore wind energy as a source of New York's overall electric generation mix, thereby helping the State to attain its "50 by 30" goal.

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A Response to Comments on the Draft GEIS

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South Shore Audubon	1-1	While in section 5.2.4, the DGEIS recognizes that the area for Offshore Wind Energy Development (OWED) overlaps with the Atlantic Flyway from Maryland to Maine, it omits study of the Flyway from Cumulative Impacts. The displacement, disturbance, and loss of habitat for birds over such a large area, especially at the crucial time of migration, when diminished foraging opportunities and the extra energy expenditure for alternate routes can be fatal, need to be emphasized and studied for mitigation. The negative impacts will be compounded when commercial and recreational vessels are displaced into wildlife habitat. According to the DGEIS, the major routes of bird migration are closer to shore than the planned turbines. However, the DGEIS also recognizes that storms may force birds farther out to sea where they may encounter turbines. Moreover, there is no guarantee that other states along the Atlantic Flyway will be as careful as we hope New York will be in identifying avian "hotspots" to be avoided. Therefore, we would like to emphasize that cumulative impacts on birds be studied as completely as possible, and take into consideration the totality of wind farm projects that will be located along the Atlantic Flyway.	The Commission recognizes the importance of birds, their habitats, and their relationship to the Atlantic Flyway. The revised Section 3.2 and Exhibit 3-2 include additional information on birds protected under the Migratory Bird Treaty Act known to occur near the Outer Continental Shelf and within the Atlantic Flyway. The revised Section 5.8.4 includes additional analysis of the potential cumulative impacts on birds, including displacement, disturbance, loss, or conversion of habitat, and injury and mortality. The analysis identifies the Atlantic Flyway as the likely area of potential cumulative impacts. Significant adverse cumulative impacts on birds from development and operation of offshore wind farms are not expected due to the application of avoidance and minimization measures detailed in Exhibit 4-2 and because impacts are expected to occur at an individual level, not at a population level.
South Shore Audubon	1-2	Further, the Cumulative Impacts section concludes that significant adverse impacts to marine mammals and sea turtles are not expected. This conclusion is premature, especially after the document recognizes the threats of collisions and noise, etc. on sensitive populations. The case of the Northern Right Whale is particularly dire, since no calves were found in the last year. The DGEIS lists federally endangered and threatened species occurring within the OCS for which the area provides critical	The Commission recognizes the importance of the sensitive species and habitats and the particular sensitivity of North Atlantic right whales. At a generic, non-site-specific level, this GEIS identifies the broad potential impact of the types of activities that could result from the procurement of 2,400 MW of offshore wind energy. As noted in Chapter 4, the design and operation of specific offshore wind projects would be subject to review by multiple federal, state, and local agencies, including those with jurisdiction for protecting sensitive species and habitats. The revised Section 5.8.1 provides additional detail on the status of

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		habitat such as the Northern Right Whale, Loggerhead Sea Turtle, and Piping Plover (Exhibit 3.1). Additionally, it recognizes the 250 New York State Significant Coastal Fish and Wildlife Habitat sites, many of which are located on the shores and bays of Long Island and in the Hudson River estuary. The cumulative impacts on sensitive species and habitats need to be emphasized and analyzed.	North Atlantic right whales and the regulatory framework to support the conclusion regarding impacts. Activities associated with construction and operation of specific offshore wind energy projects would follow consultation with state and federal agencies and comply with the Marine Mammal Protection Act and the Endangered Species Act.
South Shore Audubon	1-3	While the document correctly reinforces the benefits of clean energy on greenhouse gas reduction, public health, workforce opportunities, and the economy, the document omits assessment of the effects of climate change on the infrastructure of OWED, and the effects of rising sea level and more intense storms, such as Hurricane Sandy and the recent series of "bomb cyclones." Vulnerability to terrorist attacks also needs consideration. Nevertheless, with careful planning, we believe OWED can deliver electricity reliably and eliminate the threats of gas leaks and oil spills from infrastructure and tankers.	With regard to the ability of offshore wind energy infrastructure to withstand the effects of climate change, operating experience at the Block Island Wind project and in the North Sea provide indication of the design considerations needed to address the effects of intense storms. Similar to onshore wind turbines, offshore wind turbines automatically shut down when wind speeds reach a prescribed level. This shutdown process occurred at Rhode Island's Block Island Wind Farm during winter storm Stella in March 2018 (DOE 2017). All five turbines operated at full capacity (30 megawatts), except for a brief window of several hours when wind speeds exceeded 55 miles per hour. As noted in the GEIS, the European offshore wind industry started over 20 years ago and currently has over 12,000 MW of offshore wind in commercial operation. This operating history and the regional storm characteristics in the U.S. are considered in the design of current and future offshore wind energy projects. For example, the U.S. Department of Energy, through the National Renewable Energy Laboratory, is funding studies of advanced blade and rotor design for hurricane resilience (NREL 2016). While the risk of a terrorist attack would not be considered a reasonably foreseeable event appropriate to analyze in a GEIS, wind turbine designs, even for offshore projects, consider security as part of design and operation because of the remote locations of the turbines (Brown 2010).

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South Shore Audubon	1-4	We support the DGEIS in its emphasis on appropriate siting and lighting (Exhibit 4.2) to mitigate impacts on birds. Limiting construction to specific times and seasons should be evaluated for birds as well as marine mammals. Often birds and marine mammals take advantage of the same foraging opportunities. We also support the references to the NYSDEC Guidelines for Conducting Bird and Bat Studies for Commercial Wind Energy Projects and Master Plan Birds and Bats Study.	The revised Exhibit 4-2 includes reference to project-specific field surveys to identify avian species in a proposed project area, including their annual, season, and time of day occurrence as the basis for limiting construction to specific times and seasons. Similarly, the revised Exhibit 4-2 includes reference to the development of a project-specific marine mammal and sea turtle survey plan to guide survey activities, including characterization of marine mammal and sea turtle local and regional distribution and density, abundance and habitat use.
South Shore Audubon	1-5	In particular, to minimize impacts on birds and bats, we would like to reinforce the need to evaluate areas and design projects to minimize collisions and habitat loss; consideration of the size of turbines, which are expected to become larger, and their distance from each other; lighting that discourages perching and minimizes disorientation and collisions during migration, especially at night; breeding and foraging areas, and competition created by displacement; and the variation in sensitivity of birds to displacement.	Please refer to the response to Comment 1-4 above regarding baseline surveys and impacts assessment. Exhibit 4-2 identifies the anticipated avoidance, minimization, and mitigation measures for birds and bats, including evaluation of areas of dense bird and bat use, design of offshore wind energy farm/projects to minimize or mitigate the potential for bird strikes, and habitat loss based on the BOEM *Guidelines for Information Requirements for a Renewable Energy Site Assessment Plan* and *Guidelines for Information Requirements for a Renewable Energy Construction and Operations Plan*. Exhibit 4-2 also includes a recommendation for use of low-intensity, radar-controlled strobe lights on turbines and other measures to discourage birds from perching on equipment during turbine operation. A note has been added to Exhibit 4-2 indicating that BOEM is currently drafting Lighting and Marking Guidelines for offshore wind developments; these draft guidelines will include stakeholder outreach prior to finalization. Section 5.2.4.1 of the GEIS addresses the potential for displacement from migrating, breeding, foraging, and nesting areas due to construction activities and potential competition at alternative foraging sites. Section 5.2.4.1 also discusses habitat disturbance,

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			including the barrier effect potentially created by wind turbines, and the impact of that disturbance as being dependent upon siting, distance between wind turbines and migratory flight paths and the distance to suitable foraging areas.
South Shore Audubon	1-6	Further, the creation of new benthic and fish communities by OWED converting open water to reef-like habitat also produces the potential for collisions with infrastructure and vessels by birds and marine mammals attracted to such communities.	Studies have concluded that the conversion of open water to reef-like habitat is more likely to create a positive, not negative, overall effect (Slavik et al. 2017). As noted in the Goodale report, *Offshore Wind Energy Development and Birds in New York: Managing Risk and Identifying Data Gaps*, cited in Comment 1-7, the creation of hard substrate at turbine foundations represent less than 5% of an offshore wind farm.
South Shore Audubon	1-7	In sum, we are optimistic about being able to support specific OWEDs that are planned for areas chosen by NYSERDA and/or BOEM, provided that they undertake the most complete wildlife studies, especially bird studies. Monitoring must be done during the entire life of any OWED, and if negative impacts do indeed occur, they must be mitigated in some meaningful way. We recommend that the DGEIS incorporate these points about monitoring and mitigation as addressed in Wing Goodale's report, Offshore Wind Energy Development and Birds in New York: managing risk and identifying data gaps. Goodale's report was produced for the South Shore Audubon Society and New York City Audubon with a grant from the Moore Charitable Foundation and National Audubon Society and is available at http://www.ssaudubon.org/pdfs/Offshore-Wind-Energy-Development-and-Birds-in-NY.pdf	The monitoring and mitigation measures included in the GEIS primarily reflect precedents set by BOEM as the issuer of commercial wind energy leases in the OCS, as well as measures implemented at other offshore wind farms. BOEM's *Guidelines for Providing Avian Survey Information for Renewable Energy Development on the Outer Continental Shelf* discusses post-construction monitoring requirements (BOEM 2017). Goodale's points regarding monitoring and mitigation are consistent with BOEM's guidelines, and his points are largely included in both the *Guidelines for Providing Avian Survey Information for Renewable Energy Development on the Outer Continental Shelf* and *Guidelines for Information Requirements for a Renewable Energy Construction and Operations Plan.* The BOEM guidelines include a focus on micro-siting and macro-siting through the evaluation of areas of dense bird use and the design of projects to mitigate the potential for bird strikes, minimizing risks of collision through the use of strobe

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			lights and other measures, and collecting baseline data to identify avian species occurrence and abundance in a proposed project area. Lastly, Goodale advocates for compensation of adverse effects at a project site. Compensation of potential adverse effects of future offshore wind developments would be evaluated as part of the agency consultation process with USFWS and NMFS, as outlined in BOEM's *Guidelines for Providing Avian Survey Information for Renewable Energy Development on the Outer Continental Shelf*.
Alice Sokolow	2-1a	August 2016, the NY PSC adopted the CES. Eighteen months later, NYSERDA filed a report on OFFSHORE WIND. The Options Paper for 2.4 MW of Offshore Wind was stated as a SEPARATE ACTION from RES and ZEC. The determination of the PSC upon RES plus CES and ZEC did NOT consider a STANDALONE procurement of offshore wind at a 2.4 MW scale. The title of the GEIS should reflect Standalone Offshore Wind projects. 1. The GEIS focuses on the stand alone wind and the NO Alternative Option, but does not address the impacts upon the current approved RES, CES or ZEC. Nor does the GEIS address what has the maximum positive effect without destroying the marine and bird environment. a) What percentage of offshore wind should be stand alone and what percentage should be implicated in the adopted CES? RES? ZEC?	As noted, the Commission issued an Order Adopting a Clean Energy Standard (CES) in August 2016. In the CES Order, the Commission recognized the development of offshore wind generation as one of numerous avenues required to achieve the State's renewable energy goals. The Commission issued its Supplemental Environmental Impact Statement in May 2016 ("2016 SEIS") for the implementation of a Large-Scale Renewable Program and a CES. The 2016 SEIS examined a least-cost plan of annual incremental renewable capacity additions needed to meet the "50 by 30" goal, including multiple size categories of land-based wind; utility-scale solar; upgraded hydroelectric facilities; retrofitting non-powered dams; offshore wind; anaerobic digestion; and additional biomass-source generation. This GEIS examines the procurement of 2,400 MW of offshore wind energy by 2030. As stated in Section 1, the offshore wind procurement contemplated by the Offshore Options paper is a separate action and procurement program from the Renewable Energy Standard (RES) or the Zero Emission Credit (ZEC) programs previously approved by the Commission. The environmental review conducted for the Commission pursuant to the "Reforming the Energy Vision" (REV) proceeding and the CES, did consider the

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			impacts of offshore generation and where relevant the information contained in those documents is also incorporated herein. However, the previous environmental reviews did not contemplate a standalone procurement of offshore wind at the scale now being proposed, necessitating the development and consideration of this draft GEIS. All output procured from OSW would be treated separately as a distinct program, and would not be used to satisfy compliance with the RES LSE annual REC obligations. However, the renewable generation from both the RES and OSW would be counted toward achievement of the "50 by 30" goal. The ZEC program deals only with the output from at risk nuclear generation and is not impacted by the procurement of OSW. In Chapter 6 of this GEIS, the Commission identified the No Action alternative of not implementing the procurement of 2,400 MW of offshore wind energy by 2030. The No Action alternative likely would result in less potential development of offshore wind energy, and perhaps less diversity in generation type in the State's renewable generation portfolio. In connection with that reduction, there could be greater or fewer potential impacts on the environment, depending on the other types of renewable energy sources that ultimately would be used under the No Action alternative to achieve the "50 by 30" goal.

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Alice Sokolow	2-1b	What will the competitive consequences be?	There may be competitive consequences to the proposed offshore wind (OSW) procurement goals, both to fossil fuel generators as well as other renewable resources. The NYISO uses a "security-constrained economic dispatch" methodology to determine the least-cost option of producing electric energy to meet the statewide load. OSW resources have no fuel costs in producing electricity; therefore, according to NYISO rules, such generation is usually dispatched ahead of higher-cost resources such as natural gas generators. Other renewables resources with higher operating costs than OSW may also be impacted. New York State's OSW Options Paper evaluates the effect on other renewables, with mostly onshore wind and solar projects being reduced with the addition of 2,400 MW of OSW. Nevertheless, large amounts of onshore wind and solar are still needed to meet the aggressive "50 by 30" goal.
Alice Sokolow	2-1c	What are the potential impacts upon reliability? Wind is intermittent, what will its backup be?	The NYISO ensures the reliability of the bulk power system in the State. Before resources are allowed to interconnect into the bulk power grid, studies are completed to evaluate the effect on reliability. Each OSW development would be subject to such investigation. If upgrades to the grid, such as substation enhancements, additional balancing resources, or storage, are needed, the NYISO requires the upgrades before interconnection is allowed.
Alice Sokolow	2-1d	When multiple renewables are generating, who supersedes whom? What happens to the excess energy? What is the economic impact? Are there PPA's? Will this have a Bonneville Effect upon the ratepayers?	See previous response to Comment 2-1b concerning security-constrained economic dispatch. Renewable resources such as hydro, wind, and solar energy have no fuel costs and are selected in wholesale market auctions to operate more frequently than older, and potentially less efficient, fossil-fueled units. Purely economic questions, such as the determination of what procurement mechanism is needed, such as a PPA or OREC, is being considered separately in the PSC proceeding and is not an

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			appropriate subject matter for the GEIS. The OSW Options Paper evaluates ratepayer costs for each procurement option evaluated. It is unclear what the reference to the "Bonneville Effect" means, however when a large number of new renewable resources are deployed in areas with pre-existing low-cost renewables such as hydro plants, dispatch rules may prevent the preexisting resources from being deployed. However, the effects of the OSW deployment in New York would most likely be felt downstate where energy prices are high and few renewable resources are deployed due to, among other things, population densities.
Alice Sokolow	2-1e	Are the renewable credits for this standalone bundled or unbundled? Sold out of state?	See previous response to Comment 2-1d. The type of procurement mechanism and implementation details for OSW are being evaluated separately in the PSC proceeding and are not appropriate subject matters for this GEIS.

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Alice Sokolow	2-1f	How does this impact other renewable energy like Hydro Quebec?	See previous response to Comment 2-1d. Low-cost hydroelectric generators like Hydro Quebec are generally dispatched before higher-cost resources, but transmission congestion complicates its import into high-cost areas such as New York City, where much of the OSW is likely to be deployed. Therefore, OSW may likely decrease congestion and mitigate the need to deploy new transmission lines since the resources would be close to load. Assessment of potential competition with a particular energy provider is beyond the scope of SEQRA review.
Alice Sokolow	2-1g	How does this impact the future Champlain Power Express?	See previous response to Comment 2-1f regarding Hydro Quebec. The Commission granted the Champlain-Hudson Power Express transmission project an Article VII Certificate in 2013. To date, the Commission has not received compliance documents, including Environmental Management and Construction Plans, as pre-construction requirements. No firm date for advancing construction of that facility has been provided. The effect on the NYS Clean Energy Goals of development of OSW procurement would be enhanced by the additional import of 1,000 MW of hydro-electric power from Hydro-Quebec via the Champlain-Hudson Power Express project. In addition, the NYISO evaluates the need for new transmission lines, and if the OSW procurement moves forward, such resources would be incorporated into its planning process.
Alice Sokolow	2-1h	North South Transmission Line https://www.utilitydive.com/news/nypa-proposes-rebuilding-north- south-transmission-lines-to-bolster-renewabl/520809/	See previous response to Comment 2-1f regarding Hydro Quebec and Comment 2-1g regarding the Champlain Power Express.

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Alice Sokolow	2-1i	Where is the evaluation of balance for all of the above?	The NYSIO's Comprehensive System Planning Process, which is approved by the Federal Energy Regulatory Commission, prepares for the impact of expected changes in supply and demand of power on the reliable operation of the New York transmission system. The analyses, evaluations, and forecasts produced by the NYISO's system and resource planning activities assist regulators and policy makers, as well as market participants, as they plan for future activities.
Alice Sokolow	2-1j	Where is the evaluation of other Alternative renewable resources like wave, floating turbines, and local solar.	Alternative renewable energy technologies were evaluated in the 2016 SEIS. The 2016 SEIS examined a least-cost plan of annual incremental renewable capacity additions needed to meet the "50 by 30" goal, including multiple size categories of land-based wind; utility-scale solar; upgraded hydroelectric facilities; retrofitting non-powered dams; offshore wind; anaerobic digestion; and additional biomass-source generation. Although the 2016 SEIS did not examine all potential renewable energy technologies, it also does not exclude resources that may become available for large-scale use in the future. This GEIS specifically evaluates the procurement of 2,400 MW of offshore wind energy and a No Action alternative involving a different mix of renewable energy sources.
Alice Sokolow	2-2	2. Current Generic Existing problems with offshore wind not addressed or not thoroughly addressed in this GEIS. a) Corrosion and Offshore Wind https://cotes.com/wp-content/uploads/2014/09/CotesWindBooklet_Online.pdf (1) Wind turbine parts- 5 years verses 20 years (2) Transmission – sometimes months to find source of problem http://pmiind.com/cable-issues-undermining-offshore-wind-success/	The Commission recognizes the importance of long-term operation of offshore wind projects to achieve the "50 by 30" goal. As noted in Chapter 4, development of offshore wind projects undergo review by multiple federal, state, and local agencies, including those with jurisdiction for operation and maintenance. As described in Section 5.1, the operating life of an offshore wind farm ranges from 20 to 25 years, although components of the facility may require periodic service and replacement as a result of the effects of corrosion. Section 5.1 also acknowledges that operation includes routine maintenance activities, periodic inspections and servicing, and as-needed repairs. In addition,

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			Guidelines for Information Requirements for a Renewable Energy Construction and Operations Plan indicates that offshore wind farm developers must provide a schedule for all construction activities as well as inspection and maintenance activities throughout the life of the project, including all cables and power lines.
Alice Sokolow	2-3	3. Safety- a) Setbacks from turbines for commercial boats, recreational boats as well as impacts upon water transportation and traffic (1) Fall Zones (2) Runaway Zones (3) Noise and Hearing protection or distance (potential for 106 DB near base) (4) Grounding b) Distance between turbines for transportation and RESCUE by water and air and cost of training for Emergency Response	The Commission recognizes the importance of design and operating procedures to ensure safe operation of commercial and recreational vessels and offshore wind projects. At a generic, non-site-specific level, this GEIS identifies the broad potential impact that could result from the types of activities potentially associated with the procurement of 2,400 MW of offshore wind energy. As noted in Chapter 4, design and operation of specific offshore wind energy projects are subject to review by multiple federal, state, and local agencies, including those with jurisdiction for design and operation. Exhibit 4-1 identifies the regulatory framework for navigational safety, including the role of the U.S. Coast Guard. Section 5.3.2 explains that the U.S. Coast Guard evaluates safety measures on a project specific basis. The Shipping and Navigation Study of the New York State Offshore Wind Master Plan, which is incorporated by reference into the GEIS, includes a greater discussion of possible safety measures to reduce the risk to marine traffic.
Alice Sokolow	2-4	4. Array of turbines a) Safe corridors- minimum safe zone plus fall and runaway zones b) spray and Wake Effect http://www.envision-energy.com/wp- content/uploads/2017/06/Field-test-of-wake-steering-at-an-offshore-wind- farm.pdf www.mdpi.com/1996-1073/6/2/696/pdf	See response to Comment 2-3.

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Alice Sokolow	2-5	5. Ideal Depth of Offshore Wind and transmissions cable verses negative impact upon marine life vs other renewable options.	At a generic, non-site-specific level, this GEIS identifies the broad potential impacts that could be caused by the types of activities that could result from the procurement of 2,400 MW of offshore wind energy. As noted in Chapter 4, design and operation of specific offshore wind projects are subject to review by multiple federal, state, and local agencies, including those with jurisdiction for design and operation. A direct comparison of the potential impacts of an offshore wind transmission cable with an onshore transmission line could only be made with site-specific and project-specific information, as the relative impact would be highly dependent on site selection. However, the generic assessment of potential impact from new offshore wind energy development in Chapter 5 accounts for impacts associated with offshore transmission cables, and in Chapter 6 of this GEIS, the No Action alterative considers the consequences of not procuring of 2,400 MW of offshore wind energy and the potential for less development of offshore wind energy, and potentially greater or fewer impacts on the environment, depending on the other types of renewable energy sources deployed. New text included in Chapter 6 identifies the types of impacts that may be associated with onshore transmission cables.
Alice Sokolow	2-6	6. Homeland Security and interference with radar	As noted in Chapter 4, design and operation of specific offshore wind projects are subject to review by multiple federal, state, and local agencies, including those with jurisdiction for design and operation. With respect to homeland security and interference with radar, site-specific evaluations would occur early in the development process. During site-specific planning, placement of wind turbines would avoid known obstacles and conflicts with existing uses, such as navigational aids and military

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			practice areas. As noted in Exhibit 4-2, the Federal Aviation Administration and the U.S. Coast Guard must be consulted with respect to offshore wind energy projects.
Alice Sokolow	2-7	7. Atlantic Ocean's Environment- http://sites.nicholas.duke.edu/oceanenergy/offshore-wind-and-potential-wildlife-impacts-in-the-atlantic/	The Duke University *Offshore Wind and Potential Wildlife Impacts in the Atlantic* article identifies the need to conduct site-specific studies to understand the potential environmental risks associated with offshore wind development, and the need for mitigation measures to help reduce those risks. As noted in Section 4.2, the required avoidance, minimization, and mitigation of potential environmental impacts from future offshore wind development would occur at a site-specific level. As part of the permitting process for any specific offshore wind energy development, federal and state laws and regulations require the developer to consult with the appropriate agencies to ensure that project-specific desktop and field surveys are undertaken, and that best management practices are employed.
Alice Sokolow	2-8	There are major omissions of the GEIS that will impact the environment, ratepayers and the NY Energy Plan. The solution to the environmental impact would be an offshore certification of windfarm PROJECT by an independent engineer with a mechanism for clawback for NYS financial loss just like the IDA's are now required to do. As to NYS Energy Plan, RES, CES and ZEC, an independent professional reevaluation is in order to maximize the benefit and not negatively impact the ratepayer nor pay for not generation in a PPA.	The effects of the proposed procurement on electricity rates is not within the scope of this GEIS. However, the Commission anticipates that projects selected as a result of an offshore wind solicitation would be compensated based on actual production. If a project does not deliver energy per the terms of its contract, meaning the project either underperforms or is not built, then New York will not be exposed financially. The State would pay for offshore wind energy once that energy is actually produced and delivered to the New York Control Area.
The City of New York, Department of Citywide Administrative Services, Division of	3-1	It is the City's understanding that those future support facilities and other infrastructure necessary for the potential OSW projects referenced in the DGEIS that would be located within the City have not been specifically identified at this stage, and therefore it is unknown what actions the City would need to take for their development and approval. The City notes that the	At a generic, non-site-specific level, this GEIS considered both a broad geographic area and specifically New York State. The Commission agrees that future support facilities and other infrastructure necessary for potential offshore wind energy projects may be located within New York City and would also need to be evaluated when a specific project is proposed.

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Energy Management		Commission affirmatively indicated in the DGEIS that environmental review would be conducted for future OSW generation and/or transmission projects at the time these are proposed, and that these would address all relevant environmental impacts at a site-specific level, which would necessarily include any impacts within the City.	
The City of New York, Department of Citywide Administrative Services, Division of Energy Management	3-2	The City would like to note as well that the Commission may not have met all the procedural requirements under the State Environmental Quality Review Act ("SEQRA:" Article 8 of the State Environmental Conservation Law) when it completed the DGEIS. These requirements include, but are not limited to, the non-issuance of an Environmental Assessment Form and the lack of full inclusion of information about specific sites in the City that may be impacted by potential OSW projects, as identified in the Offshore Wind Master Plan and Offshore Wind Policy Options paper developed and issued by the New York State Energy Research and Development Authority ("NYSERDA").	The Commission complied with all required procedures under the State Environmental Quality Review Act (SEQRA). The regulations implementing SEQRA provide, at 6 NYCRR § 617.6(a)(4), that the requirement to prepare an Environmental Assessment Form may be waived by the lead agency if a draft EIS is prepared, as is the case here. As this is a Generic EIS, evaluating the proposed procurement of 2,400 MW of offshore wind energy, and not a particular wind energy project, site-specific information and analysis of site-specific impacts is premature. Evaluation of site-specific impacts occurs if and when specific projects are proposed, under SEQRA or Article VII of the Public Service Law, in the latter case if impacts within the City of New York would result from a transmission facility project. The GEIS incorporates by reference relevant portions of the Master Plan, which, as the comment notes, identifies locations within the City where future offshore wind energy projects may locate facilities. However, the GEIS also states that "the Commission at present is unable to assess environmental impacts that are likely to occur at any particular location, or otherwise conduct a project-specific or site-specific environmental review."

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The City of New York, Department of Citywide Administrative Services, Division of Energy Management	3-3	The City also thinks the Commission should indicate whether it intends to conduct scoping for OSW projects.	At this time, the Commission cannot predict whether it will act as the SEQRA lead agency for the further environmental review of any specific future offshore wind energy projects, as the state or local approvals required for such a project may vary. Jurisdiction would most likely relate to power procurement or an Article VII proceeding for a transmission facility. Article VII proceedings are exempt from SEQRA review but provide other opportunities for public participation. If the Commission's role is limited to procurement for a project that requires other approvals subject to SEQRA, it is likely another entity could act as lead agency and determine whether to undertake scoping. Given the jurisdictional limits of New York State waters, OSW projects would be subject to federal environmental reviews under NEPA, rather than SEQRA provisions, as identified elsewhere in the GEIS. Review of specific related actions, other than transmission lines under Article VII, within New York State or New York City jurisdiction would be subject to SEQRA or CEQRA reviews, accordingly, depending on location.
The City of New York, Department of Citywide Administrative Services, Division of Energy Management	3-4	Therefore, the City reserves its right to participate in all future environmental review when site-specific projects are identified so that all potential significant environmental impacts that are within the City are addressed and properly mitigated. The City expects the Commission, as well as the State Department of Public Service as the identified lead agency in the DGEIS, to coordinate with the City and all other interested agencies in the fullest manner possible under the requirements of SEQRA once such projects are identified and specific environmental review commences. Potential impacts to be studied include those related to the construction and operation of transmission lines and substations for OSW projects that make landfall within the City and any impacts created by OSW supply chain activities (e.g.	See previous response to Comment 3-3.

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		manufacturing, assembly, and staging that could occur along the City coastline).	
The City of New York, Department of Citywide Administrative Services, Division of Energy Management	3-5	In summary, the City strongly supports the State's efforts to develop OSW energy and would welcome the environmental, economic, and job creation benefits associated with the program. In order for the OSW program to be as successful as possible, full environmental review and assessment must be conducted before decisions can be made concerning specific projects and impact mitigation.	Comment noted.
Kate Kremer	4-1	The benefits and risks are not clearly understood and have not been adequately researched and studied. New York State's offshore wind proposal continues to speak in general terms about benefits without placing the funding and time into studies of what the plan means in terms of ecosystems, energy production and ratepayer cost. I do appreciate the listed attempt to analyze the wind energy goal of 2400 MW instead of looking at a project by project analysis.	The purpose of this GEIS is to analyze, in general and conceptual terms, the manner in which the State may fulfill its goal of procuring 2,400 MW of offshore wind energy. Specifically, this GEIS examines potential impacts to environmental resources within a broad geographic area from the procurement of 2,400 MW of offshore wind energy. Developers of any resulting offshore wind energy projects, and agencies with approval jurisdiction, would further assess the potential impacts on environmental resources during the pre-construction planning and analysis phase, when project-specific activities have been identified. The studies conducted as part of New York State's Offshore Wind Master Plan provide a more detailed analysis of the environmental benefits and risks of potential offshore wind development within the waters offshore of New York and New Jersey (e.g., Birds and Bats Study, Marine Mammals and Sea Turtles Study). These studies can be accessed at https://www.nyserda.ny.gov/All-Programs/Programs/Offshore-Wind/New-York-Offshore-Wind-Master-Plan.

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			With respect to energy production and ratepayer cost, while outside of the scope of this GEIS, the Commission is seeking input from stakeholders on the Phase I procurement and contracting options for offshore wind energy, including those identified by the NYSERDA in the "Offshore Wind Policy Options Paper," filed as part of this case number.
Kate Kremer	4-2	However, the overall analysis is not sufficient in several areas including wildlife and alternatives. Missing from this GEIS is a serious and scientific look at alternatives to industrial offshore wind to meet the 50 by 2030 goal. The environmental risks of this sized effort are substantial especially in that they are unknown when it comes to birds. It is hard to adequately describe the size of this plan. The turbine heights are getting taller, blades are longer and this means they need to be placed farther apart. This is massive. Birds are under stress in our world. Yes, climate change is one of those stresses. But a project that places unknown quantities of birds in harm's way when other options are available is not reasonable. It is both in the lack of means to track the birds – in life and in their death from wind turbine collision – and in terms of careful and thorough analysis of alternatives that this GEIS falls short. There are serious problems with being able to accurately anticipate the potential harm to birds. There is no method for accurately determining the flight patterns of birds over particular areas of water and there is absolutely no method for tracking the deaths. Until this has been rectified there is no method of determining accurately the environmental costs.	See previous response to Comment 1-4 regarding project-specific field surveys to identify avian species in a proposed project area, including their annual, season, and time of day occurrence as the basis for limiting construction to specific times and seasons. As discussed in BOEM's *Guidelines for Providing Avian Survey Information for Renewable Energy Development on the Outer Continental Shelf* (BOEM 2017) referenced in Exhibit 4-2, field surveys required for any specific project would use observers on boats and airplanes or through the use of high-resolution digital aerial surveillance and photography to identify avian species in a proposed project area. The new Section 5.8.4 includes additional analysis of potential cumulative impacts on birds, including displacement, disturbance, loss or conversion of habitat, and injury and mortality.

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Kate Kremer	4-3	I support the comments of the South Shore Audubon Society and its concern regarding cumulative impacts and limited studies that are referenced in the report. Honestly, the area of this proposed plan is so large that there must be significant attention to migratory movement and multiple studies over numerous years by multiple unbiased and peer reviewed sources. This plan is not talking about 10 turbines but 600 or more. And if the goal is to generate 2400 MW (as opposed to simply the capacity) then there will likely be over 1000 turbines needed.	See previous response to Comment 1-1.
Kate Kremer	4-4	When the offshore wind plan is compared to smaller more localized projects it becomes questionable. Looking at no action as a considered alternative is reasonable however, the method for analyzing what this would mean is flawed. Limiting analysis of "other options" to onshore wind projects or solar projects leaves out other forms of renewable energy. National Renewable Energy Lab has studied rooftop solar and found that New York State has the potential to meet 40% of its electrical generation in this manner. https://www.greentechmedia.com/articles/read/nearly- 40-of-us-electricity-could-come-from-rooftop-solar#gs.CV7jMmg Why has this option not been reviewed? Why is it not the first option for renewables? 40% would take us well above the 50% by 2030 plan. I am concerned that this option has not been analyzed because the financial ownership would be localized and there could be fewer large corporate players/winners. Who is making energy decisions in New York? Who is benefiting? Killing unknown quantities of birds, or causing them further stress by diverting their migration, to "save" them from climate effects only works as a reasonable solution if there are no less burdensome alternatives. This has not been determined. Rooftop solar combined with geothermal and a substantial statewide	Rooftop solar energy would not be sufficient to fulfill the State's "50 by 30" goal on its own. Prior analysis in the CES shows that multiple types of renewables are needed to meet the State's goal, and offshore wind energy fulfills a portion of the entire need. The analysis considered a portfolio of large-scale renewables that was developed using a supply curve model. The model developed a least-cost plan of annual incremental renewable capacity additions needed to meet the target, based on a projection of demand growth, market data, cost estimates, and other factors. The model considered several types of renewable resources individually, including multiple size categories of land-based wind, utility-scale solar, upgraded hydroelectric facilities, retrofitting non-powered dams, off-shore wind, anaerobic digestion, and additional biomass-source generation. The model found that the offshore wind energy projected to be developed under the CES was anticipated to occur downstate, along the Atlantic Ocean, in Zones J (NYC) and K (Long Island), and would be approximately 400 MW under the fixed REC scenario that was eventually approved by the Commission. Large- and small-scale renewable energy projects such as rooftop solar installations are important components of the New York State Energy Plan, and specifically Reforming the Energy

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		effort to reduce energy consumption (which has not occurred because most ratepayers have no idea about the NYSERDA monies available to them!) is a win for ratepayers, for municipalities, for small businesses and for wildlife. Those who are not winners are large corporate players.	Vision. The State has adopted an aggressive policy to incentivize rooftop solar under the NY-SUN program, but that alone would not allow the State to meet its aggressive renewable energy goals. The location of offshore wind energy is also important since additional costs to build transmission lines that would allow renewable energy from upstate to be used downstate may be avoided. Downstate has little ability to host other types of large-scale renewable projects due to population densities. Thus, while the State hopes that rooftop solar energy constitutes part of its renewable energy portfolio, it is not a viable alternative to the proposed procurement.
Kate Kremer	4-5	When carefully analyzing alternatives such as rooftop solar, included must be the localized nature of this energy that minimizes the transmission needs. Transmission lines are some of the most damaging aspects of these energy projects for birds, bats and raptors.	See response to Comment 4-4 with respect to rooftop solar energy as an alternative to the procurement of 2,400 MW of offshore wind. With respect to transmission lines, the generic assessment of potential impact from new offshore wind energy development in Chapter 5 accounts for impacts associated with offshore transmission cables. As discussed in Chapter 6, impacts of new onshore transmission lines that could be associated with large-scale renewable energy development may include permanent clearing and tree removal in transmission corridors, as well as temporary disturbances during construction. The revised text in Chapter 6 explains that impacts of grid solar and onshore wind energy development may result in removal of habitat to create open space for facility structures and transmission lines.

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Kate Kremer	4-6	Additionally, there is not sufficient analysis of the role that backup generation must play in this offshore plan. Where will the backup generation come from? Are ratepayers essentially paying twice for their energy? How do the environmental costs of the backup generation impact the overall climate benefits of this project?	NYSERDA's Offshore Wind Policy Options Paper evaluated the ratepayer impacts of the procurement options discussed. These purely economic issues are beyond the scope of this GEIS. As previously indicated, the New York Independent System Operator ensures the reliability of the bulk power system in the State. Before resources are allowed to interconnect into the bulk power grid, studies are completed to evaluate the effect on reliability. If upgrades to the grid such as substation enhancements, additional balancing resources, or storage are needed, the New York Independent System Operator requires the developer in most cases to pay for the upgrades before interconnection is allowed. At the time a specific project is proposed, the environmental impacts of any associated back-up generation would be studied. The New York Independent System Operator (NYISO) acknowledged that historical, predictable demand patterns that characterized infrastructure planning over much of the last century are shifting…and the NYISO is at the center of this changing landscape (NYISO 2017a). The NYISO completes a full review of reliability every two years and prepares a Reliability Needs Assessment and a Comprehensive Reliability Plan (NYISO 2017b), designed to identify and address reliability needs. The NYISO addresses the retirement of nuclear and coal facilities, the integration of grid-tied solar, onshore and offshore wind, as well as distributed energy resources and the associated reliability challenges.

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Kate Kremer	4-7	Finally, I am concerned with lack of comments on this GEIS. I request that the DPS reach out to stakeholders and offer additional time for comment. The people of NY State are generally engaged and lack of such engagement for this is a red flag that notice and outreach was not effective.	On April 17, 2018, the Commission extended the deadline for written comments on the Draft GEIS from April 9, 2018, to the close of business on May 9, 2018.
Nassau Hiking and Outdoor Club	5-1	Chapter 6 Alternatives Considered, states, "Such a No Action scenario would require more grid solar and onshore wind energy development, which would likely result in greater potential land use and other land-based environmental impacts." Evidence clearly indicates that there is much greater political and public resistance to solar farms located on Long Island than there is to offshore wind farms. And onshore wind farm proposals would meet with the same resistance as solar farm proposals have for the same reasons. Last year, the NYS Legislature passed a bill to protect nearly 1200 acres of Pine Barrens land that was slated for clear-cutting in order to build solar farms. Governor Cuomo vetoed this bill but has included around 800 acres in his budget proposal to protect land surrounding the shuttered nuclear power plant. Whatever pristine acreage might eventually be lost in Suffolk County to make way for solar and onshore wind farms would become a permanent loss of habitat that currently serves to protect species and groundwater, acts as a carbon sink and conserves a way of life that residents value. People want to live near open space because of the aesthetics and recreational opportunities it provides. They also know it contributes to their home property values. Some solar farms can and should be built on reused land such as Brookhaven's landfill, but removing hundreds of acres of pristine forest to build enough solar farms to meet NYS's renewable energy goals is too high an environmental price to pay.	Chapter 6 acknowledges that the No Action scenario would likely result in more grid solar and onshore wind energy development, and associated greater potential land use and other land-based environmental impacts. The revised text in Chapter 6 explains that grid solar and onshore wind energy development may result in removal of habitat to create open space for facility structures and transmission lines.

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		Conversely, the negative environmental impacts associated with building offshore wind farms are largely temporary, and, in the long run, habitat will actually increase because turbine foundations will become artificial reefs, much like ship wrecks become artificial reefs. Plant and animal marine species thrive on ship wreck reefs, and divers can always count on observing numerous species on and in every crevice of a wreck.	
Nassau Hiking and Outdoor Club	5-2	The promise of offshore winds can only come to fruition through careful planning. We urge careful study regarding how turbines might impact birds and bats so that such impacts can be mitigated. Thermal video is a promising new technology that provides for both night observations and limited visibility daytime observations. ThermalTracker software allows for superhuman monitoring that could make a big difference for the protection of birds and bats. We urge you to discuss the consideration of this technology in your Final GEIS. Finally, regarding the study of impacts on birds, we urge you to fully consider the cumulative impacts on birds by potential offshore wind projects being considered by several Atlantic coast states throughout the Atlantic Flyway.	The Commission recognizes the importance of bird and bat species and the need for mitigation measures to reduce potential impacts from offshore wind development. As noted in Section 4.2, the identification of required avoidance, minimization, and mitigation of potential environmental impacts from specific future offshore wind developments would occur at a site-specific level. As part of the permitting process for any specific offshore wind energy development, federal and state laws and regulations require the developer to consult with the appropriate agencies to ensure that project-specific desktop and field surveys are undertaken, and that best management practices are employed. The revised Exhibit 4-2 identifies the need to conduct project-specific field surveys to identify avian species in the proposed project area, including their occurrence (e.g., annual, season, day and night) and to establish pre-construction baseline data that would allow bird abundance and distribution to be measured in the post-construction period, as discussed in BOEM's *Guidelines for Providing Avian Survey Information for Renewable Energy Development on the Outer Continental Shelf*. See response to Comment 4-2 regarding the new Section 5.8.4 for additional analysis of the potential cumulative impacts on birds.

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Nassau Hiking and Outdoor Club	5-3	The Wind Master Plan's Marine Mammals and Sea Turtles Study discusses the use of historical and contemporary surveys and tagging to help determine the best siting for wind farms. However, it acknowledges that even with this data it is still challenging to predict whether marine mammals and/or sea turtles could be displaced by turbine infrastructure. Consequently, more data from other specific sources is needed, but this was not adequately addressed in your DGEIS. Could underwater cameras be installed and monitored during both construction and operation of the windmills?	As noted in Section 4.2, the identification of required avoidance, minimization, and mitigation of potential environmental impacts from specific future offshore wind developments would occur at a site-specific level. As part of the permitting process for any specific offshore wind energy development, federal and state laws and regulations require the developer to consult with the appropriate agencies to ensure that project-specific desktop and field surveys are undertaken, and that best management practices are employed. There are many types of monitoring, such as Protected Species Observers and passive acoustic monitoring, that have been used effectively in offshore construction.
Nassau Hiking and Outdoor Club	5-4	While the DGEIS highlights positive impact on human health, it fails to address how wind energy will positively impact the health of wildlife. Clean energy will do much more to benefit wildlife than it will to harm it. The National Audubon Society has concluded that climate change is a grave threat to birds. And certainly the greatest threat to marine life is climate change. Because oceans absorb about a quarter of the CO2 humans produce every year, ocean acidification is currently threatening seashells and plankton, which has ramifications throughout the pelagic food web.	The revised Section 5.7 identifies potential impacts to wildlife from climate change. The Intergovernmental Panel on Climate Change (IPCC) and the U.S. Environmental Protection Agency (USEPA) have stated that climate change is impacting our oceans with increasing overall and surface ocean temperatures, rising sea levels, and ocean acidification (IPCC 2013; USEPA 2016). USEPA has also identified changes in marine species distribution as an indicator of climate change (USEPA 2016). How climate change ultimately impacts wildlife is not clearly defined; however, the success of many species depends on their ability to adapt to these changes.
Nassau Hiking and Outdoor Club	5-5	New York has experienced a foot (30.48cm) of sea-level rise since 1900, due to the expansion of warming ocean water and glacial melt. And, we're locked-in to additional sea-level rise for centuries to come because of heat-trapping greenhouse gases already in the atmosphere. Increased CO2 emissions will only expedite and exacerbate escalating sea level rise. Beyond inundation of low-lying areas and the erosion of our beaches and bluffs, we risk saltwater infiltration of our surface waters and aquifers as well as the possible compromise of low-lying	The Commission agrees that it would be exceedingly difficult to correlate how offshore wind energy might mitigate sea-level rise directly, particularly because offshore wind represents only one component of large-scale renewable energy. At a generic, non-site-specific level, this GEIS identifies the broad potential impacts and benefits that could result from the procurement of 2,400 MW of offshore wind energy. However, we anticipate that the engineering design of new or modified infrastructure would account for projected sea level rise to avoid associated impacts and the potential need for shoreline stabilization.

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		sewage, wastewater, transportation, communication, and energy infrastructure and systems. While it would be difficult to calculate how OWED might mitigate sea level rise, further discussion is warranted in your final GEIS. Moreover, the GEIS states, "Sites along New York Harbor are suitable for many elements associated with offshore wind development, including manufacturing, assembly, and staging activities." How might these ports be impacted by rising sea level over the quarter century lifespan of the turbines? And how could these impacts be mitigated? Might shoreline hardening be required to protect the wind energy infrastructure?	
Nassau Hiking and Outdoor Club	5-6	In and out of Earth's ice ages, the concentration of atmospheric CO2 ranged between 180ppm and 280ppm. And it took thousands of years to change between those states. Astonishingly, it stood at 315 ppm when record keeping began at Mauna Loa in 1958. By 2013, it passed 400 ppm. And in April 2017, the Mauna Loa Observatory recorded its first-ever carbon dioxide reading in excess of 410ppm. Carbon dioxide hasn't reached that concentration in millions of years, but humankind managed this exploitation over the course of a mere two hundred years. Because of our addiction to fossil fuels, emissions have injected inordinate amounts of carbon dioxide into the air. We've engendered a world of heat-trapping greenhouse gases, and totals are climbing ever more rapidly. And our brave, new, carbon dioxide trapping warmer world is melting glaciers even as it warms and acidifies our oceans. Climate change-fueled natural disasters have more than doubled in recent years even as temperatures have soared, and the cumulative cost was over $300 billion in 2017-a new U.S. record. The 1980–2017 annual average was 5.8 events (CPI-adjusted);	Comment noted.

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		the annual average for the most recent 5 years (2013–2017) was about double at 11.6 events (CPI- adjusted). The average U.S. temperature in 2017 was 54.6 degrees F (2.6 degrees F above average), making 2017 the third warmest year in 123 years of record-keeping. In fact, the five warmest years on record for the U.S. all have occurred since 2006. The longer we wait to wean ourselves off fossil fuels, the greater the detrimental consequences will evidence themselves. However, the economic potential of offshore wind energy development and, even more importantly, the potential to alleviate the climate crisis and all its very negative consequences are at hand. While projects must be prudently planned, and the environmental impacts of such projects must be judiciously considered according to State and Federal laws, now is the time to act, to move boldly foreword toward a clean energy future in an expeditious a timeframe as is feasible.	
Nassau Hiking and Outdoor Club	5-7	New York indeed has the potential to become a permanent hub for offshore wind infrastructure that could engender numerous future projects on a grander scale, even further out at sea on floating platforms. 2,400 MW should merely be a minimal, short- term goal in NYS and beyond. The offshore wind project development pipeline includes more than 20 projects totaling 24,135 MW of potential installed capacity.	Comment noted.
NRDC et al.	6-1a	*a. Achieving Governor Cuomo's 2,400 MW by 2030 offshore wind goal is critical to New York's clean energy future* The Draft GEIS makes clear that achieving New York's 2,400 MW offshore wind commitment will reap enormous economic and environmental benefits that far outweigh the costs. Depending on the procurement option, the "GHG reductions alone are approximately equal to the cost of the Offshore Procurement program." (Draft GEIS, pg. 9-5) Along with greenhouse gas	Comment noted.

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		(GHG) emission reductions, offshore wind will also significantly improve air quality and public health in New York City, providing more than $1 billion in reduced healthcare costs, especially in communities disproportionately affected by air pollutants from gas/oil peaker plants (Draft GEIS, pg. 9-5). This is best exemplified by the Long Island Power Authority's approval of the South Fork offshore wind farm and its subsequent decision to cancel the planned repowering of three gas peaking plants. In addition to environmental and public health benefits, establishing New York as a regional offshore wind hub would create thousands of jobs and bring invaluable economic investment to New York's coastal communities. Studies commissioned by the New York Power Authority have shown that a single offshore wind farm could generate total economic activity of $1 billion in sales, 8,700 job-years, and $610 million in wages for New York. Along with the benefits from construction and operation, an early commitment to a pipeline of offshore wind projects would attract a host of supply chain companies, leading to considerable gains in research and development, such as building larger and stronger turbines that would further reduce GHG emissions reductions and project costs. These ancillary benefits would significantly magnify the direct benefits from the projects themselves, further increasing the cost effectiveness of achieving New York's 2,400 MW by 2030 goal.	
NRDC et al.	6-1b	*b. The no-action alternative is worse than suggested* The Draft GEIS identifies the no-action alternative as the only reasonable alternative to the Proposed Action. We agree with this decision in this case. The Draft GEIS goes on to predict, absent a procurement rule (i.e., the Proposed Action), that "the State still expects to achieve its '50 by 30' goal by employing a	The State expects to achieve the "50 by 30" goal through a combination of regulatory programs and market incentives, specifically Reforming the Energy Vision, Clean Energy Fund, and the Clean Energy Standard. The Clean Energy Standard serves as a mechanism to achieve the "50 by 30" goal. The development of the "50 by 30" goal did not initially envision procurement of

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		variety of resources, including offshore wind, in the renewable generation portfolio." (Draft GEIS, pg. 6-1) The Draft GEIS should acknowledge the very real risk that no action at this point would pose to the development of offshore wind along the east coast and to the "50 by 30" goal. A failure to act on PSC's part at this point would have a chilling effect on the prospect of offshore wind development along the entire east coast. At best, the increased perception of regulatory risk would increase the costs of the first wave of offshore wind projects in the U.S. and, at worst, it could lead to the withdrawal of companies and other states from the nascent market. For New York, the notion that a second offshore wind policy will be developed in time to bring offshore wind projects online by 2030 seems unlikely and, while it is possible that offshore wind projects could win competitive procurements later in the 2020's, again it is unlikely that they will come online by 2030. The Governor's commitment to 2,400 MW will provide about one third of incremental generation needed to meet the "50 by 30" goal. As noted in the Draft GEIS, offshore wind may well help reduce the cost of meeting the goal and provide the largest source of renewable energy closest to the largest load centers in the state. Absent offshore wind, meeting the "50 by 30" goal is undeniably more difficult. Failing to meet the renewables component of the Clean Energy Standard goal would mean more air pollution, contributing further to global warming, and regional and local air toxics across the state. It would have a very real human health toll and an impact on the same wildlife and ecosystems that a recklessly de-	2,400 MW of offshore wind energy. The 2016 Supplemental Environmental Impact Statement for the implementation of a Large-Scale Renewable Program and a Clean Energy Standard examined a least-cost plan of annual incremental renewable capacity additions needed to meet the "50 by 30" goal, including multiple size categories of land-based wind; utility-scale solar; upgraded hydroelectric facilities; retrofitting non-powered dams; offshore wind; anaerobic digestion, and additional biomass-source generation. The analysis considered a range of installed offshore wind energy capacity ranging from 400 MW to 1,830 MW. Given the substantial progress in evaluating the environmental, market, and programmatic aspects of offshore wind energy development, the State's strategy maximizes the benefits at the lowest possible cost. As noted, Chapter 6 discusses that the No Action scenario would likely result in more land-based renewable development and in greater potential land-use and other land-based environmental impacts. With respect to transmission lines, impacts may include permanent clearing and tree removal in transmission corridors, as well as temporary disturbances during construction. The revised text in Chapter 6 explains that impacts of grid solar and onshore wind energy development may result in removal of habitat to create open space for facility structures and transmission lines.

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		veloped offshore wind project would directly impact. A potential reduction in air pollution benefits is noted in the Draft GEIS (Draft GEIS, pg. 6-2), but the conclusion is limited since it assumes the "50 by 30" goal is still met. As noted in the Draft GEIS, without the 2,400 MW of offshore wind, we would also need more landbased renewables to try to meet the "50 by 30" goal. The Draft GEIS notes that these would come with increased land-use and potential terrestrial ecosystem impacts (Draft GEIS, pg. 6-2). The potential impacts of greater fossil fuel extraction and combustion should also be noted in the case that the "50 by 30" goal is not met. Finally, even if the Clean Energy Standard renewables goal is met without offshore wind, it will require significantly more transmission to bring a mix of land-based renewables from upstate to downstate. Transmission has its own set of visual and ecosystem impacts.	
NRDC et al.	6-1c	*c. Include birds protected under the Migratory Bird Treaty Act as a "sensitive biological resource"* In addition to federally endangered and threatened species potentially occurring within the OCS (Draft GEIS, Exhibit 3-1), the Draft GEIS includes a list of "[o]ther sensitive biological resources that could exist within the marine environment…" (Draft GEIS, pg. 3-4). We recommend that migratory bird species protected under the Migratory Bird Treaty Act ("MBTA") of 1918 (16 U.S.C. 703-712)4 be specifically included in the list of sensitive biological resources in this section. The U.S. Fish and Wildlife Service has statutory authority and responsibility for enforcing the MBTA; as such, these species must be explicitly considered as part of the federal permitting process (see,	The revised Section 3.2 and Exhibit 3-2 include additional information on birds protected under the Migratory Bird Treaty Act known to occur near the Outer Continental Shelf and within the Atlantic Flyway.

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		Draft GEIS, Exhibit 4-1). Highlighting these species as a sensitive biological resource will also serve to improve correspondence between Section 3 ("Environmental Setting") and Section 4 ("Regulatory Framework and Mitigation of Potential Impacts") of the Draft GEIS.	
NRDC et al.	6-1d	*d. Include marine mammals in the list of "Endangered and Threatened Animal Species Believed or Known to Occur in New York"* In Exhibit 3-2, the Draft GEIS presents a list of "Endangered and Threatened Animal Species Believed or Known to Occur in New York." This list is derived from the New York Natural Heritage Program's "Rare Animal Status List, October 2017." Several marine mammal species noted in the Rare Animal Status List, including federally-listed large whales, may occur in state waters (less than 3 nautical miles offshore) as well as the outer continental shelf ("OCS"; see, Exhibit 3-1). <u>We recommend that endangered and threatened marine mammals evidenced to occur in state waters be included in Exhibit 3-2, or for the rationale for this omission to be clearly explained.</u>	The revised Exhibit 3-3 (formerly Exhibit 3-2) includes the following marine mammals: North Atlantic right whale (*Eubalaena glacialis*), fin whale (*Balaenoptera physalus physalus*), sei whale (*Balaenoptera borealis borealis*), blue whale (*Balaenoptera musculus musculus*), and sperm whale (*Physeter macrocephalus*).
NRDC et al.	6-1e	*e. Accurately represent commercial and recreational fishing activity for the southeast* In describing commercial and recreational fishing activity in the area that could be potentially affected by the Proposed Action, the Draft GEIS asserts that these activities occur to a degree that can be considered "low" and "medium-low" off the Mid-Atlantic coast (i.e., Maryland, Virginia, and North Carolina), relative to the Northeast (Draft GEIS, pg. 3-10, para 2). To support this claim, the Draft GEIS refers to Exhibit 3-4, which "presents the locations of some major commercial and recreational fishing activities on scale of use ranging from very high to low." (Draft GEIS, pg. 3-10, para 2) However, the fisheries data shown in Exhibit 3-4 are limited in both geographic scope and type of	The Commission recognizes the importance of the commercial and recreation fishing industries. The information provided in Chapter 3 describes the marine environment and in Chapter 5 describes potential impacts on a broad geographic area, and where possible, specifically New York State and waters off its shores. Section 5.2.3.1 identifies the Offshore Wind Master Plan Fish and Fisheries Study, which is the source for New York State-related information. The GEIS does not evaluate the extent of the fishing industry throughout the Atlantic coast, but analyzes on a generic, site specific level potential impacts to commercial fishing interests from offshore wind energy development, for example, using information developed for the Master Plan.

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		fishing activity. The data displayed represents vessel monitoring system (VMS) data for the commercial multispecies groundfish fishery for 2011-2014. These data were originally commissioned by the Northeast Regional Ocean Council to describe how New England's commercial fishing industries utilize the region's ocean space. As such, their intention is to characterize commercial fisheries in the Northeast, and should not be used to draw conclusions regarding recreational fishing activities in the region or fishing activity overall beyond this region. With over 300 marine fish species that use New York waters for reproduction and growth, the ocean resources of New York and the wider Mid-Atlantic region are a valuable part of the economy. According to the most recent federal statistics in 2015, 648 million pounds of commercially harvested finfish and shellfish originated from this region, with an ex-vessel value of $512 million. In 2015, New York's saltwater recreational fishing industry supported roughly 8,000 of the more than 37,000 marine recreational fishing jobs in the Mid-Atlantic region. That same year in New York, 3.2 million salt water recreational fishing trips generated $873 million in sales, $376 million in income, and $586 million in value added economic activity. Overall, in 2015 in the mid-Atlantic region, 12.4 million recreational salt water fishing trips generated over $3.5 billion in trip and durable good expenditures. There is no question that fishing, both commercial and recreational, is of high importance, not only in New England and the South Atlantic, but also in the Mid-Atlantic waters that are being considered for generating and transmitting offshore wind energy for purchase by NYS to meet its renewable energy goals.	The revised Section 3.3 contains additional baseline data on commercial and recreational fishing, including speed-restricted vessel monitoring system (VMS) data for the area from Maine to North Carolina. These maps were developed by the Northeast Regional Ocean Council for the Northeast and Mid-Atlantic data portals and include information for commercial fishing areas from Maine to Virginia.

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		The Draft GEIS needs to more accurately characterize and account for commercial and recreational fishing activities for all states in the area of consideration, and particularly the Mid-Atlantic. We recommend the Draft GEIS cite the Mid-Atlantic Regional Council on the Ocean (MARCO) "Human Use Data Synthesis" "Fishing Data" theme product, which represents a synthesis of 15 fishing data layers. We still, however, caution conclusions being drawn for North Carolina based on data products prepared for the Northeast or Mid-Atlantic Data Portals, as the geographic scope of this work extends from Maine to Virginia. We recommend the Draft GEIS source information related to fisheries for southern Mid-Atlantic and southeastern states from alternative data sources, such as the Atlantic Coastal Cooperative Statistics Program (ACCSP).	
NRDC et al.	6-1f	*f. Specify seasonal restrictions for feeding aggregations as a potential mitigation measure* In the summary of potential avoidance, minimization, and mitigation measures for offshore wind development, the Draft GEIS specifies a measure to "[a]void construction activities during species specific migration and breeding periods." (Draft GEIS, Exhibit 4-2) This measure should be expanded to include foraging periods as many species, for example, the North Atlantic right whale, aggregate in high productivity areas to feed, thereby placing them at greater risk of potential impacts during a vital life history behavior.	The revised Exhibit 4-2 includes foraging periods in addition to species migration and breeding activities.
NRDC et al.	6-1g	*g. Include additional potential mitigation measures for birds and bats* In the consideration of potential avoidance, minimization, and mitigation measures for birds and bats (Draft GEIS, Exhibit 4-2), we recommend the Draft GEIS consider additional technological solutions. For example, cameras and thermal imaging technology capable of auto-detecting high densities of birds and	The Commission recognizes the importance of bird and bat species and that mitigation measures required to reduce potential impacts from offshore wind energy development. As noted in Section 4.2, the required avoidance, minimization, and mitigation of potential environmental impacts from future offshore wind development would occur at a site-specific level. As dis-

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		bats, or when specific species of concern are present in the vicinity of a wind energy area, can be used to trigger shut-down of the turbine during high-risk periods. Research has also indicated that the use of white and red lights on turbines may attract or disorient birds, respectively, whereas blue and green lights have been shown to have no observable effect on bird behavior.	cussed in BOEM's Guidelines for Providing Avian Survey Information for Renewable Energy Development on the Outer Continental Shelf (BOEM 2017) referenced in Exhibit 4-2, field surveys would use observers on boats and airplanes or high-resolution digital aerial surveil-lance and photography to identify avian species in a proposed project area. Section 5.2.4.2 states that research shows birds are particularly attracted to red and white lights, increasing the potential for collision risk. However, because Exhibit 4-2 summarizes measures required by regulation or previously developed through agency consultations, it does not include measures to avoid using white or red lights, which have not thus far been employed in an offshore wind energy project. The GEIS notes that BOEM is currently drafting Lighting and Marking Guidelines for offshore wind development and expected to be available for public review in spring of 2018.
NRDC et al.	6-1h	*h. Represent projected increases in species abundance objectively, rather than as "beneficial"* With respect to the impact analysis presented for benthic communities, the Draft GEIS states that, "[d]uring operation, beneficial impacts on benthic communities due to benthic habitat conversion can occur," (Draft GEIS, pg. 5-4) and "[o]ffshore wind energy could also provide a beneficial impact because the turbine foundations would make new surface area available for growth and development of benthic communities." (Draft GEIS, pg. 5-5) While we agree that these activities may result in a change in the benthic community and, in some cases, an increase in the abundance of certain species or in overall diversity, we caution against the Draft GEIS representing these changes as "beneficial," particularly as it is unclear what implications these changes may have on the wider ecosystem. We	The revised Section 5.2.1 refers to the potential "increase" "in benthic communities.

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		recommend that the Draft GEIS remain objective in language used in its impacts analysis (e.g., by using terminology such as "increase," "decrease," and "change").	
NRDC et al.	6-1i	*i. Include potential impacts of injury and mortality from noise for mid- and low-frequency cetaceans* In the analysis of potential impacts to marine mammals from anthropogenic noise, the Draft GEIS states that: "[t]he potential risk of noise-related injury, or behavioral changes from noise, would be highest for high-frequency cetaceans due to their sensitivity to loud, high-frequency noise generated by pile driving." (Draft GEIS, pg. 5-6, para 3, to pg. 5-7) The Draft GEIS, however, does not specifically discuss the potential impacts of anthropogenic noise on mid- and low-frequency cetaceans. The sound pressure levels and frequency range emitted during pile driving activity, and the deployment of certain high resolution geophysical survey equipment, have the potential to cause permanent or temporary auditory injury to mid- and low-frequency cetaceans at relatively near-distances, and could result in behavioral change (e.g., cessation in foraging activity, disruption to social communication, and habitat avoidance) over many miles for the duration of the development activity. This is a pertinent concern for the North Atlantic right whale that, at the current rate of decline, may be functionally extinct in 20 years. For this species, and others also experiencing Unusual Mortality Events along the Atlantic Coast, all potential stressors, including noise, must be minimized to the full extent practicable. We recommend the Draft GEIS explicitly reference the potential impacts of noise from site assessment and characterization, construction, and operations and maintenance, on mid- and low-frequency cetaceans, to ensure that these potential impacts, and related mitigation measures, are afforded full consideration in	As noted, the analysis in Section 5.2.2 focuses on the potential risk of noise-related injury, or behavioral changes from noise, for high-frequency cetaceans due to their sensitivity to noise generated by pile driving. The revised Section 5.2.2.1 includes additional discussion on the potential for impacts of anthropogenic noise on mid- and low-frequency cetaceans.

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		subsequent, project-specific environmental impact statements and assessments.	
NRDC et al.	6-1j	*j. Clarify, and potentially broaden, the definition of "cumulative impacts"* The Draft GEIS defines cumulative impacts as: "two or more individual environmental effects that, when taken together, become environmentally significant or may compound or increase other environmental effects." (Draft GEIS, pg. 5-18, para 2) It is unclear from this definition if it is intended to include the same environmental effect repeated over time (e.g., repeated noise from pile driving impacts) or the same environmental effect taking place in different geographic locations (e.g., pile driving noise taking place at two different wind project sites). We recommend the definition of cumulative impacts be broadened to include: (i) repeated disturbance from the same activity; (ii) the interactions between different types of stressor; (iii) the broader context of multiple wind energy development projects in the area defined by the Draft GEIS; and (iv) any procurement commitments of other East Coast states.	The GEIS and the Consideration of Cumulative Effects (Cumulative Study) prepared for the Master Plan, incorporated by reference into the GEIS, examine potential cumulative impacts from offshore wind energy development as defined in the Council on Environmental Quality regulations implementing the National Environmental Policy Act. The definition of a cumulative impact is the "impact on the environment which results from the incremental impact of [an] action when added to other past, present, and reasonably foreseeable future actions regardless of what agency (federal or non-federal) or person undertakes such other actions" (40 Code of Federal Regulations 1508.7). This definition is consistent with and encompasses the commenter's proposed definition. With respect to "(i) repeated disturbance from the same activity," the GEIS/Cumulative Study consider the potential cumulative impacts of repeated activities such as pile driving, excavation, and vessel traffic. The GEIS/Cumulative Study also consider cumulative impacts with respect to "(ii) interactions between stressors." For example, the GEIS/Cumulative Study consider the potential for displacement due to noise from wind farm construction causing marine mammals to move into areas of higher vessel traffic, such as shipping corridors, increasing the chance of vessel collisions for particularly at-risk species such as the fin whale, North Atlantic right whale, humpback whale, and sei whale. Section 5.8 considers a hypothetical reasonable "worst-case" scenario as far as potential cumulative impacts are concerned, by

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			considering a scenario in which all 2,400 MW of offshore wind energy projects are constructed offshore of New York, which assumes the projects would be in relatively close proximity compared to projects being distributed throughout the marine environment from Maine to North Carolina. The consideration of "(iii) the broader context of multiple wind energy development projects" was evaluated with this "worst-case" scenario. Section 2.3 of the GEIS identifies offshore wind farms under various stages of development from North Carolina to Massachusetts. These projects represent reasonably foreseeable activities within the context of a cumulative impacts analysis, and consideration of 2400 MW of new development to meet New York's goal in the context of known development near other states offers an evaluation of cumulative effects of offshore wind energy development along the East Coast as could result from procurement commitments of other East Coast states.
NRDC et al.	6-1k	*k. Deemphasize the as yet unsupported assumption of avoidance of offshore wind development activities by wildlife* There are a number of statements in the Draft GEIS that imply wildlife (including marine mammals, sea turtles, and fish) will avoid offshore wind development activities and, thus, may experience minimal impacts. Specifically, for marine mammals and sea turtles, the Draft GEIS asserts that: "… there is sufficient alternative habitat available to allow marine mammals and sea turtles to avoid impacts from sensory disturbance and displacement. The overall spatial coverage of 2,400 MW of offshore wind energy would not significantly reduce or modify marine mammal and sea turtle habitat, *as most species will avoid the structures or use other nearby available*	The revised Sections 5.2.2 and 5.2.3 include additional references to scientific literature supporting the anticipated avoidance behavior for marine species, and fish in particular. The potential costs of that avoidance behavior (e.g., energy expenditure, increased predation/competition risk, utilization of a lower quality habitat or food source, stress) would be evaluated in greater depth for specific projects but are acknowledged in Section 5.8.1. As this is a Generic EIS, evaluating the proposed procurement of 2,400 MW of offshore wind energy, and not a particular wind energy project, site-specific information and analysis of site-specific impacts is not possible.

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		habitat. Given the spatial distribution of offshore wind energy, and the available habitat in the marine environment, significant adverse cumulative impacts to marine mammals and sea turtles would not be expected." (emphasis added; Draft GEIS, pg. 5-19, para 2) For fish, the Draft GEIS states: "The majority of sediments would settle quickly, minimizing turbidity, and fish would generally relocate to nearby habitats to avoid impacts. Impacts on fish from turbidity during construction would be expected to be temporary. Pile-driving and excavation activities are likely to displace fish from regular swimming, foraging, and spawning habitats, and the fish may relocate to nearby habitats due to sensory disturbances. *The majority of fish would temporarily relocate to ample available nearby habitat, and would likely return to pre-existing habitats after construction*." (emphasis added; Draft GEIS, pg. 5-19, para 2) These are significant assumptions that are not, as yet, supported by science. In fact, for marine mammals, avoidance behavior has not been found to be generalizable among species and contexts. Further, if marine mammals and other species do exhibit avoidance behavior, the potential costs of that avoidance behavior (e.g., energy expenditure, increased predation/ competition risk, utilization of a lower quality habitat or food source, stress) may be significant and need to be taken into consideration in environmental impact assessments. <u>We therefore ask that the Draft GEIS deemphasize the assumption of avoidance for wildlife and, instead, recommend that research will be needed to understand: (i) if, and how, wildlife exhibit avoidance behavior; and (ii) what, if any, the cost of that behavioral modification may be for the individual and population.</u> In the absence of this	

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		knowledge, a precautionary approach to offshore wind development is warranted.	
NRDC et al.	6-1l	*l. Reference permanent, large-scale habitat displacement resulting from operational offshore wind projects as an unavoidable adverse impact* The Draft GEIS states that: "… there are no unavoidable adverse impacts that could not be mitigated through one or more of the mechanisms discussed in Chapter 4 (Regulatory Framework and Mitigation of Potential Adverse Impacts)." (Draft GEIS, pg. 7.1, para 2) However, the possibility of permanent habitat displacement resulting from the presence of multiple large-scale offshore wind energy projects should be accounted for in the Draft GEIS. We currently have no knowledge of how wildlife, including large whales, will interact with operational wind energy projects off the Atlantic coast. The assumption that wildlife will return to an area after the end of construction simply cannot be made with certainty at this time. This is a particular concern for the highly endangered North Atlantic right whale, which could potentially traverse multiple wind energy projects developed off the Atlantic Coast on an annual basis during their migration. Large-scale habitat displacement of the North Atlantic right whale has the potential to result in population-level impacts. As there is no mitigation measure currently available to address this impact, the Draft GEIS should reference the potential for permanent large-scale habitat displacement resulting from operational offshore wind projects as a potentially unavoidable adverse impact.	Chapter 7 concludes that no unavoidable adverse impacts would occur that could not be mitigated through one or more of the mechanisms discussed in Chapter 4, because the available scientific literature does not indicate the potential for large-scale habitat displacement. As discussed in Section 4.2, the proper siting of development projects, such as the appropriate spacing of turbines, to avoid impacts on protected or sensitive resources can minimize potential impacts due to habitat displacement. Section 5.8.1 evaluates potential cumulative impacts of multiple large-scale offshore wind energy projects on marine mammals. Habitat loss is expected to be a minimal threat for highly migratory species (Harwood 2001), and the typical distances between turbines would allow even large marine mammals to navigate between turbines. Ongoing studies at offshore wind farms in Europe of potential impacts involving habitat fragmentation and displacement caused by offshore wind activities, have not revealed evidence of permanent habitat displacement. For example, Teilmann and Carstensen (2012) noted 89% fewer harbor porpoises inside a wind farm operating in the Baltic Sea compared to baseline data prior to offshore wind development; however, Scheidat et al. (2011) found that harbor porpoise numbers within an operating wind farm increased 160% over baseline numbers. Delefosse et al. (2017) further found that harbor porpoises, killer whales, pilot whales, minke whales, harbor seals, gray seals, and white-beaked dolphins were at expected levels of abundance and diversity around oil and gas installations in the North Sea.

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Long Island Commercial Fishing Association	7-1	Dear Secretary Burgess, We hereby request an extension of the comment period of the Draft DEIS by sixty days. Thousands of small, coastal fishing businesses throughout Long Island, and several other states, including Connecticut, Rhode Island and New Jersey, stand to lose everything by the decision of New York State to go through with the procurement of 2,400 MW of offshore wind energy by 2030. There was no public announcement or email to coastal New York fisheries constituents, nor attempt to notify those directly impacted through the Department of Environmental Conservation's food fish license holder mailing list, nor an attempt by the DPS to contact the Mid Atlantic Fishery Management Council, the Atlantic States Marine Fisheries Commission, or the New England Fishery Management Council, to notify other states' stakeholders that this document was available for comment. With the exception of the DPS site, no press release of any kind was made to notify true stakeholders. That is unconscionable. When the New York State Public Service Commission (NYSPSC) approved the CES, (Case 15-E-0302) in August of 2016, on page 12 the commission referred to the standard as benefiting "New York energy consumers and the overall economy by encouraging new investments in the State, maintaining existing jobs, and attracting capital from outside the State."	On April 17, 2018, the Commission extended the deadline for written comments on the Draft GEIS from April 9, 2018, to the close of business on May 9, 2018. The Commission fulfilled the requirements set forth in 6 NYCRR 617.12 regarding the public notice of completion of an EIS. The public notice provided in Docket 18-E-0071 and the Environmental Notice Bulletin identified the type of EIS (draft, final, supplemental, generic), the contact person, and where to obtain copies of the document.

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		The historical, traditional commercial fishing communities of Long Island, which include hundreds of small business owners, the very tax and rate-payers whose businesses help to support other small businesses throughout Long Island, are ground zero for having their very livelihoods and businesses destroyed by the 50x30 CES initiative and the push for 2,400 MW of off-shore wind "green" energy at our industry's expense. For the coastal fishing communities of Long Island, it is of par-amount importance that not only comments be allowed for an-other 60 days, but that field hearings for both the Draft and the Final EIS take place in Montauk and Shinnecock/Hampton Bays at the very least, the state's number one and two largest commercial fishing ports, the fishing communities that will be the most drastically impacted economically, and at least one meeting of the DEC's Marine Resources Advisory Council. For the coastal fishing communities of New Jersey, Connecti-cut, Rhode Island and Massachusetts, they too deserve notifica-tion so that their stakeholders, many of whom fishing in the fed-eral waters slated for 2,400 MW of offshore wind, have the ability to comment on both the Draft and Final EIS as it is their jobs, their industries and their communities' future that is at risk due to the push for 2,400 MW of offshore wind. I implore you to extend the deadline so that comments may be received from multiple on the water constituents who will be most directly affected.	

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New York Offshore Wind Alliance and American Wind Energy Association	8-1	In addition to the significant economic and environmental benefits outlined in the DGEIS and Offshore Wind Master Plan, the following additional benefits should be noted and recognized. • Offshore Wind Energy Can Avoid or Defer other New Generation and/or Transmission Capacity, as well as avoid a costly repowering of existing aging power plants on Long Island. Offshore wind energy helps address one of the biggest challenges facing the New York electric system: transmission constraints that impair the flow of renewable energy from upstate to downstate New York. As noted in Power Trends 20172, "The emerging story of the New York electric system is a tale of two grids – a tale of clean energy abundance and surplus generating capacity upstate and fossil fuel dependence and high demand downstate." Offshore wind power presents a unique opportunity to address this imbalance by directly providing energy and capacity into the downstate New York grid, specifically to Zones J and K. Offshore wind power generates higher capacity value than other renewable resources since it provides peak production during the late morning through early evening hours when capacity is needed. As an example, the Long Island Power Authority's South Fork RFP sought to "acquire additional local power production and /or load reduction resources in the South Fork to meet projected load growth and thereby defer the need for new transmission," and offshore wind was a key component of the winning bid because of its ability to meet that increased demand while minimizing the transmission investments required.	Comment noted.

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		•Offshore Wind will Promote Fuel Diversity and Winter Gas Price Relief. According to the NYISO, natural gas and oil supply 100% of New York City's local power generation and 97% of Long Island's. As a result, downstate New York ratepayers are exposed to uncertainty resulting from the volatility in the gas markets. This can become extreme during winter months when gas pipeline capacity becomes constrained. This problem is compounded by local restrictions on the use of fuel oil and the uncertainty over future natural gas infrastructure expansions. Specifically, there is increasing concern over the gas system's ability to keep pace with the needs for gas utilities serving residential, commercial and industrial customers, while simultaneously meeting the expanding needs of gas-fired power plants, especially during peak demand conditions in winter and summer. Offshore wind helps address these challenges. Offshore wind will significantly increase the diversity of energy sources in the downstate region by providing 2,400 MW of clean, renewable power by 2030. Further, offshore wind power peaks in output during the coldest winter days, which will reduce demand for natural gas-fired generation, reducing demand for natural gas and the wholesale market price for energy.	

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		• Offshore Wind will promote Geographic Balance and Equity. According to the 2016 Renewable Portfolio Standard (RPS) annual performance report, the RPS has resulted in at least "$2.7 billion of direct investment in New York State" and significant environmental benefits, including 6,700 tons of nitrogen oxides; 12,200 tons of sulfur dioxides; and 6.4 million tons of carbon dioxide in reduced emissions."6 These benefits have accrued disproportionally upstate according to Con Edison's October 7, 2009 comments in case 03-E-0188, which stated that the RPS has been "successful at facilitating the development of upstate wind…[but has] not enhanced clean energy opportunities in the downstate area." Thus, downstate ratepayers have not received the same emission reduction and price suppression benefits as upstate ratepayers, despite contributing at least half the RPS funds.	

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		• Offshore Wind is Critical to Meeting New York's 50x30 Renewable Energy Standard. According to the PSC Order Establishing a Clean Energy Standard7, in order to achieve the 50 by 30 goal, the identified Tier 1 need is 29,200,000 megawatt-hours (MWh). Achieving 2,400 MW of offshore wind energy will meet approximately one-third of the GWh necessary to achieve the 50x30 target, with the remaining two-thirds being met by land-based wind, solar, fuel cells, and capacity additions at existing hydropower facilities. This two-thirds is a significant amount relative to the current level of non-hydropower deployment of renewables in New York. Thus, even with significant and accelerated development of these other technologies, it will be difficult if not impossible for New York to achieve 50% renewable electricity generation by 2030 without at least 2,400 MW of offshore wind by that date. • Offshore Wind will Promote Environmental Justice: The New York metropolitan area is one of two areas in NYS that do not meet Clean Air Act standards for criteria air pollutants. Delivering large quantities of offshore wind energy to New York City and Long Island would improve living conditions in environmental justice communities by improving air quality and public health and lowering health care costs, assuming it will displace electricity production in New York City and Long Island from natural gas or dual fuel oil/gas plants, many of which are inefficient and aged.	

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New York Offshore Wind Alliance and American Wind Energy Association	8-2	Areas of Potential Environmental Impact: The Draft GEIS identifies environmental areas that could be impacted by the Proposed Action and that must be assessed when future offshore wind projects are undertaken or approved. Potential adverse impacts are wide ranging and varied and include impacts from preconstruction siting studies, to construction related activities to long-range impacts from buried submarine cables and operation and maintenance operations. The Draft GEIS identifies a host of measures that would help avoid, minimize or mitigate potential adverse impacts. The Alliance and AWEA applaud the State's efforts through the Draft GEIS and the New York Offshore Wind Master Plan to explore all facets of offshore wind development so that it can move forward in New York responsibly, at the lowest cost and with the lowest possible environmental impact. Although the Draft GEIS and Master Plan have identified a wide range of Best Management Practices (BMPs) and mitigation measures that will reduce environmental impacts, New York State acknowledges that this is just the beginning of a process to ensure offshore wind energy is developed responsibly, not only in New York, but in the United States. To that end, NYSERDA has initiated the formation of various technical working groups to improve our understanding of offshore wind and inform how it is developed. One of those groups, the Environmental Technical Working Group, will focus on ways to avoid, minimize and mitigate anticipated impacts on wildlife by developing wildlife BMPs, identifying research needs and coordinating adaptive management measures. Importantly, it will also explore the creation of an Environmental Conservation Fund to address ongoing funding needs associated with offshore wind's impacts.	Comment noted.

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		Finally, although the Alliance and AWEA are unified in our support for the responsible development of offshore wind off New York's coast, individual members of our organizations will invariably be commenting on this Draft GEIS with recommended improvements.	
Long Island Commercial Fishing Association	9-1	When the NYSDPS approved the CES in August of 2016, on page 12 of Case 15- E00302, the commission referred to the standard as benefiting "New York energy consumers and the overall economy by encouraging new investments in the State, maintaining existing jobs and attracting capital from outside the state." Within the context of the Governor's mandate for 2,400 MW of offshore wind procurement within the EEZ, the commercial fishing industry stands to lose considerable work areas of productive and historic fishing grounds, thereby creating a domino effect of job and economic losses within the state, both for commercial fishermen, and for the shoreside businesses that support them, such as the pack houses, ice houses, gear manufacturers,, shipping facilities, trucking companies, fish buyers and restaurants. Quite simply, the CES will not benefit thousands of New Yorkers that are economically tethered to our state's commercial fishing industry, as a result of being forced off our fishing grounds. It will NOT maintain existing jobs, our jobs.	It is currently unclear what the net effects, if any, offshore wind development will have on the commercial fishing industry in New York. The Fish and Fisheries Study, Appendix J in NYSERDA's Offshore Wind Master Plan, indicates that potential environmental and socioeconomic impacts, both negative and positive, could results from the construction and operation of offshore wind farms. Section 4.2.2 notes that offshore wind farm construction provides opportunities for fishery industry vessels. Vessels are needed for conducting scientific studies prior to, during, and following construction. Studies may require fishing vessels capable of trawling, in which case local fishing vessels may be contracted. Construction contractors may also contract local industry vessels to ferry workers or provide security during installation operations. However, because offshore wind farms are a relatively new phenomenon, studies on the impacts have only been undertaken in recent years. These studies are necessarily limited to operating offshore wind farms, most of which are in northern Europe. Results of wind farm impact studies indicate that potential adverse risks of offshore wind farms occur mostly during construction (e.g., noise from pile driving, sediment dispersal), although some adverse risks may occur during operation as well (e.g., effects of habitat conversion resulting in the presence of invasive species and shifts in existing populations). Enhanced diversity and species abundance may also occur during operations and create beneficial impacts. Soci-

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			oeconomic benefits, such as employment opportunities and improved port facilities, can begin before construction and carry through operations. Regarding the net effect on jobs generally, the Offshore Wind Master Plan commissioned an analysis to evaluate new workforce opportunities in New York associated with large-scale development of offshore wind electricity generation. This analysis accounts for OSW development scenarios that could be supported by policies in New York, which has committed to a goal of installing 2.4 gigawatts (GW) of OSW capacity by 2030, as well as policies in other states in the Northeast. The Study found that New York is ideally suited for sustained OSW workforce opportunities: (1) New York can realize nearly 5,000 new jobs in manufacturing, installation, and operation of OSW facilities, with a regional commitment to scale development of the resource; Nearly 3,500 of these jobs are expected to support New York wind farms, with the remaining supporting regional projects; (2) nearly 2,000 of these jobs are in operations and maintenance, providing sustained career opportunities for New Yorkers as the average offshore wind facility life span is at least 25 years; (3) many New Yorkers already possess most of the skills necessary to attract OSW manufacturers and developers, and skill development support from New York State will ensure new workers will have the skills needed to participate in this industry; (4) New York's existing infrastructure is well positioned for OSW development throughout the region, with ports and manufacturing assets that are uniquely suited to OSW needs; and (4) the State's success in creating a clean, resilient, and affordable energy system has resulted in market opportunities that have triggered job growth across a range of technologies. More-

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			over, New York already possesses a strong clean energy workforce, evidenced by the 22,000 New Yorkers who are working in renewable energy across the State. OSW is poised to be the next clean energy industry to establish roots in New York and to be a key driver in the increasing demand for clean energy workers in the State. Focused attention on ensuring that OSW development maximizes local content through use of existing ports and manufacturing infrastructure will be key in realizing the workforce potential in New York. The analysis forecasts that the State's attainment of OSW workforce and infrastructure can result in as much as $6.3 billion of expenditure in New York, an impact that is also subject to the use of local infrastructure.
Long Island Commercial Fishing Association	9-2	Page three of the executive summary speaks to direct benefits in the form of "economic development" but makes no reference to the economic hardship or economic losses that New Yorkers within the fishing industry or auxiliary industries may suffer as a result of the Governor's development of 2,400 MW of wind by 2030. There should be additionally discussion of the direct negatives that will take place to the fishing industry as a result of this action, including discussion of direct and indirect job loss, and the socio-economic impacts to the fishing industry.	The Executive Summary enumerates the types of potential impacts discussed in the GEIS, including impacts to commercial and recreational fishing, and briefly identifies potential beneficial impacts. Sections 5.3.3 and 5.8.3 discuss potential impacts, including cumulative impacts, on commercial and recreational fishing from the conflict with use of space, including vessel damage, financial risk, exclusion from typical areas and types of fishing, navigational hazards, and the alteration of existing fish populations. Therefore, these sections acknowledge that the potential impacts could result in economic losses to participants in the fishing industry. As it is unknown at this time what existing or new wind energy areas could form the source for the proposed procurement, it is not possible to evaluate the potential economic losses that could occur. However, as a point of reference, Section 5.8.4 notes that the Master Plan's Consideration of Potential Cumulative Effects (Cumulative Study) used conservative estimates to conclude that in a scenario in which 2,400 MW was developed within waters offshore of New York, the construction and operation of 2,400 MW of offshore wind energy would restrict or exclude fishing within only approximately 3%

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			of the area offshore of New York identified by the State as most likely to accommodate offshore wind energy development, leaving large areas available without conflicts for fishing.
Long Island Commercial Fishing Association	9-3	Page three also discusses the potential for cumulative impacts of 2,400 MW buildout, yet describes those impacts in the summary rather lightly, as disturbance, or displacement, and loss of habitat for marine mammals, sensory disturbances to fish and conflict to users. We feel that the most important and most severe impacts, as you note, the "worst-case scenario" of a full 2,400 MW buildout, should be listed up front, and should include death and permanent injury to whales and other marine mammals and fish species, migratory bat and bird mortality, destruction of benthic habitat, and displacement of fish, continuous level B harassment of marine mammals and fish during operation of windfarms, affecting, feeding, breeding, transit and communication, displaced fish migrations, loss of commercial fishing grounds through loss of access, and the cumulative economic losses to fishing communities.	The Executive Summary briefly identifies all of the issues referenced by the comment, which the GEIS addresses in more detail. Section 5.8 discusses potential cumulative impacts from offshore wind energy development, as does the Cumulative Study prepared for the Master Plan, incorporated by reference into the GEIS. See response to Comment 1-1 regarding Section 5.8.4, which was added for analysis of the potential cumulative impacts on birds and response to Comment 1-2 regarding the revisions to Section 5.8.1 concerning potential cumulative impacts on marine mammals. The GEIS identifies the potential for injury and mortality of marine mammals, however, the anticipated potential "permanent injury" that may occur to marine mammals would be permanent threshold shift to hearing. Permanent Threshold Shift means that, within a limited frequency band, some damage resulting in reduced hearing capability in the frequencies at which this occurs. Analyses of such injuries rarely incorporate natural avoidance or mitigation measures such as soft start and clearance of potential injury zones; therefore, conservatively identified potential impacts are not necessarily reflective of actual anticipated injuries. Level B harassment refers to the potential to change the behavior pattern of a marine mammal, and does not refer to noise detection. NOAA designates thresholds of received sound levels for evaluating the potential to change behavior patterns. As stated in the Master Plan Marine Mammal and Sea Turtle Study, various environmental and contextual factors influence whether a behavior pattern will change. Noise generated by op-

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			erating wind turbines (based in part on measurements from Europe) would be expected to be below thresholds set by NOAA regarding Level B harassment within a short distance of a turbine. Additionally, the existing literature regarding marine mammal interactions with structures in water does not suggest that structures will cause harm or permanent displacement. The GEIS identifies short-term behavioral avoidance of noise and/or other human activity and short-term displacement as potential impacts on marine mammals. The general operation of a windfarm would not likely displace or harass marine mammals as whales are expected to migrate through properly spaced windfarms. With respect to cumulative economic impacts to the fishing community, the State is implementing Technical Working Groups to discuss specific issues associated with offshore wind energy development. One Technical Working Group will be in the area of commercial and recreational fishing. The State considers the fishing community a key stakeholder and believes engagement with this group is critical to the effective development of offshore wind energy. The Commercial and Recreational Fishing Technical Working Group will work to develop best management practices in order to prevent or reduce potential impacts associated with offshore wind energy development offshore of New York, ultimately optimizing the coexistence of these industries and minimizing project impacts at all phases of development. However, since potential impacts on the fishing community are largely a function of site-specific variables, a more detailed analysis regarding these potential impacts also would take place at a project-specific level.

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Long Island Commercial Fishing Association	9-4	Re: Section 1.3, we do not believe that ecosystem benefits include the fact that wind turbines "do not pollute water resources." Each offshore wind turbine holds within it thousands of gallons of oil, including hydraulic fluid, gear box grease, and other lubricants. Clearly those items, in the case of a catastrophic breakdown or crack within the holding tanks, would pollute the water. Re Fuel Diversity benefits, any offshore wind energy that is sent to the mainland will require fast peak gas facilities to augment the increase in wind energy coming from the turbines to maintain grid equilibrium. As such, we will actually become more reliant on new gas facilities, not less, by growing our offshore wind energy capabilities. Nuclear and coal do not have the ability to add energy quickly to the system as a fast-gas facility does. Re: Economic development benefits will not extend regionally on Long Island to fishing communities, they will exist in a fishbowl for union workers in large shipping ports.	The ecosystem services benefits in Section 1.3 refer to reduced impacts on land and water resources because fossil fuel-based generation uses large volumes of water compared to renewable energy. Any new offshore wind energy projects will have to comply with federal requirements to prepare and implement an Oil Spill Response Plan during construction and operations, if applicable, to prevent and/or minimize the occurrence of accidental spills of hazardous materials and take measures to prevent unauthorized discharge of pollutants into offshore waters. With respect to gas-fired peaker plants for electricity supply and grid reliability, see previous response to Comment 4-6. See response 9-1 regarding potential broadscale economic benefits
Long Island Commercial Fishing Association	9-5	On, page 2-5, top of the page. South Fork Wind Farm is a nameplate 90MW facility, not capable of producing 90 MW. Its actual production will be approximately on average, 38% of that figure, according to Deepwater Wind representatives, for a total of 34 MW.	The standard practice is to refer to projects by their nameplate capacity.

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Long Island Commercial Fishing Association	9-6	In 3.2 Please list all fish species with designated essential fish habitat (EFH) and habitat areas of particular concern within the 2,400 MW offshore wind area procurement zones, in both state and federal waters. Please also list those species that have an overfished or overfishing status as per National Marine Fisheries Service within the state and federal waters.	NOAA uses a 10-minute by 10-minute grid system to identify designated EFH on a regional scale. The marine environment considered in the GEIS represents a broad area of the Atlantic Coast between Maine and North Carolina, which encompasses a large number of 10-minute by 10-minute areas. Enumerating all species with EFH in this large area (nearly 1,000 species) would not provide useful information for purposes of this generic assessment. However, Section 5.2.3 acknowledges the potential for greater impacts to fish with designated EFH in project areas. As part of the permitting process for any specific offshore wind energy development, federal and state laws and regulations require the developer to consult with the appropriate agencies to ensure that project-specific desktop and field surveys are undertaken, and that best management practices are employed. As noted in Exhibit 4-2, projects would avoid locating near or anchoring on known sensitive seafloor habitats by performing appropriate siting and assessing baseline data in compliance with BOEMs *Guidelines for Information Requirements for a Renewable Energy Site Assessment Plan*. In response to the comment, additional references to EFH were added to the text.
Long Island Commercial Fishing Association	9-7	Please list within 3.2, all marine mammals that include those with threatened or endangered status.	Please refer to the response to comment 6-1d above regarding the revised Exhibit 3-2.
Long Island Commercial Fishing Association	9-8	Please additionally list all marine mammals, whales and bat species that exist within the New York Wind Energy Area of Consideration. IE Minke whales are a species very susceptible to the low frequency sounds of survey work, construction and operation of windmills, but are not listed within the graphs. Likewise, the Eastern Red Bat is known to migrate in the fall off the coast, approximated 15-20 miles South of Long Island within the Atlantic Flyway. Species known to frequent the area,	Exhibit 3-3 (formerly Exhibit 3-2) identifies endangered and threatened species for New York. Enumerating all species with within the New York Wind Area of Consideration would not provide useful information for purposes of this generic assessment. The marine environment considered in the GEIS represents a broad area of the Atlantic Coast between Maine and North Carolina. As noted in the introduction to Chapter 5, for the purposes of the cumulative analysis, the GEIS considered an

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		should be acknowledged and flagged for discussion within the DEIS, as opposed to the Eastern Cougar, who is listed within Exhibit 3-2, but does not exist within the OSW footprint.	examination of a reasonable "worst-case" scenario assuming that all of the contributing projects would be located in the waters offshore of New York, which would be in relatively close proximity compared to the marine environment from Maine to North Carolina. Please note that the revised Exhibit 3-3 (formerly Exhibit 3-2) includes the following marine mammals: North Atlantic right whale (*Eubalaena glacialis*), fin whale (*Balaenoptera physalus physalus*), sei whale (*Balaenoptera borealis borealis*), blue whale (*Balaenoptera musculus musculus*), and sperm whale (*Physeter macrocephalus*). The minke whale and eastern red bat are not threatened or endangered species and therefore do not warrant inclusion in Exhibit 3-3.
Long Island Commercial Fishing Association	9-9	Re: 3.3 Exhibit 3.4 is a very poor choice of maps to use to show the commercial fishing industry effort throughout New York and New Jersey, as it is listing the multispecies groundfish fishery only, and only utilizing 2011-14 as dates. From 2010-2013, the Southern New England winter flounder fishery, part of the ground fishery complex, a $1 million dollar fishery to NY, was closed, so the landings data from that time period is prejudicial against NY ports. Many of the species landed at New York ports, are not registered through Vessel Monitoring Survey data, such as DOF fisheries, which include the whiting, scup, fluke, black sea bass, bluefish, striped bass, and butterfish fisheries. Scallops and squid, a $6 million fishery annually to New York, were also not used. The groundfish fishery is only one of several dozen fisheries that take place in New York. The portal data used is highly inaccurate because it only has certain years of certain fisheries and without knowing the historical regulations in fisheries, a false picture can easily be portrayed. Montauk is the largest commercial fishing port in New York and the	Please refer to the response to Comment 6-1e. Section 3.3 was revised to include a description of VMS data and to clarify that the maps show a representative depiction of some of the commercial fishing grounds in the region.

Commentor	Comment Letter Number-Comment Number	Comment	Response
		68th largest port in the Nation, landing in 2016 11 million pounds of fish worth over $16 million dollars at the dock. Better statistics by state may be found here https://www.st.nmfs.noaa.gov/commercial-fisheries/fus/fus15/index and at other data points within NMFS and the DEC for state fisheries.	
Long Island Commercial Fishing Association	9-10	Likewise, the AIS data is a poor choice to show commercial fishing vessel traffic as it, since commercial fishing boats were not required to carry AIS until 2015, and only for boats larger than 65 feet, who can also turn off AIS outside of 12 miles. Fishermen often turned it off so as to maintain proprietary data re fishing areas. For large transport type traffic, yes, but fishing, no.	Exhibit 3-7 is a depiction of vessel traffic using AIS data and to illustrate the degree of existing marine transportation that includes a variety of commercial vessel uses, including the operation of vessels for import and export services, construction work, fishing, and cruise ship tourism, as well as recreational vessels. To clarify, the text and Exhibit name were revised to change "all" to "general" vessel activity.
Long Island Commercial Fishing Association	9-11	Re: 3.6 , there is very little to no socio-economic data on the coastal fishing ports of the Mid-Atlantic. A request has been made to the New England Fishery Management Council and the Mid Atlantic Fishery Management Council to develop a method to do so. A full socio-economic study must be done on the fishing communities of Long Island in conjunction with the marine program of Cornell Cooperative Extension of Suffolk County that includes the cumulative effects of the siting of offshore wind turbines on those communities and their fishing grounds. Cornell has spent the last forty years working in tandem with the fishing communities of Long Island and is best suited to partner with fishermen to qualify and quantify the data as it related to ports, workforce, and shoreside and market support.	See the responses to Comments 9-2 and 9-3.

Commentor	Comment Letter Number-Comment Number	Comment	Response
Long Island Commercial Fishing Association	9-12	Re 4.1, Policy 29 , there has been no accommodation of the commercial fishing industry by the developers of offshore wind to date within New York, or any other state, including Rhode Island and Massachusetts. Both the RI and MA WEAs were done without ANY data or input from New York fishing communities, in what would be looked at as contra to NEPA policy. Memorandums of understanding between RI and Ma allowed for both states to remove fishing areas of economic importance within the RI-WEA, yet there was no attempt by RI or MA to notify New York of their WEA plans in federal waters. Neither MA or RI included any data from New York federally permitted fishermen and their vessels that have fished in the federal waters outside of their states' water for decades. In establishing their WEAs they have created extreme economic hardship for New York's fishermen. Any future NY-WEA should require a developer to remove historic areas of commercial fishing economic importance prior to submitting a COP. All developers should be require by law to agree to a fully-negotiated and paid for by the applicant, fisheries research, monitoring (including baseline scientific studies developed with fishing industry input utilizing NOAA, NMFS, NEFSC and NEFSC- Cooperative research) mitigation and compensation plan, prior to submittal of their COP as a requirement of receiving any state permits or state coastal consistency approval. For note purposes, this will be referred to as a Fish-COMP. Each Fish- COMP will be specific to the WEA siting.	The GEIS examines, at a generic level, the potential impacts of procuring 2,400 MW of offshore wind energy, which may include the development of new wind farms along the Atlantic coastline. Any specific projects would undergo site-specific environmental review during BOEM's project review process. Such environmental review should include an assessment of impacts of each project on commercial fishing operations occurring in the project area and identify measures that will be employed to reduce adverse impacts. As part of its Offshore Wind Master Planning Process, the State plans to convene a Technical Working Group on fisheries that will include commercial fishing stakeholders. The Technical Working Group will be tasked with, among other things, identifying best management practices relating to commercial fishing in waters offshore of New York. The Fish and Fisheries Study included in the Master Plan identifies a number of such measures, which include early engagement with the fishing community to develop a mutually acceptable mitigation plan.

Commentor	Comment Letter Number-Comment Number	Comment	Response
Long Island Commercial Fishing Association	9-13	Re; 4.2- As part of the aforementioned fish COMP, fishermen must be involved from the very beginning in any discussions related to potential offshore wind mitigation, from before the survey phase regarding protection of ocean resources, including avoidance, and minimization. Without their voice at the table, their regulatory framework of working within federal waters may not be effectively iterated and mitigation may be deleterious to their ability to work within mitigated regions. IE using scour protection could effectively keep them from their ability to fish within certain areas. It could also bring biofouling to an area, therefore displacing target commercial species.	See response to Comment 9-12 regarding mitigation. Section 5.2.1 discusses the potential for habitat conversion resulting from the installation of wind turbine foundations. The revised text identifies the potential for introduction of invasive species depending on site specific conditions. The potential for biofouling and introduction of invasive species could be associated with a new surfaces area for colonization of the benthic community or introduction of new species from use of ballast water by large vessels. See the response to Comment 6-1h regarding changes to the benthic community.
Long Island Commercial Fishing Association	9-14	Re; 5-1, survey vessels presently used by offshore wind developers are far too large to stage in a smaller port on Long Island. They are also foreign flagged, contrary to the Jones Act, and employ foreign workers. These vessels should not be allowed to be considered within the "jobs created" category of offshore wind, as these jobs have minimal impact on the local economies of New York.	The Master Plan's Assessment of Ports and Infrastructure Study analyzed the current capacity and needs of New York State's port facilities to support offshore wind energy development. The assessment analyzed waterfront sites in New York Harbor, along the Hudson River, and along the coast of Long Island. It provides information on the potential of waterfront facilities to support the offshore wind supply chain and potential necessary upgrades to existing port facilities, and further identifies areas particularly well suited for supporting offshore wind energy projects. While all existing port facilities in Long Island may not have appropriate capacities, the Ports and Infrastructure Study concluded that there are several areas along the coast of Long Island that have the potential to serve as operations and maintenance facilities due to the available acreage, proximity to inlets, and existing waterfront infrastructure. In addition, NYSERDA's Offshore Wind Policy Options Paper considered installation and major operations via Jones Act-compliant vessels. To continue the work started in the Assessment of Ports and Infrastructure Study, the State plans to convene a Technical Work-

Commentor	Comment Letter Number-Comment Number	Comment	Response
			ing Group centered on jobs and supply chain. The Jobs and Supply Chain Technical Working Group will further study the upgrades needed to existing port facilities in order to support offshore wind energy component manufacturing, staging, and long-term operations and maintenance. The Technical Working Group also will analyze the local supply chain and identify the skills present in the local labor force and the training necessary to optimize benefits to local economies in New York from offshore wind energy development.
Long Island Commercial Fishing Association	9-15	Re: 5-1, pg 5-3, Jet plowing does not ensure minimal bottom disturbance, it liquefies the ocean floor with hydraulic jets to a depth of six to eight feet. Benthic habitat in its way is destroyed, along with larvae and Young of the Year (YOY) fish. Also, re 5-1, pg 5-4, a performance bond should be required of any offshore wind company to satisfy the costs necessary for decommissioning. All structures, including monopoles, jacket platforms, or future gravity foundations, plus buried grid and all ESPs MUST be removed upon decommissioning. If it is not removed, over time, the tide will eventually expose the grid. Fishing in the area of exposed "ghost grid" could create gear or boat losses and the possible loss of life. All offshore wind energy areas ocean must be returned to their original ecosystem state.	Exhibit 4-2 identifies use of a jet plow to minimize sediment disturbance and alteration during the cable-laying process as identified in *the Block Island Wind Farm and Block Island Transmission System Environmental Report/Construction and Operations Plan* prepared in 2012. As alternative methods become available to further minimize impacts, the permitting process may require use of those methods. Section 3 of the Fish and Fisheries Study, incorporated by reference in the GEIS, provides more detailed descriptions of the potential sensitivity and risk from construction of offshore wind projects related to benthic disturbance from trenching activities. As noted in Section 5.1, decommissioning activities would take place at the end of any offshore wind energy project's life. BOEM's *Guidelines for Information Requirements for a Renewable Energy Construction and Operations Plan (COP)* is referenced in Exhibit 4-2 and requires that all developers of offshore wind energy projects include conceptual decommissioning plans and site clearance procedures for all planned components and facilities. In addition, 40 CFR 285.516(a)4 requires a decommissioning bond or other financial assurance, in an amount determined by BOEM, based on anticipated decommissioning costs.

Commentor	Comment Letter Number-Comment Number	Comment	Response
Long Island Commercial Fishing Association	9-16	Re: 5-2, please add bats to Biological Resources that could be affected by offshore wind development.	In response to this comment, the footnote regarding the analysis on bats from the Birds and Bats Study was incorporated in the text of Section 5.2.4.1 to more clearly identify the consideration of bats and potential impacts from offshore wind development.
Long Island Commercial Fishing Association	9-17	Re: 5.2.1 Offshore wind has the potential to destroy and displace benthic communities. Pile driving will kill fish (also for a comment for 5.2.3) with and without swim bladders within the red zone, along with various sand worms, copepods, etc. and other larvae and YOY, through the particle wave pressure of the pile driving, creating concussive waves of pressure, not just through temporary displacement of sediment. It is not minor as you state. The same goes for jet plowing. Hydraulically liquefying the ocean floor is not a minor occurrence if you live on that ocean floor. Operation of a windmill with 120 db sound will not be beneficial to marine mammals, as it is a Level B harassment for continuous sound, and could affect migrations, breeding, eating, and transit. Benthic habitat "conversion" is a nice way of saying offshore wind displaces one ecosystem for another, and can create biofouling by invasive species, as was done in Denmark at Horns Rev, also not a benefit. Benthic communities travel with sediment; invasives colonize. Adding tide could create sedimentation, scour and silt, choking out fish, larvae, and many ocean floor denizens, such as that which happened at the Thanet Wind Farm in England. https://earthobservatory.nasa.gov/IOTD/view.php?id=89063 and the loss of their cod fishery http://keranews.org/post/uks-offshore-wind-boom-great-climate- what-about-fish	As noted, Sections 5.2.1 and 5.2.3 identify the broad potential impacts on benthic communities and fish from the types of activities that could result from the procurement of 2,400 MW of offshore wind energy, including habitat disturbance, pile driving, and habitat conversion, as well as injury or mortality. The reference to anticipated minor impacts in Section 5.2.1 refers to the minor, temporary increases in suspended sediments rather than characterizing all potential impacts on benthic species as minor. Because the increase in suspended sediment is a short-term occurrence, benthic communities would be expected to recover completely. Exhibit 4-2 identifies use of a jet plow to minimize sediment disturbance and alteration during the cable-laying process. As alternative methods become available to further minimize impacts, the Commission expects that the permitting process will require use of those methods. See response to Comment 9-3 regarding noise impacts on marine mammals. The buildup of bacteria and algal colonies creating localized anoxia at Horns Rev or the Thanet Wind Farm, which experienced tidal circulation disturbances and significant suspended sediment plumes, would not be expected to occur in the Atlantic Ocean. These wind farms are located in the North and Baltic seas, which experience significantly less circulation than would occur with turbines located in offshore areas of the Atlantic

Commentor	Comment Letter Number-Comment Number	Comment	Response
			Ocean. However, a discussion of the potential for habitat conversion to cause the introduction of invasive species has been added to Section 5.2.1.
Long Island Commercial Fishing Association	9-18a	Re: 5.2.2.1 Noise in water is 27 db louder in water than on land. The operational sound of windmills has been measured at 120 db which is considered a level B harassment, for continuous sound. Add vibrating turbines during high speed winds, and the operation could be much louder in the water than what is being modeled. In fact, the BIWF is apparently louder that modeling as per a meeting of the National Academy of Science Ocean Studies Board meeting in November of 2017. Modeling should not be used to determine operational sound of offshore wind turbines within the New York WEAs.	The perception of loudness relates to the sound source level, frequencies, and environmental conditions such as depth, temperature, and pressure. Sound received level will differ by distance from the sound and the other conditions such as depth, temperature, and pressure. As stated in the Master Plan Marine Mammals and Sea Turtles Study, Tougaard, Henriksen, et al. (2009) found that noise from three different wind turbine types in European waters was only measurable above ambient noise levels at frequencies below 500 Hz with sound pressure levels from 109 to 127 dB rms re 1 µPa at distances from 14 to 20 m from the foundations. At these levels, audibility was low for harbor porpoise (about 20 to 70 m away) and for harbor seals (less than 100 m to a few kilometers away). General seal hearing range overlaps with the low-frequency cetacean hearing range, though baleen whales hear at lower frequencies as well (NOAA NMFS 2016a). Low-frequency cetaceans within a few kilometers of a wind farm may hear noise associated with operation at low levels depending on sound-propagation conditions and ambient noise levels. However, detection of sound does not constitute harassment under the Marine Mammal Protection Act. Using the 120 dB threshold for modeling during the permitting phase will allow for conservative estimates of instantaneous effects on individuals. The use of modeling to determine the likely propagation of operational noise is the best available method to make such a prediction during the permitting phase. Field verification can be

Commentor	Comment Letter Number-Comment Number	Comment	Response
			conducted after the wind turbines are operational and measurements taken at existing windfarms can be used for inform the models, such as studies being conducted at Block Island Wind Farm.
Long Island Commercial Fishing Association	9-18b	Re: 5.2.3 1 Not all species return to the site of pile driving. A recent study of black sea bass in NC showed they did not return post pile driving.	As noted in Section 5.2.3.1, the majority of fish would likely return to pre-existing habitats after construction, when pile driving ends. The GEIS examines, at a generic level, the potential impacts of procuring 2,400 MW of offshore wind energy. Any specific projects would undergo site-specific environmental review, which should include assessment of species and habitats unique to the project area and their specific behaviors.
Long Island Commercial Fishing Association	9-18c	A loss of area to trawling is a net negative to commercial fishermen in an area that was once vibrant economically. To discuss a species as flourishing because due to OSW they will now not be caught is basically stating the obvious, fishermen will be precluded and disenfranchised from accessing their traditional fishing grounds in areas where OSW is placed. As such they should be compensated for any such losses of fisheries access.	This sentence Section 5.2.3.1 has been removed. See previous response to Comment 9-12 regarding mitigation.
Long Island Commercial Fishing Association	9-18d	There are no appropriate baseline studies of EMF to determine little to no effect. Telecommunication cables or the BIWF with a much smaller cable, is not the same as a 135 kv DC cable that may not be buried for large chunks of ocean bottom. Testing with a baseline of at least two years with appropriate cables and site specific must be done.	The conclusions regarding EMF impacts reference multiple studies including both offshore wind development, power cables, and general studies to support the potential for EMF effects on fish from buried electric cables. Overall, both existing and ongoing studies indicate little or no substantial behavioral responses.
Long Island Commercial Fishing Association	9-19	Re: 5.3.3 Not only are there conflicts of space, but radar can be rendered ineffective, throwing false images on the screen with OSW, as exhibited during public comment at the NY BOEM task force on May 9 in Newark. Also, the National Ocean Service has informed BOEM through a letter in 2014 that its 11 high frequency radar sites will be rendered useless by OSW turbines. That radar is used for 100 miles from New Jersey to	See previous response to Comment 2-6. As noted in Exhibit 4-2, developers of offshore wind energy projects must consult with the Federal Aviation Administration and the U.S. Coast Guard to address potential conflicts with radar and related impacts.

Commentor	Comment Letter Number-Comment Number	Comment	Response
		Rhode Island for Coast Guard Search and Rescue and NOAA oil spills. The turbines must also be spaced at least two miles apart with transit zones of four miles apart for commercial fishing to have even a chance of working within the sites, only if they are placed appropriately along fathom curves. The Coast Guard also recommended two miles, yet every developer to date has placed them at one mile or less.	
Long Island Commercial Fishing Association	9-20	Re: 5.8 Cumulative impacts must also include the worst case scenario where migrations no longer move in historic grounds due to windmills, the loss of fish species within the OSW areas, and the loss of cumulative fishing grounds by the fishing industry, with the cumulative economic losses to their communities.	Section 5.8.3 identifies potential shifts in existing populations, financial risks, and exclusion from typical areas and types of fishing that may contribute to cumulative impacts, which includes economic impacts.
Long Island Commercial Fishing Association	9-21	The Long Island Commercial Fishing Association supports a No Action alternative.	Comment noted.
Seatower	10-1	First of all we would like to support and echo the comments and recommendations submitted on April 9, 2018 by various organizations including the Natural Resource Defense Council, the National Wildlife Federation and the Nature Conservancy. In particular, we would like to highlight the following comments and recommendations: 1.a. “Achieving Governor Cuomo’s 2,400 MW by 2030 offshore wind goal is critical to New York’s clean energy future” 1.b. “The no-action alternative is worse than suggested”	See the responses to Comments 6-1a, 6-1b, 6-1d, 6-1f, and 6-1i.

Commentor	Comment Letter Number-Comment Number	Comment	Response
		1.d. "Include marine mammals in the list of 'Endangered and Threatened Animal Species Believed or Known to Occur in New York" 1.f. "Specify seasonal restrictions for feeding aggregations as potential mitigation measure" 1.i. "Include potential impacts of injury and mortality from noise for mid- and low- frequency cetaceans"	
Seatower	10-2	Differentiate between construction activities when proposing mitigation measures. The Draft GEIS suggests the use of regulatory requirements, guidelines and best management practices to minimize and mitigate potential impacts (p. 4-10). Limiting construction activities to specific times and/or seasons is proposed (p. 4-10 and p. 4-11). The Draft GEIS does not, however, discuss the difference between construction activity that requires pile driving and construction activities that do not. Whereas all construction activity emits sound, pile driving is in a category of its own in terms of the potential impact on marine life (as described in sections 5.2.2.1, 5.2.2.2 and 5.2.3.2). Recommendations: (1) Time-based limitations on all construction activities should only be used as a mitigation measure when even relatively low-noise construction activity would be excessively harmful. In cases where the concern is predominantly pile driving noise, the time-based limitations should not apply to non-piling activities. (2) Assess appropriate regulatory noise levels of pile driving in order to protect marine life and habitats during construction.	Section 4.2 discusses at a high-level avoidance, minimization, and mitigation measures for potential impacts from future offshore wind energy development that have been identified in existing agency guidance or included in existing United States projects. Limiting construction activities to specified times and/or seasons, as mentioned in Section 4.2 on page 4-10, may be used to address construction impacts on sensitive species as well as impacts related to conflicts of use (e.g., recreation). Such impacts potentially could result from construction activities other than pile driving. Any specific projects would undergo site-specific federal and state regulatory review, which would include assessment of species, habitats, and conflicts of use unique to the project area and would identify specific avoidance, minimization, and mitigation measures to address impacts from different types of construction activities and/or conflicts.

Commentor	Comment Letter Number-Comment Number	Comment	Response
Seatower	10-3	Acknowledge and promote construction techniques that avoid pile driving. The Draft GEIS mentions monopiles and jackets as structures that are likely to be used on the Atlantic Coast (p. 5-3). It goes on to describe pile driving techniques to install those foundations. This leaves the impression that pile driving is an unavoidable feature of offshore wind construction. Monopiles and jackets can be installed without pile driving, using a technique called "suction buckets". Another structure that is likely to be used on the Atlantic Coast is called a gravity base. A gravity base is floated to its offshore location and just placed on top of the seabed. This is another technique that does not require pile driving. Use of non-piling construction techniques would mitigate many of the potential impacts described in sections 5.2.2.1, 5.2.2.2 and 5.2.3.2. Recommendations: (1) Include descriptions of non-piled construction techniques, such as e.g. gravity based foundations. (2) Assess whether additional mitigation measures could be proposed under section 4.2 that would incentivize or mandate the use of non-piled construction techniques.	At a generic, non-site-specific level, this GEIS identifies the broad potential impacts that could be caused by the types of activities that could result from the procurement of 2,400 MW of offshore wind energy. This GEIS also discusses at a high-level certain avoidance, minimization, and mitigation measures that could be considered during federal and state regulatory review of project-specific offshore wind energy development, recognizing that additional or different measures may be appropriate for specific projects. This GEIS is not intended to prescribe certain construction techniques for developers, which could preclude advancements in technology that may develop between now and the construction of potential future offshore wind energy projects. The selection of installation techniques for any specific project must consider multiple factors and impacts on different resources. As described in the New York State Master Plan Consideration of Potential Cumulative Effects, incorporated by reference in the GEIS, use of monopile and jacket foundations would minimize certain impacts due to the relatively small footprints compared to alternative gravity foundations that typically require tens to hundreds of square meters of seafloor (MMS 2007).
Seatower	10-4	Evaluate possible operational noise and its environmental impact. The Draft GEIS states that "Operation generally would result in minimal noise and vessel traffic" (p. 5-6). We are not aware of any studies that measure the impact on marine mammals and	As described in the New York State Master Plan Consideration of Potential Cumulative Effects and the Fish and Fisheries Study, incorporated by reference in the GEIS, noise and vibration generated from operating turbines, gearboxes, and generators may theoretically cause physiological and behavioral response in fish. However, noise generated from wind farms is

Commentor	Comment Letter Number-Comment Number	Comment	Response
		sea turtles of the operational noise from offshore wind farms. The statement therefore seems unsupported. Offshore wind structures experience constant vibrations from the operation of the turbines. The vibrations travel down the tower and into the submerged structural parts. Finally, the submerged parts transfer these low frequency vibrations into the water. The intensity of the sound transferred will vary with the shape and the materials of the structure. Recommendations: (1) Describe operational noise from wind turbine operations as a potential adverse impact (in section 5.2.2.1). (2) In section 4.2, include as suggested mitigation (a) further study of underwater noise from turbine operations and (b) use of low-emitting structures as a precautionary measure.	typically masked underwater by wind or the surface of the water, and individual turbines are expected to generate less noise at the source than that produced by existing vessel traffic. Many studies have been conducted on potential impacts of operating wind farms on fish (Wahlberg and Westerberg 2005; Lindell 2003; Sigray and Andersson 2011; Westerberg 1994; Xi Engineering Consultants Limited 2013); studies on how operational noise may impact marine mammals and sea turtles are ongoing. Rice et al. (2012) and Madsen et al. (2006) indicated that operation-related noise has been determined to be unlikely or minimal compared to ambient noise of surrounding areas. Offshore wind farms currently operating in Denmark, Sweden, and Germany have taken underwater acoustic measurements to collect data on potential impacts (Degn 2000; Fristedt et al. 2001; Ingemansson Technology 2003; Betke et al. 2004) and studies are ongoing. Section 5.2.2.1 has been revised to provide further detail and references regarding potential impacts of operational noise on marine mammals and sea turtles. Discussion of additional mitigation measures related to potential impacts of operational noise is unnecessary due to the expected level of impact, as clarified in this response and the revised Section 5.2.2.1.
Seatower	10-5	Include construction materials and energy input as resources to be conserved. The construction of the offshore wind farm uses materials and energy that need to be considered in a life cycle perspective. We have not found mention of this in the Draft GEIS.	At a generic, non-site-specific level, this GEIS identifies potential impacts and associated mitigation measures that could be caused by the types of activities that could result from the procurement of 2,400 MW of offshore wind energy. Project-specific impacts, such as the life-cycle impacts of construction materials creation and shipment, would be addressed during environmental review of specific projects. Additional proposed mit-

Commentor	Comment Letter Number-Comment Number	Comment	Response
		Recommendation: Mentioned "Construction Materials and Energy" as a resource in Exhibit 4-2. Potential mitigation measures are reuse of structures/components, and recycling of materials.	igation measures, which could include reuse or recycling of materials, would also be analyzed at the project-specific level. As new wind farms would generate energy, they should far offset any use of energy during construction.

B Revisions to the Draft Generic Environmental Impact Statement

Appendix B lists edits that have been made to the Draft GEIS to incorporate new and revised information.

EXECUTIVE SUMMARY

- Revised to reflect changes made to the Draft GEIS.
- Revised to reflect the public notice and comment period on the Draft GEIS.
- Editorial revisions.

CHAPTER 1: SEQRA AND DESCRIPTION OF THE PROPOSED ACTION

- Editorial revisions.

1.1 The New York State Environmental Quality Review Act

- Revised to reflect the public notice and comment period on the Draft GEIS.

1.2 Description of the Proposed Action

- Editorial revisions.

1.3 Purpose and Benefits of Offshore Wind Energy Procurement

- No changes.

1.4 Location Affected by the Action

- No changes.

1.5 Relationship to Other Plans and Programs

- Editorial revisions.

CHAPTER 2: THE ELECTRIC INDUSTRY IN NEW YORK STATE

2.1 Trends in Electricity Demand and Generation

- No changes.

2.2 Import and Export of Electricity

- No changes.

2.3 Potential Offshore Wind Energy Projects

- Revised Exhibit 2-3 with respect to the potential capacity factor of offshore wind energy area referred to as Empire Wind.

CHAPTER 3: ENVIRONMENTAL SETTING

3.1 Physical Resources

- No changes.

3.2 Sensitive Biological Resources

- Revised text and incorporated Exhibit 3-2 (Migratory Bird Species Potentially Occurring in the OCS) to include additional information on birds protected under the Migratory Bird Treaty Act known to occur near the Outer Continental Shelf and within the Atlantic Flyway in response to public comments.
- Revised Exhibit 3-3 (New York State Listed Endangered and Threatened Animal Species Believed or Known to Occur in New York) to include additional mammal species in response to public comments.
- Editorial changes.

3.3 Marine Commercial and Recreational Uses

- Revised text to include additional information and references regarding vessel monitoring system (VMS) data in response to public comments.
- Incorporated Exhibit 3-5 (Major Commercial Fishing Activities Based on VMS Data) and Exhibit 3-6 (Recreational Fishing Areas) in response to public comments.
- Editorial changes.

3.4 Cultural Resources

- No changes.

3.5 Transportation (Vessel Traffic)

- Revised text to clarify the data illustrated in Exhibits 3-4, 3-5, 3-6, 3-7, and 3-8 in response to public comments.
- Editorial changes.

3.6 Socioeconomics

- No changes.

3.7 Community Character

- Editorial changes.

CHAPTER 4: REGULATORY FRAMEWORK AND MITIGATION OF POTENTIAL ADVERSE IMPACTS

4.1 Federal and State Regulations and Guidance Relevant to Offshore Wind Energy Development Activities

- No changes.

4.2 Avoiding, Minimizing, and Mitigating Potential Impacts

- Revised potential avoidance, minimization, and mitigation measures and added references in Exhibit 4-2 in response to public comments.
- Editorial changes.

CHAPTER 5: AREAS OF POTENTIAL ENVIRONMENTAL IMPACT

- Editorial changes.

5.1 Overview of Offshore Wind Energy Development and Impact Analysis

- No changes.

5.2 Biological Resources

5.2.1 Benthic Communities

- Revised language used to describe potential impacts on benthic communities in response to public comments.
- Editorial changes.

5.2.2 Marine Mammals and Sea Turtles

- Revised text and incorporated references regarding potential noise-related impacts to high-, mid-, and low-frequency cetaceans in response to public comments.
- Incorporated references regarding avoidance behavior in response to public comments.
- Revised text to explain that studies on how operational noise may impact marine mammals and sea turtles are ongoing. Incorporated two studies regarding noise impacts compared to ambient noise of surrounding areas.

5.2.3 Fish

- Deleted text regarding potential impacts to species due to trawling in response to public comments.
- Incorporated references regarding avoidance behavior in response to public comments.
- Editorial changes.

5.2.4 Birds and Bats

- Revised text to incorporate information on bats in response to public comments.
- Editorial changes.

5.3 Marine Commercial and Recreational Uses and Vessel Traffic

5.3.1 Recreational Activities

- No changes.

5.3.2 Vessel Traffic

- Editorial changes.

5.3.3 Commercial and Recreational Fishing

- No changes.

5.4 Cultural Resources

- No changes.

5.5 Socioeconomic Impacts

- No changes.

5.6 Visual and Aesthetic Resources

- Editorial changes.

5.7 Air Quality and Climate Change

- Revised text and incorporated references concerning potential impacts to wildlife from climate change in response to public comments.
- Editorial changes.

5.8 Cumulative Impacts

- Revised text to identify information presented in new Section 5.8.4.

5.8.1 Displacement, Disturbance, Loss, or Conversion of Habitat for Marine Mammals and Sea Turtles

- Revised text and incorporated references to include additional detail on the status of North Atlantic right whales, potential impacts on marine mammals and sea turtles from avoidance behavior, and additional references to support the conclusion regarding impacts in response to public comments.
- Editorial changes.

5.8.2 Sensory Disturbance to Fish

- No changes.

5.8.3 Spatial Conflicts with Commercial and Recreational Fishing

- No changes.

5.8.4 Displacement, Disturbance, Loss, or Conversation of Habitat and Injury/Mortality to Birds

- Incorporated Section 5.8.4 to include additional analysis of the potential cumulative impacts on birds, including displacement, disturbance, loss, or conversion of habitat, and injury and mortality in response to public comments.

CHAPTER 6: ALTERNATIVES CONSIDERED

- Revised text to include information regarding the potential impacts associated with onshore transmission cables.
- Editorial changes.

CHAPTER 7: UNVOIDABLE ADVERSE IMPACTS

- Editorial changes.

CHAPTER 8: IRREVERSIBLE AND IRRETRIENAVLE COMMITMENT OF RESOURCES

- No changes.

CHAPTER 9: GROWTH-INDUCING ASPECTS AND SOCIOECONOMIC IMPACTS

9.1 Impacts on Growth and Community Character

- No changes.

9.2 Potential Program Costs

- Format correction to Exhibit 9-1.

9.3 Potential Program Benefits

9.3.1 Greenhouse Gas Reduction Benefits

- No changes.

9.3.2 Public Health Benefits

- Editorial changes.

9.3.3 Workforce Benefits

- Editorial changes.

9.3.4 Economies of Scale Benefits

- No changes.

CHAPTER 10: EFFECTS ON ENERGY CONSUMPTION

- No changes.

CHAPTER 11: LIST OF PREPARERS

- No changes.

APPENDIX A: RESPONSE TO COMMENTS ON THE DRAFT GEIS

- Incorporated to include responses to public comments.