Collaborative Fisheries Planning for Virginia's Offshore Wind Energy Area

DRAFT Final Report

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Report prepared by Virginia Coastal Zone Program

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Glossary of Terms

A-NPDC – Accomack-Northampton Planning District Commission

ASMFC – Atlantic States Marine Fisheries Commission

BIWF – Block Island Wind Farm, a five-turbine project being built in Rhode Island state waters

BMP – Best Management Practice

BOEM – Bureau of Ocean Energy Management

C@S- *Communities at Sea*

CEC – Chesapeake Environmental Communications

COP – construction and operations plan

Conch – the common name used by the fishing community to refer to channeled and knobbed whelk

CZM – Virginia Coastal Zone Management Program

DMME – Virginia Department of Mines, Minerals, and Energy

Fisherdays - A C@S metric calculated as the length of a fishing trip multiplied by the number of crew present on the fishing trip. This project used fisherdays in the data to represent the amount of time that fishermen spend at fishing locations (including transit time), not the amount of time that fishing gear is deployed.

FMP – fisheries management plan

GEMS –Geospatial and Educational Mapping System

MAFMC – Mid-Atlantic Fisheries Management Council

MARCO – Mid-Atlantic Regional Council on the Ocean

NEAMAP - Northeast Area Monitoring and Assessment Program

NEPA – National Environmental Policy Act

NMFS – National Marine Fisheries Service

NOAA – National Oceanic and Atmospheric Administration

RFAB – Recreational Fishing Advisory Board

RPB – Regional Planning Body

"rule of three" – NOAA's policy to protect private business information by suppressing data showing the activity of less than 3 individuals, so as not to divulge any single fisherman's specific fishing location. A subset of maps (shown throughout this report and Appendix D) have the gear type or location suppressed due to the application of this rule and are coded as not applicable (NA).

TED – turtle exclusion device

TFA – Thanet Fishermen's Association

TNC – The Nature Conservancy

VCU – Virginia Commonwealth University

VIMS –The Virginia Institute of Marine Science

VOWTAP – Virginia Offshore Wind Technology Advancement Project, which is located on the research lease

VMRC – Virginia Marine Resources Commission

VTR – Vessel Trip Report

VWEA – Virginia Wind Energy Area (research and commercial leases)

Collaborative Fisheries Planning for Virginia's Offshore Wind Energy Area Final Report

Introduction

The U.S. Department of Interior's Bureau of Ocean Energy Management (BOEM) established the Virginia Intergovernmental Renewable Energy Task Force in 2009 to identify an area on the outer continental shelf (OCS) for leasing and development of offshore wind energy. Throughout the leasing process, which resulted in a commercial lease awarded to Virginia Electric and Power Company (Dominion) effective November 1, 2013, BOEM solicited stakeholder input – both from the Task Force and the public – about existing marine uses. BOEM selected the commercial lease area (yellow grid in Figure 1) to protect ecologically sensitive areas and minimize space use conflicts, while maximizing the area available for development.

In 2013, the Virginia Department of Mines Minerals and Energy (DMME) submitted a research lease application to BOEM for the installation and operation of two 6-megawatt (MW) turbines and associated cables. The requested area (purple grid in Figure 1) is adjacent to the commercial wind energy lease. After appropriate reviews, BOEM issued a research lease to DMME in 2015. The research lease is the site of the proposed Virginia Offshore Wind Technology Advancement Project (VOWTAP), which successfully competed for $47 million in U.S. Department of Energy funding.

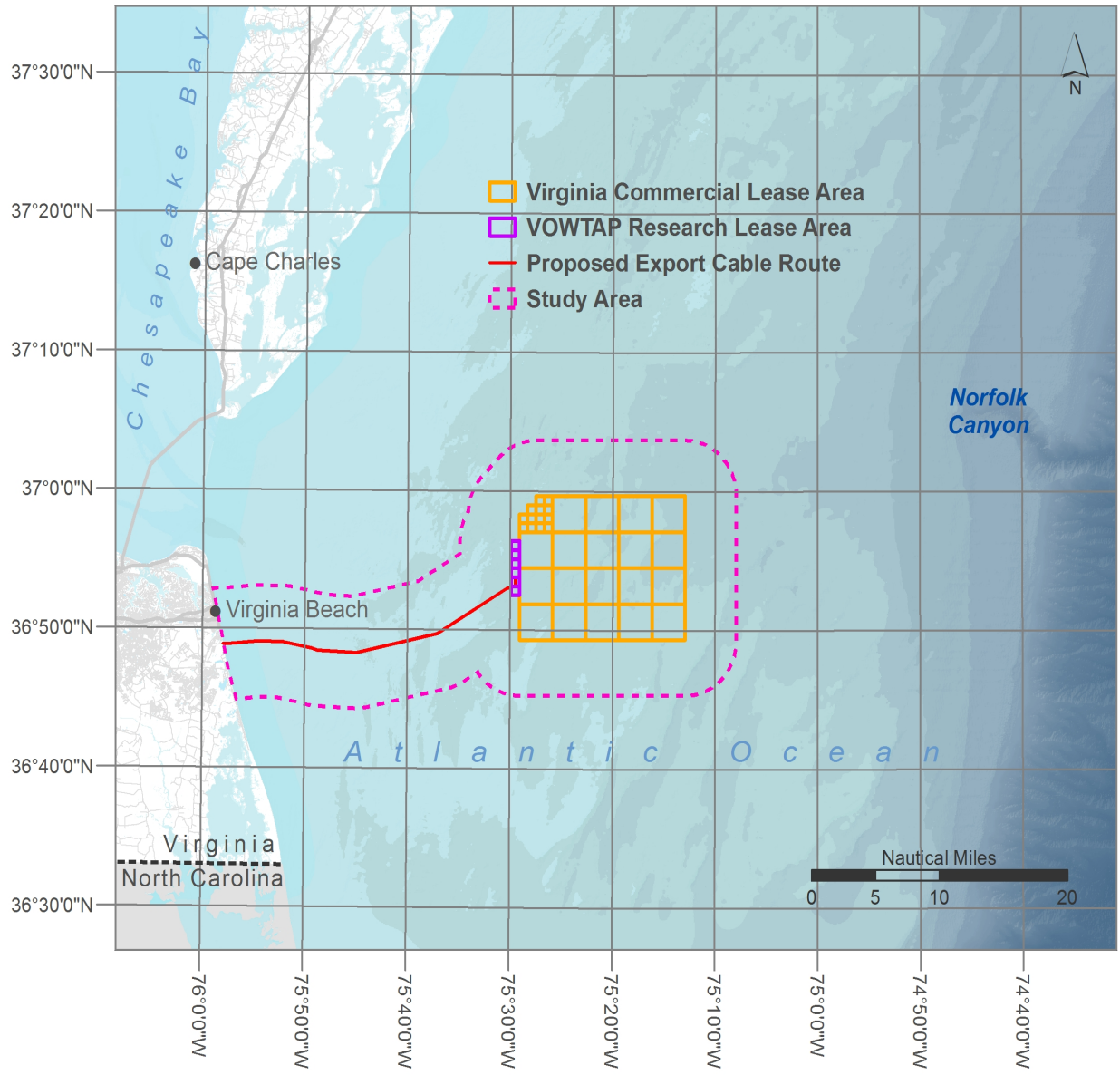

Figure 1: Virginia Wind Energy and Study Area.

Virginia's Wind Energy Area

This report refers to both the commercial and research leases as the Virginia Wind Energy Area (VWEA). BOEM's website www.boem.gov/Virginia provides the most up to date information regarding the status of regulatory approvals and identifies opportunities for public input. A map of the VWEA indicating latitude and longitude and other major features of the area is provided on page 4 of the project fact sheet (Appendix E). The project team selected a four-mile buffer around the VWEA and potential cable route for the proposed VOWTAP to focus the area of discussion.

Commercial Lease

In 2013, Virginia Electric and Power Company (Dominion) was awarded a commercial lease, which granted it the right to conduct site characterization activities to inform future plan submission. The area is approximately 176-square-miles and about 23.5 nautical miles (nmi) from Virginia Beach. The eastern edge is about 36.5 nmi from the coast. The longest north/south length is roughly 10.5 nmi. Between the years of 2016-2018, Dominion will collect biological, geological, and archaeological data under an approved Site Assessment Plan. As of February 2016, BOEM is awaiting Dominion's revised plan. The information from these surveys will inform the lessee's construction and operations plan (COP).[1] The purpose of the COP, required to be submitted to BOEM for review and approval five years after lease issuance, is to provide a description of all proposed activities and planned facilities that the lessee intends to construct and operate.

BOEM anticipates receiving the COP in 2018-2019, after which BOEM will conduct environmental analyses under the National Environmental Policy Act (NEPA) and consultations under the Magnuson-Stevens Fishery Conservation and Management Act, the Endangered Species Act and other environmental laws. The environmental review process will provide additional opportunities for fishing community input.

BOEM's post-lease regulatory process is anticipated to take at least 18 months from the submittal of a complete COP. The earliest start for the two-to-three-year construction period would be 2021. Dominion has indicated to BOEM it will take a phased approach with development, where Phase I could have a capacity of between 400 to 600 MW. There may be as many as four phases.

Research Lease

DMME assigned Dominion as its designated operator with full authority to act on the DMME's behalf to perform activities to comply with the terms of the lease. As of February 2016, BOEM is in the final stages of the approval process for the Research Activities Plan (RAP). The plan details the proposed location and schedule for the proposed VOWTAP and includes resource and assessment information and data collected to date in support of the planned design, construction, installation operation and maintenance of two 6MW turbines. The plan also provides information related to the installation of approximately 27 nautical miles of submarine transmission cable as well as other ancillary facilities required to support the project. If approved, construction in the research lease area could start as early as 2017.

Purpose and Objectives

BOEM, DMME and Virginia Coastal Zone Management (VA CZM) Program developed this project—*Collaborative Fisheries Planning for Virginia's Offshore Wind Energy Area*—to provide a process for working with the recreational and commercial fishing sectors. To prepare for potential development of wind energy facilities off the coast of Virginia, the project was designed to:

- Identify fishing communities potentially affected by the VWEA.

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[1] Lessee and developer are used interchangeably through the Virginia Collaborative Fisheries report. BOEM legal requirements are on the lessee, which typically is also the developer.

- Establish a collaborative process for a two-way exchange of information with identified communities.
- Develop accurate, fine-scale maps of important recreational and commercial fishing areas in and around the VWEA through a collaborative effort with fishermen.
- Build upon BOEM's *Report on Best Management Practices (BMPs) and Mitigation Measures for Fishing and Offshore Wind Energy Development*[2], by working with fishermen to develop a fisheries communication plan and other BMPs.
- Create BMPs regarding communication, design, operation, and environmental monitoring of a commercial wind facility.

Information from this project will feed into BOEM's environmental analysis (i.e., BOEM's NEPA review of the proposed COP).

Project Outreach

Background

In 2012, the Mid-Atlantic Regional Council on the Ocean (MARCO) and its contractor Monmouth University, and VA CZM and its contractors Virginia Commonwealth University (VCU) and the Accomack-Northampton Planning District Commission (A-NPDC), conducted participatory GIS workshops with recreational users and charter fishers to map 22 recreational uses off the coast of Virginia. Input received from recreational fishermen within those user groups captured both shore mode and open water based activities. These data also included details on the locations of large and small charter vessels and began the development of relationships with Virginia's charter industry. These maps can be viewed on the VA CZM's Coastal GEMS mapping portal: www.coastalgems.org.

In 2013, MARCO began to engage the commercial fishing industry in the mid-Atlantic with a focus on understanding fishing activities related to coastal ports, for the purpose of mapping offshore activities with a series of Communities at Sea (C@S) maps developed for MARCO's Mid-Atlantic Ocean Data Portal through a partnership with Rutgers University. These maps were reviewed with fishermen, along with the other four MARCO states (MD, DE, NJ and NY).

For this project, the C@S maps were developed using the same methodology (described below) but expanded to include complete fishing records for 2014, and customized to allow production of maps showing activity by the for-hire (party and charter boat operators) sector. The engagement process that had begun in 2013 to review the MARCO maps was implemented in earnest to review the updated maps

[2] Ecology and Environment, Inc. 2014. Development of Mitigation Measures to Address Potential Use Conflicts between Commercial Wind Energy Lessees/Grantees and Commercial Fishermen on the Atlantic Outer Continental Shelf Report on Best Management Practices and Mitigation Measures. A final report for the U.S. Department of the Interior, Bureau of Ocean Energy Management, Office of Renewal Energy Programs, Herndon, VA. OCS Study BOEM 2014-654. 98 pp.

for this project in 2014 by VCU and A-NPDC, as contractors to VA CZM. This work laid the foundation for further outreach with the commercial fishing industry on the VWEA project.

Initial Outreach Meetings

To initiate contact with Eastern Shore fishermen, since they are more dispersed than in the Hampton Roads area, the A-NPDC mailed surveys to about two hundred seaside fishing permit holders asking them to delineate, in general terms, their range of fishing grounds, and asking whether they would be willing to explore sharing chart plotter data as part of the Collaborative Fisheries work. Of the 55 returned surveys, 36 fishermen were interested in more information about the wind energy project, and of those, twelve said they would be willing to explore sharing data. Those individuals received follow-up phone calls, but most were found to not fish as far south as the VWEA. Three were found to be good candidates for further discussion. Those who were interested in more information about the wind energy project formed the basis for a contact list and guided decisions about where to hold future meetings.

Building on the information from the survey, and the earlier engagement success from both VCU and A-NPDC with C@S, in early 2015, the Project Team established outreach meetings with commercial fishermen to develop a collaborative communication process about offshore wind energy development. Handouts were developed for the sessions, including information about the proposed VOWTAP project and the larger wind energy lease area, and BOEM provided a frequently asked question fact sheet, which the team helped review (See Appendix E).

The Project Team identified the need for additional data beyond those data vetted by the C@S maps. Those included obtaining chart plotter data or directly seeking input with a separate handout on specific species and gear types in the VWEA Project Area. Protection of shared data was of great concern to the project team recognizing that these data may reveal proprietary information that could impact catch rates. The Project Team evaluated several options for Consent Agreements to protect those data and those representatives that shared them. The Project Team considered the United Kingdom Crown of State Fishery Data Consent Form; Va. Code § 2.2-3705.6(5) where the Virginia Freedom of Information Act excludes "*Fisheries data that would permit identification of any person or vessel, except when required by court order…*" as well as, guidance from BOEM stating, "*All aggregated fishing data that is provided to BOEM will be treated as confidential business information and will be withheld from public release in accordance with Exemption 4 of the Freedom of Information Act. Participants should label all information as confidential business information to assist the agency in identifying information that it would like to be withheld. Aggregated fishing data will not be withheld and BOEM plans on providing this information to the public"*. Ultimately, the industry willfully provided data and indicated it could be shared to inform this process. Methods for collecting that data- both electronically and on paper – were also developed for the meetings, and data were provided to the Project Team by fish and conch potters, and the charter industry. Direct requests were made to the industry to obtain electronic chart-plotter logs to illustrate patterns of use, relative to the Study Area. While these electronic data were not shared, specificity was provided either through mapping products or logs of waypoints identifying areas deemed valuable to their fishery.

Highlights of each of the public outreach session can be found below. Full summaries of the meetings can be found in Appendix B, including a number of questions raised during the outreach sessions.

March 26, 2015: Wachapreague

- Four fishermen attended this meeting, along with four members of the public.
- No data were shared at this meeting on paper, but team members were told that fishermen were interested in conch from October until January, and that they fish mainly around the Triangle wreck area.
- Commercial fishermen expressed a concern about being permitted to continue to transit through the area.
- Participants found out about the meeting through a variety of sources, including newspaper, friends, and email/phone call from A-NPDC staff, reinforcing the idea that a number of means for notification are needed for outreach on the Eastern Shore. One fisherman thought harbor masters should be added as points of contact.

March 30, 2015: Chincoteague

- Four fishermen (primarily conch potters who fish in the Triangle wreck area) attended this meeting, along with four members of the public.
- They noted it would help limit conflict if construction could avoid primary fishing time from October to February, and also occasional warm spells in the spring.
- The fishermen were concerned about fisheries that are not under federal permits, such as croaker. There was a history of croaker fishing in the wind energy area. Detailed spatial information on this state-licensed croaker fishing effort does not exist and project staff were unable to confirm fishermen's use of the fishery
- Fishermen felt that the years represented on the *C@S* maps (2011-2014) were not good fishing years and could understate fishing activity.
- As with Wachapreague, fishermen found out about the meeting through a variety of sources, including the radio, friends, email, and direct phone call from A-NPDC staff.
- There was a follow-up phone call from a black sea bass fisherman who fishes throughout the area with long-lines.

April 21, 2015: Virginia Beach Aquarium

- Seventeen members of the fishing community (both commercial and charter) attended the meeting.
- The team members present conducted a lengthy question-and-answer session. Fishermen asked questions about the project location and construction details, and expressed concerns about access and impacts to fishing in the VWEA.
- Fishermen identified the need for pre- and post-construction surveys to assess physical and biological parameters.

May 11, 2015: Eastern Shore Anglers Club

- A presentation about the wind energy project was given to about 30 anglers at the Club's regular monthly meeting, using handouts developed for outreach sessions.
- The general consensus was that the VWEA was beyond the area usually fished by Eastern Shore anglers. However, it was not out of the question that they would fish the

area, and their primary concern was being permitted access to the area for fishing, including proximity to the structures.

July 13, 2015: Recreational Fisheries Advisory Board, Public Informational Meeting

- A brief overview was given to the Recreational Fishing Advisory Board (RFAB) in May, and the board requested a public information meeting be held prior to their next meeting (July,2015). Invitations, as well as information and survey packets were widely distributed for the July meeting.
- At the July 13 meeting, a presentation about the wind energy projects was given, with several members of the RFAB, VMRC staff, and Collaborative team members present. Few fishermen attended; however, those that did were affiliated with larger fishing organizations.
- The primary concern by the anglers present was the potential loss of fishing effort, either by closed areas or closed days.

December 15, 2015: Virginia Saltwater Tournament Committee Meeting Briefing

- The Virginia Saltwater Tournament Committee was briefed on the current status of the wind energy projects and provided a brief overview of the five BMPs.

January 29-31, 2016: Mid-Atlantic Boat Show

The VMRC had a booth at the 63rd annual Mid-Atlantic Boat Show - which included the wind energy project information, the fact sheet, and a summary of the BMPs as part of the display. The outreach material drew a surprising amount of attention, and the overriding concern from the public was fishing access.

Historical Data

Fishermen often ask fisheries managers to understand current fishing practices within the context of much longer timescales. This may help managers to understand what may occur in the future. Unfortunately, historical fishing data is more difficult to find. The project team reviewed historical information to help characterize fishing activity within the wind energy area. The most detailed and relevant spatial information located was the 'Angler's Guide to the Atlantic Coast', a series of maps published by the National Marine Fisheries Service in the years 1974-1976. BOEM recently digitized these maps to produce GIS data, specifically for the purpose of informing the siting of renewable energy projects on the outer continental shelf. These data may best represent fishing areas in the mid-1970s but not previous, current, or future fishing as accurately, as much has likely changed over the decades and will change in the future. However, there are some seafloor areas near the proposed cable alignment that still seem to have been productive for fishing since the 1970s. Although these data may not accurately or comprehensively represent important fishing locations, as the amount and type of fishing effort has changed substantially over the past few decades. However, the Angler's Guide data was integrated with project boundary information for this report and included as Map 27 in Appendix D.

Commercial Data

As mentioned previously, MARCO began working with Rutgers University in 2013 to develop maps of important commercial fishing areas in the Mid-Atlantic region. These *C@S* maps integrated the National Oceanic and Atmospheric Administration's (NOAA) Vessel Trip Report (VTR) and vessel permit databases to produce heat maps that explicitly link fishing communities (defined by home ports and gear types) with the ocean places where they spent the most time (fisher days). As part of the parallel project described above, MARCO's portal team and VA CZM and its contractors are currently in the process of vetting these maps with commercial fishermen before posting them on the Mid-Atlantic Ocean Data Portal (www.midatlanticocean.org/portal). Again, multiple relationships with various fishers have been established and developed through this process.

Some patterns that emerged include consistent fishing effort throughout an extended time period, although the particular species targeted varied over time as sea conditions changed. This was reported to occur within the nearshore area of the proposed cable route and around the Triangle wreck area within the VWEA. It is important to acknowledge that fisheries have changed over time. Historically, there have been other types of fishing, such as mackerel and herring. Based on feedback from the Commercial Fishing industry, changes in fishing regulations that took place during the 1990s required the fishermen to use less efficient trawl gear to reduce the likelihood of sea turtle entrapment. Therefore, in recent years this and several environmental factors impacting fishing activity patterns have made it more efficient for the fishermen to fish further north of the Study Area, where the modified gear is not required (as sea turtles are less likely to be encountered). This shift in fishing effort is illustrated in a 4-panel map showing the Hampton bottom trawl community fishing over a 16-year period from 1999-2014 (see Appendix D, map 16).

Although the *C@S* maps depict the great majority of commercial fishing effort within the study area, a small amount of state licensed fishing conducted from vessels not holding federal permits (e.g., conch/whelk potting) is not represented in these maps because fishing from these vessels is not subject to federal vessel trip reporting requirements. Additionally, some federally licensed fishing activity is excluded from community and gear specific maps due to the "rule of 3", NOAA's policy to protect individual fishermen's privacy in cases where fewer than three vessels are fishing in a given area. Therefore, additional direct interaction with fishing community members will be critical to understanding the full extent of any potential impact. (see Stakeholder Engagement for Data Development and Map Review)

Methodology

The "*Communities at Sea*" (*C@S*) database was used to extract all available commercial and recreational fishing data from 1996 through 2014. This database was created by integrating NOAA's VTR and commercial fishing permit databases and represents fishing activity undertaken by most federally-licensed vessels. In this database, a community was defined by vessels' designated home ports and gear types (e.g., the Virginia Beach gillnet community). This report uses the word "community" to refer to any specific gear group and port combination. In cases where more than 50 percent of a vessel's annual catch was not landed at its home port, the vessel's activity was instead linked to the port where the vessel landed the majority of its catch. These data allowed for the identification of communities of interest with current or historic participation in the VWEA. Rutgers University researcher, Dr. Kevin St. Martin, developed the *C@S* methodology, and obtained summarized VTR and Permit database information from

NOAA's Northeast Fisheries Science Center (NEFSC). Staff at NEFSC first processed the data to remove all personal information (e.g. vessel and fisherman names, registration numbers) and to apply the rule of 3. Dr. St. Martin maintains the *C@S* database, and his students, Michael Borsellino and Jessica Bagtas, provided descriptive files, diverse spatial data products and tables and overall invaluable support for this project. Aggregated spatial data and maps will be made available for public use via online mappers and on request.

To gain a better understanding of relevant fishing activity from 1996 to 2014, the database was analyzed to identify trips that occurred within the Study Area. A variable called "fisherdays"--defined as the length of a fishing trip multiplied by the number of crew present on the fishing trip--was created to estimate a community's fishing effort and geographic tie to the ocean and its resources. The resulting spatial data products illustrate the specific ocean places communities were most dependent on based on the amount of time (labor) spent fishing at those places. These maps represent the amount of time that fishermen spend at fishing locations (including transit times), not the amount of time that fishing gear is deployed. Consequently, these factors helped determine the overall contributions of fishing locations to community socioeconomic capital. This analysis allowed for the computation of total annual fisherdays spent within the study area as well as total annual fisherdays for each community. Detailed metrics in tabular form for fishing activity within the project area for each community for the years 1996-2014 were provided to Virginia CZM and are available on request..

To gauge the amount of labor spent in the study area, density surfaces weighted by fisherdays were created. Each density surface was derived considering all trips which occurred south of Cape May (38.94° N latitude) to provide a more relevant measure of the study area's regional importance than would be obtained if the database's full extent (Virginia to Maine) were included.

Historical and Current Commercial Fishing

Though the database extends back to 1996, the four-year period from 2011 to 2014 was selected to represent the most recent fishing effort. Maps were created showing the seven commercial fishing communities that represented 98% of the total fisherdays in the study during this time (see Appendix D). The most fisherdays were in the Virginia Beach port's gillnet and pots and traps communities (Figures 2 and 3). Other commercial fishing communities with more than 10 fisherdays per year during this recent four-year period were NA-Gillnet, Hampton VA-Bottom Trawl (>65 ft. vessel), Engelhard NC-Shrimptrawl, NA-Pots and Traps, and Wanchese NC-Pots and Traps (note that "NA" means either the port or gear are suppressed for confidentiality reasons).

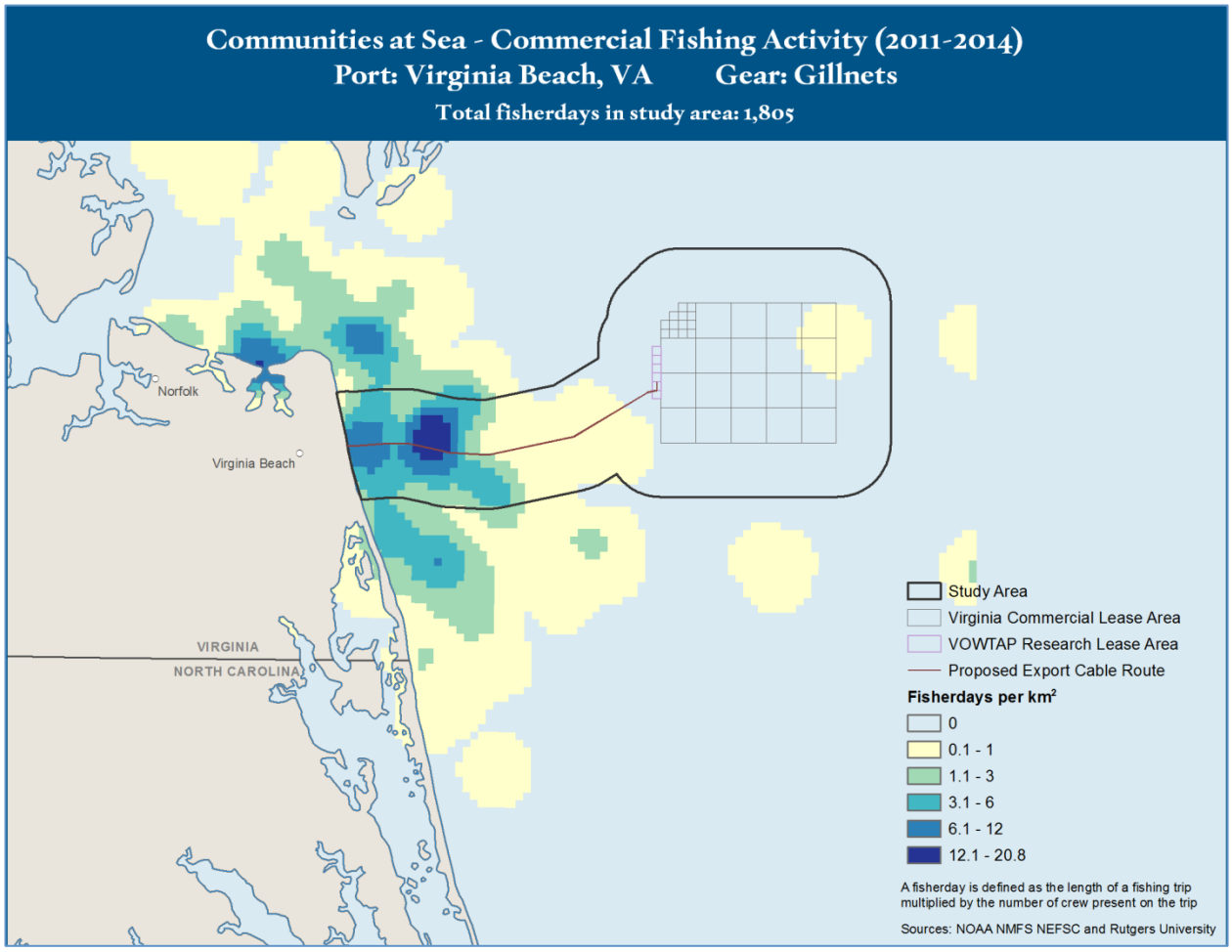


Figure 2: Virginia Beach gillnet community (2011-2014).

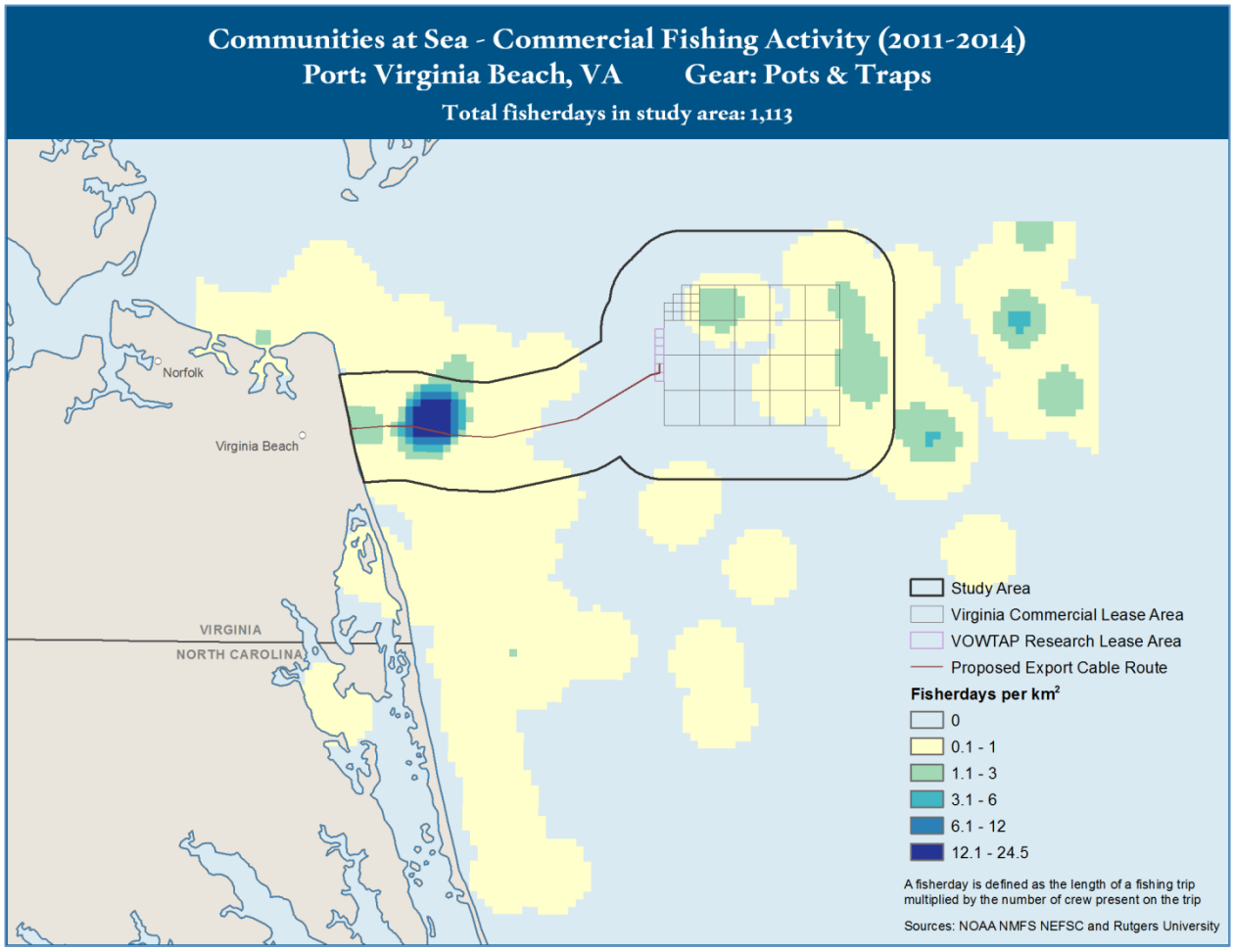


Figure 1: Virginia Beach pots & traps community (2011-2014).

Historic fishing activity dating back to 1996 was also analyzed. Time series maps and animated gifs were created for a number of communities that historically used the Study Area, but have not fished there in recent years. A subset of records in the project database were coded as gear type "NA"; these are fishing records where it is not possible to reveal gear type because of application of the "rule of three," NOAA's policy to protect private business information by suppressing data showing the activity of less than three individuals. Figure 4 shows fisherdays for the Virginia Beach-NA community, a record of additional past activity of vessels landing catch in Virginia Beach, with gear type suppressed due to the rule of three.

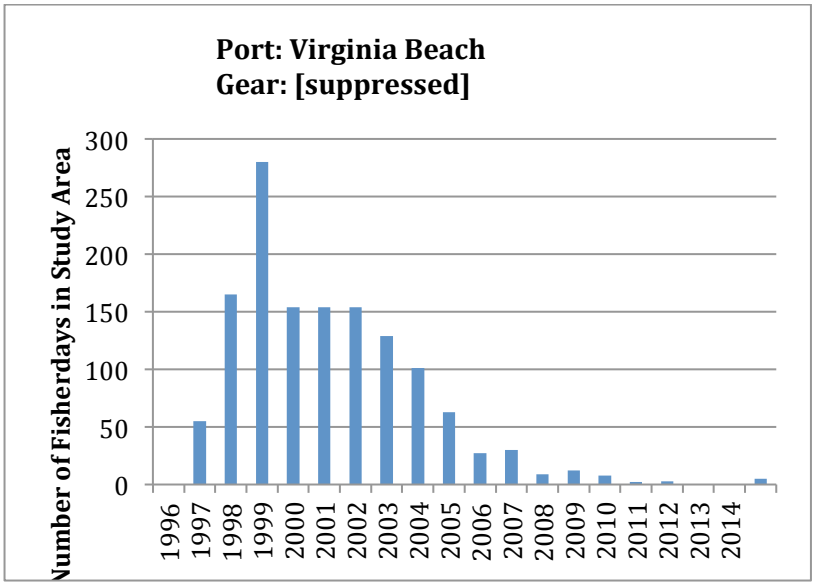


Figure 4: Virginia Beach-NA activity (1996-2014).

In addition to commercial fishing activity, for-hire recreational fishing was also analyzed. This analysis was limited to charter boats and party boats with federal fishing permits. A charter boat generally carries between one and six anglers, while a party boat may carry up to 150 anglers. The only communities with significant for-hire activity in the Study Area were Virginia Beach charter boats and Virginia Beach party boats. Maps and charts were created for these two communities showing both recent activity (2011-2014) and activity since 1996 (Figure 5).

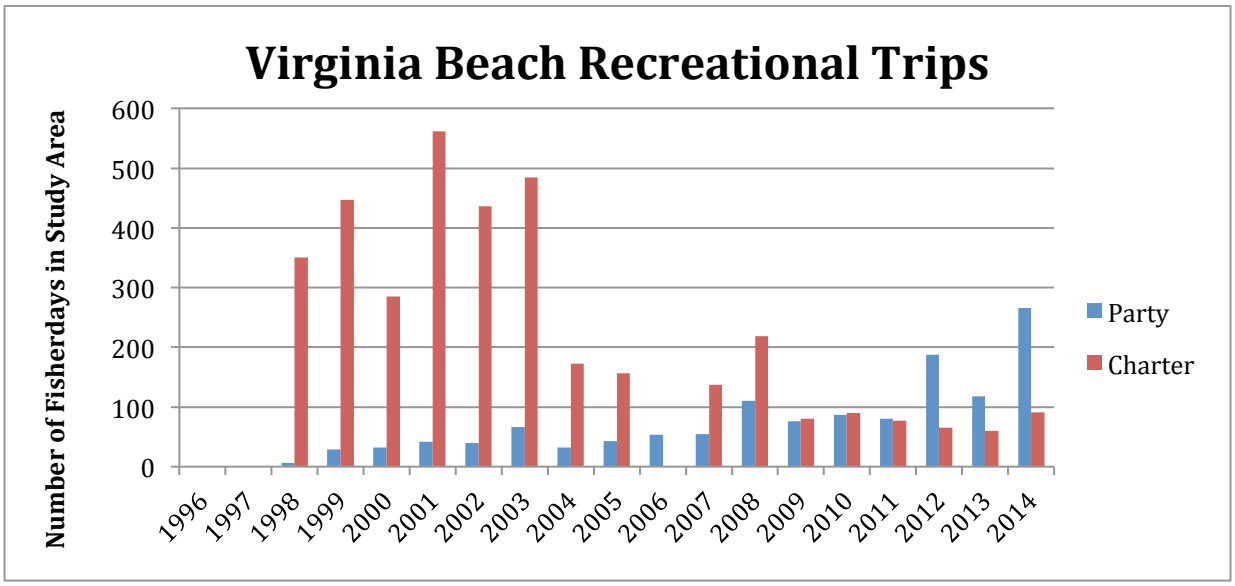


Figure 5: Virginia Beach recreational fishing trips.

Analysis of Important Fishing Areas

It should be noted that characterizations of 'importance' in this report are qualitative and relative to the Study Area, not in relation to regional or coast wide fishing patterns. Maps 19-24 in Appendix D illustrate this point. However, some fishing communities in Virginia do in small or large part depend on access to locations within the Study Area—it is very important to them, and this area may also be regionally 'important' for fishing with pot gear (see Figure 8).

Generally, the highest levels of fishing within the Study Area have occurred in the vicinity of the export cable route. The Virginia Beach gillnet community reported higher activity in this area consistently over the study period and the Virginia Beach pots and traps community had also reported recent activity in this area. Gillnetters from other ports, and Virginia Beach party and charter fishing communities, have also regularly and often used this area. There has also been persistent and significant pots/traps and recreational fishing activity in an area known as the Triangle Wrecks, in the northwest corner of the VWEA. This area is subject to significant activity recorded as the Virginia Beach "NA" community, with gear types not listed due to application of NOAA's rule of three.

In addition to analyzing maps and data from individual communities, an analysis was undertaken to determine the highest use areas across communities. For each gear type, the mean number of fisherdays was calculated and areas were mapped where the number of fisherdays was more than two standard deviations above the mean (Figure 6). This analysis shows significant activity in the vicinity of the export cable route, as well as a small area of significant activity just to the east of the Virginia commercial lease area. While this map shows important fishing areas for all commercial gear types in combination, two gear groups (gillnets and pots/traps) dominate the fishing pattern. Further analysis to reveal higher-than-average use areas for these two gear groups is shown in Figure 7. In this analysis, additional resolution and areal coverage was provided by including areas where fisherdays were greater than one and less than two standard deviations above the mean.

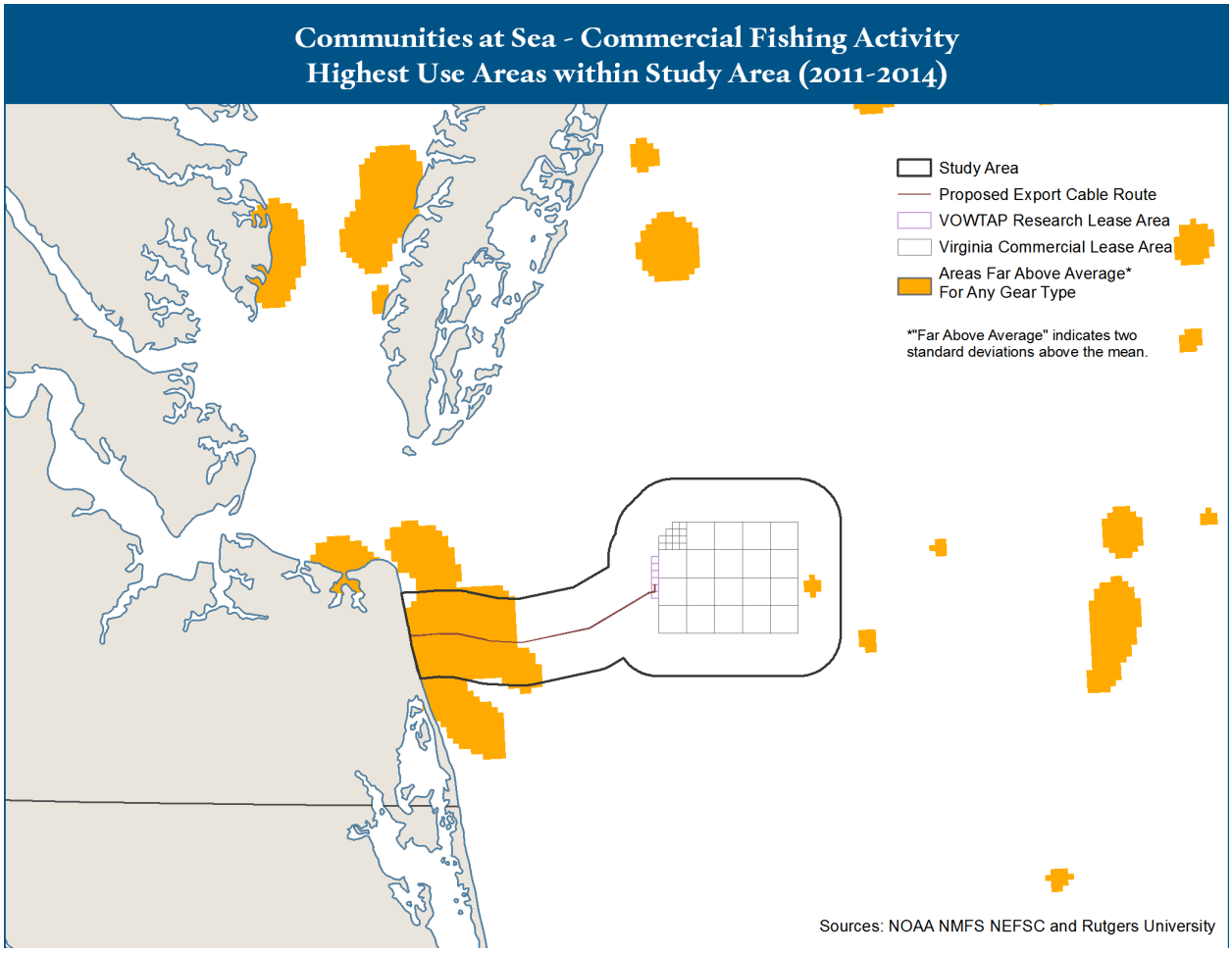


Figure 2: Highest use areas for all types of commercial fishing.

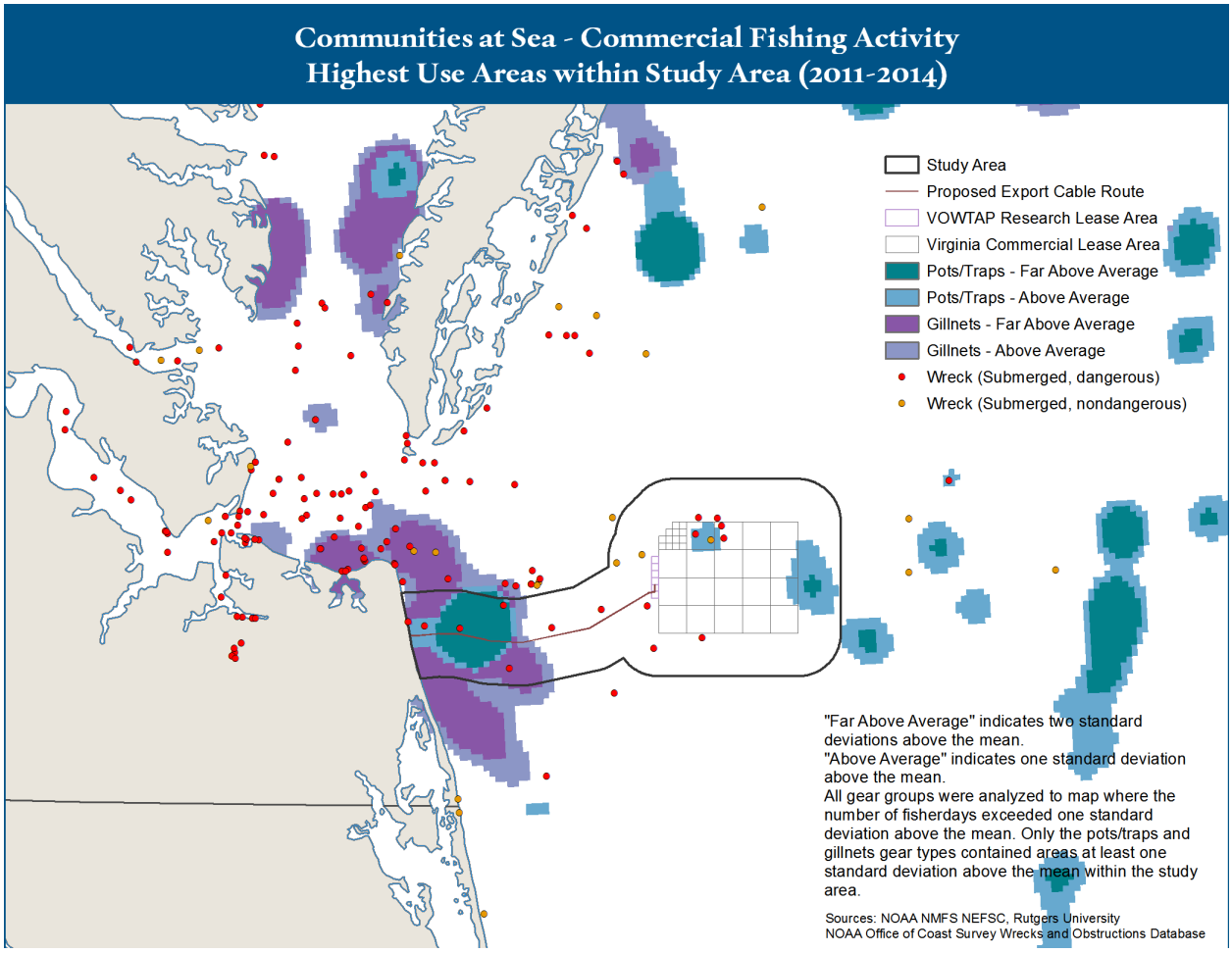


Figure 7: Highest use areas for select commercial fishing gear types (gillnets, pots/traps)

NEFSC's Socio-Economic Fishing Report

In 2012, BOEM entered into an interagency agreement (No. M12PG00028) with the National Oceanic Atmospheric Administration's Northeast Fisheries Science Center (NEFSC) to have them characterize commercial and recreational fishing from Maine to North Carolina.

Methodology

To better understand important fishing areas, NEFSC used an innovative method to spatially map fish harvest revenue. By merging 2007 to 2012 vessel trip reports (VTR) with data collected by at-sea fisheries observers, a statistical model was developed to predict the spatial footprint of fishing trip. These locations were then linked to seafood dealer reports, allowing NEFSC to create revenue-intensity rasters to create a visual representation of the fishing harvest (e.g., Figure 8). For additional detail on the methodology, see NOAA Tech Memo NE-229 and Justin Kirkpatrick's 2014 presentation to the Mid-

Atlantic Fisheries Management Council."[3] The NEFSC socioeconomic data was posted in September 2015 and is available at www.boem.gov/Renewable-Energy-GIS-Data.

Analysis of Exposure Data

NEFSC characterized the VWEA as being lightly fished. (Their analysis does not include the cable route). For fishing intensity, the VWEA ranked last ($144 per km^2) among the eight BOEM WEAs examined. In contrast, the highest—NY Call Area is valued at $10,937 per km^2. Table 1 shows the average annual commercial fishing revenue based on NEFSC's analysis of VTR data.

Amount of Historical Annual Revenue from VWEA	Landing Port Group	Federal Permitted Commercial Fishing Revenue (2007 to 2012)	
		Average Annual Revenue from VWEA	Average Annual Total Port Revenue
2% to 4%	Virginia Beach, VA	$40,251	$1,122,195
	Norfolk, VA	Not disclosed	Not disclosed
0.1%	North Kingstown, RI	$9,530	$9,555,145
	Engelhard, NC	$2,109	$2,307,195
	Oriental, NC	$1,087	$1,272,725
Less than 0.1%	Chincoteague, VA	$808	$3,130,890
	Newport News, VA	$5,633	$38,319,620
	Hampton, VA	$1,176	$15,344,027
	Cape May, NJ	$1,437	$75,665,163
	New Bedford, MA	$926	$292,229,242

Table 1: Average annual commercial fishing revenue.

The NEFSC data was categorized by port, gear type, and fishery management plan (FMP), and the Project Team created heat maps. The data showed the highest use by the pot and gillnet fishing sectors, with catch mainly landed in Virginia Beach. NEFSC estimated the VWEA provided approximately 4% of the 2007 to 2012 commercial permitted fishing revenue. Study Area fishing activity pursuant to the summer flounder, scup, and black sea bass FMP also occurred. Figure 8 shows pot gear fishing; additional maps were included in Appendix D.

The Project Team considered integrating the NEFSC data with *C@S* data, but concluded that this was not feasible due to methodological differences. However, taken together, final products from the two methods provide complementary ways of characterizing fishing within the study area (revenue and revenue-independent labor). The overall patterns of fishing activity in the vicinity of the study area revealed by the

[3] DePiper, Geret. June 2014. "Statistically Assessing the Precision of Self-reported VTR Fishing Locations." NOAA Technical Memorandum NOAA Tech Memo NMFS-NE-229. National Marine Fisheries Service. http://www.nefsc.noaa.gov/publications/tm/tm229; Kirkpatrick, Justin. April 2014. "Who Fishes There? Establishing a Baseline of Spatial Fishing Revenue along the Atlantic Coast." http://www.mafmc.org/briefing/april-2014

NEFSC data are quite similar to the *C@S* data, with both data sets showing the most significant locations near the export cable route with additional important areas near the Triangle Wrecks area and in the eastern part of the VWEA.

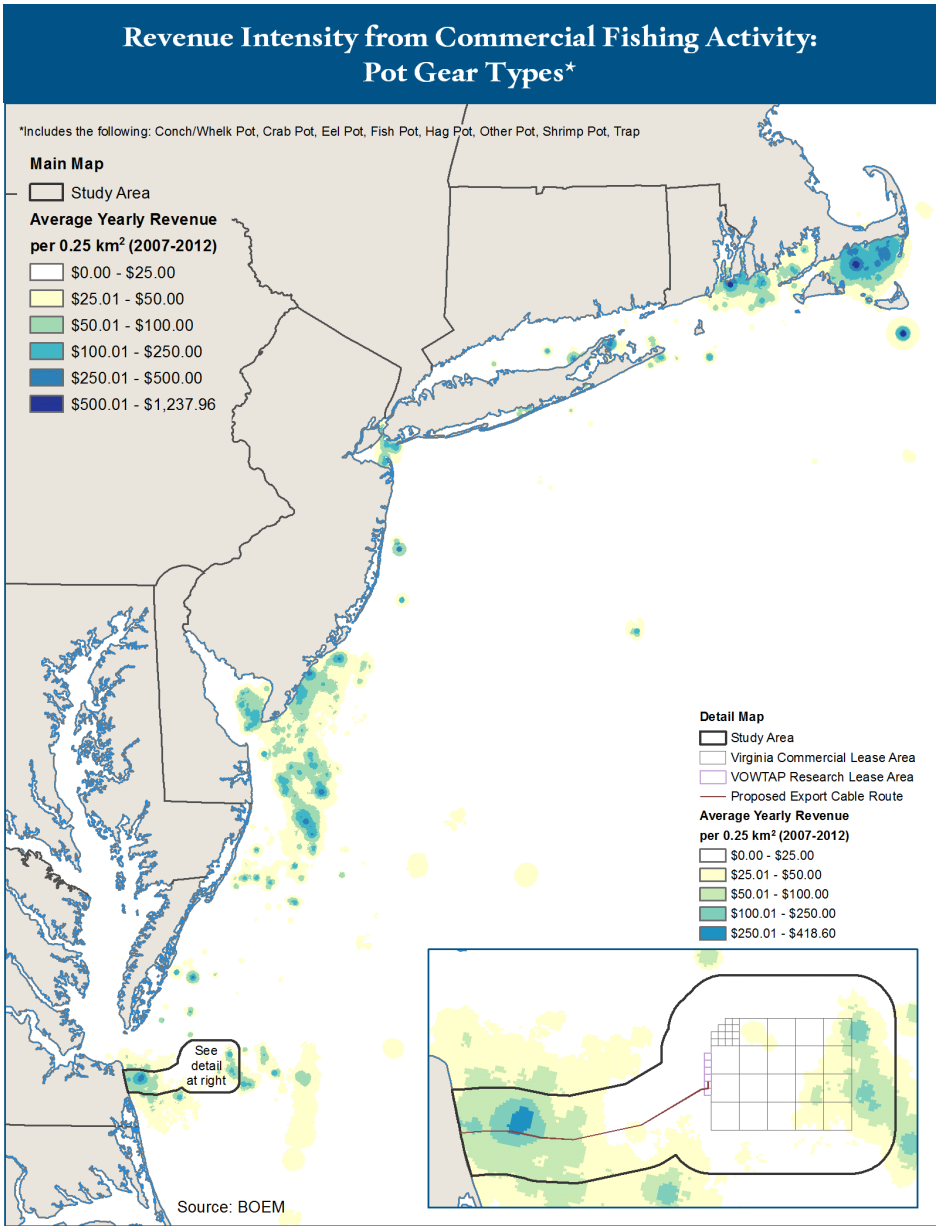


Figure 8: NEFSC data for pot gear.

Stakeholder Engagement for Data Development and Map Review

Approach

Draft C@S maps were reviewed by fishing community participants representing the identified ports of Chincoteague and other Eastern Shore localities, Newport News, Hampton, and Virginia Beach for each gear type. Contact was made to the commercial fishing industry in the states of North Carolina, Rhode Island, and Massachusetts, but no response was received. There was little negative response from those contacted. Of the comments received, industry representatives indicated the date range should be lengthened to represent a longer period of activity and that the data for the dredge/scallop industry may not be representative of all captains.

The following themes emerged from these review sessions:

- While it's important to examine fishing patterns during the most recent three years, that's not sufficient as areas that were important in past years may again be important in the future. Four-panel maps depicting fishing over the last 16 years were developed as an initial response to this feedback. (Appendix D, Maps 10-18).
- As discussed above, some state licensed fishing activity is not included in the federal data summarized for this project.
- Maps showing fixed gear (pots, traps, gillnets) fishing areas will tend to be more accurate than maps of fishing using mobile (trawls, dredges) fishing gear. This is because of the nature of the fishing activity and record keeping requirements; for example, fishermen using trawl gear are highly mobile but only required to report one geographic position per day in most instances.
- When these data are displayed via online mapping portals, fisheries management boundaries and zones should be available as overlays to aid in interpretation of regulatory impacts on fishing patterns.
- VTR data derived maps should be supplemented with more precise maps made using Vessel Monitoring System data (available for select federally managed fisheries).
- Although we believe the maps developed for this project to be accurate based on the information available at this time, affected communities need to be directly engaged during all phases of wind energy planning, and during construction and operations if development projects go forward (see the Best Management Practices in Appendix C).

The VCU staff continued to work closely with the A-NPDC planner to plan the communication and outreach strategies for reaching the Virginia fishing industries. Both Project Team members worked directly with the seafood and commercial fishing industry, building on previous successes and relationships. The Virginia Seafood Council continued to be a critical partner in communicating with those in the seafood processing and handling industry.

The Project Team developed plans for in-person meetings to discuss the details of the project and goals, and to acquire additional chart-plotter data reflective of use in the Study Area. Additional effort was accomplished through phone and email. Chart plotter data was requested through direct communication with the commercial and charter industries. Representatives from the black sea bass, conch, small boat charter ('six-pack') and headboat industries shared information relevant to their activities in the VWEA. None of these representatives shared downloaded chart-plotter data, however, VCU staff was able to obtain waypoints, hand-drawn maps, and completed data from electronic navigation equipment. These data were forwarded to TNC for aggregation. The team received confirmation from the red crab industry that they do not fish in the VWEA, but do transit through the cable alignment and VWEA on route to

their fishing grounds. The team consulted with the menhaden industry, which shared their data but requested it to remain as a confidential document. In summary, these data illustrated net-set in a 2011-2013 date range, comparable to the C@S maps. None of their landings are taken in the VWEA, but nets are set may be in the alignment of the export cable. Through discussions with the industry, the depth of the nets relative to the cable are not considered to be a hazard or hindrance to their operations. Consulting with the black sea bass trapping industry revealed intense fishing in the VWEA and was indicated by sharing waypoints and information to be mapped.

VCU staff continued considerable communication with representatives outside of the state of Virginia guided by the interpreted data from the National Marine Fisheries Service (NMFS) Draft Fisheries Exposure report. The Project Team identified the Rhode Island Coastal Resources Management Council fisheries liaison as a representative from Rhode Island. The liaison provided direct contact information for those industry representatives most likely to be fishing in the VWEA and landing fish in Rhode Island. For North Carolina, the North Carolina Fisheries Association continued to provide open communication for developing contacts and communication routes with the industry. However, none of these out-of-state contacts resulted in direct input or review of the *C@S* products.

Fishermen largely supported the maps and the team's conclusions on trends in the data. However, the industry has recommended that fishermen be included in monitoring efforts to document fisheries utilization in and around the VWEA. Scallop fishing industry representatives stated that the VWEA is probably in the optimal offshore location to minimize negative impacts within the scallop fishing industry.

Chart Plotter Data

Sample chart plotter data was obtained to successfully test data conversion and mapping methodology. Some fishermen have contributed fishing records for the project study area, including confidential data from digital chart plotters and hand written notes. If including this data, they could be useful for micro-siting considerations as areas to avoid. However, despite extensive outreach through individual contacts and public outreach meetings, fishermen were reluctant to share their chart plotter data with our team, although they were often willing to draw generalized locations on maps. Based on experience and information from wind development planning in other geographies, the Project Team expects that if the Virginia project moves forward, fishermen will be more inclined to share their personal high-resolution electronic records with developers or regulators to inform micro-siting considerations.

Results and Lessons Learned

Fishermen were willing to review the *C@S* maps and provided considerable commentary based on their own experience. For the most part, their knowledge of areas important to the commercial fishing industry matched those shown on the maps for the ports represented, with a few additions. However, one fisherman felt that the pots/traps maps understated the intensity of fishing because it represented only labor hours when the pots were being set and checked, and not the "soak time," or the number of hours the pots were actually in the water fishing.

Despite the fact that four Eastern Shore fishermen who fished within the Study Area initially indicated a willingness to explore sharing chart plotter data, none were ultimately willing to provide that data. They

were consistent in their reason: although they said they trusted the people doing the study and their intentions, they feared that once the data were handed over, the information would be accessed by a regulatory agency to impose a new restriction or regulation, and they were not willing to take the risk.

Fishermen on the Eastern Shore and in Virginia Beach were more inclined to draw on the *C@S* maps or on paper maps of the VWEA, and several did. Their compiled contributions can be seen in the Appendix D Map Gallery, "Volunteered Data."

Recreational Data

Methodology and Efforts to Collect Data and Information From Recreational Fishermen

Through a two day participatory GIS workshop in 2012, the Virginia Coastal Zone Management (VA CZM) Program, partnering with the Accomack-Northampton Planning District Commission (A-NPDC) and with assistance from National Oceanic and Atmospheric Administration (NOAA) staff, collected information on how the public recreates along the Atlantic coast of Virginia, from the shoreline out to the 200 mile US Exclusive Economic Zone (EEZ) boundary. At the workshop, expert stakeholders chosen for their knowledge of recreational use activities occurring along Virginia's Atlantic Coast (including representatives from state parks, wildlife refuges, marine police and the coast guard and also owners of shops, tour operators, recreational fisherman, and charter boat captains) used participatory GIS to map twenty-two distinct recreational uses.

The workshop utilized digital whiteboard technology to allow participants to draw polygons directly into a GIS prepared with various base map data. The workshop's forty-five participants were divided into five groups, each of which collectively drew both general use footprints (areas in which a use is known to occur with some regularity, regardless of its frequency or intensity) and dominant use areas (areas routinely used by most users most of the time) for each use. After the workshop, the data collected were cleaned and joined to a grid of one nautical mile cells. A threshold was applied to the grid cells representing dominant use areas to retain only those mapped by a majority of the groups. No threshold was applied to the grid cells representing general use footprints. These processed data were used to create draft maps of each use, which were shared for validation purposes with workshop participants as well as others who were unable to make it to the workshop. The final maps were posted to VA CZM's online mapping application, Coastal GEMS, available at www.coastalgems.org.

Six of the twenty-two distinct recreational uses mapped at the workshop involved recreational fishing: **large vessel charter fishing** which includes charter activity related to fishing led by charter vessels of greater size (e.g. head boats), **small vessel charter fishing** which includes charter activity related to fishing led by charter vessels of lesser size (e.g. 6-pack boats), **recreational fishing from motorized vessels** which includes any fishing activities from private motorized vessels (including tournaments), **recreational dive fishing** which includes recreational SCUBA and free-dive fishing, **recreational shore fishing** which includes recreational fishing from beaches or piers, and **recreational kayak/non-motorized vessel fishing** which includes any fishing activities from private non-motorized vessels.

Outreach Efforts

Outreach to the recreational community was made through presentations to fishing boards (The Recreational Fishing Advisory Board (RFAB), the Finfish Management Advisory Committee (FMAC), and The Virginia Saltwater Tournament Committee), by local fishing clubs (the Eastern Shore Angler's

Club) notices, and by notifications on the Virginia Marine Resources Commission's (VMRC) website and Facebook page. RFAB, made of members with close ties to the recreational community, was briefed on the data collection effort and scheduled the public informational meeting in conjunction with their July 13, 2015 meeting.

The Collaborative Fisheries planning team developed a fact sheet (Appendix E) and surveys describing the project. The survey sheets encouraged participants to provide information about their fishing preferences and to note the highest priority fishing locations within the VWEA on a map attached to the survey. Anglers had the opportunity to provide feedback through their respective clubs, by attending the informational meeting, or by returning the survey to one of several team members.

Packets of fact sheets and surveys, along with a cover letter inviting the public to the informational meeting on July 13, 2015, were widely distributed to locations saltwater anglers frequent (fishing clubs and tackle shops). All saltwater fishing clubs with valid addresses and all official weigh stations (80+ stations) participating in the Virginia Saltwater Tournament were sent a supply of fact sheets and surveys for distribution to the public. In addition, the fact sheet and survey were sent out electronically to everyone on the RFAB notification list and posted to the VMRC agency webpage. Several fishing clubs also included the information in their respective newsletters.

The July 13 informational meeting was not well attended; however, those that did attend represented some of Virginia's most active fishing clubs. While there was interest in the possibility of new fishing opportunities, and a concern about restriction of access in the VWEA, very few completed surveys were returned.

Fact sheets were also provided at the VMRC Display at the 2015 State Fair of Virginia. In December 2015, the Virginia Saltwater Tournament Committee held their annual meeting (also open to the public) and were briefed on the current status of the project. They were also provided a brief overview of the five BMPs. The VMRC had a booth at the 63rd annual Mid-Atlantic Boat Show from January 29 through January 31, displaying the wind energy project information and the fact sheet.

Volunteered Data

Volunteered data provided by the recreational fishing industry was very limited and generalized in nature. Responses to the surveys and outreach effort were low. While recreational anglers wanted to learn about and discuss the project, there were many who felt that they did not have enough information to provide specific fishing locations or detailed comments. Several noted that they wanted more detailed information about siting and timing of the construction process.

Anglers also noted that the wind energy area is very important to recreational fisheries, as it provides multiple opportunities to fish productive offshore areas (particularly the wrecks and artificial reefs located in the VWEA). The most frequent input was that anglers were excited about the prospect of additional vertical structure in the area once the turbines are installed, but they were concerned about potential limitations on fishing access, with specific interest being in the distance vessels might be from the structures. The recreational angling community expressed interest in the possibility of fishing as close as possible to the structures. One angler noted that losing a single day of available fishing would be unacceptable.

BMP Development

Background

The National Energy Policy Act (NEPA) contains guidelines associated with wind energy development and activities on the Outer Continental Shelf as they relate to interaction with commercial and recreational fishing practices. Using information obtained during BOEM's outreach meetings conducted from October 2012 to April 2014, to develop the *Report on Fishing Best Management Practices and Mitigation Measures,* suggested BMPs and mitigation measures for analysis and decision-making were developed. The goal for the Collaborative Fisheries project is to take BOEM's work, combined with the input from recreational and commercial fishermen active in the Study Area, to craft BMPs that are specific to the VWEA.

A primary objective of the BMPs is to share information in an ongoing way that is credible and makes the fishing industry's role clear. That means working closely with fisheries representatives, using the information channels that they are accustomed to, and providing opportunities for direct input to decisions in ways that are concrete. Communication has been identified as the most critical piece to effectively deploying offshore energy and is a foundational consideration in the following four BMPs: #2. Siting, Micrositing and Design, #3. Navigation, Access and Safety, #4. Environmental Monitoring and #5. Mitigation. All the full BMPs can be found in Appendix C of this report.

BMP Workshop

In September 2015, the Project Team held a workshop in Virginia Beach, which brought together representatives from all interested agencies and invited experts from the State of Rhode Island and a fisheries Liaison and Representative from the United Kingdom. The major goals of the workshop were to learn from the invited experts, identify and refine BMPs to mitigate potential use conflicts between fishermen and wind energy developers, create a communication plan to keep fishermen informed of wind energy activities, and vet the aforementioned mapping products with the fishing community.

The A-NPDC planner contacted fishermen on the Eastern Shore by phone and by email to gauge interest about meeting with visiting commercial fishermen from the UK to learn first-hand about their experiences working through the planning process and development process with energy companies, and fishing among the turbines. Due to the limited interest from the Eastern Shore-based industry representatives, the team decided it was not effective use of the visitors' time to schedule port meetings on the Eastern Shore. Interested individuals were contacted and invited to participate in the September 16 public meeting in Norfolk, Virginia. The meeting was also shared on the A-NPDC website. One fisherman, who was unable to attend the meetings, indicated an interest in participating in some of the survey/monitoring work with his side-scan equipped fishing vessel.

Port Visits

Members of the Project Team visited ports around the area with the invited experts to meet with fishermen about the offshore wind energy development process and encourage them to attend the outreach meeting later that week. During this informal engagement opportunity, the Virginia fishermen shared concerns about exclusion zones, compensation, and the timing of offshore wind energy development.

The field visits included a scallop processing and packing operation in Newport News, where they heard from the owner that the VWEA Study Area was in the "best possible location" to avoid interactions with the offshore commercial scallop fishing industry. The team visited a finfish and shellfish dealer in Hampton to discuss how the offshore wind energy project might impact his business and those of the fishermen he buys from. He expressed concerns about a possible exclusion zone during and after construction, and advocated for baseline studies such as the Northeast Area Monitoring and Assessment Program (NEAMAP) through the Virginia Institute of Marine Science (VIMS). The field visits concluded with a stop at a wholesale seafood company in Virginia Beach, where the Project Team met with several commercial fishermen to answer their questions about the offshore wind energy development process and potential interactions with the fishing industry.

In terms of mitigating gear interactions with the VWEA, a dredge vessel captain requested a minimum turbine spacing of 300 feet (about 91 meters) to allow for gear during transit. This accounts for 100 feet (about 30 meters) of gear and an additional 100 feet per side. A mid-water and otter trawl first mate said that a minimum of 500 meters (about 1640 feet) would be needed to operate with their gear deployed. Another fisherman noted that gillnetters would like to set their 1200-foot gillnets in the area to soak, and would like to be able to continue fishing in the area once the turbines are deployed.

Workshop Overview

All presentations can be found at:
http://www.deq.virginia.gov/Programs/CoastalZoneManagement/CZMIssuesInitiatives/OceanPlanning/FishingandVirginiaOffshoreWind.aspx

The VA CZM Program Manager opened the first day of the workshop with an overview presentation of ocean planning activities in the Mid-Atlantic, including the MARCO ocean data portal. BOEM staff reviewed BOEM's statutory and regulatory responsibilities, including the consideration of impacts to commercial and recreational fishermen as a result of projects it authorizes. Previous BOEM-led projects that provide a foundation of information for offshore wind energy development along the Atlantic coastline were also discussed, and an update was provided on the status of the proposed VOWTAP.

TNC presented several of the maps they developed using the *C@S* and NMFS Exposure data. VIMS Fisheries representatives discussed the NEAMAP data and provided several maps for areas adjacent to the project area. The NEAMAP fisheries research trawl survey area is inshore of the VWEA but can be useful for understanding trends and species utilization within the transmission cable area.

Lessons Learned from Other Regions

United Kingdom

The Project Team was joined by John Nichols, chairman of the Thanet Fishermen's Association (TFA), and Merlin Jackson, Treasurer for the TFA and the Fisheries Liaison (FL) for the London Array wind farm. The TFA is a voluntary organization formed for the benefit of the local community. The London estuary is only about 30 miles across at its widest point, with significant competing uses across the estuary, including protected areas, dredging, and three of the largest offshore wind farms in the world, including the London Array. There is trawling for cod, skate, and bass, and dredging and potting for cockle, oyster, lobster, and whelk. The area also contains important breeding grounds for Dover sole.

The Crown Estate (a quasi-equivalent to BOEM) leased the wind farm areas without consultation with the fishing community. Fishermen were inconsistently given information regarding wind array activities and often had no advance notice of construction that impacted access to fishing grounds. The developer issued electronic nautical charts in formats inconsistent with maritime navigation, and the lack of lighting in the wind energy area caused a few avoidable accidents. There was also not a gear loss/impact claims procedure put in place by the developer.

It was difficult for UK fishermen to document their historical fishing because there was a lack of detailed record keeping by fishermen and pre-construction monitoring. This posed challenges for the fishing industry to make claims about impacts to important fishing grounds. By comparison, the VWEA has tremendous data on past and current uses.

Due to a lack of an organized fishing community in the UK, the fishermen were unprepared for the changes when the wind energy developers arrived. However, this community soon realized that they needed to stand together and unite as one voice. The wind farm was the impetus that the fishermen needed, and 85% joined the TFA. The TFA made objections to the Crown Estate and raised concerns about the lack of consultation by developers. The objections were accepted and cannot be lifted until the Crown Estates determines the developer sufficiently addressed the fishermen's concerns. Negotiations proved lengthy and costly for the developer, as they ended up paying for TFA's legal costs to review contracts. The association also established a code of practice for fishermen operating within the wind farm as detailed in the following publication: Fishing Liaison with Offshore Wind and Wet Renewables Group (FLOWW) recommendations (http://www.sff.co.uk/sites/default/files/FLOWW%20Best%20Practice%20Guidance%20for%20Offshore%20Renewables%20Developments%20Jan%202014.pdf).

They were able to get compensation on some issues. Some forms of mitigation in the UK wind farms have been improvements to shore/harbor facilities and vessels, assistance with shifting to alternative fishing methods, and direct/indirect employment or compensation for disruption of activities.

The association also created a fuel services company in which each fisherman was a shareholder and negotiated that the developer was required to purchase their fuel. This has been very successful and helped to keep the association a cohesive group to address other issues related to the wind farms. There was no group consensus on mitigation, and the choices are very site-specific.

In terms of lessons learned from the wind farm development in the UK, both Mr. Jackson and Mr. Nichols agree that fighting does not achieve the desired outcomes, and that it is critical to establish trust between fishermen and the developer. Regular communication and scheduled fishermen's meetings to increase solidarity among fishermen are required. Communication must begin early, prior to permitting, and continue through the life of the project. They also noted the necessity of any agreements made being binding to all parties, including subcontractors and future owners.

Rhode Island

Dave Beutel, who is the Aquaculture and Fisheries Coordinator for the Rhode Island Coastal Resources Management Council, provided lessons learned from Rhode Island's experience. He also has been helping to develop the fisheries aspects of marine spatial planning, mainly through work on the Rhode

Island Ocean Special Area Management Plan. Mr. Beutel provided an update about the Block Island Wind Farm (BIWF) development in Rhode Island.

As of September 2015, the wind farm is under construction. All the foundations are sitting on barges in Narragansett Bay, with one base being fixed after damage when the foundation hit the barge during installation as it was being repositioned. Mr. Beutel said that the Certified Verification Agent, which was required by the Rhode Island Coastal Resources Management Council (CRMC) for the project, provided written and oral reports of activities to CRMC staff and was on site during construction. The Certified Verification Agent also provided a presentation for the monthly CRMC meeting. The presentations are part of the public record. The construction company has also been brought under scrutiny due to their lack of experience and errors related to safety records and equipment. The six-megawatt turbines and export cable should be installed by end of next summer, and operations are expected to begin by the end of 2016.

The current liaison is a prior National Marine Fisheries Service (NMFS) employee with the responsibility to communicate on a daily and weekly basis and provide future projections for work on the wind farm. The liaison also provides a daily report of what has taken place and the outcome of projections. The liaison answers to Rhode Island Coastal Zone Management, but is funded by the developer.

Mr. Beutel shared that there was not complete agreement from the fishing industry on the selection of the liaison due to past experience with the FL as a NMFS employee. An unfortunate unintended consequence is the lack of trust by the fishing industry toward the liaison, and it is assumed there is a lack of complete communication between them. The liaison also faced the additional challenge that they could not share the developer's proprietary information with the fishing industry- a fact that should have been more clearly established with all parties prior to the establishment of the liaison position.

CRMC worked with the University of Rhode Island Coastal Resources Center to engage commercial and recreational fishermen. The process was intended to create qualitative maps showing the fisheries usage of the area. Subsequent maps, one based upon VTR data and the other based on VMS data, confirmed the qualitative maps. The maps are part of the RI Ocean Special Area Management Plan. Most of their proposed wind energy area was marked as ecologically important or critical fishing grounds, making siting difficult. Fisheries mitigation included direct compensation during construction, a charter and party boat marketing plan, ventless trap and bottom trawl surveys to establish baseline, construction and post construction levels, and 5 years of funding of the Director for the commercial fisheries center, which houses fishing associations.

Commercial Fishermen Outreach Meeting

On September 16, 2015, five commercial fishermen attended an outreach meeting in at the Slover Library in Norfolk, VA. The VA CZM Program Manager and BOEM Staff presented an overview of regional ocean planning with MARCO and BOEM's statutory and regulatory responsibilities. They discussed the need to work on gaps in fisheries data by vetting maps and learning from the UK and Rhode Island experts to create recommendations for multiple uses and to develop a communications plan.

The Project Team provided a presentation of the *C@S* and NMFS Exposure data maps. The fishermen felt that fisherdays may not be a great statistic given it was not capturing the soak time for gear that was unattended. Fisherdays are most applicable when boats are fishing, such as during trawling, however, pots and traps fish for the duration of their deployments (i.e., soaking time). The group felt a more effective

key would be to replace fisherdays on the pots/traps and gillnets with classification terminology (low, med, high, very high). Many did agree that the current places highlighted indicated important places for their fishery.

Mr. Jackson and Mr. Nichols provided a brief presentation on their experience in the UK. They emphasized that they have much less space than the VWEA but are attempting to co-exist with the largest wind energy development in the world. They advised U.S. fishermen to choose their Fisheries Representative carefully as this role is critical to ensure their concerns and recommendations are heard by industry. They encouraged fishermen to consider creating or joining an industry association, or other collaborative group, which would organize their position and strengthen their approach to working with developers. They also encouraged fishermen to put advance thought into what type of mitigation would be acceptable (e.g. for gear claims because gear will be lost at some point).

The Project Team then opened the outreach meeting for a question-and-answer session with the fishermen. The fishermen expressed concerns about the effect of electromagnetic fields on fish migration, access to the wind farm area, and the lack of very long-term data and limited understanding of the offshore environment. They strongly support long-term surveys and monitoring programs, and suggested that a group like VIMS could design those surveys. Fishermen have confidence in the NEAMAP survey and recommended that it begin surveying in and around the VWEA. One reason NEAMAP and VIMS are trusted is because both have developed collaborative research opportunities with fishermen.

Several attendees indicated that they had not been directly contacted about the meeting. The Project Team discussed how outreach had been conducted and asked for recommendations for improvement. There was mixed reaction to the question regarding whether mailing lists from the regional Fishery Councils were the most comprehensive lists of fishermen available. Most fishermen thought the Councils would maintain the most comprehensive lists but even those were not all-inclusive. Chesapeake Bay and Virginia fishing associations were also suggested as a means to reach and engage fishermen on issues such as outreach and research topics.

Vetting BMPs

Fisheries Representatives (FRs) and Fisheries Liaisons (FLs) should be selected from, and vetted through, the local fishing community to ensure that the FR enjoys the confidence of this important constituency. Additionally, the FL's should be familiar with the local fishing industry. The Mid-Atlantic Fishery Management Council and Virginia Marine Resources Commission could help vet names of leaders within the local fishing industry.

After initial review of the draft report and BMPs by BOEM, the BMPs will be vetted with stakeholders. A two-page summary of the BMPs was prepared by VMRC Project Team members, directing those wishing to review the BMPs in more detail to the VA CZM website. Team member contact information will be provided for the Eastern Shore (A-NPDC) and Hampton Roads/Virginia Beach (VCU) area commercial fishermen, and for recreational fishermen (VMRC).

After the review time has passed, the Project Team will consider whether changes to the BMPs are warranted, make changes as needed, and submit the final report to BOEM.

Other Data and Tools

Importance of Regional Ocean Planning

Ocean planning on a multi-state level will be necessary to develop a shared understanding of how the offshore environment is currently used and how it may be used in the future. It will provide a transparent framework to organize and map uses, resources, and interactions. Ocean planning will help to create a collaborative vision for balancing ecological, economic, and social demands on marine ecosystems. This project will inform and provide data for the MARCO and the Mid-Atlantic Regional Planning Body (RPB), as well as DMME and Dominion. Both MARCO and the Mid-Atlantic RPB are working on regional ocean planning, including coordination of projects such as the development of offshore renewable energy production.

Integrating all Data

In addition to collecting new information, this project sought feedback on existing mapping projects, including MARCO's *C@S* maps, Virginia CZM's Recreational Use Maps, and BOEM's fishery exposure analysis. *C@S* maps integrate NOAA's VTR and vessel permit databases (2011 to 2013) to produce heat maps that link commercial fishing with the ocean places where they spend the most time. Virginia Coastal GEMS identified recreational fishing locations via participatory GIS workshops in 2012. In 2015, results from BOEM's project with NOAA's Northeast Fisheries Science Center are expected to be available and will provide estimated fishing revenue from wind energy areas (i.e., exposure).

Data from these three sources within the Study Area will be synthesized as a baseline to be enhanced and improved through the new data collection activities undertaken through this project.

Lessons Learned

In addition to the points in the Outreach section, some other lessons were drawn from interactions with fishermen, industry partners, and invited UK and Rhode Island guests.

Fisheries outreach is a labor-intensive effort; there are few good, credible shortcuts. Relationships in the community are the best bet for connecting with fishermen, and even then, there are limits to their trust, as manifested in their fear of sharing chart plotter data. To gain or regain ground/trust with the commercial and recreational fishing industries requires:

- building and deepening connections and interactions with the industry through multiple communication channels and sustained outreach;

- identifying, prioritizing and developing a game plan for addressing critical uncertainties, such as the criteria and process for determining access and transit; and
- building and relying on a network of trusted and credible fisheries representatives to serve as spokespersons for the different parts of the industry and to keep fishermen informed.

Outreach on the Eastern Shore must be approached differently than in the Hampton Roads/Virginia Beach area. Although many fishermen are clustered in Chincoteague, others are found in ports around the seaside and bayside, there is no central information source, and there are as many preferred methods of communication as there are ports.

Offshore wind energy development lacks front burner status with most of the fishing industry. The main reason is because it is not perceived as immediate and other fisheries management issues have taken priority. A challenge will be to reengage the industry and make sure they understand the overall process, time horizon, likely geographic focus, and most importantly, the need for their early input.

Bring key federal/regional/state partners into the process when engaging the fishery industry to promote better coordination of outreach efforts. Mr. Beutel, for instance, recruited New York State Energy Research and Development Authority for help in outreach to the fishing communities for the Wind Mitigation Measures Workshop in Montauk last year for the Block Island Wind Facility project. he turnout of fishermen was outstanding. BOEM Intergovernmental Task Forces are not typically scheduled to target commercial and recreational fishermen.

Draw on existing state and European experience. Several individuals pointed to the implementation of the Rhode Island Ocean Special Area Management Plan (SAMP) as a model for good outreach, after an initial rough start. Many pointed to the successful use of fisheries liaisons and representatives for outreach in the UK.

Additional Research or Next Steps

Fishing data collected as part of the project were sufficient to inform this phase however, additional research and suggested activities to support future phases are identified in the BMPs. The following represent suggested next steps with the industry: Develop and maintain relationship with offshore commercial industry, specifically those related to the trap, pot and trawling industry.

- Utilize existing outreach mechanisms such as the Mid Atlantic Regional Fisheries Management Council as a conduit to the industry

- Develop detailed outlines of roles and responsibilities for Fisheries Liaisons and Representatives, seeking to engage those positions as soon as possible. Industry indicated this as a priority to begin early in the process to ensure buy-in and involvement.

- Seek additional and improve understanding of temporal and spatial factors that may influence changes in the fisheries in the Study Area such as expanding on trawl surveys consistent with existing gear practices.

Appendices

Appendix A: ***Team Composition and Coordination***

The Collaborative Fisheries Planning team utilized a variety of different methods to manage the work done through this project. The Project Team used Dropbox to allow the entire team to access and collaborate on files while keeping outreach documents organized in a centralized location. Many of these resources can be found in later Appendices of this report.

The team met monthly via webinar using the GoToMeeting online meeting service. Smaller team meetings were scheduled as necessary to focus on project aspects such as BMP development and logistics. Meetings were scheduled by querying team members using Doodle polls to allow team members to select dates and times that worked best with their schedules. Using Doodle polls helped the team stay on track with the project timeline, while accommodating the varied and diverse schedules of a large Project Team.

Members of the Collaborative Fisheries Planning Team, along with their affiliations and project roles, are listed below.

Principal Investigator:	**Laura McKay**, Virginia CZM Program Manager, VA DEQ
	Role: overall project management [time provided through CZM funding from NOAA.]
Funding Agents:	**Brian Hooker,** Marine Biologist and **Amy Stillings**, Industry Economist, Bureau of Ocean Energy Management,
	Al Christopher, Division Director, and **Ken Jurman**, Renewable Energy Manager, Virginia Department of Mines, Minerals & Energy
	Role: Project advisors; participation in meetings and workshops; provision of information and products from other BOEM-related projects; review of progress reports and final products
Fisheries Managers:	
	Lewis Gillingham, VSFT Director, and **Alicia Nelson**, Natural Resources Manager, Fisheries Management Division, VA Marine Resources Commission
	Jeff Deem, Chair of VMRC's Finfish Management Advisory Committee (FMAC) **Rick Robins**, Chair of Mid-Atlantic Fishery Management Council (MAFMC)

Role: project advisors; participation in meetings and workshops to lend knowledge of Virginia commercial and recreational fishing industries; review and comment on draft and final reports; liaison with MAFMC, ASFMC and FMAC

GIS Experts:

Nick Meade, Coastal GIS Coordinator, VA CZM Program

Role: fine-scale analysis of 2012 PGIS raw recreational fishing data; operation of E-beam or other GIS draw features to collect and map new fishing data. Project management for GIS aspects [time provided through CZM funding from NOAA.]

Jay Odell, Mid-Atlantic Marine Program Director, The Nature Conservancy, MARCO Mid-Atlantic Data Portal Team Leader
Kevin St. Martin, Associate Professor, Rutgers University

Role: expansion of GIS analysis of fishing data used to produce C@S maps to create VWEA-specific fine-scale maps; development of digital function to show and share maps; participation in meetings/workshops with fishers. [TNC with Rutgers effort provided through a sole source contract]

Coastal Planners:

Todd Janeski, Program Manager, VA Commonwealth University

Curt Smith and **Connie Morrison**, Transportation Program Manager, Accomack-Northampton Planning District Commission

Role: identification and recruitment of commercial and recreational fishers to participate in the planning process for the VWEA; development of relationships with those fishers to build social capital, trust and encourage participation; collection and compilation of fishers' opinions on collaborative design/BMP and communications plan recommendations; participation in meetings/workshops with fishers.

Facilitation Contractor:

Paula Jasinski, President**,** Chesapeake Environmental Communications

Role: Meeting logistics and facilitation; compilation and synthesis of meeting notes from all Project Team members; reimbursement to fishers for travel to meetings and workshops; quarterly report preparation; draft and final report compilation and synthesis

APPENDIX B: Full Summaries of Fishermen Outreach Meetings

Summary of Engagement with Commercial Fishermen in Wachapreague

March 26, 6-7:30 p.m., VIMS, Wachapreague

Attendance

Commercial Fishermen in attendance: 4

2 fish with sea bass pots and hook and line. Primary species are sea bass, tautog, blue fish, and lobster as by-catch.

2 fish with gill nets and pots. Primary catch is spiny dogfish.

Charter Boat Captain: 1

General Public: 5

Comments/Concerns

Right now, generally conch potters fishing in the area, and they fish around the shipwrecks on the north central edge (the "Triangle wrecks") of the commercial lease area. Active time of year is late October to January. This should be noted for construction timing.

The farthest south that fishermen in attendance fish is around the northern edge of the commercial area.

Main concerns are being able fish under the turbines and transit through the area; no problem with what's proposed, as long as the area is not closed off to fishermen.

Good possibility it will harm fishing, but good possibility it will help it too because the rock bases will provide more rock area for food to grow on and attract more of the species they fish for. Conch forage for food attached to base of structures.

Pelagic birding expeditions out of Lynnhaven and are often seen by fishermen in the wind energy area during winter months.

Fishermen are concerned about scour.

One fisherman speculated the two research structures will be crowded with fishermen after they are first installed.

"Just put 'em up."

"Go for it. See what happens."

Data Sharing

No data were shared at this meeting on paper, but we were told that fishermen were interested in conch October to January, and fish mainly around the triangle wrecks.

Questions

Will there be public meetings across the bay?

Wachapreague Summary (Continued)

Will fishermen be excluded from the area?

What is the lifespan of the turbines?

How many development phases will there be?

How long does it take to install a turbine?

Will any be installed off the Eastern Shore?

Where will maintenance for turbines be based?

Engagement

No single best way to contact people. Harbor Master is a good way to reach a lot of people with information.

Three preferred email; one preferred a phone call.

General public prefers newspaper.

No best time for meetings, but if there are going to be evening meetings, make sure everyone can get home by 9 p.m. Summer-fall months are busiest, but they work all months.

Check VMRC website for advisory boards and schedule around those.

Meeting Evaluation

(Eight surveys completed.)

All said they understood the fisheries planning project and how it relates to the wind energy projects.

All indicated the meeting time, length and content were about right.

Participants found out about the meeting from friends (3), the newspaper (2), e-mail (1), and a phone call (1).

The four commercial fishermen indicated they found out from a postcard, phone call, email, and a friend. (Note: three of the commercial fishermen in attendance received phone calls from ANPDC.)

This suggests that the notification from all fronts – newspaper, postcards, email, and phone calls – was indeed necessary. One participant said the post cards were sent too early, and he had forgotten about the meeting until he received the phone call. Posting with harbor masters will be included in future notifications.

Summary of Engagement with Commercial Fishermen in Chincoteague

March 30, 6-7:30 p.m., Chincoteague Town Offices

Attendance

Commercial Fishermen in attendance: 4

2 are GARFO license holders, one is president of the local watermen's association

General Public: 2

Comments/Concerns

Primarily conch potters fishing the wrecks; it would help if construction could avoid October to February, which is primary time, but also occasional warm spells in the spring.

Fishermen were concerned about the inclusion in this process of vessel operators from the north, and from North Carolina, who fish the wind energy area.

There has been discussion about the wind energy meeting and project among other fishermen, so the word is getting out.

They are fine with everything as long as they are not denied access, although they understand that during construction there will be some give and take.

Depth of cable was a concern for dragging for flounder between the wind energy area and the shore.

They are concerned about long-term effects of scour and snagging riprap over transmission lines.

The wind turbines will add some interest. The sea floor has been dragged flat.

Could have good unintentional consequences.

Would not want to be around the turbines in bad weather.

One fisherman said he has talked to others and they are not opposed to wind energy development.

Insurance rates not likely to be impacted since these structures are similar to other objects in the water.

Data Sharing

Fishermen indicated conch activity October to January, and mainly around the triangle wrecks.

Flounder activity was pushed further south this year; they were dragging off the coast of Virginia Beach which had not happened for a number of years.

There is a history of dragging within the wind energy area, but not in recent years.

An area of Chincoteague-based conch pot activity was noted on the Communities at Sea map mostly south and west of the wind energy area. This is captured on the Virginia-wide map, but not the Chincoteague map.

Chincoteague Summary (Continued)

Noted the gill net Communities at Sea map shows "invisible fences" they operate within for monkfish, referring to rolling closure to protect harbor porpoise and sea turtles. They would like to be operating further south, but can't. Closure depends on water temperature.

2011 and 2013 were bad years for fishing data; not really good representative years for Communities at Sea maps. Last three years there were no croaker – 2012, 2013, nor 2014. Ordinarily fishing for them August through mid-November. Croaker activity won't show up on the fishing maps because no federal permits are required. Need longer than a three-year window of data.

Questions

Will fishermen be excluded from the area?

How long does it take to install a turbine?

How close will fishermen be able to get to the turbines?

How loud are they?

Are they a danger to birds?

What kind of foundation will they have?

How was the wind energy area decided? Why there?

What is success rate of wind energy in other countries?

Engagement

Two preferred email for future engagement and two favored phone calls.

No best time for meetings. They work year-round, but noted that those they see as most affected – conch potters – are busiest during October through January so if they are wanted at the meetings, keep that in mind.

Meeting Evaluation

(Five surveys completed.)

All said they understood the fisheries planning project and how it relates to the wind energy projects.

One said the meeting time was too early (all of the fishermen arrived about five minutes late); the rest indicated the meeting time was about right. Meeting length and content were about right.

The four commercial fishermen indicated they found out from multiple sources: newspaper (3); radio (1); phone call (2); email (2); and friend (2). The two general public attendees read about the meeting in the newspaper.

Fishermen Comments from January Mail-In Survey

"I have no issue with fixed structures."

Chincoteague Summary (Continued)

Summary of comment - We need wind energy here – cheap power to help progress.

“Windmills will not affect crabbing.”

“Hope it doesn’t mess with fish migration.”

“I do not see where this windfarm will be any problem for myself. However, the trawler fleet would probably feel different.”

Appendix B (Continued)

Virginia Beach Fishing Community Meeting Summary

April 21, 2015

Virginia Beach Aquarium

The Virginia Beach Fishing Community VWEA Meeting was a success. Seventeen members of the fishing community (commercial and charter) attended. Each provided insights and raised a number of concerns and questions. The VWEA Team was well-represented with Todd Janeski (VCU/meeting facilitator), Rick Robins (MAFMC), Laura McKay (CZM), Nick Meade (CZM), Jeff Deem (MAFMC), Alicia Nelson (VMRC), Casey Reeves (BOEM), Laurie Jodziewicz (Dominion/TetraTech), Paula Jasinski (CEC) and Heather Kerkering (CEC).

The purpose of the meeting was to introduce and describe the project, address and answers or concerns, and to establish a means of communication with the fishing community on offshore wind development activities.

THE AGENDA

I. Welcome by Rick Robbins

a. Welcome and description of success in other areas of the world between fishing and offshore wind interests.
b. Pleased to see fishermen approached for collaborations as the discussion will help mitigate conflict.
c. We need to data to inform decision-making.
d. The project purpose is to identify fishing data to inform decision-making.

II. Project Introduction by Todd Janeski

a. Here to discuss best ways to engage fishermen for BMP around WEA and best ways for communication.
b. Want to:
    i. ID conflict areas and come up with mitigation strategies
    ii. Develop more fine-scale maps
    iii. Refine BMPs around VWEAs.
c. Benefits to fishermen:
    i. Reduce conflict
    ii. Help communicate in the filed.
    iii. Influence timing of operation and plans.
d. Provided the presentation
e. Suggested reviewing a document, "Development of Mitigation Measures to Address Potential Use Conflicts between Commercial Wind Energy Lesses/Grantees and Commercial Fishers on the Atlantic Outer Continental Shelf": http://www.boem.gov/Draft-Report-on-Fishing-Best-Management-Practices-and-Mitigation-Measures/

III. Meeting Objectives

a. Collect ocean information on ocean plans in general
b. Explain project details

c. Gather your expertise and hear concerns
d. Identify more ways to communicate and get participation.

IV. Ocean Planning Background by Laura McKay

a. Reviewed planning projects using ppt slides.
b. Highlighted the importance of fishing maps in ocean planning and process to identify important fishing areas in the region.
c. Demonstrated how use fishing data in mapping process and asked if we are getting it right.

V. Virginia Offshore Wind Energy

a. Provided a description of the project and Dominion's perspective and interest.

VI. Information Stations

We did not end up using the information stations. Rather, we conducted a long and productive question and answer session.

Jeff Deem reiterated that this is the opportunity and the fishermen's 'chance' to have a role in ocean plans and activities. Now is the time to speak up!

QUESTIONS AND ANSWERS

LOCATION OF PROJECT

1. Can the cable be moved elsewhere to avoid fishing activities and grounds?
    a. Suggestion: Move to Ft Story instead of Camp Pendleton
    b. Response (Laurie J/Dominion): There were many constraints in locating the cable route, specifically from military activity, dredging activity, and maritime traffic patterns. The cable will be buried ~2m deep all the way to shore and have some type of protection. The route is well set with an ability to move it within a 200m swath.
2. Can the entire project area be moved south?
    a. Response (Laura/Dominion): We will not necessarily build out to the entire lease area. We don't yet know how all of the construction will take place but hoping it will not take ten years.
3. Is it possible to modify the grid build out to avoid prime fishing areas- even when certain areas are only "prime" to a small number of fishermen?

CONSTRUCTION DETAILS

1. How many transmission cable routes will be constructed?
    a. Response (Laurie/Dominion): Yes, there will be more cables associated with the commercial area construction. However, the number and routes are currently unknown.
2. Explain the build out plan for the entire area. Will the construction for the commercial lease be continuous over a 10yr time span?
    a. Response (Laurie/Dominion): The commercial lease area will be constructed in phases, not all at once. Plans could change with technology over the years. The full area will not be built out completely and the shape of the area may not be in exact grid format.

3. What is the length of time to construct each turbine? What about the transmission cable?
    a. Response: About a week of construction for each turbine.

RESTRICTIONS

4. Will the cable area (and a buffer zone) be restricted from fishing activities during or following construction?
    a. Response (Laurie/Dominion): There will NOT be fishing restrictions.
5. Will fishing be allowed around the base of turbines or even close to the turbines?
    a. Response (Casey/BOEM): The project and turbine locations are not intended to be restrictive. BOEM and this group will continue to host meetings to make people aware and any buffer will depend on the type of fishing activities taking place.
6. What is the buffer zone around the turbines expected to be during the construction phase?
    a. Response (Laurie/Dominion): There will be a buffer area during construction, but there are not real restrictions. Of course, the engineers would like you to not hook onto a substructure. A construction buffer area would be small (<10miles). It takes approximately 1 week for the construction of a turbine offshore.
7. Can I run a string of pots across the cable?
    a. Response: Yes
8. Statement: We are used to government taking but not compensating.
    a. Response (Todd/VCU): The best we can do, now, is to engage you to inform the process and work toward solutions. It is a bit early to address compensation for lost business.

FISHING IMPACTS

9. Will construction impact ongoing fishing? For example, will boat activity during construction run over/impact my gill nets? Will the construction projects massacre any of my buoys that drift into the turbine area?
    a. Response (Laurie/Dominion): Laurie provided a description of the construction activities, stating that construction will require only a short timeframe and the use of only one main vessel. Everything will be released in the Notice to Mariners. Laurie suggested looking at the Research Activities Plan for further information: http://www.boem.gov/Research-Activities-Plan/
    b. Todd: Emphasized that we want the fishing community to inform the process so that we can avoid any conflict during construction. Input from the fishing community will help to identify what will work best for everyone.
10. Do the turbines make noise? What should fishermen expect in terms of the noise level.
    a. Response: Laurie noted that there is noise during construction and from the turbines.
    b. Jeff Deem noted that the turbine blades make a whooshing sound as they pass by.
11. What is known or projected in terms of habitat impacts and protection from scouring around bases?
12. What is known on EMF impacts to fish behavior?
    a. Todd talked about the type of current emitted from these systems and noted that he will investigate pervious research on this topic and share any findings from related work by VCU.
13. What are the considerations for gear interactions with the cable?

14. Fishermen identified the need for pre and post surveys of conditions in the wind energy area to assess physical and biological parameters.
    a. Response: Benthic and geophysical surveys are required by BOEM.
15. Is it possible to use the construction and turbines as a means to increase fish habitat (ex. add rocks to the base of the turbines)
    a. Statement: It is great to have habitat, but if the turbines and construction scare fish away, we don't support the project.

COMMUNICATION

16. How can we establish effective communication among groups before and during construction?
    a. UK Example was discussed
    b. Could we bring on a Fishery Liaison?
    c. Establish communication standards
17. Statement: No one reads the Notice to Mariners
    a. Todd: Emphasized why a liaison would be important for communication.
18. VTR data only depicts activity for those with federal permits, how can the process include the rest of the activity?
19. Statement: This (the VWEA) is a prime fishing area.
    a. Response (Rick): We haven't identified that this is a prime fishing area based on the data available. This is why we need your help in mapping prime fishing spots.

COMPENSATION

20. Will there be an opportunity for compensation for lost fishery access as a result of the build out? Or for gear that gets lost in the turbine area?
    a. Response: Rick cited and highlighted the UK example. He noted that the process there includes a fisheries liaison officer and representative to interact with the development groups and that this has allowed for communication on the questions and concerns so that a plan can be developed to work around activities and avoid conflict. The industries have also worked together in the UK to identify and return gear if lost.
    b. Response (Todd): We hope your input will provide details of fishing schedule and gear type. This input will influence construction process and we hope to time everything with the least impact resulting.

Final comment: Jeff: In Europe, the development of offshore wind has not impacted fishing. It is a good collaboration that allows for fishing and construction to exist in harmony.

Follow-Up:

- Explore if a fishing liaison is best next step. If so, identify potential liaisons to work with the VWEA project.
- Determine best method to obtain data from fishermen in person and otherwise.
- Email attendees an evaluation form.
- Continue communication with fishermen.

APPENDIX C: ***Final BMPs***

BMP #1 – Communications Framework

Overview

This Communications Framework identifies a starting point to assist the wind energy developer and other interested parties with information about the specific interests, needs, and dissemination methods appropriate for communicating with those fishing off the Virginia coast. The following is based on lessons learned at similar offshore developments including those in the United Kingdom and offshore energy structures in the US. The primary objective is to share information in an ongoing way that is credible and makes the fishing industry's role clear. That means working closely with fisheries representatives, using the information channels that they are accustomed to, and providing opportunities for direct input to decisions in ways that are concrete. Communication has been identified as the most critical piece to effectively deploying offshore energy and is a foundational consideration in the following four best management practices (BMPs): #2. Siting, Micrositing and Design; #3. Navigation, Access and Safety; #4. Environmental Monitoring; and #5. Mitigation.

Due to conflicts with the fishing industry, which resulted in project delays for the developer, the United Kingdom has mandated the hiring of additional personnel as part of the outreach requirements of wind energy developers:

The Fishery Liaison (FL), which is as a member of the developer's team, who is familiar with the issues and the fishing interests in the region surrounding the project and is available to discuss fishing matters with the developer, keeps the fishing communities informed, and helps minimize and defuse conflict between the project and fishing activities. This person is the day-to-day "face" of the developer in negotiations with the fishing industry representative (FR).

All the BMPs suggested by this project have aspects that link to the communication process. The key is to develop a successful business to business relationship between the fishing community and the developer.

Guiding Principles

These principles should be considered when creating the strategy for maintaining clear communication with the industry during all phases of deployment, from survey to construction to post-deployment monitoring.

- Create a timely, coordinated, credible and transparent two-way communication plan that leverages existing formal and informal outreach nodes which recognize the diverse commercial and recreational fishing communities and other affected stakeholders.
- Employ an adaptive management approach to continually evaluate and revise the communication strategy, as necessary to ensure the affected industries are effectively and authentically engaged.

BMP 1 (Continued)

- Ensure consistent and accessible messaging that is in plain language and provides visual representations (e.g., technology design; maps of impacted areas).
- Develop a strong and respected network of stakeholders for consultation on issues and outreach.
- Work toward an outcome that balances the needs of fisheries activities and energy development.
- Tailor outreach to specific gear groupings, ports, and impacted fisheries and be especially sensitive to the differences in organization and communication between the Eastern Shore and the Virginia Beach communities.
- Fishermen are less inclined to use social media, and their preferred contact methods include a mix of direct contact through e-mail, text message, phone calls to land lines and cell phone numbers, and U.S. mail.

Fisheries Liaison and Representatives

In November, 2015, the Bureau of Ocean Energy Management issued *Guidelines for Providing Information on Fisheries Social and Economic Conditions for Renewable Energy Development on the Atlantic Outer Continental Shelf Pursuant to 30 CFR Part 585* (http://www.boem.gov/OCS-Study-BOEM-2015-037/ *Identifying Information Needs and Approaches for Assessing Potential Impacts of Offshore Wind Farm Development on Fisheries Resources in the Northeast Region*.). As part of the guidelines, BOEM recommends that the developer implement a project-specific fisheries communication plan, which includes at least two people responsible for communications between the developer and the fishing community: a fisheries liaison (FL), who is the lessee's primary point of contact typically employed directly by the lessee; and a fisheries representative (FR), who is the fishing community's primary point of contact for communicating its concerns to the lessee.

The BOEM 2014 report "*Development of Mitigation Measures to Address Potential Use Conflicts between Commercial Wind Energy Lessees/Grantees and Commercial Fishermen on the Atlantic Outer Continental Shelf*" suggested respective criteria for the selection and hiring of the two fisheries representatives (FR) (one representing commercial interests, and one representing recreational fisheries interests) and the fisheries liaison (FL). In addition, this report defines their roles and responsibilities and is modeled after efforts in the United Kingdom. In general, the functions of the liaison and the representative(s) would be the timely communication of various stages of planning, permitting and deployment, organizing and facilitating outreach meeting(s), and other tasks, as needed, for engaging and informing local fishing sectors during the various project phases.

Selection of the FRs should be determined by vetting candidates through the local fishing communities that are most active in the wind energy area (WEA) and consider representatives based on geographic location or port. Critical factors to consider for the FR and FLs are the ability communicate effectively, work proactively, and to strive to balance the needs of both parties: the affected industry/sector and the developer. The suggested vetting process includes utilizing existing Industry Associations and managed Boards such as the Virginia Seafood Council, and/or the Mid-Atlantic Fisheries Management Council. Vetting might include an assessment of credentials, credibility with the industry, and from direct interviews with the Industry to review candidates. (Attached as Appendix BMP 1.A., are suggested draft descriptions for the positions.)

BMP 1 (Continued)

List of information desired in a developer's communication document

A. In addition to the Fisheries Liaisons and Representatives, identify relevant points of contact in the industry for various stages of the project (design, pre-permitting, permitting, pre-construction, construction, post-construction, monitoring, etc).

B. Schedule regular communication intervals on project status, in addition to scheduling on an as-needed basis for providing updates. Consider communicating on a weekly or daily basis including identified active vessels with clear descriptions, areas impacted, names and contact information for operators of commercial vessels and fishing vessel name, operator and contact information.

C. Clearly identify the timeline of each phase of the project's life; including clear language stating that flexibility in that schedule may be necessary due to project uncertainties, modifications or delays.

D. Identify and provide milestones for regulatory filings, decisions, and most importantly opportunities for stakeholder input.

E. Regulatory and development schedule changes may affect the timing of various stages of the deployment. Those will be broadly disseminated to fishing industry for stages of that project that may result in effects on their operation, such as design, pre-permitting, permitting, pre-construction, construction, post-construction, monitoring, etc.

F. Clearly articulated roles and responsibilities of Fisheries Liaisons and Representatives, including defined methods for coordination.

G. Consider meetings in the ports of: Hampton, Virginia Beach (Lynnhaven or Rudee) and Chincoteague as central locations for fishing communities.

Identification of audiences to engage and collaborate with throughout process

Commercial Fishery

The commercial fishery is comprised of fishing communities and ports, identified by gear group/sector, impacted directly or indirectly by project via industry leaders.

A. The majority of commercial fishermen potentially impacted from development in the VWEA will be from the Virginia Beach, Virginia area, which includes the commercial fishing ports at Rudee's Inlet and the Lynnhaven River.

B. Additionally, a smaller impacted community of commercial fishing activities resides on the Eastern Shore of Virginia. Outreach is best approached based on gear type (pot, gillnet, dredge) rather than port specific.

C. Other ports with commercially important landings: Norfolk, Newport News, Hampton, Cape Charles, Saxis, Tangier, Wachapreague, Oyster, and Chincoteague in Virginia.

D. Based on analysis of VTR data, outreach to non-Virginia ports should also include: Cape May, NJ, North Kingstown, RI, New Bedford, MA, Englehard, NC, and Oriental, NC.

E. The Eastern Shore of Virginia poses a unique challenge for communication. An initial starting place is to consult with the Accomack-Northampton Planning District Commission for recent changes or updates in direct points of contact. While both the Eastern Shore and the Virginia Beach fishermen prefer contact methods which include a mix of direct contact through e-mail, text message, phone calls to land lines and cell phone numbers, and U.S. mail, they are less inclined to use social media.

F. When a more encompassing method of public contact is needed, the best options are local newspapers and radio stations. The Eastern Shore has no single primary news source, so a combination of media must be employed depending on coverage required and urgency.

Commercial Gear Type and Species

Although there are a number of fisheries and gear types used to harvest fish off the coast of Virginia, a limited number of gear types account for the majority of the landings.

- Pots are the most commonly used gear in the VWEA, followed by bottom trawl. In 2007 to 2012, commercial fishermen primarily landed black sea bass and channeled whelk. Bottom trawl tended to land small amounts of squid. Both gear types landed small amounts of summer flounder as well.
- The cable alignment contains an identified gillnet fishery for spiny dogfish and croaker.

Recreational Fishery

Outreach to the for-hire recreational boating sector should target business in the Norfolk and Virginia Beach, VA. Private recreational boaters typically launch in Virginia Beach. Recreational fishing participants should be contacted through:

A. Ports and communities impacted directly or indirectly by the project via local fishing associations and local elected officials of VA Beach, Norfolk, Hampton Roads, North Hampton/ Accomack, and the VA Port Authority. Virginia has fishing clubs with statewide membership. Many will tow or store boats closer to the ports in question.

B. Federal and State agencies involved in any aspect of the renewable energy development or fisheries management: Bureau of Ocean Energy Management; Virginia Coastal Zone Management Program; Virginia Department of Mines, Minerals, and Energy; Virginia Port Authority; Virginia Offshore Wind Development Authority; Virginia Marine Resources Commission.

C. Regional universities with relevant fisheries and wind energy research and communication programs include, but not limited to: Virginia Institute of Marine Science, Virginia Sea Grant Marine Advisory Services, Virginia Commonwealth University, Virginia Tech, James Madison University, Norfolk State, Hampton University, Old Dominion University, George Mason University.

BMP 1 (Continued)

D. Associations and organizations associated with offshore wind energy development or affected by changes in offshore activities including but not limited to: American Wind Energy Association, Center for Wind Energy at the James Madison University, Virginia Offshore Wind Coalition, Fisheries and Fishing Industry groups and Conservation-based Non-governmental organizations.

Recommended dissemination

A. Messages & Messenger / Platform

1. Identify the approach for developing tailored messages for priority issues (e.g. the objective of the outreach, how input will be used, the timeline for decisions). Where applicable, be specific as to whether the message applies to the Eastern Shore or Virginia Beach areas.

2. Outline basic guidelines for message delivery (e.g. make information accessible -- use "plain English," maps and graphics, keep presentations short, ensure adequate time for questions and small group discussion).

3. Identify the appropriate messenger and partners (e.g. Fisheries Liaison, Council website, Virginia state agencies, Fishing Representatives, BOEM, Lessee) for priority issues.

B. Distribution Tools and Mediums

1. Matrix of methods for outreach listed below by phase, type of engagement needed, and audience (which can be further tailored to prioritized issues):

a) Notice to Mariners
b) One-on-one outreach by phone or text messaging
c) Small group informal meetings
d) Briefings at partner organization meetings (e.g. advisory meetings for Councils, Virginia fisheries advisory committees)
e) Public Service Announcements (PSAs) on local radio or in print media
   (1) WESR (103.3) Eastern Shore; Contact: charlie@wesr.net
   (2) WCTG (96.5) Chincoteague; studio@965CTG.com
   (3) Eastern Shore News
   (4) Eastern Shore Post
f) Printed materials at meetings
g) Research-oriented joint fact-finding meetings
h) Publications (e.g. key newspapers)
   (5) The Eastern Shore News, a Gannett subscription publication, publishes twice weekly, on Wednesdays and Saturdays
   (6) Eastern Shore Post, a free (to the public) newspaper, is published on Fridays. Contact: email:editor@easternshorepost.com for news; angie@easternshorepost.com or troy@easternshorepost.com for ads.
   (7) The Chincoteague Beacon is a free (to the public) mini-version of the Eastern Shore News, published on Thursdays and targeted to Chincoteague.
i) Online via websites, blogs, social media
j) Emails via established listservs or groups (local fishing clubs, licensing, or other mechanism)

k) Vessel communication systems
l) Postings at harbormaster locations, commercial fish landing facilities, or at the Virginia Beach Fishing Center (200 Winston Salem Ave, Virginia Beach, VA 234541)
m) Subscription services for notices via text and/or through the creation of new downloadable applications

Recommended Feedback Methods

A. Methods for documenting input received and sharing how input is used (feedback loop)
   1. Procedures for capturing input or feedback from all outreach activities (e.g., develop consistent metadata forms, daily/weekly activity logs, etc.).
   2. Procedures for aggregating and synthesizing input by issue and audience.
   3. Policy for writing and posting summaries of all public meetings.
   4. Policy for reviewing data and reporting back to stakeholders (including timeframe and multiple pathways (website, through FL and FRs, at Council meetings, etc) for explaining how input informed project direction, synthesis of how concerns were incorporated and if not, why not.

B. Need to evaluate and collect feedback.
   1. Tracking and Evaluation of Outreach Activities
      a) Standardized system for recording purpose, participants, venues and outcomes of each outreach activity.
      b) Template for participant evaluation of activities.
      c) Protocols for the debrief of the event or effort reflections about what worked and what didn't from facilitator's, Fishery Liaison, Fishery Representative, lessees' and other team leaders.
      d) Evaluate overall efforts every 6 months to gauge level of success and need for improvement.
         (1) Level and quality of participation
         (2) Gaps in stakeholders reached
         (3) Quality of information shared
         (4) Patterns in participant evaluations
         (5) Performance and industry perceptions of FL
      e) Procedure to adapt and revise outreach and communication plan as indicated by evaluation steps above.
      f) Procedure for dispute resolution

BMP 1 (Continued)

Appendix BMP 1.A: Descriptions of Fisheries Liaison and Fisheries Representative

This Appendix was developed based on the 2014 BOEM report cited below, to aid the developer.

Reference

Bureau of Ocean Energy Management (BOEM), 2014. Development of Mitigation Measures to Address Potential Use Conflicts between Commercial Wind Energy Lessess/Grantees and Commercial Fishermen on the Atlantic Outer Continental Shelf: Final Report on Best Management Practices and Mitigation Measures. OCS Study, BOEM 2014-654. U.S. Department of the Interior, Bureau of Ocean Energy Management, Office of Renewable Energy Programs.

A. Fishery Liaison role in outreach and communication
    1. Outline the credentials and process for hiring the Fishery Liaison (FL) to ensure greatest credibility with stakeholders; FL should be hired early in the process (i.e. immediately after lease issuance).
    2. Include a job description for FL; Highlight FL's role in outreach and communication, e.g. Lessee will work with FL in development and revision of detailed Outreach and Communication Plan.
    3. Describe how the FL should work with Fishing Industry Representatives (FRs) in their communication and outreach role.

[Note: There may be several FRs for each project chosen by different sectors of the fishing industry to represent their interests both formally and informally. The Project Team recommends that initially there be one FR for the Eastern Shore, and two for the Virginia Beach area, one representing recreational, and the other commercial fishing. Communication between FL and FRs should be a high priority and regularly scheduled part of outreach.]

B. Fisheries Liaison: The Report on Best Management Practices and Mitigation Measures states :
    1. This person would be the lessee's interface with the public and the FR.
    2. The FL must be able to not only represent the interests of the developer, and serve as a conduit but also seek to balance working relationships with fishermen, find ways to bridge the interests of two industries.
    3. This person should be able to communicate effectively with fishermen groups, and work to mitigate potential adverse project impacts by ensuring timely dissemination of information regarding all project activities, including projected vessel movements or delays. Communication may be as frequently as daily, but would include a regular schedule that includes weekly, monthly or at scheduled intervals when construction activity is not underway.

4. The FL would organize meetings, as necessary, in order to garner fishermen's views of project effects on their industry and navigational rights, and communicate fishermen's concerns to management.
5. The FL would work directly with one or several FRs who have specific knowledge and understanding of the local fishing communities' concerns.
6. The FL would develop a stakeholder list, including relevant fishery community individuals, officials, and organizations for future communication efforts.
7. The FL will coordinate daily information releases on relevant VHF and medium frequencies (MFs) concerning work vessels' schedules, vessels' identification, details of work to be performed and clearance warnings, as necessary.
8. The FL also will advise fishermen/FR on removal of static gear when construction or operations could present a damage risk.
9. The FL can play an important role in identifying and contracting with the Fishing Industry Representatives, as outlined below.
10. The FL should use the Ocean Data Portal, an extensive database coming together as part of the Regional Planning Body process in both the Mid-Atlantic and New England which links fishing activities to communities and ports. This will provide valuable information for an FL to begin the incremental process of building a communication network and strategy.

C. Fishing Industry Representatives:

1. The FR may be supported by the lessee or privately supported by fishing organizations, but should be identified and available throughout the planning and construction phases of the project.
2. The FR will have prior acceptance of the fishing industry to be represented, will be selected by members of the fishing community, and will provide unbiased representation of the fishing community.
3. The FR will provide the lessee, via the FL, with guidance on fishing activity in the area and an understanding of particular fishing sensitivities, including the different environmental and biological concerns related to impacts from offshore wind development in the region.
4. The FR will help the FL disseminate project information to his/her constituency and provide feedback to the FL regarding the success or failure of various BMPs and/or mitigation methods employed by the lessee.
5. The FR must keep abreast of fishing activities by his/her constituents in the project area and communicate any conflicts to the FL immediately.
6. The FR will utilize their knowledge of at-sea safety procedures and navigational aids to promote safe fishing practices within the project area to his/her constituency.
7. The FR will maintain a log of all contacts made with fishing vessels in the project area, along with the type of fishing being conducted and other details.
8. The FR will provide regular reports to the lessee/FL and maintain confidentiality of all non-fishery-relevant project details.

9. The FR are to remain unbiased with respect to claim of responsibility, or admission of fault, for fishing vessel or fishing loss claims that could occur.

D. What are the selection criteria for FRs and FLs? What process should be used to select them?

1. Important criteria for FL selection should include:

a. Practical knowledge of fishing industry economics;
b. Familiarity with fishing operations at sea under real conditions;
c. Skills in multiple communication methods and ability to adaptively manage approaches;
d. Skills in negotiation or conflict resolution;
e. Political awareness;
f. Ability to get along well with diverse personalities;
g. Local knowledge would also be a plus, but, more critical in role of the FRs
h. Important criteria for FRs selection should include*:*

(1) Knowledgeable about the different fishing sectors, seasons, key species, fishing patterns, and gear types, and must have fishing experience in the region.
(2) Respected by their sectors as measured by the grass-roots selection process
(3) Able to communicate effectively in front of large groups
(4) Can ably and fairly represent a diverse, and sometimes conflicting points of view on issues

2. Selection Process for FL:

a) Post lessee's job description and qualifications for FL on MAFMC and state websites; outline process for how to apply.
b) The lessee's shortlist of qualified candidates may be vetted through outreach to Mid Atlantic Fisheries Management Council, VMRC, VA CZM, DMME, MARCO, key fisheries organizations and leaders.
c) Lessee will have the ultimate authority to select the FL.

3. Selection Process for FRs:

a) FRs (peer leaders in the industry) will tend to self-identify; therefore, formal elections may not be necessary.
b) The Mid-Atlantic Fishery Management Council and Virginia Marine Resources Commission could provide names of leaders within the local fishing industry.
c) The FL could play an important role in informally identifying FRs. The FL could meet with small groups in coffee shops and co-op offices and on holidays and weekends. Bad weather days are also an ideal opportunity to do business.
d) When the FL can identify a cohesive set of interests he begins to direct attention to a formal structure: Who speaks for you? Who do you speak for?

e) If the developer is responsible for funding the FRs, it would be preferable to use a third-party organization to manage and distribute the funds, and the accountability mechanism may also need to be separate to avoid the possibility that the developer dismisses or refuses to work with FRs that are less amenable to the developer's interests.

f) The goal should be for the FL to be able to make a mutually-defined letter agreement with a group of identified representatives, who can clearly articulate who they speak for (a list of names with phone numbers). The agreement outlines the structure for two-way communications, expectations of time commitment from the FR, and the rate of compensation.

g) The FL could maintain a feed-back loop with the names on the FR's list, and if people aren't happy, recommend changes to the independent entity responsible for oversight and accountability.

4. Interactions between FL & FRs:

a) The communication relationship between the FL and FRs will change and may deepen over time. It will likely progress in stages which are increasingly complex and potentially contentious:

b) Setting up lines of communication;

c) Educating the community on offshore wind project design and development;

d) Information collection and cooperative monitoring;

e) Input on design elements and other technical matters as they affect fishermen;

f) Safety and navigation;

g) Compensation and other forms of mitigation;

h) Construction activities;

i) Handling claims and conflicts; and

j) On-going operations.

BMP #2: Siting, Micrositing, Design, and Construction

Overview

The Siting, Micrositing, Design, and Construction Best Management Practice (BMP) is intended to minimize potential conflicts between the wind energy developer and fishermen during active project phases. It is prefaced on ongoing interaction between the industry and fishermen, and transparency throughout the process. It relies on Fisheries Representatives as an important link in maintaining productive relationships and helping to keep parties informed.

Guiding Principles

The following guiding principles underlie all of the best management practices outlined in this section. These principals were either articulated directly or at the root of concerns advanced by Virginia fishermen and their importance was underscored by guest fishermen from Rhode Island and the United Kingdom as being essential to a successful partnership.

- Engagement with fishermen must be early, often, ongoing, and collaborative.
- Fishing should be allowed to continue with as few disruptions as possible for both commercial and recreational fishermen.
- Highly valued grounds should be disrupted as little as possible at those times of year which provide the best fishing opportunity and during vulnerable times for the species.

Best Management Practices

The practices are grouped into topics, arranged by phase, beginning with development and review of the construction and operations plan.

Development/Review of Construction and Operations Plan

Master Scheduling Document. This document should identify project milestones, and clearly note opportunities for fishermen and the fishing industry to offer input into key decisions.

- Create a master scheduling document identifying project milestones, and post it to a public site. It should clearly note opportunities for fishermen and industry to provide input into micrositing, spacing, materials (as they pertain to long-term health of fisheries, or the operations or safety of fishery operations), timing of certain activities, and other key decisions that are anticipated to impact fishery operations.
- Consult Fishery Representatives in setting milestones to ensure availability of fishermen for consultation, so that they are able to have input at points that are important to them.
- Regularly update the master scheduling document throughout all project phases as more detailed information becomes available.

Project Design. Project design refers to siting and micrositing, configuration of turbines and cable arrays, phasing of project, orientation of turbines, and design.

BMP 2 (Continued)

- Schedule meetings to solicit information and to familiarize fishermen with the design development process, and note in the master scheduling document their opportunities to influence outcomes.
- Clarify how their input will be used, and any items that are not on the table for discussion, and why.
- Clarify that fishermen are one group of stakeholders in the overall process, and explain how their input will be used in conjunction with the input of other stakeholders.

Siting. Siting refers to the general location of facilities: turbines, array and export cables, and substations.

- Define important fishing use areas, drawing upon, but not limited to, Communities at Sea data, fine-scale and time-series fisheries maps developed as part of the Collaborative Fisheries Planning for Virginia's Offshore Wind Energy Area, the MARCO data portal, Virginia Coastal Zone Management's Coastal GEMS, interviews with fishermen, and research from BMP #4 Environmental Monitoring and Research.
    - Through the Collaborative Fisheries Planning work, important use areas for longline gear (black sea bass) and pots and traps (conch (channeled whelk) and black sea bass) were confirmed by fishermen within the wind energy study area. Additional fishing locations were volunteered for menhaden (purse nets), and an area of concentrated rod and reel fishing emerged in the vicinity of the triangle wrecks. General locations for gillnets were identified coincide within the cable export area.
    - Where fishermen were willing to shared data during public outreach (mostly by hand-drawing on maps), or during individual interviews, those data were captured in GIS and are depicted in the following map:

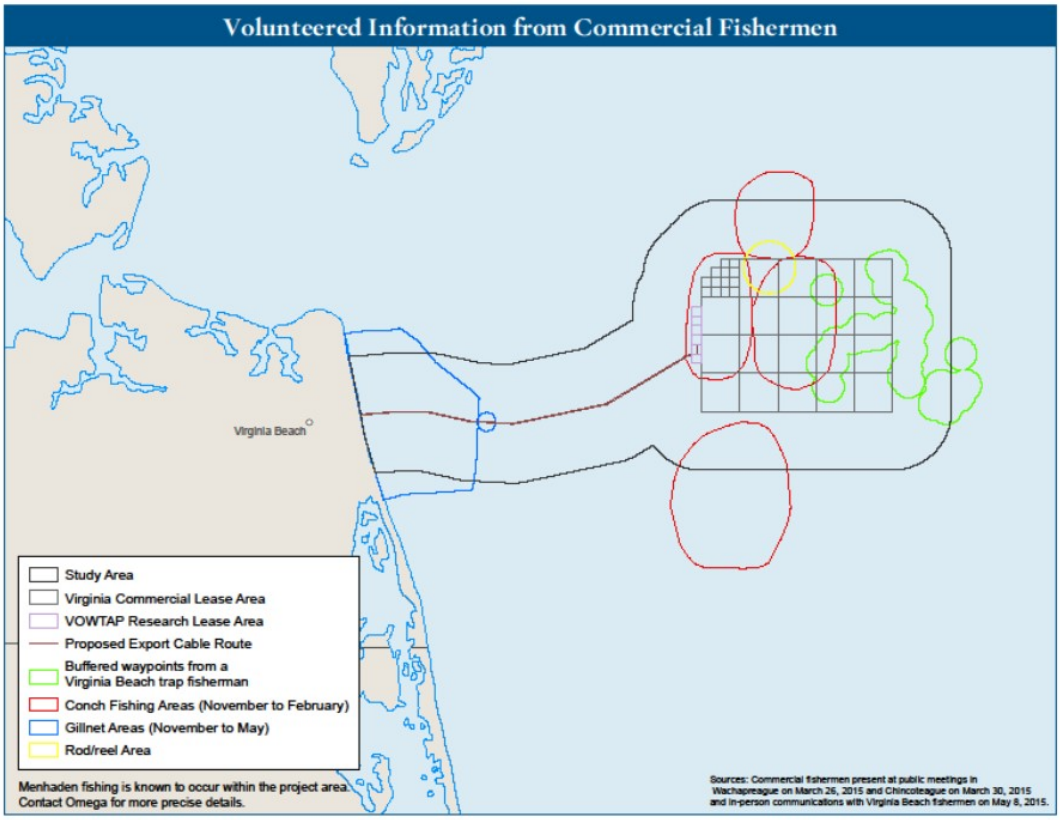


Figure 1: Volunteered Information from Commercial Fishermen.

- Chincoteague fishermen noted historic dragging activity and commercial croaker fishing within the VWEA. One fisherman noted they were dragging for flounder off the coast of Virginia Beach within the cable export area this year.
- The Virginia Beach fishing community identified trawling activities as historically taking place in the alignment of the cable and the Study Area. The target species for trawlers has varied over time but includes herring to squid.
- The Red Crab industry indicated their fishing activities will not be impacted by the proposed VWEA, however, they do transit through the study area to fishing areas.
- Charter fishing is also known to occur within and around the VWEA. The map on the following page depicts waypoints (latitude and longitude coordinates) shared by one charter captain representing one year of data.

BMP 2 (Continued)

- Designing the project with an understanding of ecological time scales. Ecology and thus fishery resource availability changes at different time scales. Since a wind facility is supposed to operate for at least 2 decades then decadal variability in fishery resources should be understood. We heard from fishermen that 15 years of fishing data that are mapped in Communities at Sea are not sufficient to accurately convey fishing patterns that might have occurred in the past, or might occur in the future within the VWEA. The wind energy facility will be in place for decades, and some oceanic and current cycles that affect fish migrations span decades. As in the case of the Chincoteague fishermen, the fishermen themselves could be the repositories of the historic information.

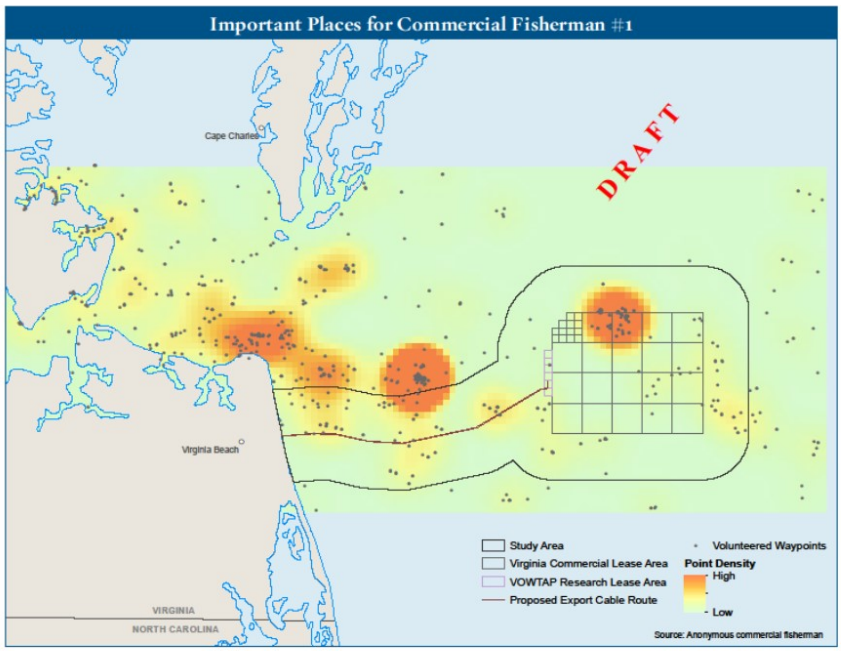


Figure 2: Important Places for Commercial Fishermen.

- Coordinate with Fisheries Representatives, fishermen, and monitoring entities to look for changing conditions, and incorporate emerging research on topics such as the effects of electromagnetic fields on fish species.
- Provide a minimum 50-meter buffer zone around natural and artificial reefs .

Micrositing. Micrositing is the exact placement of a facility within a previously identified area. We heard from fishermen that some areas of importance to them are relatively small, therefore allowing them to suggest footprint shifts that remain within the previously identified site zone could potentially avoid impacts to small areas that are important to them. In addition to the above, the following apply:

- Verify available fishing and oceanographic data with fishermen active at the site.

BMP 2 (Continued)

- Conduct additional outreach and seek additional first-hand information from fishermen active in the site vicinity regarding fish habitat, spawning, nursery, and feeding grounds; small areas of cover; and benthic novelties or bathymetric irregularities. Verify any species of concern and their patterns.
- Conduct additional surveys as needed to verify any changed conditions or where fishermen observations vary from previously collected data.
- Consult fine-scale and time-series fisheries maps developed as part of the Collaborative Fisheries Planning for Virginia's Offshore Wind Energy Area. A sample map depicting commercial gillnet activity from all ports since 1999 is shown on the next page. A link to all maps developed as part of the collaborative fisheries project can be found here: http://www.deq.state.va.us/Programs/CoastalZoneManagement/CZMIssuesInitiatives/OceanPlanning/FishingandVirginiaOffshoreWind.aspx.

Construction

Dynamic fishing activity calendar. In consultation with the Fisheries Representatives, the offshore wind developer should develop and maintain a *dynamic fishing activity calendar*. The calendar builds on the information compiled during the development and review of the construction and operations plan. During the construction phase, it is recommended that the Fisheries Representatives provide current information to fine-tune the windows provided in the initial calendar to conditions reported by fishermen that reflect that particular year's characteristics. The purpose of developing and maintaining the calendar through the construction period is to ensure that developers keep abreast of changing environmental conditions and not rely upon seasonal generalizations.

- Develop and maintain – in consultation with fishermen, and regulatory agencies - a publicly available fishing activity calendar so that construction and staging activities can be coordinated to limit exclusions and minimize disruptions. Fisheries Representatives are best placed to gather and report fishermen's day-to-day observations, such as water temperature effects on the arrival of species, and make recommendations about where nudging schedules could avoid adverse impacts.
- Utilize extensive information gathered from work conducted under the Collaborative Fisheries initiative and BMP #4 Environmental Monitoring and Research - before and during Construction and Operations Plan development and review - to inform the initial project and to update as additional information becomes available.

BMP 2 (Continued)

- Employ the dynamic fishing activity calendar to modify construction and staging where appropriate and feasible so that activities minimize exclusions and disruptions. Variability in black sea bass landings typically corresponds to the landing value. Whereas, peak fishing by some commercial individuals might take place during times where the Greater Atlantic Regional Fisheries Office landings show the lowest numbers. For example, lowest landings are recorded during summer months, however, interviews with commercial industry representatives indicate their highest activity is during March-January. Representatives from the charter industry indicated a preference for Black Sea Bass during the months of May-September.

BMP 2 (Continued)

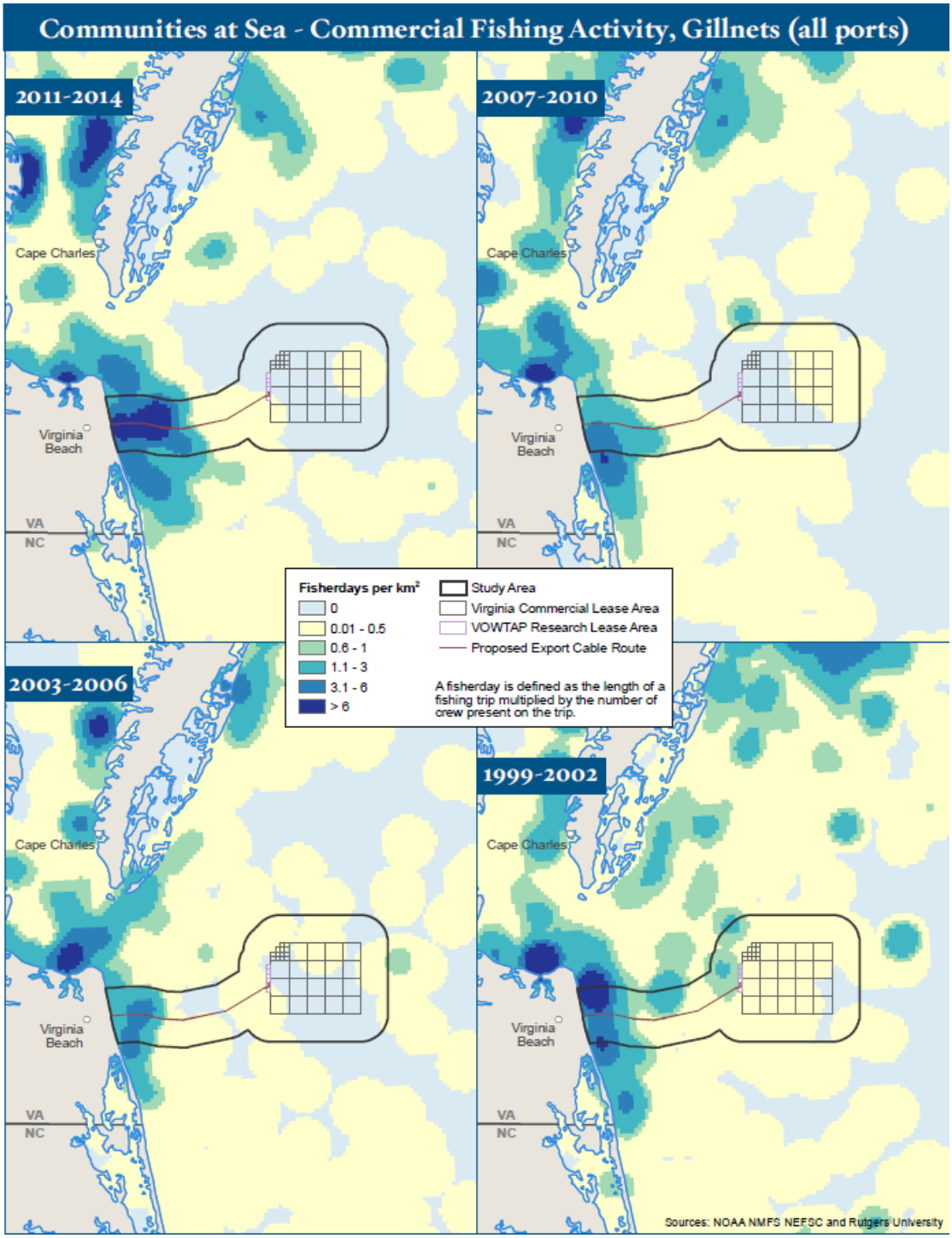


Figure 3: Communities at Sea – Commercial activity with gillnets, for all ports from 1999-2014.

BMP 2 (Continued)

Dockside facility coordination. Dockside facility coordination includes the use of docks, boat slips, and staging areas in the port used by vessels associated with the wind energy area. A port operations manager should be considered to coordinate port operations.

- Port Impacts – work with Fishery Representative to identify how port operations may affect fishing activity.
- A dockside coordination plan should address, at a minimum: questions of staging, number of vessels, size, and docking requirements, fuel purchase requirements, and the potential displacement of -and impacts on- the home port fleet.

Construction techniques. Construction techniques are the methods employed in the building or assembly of facilities, including equipment used.

- Techniques should be sensitive to the impacts of noise, vibration, turbidity, scour, sedimentation, and construction debris on fisheries and migrations, and seek to minimize those impacts to the extent possible, especially in areas that are important to fishermen.

Construction communiques. Construction communiques are informational pieces to let fishermen know what to expect during construction, or how to operate in and around the wind energy area.

- To assist with the communiques, Fisheries Representatives forward questions as they arise in conversations with fishermen. Some topics that have been posed already include:
  - The effect of construction vessel activity on fishing vessels and gear;
  - The impact increased vessel traffic will have on the primary navigation channels;
  - Whether fishing vessels will be required to use alternate routes during construction;
  - The timing and phasing of development; and
  - The type of turbine foundations with visual representation of the understructure and description of the footprint that will be employed
- Regularly complete, update, and disseminate a construction traffic management plan, with details about vessels that will be used in construction, their expected placement, rules for operating in the proximity of fishing vessels and gear, and other issues related to movement. This includes vessels in port, in transit, and anchored in the construction area.

Development of Construction and Operations Plan; Construction; and Operation

Export Cable. Export power cable issues were cited with sufficient frequency to merit a separate section in best management practices.

- Communicate cable location, depth, and monitoring results to fishermen.

BMP 2 (Continued)

- Require cable monitoring and maintenance commitments to continue with subsequent owners, lessees, concessionaires, or any other future arrangement that would transfer responsibility for the cable to another entity.
- Avoid interference with gear and fishing patterns and practices.
    - The same care for minimizing disruptions to fishing activities and resources in the VWEA should be applied to siting export cables.
    - Sustained interactions between fishery representatives and fishermen will help ensure that final cable locations minimize interference with fishing gear and anchoring types.
    - Consult fine-scale and time-series fisheries maps developed as part of the Collaborative Fisheries Planning for Virginia's Offshore Wind Energy Area, and recreational fishing maps developed for Virginia Coastal Zone Management's Coastal GEMS program to identify important fishing use areas where conflicts may occur.
        - The Communities at Sea map for the Virginia Beach community fishing with pots and traps indicates a concentration of activity in the study area.

BMP 2 (Continued)

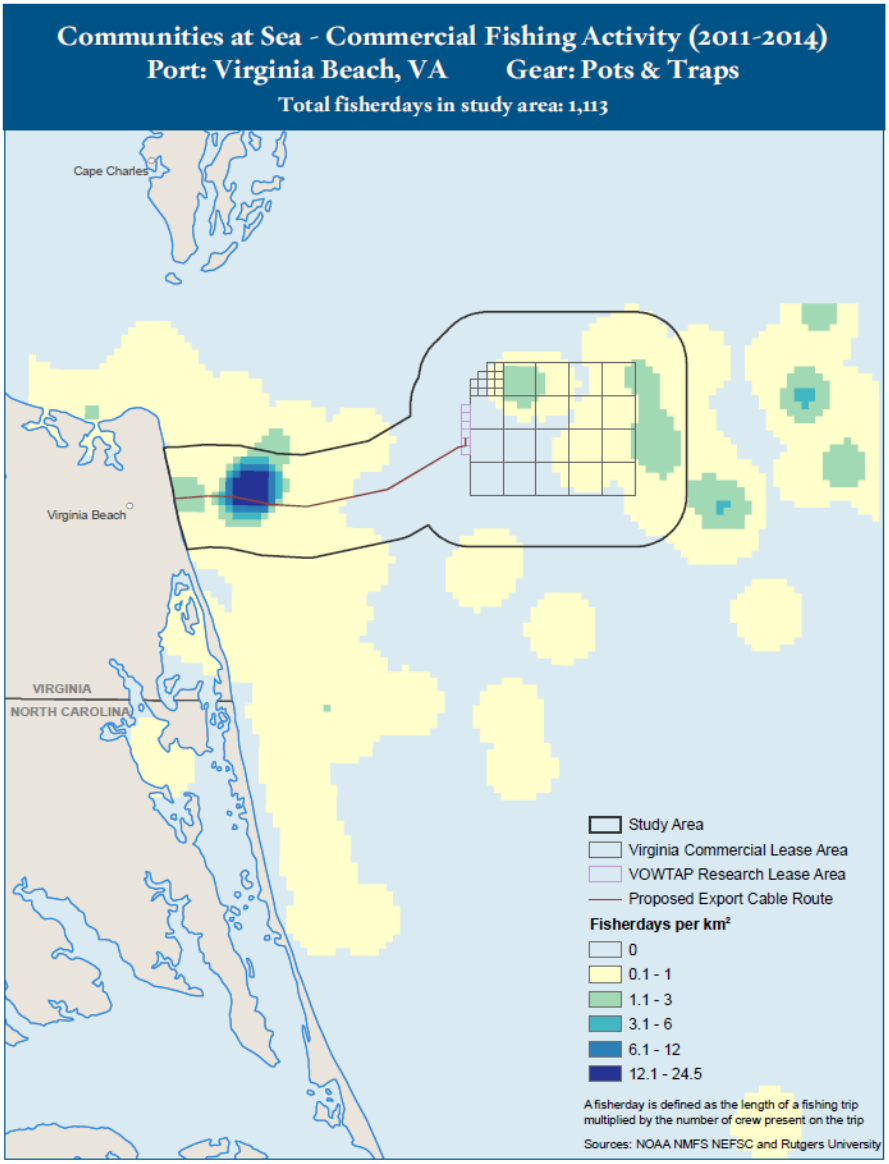


Figure 4: Communities at Sea – commercial fishing activity from 2011-2014 for pots & traps in Virginia Beach, VA.

- The map for the Virginia Beach gillnet community shows a more widespread, but intense, activity throughout the cable export portion of the study area.

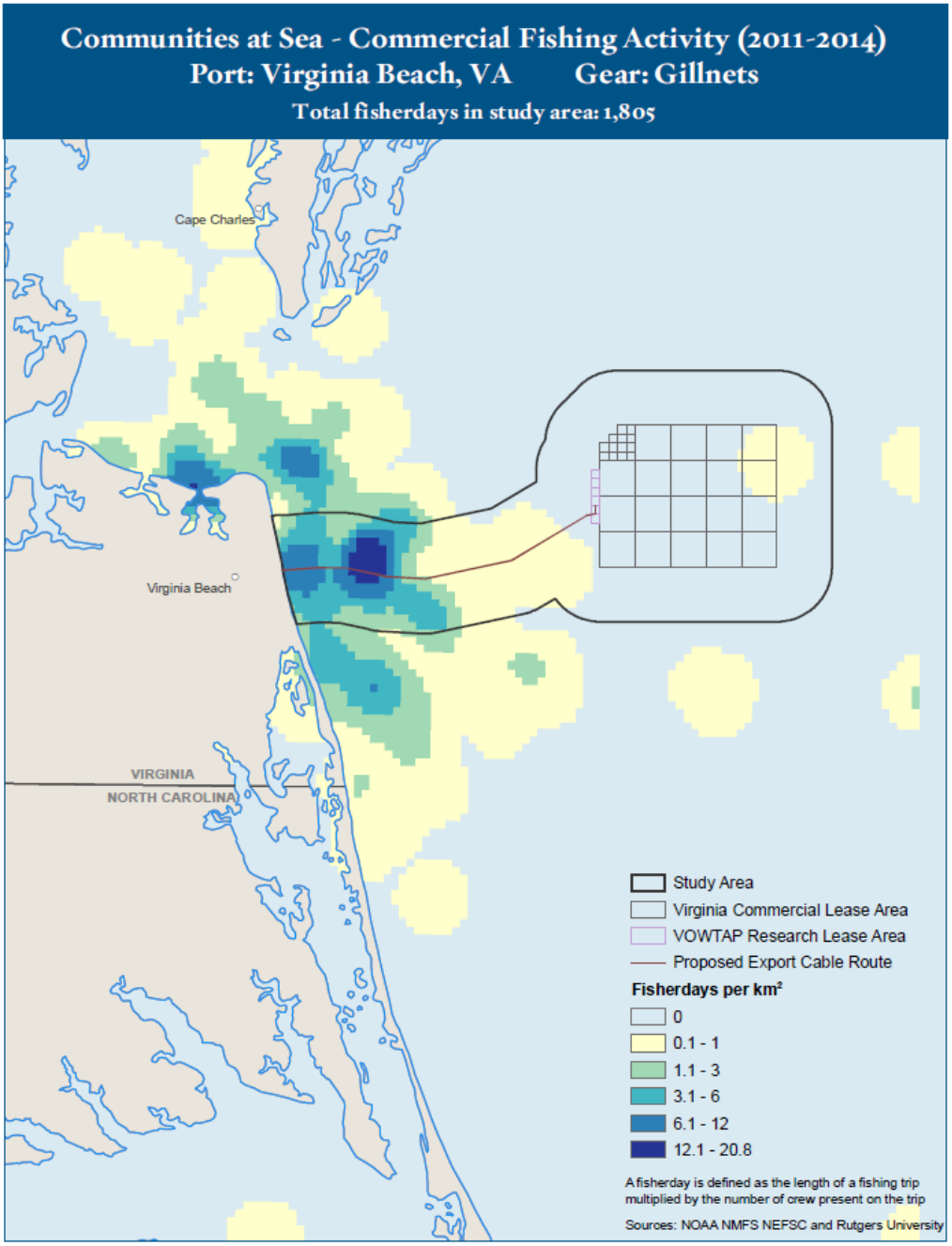


Figure 5: Communities at Sea – commercial fishing activity from 2011-2014 with gillnets in Virginia Beach, VA.

BMP 2 (Continued)

- Although Coastal Gems does not display the cable export route study area, the Coastal Gems charter fishing map shown below indicates consistent activity along the entire Virginia Beach shoreline, some of which falls within the cable export study area.

Other communities and recreation fishing activities that were examined, along with data collected and mapped for the Collaborative Fisheries Planning for Virginia's Offshore Wind Energy Area project, can be found here:

http://www.deq.state.va.us/Programs/CoastalZoneManagement/CZMIssuesInitiatives/OceanPlanning/FishingandVirginiaOffshoreWind.aspx

BMP #3: Navigation, Access and Safety

Overview

This best management practice (BMP) includes recommendations regarding navigation through wind facilities, accessing and anchorage at or around structures, marking, radio identification, lighting, and safety equipment. This includes both visual marking as well as automatic identification system transponders. These requirements may be beyond those required by the U.S. Coast Guard (which reviews the developer's Navigational Risk Hazard Assessment) and the Federal Aviation Administration. BOEM regulations require a Safety Management System (SMS) that includes clear communication protocols and describes roles and responsibilities. Under this BMP, the SMS must include procedures for emergency events such as:[1] allision (See definition below) of a vessel with a turbine structure, gear entanglement or damage to cabling by fishing activity, catastrophic failure of a turbine, or other events. The SMS will include clear communication protocols for alerting the fishing community with points of contact should an emergency arise. BMP No. 3 applies to all five phases of project development.

Best Management Practices

The practices are grouped into two topics: (A) Navigation, Access, and Safety, and (B) Vetting those protocols with the industry. The best management practices for each are listed within each topic.

Navigation, access and safety

To avoid conflicts with fishermen, wind energy lessees will seek to maximize fishing access throughout all phases of offshore development: site assessment and site characterization, construction, operation, and decommissioning. During the earliest planning stages of wind development, the lessee will meet with local fisheries groups (see BMP No. 1) who are most likely to be affected by offshore wind facilities development for input regarding access by fishermen. Additionally, the lessee will provide guidelines on safe navigation within and through the project site during construction and operation, *including consideration of specific transit lanes through wind energy project areas.* The lessee's Construction and Operations Plan describes the possible use of exclusion zones, any public mooring buoys that may be provided, potential hazards to vessels and/or gear, and/or other pertinent information associated with use of waters by local fishermen around and within an offshore wind facility. The lessee will work with the fishing community to determine the configuration of submarine cabling and foundation location/design relative to known adjacent fishing locations. BMP No. 3 should apply to all five permitting phases.

A SMS will need to recognize and differentiate between relatively temporary hazards to navigation (e.g., during construction activities) which will require an immediate short-term response, and more permanent conditions which may be handled through conventional communication

channels. A SMS will also need to address responses to accidents/emergencies for both workers and the community around them.

[1] Vessel striking of a stationary object (e.g., turbine platform) is referred to as an allision. A vessel striking of another moving vessel is referred to as collision. The SMS will need to account for both types of accidents. It will also need to account for interference by fishing vessels in construction activities.

BMP 3 (Continued)

Most broadly, fishermen consider careful siting and design of offshore wind farms to be the most effective way to proactively address safety issues. These considerations are discussed as part of BMP #2. Below are other safety-related issues generally cited by the fishing industry as being of greatest concern:

- Adequate spacing of turbines to allow the operation of commercial fishing gear between them
- Potential impacts of turbines on fishing vessel radar function[2]
- Routine updates on maintenance schedule/vessel locations
- Concerns about limited fishing access on the structures, post-construction
- Increased wind energy-related vessel traffic
- Rapid growth in recreational boating traffic due to increased fishing opportunities created by turbines
- Potential for arrays to impede Air Search & Rescue
- Onshore ability to respond effectively to emergencies (vessels, cleanup materials, etc.)
- Potential ice throws from turbines

Potential mitigation for the concerns listed above:

- Minimum distance between structures (conch pot fishermen suggest 1,000-foot separation between turbines, while scallop dredge fishermen suggest 1,200-foot separation between turbines)
- Updating nautical charts to reflect new offshore structures and associated navigational hazards
- Protocols for communicating real-time hazards to fishing vessels (centralized entity, channel for disseminating information – Vessel Monitoring System, text, smart phone apps, etc.)
- Protocols for fishing vessels to report real-time at-sea emergencies and/or hazards (centralized reporting, communication channels, etc.)
- Protocols for designating right-of-way between vessels in the VWEA
- Development of gear-specific hazard avoidance plans (operating protocols to minimize gear entanglements, allisions, collisions, etc.)
- Protocols for handling gear entanglements with VWEA facilities (who to contact, retrieval protocols, rules regarding compensation, etc.)
- Turbine signage (identifying number, foundation type, scour protections)
- Markings of designated transit zones for vessel traffic
- Right of way delineations
- Training/emergency readiness drills to prepare for emergency situations

[2] Smaller objects may be filtered out when vessels turn down signal strength due to strong echo return from towers.

BMP 3 (Continued)

- Use of WEAs to augment current safety/emergency communication practices (provide helipad, add cell tower functions to turbines, etc.)
- VHF transmitter or cell phone tower installed on one of the structures to facilitate communication to shore
- Tie-offs to the tower or at least nearby mooring buoys (most emergencies are mechanical)
- Safety ladders painted in contrast color of tower
- Safety lighting on towers at a height visible by smaller vessels and during low visibility (fog) as they approach close to the tower
- Guard vessels during construction and major maintenance efforts
- Power air draft markings (indicates gap between water surface and blades)
- Augmented turbine markings to address visibility concerns at night and in fog (radar reflection, AIS on fixed stations, RACON, etc.)

Vetting the navigational safety, communication protocols, and emergency response procedure

The process for vetting protocols and procedures with the fishing industry is largely comparable to other issues, but necessitates the involvement of US Coast Guard and state marine fisheries law enforcement. Specific suggestions regarding an outreach process are outlined below.

Pre-Project Construction and Operation:

- Initial discussions with local Coast Guard Captain of Port, Virginia state safety officials to understand existing mechanisms (e.g., Coast Guard Harbor Committees) for discussing safety concerns with fishing industry; assess effectiveness/gaps given target fishing industry audience (e.g., many not home-ported in Virginia)

- Initial discussions with fishing industry to understand and confirm safety concerns, identify cross-cutting vs. gear-specific safety considerations; Fisheries liaison (FL) works with key Fisheries Representatives (FR), Captain of Port to refine specific outreach strategy (meeting locations, group composition and size, etc.)

- Focused discussions with affected gear groups to develop gear-specific hazard avoidance plans; FL works with key FRs to refine specific outreach strategy

During Wind Farm Operation and Decommissioning:

BMP 3 (Continued)

- Convene periodic discussions with fishing industry (twice annually at outset, then adjust as needed) to assess effectiveness of and recommend revisions to Safety Management System/National Safety Risk Assessment; FLs work with Captain of Port, existing safety committees, FRs to develop effective outreach strategy.
- Following incidents between wind farm operations and fishing vessels/gear, convene post-incident discussions to assess effectiveness of and recommend revisions to SMS/NSRA; FLs work with Captain of Port, VA state safety officials, existing safety committees, FRs to develop effective outreach strategy.

BMP #4: Environmental Monitoring

Overview

This best management practice (BMP) recommends procedures for documenting, monitoring, and researching environmental conditions related to the commercial and recreational fishing industry in and around Virginia's wind energy area during construction, operation, and following storm events. This BMP calls for the development by the developer of an over-arching Environmental Monitoring Plan to detail recommended procedures.

BOEM and others have completed much work to identify environmental monitoring and research protocols. For example, in November 2015 BOEM published "Identifying Information Needs and Approaches for Assessing Potential Impacts of Offshore Wind Farm Development on Fisheries Resources in the Northeast Region."[3] Commercial Fisheries Research Foundation and the Cornell Cooperative Extension of Suffolk County Marine Program solicited, compiled, and synthesized input for that report from fisheries scientists, managers, and members of the commercial fishing industry. The report contains suggested best practice protocols and identifies research needs that pertain to Wind Energy Areas (WEAs).

This BMP should be part of an over-arching Environmental Monitoring Plan to detail recommended procedures for the wind energy area developer to implement. The full Environmental Monitoring Plan should also include the results of other BOEM studies on the potential impacts to marine mammals, migratory birds, and geophysical processes. [4]

Guiding Principles

The following guiding principles provide a foundation for the BMPs outlined in each section.

- The Environmental Monitoring Plan should incorporate an adaptive management approach;
- Pre-construction baseline surveys and post-construction monitoring will lay the foundation for tracking environmental changes;
- Fisheries surveys of the Virginia Wind Energy Area should be conducted to avoid or minimize any impacts to fishing activities;
- Applicable academic research institutions that may play a key role in informing the Environmental Monitoring Plan should be part of the plan development (see the list in BMP 1);
- As with all project-related activities environmental monitoring activities should be coordinated with the FR and FL.; and

[3] http://www.boem.gov/OCS-Study-BOEM-2015-037/.

[4] See http://www.boem.gov/Virginia-Geophysical-Phase-II/; http://www.boem.gov/Understanding-Whale-Presence-Virginia-Offshore-Wind-Energy-Area-using-Passive-Acoustic/; and http://www.boem.gov/Risk-of-an-Offshore-Wind-Project-to-a-Migrant-Shorebird/

BMP 4 (Continued)

- Monitoring and research priorities and findings should be clearly communicated with fisheries stakeholders.

Environmental Monitoring

Pre-construction baseline surveys. Pre-construction surveys should begin well in advance of construction to determine the baseline conditions. Where available, several years or decades of pre-construction environmental data (e.g., bathymetry, sediment type, habitat maps, benthic habitats, benthic and pelagic community structures, water currents, water quality, etc.) should be analyzed to establish baseline conditions and trends. The results of pre-construction site characterization surveys inform what needs to be monitored by the lessee post construction. The Environmental Monitoring Plan should include the results of the previous surveys and the rationale for choosing the monitoring protocol in order to demonstrate that it is sufficient in scope to track and quantify project impacts and is credible with industry (i.e., over a long enough period to capture changes in fish migratory and spawning behaviors and related fishing activities tied to the wind project). Data needs to be collected both for the project footprint and an appropriate surrounding buffer area (during construction) selected in consultation with fishing industry representatives (given the potential for wider impacts to those small areas which are important to them).

Requested baseline data include:

- existing benthic and epibenthic biological communities,
- high resolution bathymetry and substrate,
- harvest species abundance,
- migratory fish patterns,
- spatial and temporal fishing patterns by fishery type.

Monitoring Plan. The Environmental Monitoring Plan needs to spell out specific environmental conditions to be monitored by the lessee during construction, operations and decommissioning to assess potential impacts to habitat and target species.

Focus for monitoring activities should evaluate how project-related activities may impact:

Biological

- Migration patterns in/out of Chesapeake Bay and along the north/south ocean corridor
- Benthic habitat and community level changes
- Species abundance

BMP 4 (Continued)

- Spawning behavior
- Fish movements and aggregations
- Larval transport and settlement
- Fishing effort

Both commercial and recreational fishermen have noted concerns over the potential impacts of AC and DC electromagnetic fields to migratory finfish, elasmobranchs, and other marine life, and have requested more research and monitoring to understand the real and potential risks to the mid-Atlantic's marine life.

Black sea bass and conch have been identified as important commercial species in the VWEA. Other recreationally important species may include: tautog, flounder, amberjacks, cobia, spadefish, king mackerel, and wahoo. Forage species should also be considered, including but not limited to sardines, sand lance, river herrings (blueback herring and alewives), menhaden and krill. The Virginia Institute of Marine Science has participated in the NorthEast Area Monitoring and Assessment Program (NEAMAP) to collect fishery independent information along Virginia's coastline since 2006. This program has collected data throughout much of the transmission cable area but has not extended into the VWEA. Because this program is consistent throughout the Northeast, including within Rhode Island's Deepwater Wind project, it is recommended for expansion into the VWEA. Expansion of the NEAMAP survey (or a companion survey following identical protocols) to cover the VWEA would provide a seamless assessment for evaluation of impacts across the cable and wind development areas.

Physical and Structural

- Currents and flow
- Upwelling/water column mixing
- Benthic habitat burial or degradation
- Scouring and turbidity
- Noise
- Vibrations

Industry has concerns regarding the impact of wind turbine platforms and footings on currents and current flows, sediment transport and scouring. The Environmental Monitoring Plan should make explicit whether and how such potential impacts will be tracked from construction through decommissioning. The Environmental Monitoring Plan should consider impacts beyond immediate project footprint such as the potential to disrupt flow and upwelling. Preliminarily there are few, if any, identified fine sand/silt areas that could become easily re-suspended within/or immediately adjacent to the VWEA.

The fishing industry has strong concerns associated with the potential for buried cables to become exposed due to storm events and routine sediment movement. An Environmental Monitoring Plan should specify the monitoring protocols to be followed related to buried cables, including inspection mechanism (visual and/or remote-sensing – ongoing and post-storm), frequency (greater frequency earlier in the project life is seen to be important) and communication with the fleets regarding operational concerns.

BMP 4 (Continued)

The protocol should also discuss the procedures for a post-storm inspection to be triggered by a request from any of the fishing sectors. The Environmental Monitoring Plan should explicitly state whether the communication plan for informing the sectors that inspections and corrective actions have been completed (through multiple channels or nodes.) Further details about communication are provided in BMP #1.

Post-construction surveys. The lessee's Construction and Operations Plan, which is submitted to BOEM, must provide measures for avoiding, minimizing, reducing, eliminating, and monitoring environmental impacts per 30 CFR Part 585.626(b)(15).

The physical and biological resources that are to be monitored by the developer will be determined on a site- by-site basis. BOEM has completed studies aimed at guiding the lessee toward appropriate monitoring methods. This BMP is primarily applicable to the Construction, Operations, and Decommissioning phases of wind project development.

Monitoring and evaluation surveys should follow adaptive monitoring principles. Such an approach should include a systematic process to continually improve management policies and practices in a dynamic, changing environment. A strong stakeholder process, coordination among federal and state regulatory agencies, and a transparent, monitoring evaluation and reporting mechanism ensures monitoring occurs.

Other. Other issues to incorporate in an Environmental Monitoring Plan include:

- Potential to use wind energy infrastructure to learn more about winds, waves, ocean temperatures, marine debris, and for other ancillary data collection that has the potential to provide fishing industry and environmental benefits (ideally linked to the existing Integrated Ocean Observing System).
- Climate change impacts on current patterns and, as a result, potential impacts on habitat/species.
- Comparison of impacts from similar offshore structures elsewhere.
- Communication products (e.g., fact sheets and other summary documents) should be developed to inform the public about existing research and monitoring information.
- These communication products should be easily accessible through project and partner websites and outreach events.

The Environmental Monitoring Plan should articulate the entities (lessee, others) responsible for implementing specific aspects of the monitoring during each phase of the VWEA. As appropriate, the Plan needs to articulate an adaptive management approach dependent on monitoring results.

Monitoring Results and Coordination

The results of monitoring activities should feed into locally important research needs, as well as inform broader research questions relevant along the Eastern Seaboard. The aim is to have locally

nuanced/informed approaches that still allow for consistency and learning across WEAs. The Environmental Monitoring Plan should describe the potential to use cooperative research efforts with all fisheries sectors and the potential to work with regional and local academic institutions (listed below). The Environmental Monitoring Plan should identify communication and outreach processes and products to inform and educate the larger community on research and monitoring findings, with an emphasis on presenting information in a manner that is both accessible and understandable (e.g., using units and values that resonate) to commercial and recreational fishermen.

Collaboration

Organizations/leaders the lessee should be working and the roles of the Fisheries Liaisons and Fisheries Representatives:

Fisheries Liaisons/Fisheries Representatives. As outlined in BMP 1, Fisheries Liaisons and Fisheries Representatives are the primary conduits to foster information-sharing between the lessee and the fishing industry. Fisheries Liaisons/Fisheries Representatives can and should play a critical role in both helping provide input into the Environmental Monitoring Plan (both operational and environmental), as well as serving as conduits to provide feedback to the lessee on implementation concerns and challenges.

Relevant gear groups and local fishing associations. Input from all relevant gear- and state-based fisheries groups will be needed to provide input on data to be collected and assessed in the Environmental Monitoring Plan (both operational and environmental), as well as any operational concerns. It is important to elicit feedback from relevant gear/local association-based fisheries groups home-ported in and outside Virginia. Fishermen should also be considered as collaborative research partners and engaged in monitoring data collection whenever practical.

Fishermen. Fishermen can and should participate in collaborative monitoring and research projects whenever feasible. The fishing industry often has the knowledge, vessels, and equipment necessary to conduct or support monitoring and research projects. Virginia fishermen currently work with the fisheries-independent, NEAMAP through the Virginia Institute of Marine Science. Their inclusion in the process creates a broader sense of trust in the findings. Although NEAMAP's study area does not currently extend into the VWEA, fishermen recommended establishing a complementary survey using the same protocol to survey the VWEA.

Research institutions. Research and academic institutions that have credibility with fishing sectors will likely play a key role in informing and implementing the Environmental Monitoring Plan. Key research institutions with an interest in the Mid-Atlantic for the lessee to work with include, but not restricted to: College of William & Mary /Virginia Institute for Marine Science (expected to have a 93' research vessel by 2017 for offshore monitoring), Virginia Commonwealth University, Old Dominion University, James Madison University, Monmouth University, East Carolina University, Duke University, University of Virginia, Virginia Polytechnic Institute (Virginia Tech), University of Maryland, and University of Delaware.

The Lessee also needs to work with entities such as NOAA, the Mid-Atlantic Fishery Management Council, US Coast Guard, VMRC, Virginia Department of Environmental Quality and VA CZM. Collaborations with research institutions and federal/state agencies may also identify opportunities to use the turbines as research or monitoring platforms.

BMP #5: Mitigation

Overview

Development of the wind energy area (VWEA), placement of the export cable, and associated activities could have detrimental effects to commercial and recreational fishing, because of the importance of certain areas within the VWEA, and its location relative to other important fishing and fish migration, habitat, spawning, and nursery grounds. The goal of this best management practice (BMP) is to identify foreseeable short-term and long-term impacts and to create acceptable mitigation strategies, through ongoing dialogue with fishermen, fishery representatives, the fishery liaison, and the developer.

The Fishermen's Contingency Fund, established under the Outer Continental Shelf (OCS) Lands Act of 1978, compensates U.S. commercial fishermen for property and economic loss caused by obstructions related to oil and gas development activities. There is no equivalent compensatory fund for offshore wind energy development impacts. The Bureau of Ocean Energy Management (BOEM) does not have statutory authority to establish such a fund. BOEM is required to assess socioeconomic impacts and the adequacy of any associated mitigation under the National Environmental Policy Act. Any procedures and protocols regarding compensatory mitigation to offset harm to the fishing industry due to offshore wind activities would be voluntary. Compensation schemes to-date have largely been determined through industry-to-industry negotiations.

Compensatory mitigation can take the form of offsets like shore-side improvements, fish habitat restoration and improvements, modifications and additions to gear and vessels, pre-restoration surveys, enhancements to fisheries science, seafood and tourism promotion, and special contract provisions. It can also include direct financial compensation to fishermen in the event of lost revenue associated with displacement from the WEA or export cable areas, impacts from damaged vessels, or gear losses.

Compensation and mitigation plans may be comprehensive or targeted to address direct and indirect fisheries impacts, as needed, associated with the VWEA and export cable corridor development. Displacement and disruption impacts to existing fisheries should be evaluated and addressed collaboratively in consultation with the liaisons and fishing industry representatives for appropriate mitigation, and may include direct compensation. Mitigation strategies may also include measures to mitigate indirect impacts, and these strategies could include measures that benefit affected ports and fisheries. Examples include enhancements to port infrastructure and enhancements to fisheries science. In the case of the VWEA, the two fisheries expected to be most significantly impacted (black sea bass and channeled whelk) are data-poor fisheries, so mitigation plans could include measures to enhance existing science and management of these species.

Guiding Principles

The following guiding principles underlie all of the best management practices outlined in this section.

- Fishing should be allowed to continue with as few disruptions as possible for both commercial and recreational fishermen.
- The developer should be prepared to acknowledge that its activities may have the potential to disrupt commercial and recreational fishing, and that it may need to develop mitigation measures.

BMP 5 (Continued)

- Commercial fishermen have thorough knowledge of the VWEA and should be viewed as a valuable asset.
- Participation of fishermen in the development, methods, and study activities for monitoring and mapping will yield results of mutual benefit, and strengthen cooperation.
- Every effort will be made to anticipate negative impacts ahead of time, but it is possible that unforeseen conditions will arise. In those situations, it is in the best interest of all to collaborate on remedies to improve the end result.

Best Management Practices

Improvements/Additions/Modifications/Restoration

Shore-side Improvements. Developer and fishery representatives will explore the need for permanent shore-side improvements arising from the developer's chosen port location and the ripple effects it will have on other ports. Infrastructure could include derricks, gear or fuel storage facilities, freezers, ice machines, shelters, or other equipment, with an eye towards efficiency and modernization.

Enhancing fisheries science and management. The two fisheries in the VWEA that are expected to be most impacted—black sea bass and channeled whelk—are both data-poor species. A mitigation plan could include measures to enhance the state of the science for these species. Affected fishers could be engaged in the implementation of pot surveys and other surveys prior to construction in order to establish a baseline of abundance of fisheries resources.

Fish habitat restoration and improvements inside the WEA. Commercial fishermen and recreational anglers both expressed concern with avoiding damage to fish habitat, and they hoped for improved fish habitat in the WEA after the turbines are constructed. Design improvements to enhance fishery production should be considered, and where possible, habitat that is disrupted should be restored to pre-construction conditions.

Fish habitat improvements outside the WEA. When parts of the WEA that are important to fishermen will be closed during construction, establishing new structure areas outside of the WEA should be explored to provide an alternative by the time closures or exclusions occur. Since new structures will take several years to become established and populated, this process should begin early in the project cycle to allow time for its establishment.

Vessel/gear modifications/additions. Fishermen might find that their gear is not well adapted or may require modifications to improve fishing within the WEA. Furthermore, depending on the safety protocols that are adopted, fishermen might need to purchase or install additional equipment to safely navigate within the WEA. Assistance with gear modification could be considered as a mitigation measure.

Pre-restoration/mitigation surveys. Occasionally, storms, ocean currents, gear entanglement, or other natural or mechanically induced events will disrupt cover that overlies cables, or previous mitigation or restoration before it is fully established. Pre-restoration surveys are highly recommended to document the effectiveness on the restoration or mitigation.

BMP 5 (Continued)

Promotion

Sport fishing and tourism promotion. Development of the WEA can cause temporary disruption to sport fishing and other oceanic tourism sectors. Compensation possibilities include direct payment to organizations that represent charter and head boat captains to boost promotion on behalf of their members, or temporarily funding full or part-time positions within those organizations. In devising this mitigation strategy, it should be recognized that adverse impacts can go well beyond the fishing industry, and the developer should work with local ports and economic development officials to better understand and assess the potential for impacts beyond the fishermen.

Virginia seafood promotion. Similar to the previous BMP, this mitigation item would pay for promotion and marketing of fish species associated with ports affected by construction, especially those forced to adapt due to offshore wind energy construction.

Special contract provisions

Use of fishermen and their vessels. One way to offset interruptions to commercial fishing is by allowing fishermen to pick up other work during construction. For example, if marine mammal scouting vessels are needed, specify that local fishing vessels have the first right of refusal for the work. (The specialized spotting work would still be done by a person of the developer's choosing). The European experience with offshore wind energy development indicates that offshore development will have the most conflicts with fisheries, and mitigation plans should prioritize including affected fishers in their mitigation plans. Employing impacted fishing vessels to serve as transit and guard vessels during the construction and ongoing maintenance phases of the development are salient examples.

It is acknowledged that in order to implement such provisions, fishing vessels must meet the safety and operational standards required by the developer, the U.S. Coast Guard, and other marine safety requirements. Sample guidelines taken from the United Kingdom FLOWW "Best Practice Guidance for Offshore Renewables Developments: Recommendations for Fisheries Liaison" (specifically, Chapter 6: Liaison During the Construction and Operational Phases) can be accessed online via: bit.ly/1W4MMh6.

Other possibilities include, but are not limited to:

- Setting traps in ventless trap surveys.
- Bottom trawl surveys.
- Guard vessels.
- Benthic surveys for fishing vessels equipped with side-scan radar.

Transit rights. In areas that are closed to general traffic, consider allowing transit rights to commercial fishermen and charter captains to save them time and fuel. This would be managed through the construction traffic management plan in BMP #2.

Purchasing. Look for opportunities in purchasing at a certain location or in a certain way that benefits could accrue to a port group or a sector of fishermen, as determined by the fishery representatives.

Fishermen Financial Compensation – Types of Loss

Increased costs. WEA activities that could increase costs for fishermen include: exclusions that cause longer transits, loss of dock space, and higher prices from increased competition for goods and services. Compensation for these costs is often through dockside improvements, contract provisions, or other offsetting mitigation rather than actual payments to fishermen.

Gear or vessel loss or repair. Entanglements on turbine platforms, snagging on cables, and allisions from objects that were not properly lighted are all examples of possible causes for gear or vessel losses. These losses will likely be approached differently during construction than during operation. Operational manuals must contain clear procedures for not only what do to in the event of an entanglement or allision, but evidence that must be collected at the time for claims. Obligations for compensation must have continuity over time, regardless of who is responsible for the asset after its initial construction.

Loss of fishing revenue. Revenue loss will apply mostly during the construction phase, and can come from several sources. Closures during the time of construction are commonly thought of but other examples include removal of fixed gear during surveys, pressure on other fishing grounds caused by displaced fishermen, changes in the types of fishing employed, species of fish caught, and value of the catch from the project site after construction.

Fishermen Financial Compensation – Structure

In most gear compensation cases, developers paid into a fund (rather than direct payments to fishermen), with fishermen submitting claims to the fund for reimbursement. In devising a financial compensation plan, relevant fishing gear groups and associations from within and outside of the home port area, along with industry representatives, should all inform the financial compensation process.

Elements of a Compensation Fund. Compensation plans have several elements in common:

1. **Source(s) and amount of funding**. A fund is typically established, and claims draw from the fund. The source and amount of funding should be determined, along with any stipulations such as: in the event that claims exceed funding, whether funding is static over time or escalates, timing of payments into the fund, under what conditions payment can be suspended, and when payments into the fund cease.

2. **Term**. Is the duration of the compensation fund for the term of construction or development of the entire WEA? Or, does it last until decommissioning of the development? There could be different durations for different compensation agreements. The fund horizon should adequately consider the potential duration of fisheries impacts.

3. **Data**. Effective mitigation requires that both the developer and the fishing industry have confidence in the information being used to assess impacts and, as a result, possible mitigation or compensation.

   In the case of vessel and gear claims, up-to-date benthic data and data on infrastructure positions, safety zones, vessel movements, submarine cable routes, and other relevant information needed for verification are somewhat straightforward.

Revenue claims can be more complex, depending on how they are structured. There are several sources of information for assessing industry-level losses, including data from the National Marine Fisheries Service who track fishing effort as well as landings revenue, and additional studies may be conducted by the developer to support the submission of a Construction and Operation Plan. Even so, direct financial compensation for individual fishermen impacts may require a level of data and documentation not currently being collected, particularly by the recreational fishing sector. However, commercial fishermen may have electronic chart plotter data and logbook data to support individual claims in fisheries that are not federally managed. If post-construction compensation is pursued it would likely need to include extensive documentation of a baseline period and subsequent changes in fishing activity, vessel routes and fuel costs, and landings both inside and outside the project area. Market prices and the status of other potential factors (pollution events, changing water temperatures and currents, drop in demand for certain species, fisheries management restrictions, etc.) can also impact individual income. In some cases, wind turbine structures are expected to act as artificial habitat enhancement that might even improve catch and income, which should be documented as well. In addition, the developer may want to require third party verification for all data submitted.

4. **Clear instructions**. There need to be clear instructions on the process for submitting claims, including evidence that must be collected and actions that must be taken at the time of the incident in the case of vessel and gear claims. Instructions should also state specific damages that will be covered, and under what conditions, including whether loss of income is covered until the vessel or gear is again fully functional.

5. **Description of Process**. A full description of the claims process, including how long the claimant can expect to wait for a decision, who decides if a claim is approved, and the appeals process. The manner of determining compensation should be clearly stated. Provisions should be made for arbitration if claims cannot be resolved.

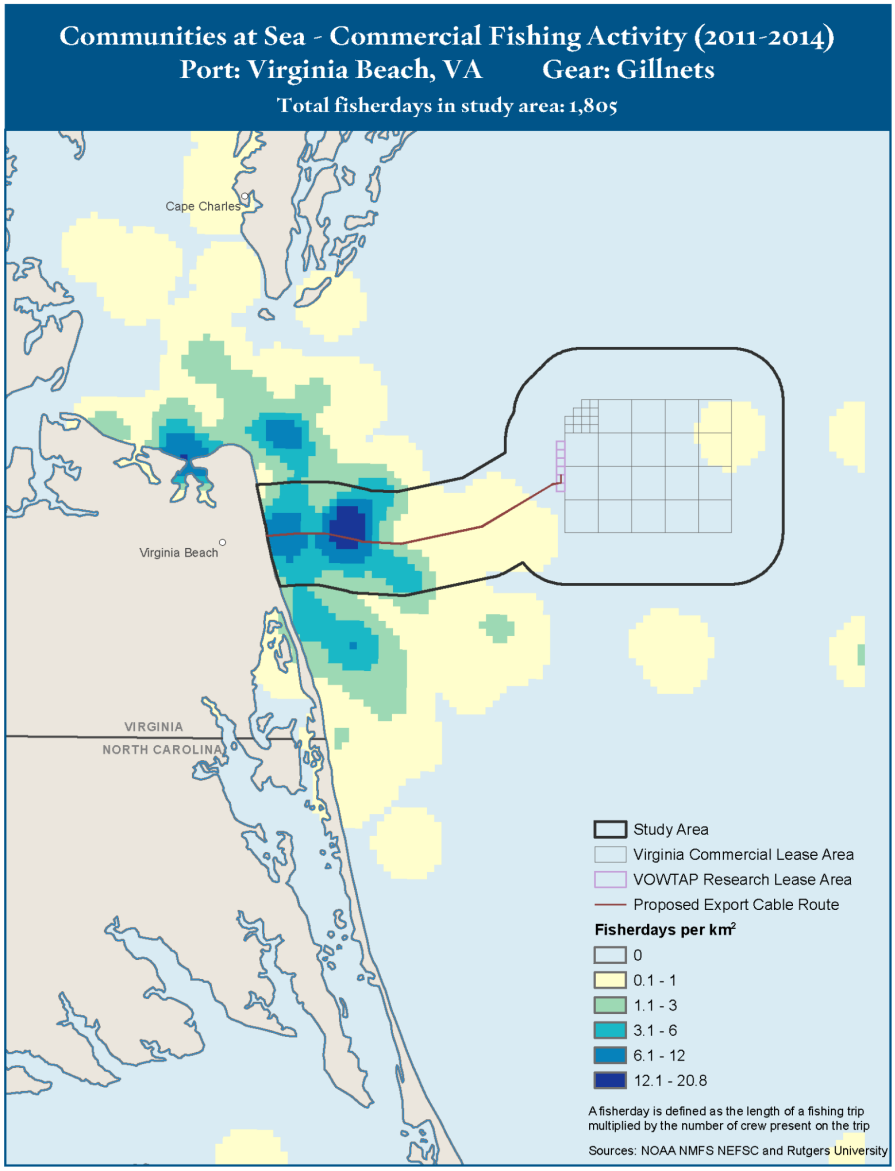
APPENDIX D: Map Gallery

APPENDIX MAPS

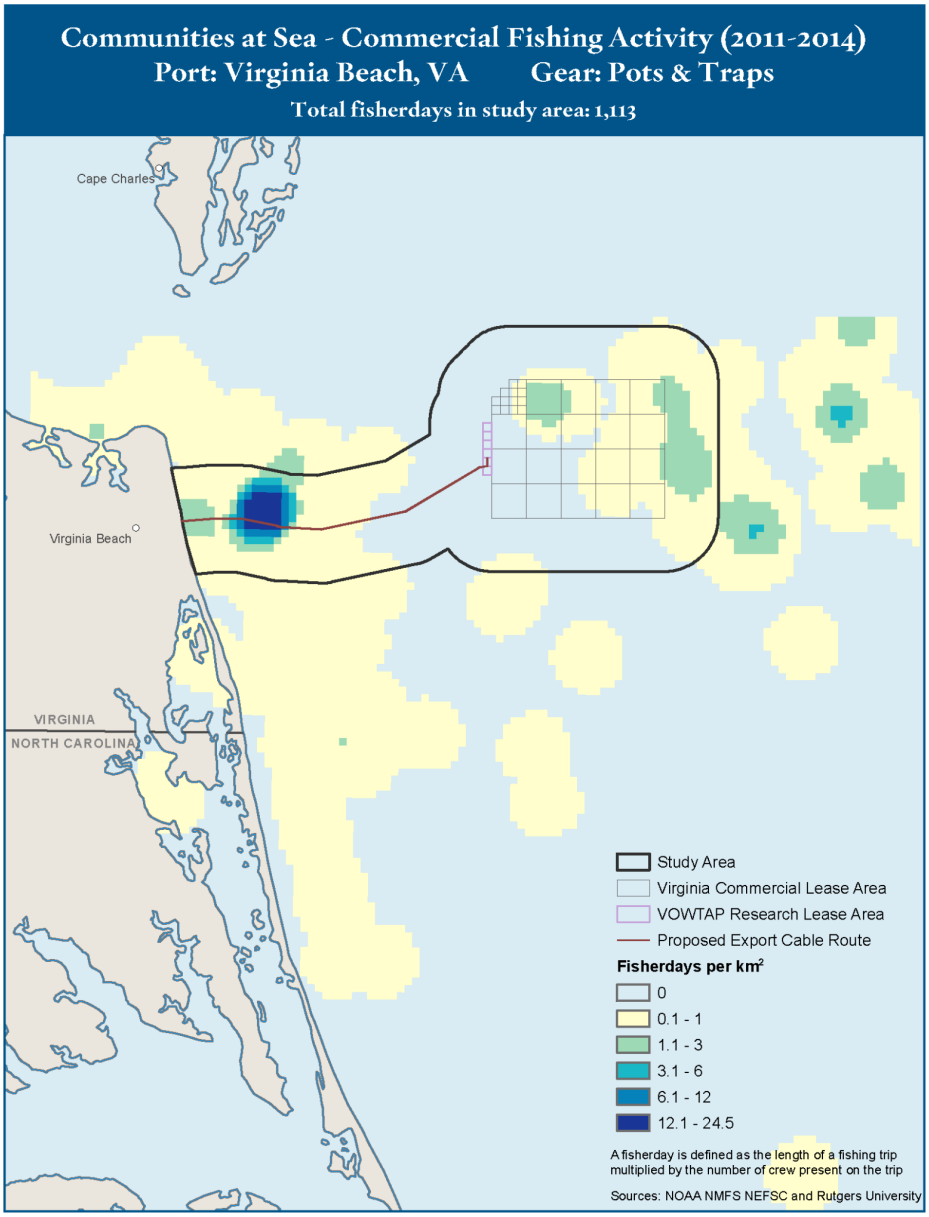
The following pages include 32 maps organized according to the following categories:

A. Communities at Sea (maps 1 – 9) – Data on fishing gear and home port for 2011 to 2014. Includes total fisherdays per square kilometer, a measure of fishing effort. See report section "Commercial Data" for additional information.
B. Time Series (maps 10 – 18) – A product of the Communities at Sea data showing fishing effort and location across four periods: 1999 to 2002, 2003 to 2006, 2007 to 2010, and 2011 to 2014. The ports of Virginia Beach, Hampton Roads, and Norfolk are represented as are two key gear types, gill nets and pots/traps. See report section "Commercial Data" for additional information.
C. Exposure (maps 19 – 24) – Data on revenue intensity for 2007 to 2012 as an indication of the socio-economic exposure of commercial fisheries to offshore wind energy development. See report section "NMFS Exposure Report" for additional information.
D. Volunteered Data (maps 25 – 26) – Information about fishing locations for certain gear types volunteered by fishermen during the Communities at Sea data review process. See report section "Efforts to Collect Missing Data and Vet Communities at Sea" for additional information.
    a. Recreational Fishing – pGIS data (maps 27-32)

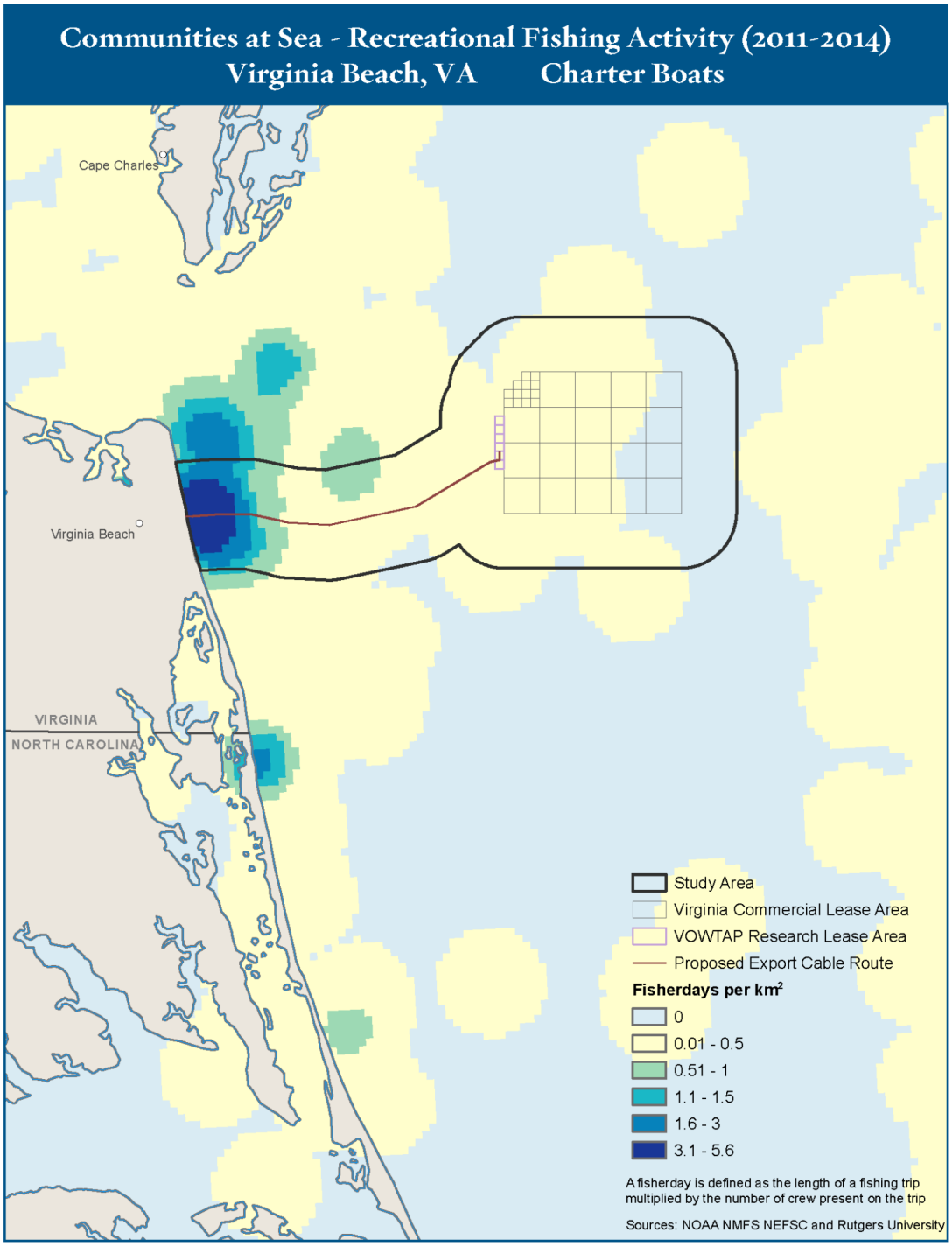
Map 1.


Communities at Sea - Commercial Fishing Activity (2011-2014)
Port: Virginia Beach, VA Gear: Gillnets
Total fisherdays in study area: 1,805
Cape Charles
Virginia Beach
VIRGINIA
NORTH CAROLINA
Study Area
Virginia Commercial Lease Area
VOWTAP Research Lease Area
Proposed Export Cable Route
Fisherdays per km²
0
0.1 - 1
1.1 - 3
3.1 - 6
6.1 - 12
12.1 - 20.8
A fisherday is defined as the length of a fishing trip multiplied by the number of crew present on the trip
Sources: NOAA NMFS NEFSC and Rutgers University

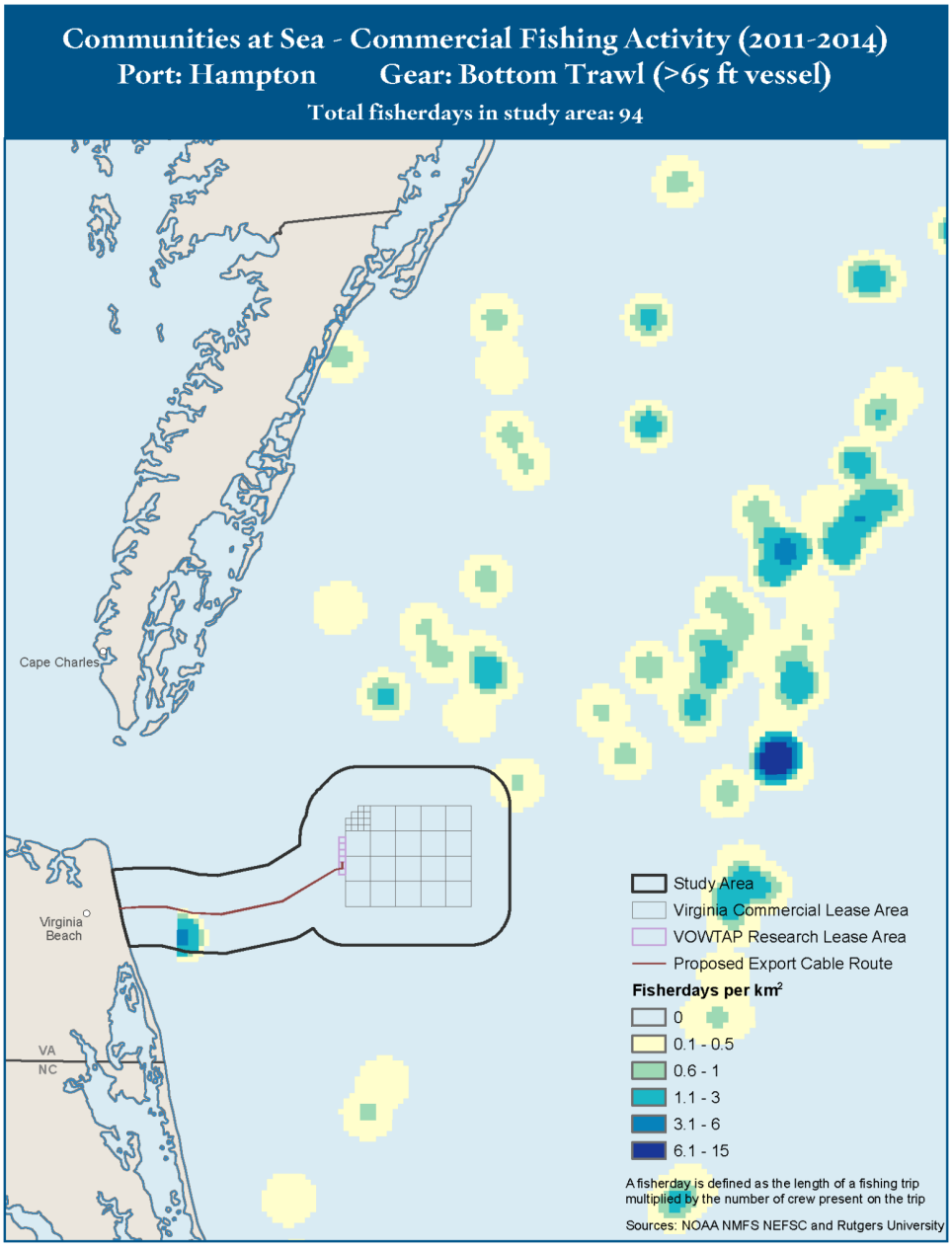
Map 2.


Communities at Sea - Commercial Fishing Activity (2011-2014)
Port: Virginia Beach, VA Gear: Pots & Traps
Total fisherdays in study area: 1,113
Cape Charles
Virginia Beach
VIRGINIA
NORTH CAROLINA
Study Area
Virginia Commercial Lease Area
VOWTAP Research Lease Area
Proposed Export Cable Route
Fisherdays per km²
0
0.1 - 1
1.1 - 3
3.1 - 6
6.1 - 12
12.1 - 24.5
A fisherday is defined as the length of a fishing trip multiplied by the number of crew present on the trip
Sources: NOAA NMFS NEFSC and Rutgers University

Map 3.

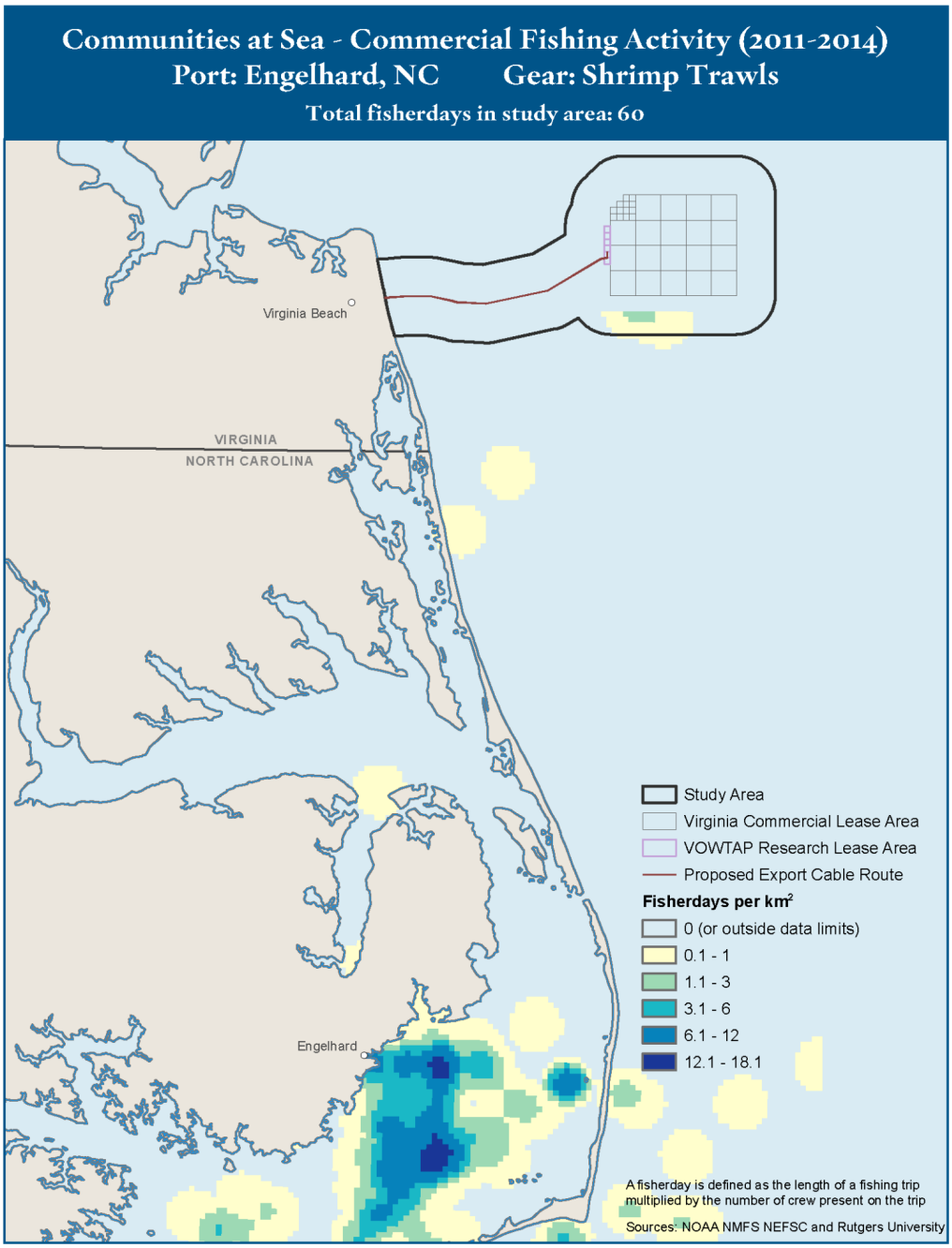

Communities at Sea - Recreational Fishing Activity (2011-2014)
Virginia Beach, VA Charter Boats
Cape Charles
Virginia Beach
VIRGINIA
NORTH CAROLINA
Study Area
Virginia Commercial Lease Area
VOWTAP Research Lease Area
Proposed Export Cable Route
Fisherdays per km²
0
0.01 - 0.5
0.51 - 1
1.1 - 1.5
1.6 - 3
3.1 - 5.6
A fisherday is defined as the length of a fishing trip multiplied by the number of crew present on the trip
Sources: NOAA NMFS NEFSC and Rutgers University

Map 4.

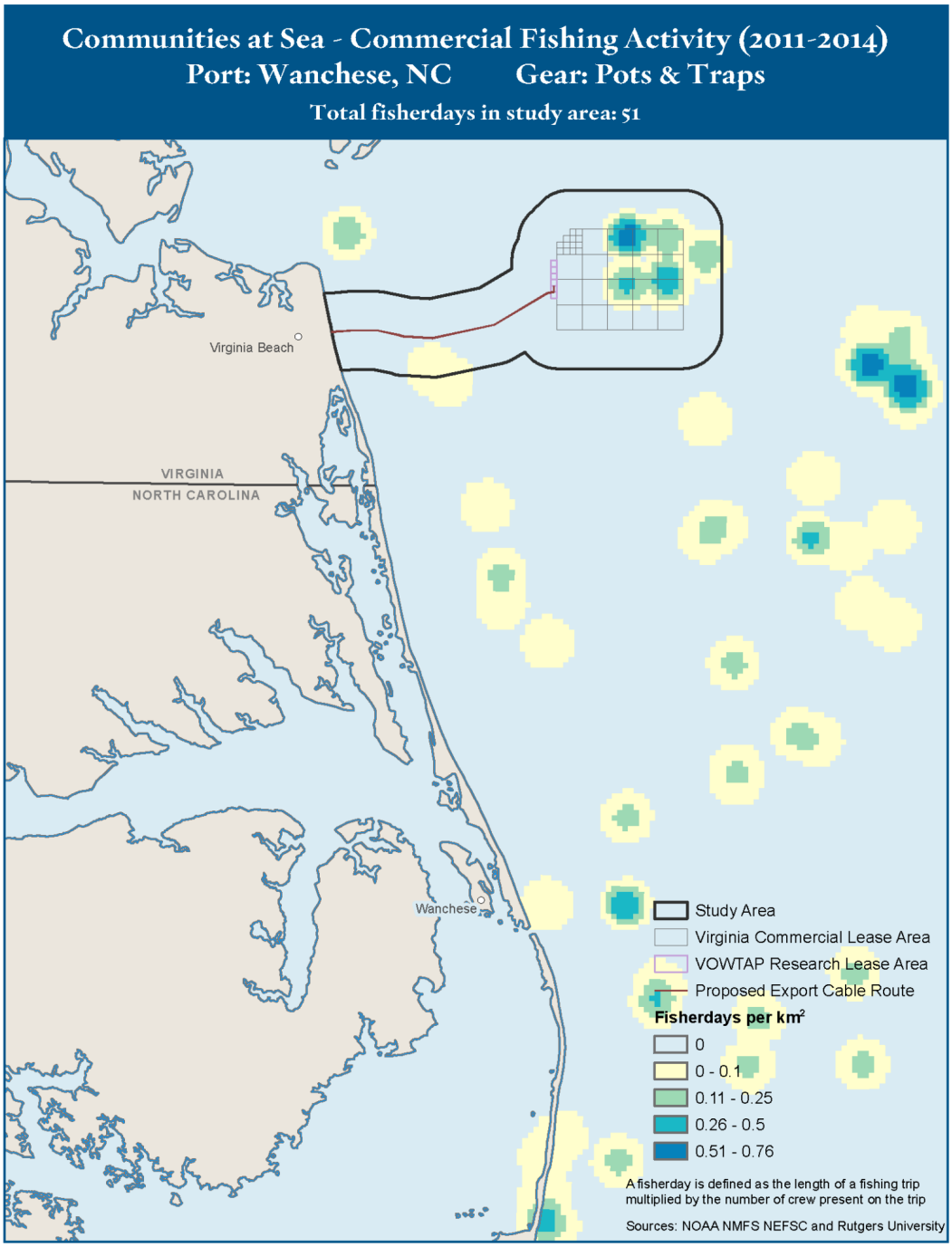

Communities at Sea - Commercial Fishing Activity (2011-2014)
Port: Hampton Gear: Bottom Trawl (>65 ft vessel)
Total fisherdays in study area: 94
Cape Charles
Virginia Beach
VA
NC
Study Area
Virginia Commercial Lease Area
VOWTAP Research Lease Area
Proposed Export Cable Route
Fisherdays per km²
0
0.1 - 0.5
0.6 - 1
1.1 - 3
3.1 - 6
6.1 - 15
A fisherday is defined as the length of a fishing trip multiplied by the number of crew present on the trip
Sources: NOAA NMFS NEFSC and Rutgers University

COMMUNITIES AT SEA

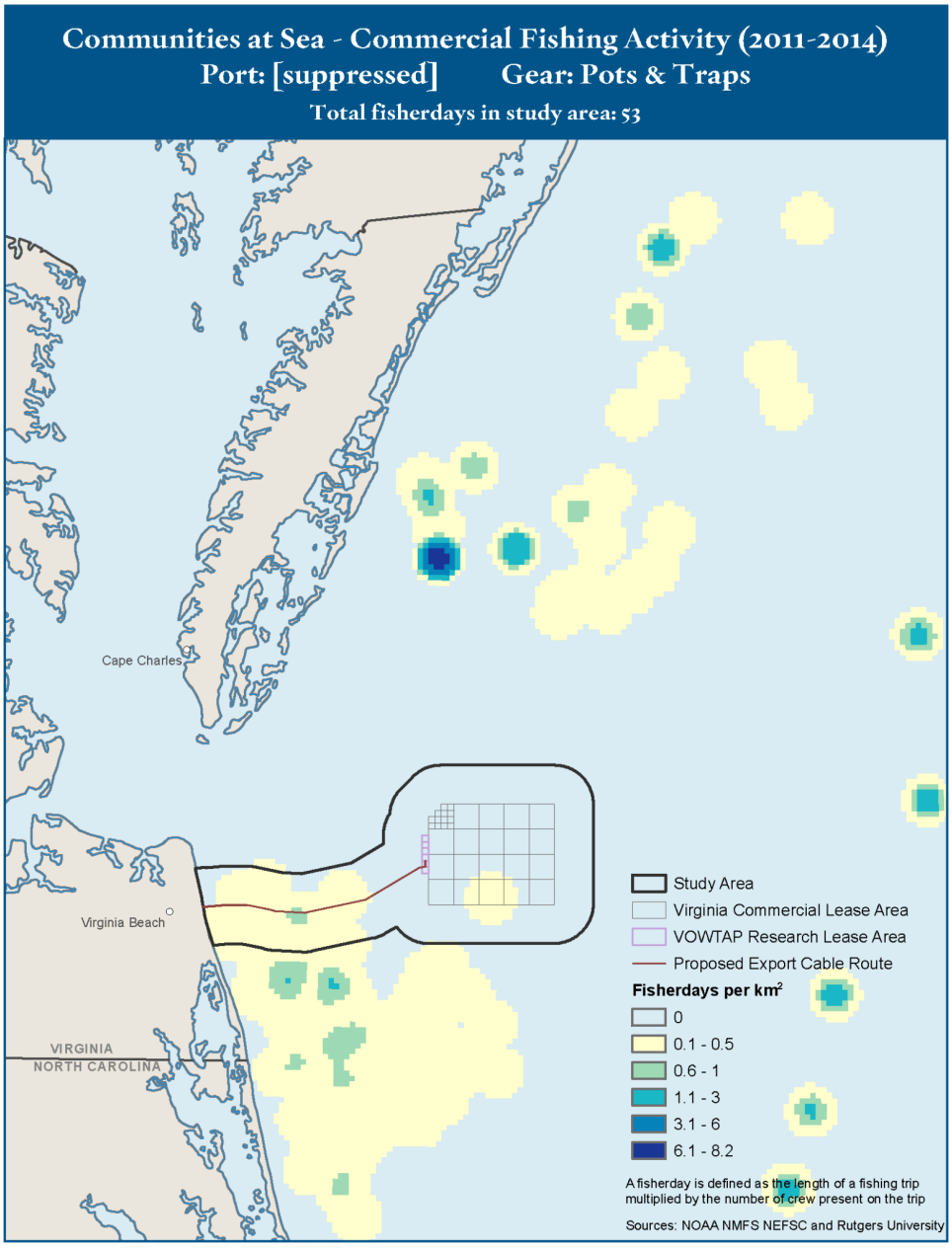
Map 5.



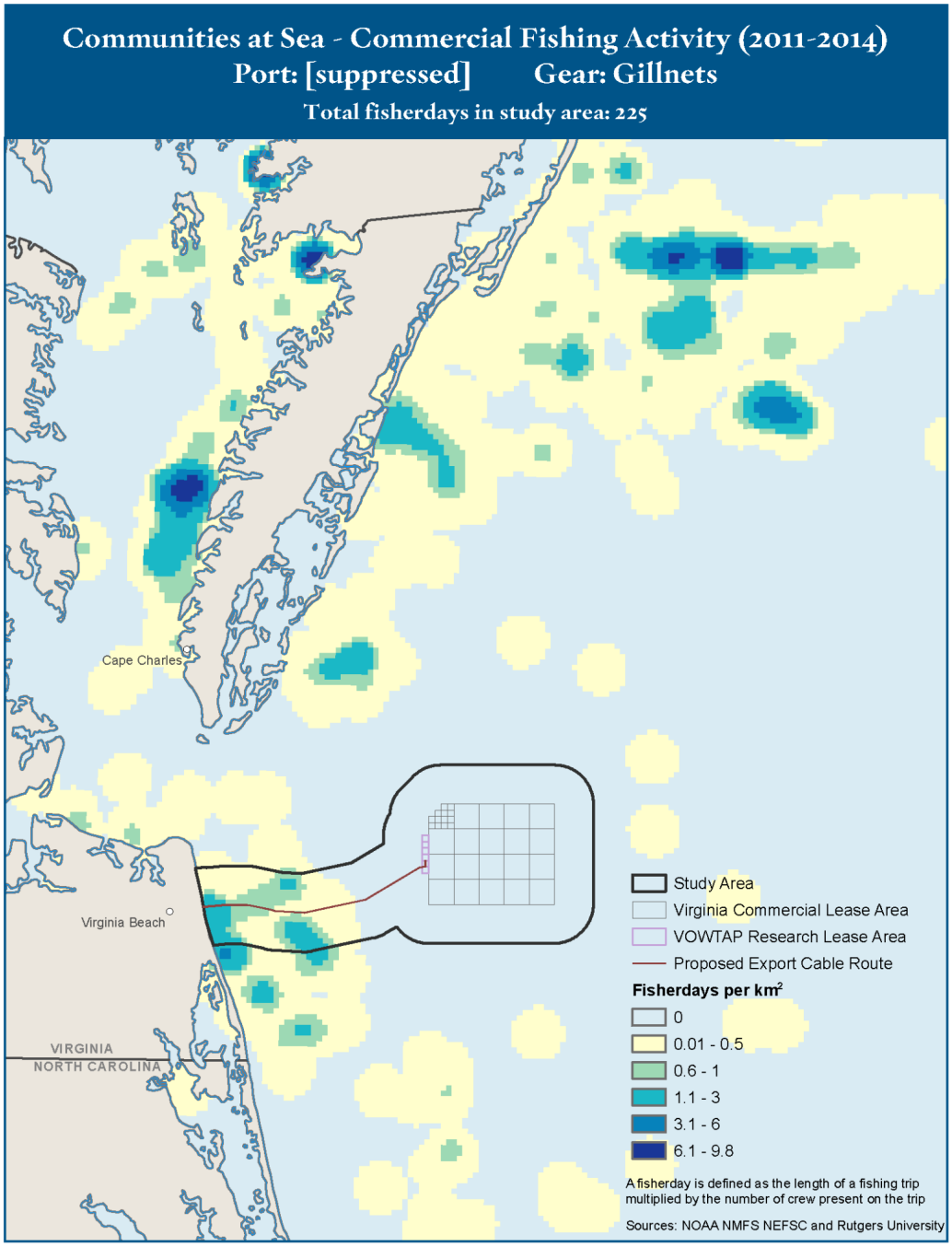
Map 6.


Communities at Sea - Commercial Fishing Activity (2011-2014)
Port: Wanchese, NC Gear: Pots & Traps
Total fisherdays in study area: 51
Virginia Beach
VIRGINIA
NORTH CAROLINA
Wanchese
Study Area
Virginia Commercial Lease Area
VOWTAP Research Lease Area
Proposed Export Cable Route
Fisherdays per km²
0
0 - 0.1
0.11 - 0.25
0.26 - 0.5
0.51 - 0.76
A fisherday is defined as the length of a fishing trip multiplied by the number of crew present on the trip
Sources: NOAA NMFS NEFSC and Rutgers University

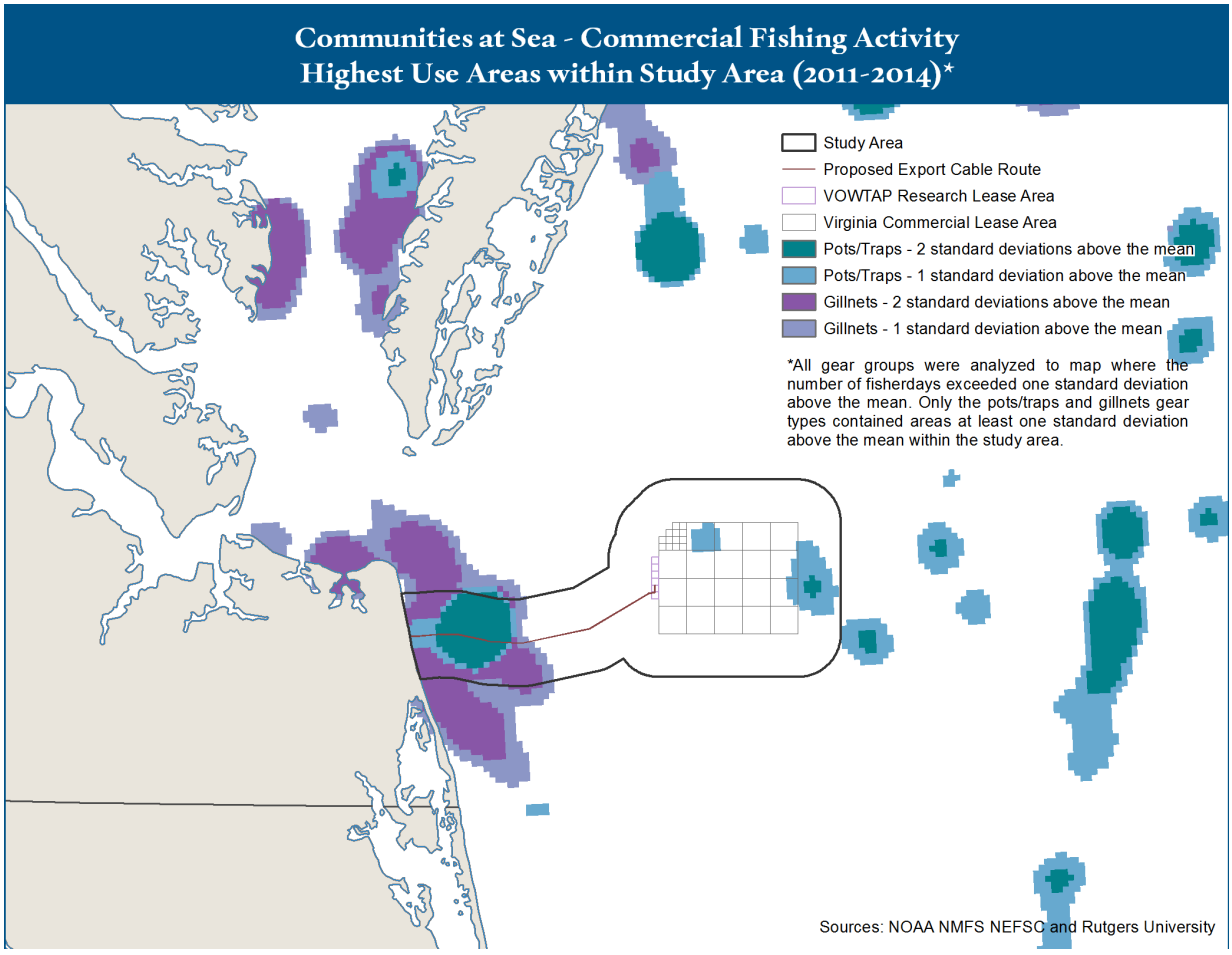
Map 7.


Communities at Sea - Commercial Fishing Activity (2011-2014)
Port: [suppressed] Gear: Pots & Traps
Total fisherdays in study area: 53
Cape Charles
Virginia Beach
VIRGINIA
NORTH CAROLINA
Study Area
Virginia Commercial Lease Area
VOWTAP Research Lease Area
Proposed Export Cable Route
Fisherdays per km²
0
0.1 - 0.5
0.6 - 1
1.1 - 3
3.1 - 6
6.1 - 8.2
A fisherday is defined as the length of a fishing trip multiplied by the number of crew present on the trip
Sources: NOAA NMFS NEFSC and Rutgers University

Map 8.

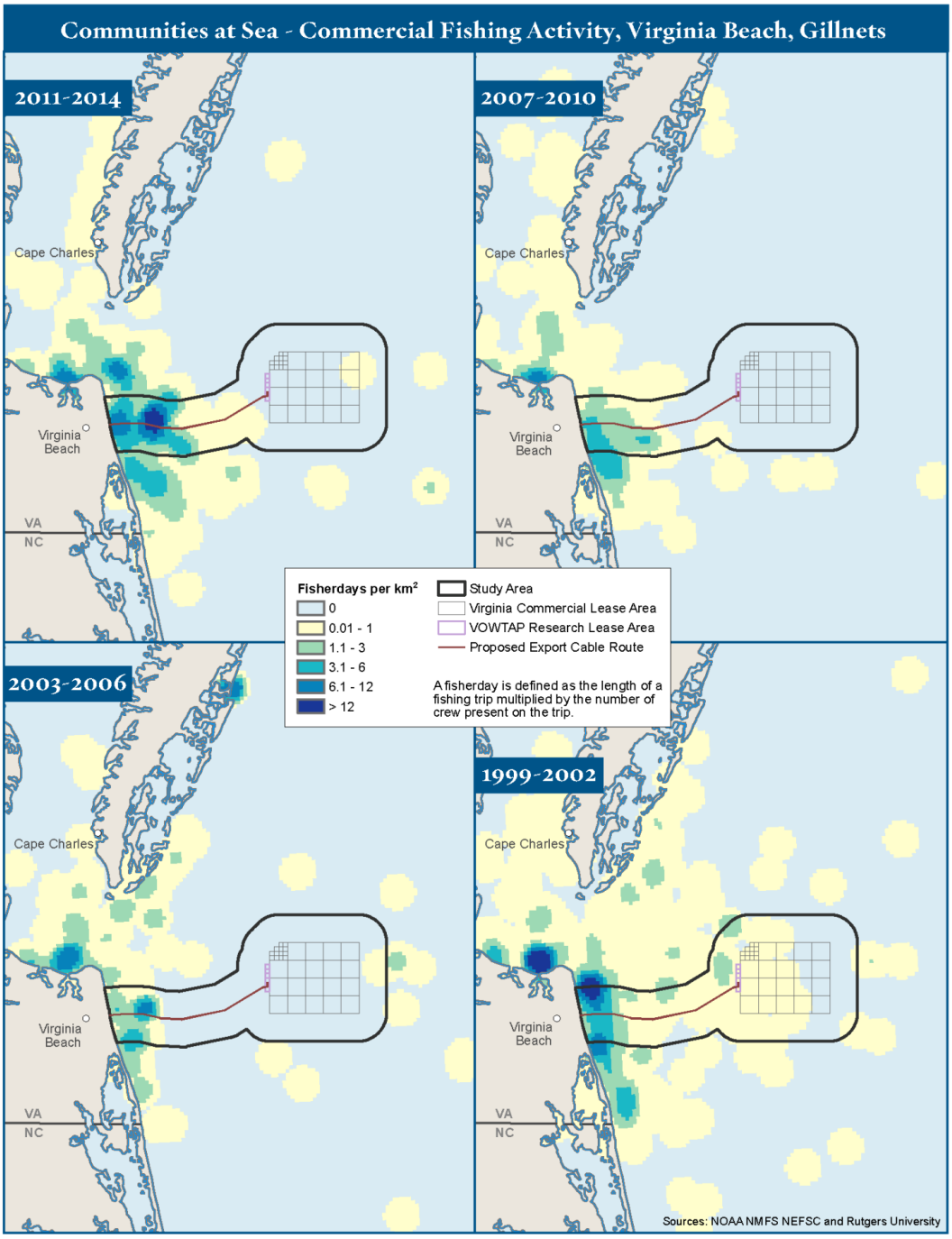

Communities at Sea - Commercial Fishing Activity (2011-2014)
Port: [suppressed] Gear: Gillnets
Total fisherdays in study area: 225
Cape Charles
Virginia Beach
VIRGINIA
NORTH CAROLINA
Study Area
Virginia Commercial Lease Area
VOWTAP Research Lease Area
Proposed Export Cable Route
Fisherdays per km²
0
0.01 - 0.5
0.6 - 1
1.1 - 3
3.1 - 6
6.1 - 9.8
A fisherday is defined as the length of a fishing trip multiplied by the number of crew present on the trip
Sources: NOAA NMFS NEFSC and Rutgers University

Map 9.


Communities at Sea - Commercial Fishing Activity
Highest Use Areas within Study Area (2011-2014)*
Study Area
Proposed Export Cable Route
VOWTAP Research Lease Area
Virginia Commercial Lease Area
Pots/Traps - 2 standard deviations above the mean
Pots/Traps - 1 standard deviation above the mean
Gillnets - 2 standard deviations above the mean
Gillnets - 1 standard deviation above the mean
*All gear groups were analyzed to map where the number of fisherdays exceeded one standard deviation above the mean. Only the pots/traps and gillnets gear types contained areas at least one standard deviation above the mean within the study area.
Sources: NOAA NMFS NEFSC and Rutgers University

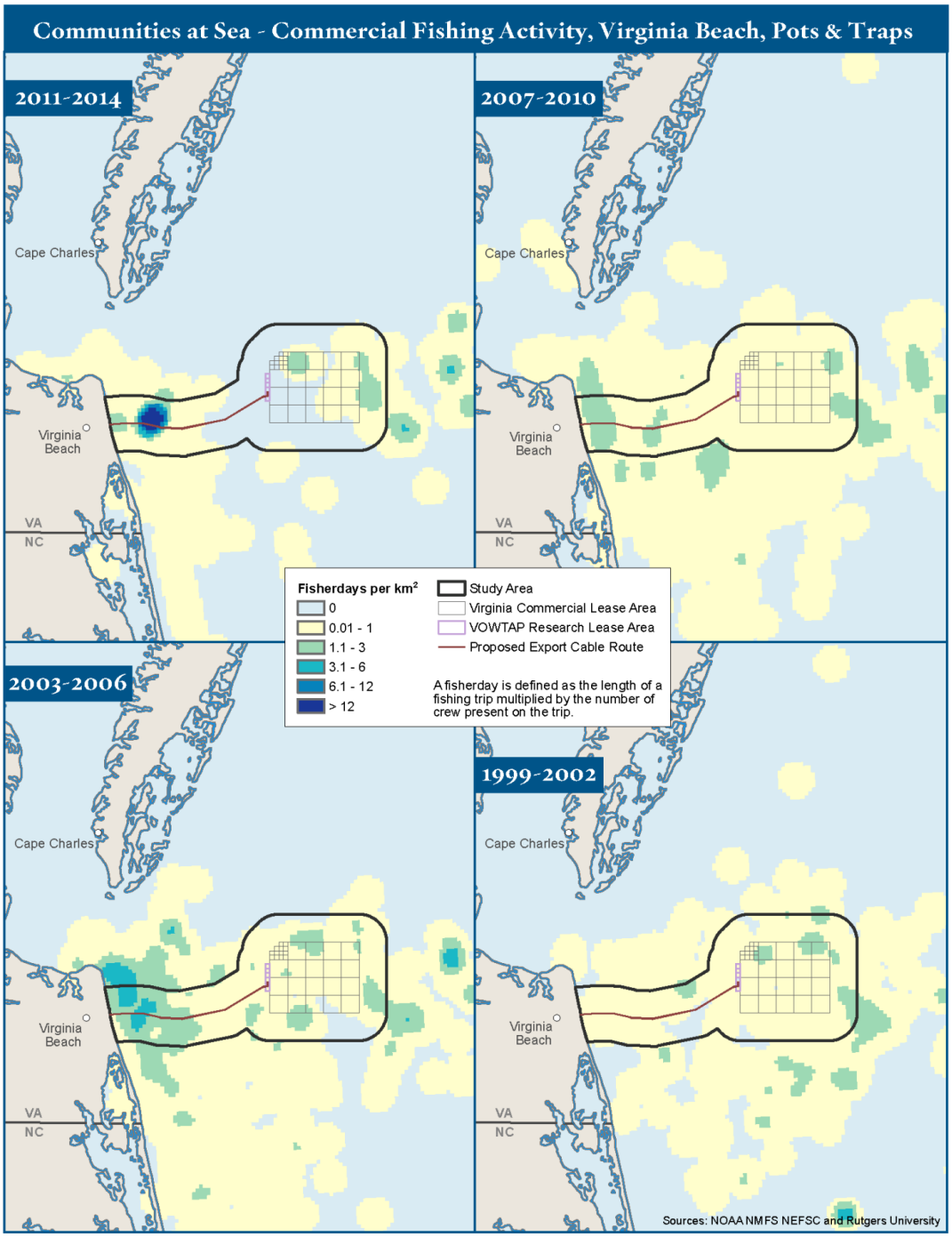
TIME SERIES

Map 10.



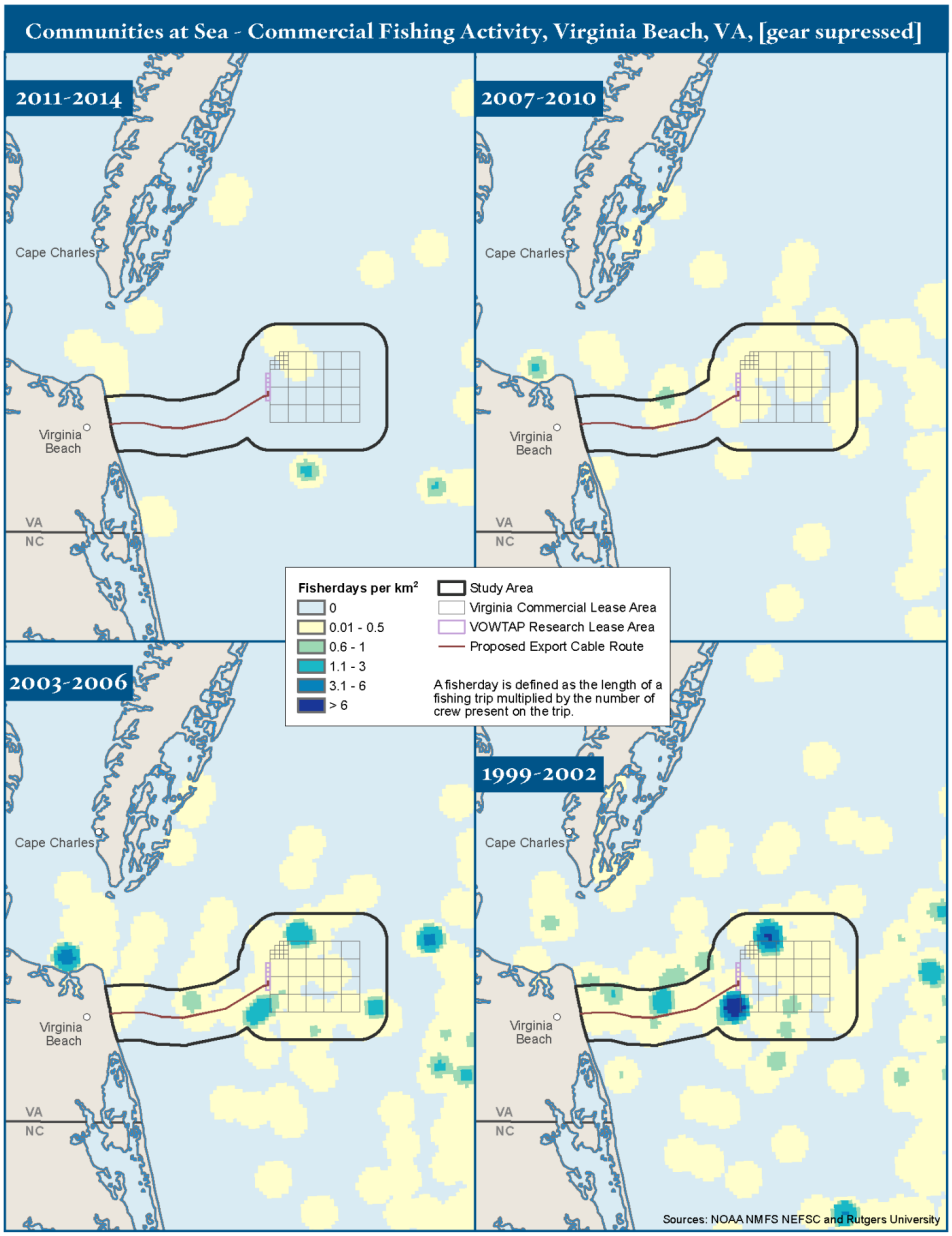
TIME SERIES

Map 11.



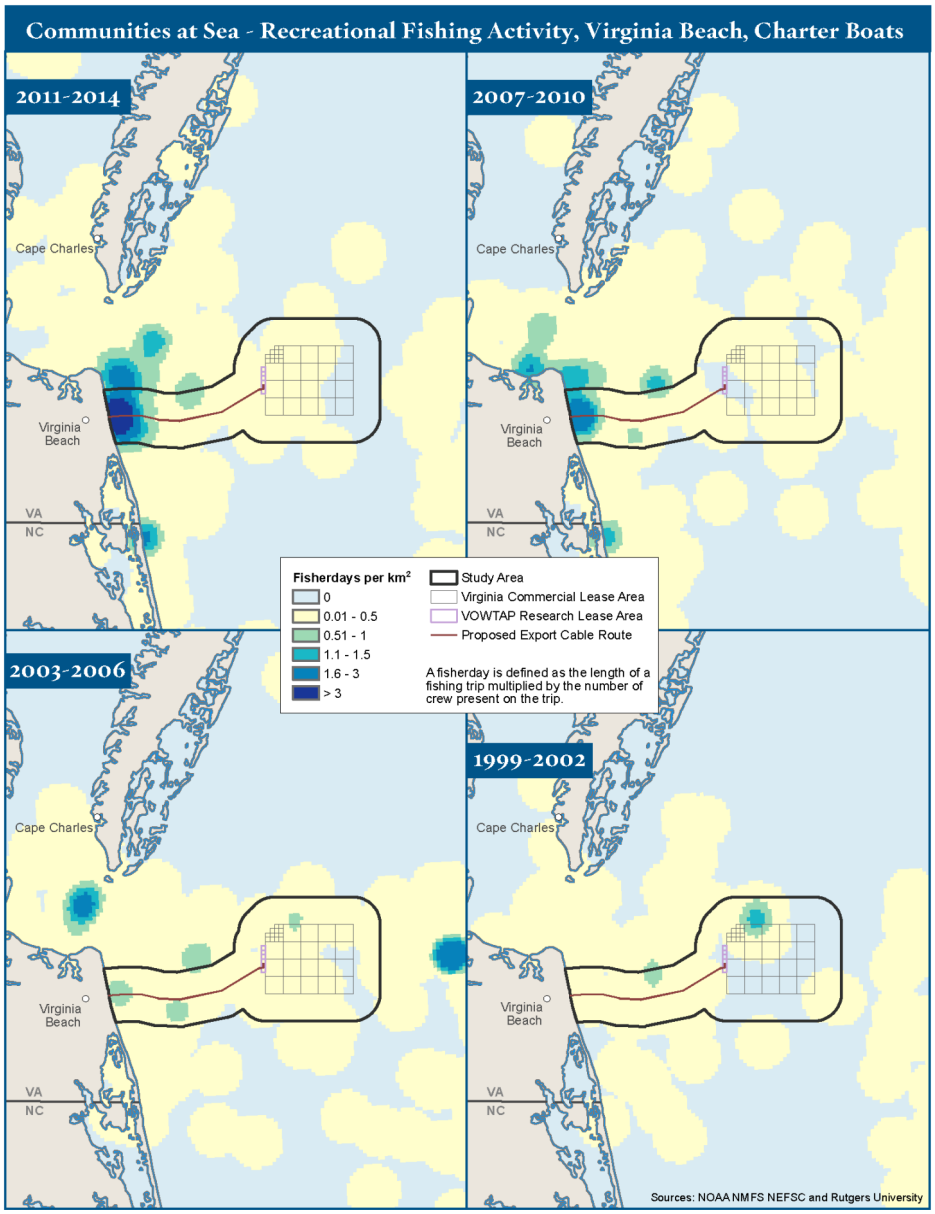
TIME SERIES

Map 12.



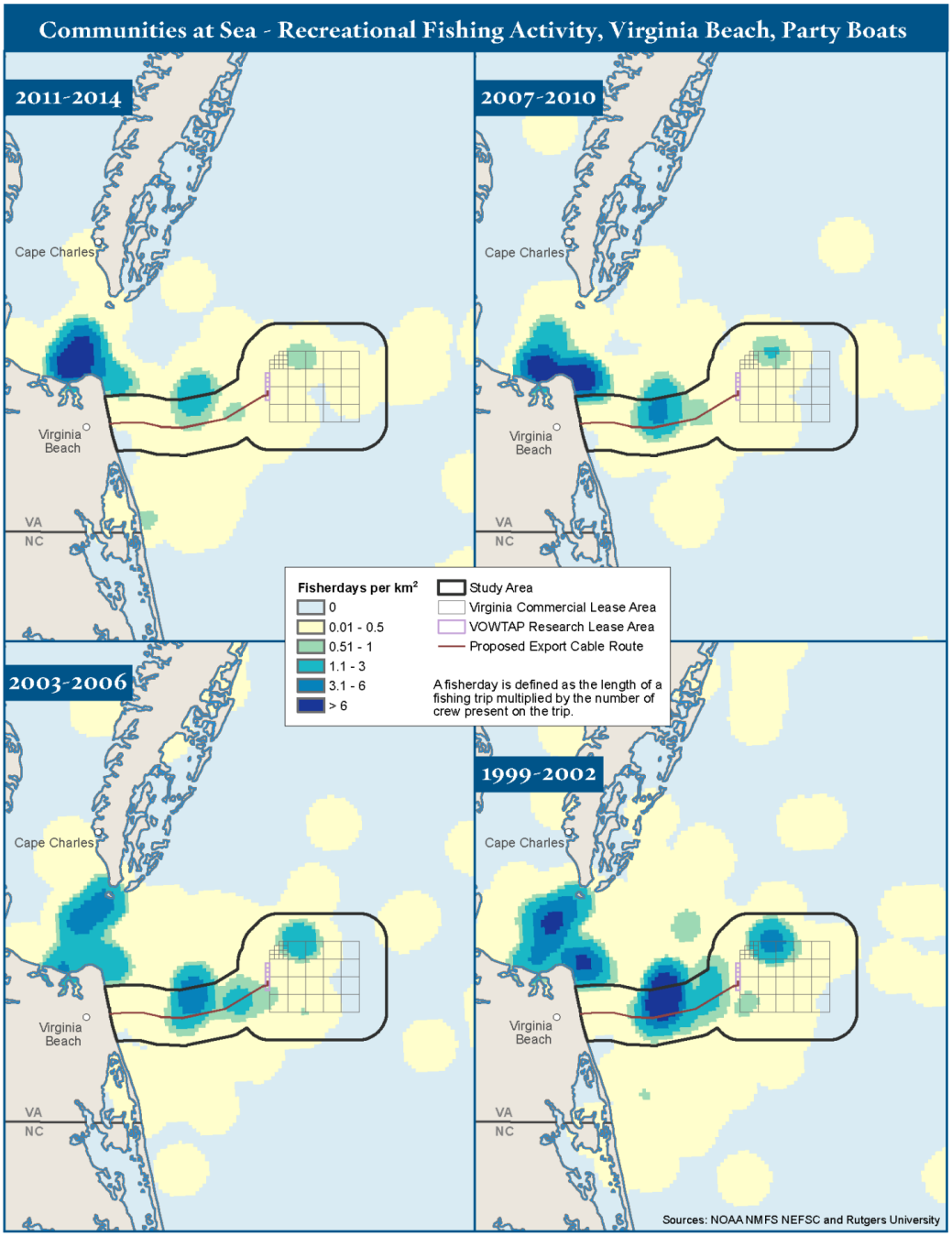
TIME SERIES

Map 13.



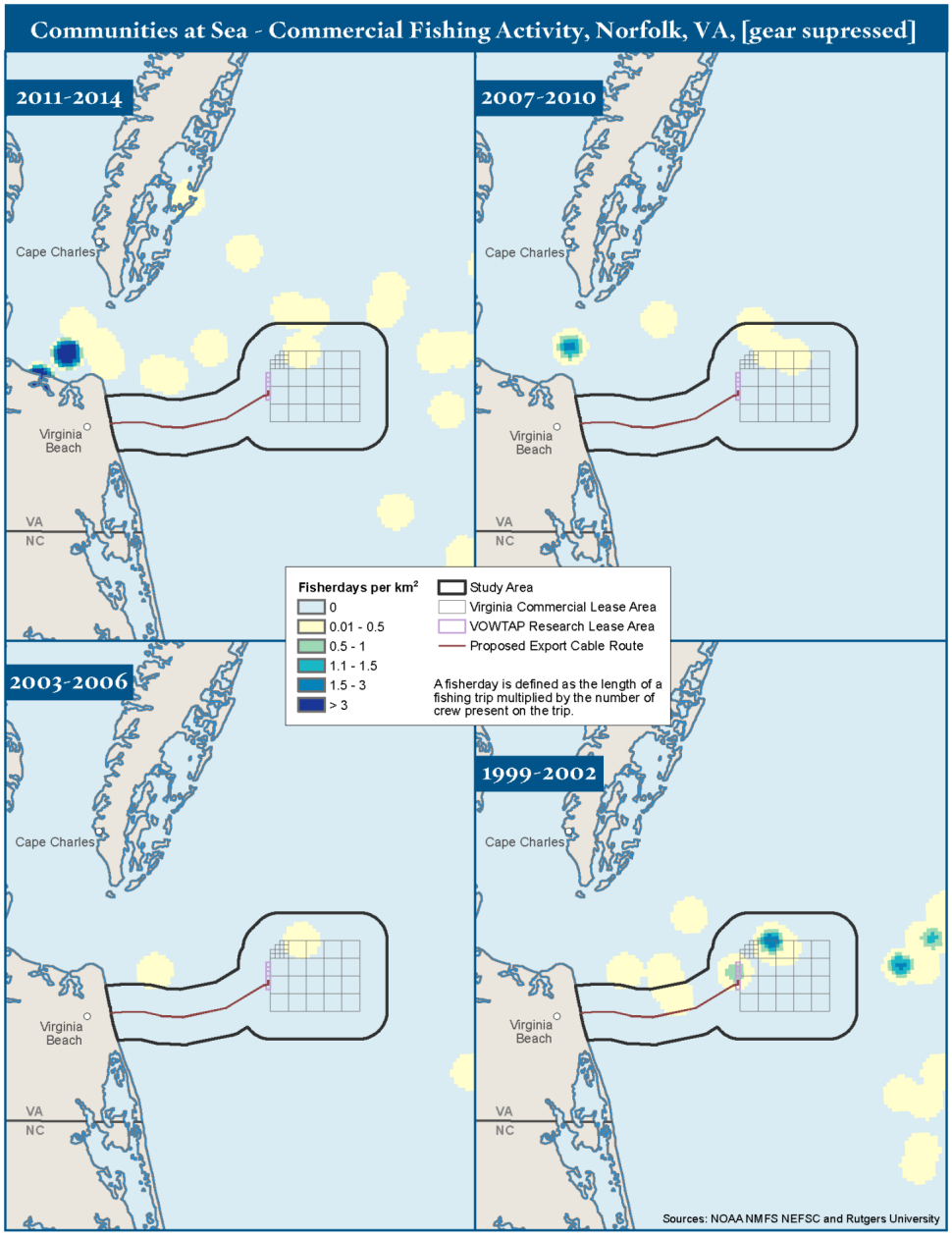
TIME SERIES

Map 14.



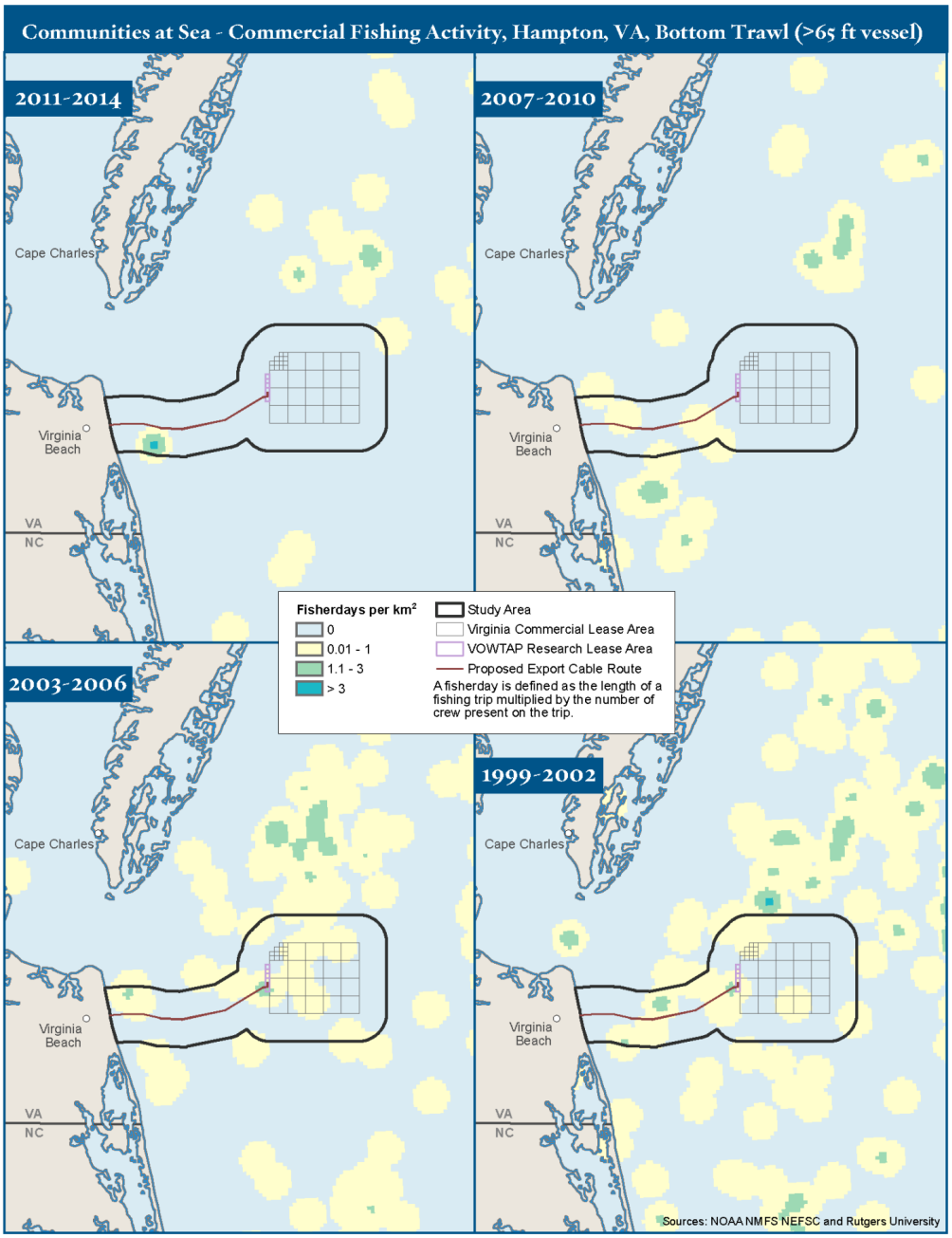
TIME SERIES

Map 15.



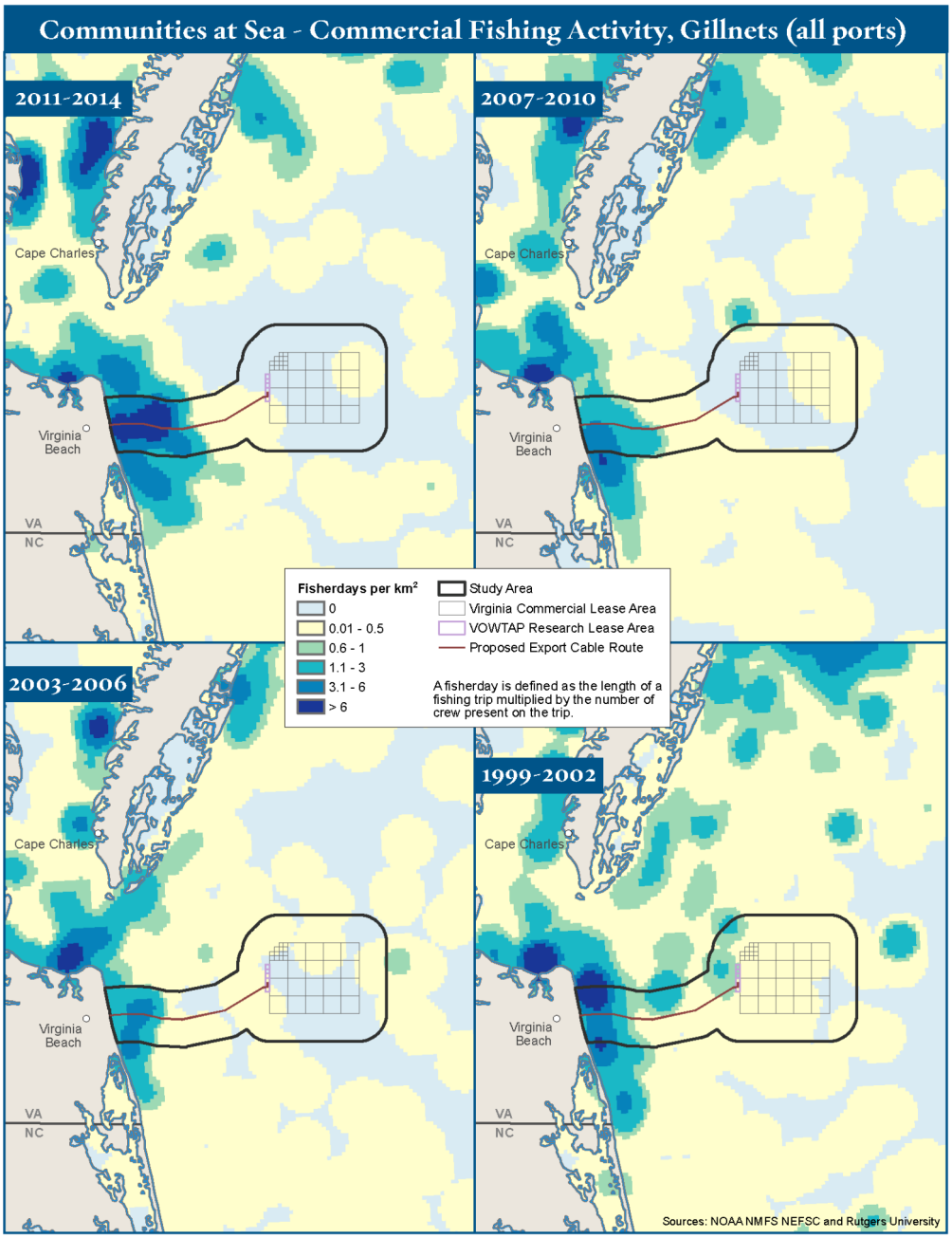
TIME SERIES

Map 16.



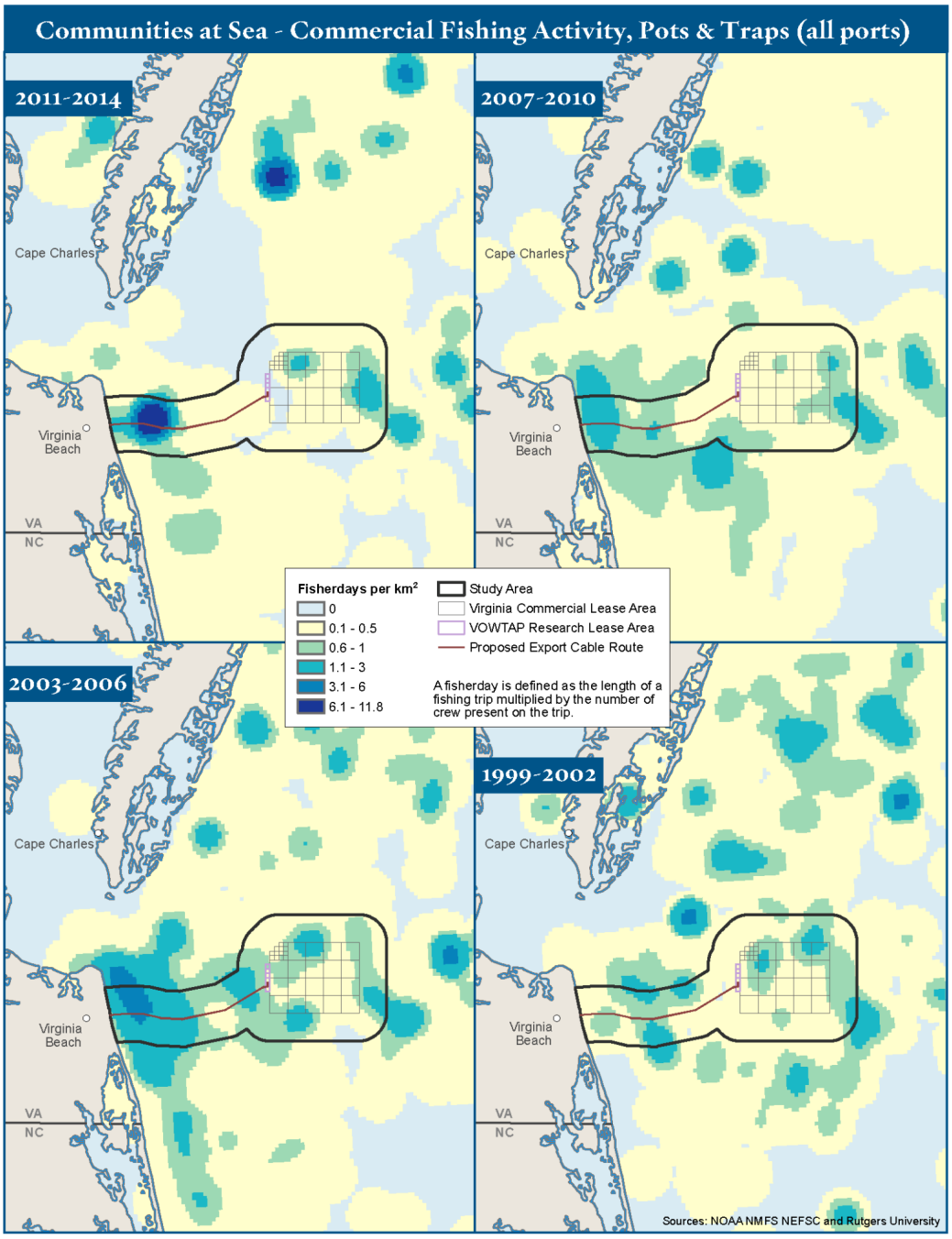
TIME SERIES

Map 17.



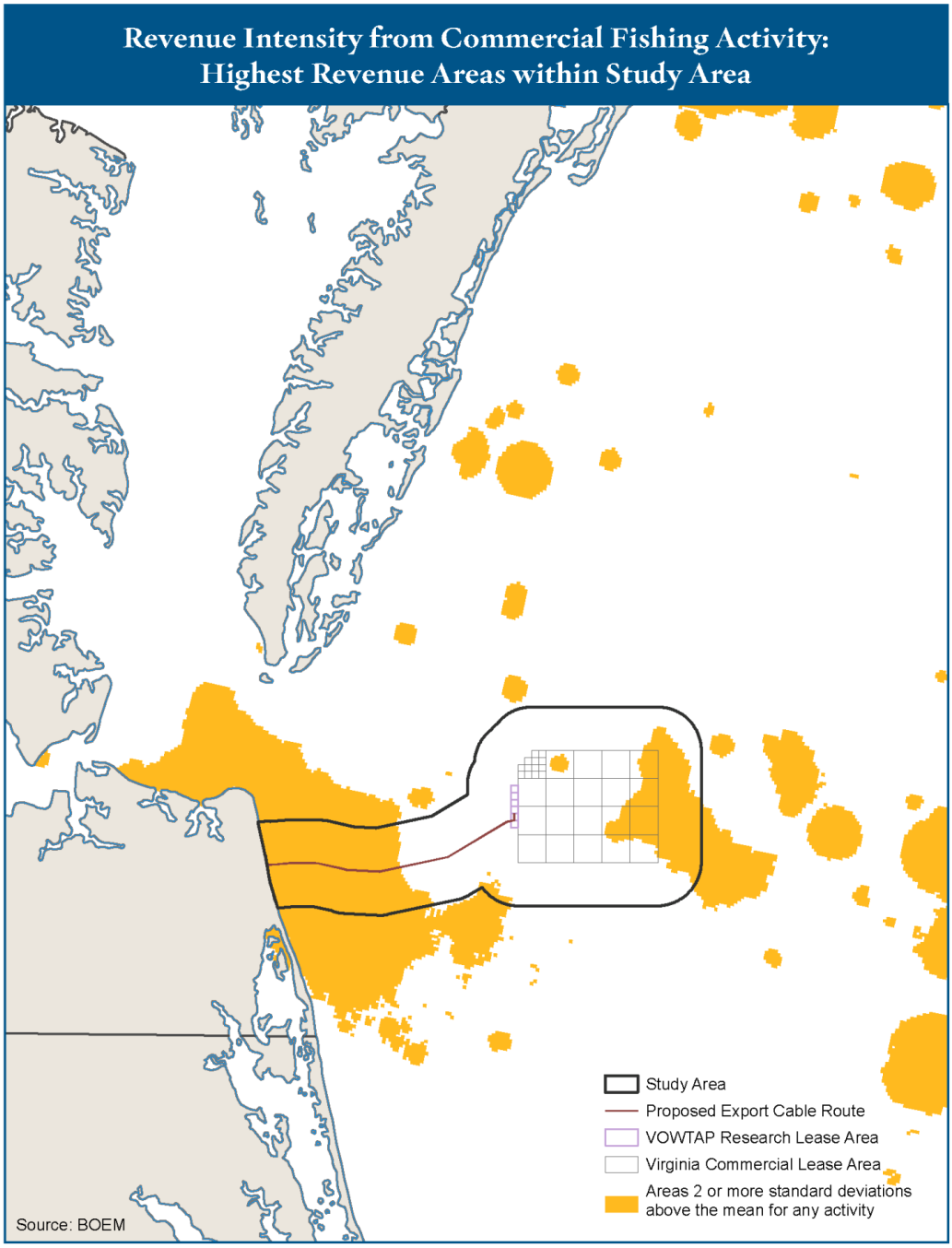
TIME SERIES

Map 18.



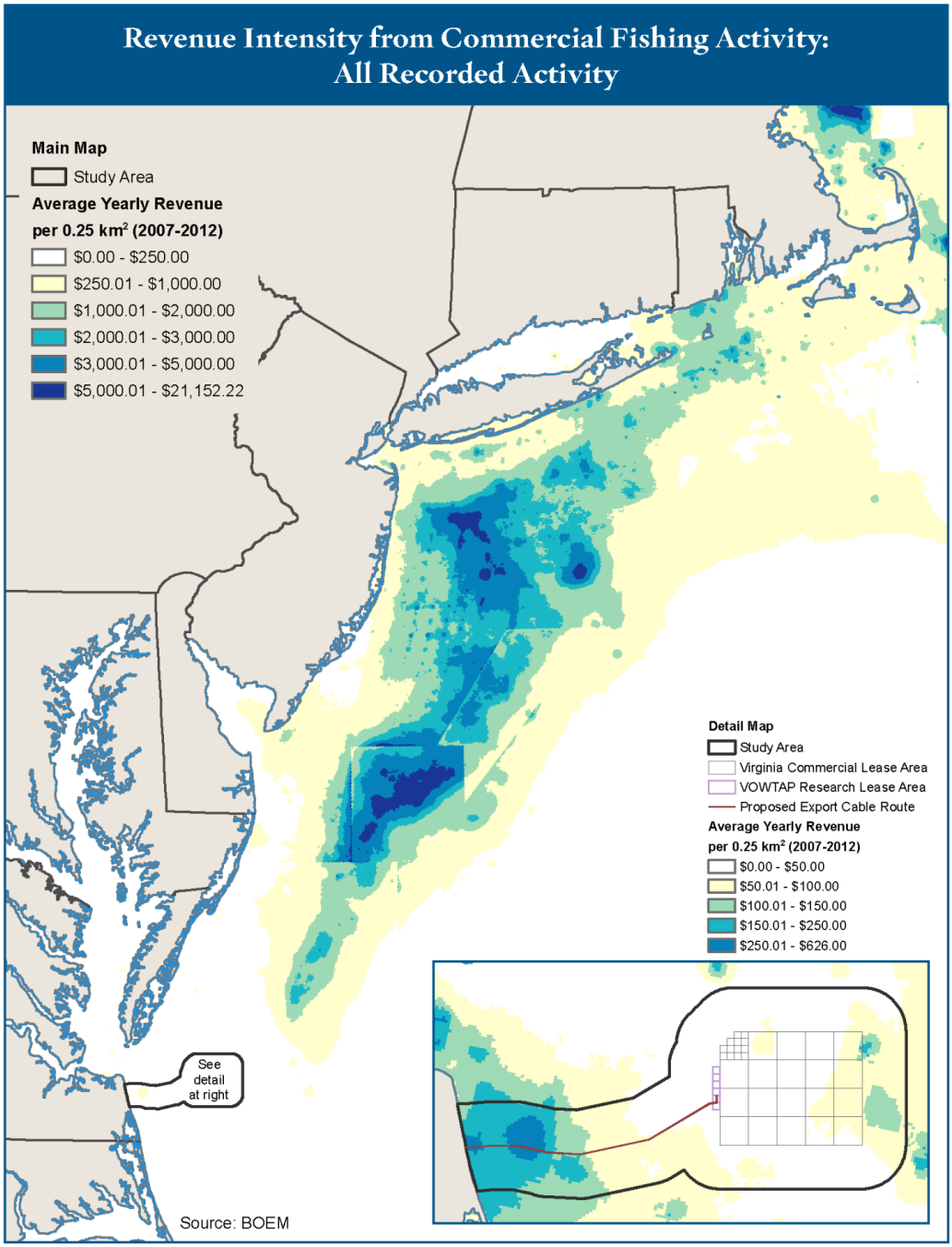
EXPOSURE

Map 19.



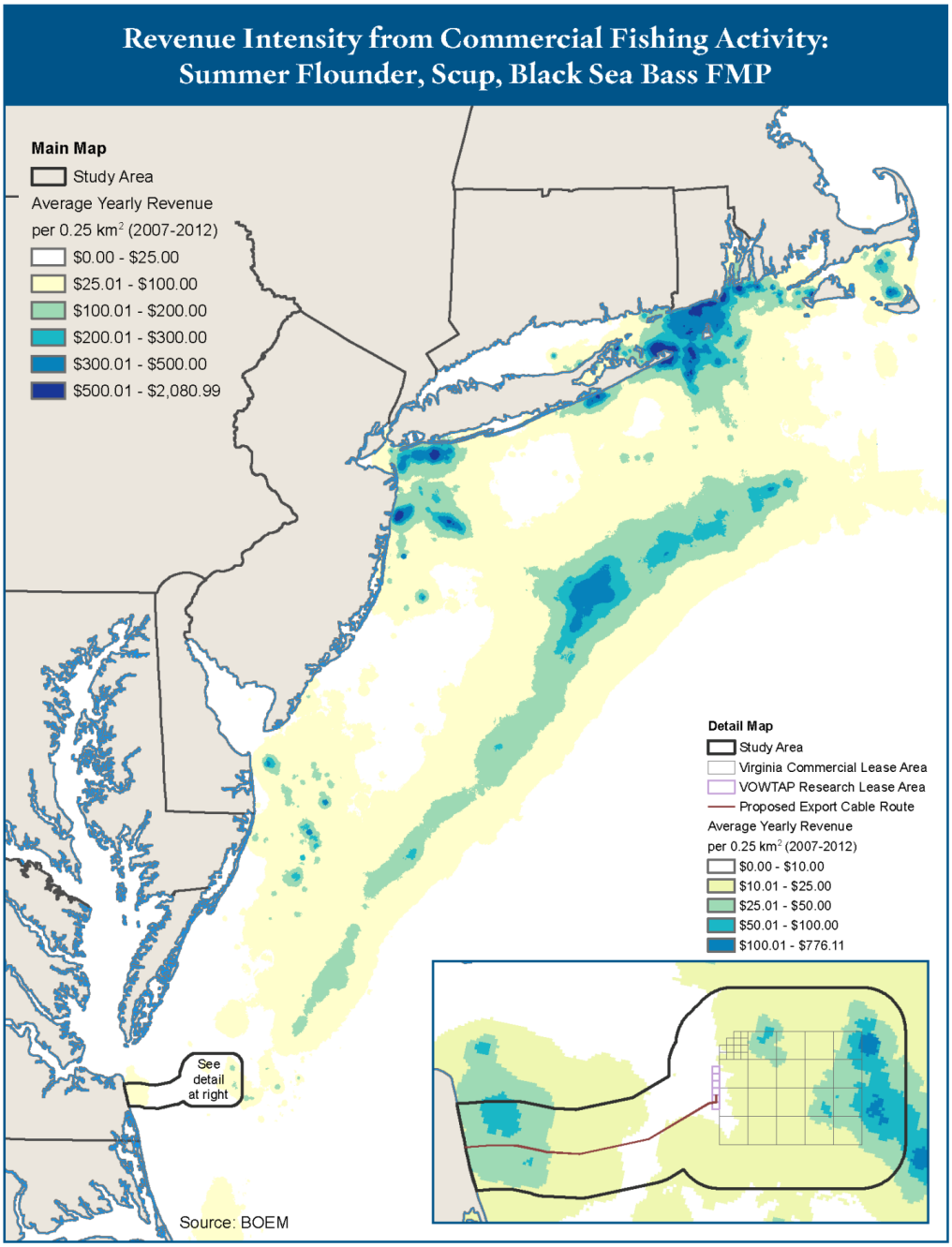
EXPOSURE

Map 20.



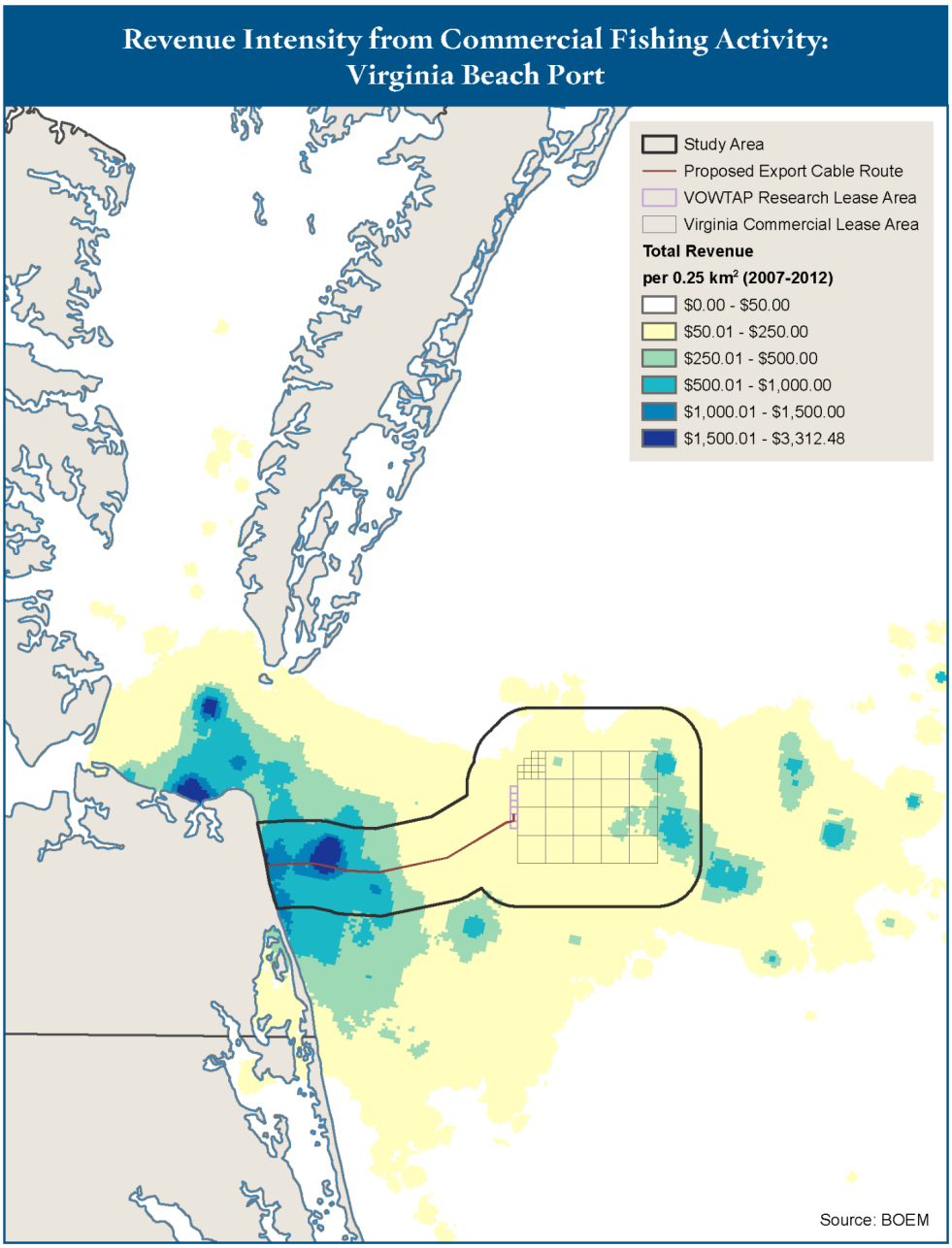
EXPOSURE

Map 21.



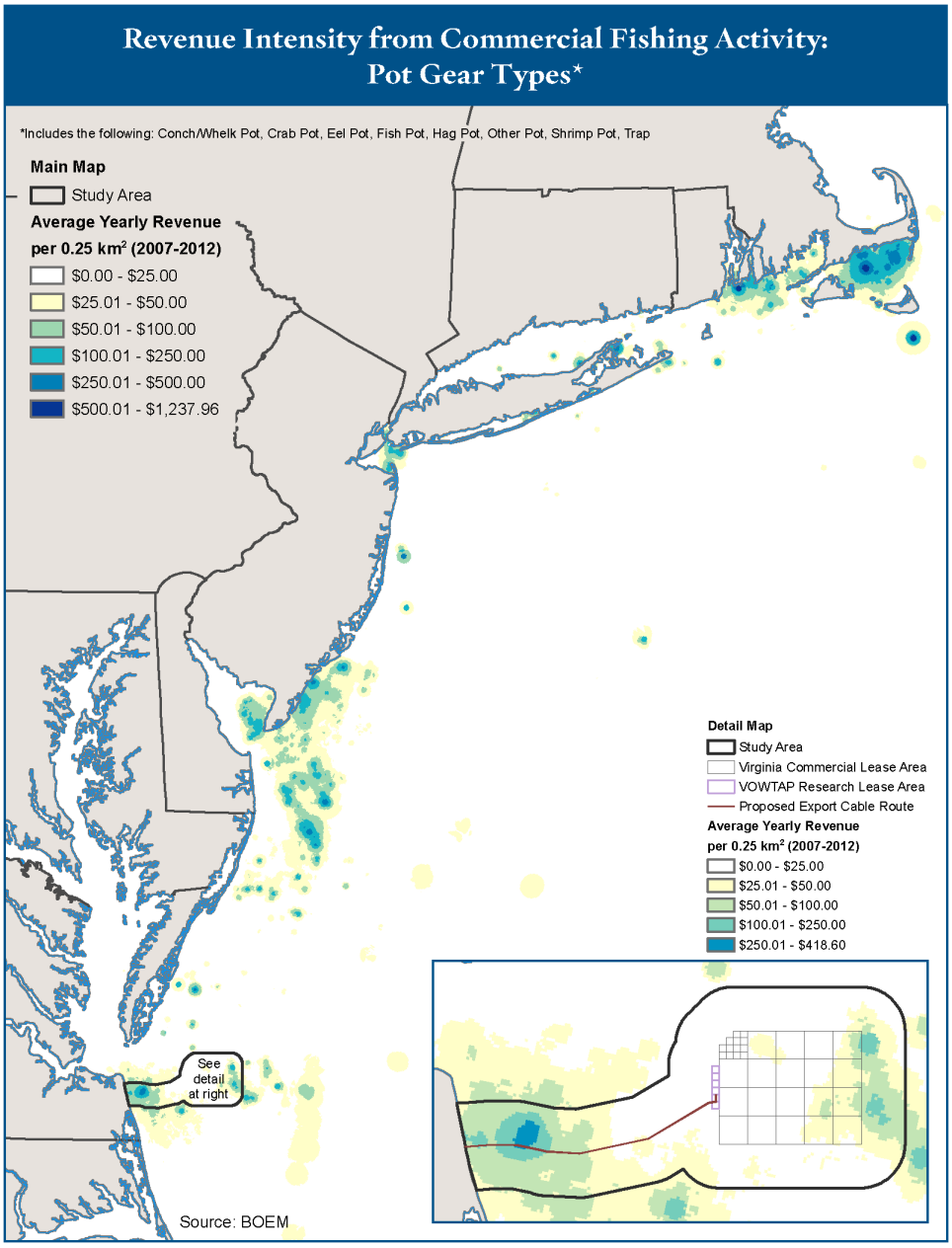
EXPOSURE

Map 22.



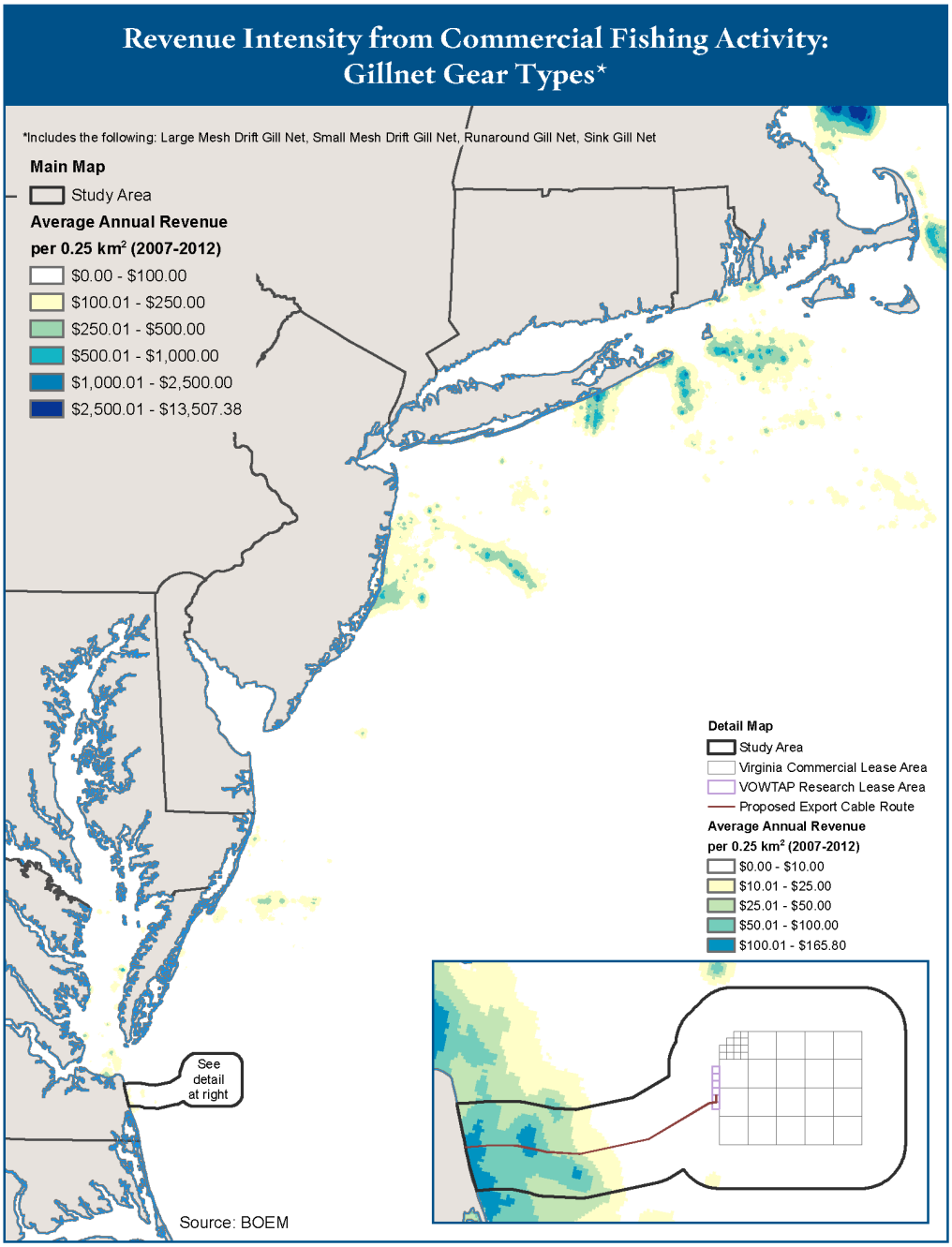
EXPOSURE

Map 23.



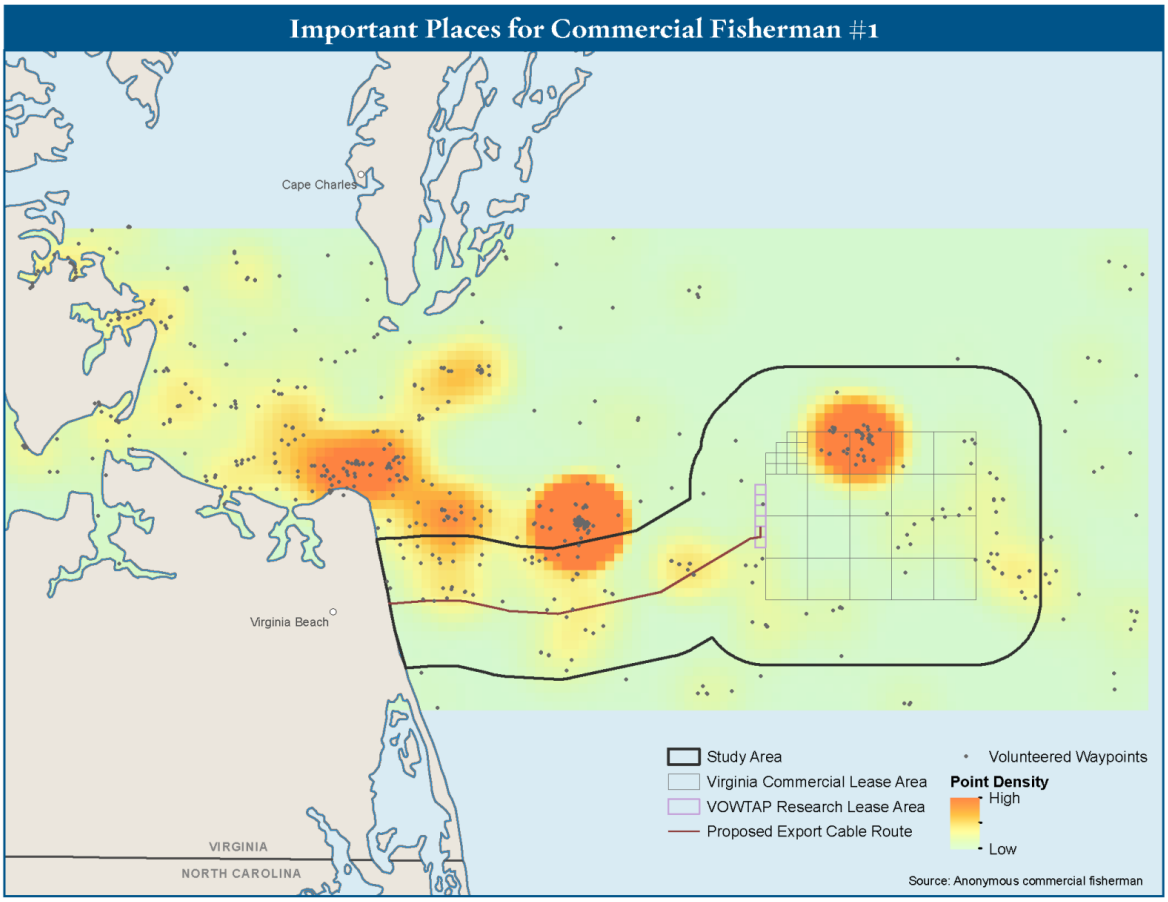
EXPOSURE

Map 24.



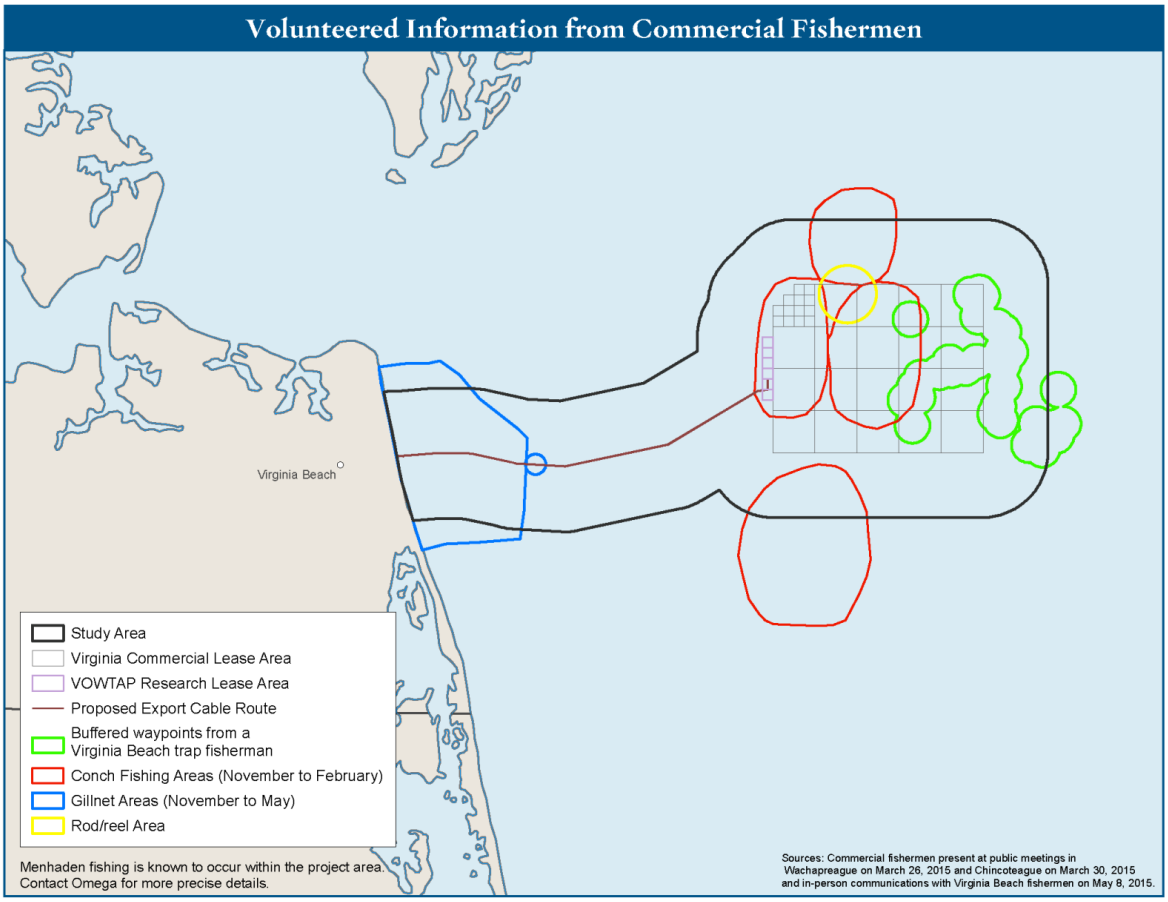
VOLUNTEERED DATA

Map 25.



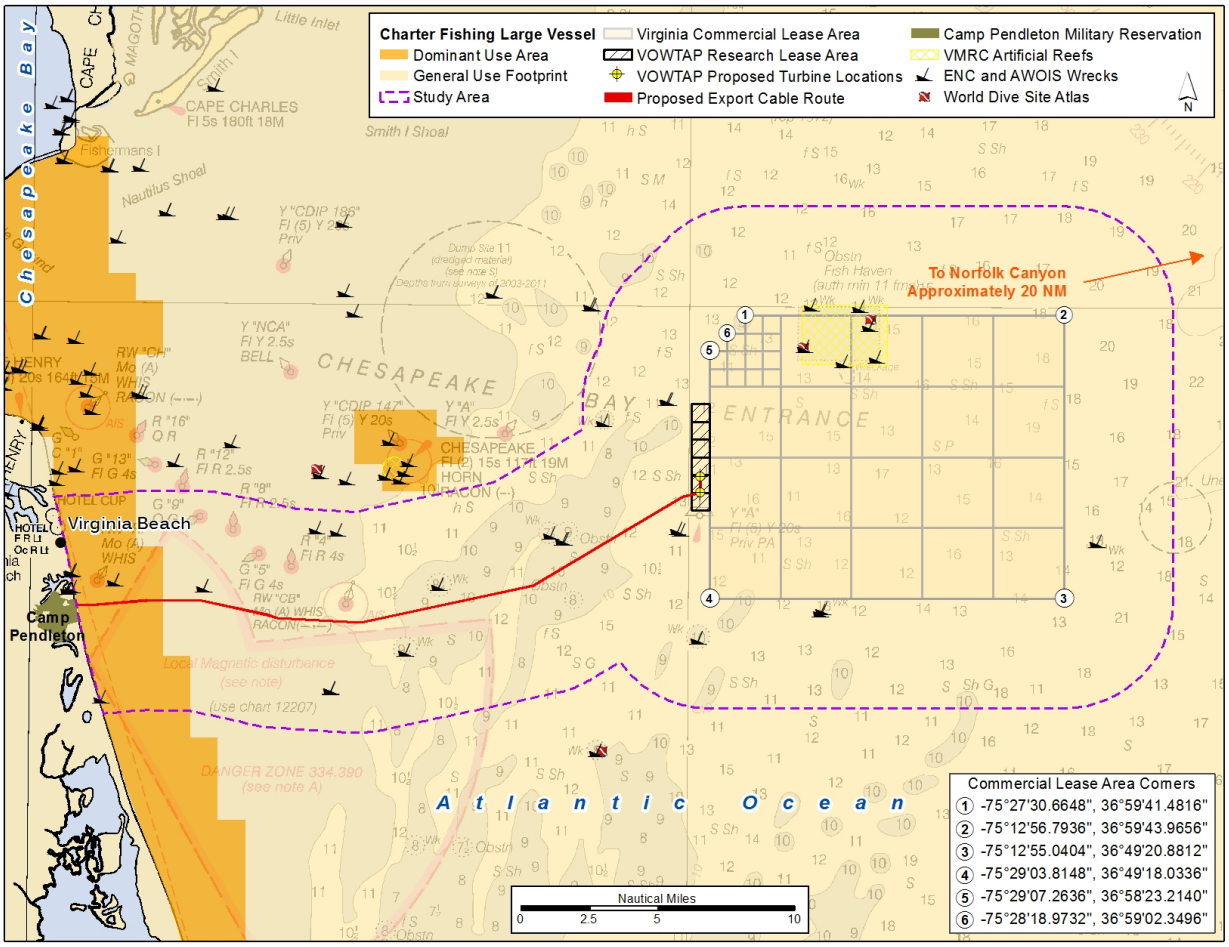
VOLUNTEERED DATA

Map 26.



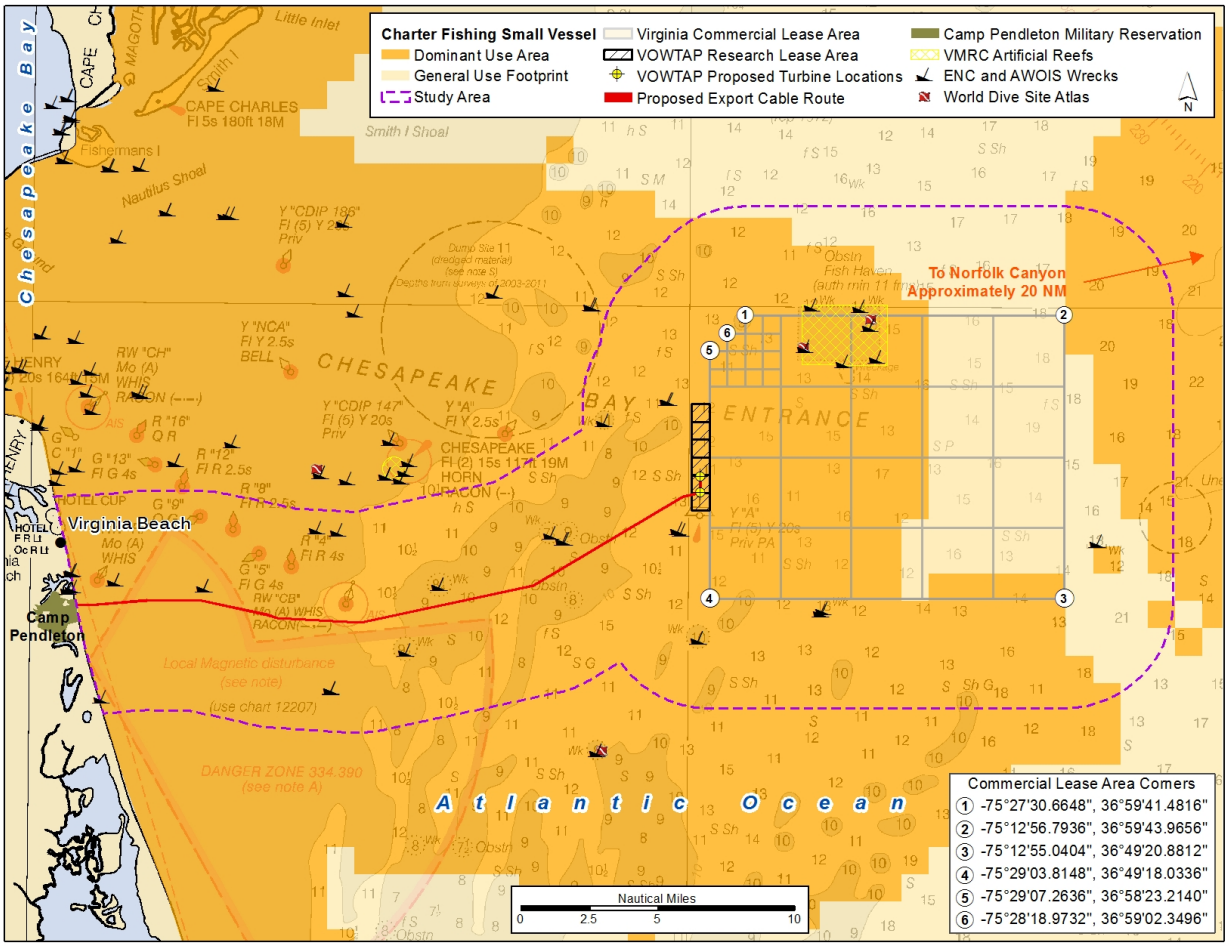
RECREATIONAL FISHING

Map 27.



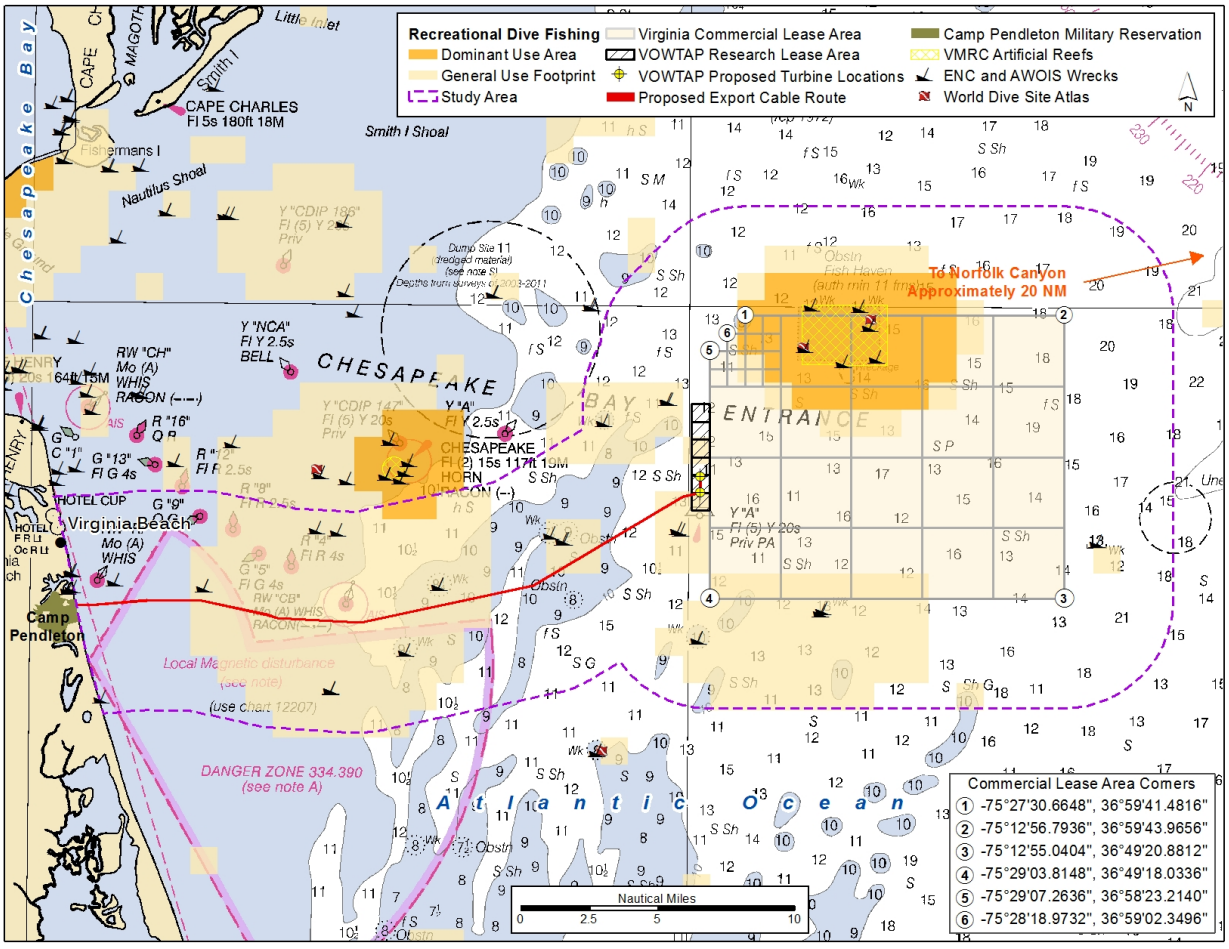
RECREATIONAL FISHING

Map 28.



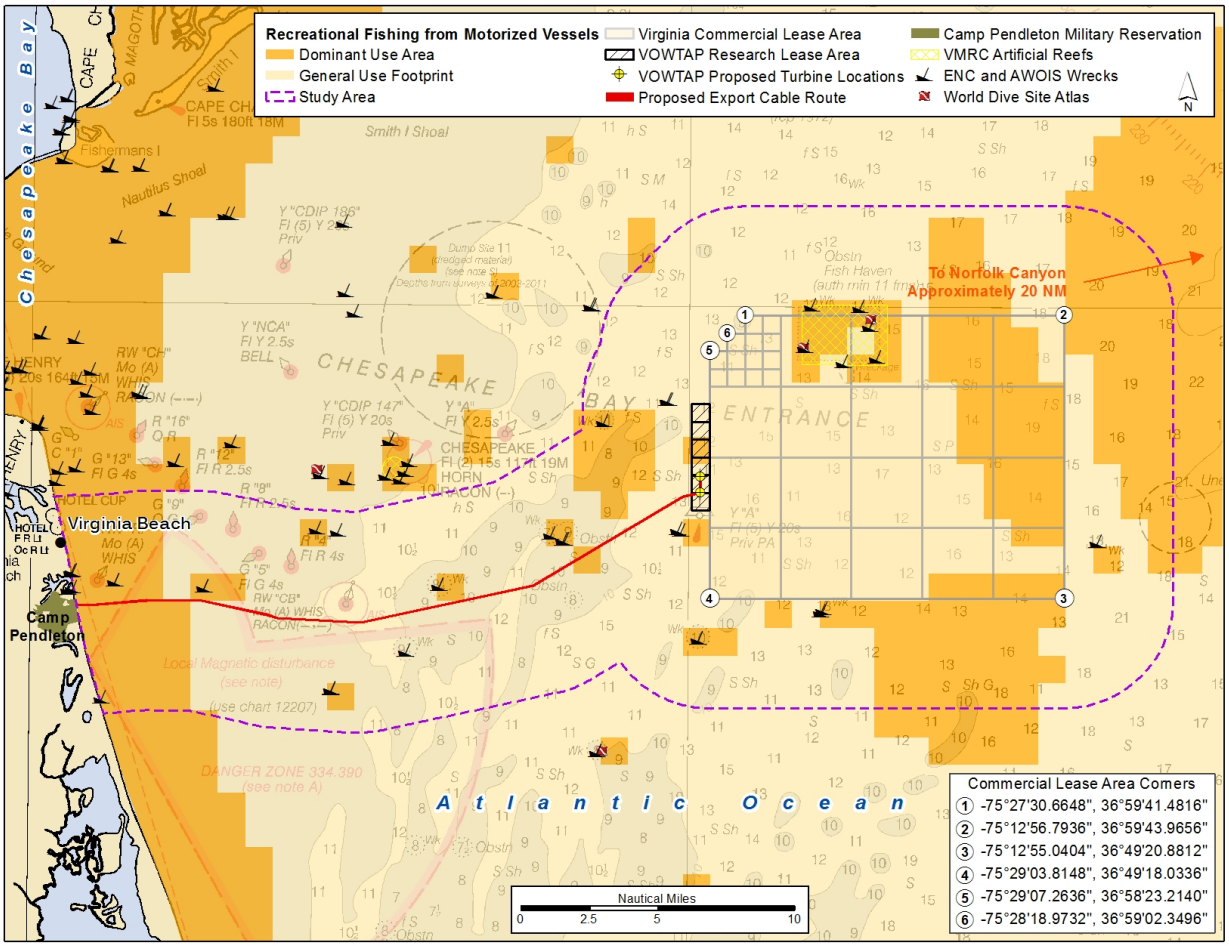
RECREATIONAL FISHING

Map 29.



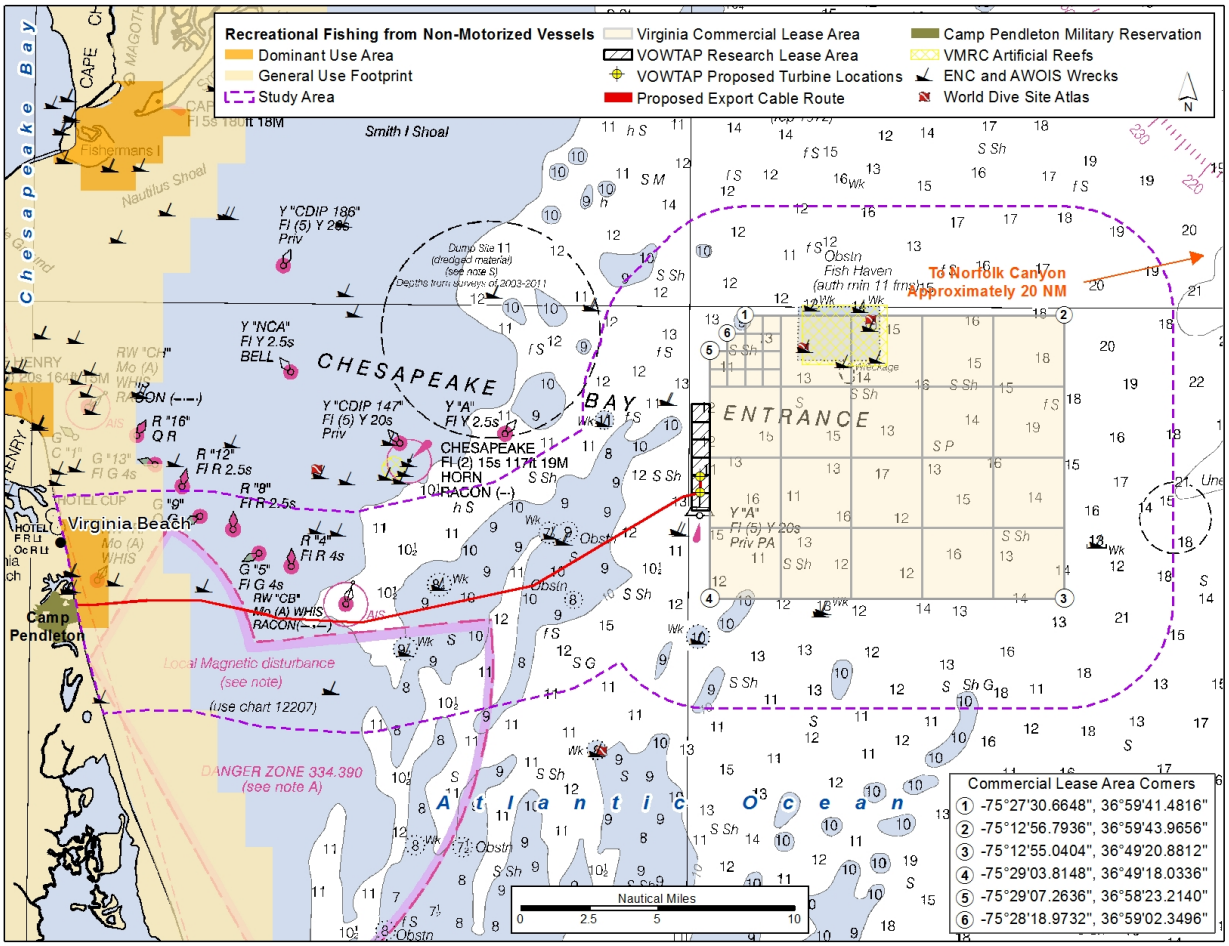
RECREATIONAL FISHING

Map 30.



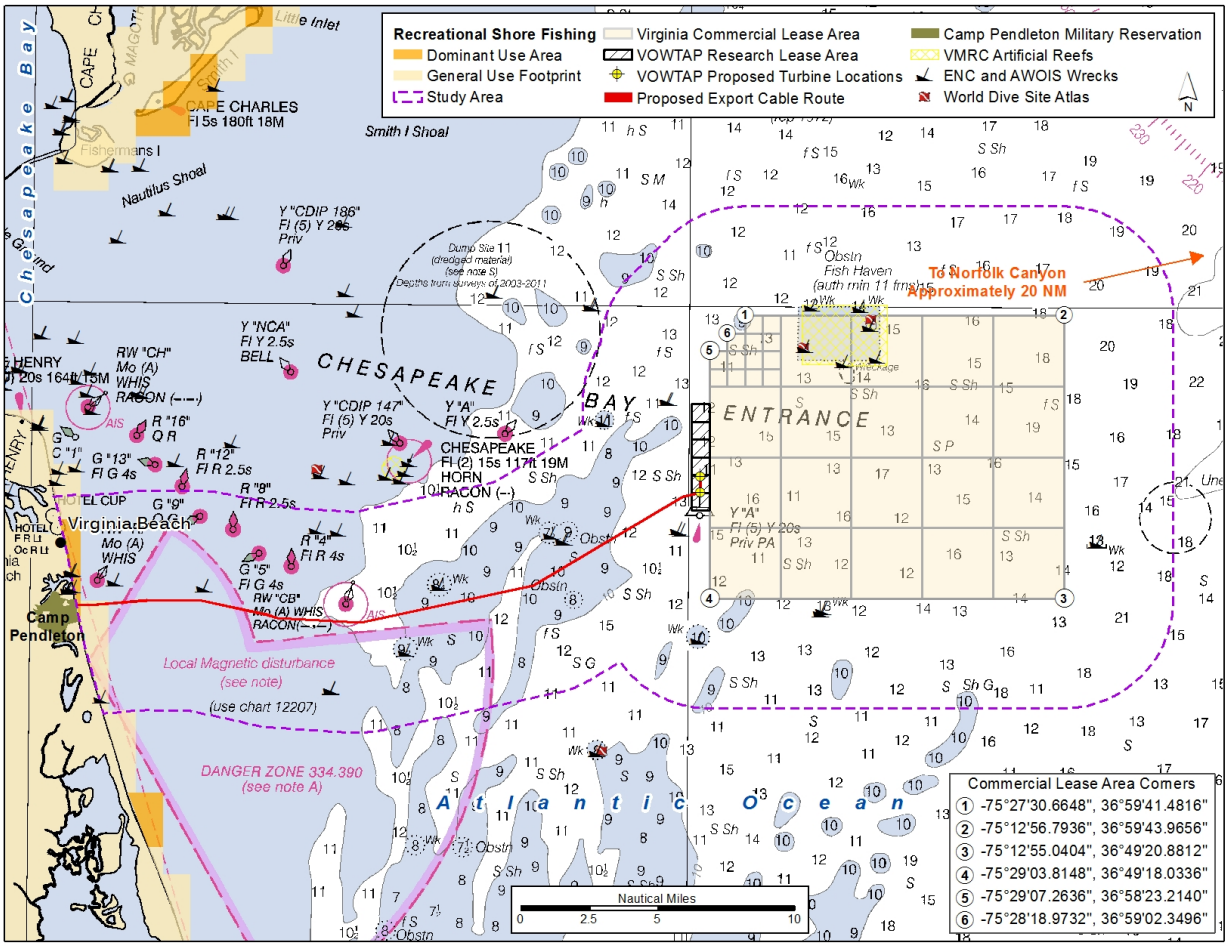
RECREATIONAL FISHING

Map 31.



RECREATIONAL FISHING

Map 32.



APPENDIX E: Materials Developed for Fishermen Outreach Meetings

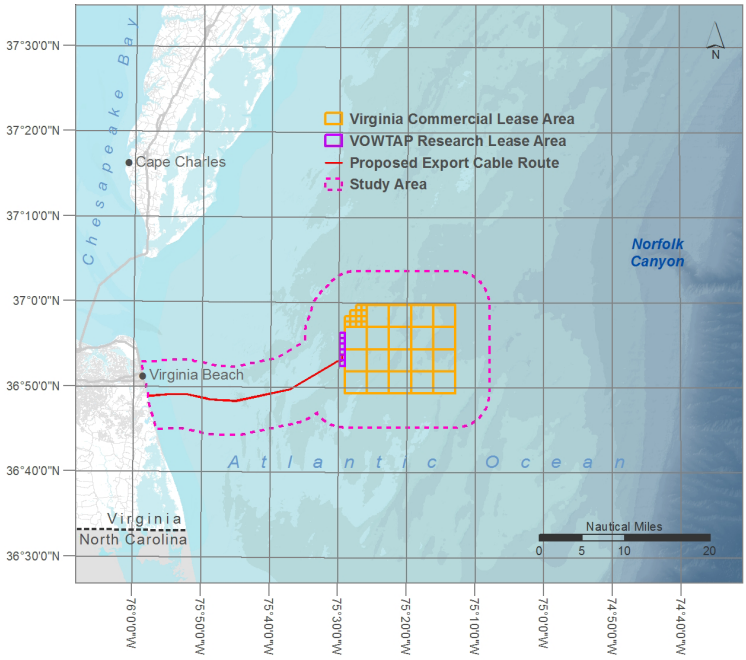
Collaborative Fisheries Planning for Virginia's Offshore Wind Energy Area

Photo of fishing vessel navigating wind farm in Sweden, Distance between turbines in Virginia would be greater than shown.

To prepare for future development of wind energy facilities off the coast of Virginia, the Bureau of Ocean Energy Management (BOEM), Virginia Department of Mines, Minerals, and Energy (DMME), and Virginia Coastal Zone Management (VA CZM) Program are working with the recreational and commercial fishing communities to share information through a collaborative process. Our objectives include developing fine-scale maps of commercial and recreational fishing areas; identifying recommendations to mitigate use conflicts between fishermen and wind energy development; and developing a plan for communicating with fishermen about wind development activities.

Value for Participating Fishermen

- Your participation will provide regular communication to let you know what to expect as the wind energy projects progress
- You can inform the project team of the best ways to communicate with all fishermen under various circumstances, such as notifications about temporary closures or other messages that need to be communicated during construction and operation
- Your fishing data and other information can help with decisions about some aspects of design, construction, and operation of the commercial wind energy project infrastructure, and construction timing, to reduce conflict with the fishing community during the development of wind energy facilities



Virginia's Wind Energy Area

Virginia's designated offshore commercial wind energy area is 24 nautical miles off the coast of Virginia Beach. The Virginia Offshore Wind Technology Advancement Project (VOWTAP) Research Lease Area (purple grid) will include two 6 megawatt ocean scale wind turbines and a buried transmission cable. Commercial and recreational fisheries data in and around the research and commercial (yellow grid) lease area are being sought, collected, and analyzed to minimize use conflicts with offshore wind energy development. This area is approximately 176 square miles.

For more information, please contact:
Virginia Coastal Zone Management Program, Laura McKay (Laura.McKay@deq.virginia.gov);
For ports in Virginia Beach, Hampton, or Newport News, Todd Janeski (tvjaneski@vcu.edu); For ports on Virginia's Eastern Shore, Connie Morrison (cmorrison@a-npdc.org); Recreational Fishing Contact, Jeff Deem (jeff.deem2@gmail.com); Commercial Fishing Contact, Rick Robins (richardbrobins@gmail.com); Bureau of Ocean Energy Management, http://www.boem.gov/Renewable-Energy/

For more information visit CZM's *Fishing and Virginia Offshore Wind* webpage at http://www.deq.virginia.gov/Programs/CoastalZoneManagement/CZMIssuesInitiatives/OceanPlanning/FishingandVirginiaOffshoreWind.aspx

Collaborative Fisheries Project Schedule

Winter/Spring 2015

- Compile and review available commercial fishing data (e.g., National Marine Fisheries Service's vessel trip reports, vessel monitoring system and logbook data)
- Identify and collect commercial fishermen's data to fill known data gaps (e.g., sea bass potters, conch, red crab and menhaden)
- Compile and analyze recreational fishing spatial data

Spring 2015

- Review and evaluate all maps with fishermen

Summer/Fall 2015

- Potentially host a fishermen exchange to discuss experiences with offshore wind energy development in other regions
- Develop recommendations, best management practices, and a fisheries communication plan for the design, construction and operation of wind energy facilities

Beneath the surface: This graphic illustrates the proposed foundations for the two VOWTAP turbines. Specific foundation types for the commercial project have not yet been identified.

Research Lease

The Virginia Offshore Wind Technology Advancement Project (VOWTAP) is located on a research lease area held by VA Department of Mines, Minerals and Energy (DMME) and is approximately 24 nautical miles east of Virginia Beach. The research project, subsidized largely by the U.S. Department of Energy, will construct and operate two 6-megawatt (MW) wind turbine generators and install 27 nautical miles of submarine cable transmission line.

Although the VOWTAP is already designed and funded, it provides an opportunity for DMME and other project members to seek input from the fishing community on the development of the communication plan and best management practices under this Fisheries Collaboration project. Construction and operation of VOWTAP will inform development within the commercial lease.

Tentative Timeline for VOWTAP

2014-2016: *Site assessment activities*

2017: *Construction and installation of wind turbine generators and transmission cables.*

Commercial Lease

From 2009 to 2012, BOEM convened the Virginia Renewable Energy Task Force, which includes federal, state, local, and tribal government representatives. It identified an area on the outer continental shelf for large scale development. BOEM solicited stakeholder input about existing uses of the location prior to the notice of the lease auction. In consultation with the Task Force, BOEM selected the final lease area to protect ecologically sensitive areas and minimize space use conflicts while maximizing the area available for offshore wind development. In 2013, Dominion Virginia Power won the bid for the lease area of approximately 112,799 acres, located 24 to 36 nautical miles offshore from Virginia Beach.

Between 2016-2018, Dominion will collect biological, geological, and archaeological data to inform their construction and operations plan. BOEM anticipates receiving the plan in late 2018, after which BOEM will conduct environmental analyses under the National Environmental Policy Act (NEPA), Magnuson-Stevens Fishery Conservation and Management Act, and the Endangered Species Act. The environmental review process under NEPA will provide an additional opportunity for the fishing community to be involved in the decision-making process. To complete its NEPA responsibilities, BOEM will ask for your thoughts on potential project alternatives and solicit your comments on whether BOEM has adequately identified social, environmental, and economic impacts.

Tentative Timeline for Commercial Lease

2016-2018: *Site assessment activities*

Late 2018: *Submission of construction and operations plan*

2019: *BOEM begins environmental review of the plan, including multiple opportunities for public comments*

2021: *Earliest start of construction*

BOEM's post-lease regulatory process is anticipated to take as few as 18 months. The earliest start for the 2-3 year construction period would be 2021. Dominion has indicated it will take a phased approach with Phase I providing between 400 to 600 megawatts. There may be as many as four phases.

Importance of Regional Ocean Planning

Ocean planning on a multi-state level is necessary to develop a shared understanding of how the offshore environment is currently used and how it may be used in the future. It provides a transparent framework to organize and map uses, resources, and interactions. Ocean planning helps create a collaborative vision for balancing ecological, economic, and social demands on marine ecosystems. This project will inform and provide data for the Mid-Atlantic Regional Council on the Ocean (MARCO) and the Mid-Atlantic Regional Planning Body (RPB), as well as DMME and Dominion. Both MARCO and the Mid-Atlantic RPB are working on regional ocean planning, including coordination of projects such as the development of offshore renewable energy production.

Study Area

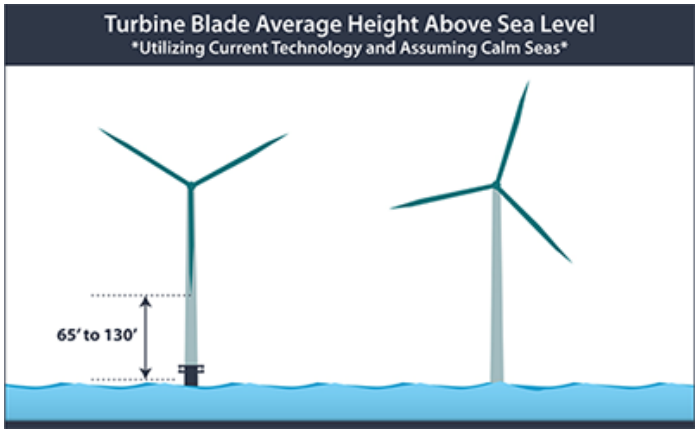
Data will be developed for the waters off of Virginia Beach which have been identified as potential cable transmission routes and a study area of approximately four nautical miles around the research and commercial lease areas.

New Data to Collect

The project team seeks to capture missing data within the study area (e.g., fishing activity not required to be reported; primary transit routes, etc.) via two methods:

- Download and mapping of voluntarily contributed chart plotter data (grouped and summarized to address confidentiality concerns).
- Participatory Geographic Information System (p-GIS) mapping work with fishermen to map fishing and transit locations directly into a computer.

Any data submitted will be assigned a unique ID and any identifiable information (e.g., vessel or owner name) will be removed. Unless specifically authorized by you, your data will only be used in a combined data set so that it does not identify your individual fishing patterns. Raw, unaggregated data will not be shared publicly.



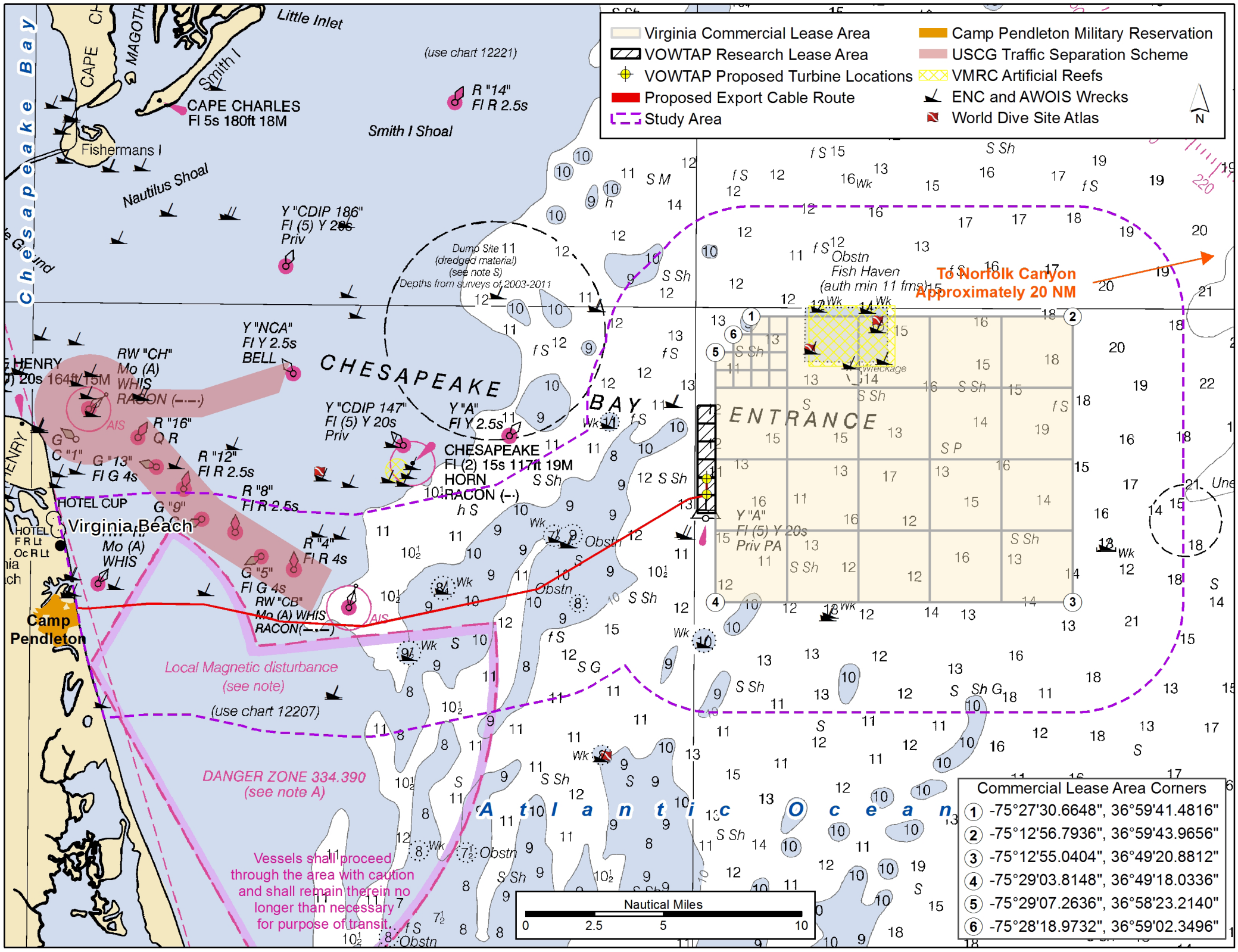
Integrating all Data

In addition to collecting new information, this project also seeks feedback on existing mapping projects, including MARCO's Communities at Sea maps, Virginia CZM's Recreational Use Maps, and BOEM's fishery exposure analysis. Communities at Sea maps integrate National Oceanic and Atmospheric Administration's (NOAA's) Vessel Trip Report (VTR) and vessel permit databases (2011 to 2013) to produce heat maps that link commercial fishing with the ocean places where they spend the most time. Virginia Coastal GEMS identified recreational fishing locations via pGIS workshops in 2012. In 2015, results from BOEM's project with NOAA's Northeast Fisheries Science Center are expected to be available and will provide estimated fishing revenue from wind energy areas (i.e., exposure). Data from these three sources within the study area will be synthesized as a baseline to be enhanced and improved through the new data collection activities undertaken through this project.

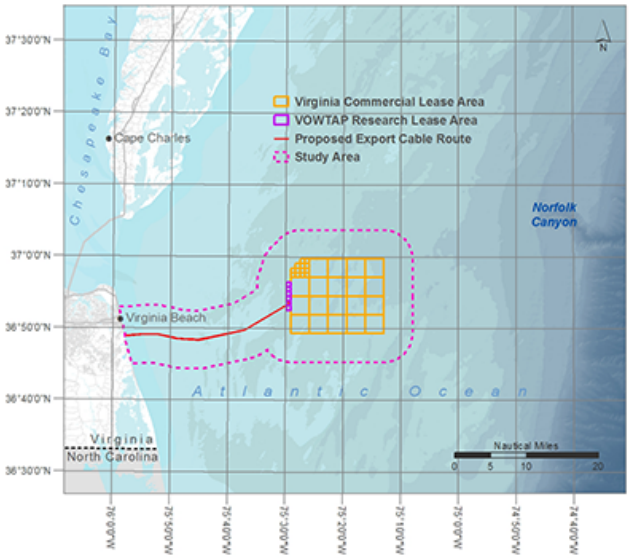
This collaboration is designed to complement and integrate existing data to build a stronger regional spatial understanding of fishing. As such, information on other existing initiatives listed in the table below will also be shared.

Mapping Tool	Fisheries Data Description	Primary Data Source	For More Information
MARCO's Ocean Data Portal	"Communities at Sea" heat maps showing commercial fishing effort linked to fishermen's home ports	NOAA VTR and NOAA vessel permit database	portal.midatlanticocean.org
Virginia CZM's Coastal GEMS Portal	Locations of general and dominant use for recreational fishing	Participatory mapping (P-GIS) workshops	www.coastalgems.org
NOAA/BOEM fishery exposure analysis	Estimated value of fish commercially harvested from wind energy areas	NOAA VTR, Vessel Monitoring System, and seafood dealer reports	Report expected to be available in summer 2015

Data confidentiality statement: All unaggregated fishing data provided by fishermen to the project team will be treated as confidential business information under Exemption 4 to the Freedom of Information Act and not released to the public. Only aggregated fishing data will be available to the public. Virginia's Freedom of Information Act at Section 2.2-3705.6 excludes "Fisheries data that would permit identification of any person or vessel except when required by court order as specified in Section 28.2-204."


Virginia Commercial Lease Area
VOWTAP Research Lease Area
VOWTAP Proposed Turbine Locations
Proposed Export Cable Route
Study Area
Camp Pendleton Military Reservation
USCG Traffic Separation Scheme
VMRC Artificial Reefs
ENC and AWOIS Wrecks
World Dive Site Atlas
N
Chesapeake Bay
Little Inlet
(use chart 12221)
CAPE CHARLES
Fl 5s 180ft 18M
Smith I
Smith I Shoal
R "14"
Fl R 2.5s
Fishermans I
Nautilus Shoal
Y "CDIP 186"
Fl (5) Y 20s
Priv
Dump Site 11
(dredged material)
(see note S)
Depths from surveys of 2003-2011
Obstn
Fish Haven
(auth min 11 fms)
To Norfolk Canyon
Approximately 20 NM
Wreckage
CHESAPEAKE BAY ENTRANCE
Y "NCA"
Fl Y 2.5s
BELL
RW "CH"
Mo (A)
WHIS
RACON (–·–·)
AIS
R "16"
Q R
G "1"
G "13"
Fl G 4s
R "12"
Fl R 2.5s
R "8"
Fl R 2.5s
G "9"
R "4"
Fl R 4s
G "5"
Fl G 4s
RW "CB"
Mo (A) WHIS
RACON(–·–)
Y "CDIP 147"
Fl (5) Y 20s
Priv
Y "A"
Fl Y 2.5s
CHESAPEAKE
Fl (2) 15s 117ft 19M
HORN
RACON (–·)
Y "A"
Fl (5) Y 20s
Priv PA
HOTEL CUP
Virginia Beach
HOTEL
F R Lt
Oc R Lt
Camp Pendleton
Local Magnetic disturbance
(see note)
(use chart 12207)
DANGER ZONE 334.390
(see note A)
Vessels shall proceed through the area with caution and shall remain therein no longer than necessary for purpose of transit.
Atlantic Ocean
Nautical Miles
0
2.5
5
10
Commercial Lease Area Corners
1 -75°27'30.6648", 36°59'41.4816"
2 -75°12'56.7936", 36°59'43.9656"
3 -75°12'55.0404", 36°49'20.8812"
4 -75°29'03.8148", 36°49'18.0336"
5 -75°29'07.2636", 36°58'23.2140"
6 -75°28'18.9732", 36°59'02.3496"

To prepare for future development of wind energy facilities off the coast of Virginia, the Bureau of Ocean Energy Management (BOEM), Virginia Department of Mines, Minerals, and Energy (DMME), and Virginia Coastal Zone Management (VA CZM) Program are working with the recreational and commercial fishing communities to share information through a collaborative process. Virginia's commercial wind energy area is 24 nautical miles off the coast of Virginia Beach (yellow grid) and consists of approximately 176-square miles. Additionally, BOEM has issued a research lease, which is the location of the Virginia Offshore Wind Technology Advancement Project (VOWTAP) (purple grid). This proposed project includes two 6-megawatt ocean scale wind turbines and a buried transmission cable. The earliest construction start date for VOWTAP is May 2017.



As part of the project, the Collaborative Fisheries Planning Team has developed Best Management Practices (BMPs) to minimize the use conflicts with offshore wind energy development and the fishing community. This document includes a brief description of each of the 5 BMP's. Fully described BMPs and more detailed information on the Collaborative Fisheries Planning Team can be found at:

http://www.deq.state.va.us/Programs/CoastalZoneManagement/CZMIssuesInitiatives/OceanPlanning/FishingandVirginiaOffshoreWind.aspx

BMP 1: Communications Framework

BMP 1 identifies a starting point to assist the wind energy developer and other interested parties with information about the specific interests, needs, and dissemination of methods for communicating with those fishing off of the Virginia coast. This BMP includes creating a timely two-way communication plan between the affected stakeholders (fishing communities) and the developers that can adapt over time. A network of involved stakeholders is necessary, and the hiring of a fisheries liaison (who is the developer's point of contact) and a fisheries representative (who is the fishing community's point of contact) is recommended. These individuals would work together to ensure effective communication between the developers and user groups.

BMP 2: Siting, Micrositing, Design, and Construction

This BMP is intended to minimize potential conflicts between the wind energy developer and fishermen during active project phases. It is predicated on ongoing candid interaction between the industry and fishermen and providing user groups continuously updated information. Suggestions include early, often, and ongoing engagement with fishermen and that fishing should be allowed to continue with as few disruptions as possible. Highly valued grounds and ecologically important areas should be disrupted as little as possible, especially during ecologically vulnerable times. The

creation of a public website to post bulletins and provide opportunities for public comments is also recommended.

BMP #3: Navigation, Access and Safety

This BMP includes recommendations regarding navigation through wind facilities, accessing and anchorage at or around structures, marking, radio contact, lighting, and safety equipment. This includes both visual marking as well as automatic identification system transponders. It also includes the vetting of those procedures and notices by the user groups (fishermen). To avoid conflicts with fishermen, wind energy developers will seek to maximize fishing access throughout all phases of offshore development: site assessment and site characterization; construction; operation; and, decommissioning.

BMP #4: Environmental Monitoring and Research

BMP 4 recommends procedures for documenting, monitoring, and researching environmental conditions and fish surveys related to the commercial and recreational fishing industry in and around Virginia's wind energy area during construction, operation, and following storm events. An adaptive environmental monitoring plan should be implemented during all phases of development and include a pre-construction baseline survey and post-construction monitoring.

BMP #5: Mitigation

The goal of this BMP is to describe acceptable mitigation strategies, which will need to be further refined through dialogue with fishermen, fishery representatives, the fishery liaison, and the wind energy developer. Types of mitigation could include:

- Shore-side improvements (e.g., derricks, gear or fuel storage facilities, freezers)
- Enhance fisheries science and management (e.g., surveys for black sea bass and channeled whelk)
- Fish habitat restoration and improvements
- Vessel and gear modifications
- Sport fishing and tourism promotion
- Use of fishermen and their vessels (e.g., surveys, guard and observer vessels)
- Financial compensation

For more information, please contact:
Virginia Coastal Zone Management Program, Laura McKay (Laura.McKay@deq.virginia.gov);
For ports in Virginia Beach, Hampton, or Newport News, Todd Janeski (tvjaneski@vcu.edu); For ports on Virginia's Eastern Shore, Connie Morrison (cmorrison@a-npdc.org); Recreational Fishing Contact, Jeff Deem (jeff.deem2@gmail.com); Commercial Fishing Contact, Rick Robins (richardbrobins@gmail.com); Bureau of Ocean Energy Management, http://www.boem.gov/Renewable-Energy/

Frequently Asked Questions Related to Wind Energy on the Outer Continental Shelf – Virginia – March 2015

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1. *In its evaluation of offshore wind facilities and their potential impacts, does BOEM consider other marine uses that may also impact the fishing community?*

   - Yes. As part of our analysis of potential impacts for construction, operation and maintenance, and decommissioning of offshore wind energy facilities, BOEM will evaluate impacts to existing and likely future uses of the coastal and ocean environment.
   - Examples include fishing; oil and gas exploration and development; military activities; marine mineral extraction; and commercial, recreational, and military vessel traffic.

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2. *Are there siting considerations to address potential impacts to fisheries and habitat (e.g., turbine configuration to minimize navigational impacts; turbine design options to provide habitat)?*

   - BOEM held a series of workshop in 2012 and 2014 with the fishing community to solicit input for the *Development of Mitigation Measures to Address Potential Use Conflicts Between the Wind and Commercial Fishing Industries.* BOEM's cooperative project (M14AC00029) with the Commonwealth of Virginia, *Collaborative Fisheries Planning for Virginia's Offshore Wind Energy Area* is designed to further refine the proposed options to meet the needs of Virginia fishermen.

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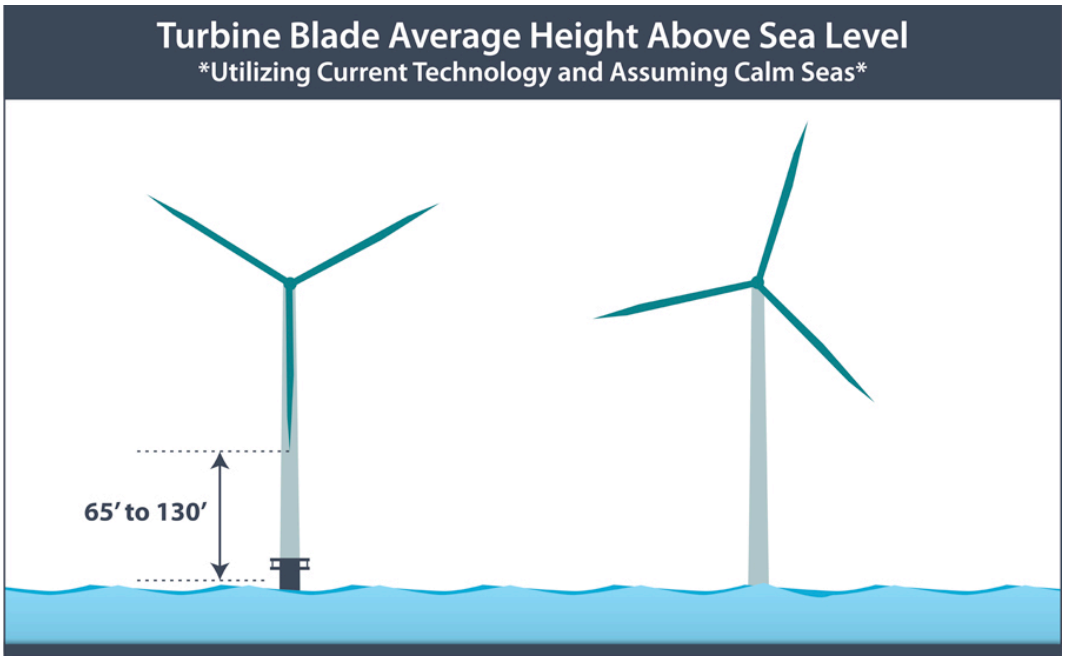
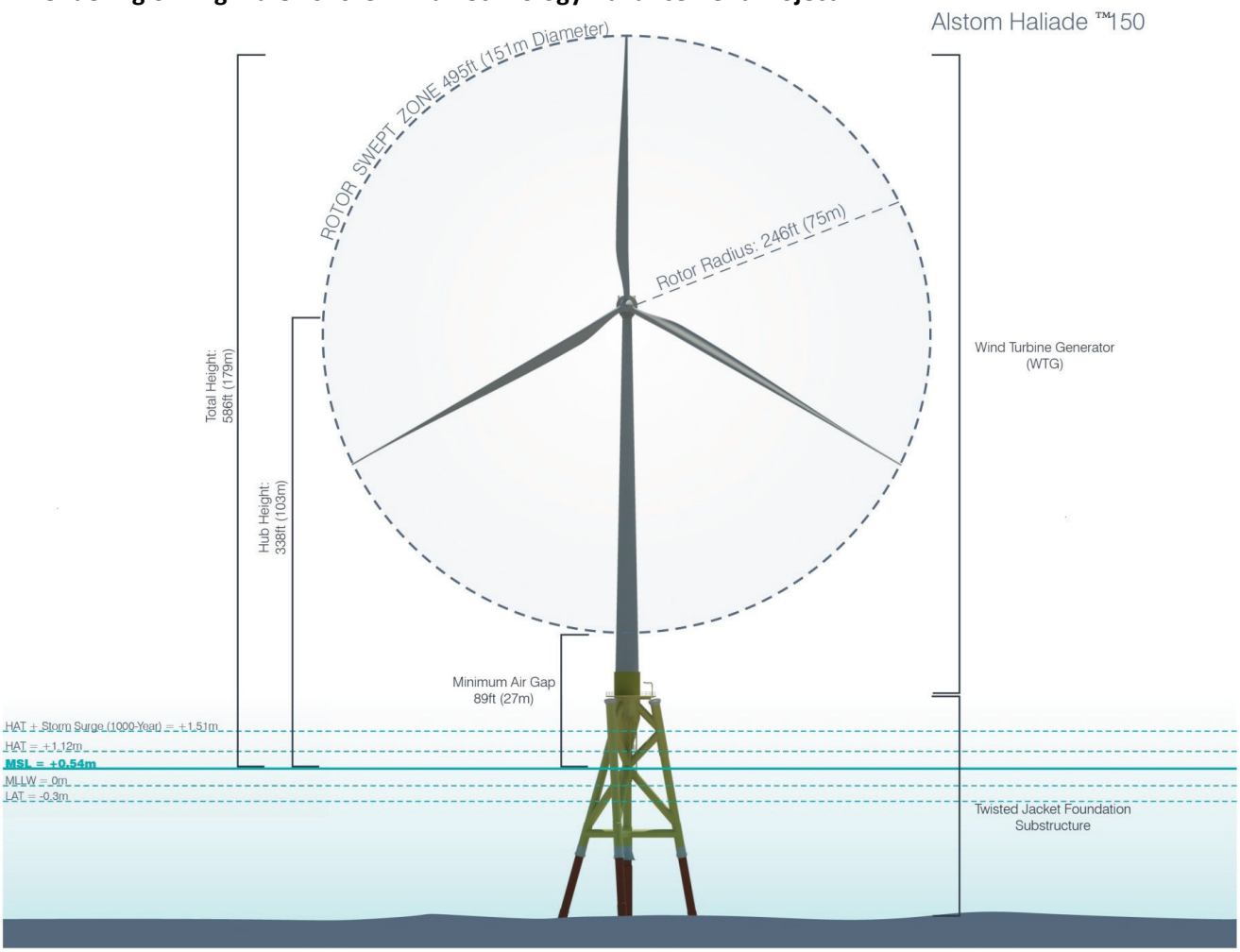
3. What is the average height above sea surface and distance between wind turbines?

   - Based on the current technology, the lowest point of the rotor sweep would be 65 to 100 feet (ft) above the sea surface. The minimum gap for the Virginia Offshore Wind Technology Advancement Project (VOWTAP) on the proposed research lease is 89 feet above mean sea level.



Rendering of Virginia Offshore Wind Technology Advancement Project



HAT = highest astronomical tide; MSL = mean sea level; MLLW = mean lower low water; LAT = lowest astronomical tide

- Spacing between turbines is determined on a project-by-project basis to minimize wake effect between turbines and is based on rotor diameter and turbine size. It is anticipated that U.S. offshore wind turbines will use rotors of 151 m (495 ft) or more in diameter, so turbines would be spaced at least 0.3 to 0.6 nautical miles apart. The VOWTAP wind turbines will be arranged in a north-south configuration spaced approximately 0.5 to 0.6 nautical miles (1,050 m) apart.

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4. Will areas around the wind energy facility structures exclude vessel traffic and fishing activity?

- BOEM does not intend to restrict vessel traffic in and around offshore wind facilities.
- The U.S. Coast Guard (USGC) has the authority to implement a safety zone or buffer to ensure safety at sea. They have stated such measures would be evaluated on a case-by-case basis.
- To ensure the safety of the local mariners, VOWTAP's developer will establish a 95 acre temporary work area around each turbine and a 61 m (200 ft) construction right-of-way along the routes of the cables. As appropriate, these areas will be marked and lit in accordance with USCG requirements and monitored by a security boat that will be available to assist mariners.

5. *What is the footprint of the VOWTAP wind turbines and what is the foundation design?*

- The Keystone Inward Battered Guide Structure (IBGS) foundation is narrower at the top than it is at the seafloor. The total footprint of each IBGS foundation is approximately 0.09 acre on the seafloor. At sea level, the IBGS foundation measures approximately 17 m by 17 m (56 ft by 56 ft).
- The foundations consist of one approximately 3.1 m (10.2 ft) diameter central caisson, the structural jacket installed over the central caisson, and three through-the-leg inward battered piles approximately 1.8 m (5.9 ft) in diameter driven through the structural jacket spaced approximately 29 m (95 ft) apart at the seafloor.

6. *How deep are the electrical transmission cables buried under the sediment?*

- Varies by project with cables typically buried below the seafloor at an appropriate depth based on the underlying geology, navigation and other hazards, and heat transfer properties of the sediment. Mitigation measures, such as concrete mats, rock, and other types of fill may be used in cases where a minimum depth of cover is required or at cable crossings.
- VOWTAP has proposed a 2 m (6.6 ft) target burial depth for the export cable. The operators will be required to conduct inspections, including after storms, to ensure cables remain buried.
- Additional discussion is available in *Offshore Electrical Cable Burial for Offshore Wind Farms on the Outer Continental Shelf* (2011) and *Offshore Wind Submarine Cable Spacing Guidance* (2014) at www.bsee.gov/Technology-and-Research/Technology-Assessment-Programs/Categories/Renewable-Energy-Research

7. *What are the effects of electromagnetic fields (EMF) on fish species?*

The following studies examine the effects of EMF on marine animals (primarily fish):

- In 2011, BOEM initiated a study titled "Renewable Energy *in situ* Power Cable Observation" that is evaluating species densities along electrified and non-electrified undersea power cables off the California coast. This study will be completed in 2015. See the study profile for more information: www.boem.gov/pc-11-03
- On July 7, 2011, BOEM completed the study "Effects of EMFs from Undersea Power Cables on Elasmobranchs (Sharks and Rays) and Other Marine Species." This study researched potential ecological effects of EMFs emitted by sub-sea power transmission cables, suggested solutions that reduce EMF exposure, and identified data gaps and future research priorities. Report is located here: www.data.boem.gov/PI/PDFImages/ESPIS/4/5115.pdf

- In December 2013, a site-specific EMF study was provided for the buried submarine cable that is proposed for VOWTAP. The report, *Magnetic Fields from Submarine Cables*, was prepared by Exponent, Inc. and was issued as part of the VOWTAP Research Activities Plan submitted to BOEM. The VOWTAP EMF report is available at http://www.boem.gov/Renewable-Energy-Program/State-Activities/VA/2013-12-06_Appendix-K_VOWTAP_EMF-Analysis_FINAL.aspx
- The Department of Energy's Pacific Northwest National Laboratory has completed a study titled "Effects of Electromagnetic Fields on Fish and Invertebrates." This study looks at behavioral responses of selected finfish, crabs, and spiny lobster to EMF produced in a laboratory setting. Results are here: mhk.pnnl.gov/publications/effects-electromagnetic-fields-fish-and-invertebrates
- The Oregon Wave Energy Trust concluded an EMF study titled "Electromagnetic Field Measurements." Report is here: oregonwave.org/oceanic/wp-content/uploads/2013/09/Electromagnetic-Field-Measurements-EMF%E2%80%94September-2010.pdf
- A United Kingdom study, "EMF-Sensitive Fish Response to EM Emissions from Sub-Sea Electricity Cables," looked at behavioral reactions of certain sharks and rays to EMF in a large sea pen. The report concluded that although some fish appeared to respond to EMF, no positive or negative effects could be determined.
- In late 2014, BOEM kicked off an Atlantic EMF study on elasmobranch (sharks, rays and skates) and American lobster movement and migration. The study profile is available: www.boem.gov/EMF-Impacts-on-Elasmobranch-and-American-Lobster

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8. If fishermen are displaced or economically impacted, will compensation be available from the Federal government?

- The Fishermen's Contingency Fund, established under the OCS Lands Act of 1978, compensates U.S. commercial fishermen and other eligible citizens and entities for property and economic loss caused by obstructions specifically related to oil and gas development activities on the OCS.
- BOEM does not have the authority to establish a similar mitigation fund related to OCS renewable energy development.
- Through BOEM's compliance with the National Environmental Policy Act, the Agency must identify environmental, economic and social impacts related to approval of construction and operation of offshore wind energy facilities. Projects like the Virginia Cooperative Agreement and public involvement in the NEPA decision-making process are vital for understanding potential impacts.

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9. Where can I find more information about offshore wind energy development in the Atlantic?

- Information on the planning process and the status offshore wind leases, including opportunities for comment, can be found on the BOEM website at: www.boem.gov/Renewable-Energy
- Information specific to off-shore wind development and fisheries conflicts can be found at: www.boem.gov/Fishing-Offshore-Wind-Mitigation-Measures-Development-Workshops

APPENDIX F: Communications Plan

VWEA COMMUNICATIONS PLAN

Collaborative Fisheries Planning for Virginia's Offshore Wind Energy Area

(revised March 2, 2015)

A. Identify and develop needed outreach materials
    a. Project Fact Sheet (overview, VWEA v VOWTAP), map, data sources
    b. FAQ (process for input, data collection and sources used, legalities, confidentiality, timeline, etc).
    c. Establish online forum or site for communication sharing.

B. Outreach Efforts (Connie Morrison and Todd Janeski)
Proposed approach:

I. Initial Outreach Meetings
Objectives:

a. Increase awareness of project plans and timelines
    i. Differentiate between VOWTAP and VWEA
    ii. Detail how/when fishers can interact with both projects
b. Encourage input and participation in process
c. Gauge interest in providing data
d. Identify fishers preferred means of ongoing communication related to the VWEA process
e. Identify opportunities for ongoing interactions for fishing communities with the VWEA process

<u>Commercial Fishers</u>

Chincoteague, target dates of March 25/26th: Town Office (Connie)

Machipongo, target date of March 30th: Barrier Island Center, Education Bldg (Connie)

Visits to Ports (TBD, with input from Rick Robins), mid-March (Todd)

Proposed Outreach Meeting Agenda:

i. Introductions
ii. Brief overview of ocean planning
iii. Intro to VWEA project and VOWTAP

a. BOEM handouts, VWEA project area maps, Community at Sea map acknowledgement

iv. Opportunity for input from fishers
   a. How they can provide input to the lease area project
   b. Identify avenues for participation and methods for data sharing
      i. Fishing locations
      ii. Chart plotter data
   c. Communicate plans for sharing and distribution of gathered information to the public, participating organizations, and government agencies.
   d. Address confidentiality and gauge interest

v. Identification of best communication strategies
   a. What information is needed and when
   b. How would they like to communicate throughout entirety of the project(s).
   c. Gather contact information

Participation in outreach meetings

- 2 Dominion representatives on hand for questions
- BOEM representative?
- VWEA Collaborative Team members

Visual Aids

- Communities at Sea maps
- Handouts (Fact Sheet and FAQs)

<u>Recreational Fishers</u>

Eastern Shore Anglers Club Meeting, March 11th (Connie)

VMRC and DCR Outreach Schedule

II. Data Collection (may be a process, not be a workshop)
Objectives:

a. Work with fishers to collect actual data and information for mapping process, specifically Chart Plotter Data and fishing locations.
b. Integrate these data into mapping process.

III. Workshop: pGIS and UK integration (combine these in 1 workshop?)
Objectives:

a. Host a participatory GIS workshop to integrate additional information into mapping process.
b. Learn from UK expert and experience

IV. Workshop: Vet and Verify Maps

Objectives:

a. Gather participants to present synthesized commercial and/or recreational fishing maps and solicit additional input.
b. Assure support and agreement of maps, data sharing and distribution, and for process forward.