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Commercial Leasing for Wind Power on the Outer Continental Shelf (OCS) Offshore New Jersey – Call for Information and Nominations

Comment On: BOEM-2011-0005-0001
Commercial Leasing for Wind Power; Call for Information and Nominations Outer Continental Shelf Offshore New Jersey

Document: BOEM-2011-0005-DRAFT-0007
Comment from Patty Doerr, organization

Submitter Information

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General Comment

See attached file(s)

Attachments

BOEM-2011-0005-DRAFT-0007.1: Comment from Patty Doerr, organization

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June 6, 2011

Mr. William Waskes
Bureau of Ocean Energy Management,
Regulation and Enforcement
Office of Offshore Alternative Energy Programs
381 Elden Street
Mail Stop 4090
Herndon, VA 20170

Re: Call for Information and Nominations for Commercial Leasing for Wind Power on the Outer Continental Shelf Offshore New Jersey (Docket No. BOEM-2011-0005)

Dear Mr. Waskes:

We are writing to provide comments on the Bureau of Ocean Energy Management, Regulation and Enforcement's (BOEMRE's) Call for Information and Nominations for Commercial Leasing for Wind Power on the Outer Continental Shell Offshore New Jersey. The Nature Conservancy recently submitted comments in response to BOEMRE's Notice of Intent to Prepare an Environmental Assessment for Mid-Atlantic Wind Energy Areas. We appreciate the opportunity to provide further input on areas that may specifically impact natural resources off the coast of New Jersey.

The Nature Conservancy recognizes wind as a valuable, emissions free source of renewable energy. Utility-scale wind development could reduce our consumption of fossil fuels, thereby reducing greenhouse gas emissions, other pollution, and associated environmental impacts. As with any industrial energy development, however, utility-scale wind production will have an associated footprint and environmental impact. Especially in these very early stages of the industry's development, when initial decisions have the opportunity to affect how these issues are addressed for years to come, *the Conservancy submits that it is imperative that BOEMRE ensure that the siting, construction, and eventual operation of these facilities are compatible with marine biodiversity conservation and other important uses and values of our oceans.*

We know and appreciate that BOEMRE shares this basic objective and is working hard on a number of fronts to achieve it. This letter highlights in more detail some of the specific issues BOEMRE should address and the data gaps it will need to fill so that it can help facilitate the development of offshore wind energy in an environmentally responsible fashion. Please find attached several maps that focus on the intersection of our Northwest Atlantic Marine Ecoregional Assessment (NAM ERA) (Maps 1, 4, 5, 6) and the State of New Jersey's Ocean Wind Power Ecological Baseline Study (Map 2) with the wind energy areas (WEA's) off the coast of New Jersey proposed by BOEMRE, along with additional U.S. Fish and Wildlife Service waterbird data (Map 3.) While we recognize that there will be additional opportunities for public comment as the locations of potential wind energy development sites are refined, leases proposed and specific projects developed, we would like to take the opportunity to highlight areas of particular concern that should either be avoided as a WEA or where more data is needed to better inform your decision making process.

Known data gaps New Jersey WEAs – Marine Birds, Mammals and Benthic Habitats
The New Jersey baseline study (http://www.nj.gov/dep/dsr/ocean-wind/report.htm) gathered offshore data on marine mammals, sea turtles, avian, and fish species over a two-year time period to provide an initial dataset of species use of particular areas offshore of New Jersey (Geo-Marine, Inc. 2010). The data ranks areas for environmental sensitivity by species type and provides points for where species were actually sighted (Map 2). While we commend New Jersey for its completion of the Ocean Wind Power Ecological Baseline Study, there are tremendous data gaps for ecological resources that offshore commercial wind development and operations are most likely to impact, especially marine birds, marine mammals, and sensitive benthic habitats. We face the compounded challenge of having an inadequate baseline of sensitive ecological resources off the coast of New Jersey coupled with an incomplete understanding of how these resources may be adversely affected by offshore wind activity. *Given limited time and resources for data collection, we urge BOEMRE to prioritize data collection and analysis based on the most urgent data gaps regarding marine mammals, birds and sensitive benthic habitats*

It is important to emphasize that the NAM ERA data were intended for regional assessments such as the assessments of potential WEAs that BOEMRE is conducting. However, NAM ERA data are not intended for more detailed analyses at the scale of OCS blocks. A scale and data resolution mismatch exists between the planning unit used for the NAM ERA (ten minute squares, or approximately 100 square miles) and for OCS blocks (approximately 10 square miles). Therefore, while the use of the NAM ERA priority conservation areas can inform environmental review of WEAs, drawing meaningful conclusions about leasing specific OCS blocks requires further investigation and site specific data collection.

Moreover, the NAM ERA data does not include robust information on offshore sea duck and sea bird concentration areas in the Northwest Atlantic, including off the coast of New Jersey, because we were unable to obtain regional scale data on the presence, absence or abundance of bird species. Several studies of offshore birds do exist for portions of the WEAs, and we used two of these to screen the WEAs as coverage allowed: the New Jersey Ocean/Wind Power Ecological Baseline Study published in July 2010 and the U.S. Fish and Wildlife Service's (USFWS) water bird aerial survey data collected between 2001 and 2003. USFWS water bird density survey data (extracted from the former Minerals Management Service's Mid-Atlantic Waterbird Data Beta Version 1.0) was analyzed in consultation with USFWS staff. Winter survey data that were valid for density calculations were portrayed at OCS block scale for all waterbird species combined (Map 3).

Lastly, please note that places not designated as priority conservation areas cannot be reliably interpreted as suitable for wind energy development without further investigation. In consideration of data limitations for marine birds, marine mammals and sensitive benthic habitats, areas not flagged as containing significant ecological resources may be as likely to represent a data gap as a lack of ecological conflict. Put another way, since the NAM ERA represents the most comprehensive ecological baseline study of the Northwest Atlantic outer continental shelf to date, the data gaps are themselves more instructive in illuminating the limitations of our current knowledge than they are at providing a systematic assessment of potential impacts and levels of risks to habitats and biological resources.

Additionally, and in consideration of data gaps articulated above, we highlight in Table 1 the highest priority data gaps that TNC submits need to be addressed before potential impacts can credibly be evaluated. Given the limited resources for new surveys, our focus is on the subset of the most vulnerable ecological resources that are the least well mapped and understood.

Migratory shorebirds, waterfowl, and sea birds
Commercial offshore wind facilities present a significant potential conflict with important migratory bird pathways in the Mid-Atlantic. The coastal route of the Atlantic Flyway, one of four principal flyways in North America, passes through the Mid-Atlantic and the New Jersey WEAs. Sea birds and sea ducks migrate through the Mid-Atlantic region during the fall, winter, and spring to forage at shoals, reaching their highest concentrations during winter months. Species of concern include piscivores (e.g. common and red-throated loons, northern gannets and red-breasted mergansers) that feed on menhaden and other small pelagic fish species and benthivores (e.g. scoters) that feed on small crustaceans, larval fish, and polychaete worms. Additional species of concern, including loons, gannets, mergansers, and scoters, are mostly commonly seen within 12 miles of the coast, and they tend to concentrate around highly productive coastal shoals in the Mid-Atlantic to forage (D. Forsell, personal communication, 2006).

As BOEMRE is aware, there are significant information gaps regarding the behaviors, migratory patterns, and densities of sea ducks and sea birds in the Mid-Atlantic. In fact, because of a lack of availability and access to regional spatial data on sea ducks and sea birds in the Northeast Atlantic, the Conservancy has been unable to produce a robust assessment of the most important offshore areas for these birds. The USFWS waterbird data provides valuable information for assessing potential wind energy development impacts (Map 3), but additional data to expand geographic and temporal scope and species coverage are needed. We note that there are existing spatial data on distribution and abundance of Atlantic seabirds that may be extremely useful to BOEMRE, including data from the U.S. Geological Survey and Manomet Center for Conservation Sciences.

We commend BOEMRE's Renewable Energy Studies program for investing approximately $275,000 to address avian data gaps through a research initiative entitled "Surveying for Marine Birds in the Northwest Atlantic". However, given the enormity of the data gaps and the high potential for risk to marine birds, we are concerned that while useful, this level of investment will be inadequate to reliably evaluate environmental impacts due to offshore wind energy developments, construction and operations for the regional EA*. Therefore, we strongly recommend that BOEMRE and other federal agencies like US Fish and Wildlife invest more heavily in comprehensive marine bird surveys of the proposed WEAs in the Mid-Atlantic.*

Marine mammals
Potential impacts to marine mammals from offshore wind facility construction and operations include habitat displacement, migration barriers, noise disturbance, and the increased potential of collisions with vessels (Wihelmsson et al. 2010). Very little is known about the temporal distribution and abundance, migratory paths, and feeding behaviors of marine mammals in the Mid-Atlantic, especially for large whales. The Mid-Atlantic is the least studied region in the U.S. for large whale activity and population estimates. We do know that approximately 40 species of marine mammals either migrate through or are seasonally present in the Mid-Atlantic. Two of these species, the Northern right whale and the humpback whale, are federally endangered, and a third, the bottlenose dolphin (coastal and offshore populations), is a species of special conservation concern. The Mid-Atlantic provides critical juvenile and foraging habitat between April and November for the northern migratory stock of the bottlenose dolphin. Bottlenose dolphins are common in the waters of the Mid-Atlantic WEAs during the summer based on effort-corrected observation data (Map 4).

With a population estimated at only 345 individuals per the most recent NOAA stock assessment (Waring et al. 2009), the Northern right whale is considered to be the most critically endangered large whale in the

world and is of greatest concern in the context of this analysis. This species migrates through the Mid-Atlantic in the late autumn on route to calving grounds in the South Atlantic coastal waters and then passes back though the area with calves in the spring on their way to summer foraging grounds off New England and Nova Scotia (Winn et al., 1986) (Map 4). However, virtually no data exists regarding right whale migratory pathways and foraging behaviors in the Mid-Atlantic. While the New Jersey Ecological Baseline Study documents a few sightings of right whales along with humpback whales and dolphins, unfortunately this study reveals little about migratory pathways (Map 2).

We recommend that closing critical data gaps for marine mammals in the Mid-Atlantic be one of BOEMRE's top priorities. BOEMRE should work in partnership with other federal agencies and other entities to conduct surveys, biopsies, and other research to determine the presence and absence of different large whale species, identify key population estimates, establish location and timing for migrations and overwintering, and characterize key activities and behaviors (such as feeding). These studies are critical to providing the baseline information on migratory patterns and behaviors necessary to credibly evaluate impacts from large scale offshore wind development in this region.

Benthic habitats

Another potential impact of offshore wind energy is the loss or conversion of benthic habitats and communities due to the placement of turbines and associated scour protection (riprap). Habitats most vulnerable to this conversion include hard bottom habitats with associated growth of corals and other biogenic habitat forming organisms which are highly sensitive to any bottom disturbance.
And while the conventional wisdom used to be that the Mid-Atlantic was a vast plain of sand, largely devoid of hard bottom structure, and, indeed, flat sand habitat does dominate this region, fine resolution surveys for sensitive coral habitat of the coast of New Jersey have not yet been conducted. The irregular occurrence of such habitats throughout the Mid-Atlantic region is highly probable and has been documented anecdotally and through records in the National Marine Fisheries Trawl Survey database. *As these habitats are extremely sensitive to bottom disturbance, investigating, characterizing, and documenting locations and distribution of live bottom patch habitats should be a top priority for BOEMRE in the EA and subsequent project specific EIS reviews.* It is critical that direct physical impact to these patch habitats does not occur as offshore wind projects are developed.

The Conservancy has taken steps to address benthic habitat data gaps through the NAM ERA. A team of scientists at the Conservancy developed an innovative method for defining and mapping the diversity and extent of marine benthic habitat types to characterize the seafloor of the outer continental shelf (Anderson, et al 2010b). These habitats are defined using information on organism distributions in combination with interpolated data on bathymetry, sediment grain size, and seafloor topography. Map 6 illustrates an overlay of the WEAs with the diversity of benthic habitats mapped in the Mid-Atlantic. *While these data are too coarse to provide the resolution necessary to site structures associated with wind facilities within the proposed WEAs, we recommend that BOEMRE use these data to provide ecological context for more detailed EIS reviews for proposed leases.*

Potential cumulative impacts to marine living resources and habitats

While we understand that many technological and socio-economic factors will influence the pace of offshore wind energy development and the space it requires, meeting wind energy goals within the Mid-Atlantic would require a conversion of a significant portion of the outer continental shelf to industrial use (Map 7). *However, given that the New Jersey and other Mid-Atlantic WEAs are a first step toward the fulfillment of DOI and DOE's national goal, it is incumbent upon BOEMRE to develop a transparent and*

thoughtful approach and associated methods for assessing cumulative impacts early in the NEPA process. We know that the development of multiple wind facilities in this region will have ecological consequences, including habitat loss and fragmentation, disruption of migratory pathways, increased noise and associated auditory disruptions for marine mammals and other species, and direct mortality from avian collisions with turbines and large whale collisions with vessels. It is essential that BOEMRE rigorously assess these likely cumulative impacts – both the increasing physical footprint of wind facilities and the interaction these facilities may have with other existing uses –as it takes steps towards its 54 GW goal.

We fully recognize that evaluation of cumulative impacts to marine ecosystems is challenging. We also appreciate that designing cumulative impacts assessments for offshore wind development will be difficult until more baseline data on ecological resources and first generation of wind facility construction and operations has been collected. However, the Conservancy believes it is imperative nevertheless for BOEMRE to strive to pioneer approaches and methods that will define what overall level of development in the Mid- Atlantic is possible without causing unavoidable and significant impacts to marine resources and habitats and other human uses of the ocean. Such methods will be iterative and improve over time through adaptive management and monitoring.

Best management practices and mitigation measures

The Conservancy wants to emphasize that, given the ambitious nature of the national offshore wind goal and the tremendous uncertainty about the nature and extent of associated ecological impacts, perhaps the most important BMP that BOEMRE can require is the development of robust, long term monitoring programs. Data acquired through site-specific monitoring will prove crucial to determining both the actual impacts and what BMPs most efficiently and effectively minimize those impacts. Decisions on more detailed or project specific BMPs made in the absence of this information may put sensitive resources at unnecessary risk or, conversely, prove costly to a wind energy facility without yielding a commensurate ecological benefit. *Toward this end, robust long-term ecological monitoring requirements should be included in permits for facilities in the Mid-Atlantic WEAs. BOEMRE should require that the effectiveness of BMPs and mitigation measures be monitored and reported in the annual wind project compliance certification.*

Monitoring data from the first generation of permitted wind projects will provide information critical to improving future design, construction, and operation standards. It will also greatly improve the accuracy and completeness of cumulative impacts assessments. This information in turn will enable effective adaptive management, including the revision of BMPs and mitigation measures for future permits to ensure that impacts are avoided, minimized or offset using best-fit requirements that reduce both economic and environmental impacts.

Summary and conclusions

In summary, The Nature Conservancy of New Jersey recommends the following:

- BOEMRE should acknowledge and seek to address significant data gaps regarding the location of ecological resources off the coast of New Jersey and how those resources may be impacted by offshore wind energy development.
- Given limited federal resources for data collection, BOEMRE should prioritize data collection and analysis on the most urgent data gaps regarding marine mammals, birds and sensitive benthic habitats off the coast of New Jersey and the rest of the mid-Atlantic.

- BOEMRE and other federal agencies like US Fish and Wildlife invest more heavily in comprehensive marine bird surveys of the proposed WEAs off the coast of New Jersey.
- Closing critical data gaps for marine mammals off the coast of New Jersey and the rest of the mid-Atlantic should be one of BOEMRE's top priorities. BOEMRE can expand efforts in partnership with other federal agencies and other entities to conduct surveys, biopsies, and other efforts to determine the distribution and abundance of large whale species, produce population estimates, establish location and timing for migrations and overwintering, and characterize key activities and behaviors (such as feeding).
- We recommend that mapping and characterization of benthic habitat off the coast of New Jersey, particularly for sensitive hard bottom habitats, should also be a top priority for BOEMRE. It is critical that direct impact to relatively rare and ecologically vital live, hard bottom patch habitats does not occur as offshore wind projects are developed.
- BOEMRE develop a transparent and thoughtful approach for assessing cumulative impacts based on future build out scenarios early in the NEPA process. It is essential that BOEMRE rigorously assess the likely cumulative impacts – both the increasing physical footprint of wind facilities and the impacts these facilities may have on marine resources and human uses.
- Building on the BMPs published in the ROD in January 2008, BOEMRE develop clear expectations for lessees regarding best management practices, including long term ecological monitoring, that mitigate impacts for this first generation of offshore wind energy facilities and enable adaptive management of future leasing, construction and operations. Toward this end, robust, long term ecological monitoring provisions should be included as part of leasing and permitting conditions for the Mid-Atlantic WEAs.

In conclusion, thank you for the opportunity to provide comments to BOEMRE on this important issue. We look forward to working with you as BOEMRE implements its Smart from the Start Initiative off the coast of New Jersey. If you have any immediate questions, please contact Patty Doerr, our Director of Conservation Projects, at (609) 861-4123 or pdoerr@tnc.org.

Sincerely,

Barbara Brummer
State Director

Attachments: References, Table 1, Maps 1-7.

About the North Atlantic Marine Ecoregional Assessment (NAM ERA):
The NAM ERA was developed in two phases, and we used data from both Phase One and Phase Two in assessing the WEAs. Phase One provides a comprehensive regional scale database of information on coastal and marine ecosystems, habitats and species to help inform and guide diverse conservation strategies (Greene et al. 2010). The Phase One database was designed to help fill critical data gaps to inform planning and decision making in support of multiple objectives, including conservation. Phase Two presents a suite of high priority conservation areas selected through full integration of the Phase One spatial data for all coastal, benthic and migratory species and habitats (Anderson et al. 2010a). The primary objective of the second phase was to identify a set of geographic areas that merit the highest conservation and management attention to meet broad goals for conserving the array of coastal and offshore marine ecosystems from the Bay of Fundy to Cape Hatteras, North Carolina. We believe these reports and spatial data products (available at www.nature.org/easternusmarine) will be useful to BOEMRE and others as the regional environmental assessments (EAs) for WEAs off the coast of New Jersey and the rest of the Northwest Atlantic are developed.

References

Anderson, M., J. Odell, M. Clark, Z. Ferdana, and J. Greene. 2010a. The Northwest Atlantic Marine Ecoregional Assessment, Phase Two: Identifying Conservation Areas in the Northwest Atlantic Marine Region. The Nature Conservancy, Eastern U.S. Division, Boston, MA.

Anderson, M., J. Greene, D. Morse, C. Shumway, and M. Clark. 2010b. Benthic habitats. *In:* J.K. Greene, M.G. Anderson, J. Odell, and N. Steinberg, eds. 2010. The Northwest Atlantic Marine Ecoregional Assessment: Species, Habitats and Ecosystems. Phase One. The Nature Conservancy, Eastern U.S. Division, Boston, MA.

Forsell, D. 2006. Personal Communication. Chesapeake Bay Field Office of the U.S. Fish & Wildlife Service, Annapolis, MD.

Greene, J.K., M.G. Anderson, J. Odell, and N. Steinberg, eds. 2010. The Northwest Atlantic Marine Ecoregional Assessment: Species, Habitats and Ecosystems. Phase One. The Nature Conservancy, Eastern U.S. Division, Boston, MA.

Geo-Marine, Inc. 2010. New Jersey Department of Environmental Protection Baseline Studies Final Report, Volume I: Overview, Summary, and Application. Plano, Texas.

Winn, H. E., C. A. Price and P. W. Sorensen. 1986. The distributional biology of the right whale (*Eubalaena glacialis*) in the western North Atlantic. Report to the International Whaling Commission, Special Issue 10:129-138.

Table 1. Existing data on known occurrences of sensitive ecological resources in the Mid-Atlantic proposed Wind Energy Areas based on the Conservancy's Northwest Atlantic Marine Ecoregional Assessment (NAM ERA) Phase One and Two data, the USFWS 2001-03 waterbird surveys and the New Jersey Ocean/Wind Power Ecological Baseline Studies (NJ EBS) completed in July 2010.

Finding	**Assessment/ Data Source****	**Map Reference**	**NJ WEA**	**DE WEA**	**MD WEA**	**VA WEA**	**Data Gap Priority**	**Potential impact**
Significant concentrations of hard and live bottom habitat	NAM ERA Phase II (NMFS)	Map 1	X				High	High
Observations of northern right whales	NJ EBS/ NAM ERA Phase I (US Navy)	Maps 2 and 4	X				High	High
Effort corrected sightings of bottle nosed dolphins during the summer	NAM ERA Phase I (US Navy)	Map 4	X	X	Adj.*	Adj.*	High	High
Effort corrected sightings (winter)/ observations of humpback whales	NAM ERA Phase I (US Navy) for VA only, NJ EBS	Maps 2 and 4	X			X	High	High
Observed presence of sea ducks and sea birds (specifically common and red-throated loons, Northern gannets, and long-tailed ducks) and areas of avian sensitivity (NJ only)	USFWS and NJ EBS	Map 3	X	X	X		High	High
Significant effort-corrected observations of leatherback and loggerhead sea turtles	NAM ERA Phase II (U.S. Navy)	Map 1	X	X	X	X	Medium	Medium
Significant persistence and richness for demersal fishes (e.g. summer flounder, black sea bass, skate, croaker)	NAM ERA Phase II (NMFS)	Maps 1 and 5	X	X	X		Low	Low
Significant persistence and abundance of large pelagics: dusky shark, sandbar shark, shortfin mako, thresher shark, Atlantic bluefin tuna (NJ only)	NAM ERA Phase II (NMFS)	Map 1	X		X		Low	Low

*Adjacent to the WEA.

** The original data source used in the NAM ERA assessment is noted parenthetically; NMFS = National Marine Fisheries Service.

Map 1. Regionally Significant Ecological Areas

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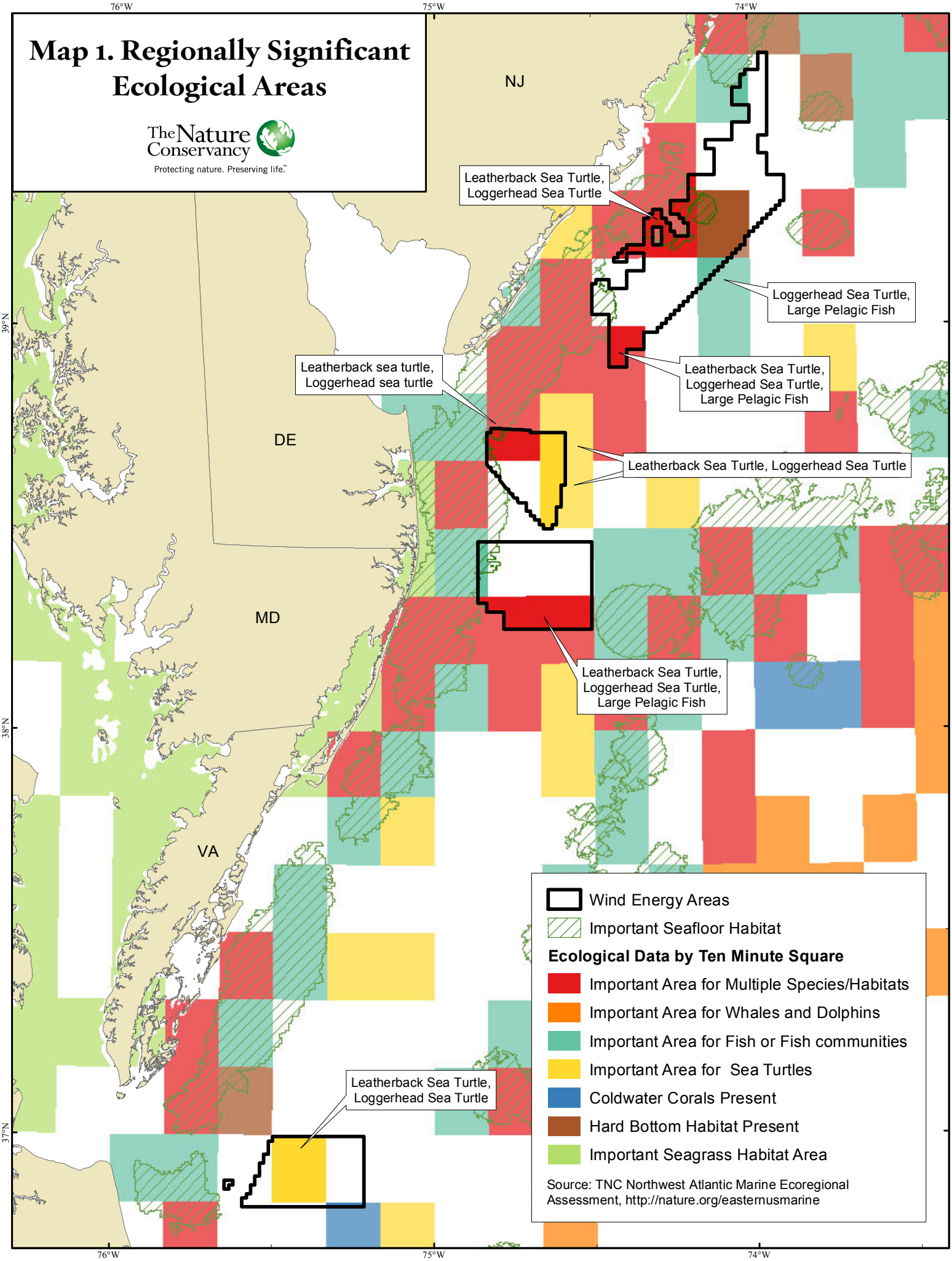
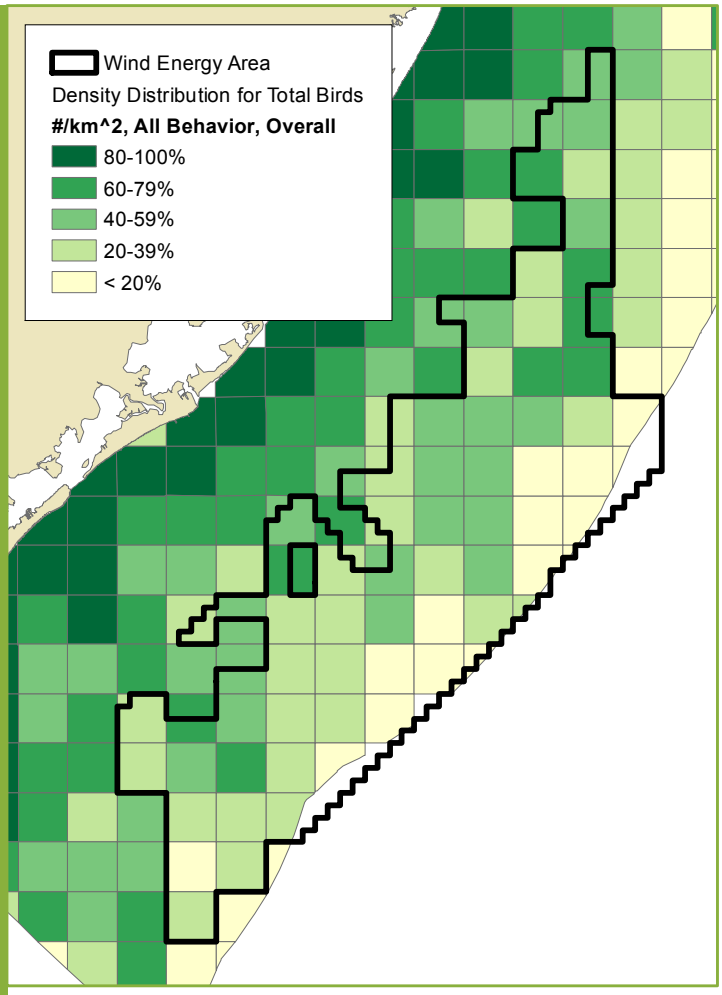
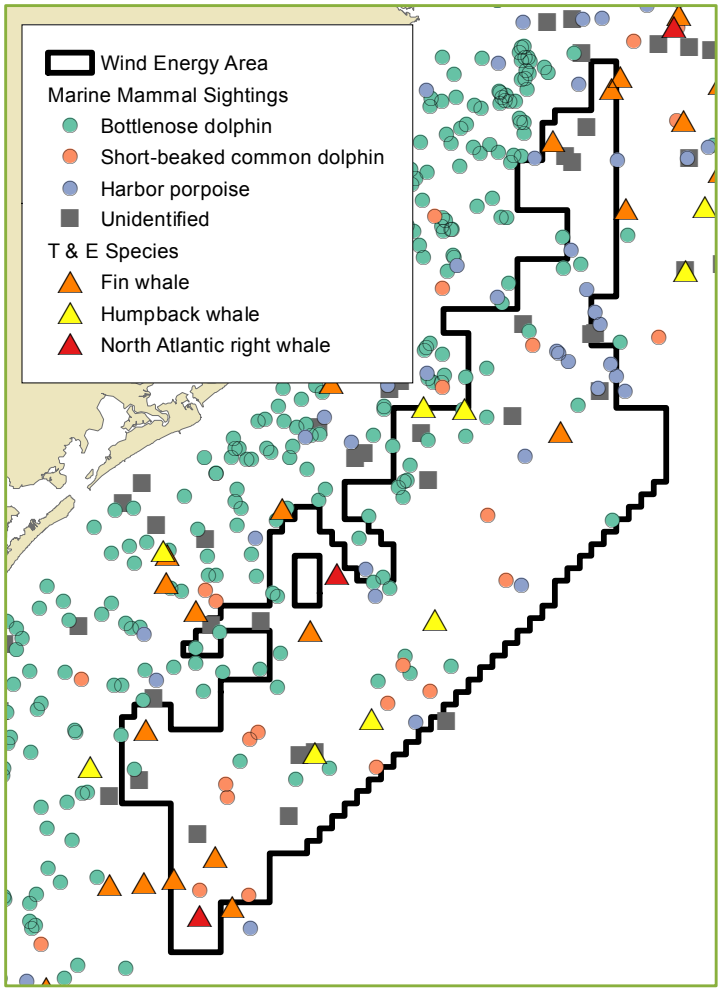
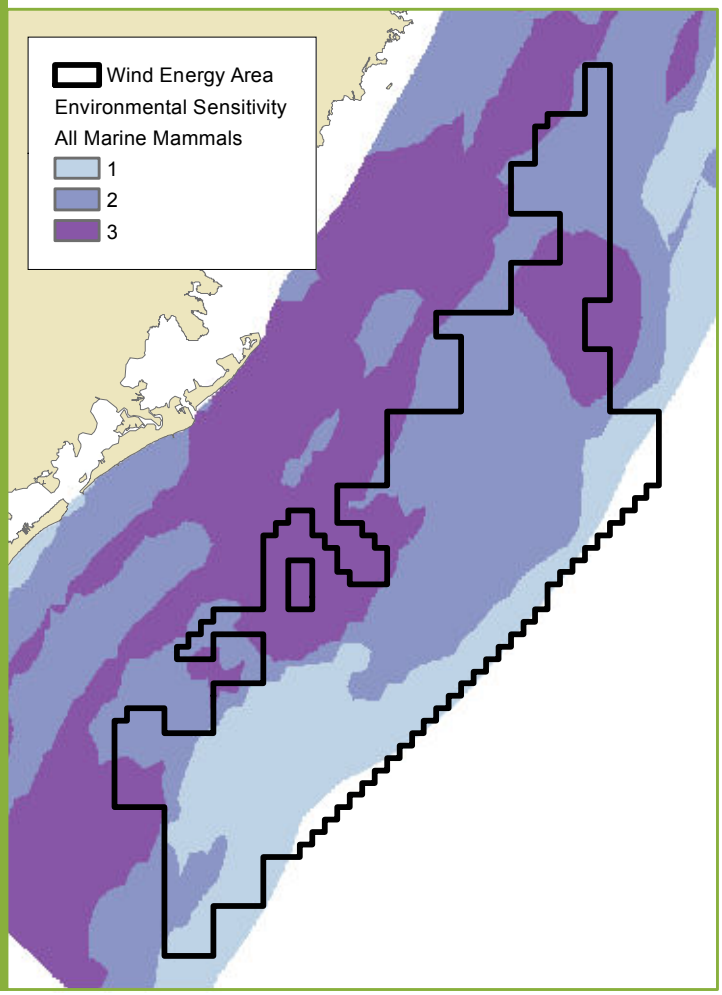
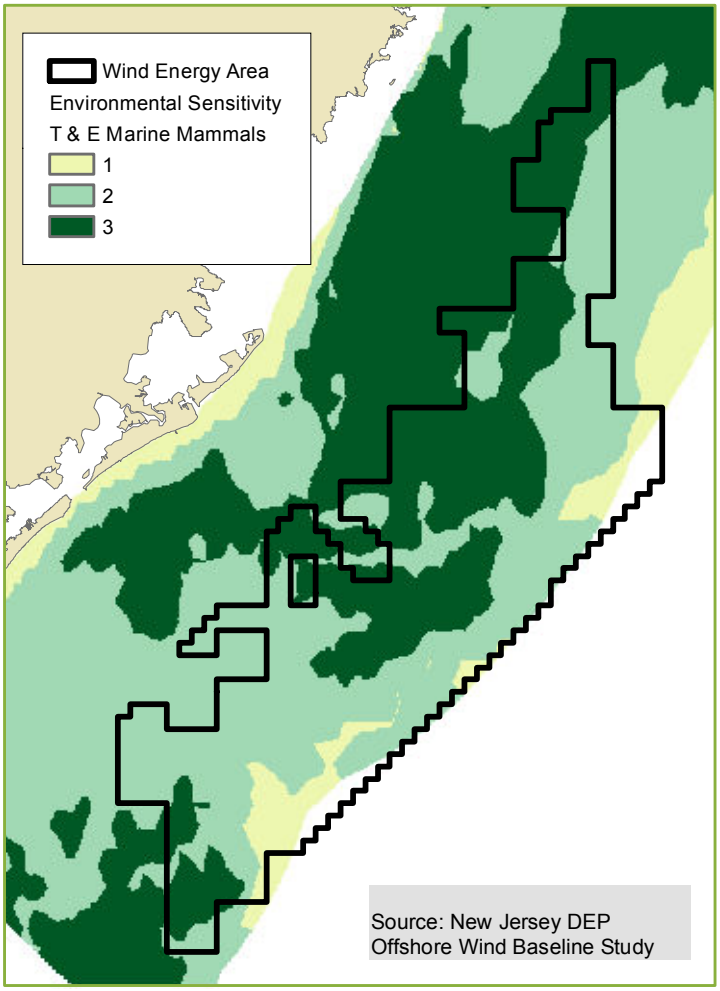


Map 2. Selected New Jersey Baseline Data









Source: New Jersey DEP
Offshore Wind Baseline Study

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Map 3. USFWS Waterbird Survey

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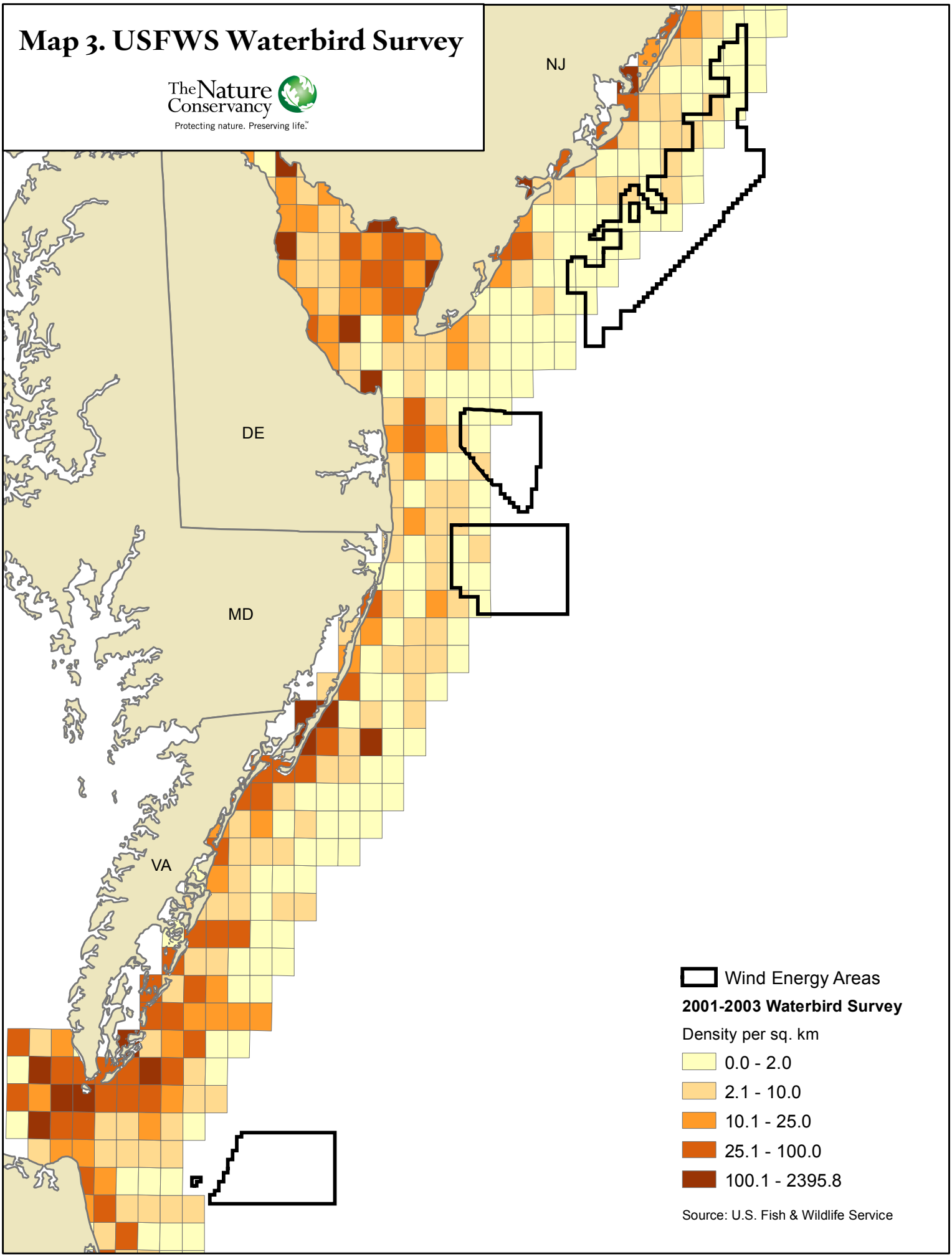
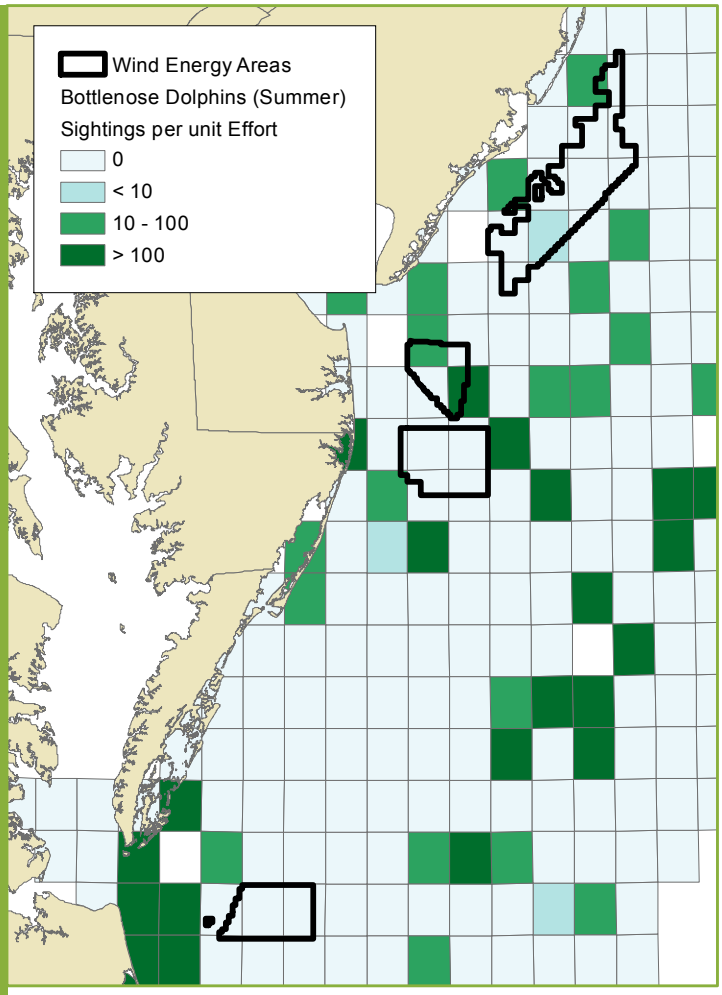
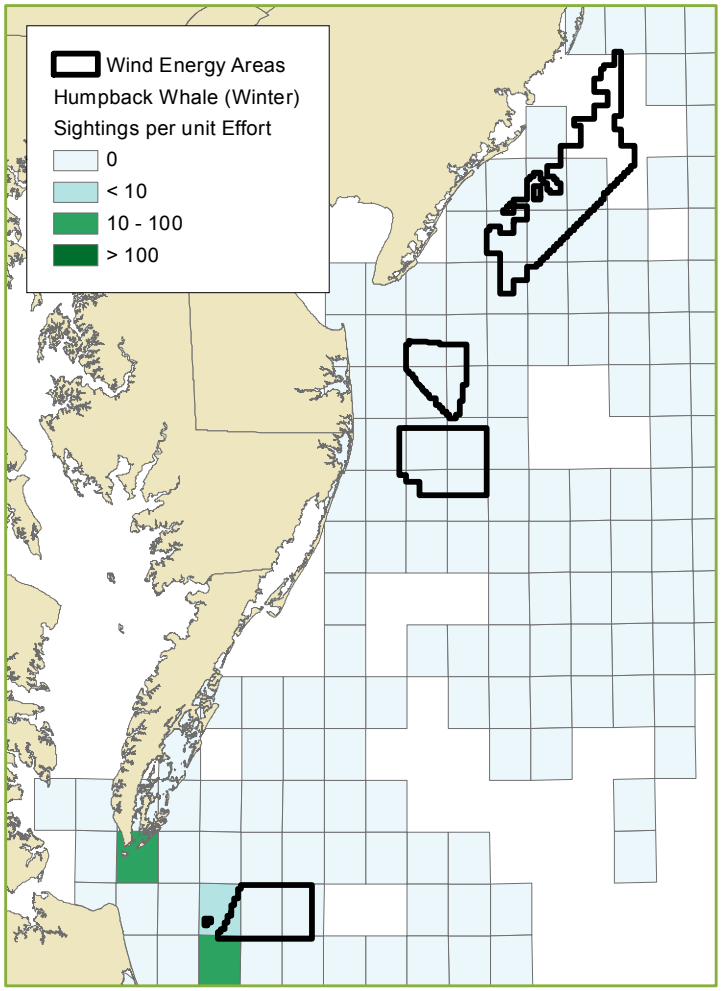
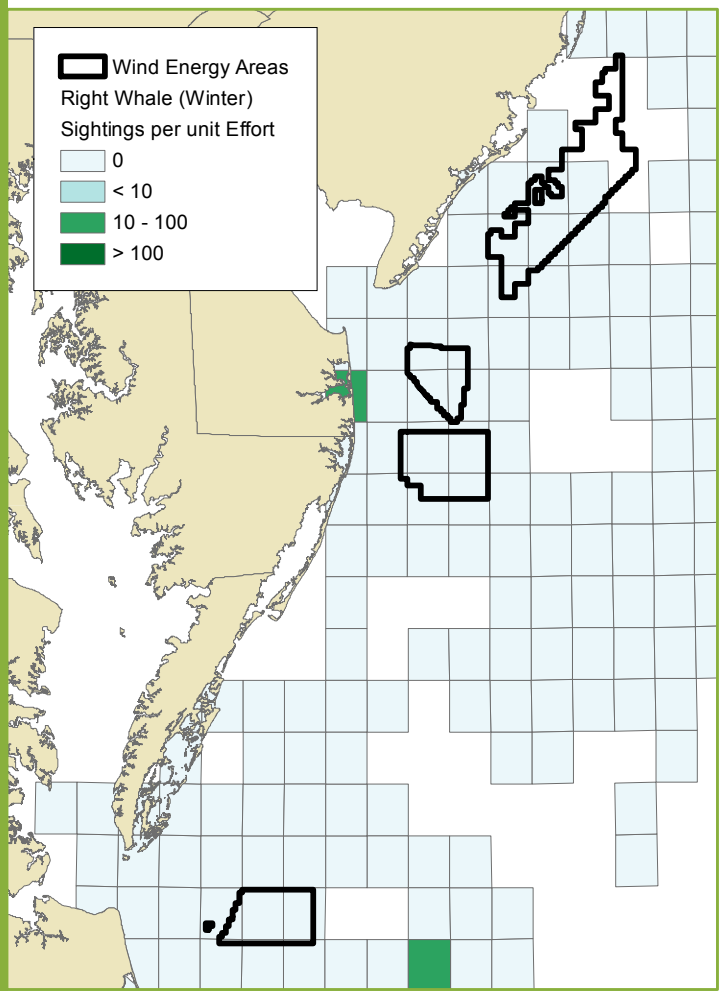
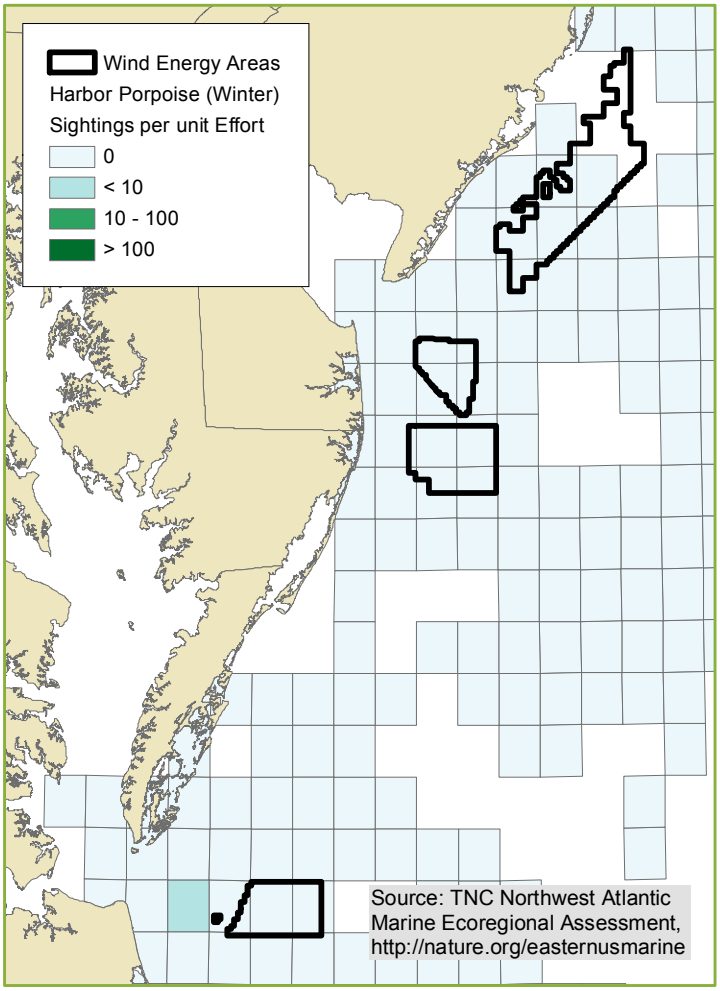


Map 4. Selected Marine Mammal Data









Source: TNC Northwest Atlantic Marine Ecoregional Assessment, http://nature.org/easternusmarine

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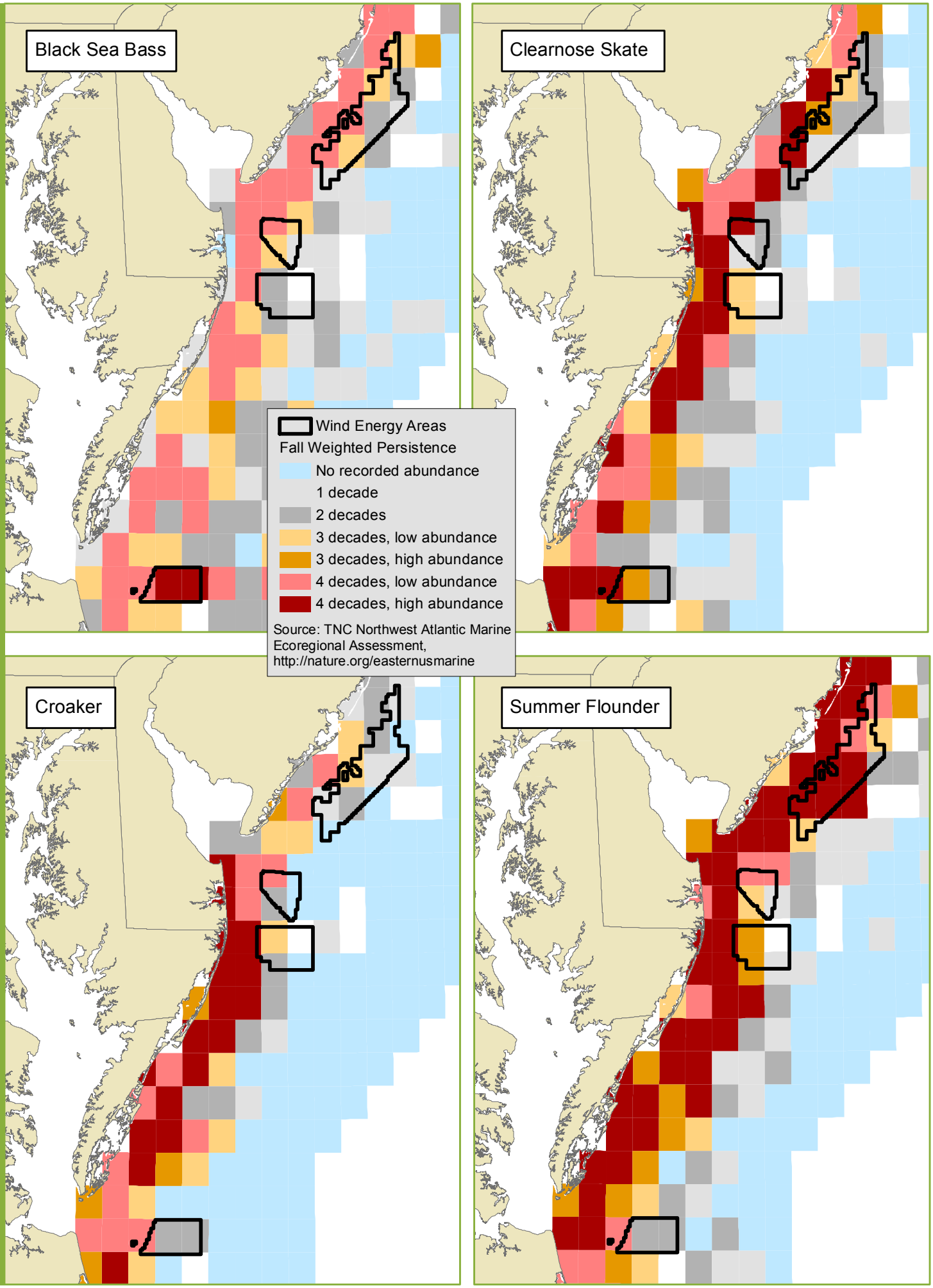
Map 5. Weighted Persistence for Selected Demersal Fish



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Map 6. Benthic Habitats

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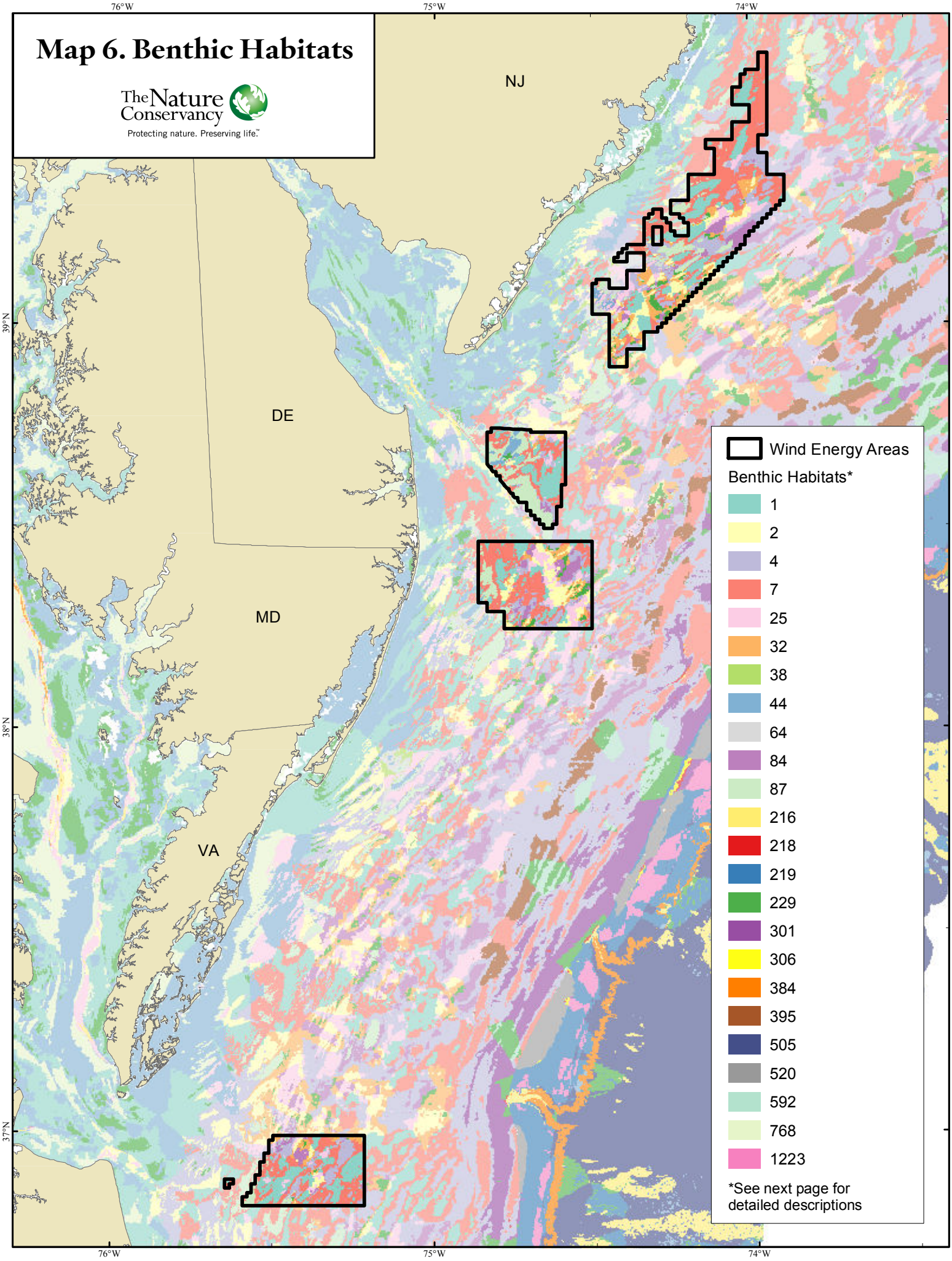
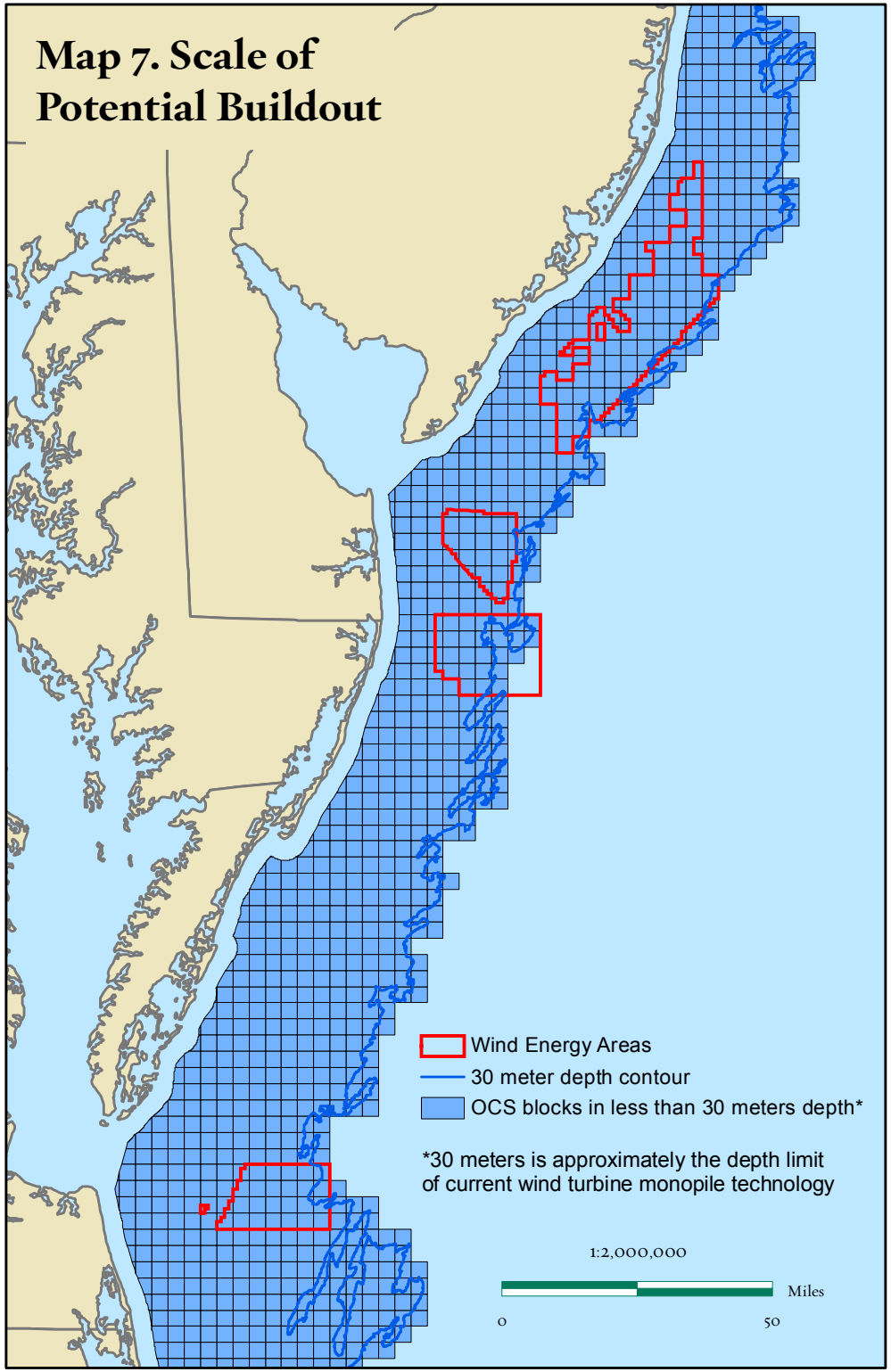


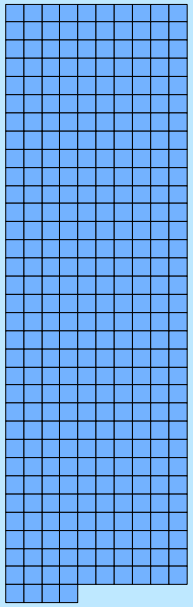
Mid-Atlantic Benthic Habitats

	Code	Description	Selected Species
	1	Depressions and mid-position flats, shallow to moderate depth (0 - 45 m) on coarse to fine sand	Shimmy worm, Astarte, Lancelet
	2	Flat depressions at shallow to moderate depth (0 - 45 m) in medium sand	Chevron worm, Burrowing anemone, Dog welk
	4	Mid-position flats in shallow water (25 - 45 m) on coarse to medium sand	Bamboo worm, Thread worm, Chestnut astarte
	7	Mid-position flats and depressions in shallow water (25 - 45 m) on medium to coarse substrate	Fringe worm, Frilled anemon , Common sea star
	25	Depressions at moderate depths (15 - 82 m) on fine to coarse sand	Bristle worm, Moon snail, Lined anemone
	32	Mid-position flats at shallow to moderate depths (22 - 45 m) on medium sand	Atlantic rock crab, Longnose spider crab, Common northern moon snail
	38	Depressions in water shallow (15 - 22 m) on medium to coarse sand	Bamboo worm, Olivepit porcelain crab, Arctic paper-bubble
	44	Depressions and mid-position flats mostly very shallow (0 - 22m), but occasionally very deep on fine to coarse sand	Jonah crab, Amethyst gemclam, Northern sea star
	64	Depressions and mid-position flats in shallow water (15 and 22 m) on medium sand	Blood worm, Sharp-tailed cumacean, Blue mussel
	84	All types of flats at moderate depth (22 - 82 m) on fine to medium sand	Beardworm, Sea urchin, Nutclam
	87	Depressions and high flats in shallow water (15 - 22 m) on medium sand	Burrowing scale worm, Glass shrimp, Sand dollar
	216	High slopes in deep water (95 - 592 m) on medium to fine sand	American lobster, Sea feather, Bobtail squid
	218	Depressions at moderate depths (45 - 82 m) on medium to coarse sand	Feather duster worm, Bean musse , Conrad's thracia
	219	High flats at moderate depths (45 - 82 m) on coarse to fine sand	Prawn, Sea scallop, Mud star
	229	High flats and depressions at shallow to deep depths (22-592 m) on a fine to medium sand	Jonah crab, Green sea urchin, Anemone
	301	Any seabed form at moderate to deep depths (45 -592) on any substrate	Gould's pandora, Calcareous coral, Foraminiferida
	306	All types of flats at medium depth (45 - 82 m) on medium sand	Acadian hermit crab, Daisy brittle star
	384	High slopes and canyons in deep water (95 - 592 m) on any substrate	Scale worm, Florida lobsterette, Royal red shrimp
	395	Depressions and high flats at moderate depths (45 - 82 m) on fine to medium sand	Spionid mud worm, Paper clam, Sea star
	505	Slopes and canyons in very deep water (>592 m) on silt and mud	Beardworms, Hairy sea cucmber, Stony corals
	520	Mid position flats and depressions at moderate depths (45 - 82) on mostly coarse to occsasionaly fine sand	Long-horned skeleton shrimp, Hatchet shell, Peanut worm
	592	Mid-position flats at moderate depth (45 - 82 m) on medium sand	Paddle worm, Cumacea, Arctic rock borer
	768	Depressions in very shallow water (0 - 15 m) on silt to fine sand	Mysid shrimp, Elongated macoma, Burrowing brittle star
	1223	High flats in moderately deep water (82 - 95 m) on medium sand	Eunice worm, Striate scallop, Margined sea stars

Map 7. Scale of Potential Buildout



Below is a simplified example of the area of OCS blocks required to reach the Department of Interior's 2030 national goal for 54 gigawatts of offshore wind generating capacity. Assuming 3.4 megawatt turbines, 15,882 turbines would be required to reach 54 gigawatts. Assuming spacing that would allow 49 turbines per OCS block, 324 OCS blocks would be required. The area below shows 324 OCS blocks at the same scale as the map on the left.



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