

**REPORT OF THE
VIRGINIA MARINE RESOURCES COMMISSION**

**Opportunities for Offshore
Wind Energy in State
Territorial Waters**

**TO THE GOVERNOR AND
THE GENERAL ASSEMBLY OF VIRGINIA**



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COMMONWEALTH of VIRGINIA

*Marine Resources Commission
2600 Washington Avenue
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Newport News, Virginia 23607*

Douglas W. Domenech
Secretary of Natural Resources

Steven G. Bowman
Commissioner

February 24, 2010

MEMORANDUM

TO: The Honorable Bob McDonnell
Governor of the Commonwealth of Virginia
And,
Members of the Virginia General Assembly

THROUGH: The Honorable Doug Domenech
Secretary of Natural Resources

FROM: 
Steven G. Bowman

SUBJECT: Opportunities for Offshore Wind Energy in State Territorial Waters

This transmits the report of the Virginia Marine Resources Commission's (VMRC) effort to determine whether sufficient and appropriate subaqueous land exists in state territorial waters to support the generation and transmission of electrical or compressed air energy from offshore wind. This review was conducted in response to Acts of Assembly 2009, Chapter 766 (SB1350).

In order to depict potential opportunities for wind development and identify resource and use conflicts this report includes various maps that show the States tidal waters covering State-owned submerged lands extending offshore to the three nautical mile State boundary. These maps depict various, but not necessarily all, resources and uses of State waters and submerged lands for which data and information are available, and which were considered to be important factors for the appropriate siting of leases and permitting for offshore wind energy facilities.

For this assessment effort, VMRC invited interested parties to participate in an Ad-Hoc advisory workgroup and sought input from members of the Coastal Policy Team of the Virginia Coastal Zone Management Program. While valuable information and comment was provided by the Ad-Hoc participants, this is a VMRC staff report and is not meant to represent or reflect the position of any other agency or organization.

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Opportunities for Offshore Wind Energy in State Territorial Waters

Prepared in response to
Acts of Assembly 2009, Chapter 766
(SB1350)

By

Virginia Marine Resources Commission

February, 2010

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INTRODUCTION

This report describes the Virginia Marine Resources Commission's (VMRC) effort to **determine whether sufficient and appropriate subaqueous land exists in state territorial waters to support the generation and transmission of electrical or compressed air energy from offshore wind.** This review is conducted in response to Acts of Assembly 2009, Chapter 766 (SB1350).

This Act amended § 28.2-1208 of the Code of Virginia, by adding the following:

- provides the Marine Resources Commission with the authority to lease subaqueous lands for the purpose of generating electrical energy from wave or tidal action, currents, offshore winds, or thermal or salinity gradients and transmit energy from such sources to shore (in addition to permits required pursuant to § § 28.2-1203 and 28.2-1204 of the Code of Virginia),
- requires that any leases require a royalty to be appropriated to the Virginia Coastal Energy Research Consortium (VCERC),
- requires the maintenance of a State Subaqueous Minerals and Coastal Energy Management Plan (in lieu of a Subaqueous Minerals Management plan) as a supplement to the State Minerals Management Plan as well as the Virginia Energy Plan , and
- directs VMRC to:
 - identify 100 acres suitable for use by the VCERC as a research site,
 - in consultation with the VCERC, other state agencies, conservation and industry representatives, and other interested parties as appropriate, determine whether sufficient and appropriate subaqueous land exists in state territorial waters to support the generation and transmission of electrical or compressed air energy from offshore wind, and
 - by March 1, 2010 submit its findings in a written report to the General Assembly.

WIND ENERGY FACILITIES

For the purpose of this report wind energy facilities were considered to be those that would be viewed as commercial scale projects that either sell or provide power through the electrical grid or they are intended to provide power for a specific community or business use. In such cases, it is assumed that any excess power would also be provided back to the electrical grid. While commercial scale projects are not specifically defined, this report considers such projects to include both industrial scale and community scale facilities. Industrial scale projects would be those more commonly referred to as “Wind Farms” that would be comprised of multiple towers and turbines, whereas community scale projects would generally be comprised of one or possibly several towers and turbines. While industrial scale projects might be rated to produce up to 100 or more megawatts (MW) of electricity, community scale projects would generally be rated to produce less than one to just several MW.

WIND ENRGY RESOURCES AND TRANSMISSION CORRIDOR

Although the Virginia Energy Plan developed in accordance with Title 67 of the Code of Virginia recognizes that the Commonwealth should encourage all cost effective, environmentally responsible development of offshore wind resources, most of the focus has been on developing areas beyond the normal visible horizon in the Atlantic Ocean in areas with wind resources suitable for commercial development. This is generally considered to be those wind resources identified as Class 5 and higher as shown in the wind resource map in **Figure 1**. This is also consistent with the Commonwealth’s policy “to support federal efforts to examine the feasibility of offshore wind energy being utilized in an environmentally responsible fashion.” (§ 67-300 of the Code of Virginia). Nonetheless, the Energy Plan characterizes Virginia’s potential wind energy resources both in the Chesapeake Bay and in the Atlantic Ocean to three nautical miles. The plan further recognizes, however, that although there are substantial areas of Class 3 and 4 winds and some class 5 winds over state waters, sensitive areas unsuitable for development would need to be excluded. While Class 5 or higher winds may be needed for economic development of offshore wind projects, this may, however, be more applicable to industrial size projects rather than those of a community scale.

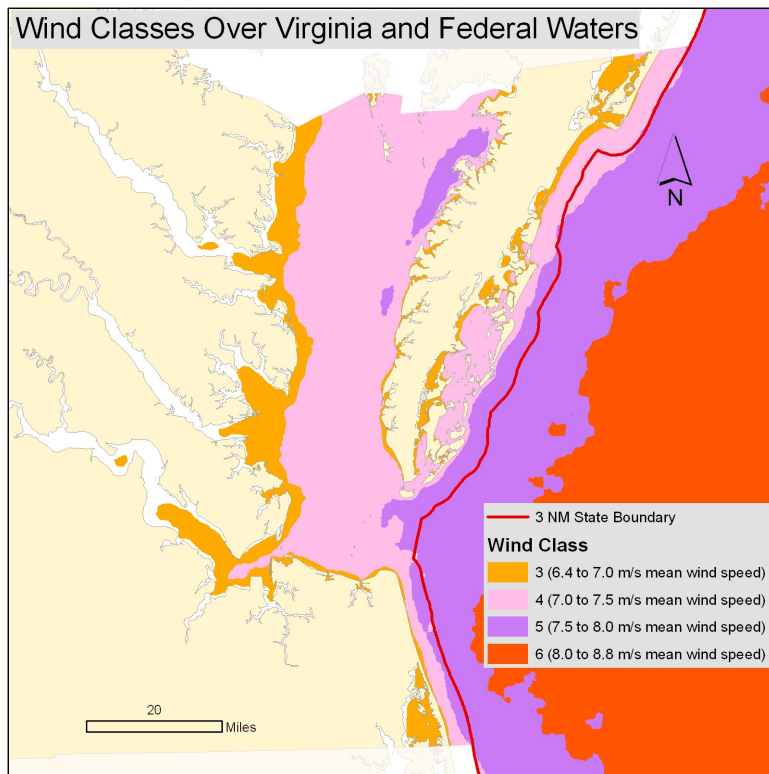


Figure 1. Wind Classes for coastal water areas.

As such, this report is intended to identify potential opportunities for wind development and identify resource and use conflicts that should be considered when evaluating opportunities for siting of wind energy projects in State waters on State-owned submerged lands. Also, an area adjacent to the city of Virginia Beach near Dam Neck in the vicinity of the HRSD Atlantic Wastewater Treatment Plant outfall is identified as possibly the most appropriate corridor for transmission of power from offshore wind facilities in Federal Waters. This would include the area surrounding the outfall that is classified as condemned for the direct marketing of shellfish by the Department of Health and is near suitable electrical transmission facilities in the area as identified by VCERC. This area and map of the nearby electrical transmission infrastructure are shown in **Appendix A**.

ASSESSMENT OF USE AND RESOURCE CONFLICTS

In order to depict potential opportunities for wind development and identify resource and use conflicts this report includes various maps that show the States tidal waters covering State-owned submerged lands extending offshore to the three nautical mile State boundary. These maps depict various, but not necessarily all, resources and uses of State waters and submerged lands for which data and information are available, and which were considered to be important factors for the appropriate siting of leases and permitting for offshore wind energy facilities. **Appendix B** includes a list of potential resource and use conflicts considered to be important issues for this assessment.

For this assessment effort, VMRC invited interested parties to participate in an Ad-Hoc advisory workgroup and sought input from members of the Coastal Policy Team of the Virginia Coastal Zone Management Program. Two Ad-Hoc advisory work group meetings were held at the agency's Offices in October and November of last year, and the assessment was considered at a Coastal Policy Team meeting during the same period. While valuable information and comment was provided by the Ad-Hoc participants, this is a VMRC staff report and is not meant to represent or reflect the position of any other agency or organization.

Based on the resource and use information depicted in these maps, state waters are divided into the four categories listed below in order to depict whether sufficient and appropriate subaqueous lands exist in state territorial waters to support the generation and transmission of electrical or compressed air energy from offshore wind. As noted in a 2009 federal Minerals Management Service (MMS) report to the Secretary, U.S. Department of the Interior, key challenges for renewable energy development include such issues as offshore space-use conflicts, artificial reef effects, habitat alteration, noise from pile driving and effects from electromagnetic fields on fishery resources, as well as understanding the potential affects on sea floor and coastal habitats, marine mammals and sea turtles resulting from anthropogenic sound, and impacts on marine and coastal birds. Also, as identified during this assessment, potential affects of barge and vessel access for construction and maintenance, especially in shallow water areas, should be considered as a factor.

Excluded Areas:

Areas for which there is a legally defined use or protection such as navigation channels and anchorages, military security and training areas, FAA restriction areas, the NASA Wallops Flight Facility range, Baylor Grounds (public oyster grounds) and private shellfish leases.

Major Potential for Resource and Use Conflict:

Areas where there are significant use or resources conflicts that would appear to preclude wind energy development. Examples of areas suggested for this category include sensitive shallow water areas with depths less than 2 meters, including the Eastern Shore lagoon system behind Virginia's barrier islands, and areas along the coast that are of continental and global importance to birds due to the large number of species and individuals that migrate through this corridor and overwinter in the area. This area includes much of the Bay mouth that overlaps or is near blue crab spawning and nursery areas and fishery, marine mammal and turtle migratory corridors as well as high commercial shipping and recreational use areas including those near recreational beaches.

Moderate Potential for Resource and Use Conflict:

Areas where there appears to be some use or resource conflict, but with further analysis might possibly be considered suitable for leasing. Examples of areas suggested for this category include areas with depths from 2 to 4 meters and areas of regional bird importance due to the concentration of breeding and overwintering species. This may also include sand resource areas, and fishing reefs, as well as certain important fishery management areas as established by State Code or regulation.

Lesser Potential for Resource and Use Conflict:

Areas that may be suitable for leasing recognizing that detailed environmental and use analysis will be needed before permits and leases can be issued. This, however, includes portions of the designated blue crab sanctuary within the main-stem of the Bay, potential hard clam resource areas and fishery management areas, as well as potential historic resource conflict areas and areas near dredge disposal sites that are not already within areas considered to contain other excluded, moderate and major resource or use conflicts.

MAPPING RESULTS

The categories described above, are shown in **Figure 2**. Within this figure the areas of lesser potential for conflict show the most likely areas for wind development, however, only a small area in the Bay near the Eastern Shore contains Class 5 winds. **Figures 3, 4 and 5** show the various data layers within the Excluded, Major Conflict and Moderate Conflict category areas, and **Figure 6** shows the wind classes within the Lesser Conflict category area. The individual data layer maps contained within these figures are included in **Appendix C**.

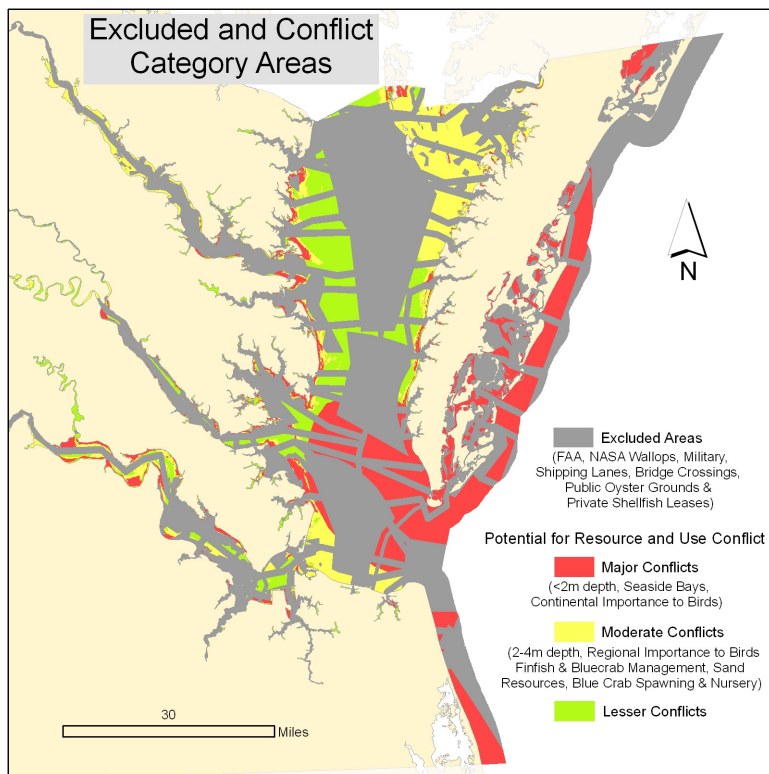


Figure 2. Resource and Use Conflict Categories Map

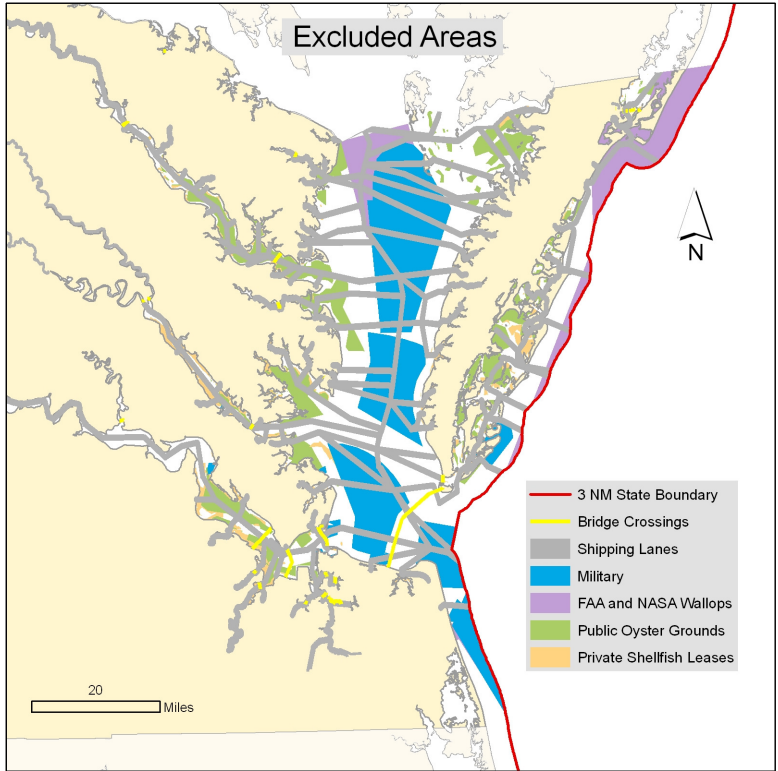


Figure 3. Combined Data Layers for Excluded Areas.

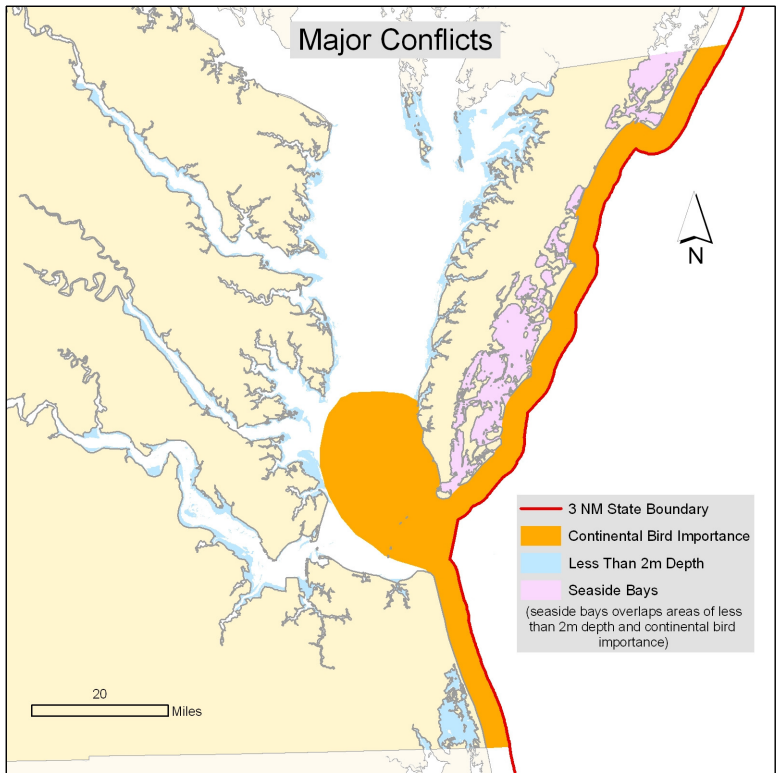


Figure 4. Combined Data Layers for Major Conflict Areas.

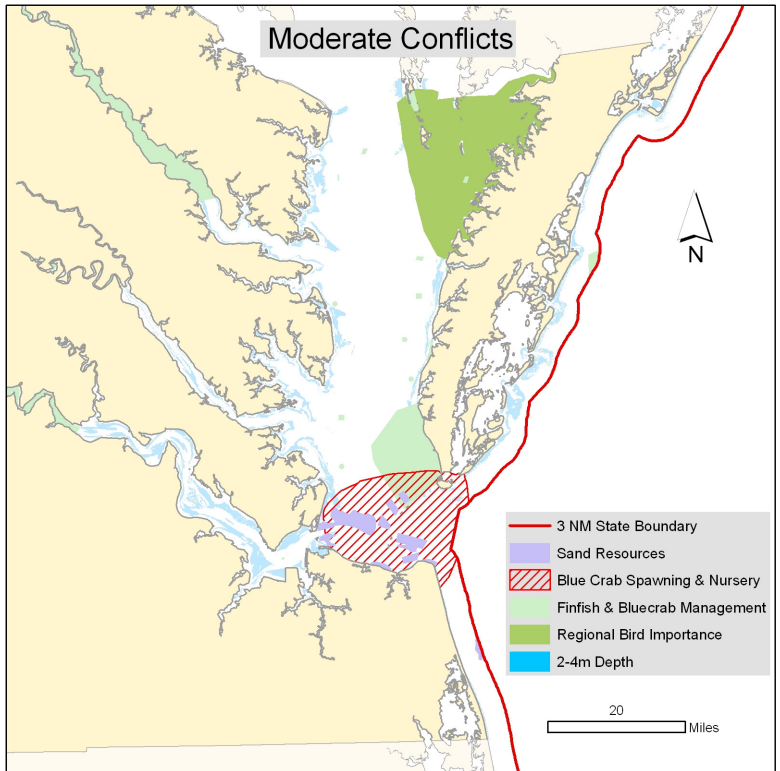


Figure 5. Combined Data Layers for Moderate Conflict Areas.

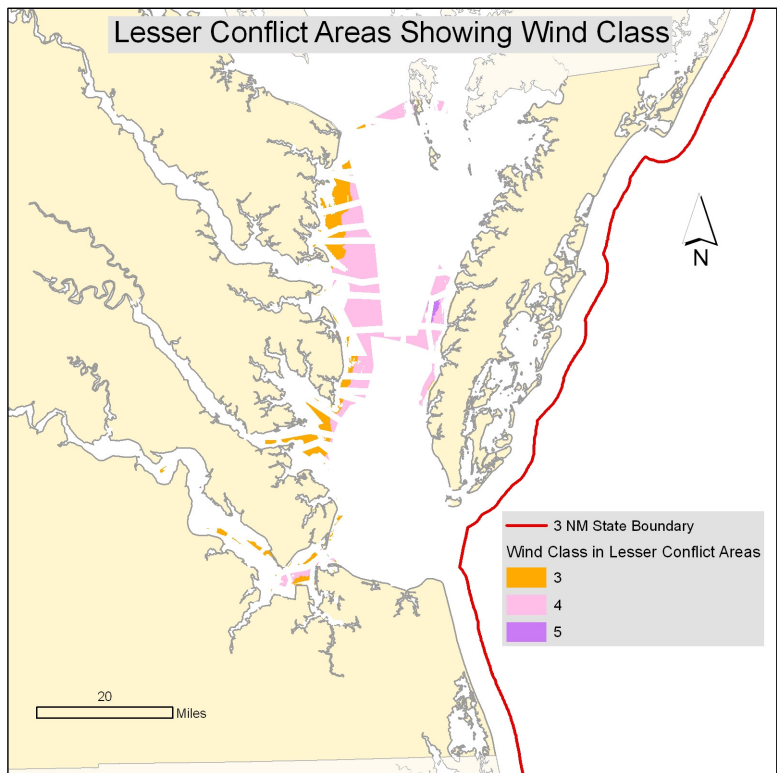


Figure 6. Wind Classes in Lesser Conflict Areas.

The information shown in these maps was derived from the Virginia Coastal Zone Management Program; Coastal Geospatial and Educational Mapping System (Coastal GEMS), VMRC data and information, map products produced for VCERC by JMU and information provided by Ad-Hoc workgroup participants including but not limited to VIMS, Corps of Engineers, the Department of Game and Inland Fisheries, the Department of Historic Resources and the College of William & Mary/Virginia Commonwealth University Center for Conservation Biology.

FINDINGS, PERMIT AND LEASE PROCESS RECOMMENDATIONS

While there may very well be areas in state waters that are potentially suitable for development of wind projects it is unlikely there will be large areas with suitable wind resources for large industrial scale projects, nor does it appear the electrical distribution system is adequate for large projects except in the Virginia Beach area. In fact, based on analysis by VCERC it appears the best opportunities for large scale wind projects are most likely available in the Atlantic Ocean beyond Virginia's three nautical mile territorial sea east and south of the Chesapeake Bay entrance. This is further reinforced by the fact that two proposals have been submitted to the Minerals Management Service (MMS) for leases in federal waters off of Virginia Beach. With that said, however, it has been suggested by participants in this assessment that there may be opportunities in State waters for community scale projects and possible research activities for turbine and tower design. As such, it is anticipated that this assessment may help guide such development through the identification of resource and use conflicts that will need to be considered.

To that end, the existing Joint Permit Review process could possibly be utilized by VMRC for consideration of community scale wind development projects on State-owned submerged lands. This is a public interest review process that utilizes the Joint Permit Application (JPA) that has been developed in conjunction with the Corps of Engineers, DEQ and Local Wetlands boards. With the submittal or development of necessary information for a given site this process has been utilized to review projects such as the Chesapeake Bay Bridge and Tunnel expansion and the recent natural gas pipeline crossing under Hampton Roads as well as other large facilities. In conjunction with the Corps, necessary information could, however, require the development of an Environmental Assessment or Environmental Impact Statement consistent with National Environmental Policy Act (NEPA) requirements. This process could also apply to any structures VCERC may wish to place in a 100 acre research site. While VCERC has not identified a specific location for a research area they would like the Commission to designate, a desire has been expressed to establish a site in Hampton Roads close to existing industrial facilities and near industrial developed shorelines. The map included in **Appendix D**, shows the Hampton Roads area from the Hampton Roads Bridge Tunnel to the James River Bridge. Although, much of the area is dedicated to shipping channels and anchorages there are some areas that are not designated as Baylor Grounds or occupied by private shellfish lease. One such location in this area appears to be near the north island of the Monitor Merrimack Memorial Bridge-Tunnel. A portion of the submerged land in this area, however, was granted to the City of Newport News in 1958 by the

General Assembly. Therefore, placement of a structure, such as a research turbine, in that area would depend on acceptance by the City and the approval of various permits including authorization from the Corps of Engineers, as well as the consideration of air traffic in the area, especially for aircraft approaching and departing from Chambers Field at the Norfolk Naval Base.

Although the maps in this report depict areas with lesser and moderated potential for resource and use conflicts associated with possible wind energy projects the areas should not be considered for leasing until this assessment is subjected to a complete public interest review. In addition, before any areas are considered for leasing, and if leases are desired in addition to the use of the existing Joint Permit Application process for VMRC permit authorization, the following specific lease procedure steps should be considered.

Lease procedures should include (but not necessarily be limited to) the following:

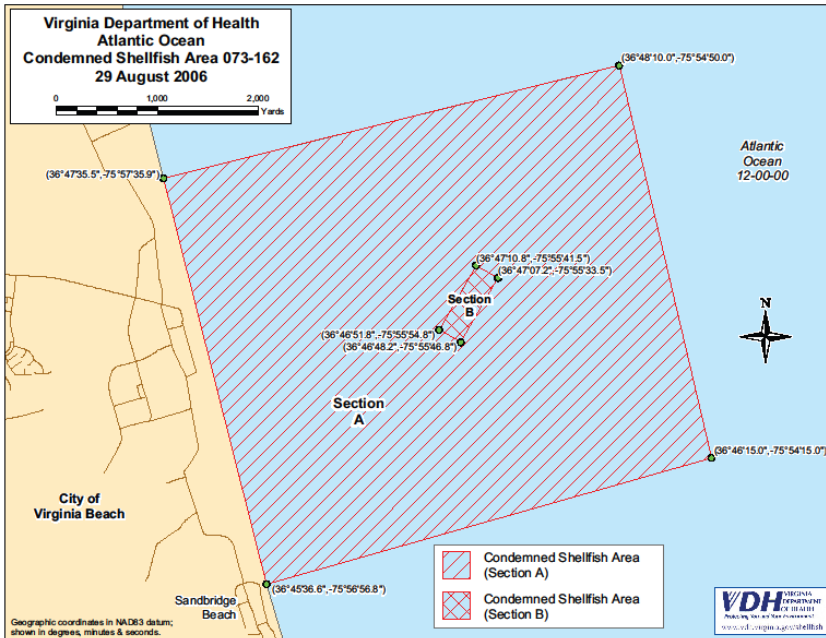
- Process for a lease request or bids
- Establish qualifications to request a lease
- Opportunity for public comment for a requested lease including provisions for local government input
- Possible procedures for approving a research lease and for establishing a research period (five years?)
- Identification of specific information that will need to be acquired prior to final lease issuance or acquired during the possible research period, and which should be considered for any permit review, depending on the site selected, such as:
 - Specific wind resource assessment
 - Benthic assessment
 - Fishery and/or Essential Fish Habitat assessment
 - Fishing activity assessment
 - Marine mammal and sea turtle assessment
 - Marine and coastal bird assessment
 - Threatened and endangered species assessment
 - Sediment and geo-technical assessment
 - Cultural/historic assessment
 - Tidal current and sediment movement
 - Development of a specific site plan for permitting
 - Interconnection agreement
 - Identification of the cable route to shore
 - Decommissioning plan
- Procedure for acceptance of bids and establishment of lease rates
- Procedures for public hearings before a final lease is authorized

Acknowledgement:

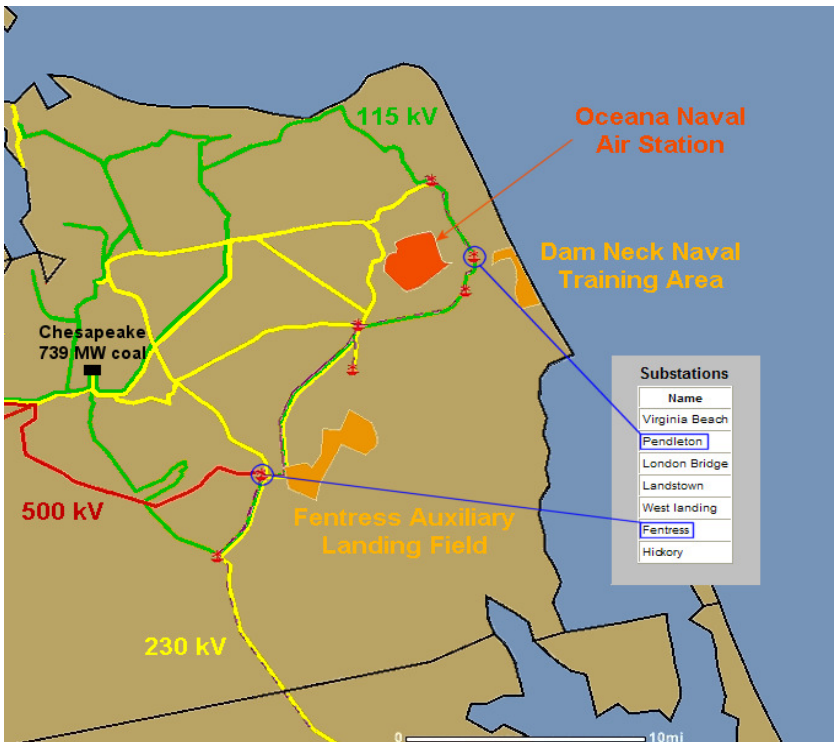
The information included in the maps was provided by James Madison University (JMU) based on their work in association with the Virginia Coastal Energy Research Consortium (VCERC), The Virginia Coastal Zone Management (CZM) Program and/or other agencies and organizations that participated in the Ad-Hoc advisory workgroup process. The maps were assembled and created by Nick Meade of the Virginia CZM Program with assistance of Remy Loursen of JMU unless otherwise noted. As such, we are grateful for the efforts of JMU and the Virginia CZM Program and especially for the support of the Manager of the Virginia CZM Program, Laura McKay.

Appendix A.

Potential Transmission Corridor from Offshore Wind Facilities



Department of Health Condemned Shellfish Area map.
<http://www.vdh.state.va.us/EnvironmentalHealth/shellfish/closure/cond073-162.pdf>



Electrical transmission system facilities in the south Hampton Roads Area. Map provided by the City of Virginia Beach.

Appendix B.

Potential Resource and Use Conflicts

Offshore Wind Energy
Possible
Lease Conflict Issues

Use Conflicts

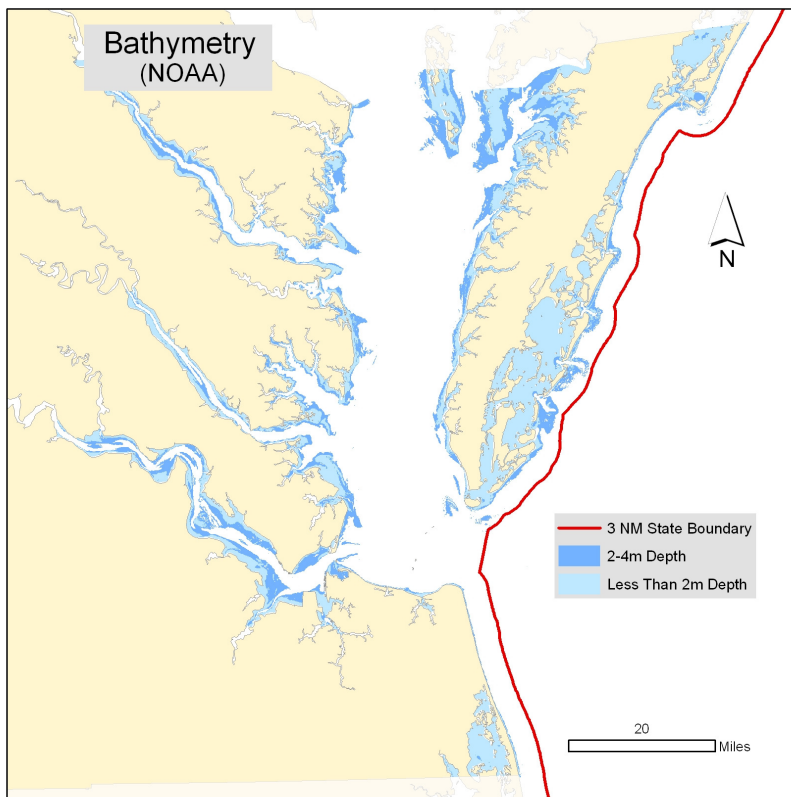
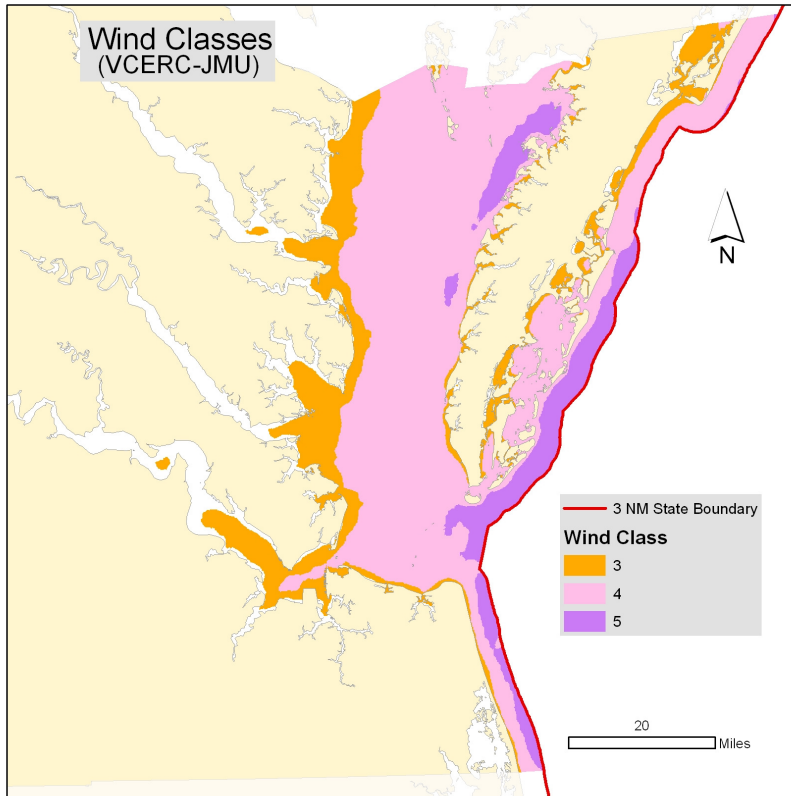
- Navigation
- Recreation
- Military operations/training/security
- Recreational fishing (security zone)
- Commercial fishing (gear/use restriction)
- Fishing Reefs
- Sand dredging for beach nourishment
- Shell mining for oyster restoration
- Local government zoning and viewshed issues
- State Parks, National Parks/Seashore and National Wildlife Refuge management

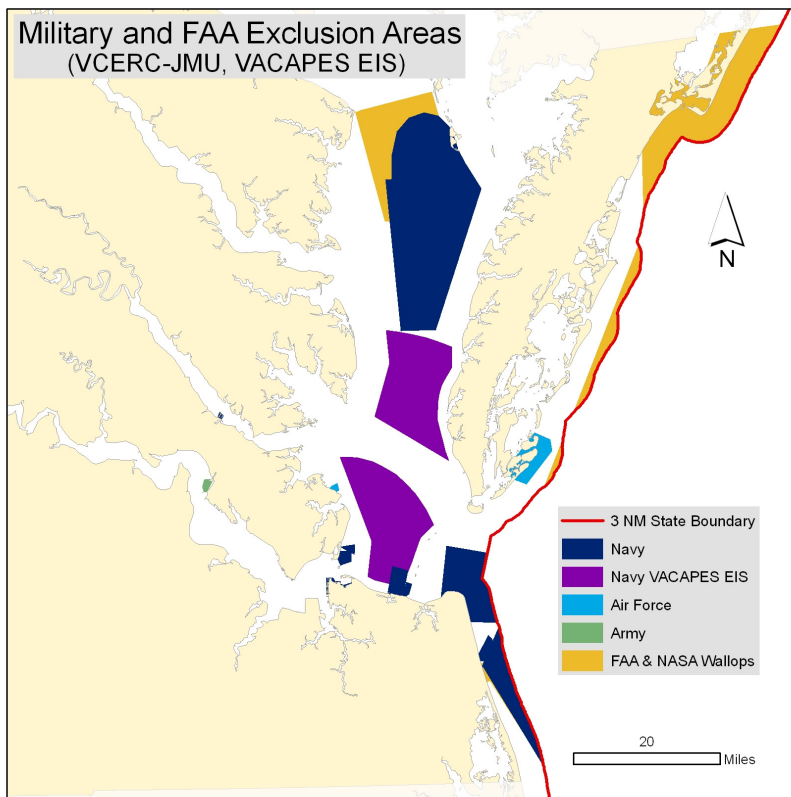
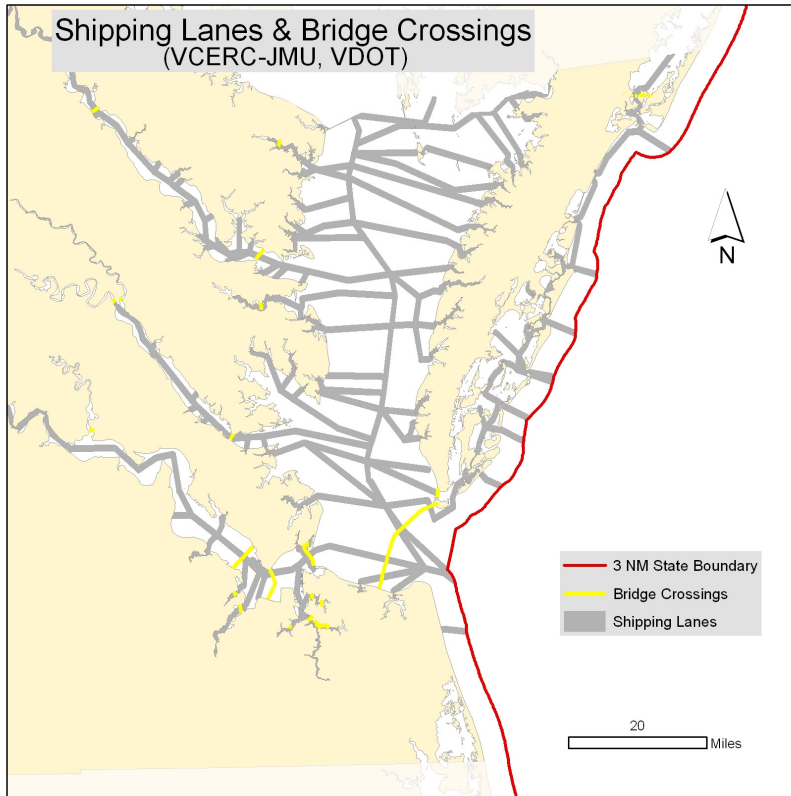
Resource Conflicts

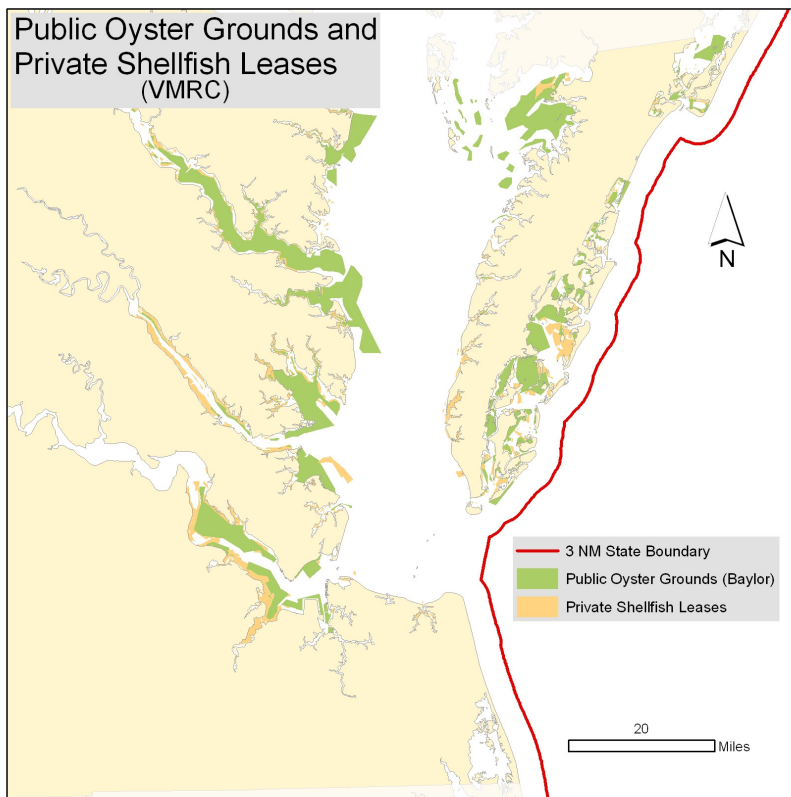
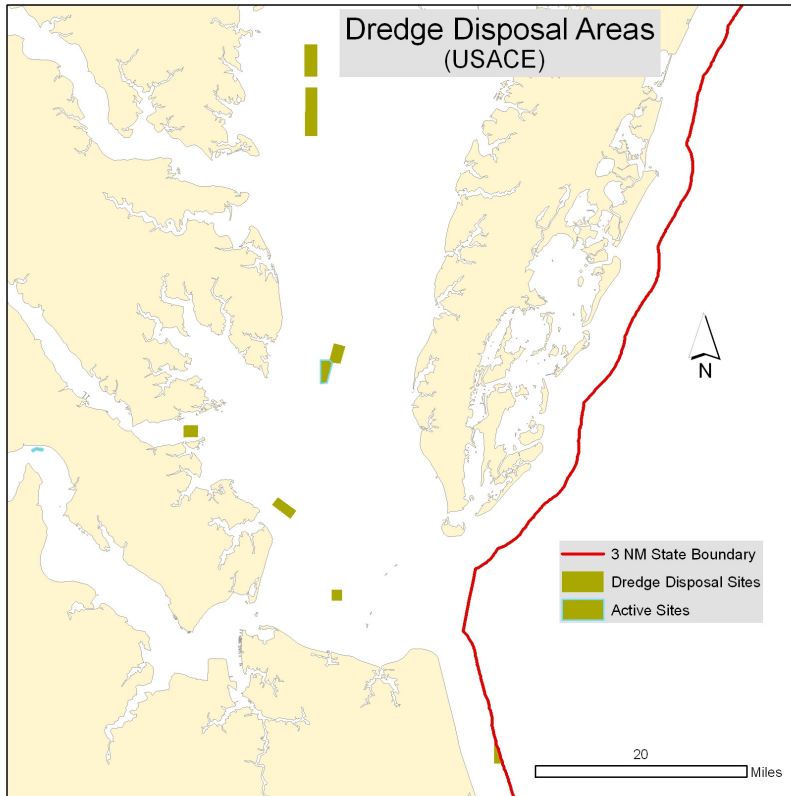
- Fisheries (finfish and blue crabs)
 - Habitat and migration issues
- Shellfish
 - Baylor grounds and other public shellfish grounds
 - Private shellfish leases
- Marine mammals
- Sea turtles
- Avian species
 - Habitat and migration issues
- Shallow water habitats
- Benthic resources
- Cultural and Historic resources

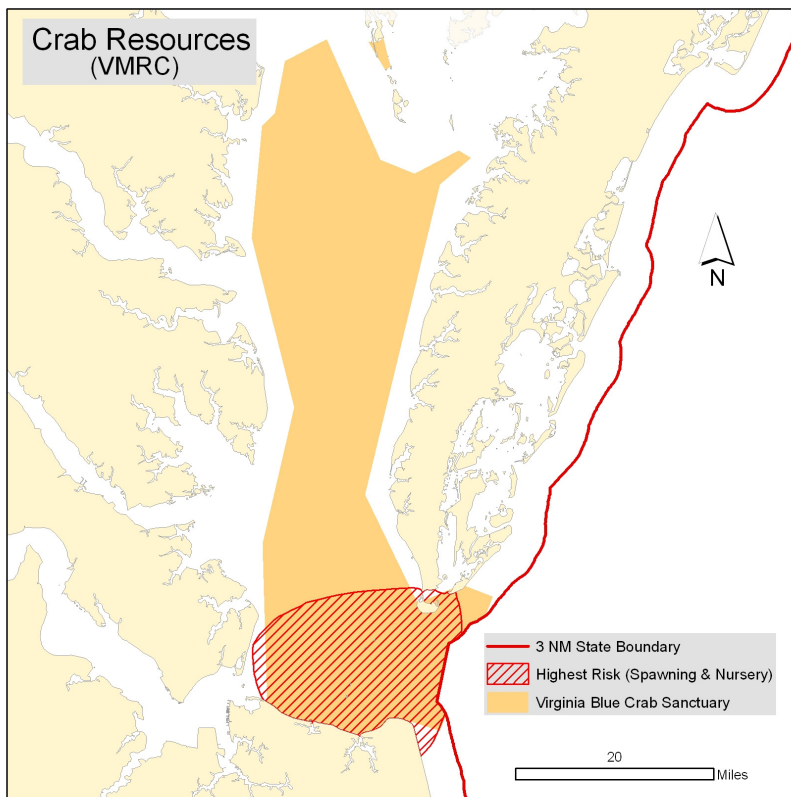
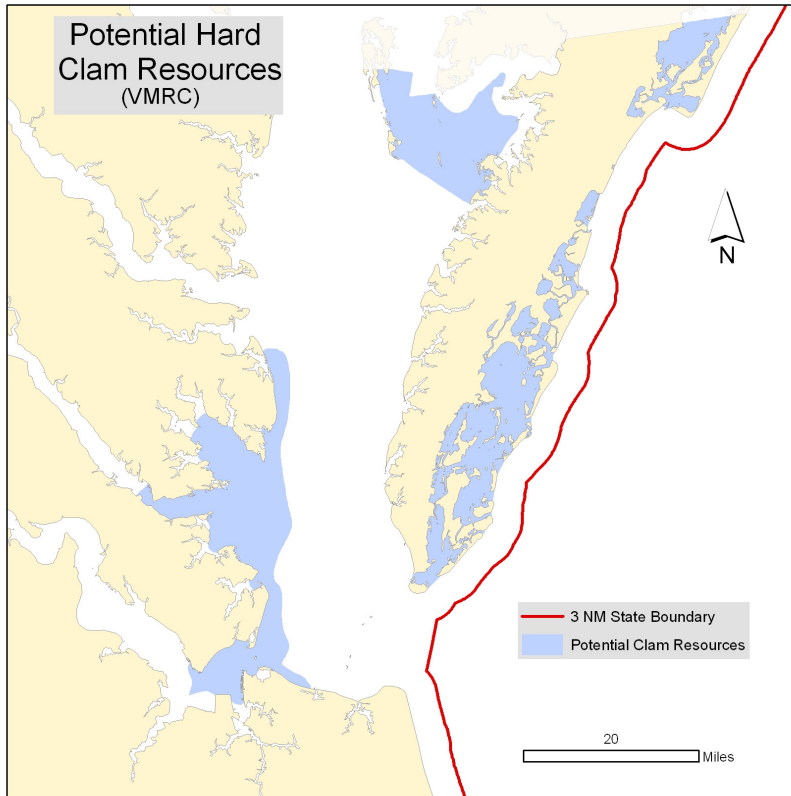
Appendix C.

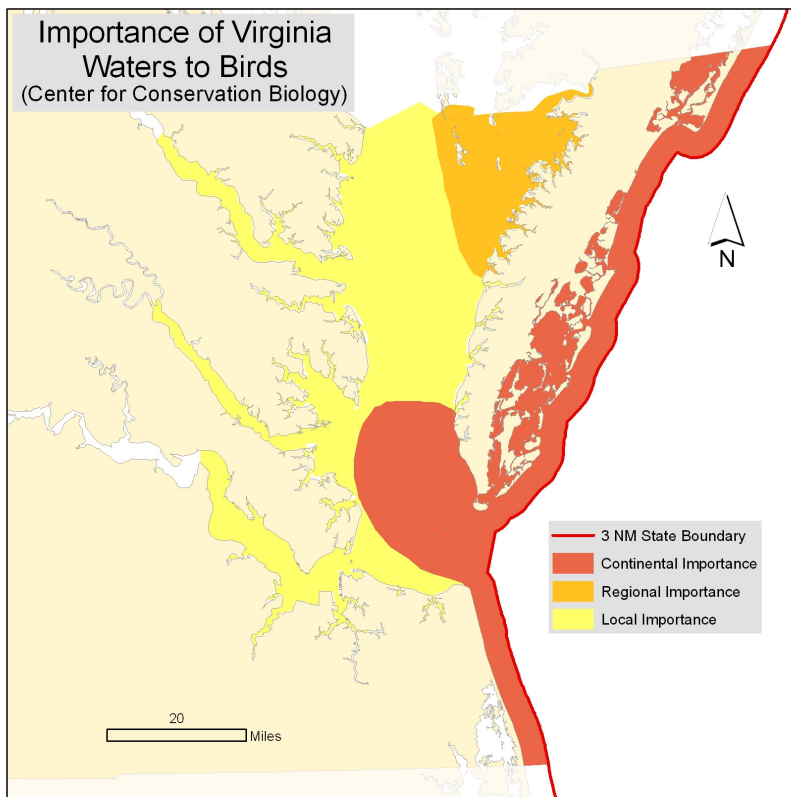
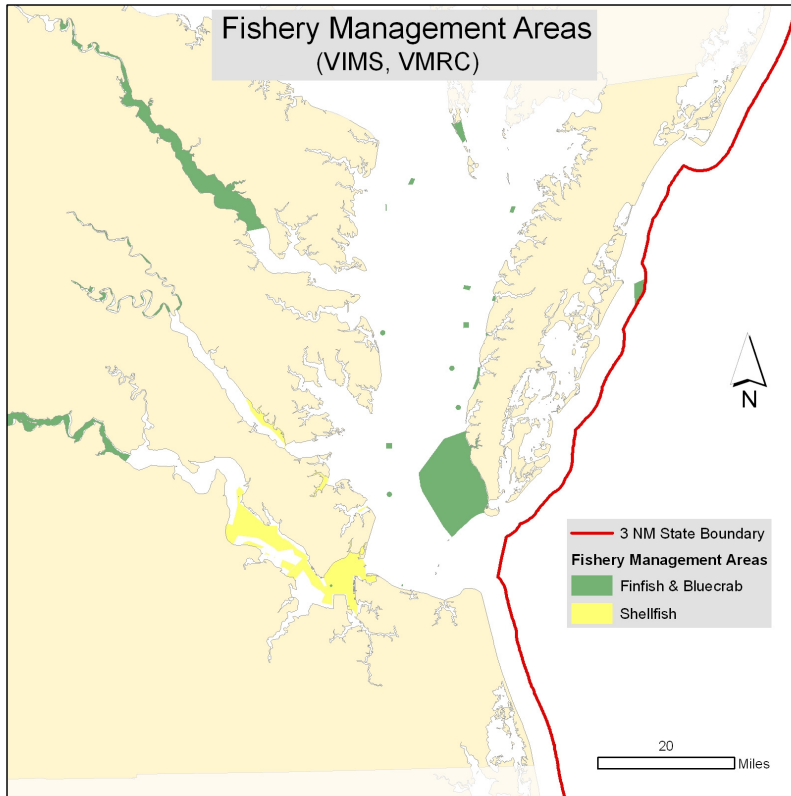
Individual Data Layer Maps

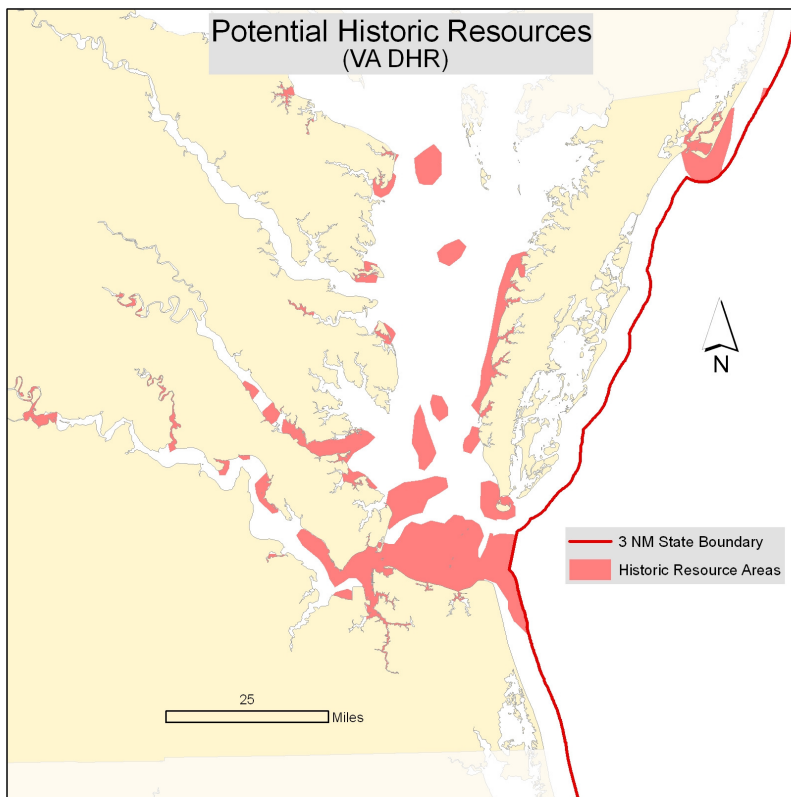
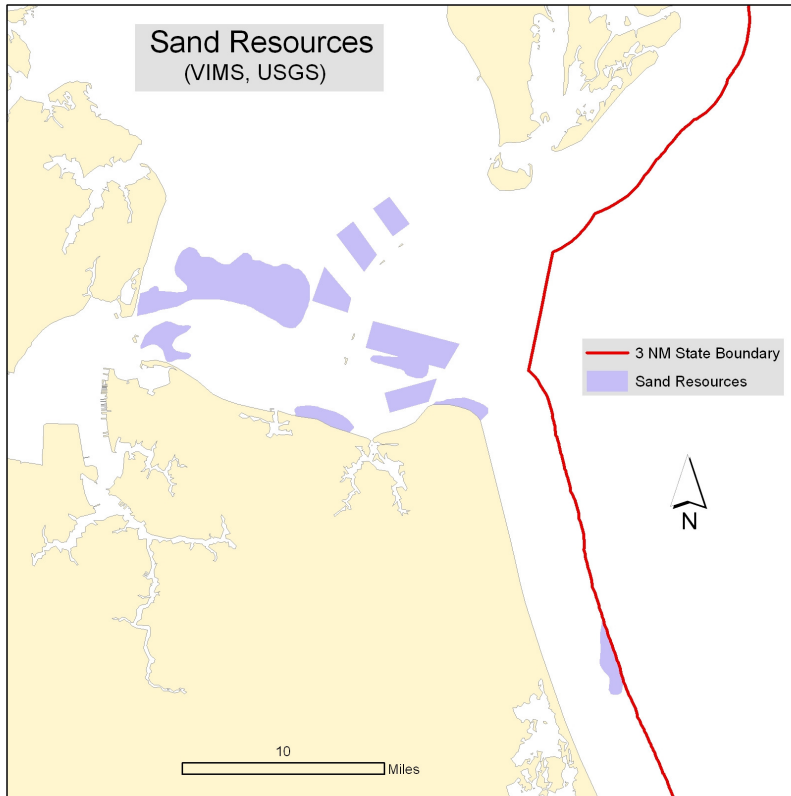






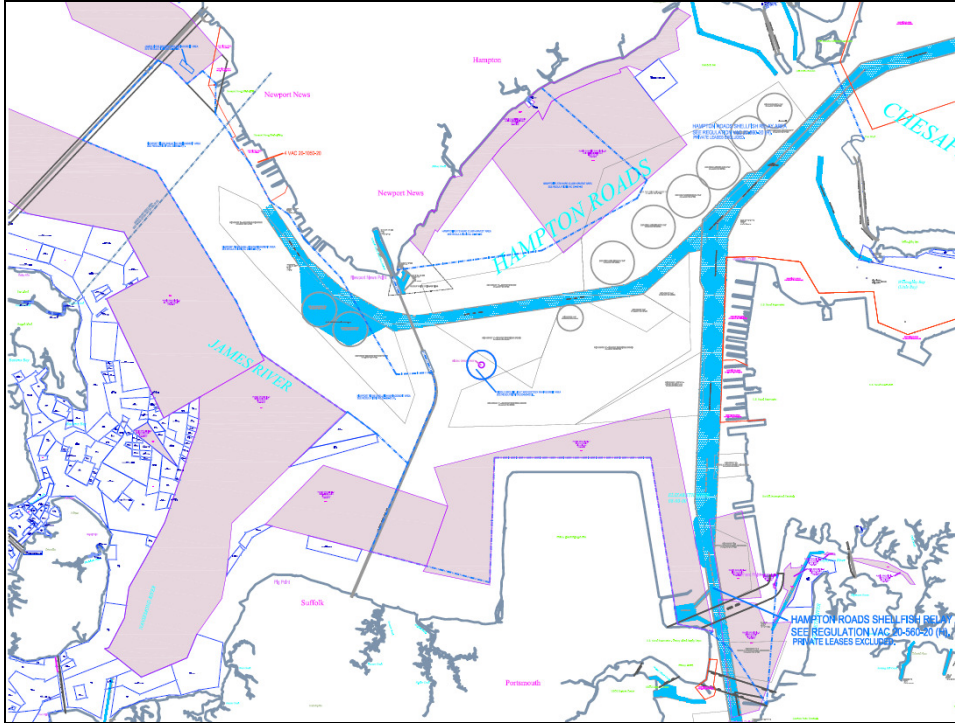




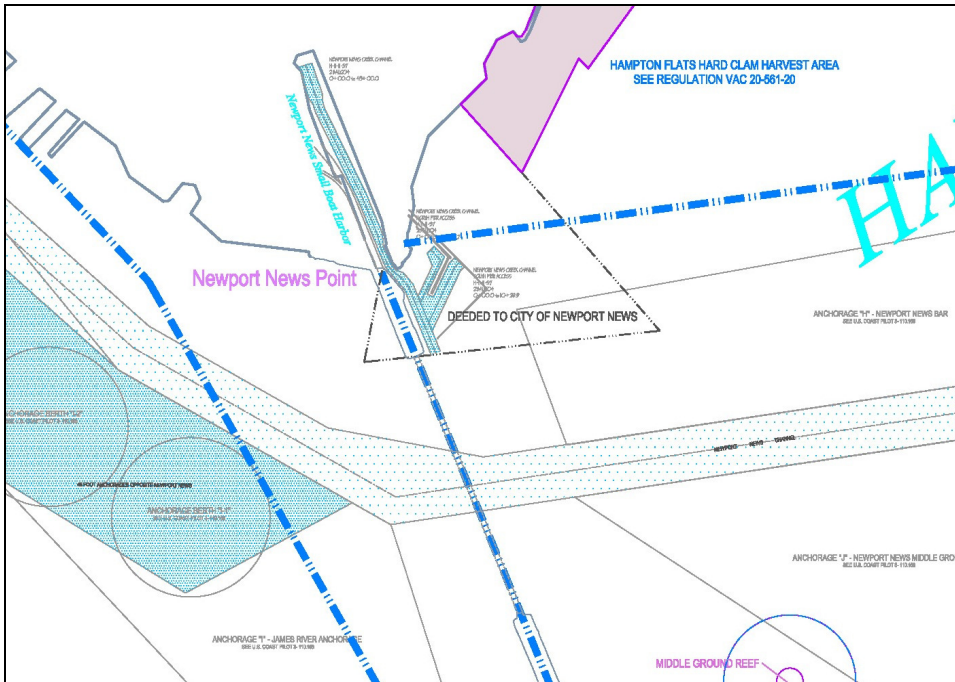


Appendix D.

Hampton Roads Area Map



Hampton Roads area from the James River Bridge to the Hampton Roads Bridge-Tunnel. Map prepared by VMRC Engineering and Surveying Department.



Hampton Roads area adjacent to Newport News Point and North Island of the Monitor Merrimac Memorial Bridge-Tunnel. Map prepared by VMRC Engineering and Surveying Department.

