UNITED STATES COAST GUARD

Port Access Route Study (PARS): Approaches to the Chesapeake Bay, VA

Final Report

Docket Number USCG-2019-0862

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A. Executive Summary

The Port Access Route Study (PARS) analyzed navigation routes to/from the Chesapeake Bay, VA, to the proposed fairways outlined in the Shipping Safety Fairways along the Atlantic Coast Advanced Notice of Proposed Rulemaking (ANPRM) and international routes to/from the United States. The Fifth Coast Guard District considered and assessed current capabilities and planned improvements to handle maritime conveyances in this report. We considered public comments on the draft report before submitting this final report of study to Coast Guard Headquarters for potential rulemaking and international resolution.

The study considered whether existing or additional routing measures or shipping safety fairways are adequate or require modification(s) to improve navigation safety due to factors such as planned or potential offshore development, current port capabilities and planned improvements, increased vessel traffic, changing vessel traffic patterns, weather conditions, or navigational difficulty. Vessel routing measures aim to reduce the risk of casualties and include, among others, traffic separation schemes (TSS), two-way routes, recommended tracks, deepwater routes, precautionary areas, and areas to be avoided. Appendix A contains a complete list of routing measures and their definitions. In addition, this study considers whether existing safety zones, security zones, or regulated navigation areas should be modified or new ones established.

The study area extends approximately 220 nautical miles seaward of the Chesapeake Bay, between Ocean City, Maryland and Cape Hatteras, North Carolina.

The report recommends a combination of proposals including a precautionary area, as defined by the International Maritime Organization (IMO), connector fairway and modifications to the ANPRM fairways. Figure A.1 illustrates these proposals. Conclusions contained in Section F provide supporting analysis and a more detailed assessment of these recommendations and other alternatives assessed. Following a 30-day comment period on the draft report, the Fifth Coast Guard District reviewed all comments submitted to the record. A list of comments and brief description of changes impacted in the final report are now included in Section G. Additional changes to the report are indicated in *italicized type.* These recommendations seek to improve the marine transportation system and promote safe navigation, reconciling vessel activity with other waterway uses.

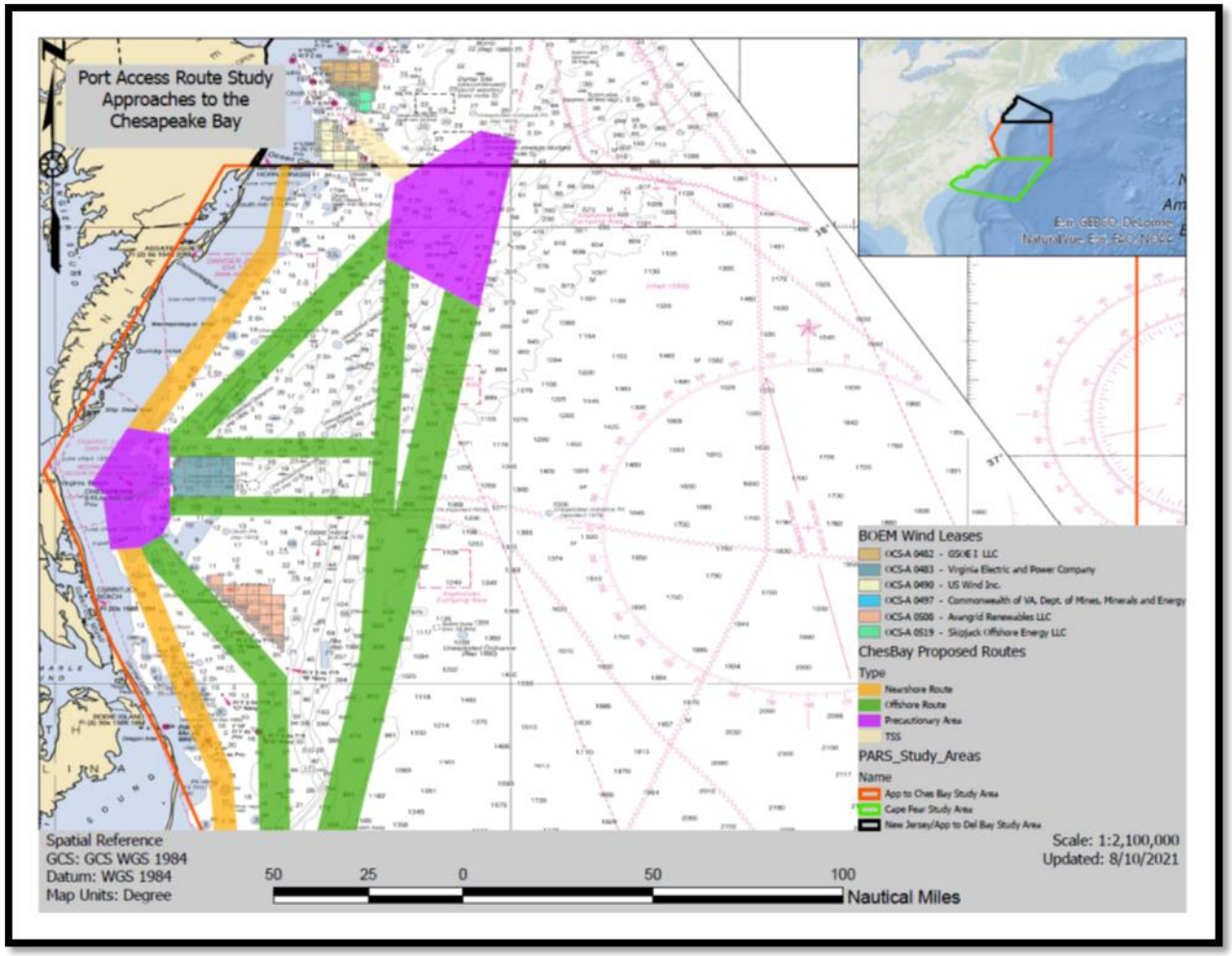

Figure A.1 – Final proposed changes to routing measures and fairways in the study area

B. Purpose and Authority

Under Section 70003 of Title 46 of the United States Code, the Commandant of the Coast Guard may designate necessary fairways and traffic separation schemes (TSSs) to provide safe access routes for vessels proceeding to and from U.S. ports. The designation of fairways and TSSs recognizes the paramount right of navigation over all other uses in the designated areas.

Before establishing or adjusting fairways or TSSs, the Coast Guard must conduct a PARS, i.e., a study of potential traffic density and the need for safe access routes for vessels. Through the study process, the Coast Guard must coordinate with federal, state, and foreign governmental agencies (as appropriate) and consider the views of maritime community representatives, environmental groups, and other interested stakeholders. The primary purpose of this coordination is, to the extent practicable, to reconcile the need for safe access routes with other reasonable waterway uses, such as the construction and operation of renewable energy facilities, and other uses of the waters within the study area.

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C. Background

Area of Analysis

Figure C.1 is the study area, an area bounded by a line connecting the following geographic positions:

38°16′ N,	71°16′ W;
35°19′ N,	71°16′ W;
35°19′ N,	75°21′ W;
36°56′ N,	76°03′ W;
38°16′ N,	75°16′ W.

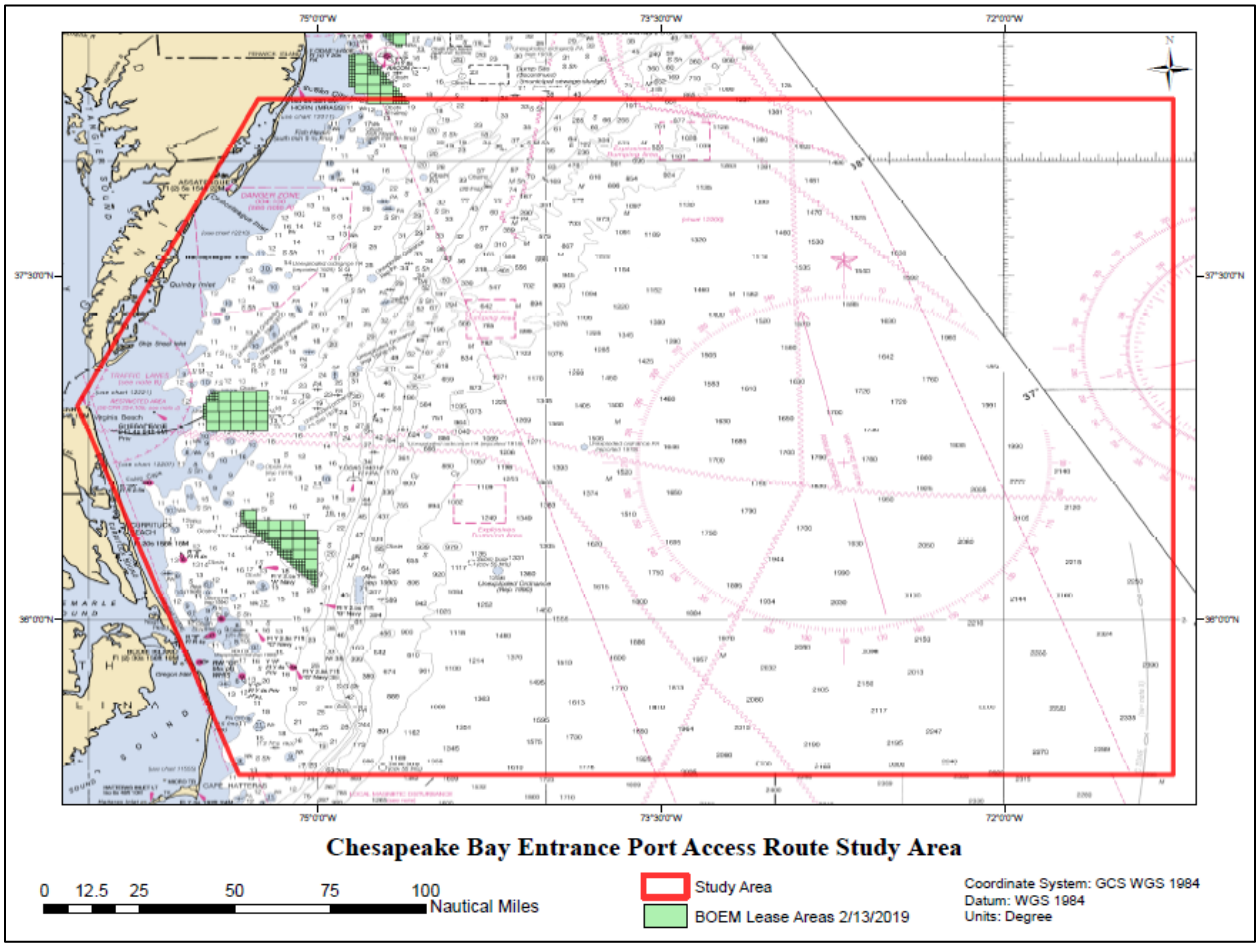

Figure C.1

Previous Studies

The Coast Guard last studied the approaches to the Chesapeake Bay, VA in 2002, and published a Port Access Route Study. See 69 Fed. Reg. 3869 (Jan. 27, 2004). The study, conducted in response to the slow continuous southward movement of the Nautilus Shoal, primarily examined the location of the Eastern Approach TSS to determine a location that would better accommodate vessels. The study[1] recommended modifying the TSS to accommodate vessels drafting 42' or more avoiding the shoal to the north, and that an anchorage area be established. These recommendations were later implemented.

In 2016, the Coast Guard published a Notice of Study for the Atlantic Coast Port Access Route Study (ACPARS) (81 Fed. Reg. 13307 (March 14, 2016)). The ACPARS analyzed Atlantic Coast waters seaward of existing port approaches within the U.S. Exclusive Economic Zone and announced the report as final in 2017. See final report, 82 Fed. Reg. 16510 (April 5, 2017). This multi-year study[2] began in 2011, included public participation, and evaluated potential navigational safety risks associated with developing offshore renewable energy installations (OREI). The ACPARS identified navigation safety corridors along the Atlantic Coast necessary to ensure safe navigation (see figure C.2). The ACPARS identified deep draft routes for navigation and recommended that they have priority consideration over other uses consistent with the United Nations Convention of the Law of the Sea. The ACPARS also identified coastal navigation routes and safety corridors of an appropriate width for seagoing tows, and clarified the necessary sea space for vessels to maneuver in compliance with the International Regulations for Preventing Collisions at Sea (COLREGS) that led to the development of Coast Guard Marine Planning Guidelines.[3] The ACPARS did not consider detailed navigation routes to or from ports or international routes destined for the United States that are integral to a safe and efficient transportation infrastructure.

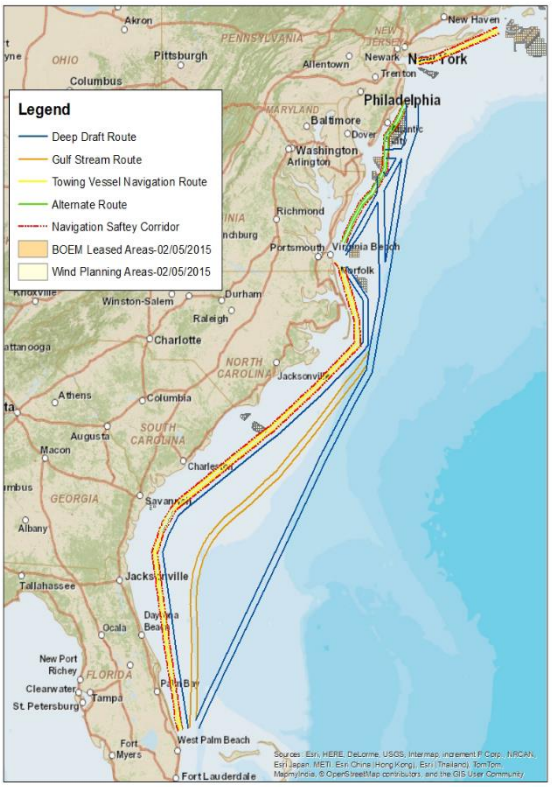

Figure C.2

[1] U.S. Coast Guard. *Chesapeake Bay PARS*, 2002.
[2] U.S. Coast Guard. *Atlantic Coast PARS*, 2017.
[3] U.S. Coast Guard. *Marine Planning Guidelines*, 2019.

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2021

In 2019, the Coast Guard announced a new study of routes used by ships to access ports on the Atlantic Coast of the United States. See Port Access Route Study, 84 Fed. Reg. 9541 (March 15, 2019). This new study of routes supplements and builds on the ACPARS by concentrating on the navigation routes to and from U.S. ports, and their interconnectedness to the Atlantic Coast routes. As part of the new study, the Coast Guard will conduct several PARS to examine East Coast ports that are economically significant and/or support military operations or critical national defense. This study, supplemental to the ACPARS, examines the approaches to the Chesapeake Bay, Virginia, and the interconnectedness to the Atlantic Coast routes.

In 2020, the Coast Guard published an ANPRM (85 Fed. Reg. 37034 (June 19, 2020)) seeking public comment regarding the possible development of the navigation safety corridors identified in the ACPARS into shipping safety fairways. The rulemaking relates to this study in that it intends to implement the recommendations of the ACPARS, which this study supplements. Any routing measures proposed by this study may lead to future rulemakings or appropriate international agreements.

Study Methodology

This study was conducted in accordance with Appendix D of the Coast Guard's Marine Planning to Operate and Maintain the Marine Transportation System (MTS) and Implement National Policy, Commandant Instruction 16003.2B.

Consultations and Outreach Efforts

Throughout this study, the Coast Guard coordinated with other governmental agencies and considered the views of maritime community representatives, environmental groups, and interested stakeholders.

Prior to announcing the study and with the intent to aid public review and participation, the Fifth Coast Guard District worked with the Mid-Atlantic Regional Council on the Ocean to make the study area available on the Mid-Atlantic Ocean Data Portal at http://portal.midatlanticocean.org/visualize/.

On November 14, 2019, the Coast Guard attended a roundtable discussion hosted by the Virginia Maritime Association to discuss the upcoming study. Attendees included representatives from the Virginia Maritime Association, the Virginia Pilots Association, Maersk Line Limited, the Port of Virginia, U.S. Navy Fleet Forces Command, U.S. Army Corps of Engineers, and the National Oceanic and Atmospheric Administration.

The Coast Guard published a notice of study and request for comments in the Federal Register on November 27, 2019. See 84 Fed. Reg. 65398. In the announcement, commenters were asked to address impacts to navigation in the approaches to the Chesapeake Bay resulting from factors such as planned or potential offshore development, current port capabilities and planned improvements, increased vessel traffic, changing vessel traffic patterns, weather conditions, or

navigational difficulty. Table C.1 provides an overview of the comments received, as well as the Coast Guard's response where appropriate.

Comment	**Coast Guard Response**
Comments of general support or dissatisfaction:	
The Virginia Department of Mines, Minerals and Energy supports current wind energy areas and future expansion potential.	
The Virginia Department of Mines, Minerals and Energy requested a public meeting.	The agency withdrew their request after the Coast Guard explained additional outreach conducted via a Marine Safety Information Bulletin and Local Notice to Mariners.
Comments regarding applicability of routing measures:	
Three entities (CMA CGM America, LLC, Virginia Maritime Association, and Virginia Port Authority) requested the establishment of vessel fairways to route traffic around wind energy areas.	This study identifies potential navigational conflicts and makes recommendations that aim to strike a balance between protecting safe access to the Chesapeake Bay and its ports and offshore development. The recommendations of this study may lead to future rulemakings or appropriate international agreements.
One entity (American Waterways Operators) requested the Atlantic Coast Fairways be established and finalized as recommended in the ACPARS.	In 2020, the Coast Guard published an ANPRM seeking public comment regarding the possible establishment of shipping safety fairways as per the ACPARS. This rulemaking is separate but related to the study in that it is intended to implement the recommendations of the ACPARS, to which this study supplements. Any routing measures proposed by this PARS may lead to future rulemakings or appropriate international agreements.
Comments regarding collaboration:	
The Commonwealth of Virginia requested compliance with the National Environmental Policy Act (NEPA) and	This study is academic in nature and does not impact the environment. Any future rulemaking to implement the

the completion of an Environmental Impact Statement, and offered to provide resources in support.	recommendations of this study will be completed in compliance with NEPA.
Comments regarding impacts to wildlife and environment:	
The Virginia Department of Conservation and Recreation suggested coordination with the National Marine Fisheries Service and the Virginia Department of Game and Inland Fisheries for biotic data and environmental impact of wind energy areas, and with the U.S. Fish and Wildlife Service to ensure protected species are considered and studied.	This study is academic in nature and does not impact the environment. Any future rulemaking to implement the recommendations of this study will be completed in compliance with NEPA. Environmental analysis specific to wind energy areas and their development are the responsibility of the lead federal agency, the Bureau of Ocean Energy Management (BOEM). The Coast Guard, as a cooperating agency, provides input to the BOEM during the analysis.

Table C.1

On December 2, 2019, Coast Guard Sector Virginia (previously named Sector Hampton Roads) issued Marine Safety Information Bulletin 19-301, announcing the study to approximately 1,300 subscribers, who follow their bulletins via govdelivery.com.

From December 2, 2019 through January 6, 2020, the Fifth Coast Guard District advertised the study in the Fifth District's Local Notice to Mariners which is distributed weekly to more than 5,000 subscribers, and publicly available on the Coast Guard Navigation Center's website, www.navcen.uscg.mil.

In November 2020, discussions regarding the study's assumptions were held and data analysis was shared with the following local fishing community representatives: Virginia Beach Sport Fisherman - Rick Robins; Virginia Beach Charter Boat Captain - Skip Feller; Virginia Beach Fish Dealer - Scott McDonald; and North Carolina Fisherman's Association - Brent Fulcher.

On December 7 and December 16, 2020, the Coast Guard attended roundtable discussions hosted by the Virginia Maritime Association to discuss the potential routing measures. Attendees included representatives from the Virginia Maritime Association, the Virginia Pilots Association, CMA/CGM Operations Department, the Port of Virginia, U.S. Navy Fleet Forces, U.S. Army Corps of Engineers, and the National Oceanic and Atmospheric Administration.

Over the course of the study, sections of this report were reviewed by the following port agents and military representatives: Maryland Port Administration; U.S. Navy Fleet Forces; Virginia Maritime Association; and U.S. Army Corps of Engineers.

Over the course of the study, the Coast Guard's data and analysis were reviewed and discussed with various key stakeholders. These include:
National Weather Service: Wakefield, VA – Larry Brown
Virginia Maritime Association: Norfolk, VA – Will Fediw, David White
Virginia Pilots Association - CAPT Whiting Chisman, *CAPT Frank Rabena*
Maryland Port Administration: Baltimore, MD – Brian Miller
NOAA Port Agent: Norfolk, VA – Steve Ellis
NOAA Mid-Atlantic Navigation Manager – Ryan Wartick
NOAA VMS – William Semarau
NOAA NMFS Permits – Jeannette Dudley
U.S. Fleet Forces (DoD) – Jim Casey and Joe Atangan
Responsible Offshore Development Alliance – Annie Hawkins and Fiona Hogan

No tribal consultations were conducted due to the study area's distance from known tribes.

D. Key Port and Waterway Features

This section provides an overview of key features or factors (non-environmental) that have a role in influencing or dictating the movement of vessels in the study area (e.g., current port infrastructure, capabilities and planned improvements, planned or potential offshore development, etc.).

Major Ports

The Port of Virginia

The Port of Virginia shelters the largest shipbuilding and repair industrial base, including a thriving export coal and bulk trade and the sixth largest containerized operation in the United States.[4] It is the second largest port on the East Coast by tonnage,[5] due in large part to the export of coal, and the third largest port on the East Coast[6] by container volume, with more than 2.9 million twenty-foot equivalent container units (TEU) of cargo moving through its container terminals in 2019. The port consists of over 55 public and private marine terminals,[7] with the Virginia Port Authority (VPA) operating four deep-water marine terminals, an upriver terminal and an inland intermodal terminal. Virginia's 50-foot channels and unobstructed terminal access have allowed the size of the vessels calling on the Port of Virginia to increase significantly. The Port of Virginia has authorization to dredge its shipping channels to at least 55 feet deep, with deeper ocean approaches, and widen them from 1,000 feet up to 1,400 feet in specific areas. In 2024, at 55-feet, the Port of Virginia will be the deepest port on the East Coast, and the State estimates this would bring another 1,000,000 containers to the port, increasing its capacity by 40 percent.[8]

Nearly 30 international shipping lines offer direct, dedicated service to and from Virginia, with connections to more than 200 countries around the world. In an average week, more than 40 international container, breakbulk, bulk, tanker, and roll-on/roll-off vessels are serviced at the port's marine terminals. In 2018, more than 2,500 commercial ships called on the Port of Virginia, with 2,327 calling in 2019.[9] This reduction in calls is mostly due to the increased size of vessels calling on the port, increasing efficiencies.

The VPA's container trade balance is 53 percent imports and 47 percent exports. This balance allows containers with varied products coming into Virginia to get unloaded, repacked with American-made goods and sent back overseas using the same route. Since 2010, the Port of Virginia has gone from being the fifth largest exporter on the East Coast to the second largest exporter, due to a combination of container and bulk cargoes.

[4] Morley, H. *Journal of Commerce*. 2019.
[5] U.S. Army Corps of Engineers. 2018.
[6] Morley, H. *Journal of Commerce*. 2019.
[7] Virginia Maritime Association. 2020.
[8] U.S. Army Corps of Engineers. 2017.
[9] Virginia Maritime Association. 2020.

In 2016, the Neo-Panamax vessel, *MOL Benefactor,* was the first, and largest, container ship to transit the expanded Panama Canal and call on Virginia. The arrival of that ship signaled the start of a new era at the port. Since then, calls by Neo-Panamax vessels have increased significantly in number and call on the port multiple times each week.

The Port of Baltimore

The Port of Baltimore offers the deepest harbor in the Maryland waters of the Chesapeake Bay. Closer to the Midwest than any other East Coast port, the Port in Baltimore City is within an overnight drive of one-third of the nation's population. Handling port traffic are five public and thirty private terminals, as well as seven post-Panamax cranes and four super-post-Panamax cranes. Public terminals include Dundalk, Fairfield, North Locust Point, Seagirt, and South Locust Point.

Baltimore is one of only four Eastern U.S. ports with a 50-foot shipping channel and a 50-foot container berth, allowing it to accommodate some of the largest container ships in the world. On July 19, 2016, the *Ever Lambent*, a cargo-carrier from Taiwan, was the first supersized container ship to reach Baltimore through the Panama Canal. These large vessels must transit the mouth of the Chesapeake Bay to gain access to Baltimore's port facilities.

In the first quarter of 2019, the Port of Baltimore's public terminals handled 335,638 tons of roll-on/roll-off cargo, a 32.5 percent increase from the same period in 2018. In the second quarter, the port set a new record for moving 2,873,392 tons. In March 2019, the port set multiple records for handling the most cargo in a month, including 1,018,274 general cargo tons; 95,862 TEU containers; 96,535 tons of roll-on/roll-off cargo tons, the most since June 2012; and 59,052 vehicles, the best March for autos and light trucks.

In 2018, the Port of Baltimore handled a record 42.9 million tons of international cargo, valued at $59.7 billion, up from 38.2 million tons and $53.9 billion in 2017. In 2019, the port's public terminals, eclipsing a 2018 record of 10.9 million tons, handled a record-setting 11 million tons of general cargo. For total overall dollar value of cargo, Baltimore is ranked ninth, and for international cargo tonnage, 11th. In 2018, the port ranked second in the country for exporting coal, the port's top export commodity, based on tonnage. The port's coal exports had a record year in 2018, surpassing 21.5 million tons.

In 2021, Tradepoint Atlantic (formerly Bethlehem Steel at Sparrows Point, Maryland) signed a long-term lease with U.S. Wind to provide manufacturing of wind turbine monopiles to support the Maryland OREI.[10]

Military Installations

The implementation of routing measures or fairways will not significantly impact military installations or operations within the study area.

[10] Found at https://baltimore.cbslocal.com/2021/08/03/sparrows-point-wind-steel-tradepoint-atlantic/.

U.S. Navy (USN)

Naval Station Norfolk

Naval Station Norfolk and its regional Hampton Roads Navy and Marine Corps installations is home to the United States Fleet Forces Command (USFF). USFF trains, certifies, and provides combat ready Naval forces to combatant commanders worldwide in support of U.S. national interests. Norfolk Naval Station is the world's largest naval base and hosts the USN's greatest concentration of maritime forces, including 75 ships alongside 14 piers, and 134 tactical aircraft and 11 hangers at the co-located Chambers Field Naval Air Station. Naval Station Norfolk's Port Services Division annually controls over 3,100 ship movements in support of overseas logistics requirements for deployment to the European, Central, and Southern Command area of operations.

Naval Air Station Oceana

Naval Air Station (NAS) Oceana is home to all Navy East Coast Strike-Fighter Airwings, consisting of 16 squadrons and over 180 tactical aircraft. Assigned units train and operate throughout the Virginia Capes Operating Area (VACAPES OPAREA). Events include air combat maneuvers, anti-submarine warfare training, mine countermeasures training, and a wide range of weapons employment, to include live and inert ordnance delivery from both fixed wing and rotary wing aircraft.

Joint Expeditionary Base Little Creek-Fort Story

Joint Expeditionary Base Little Creek–Fort Story (JEBLCFS) was created by combining U.S Army Post Fort Story and Naval Amphibious Base Little Creek. JEBLCFS is the major operating base for the amphibious forces in the USN's Atlantic Fleet. JEBLCFS offers a unique combination of features, including dunes, beaches, sand, surf, deep-water anchorage, variable tide conditions, maritime forest and open land. This provides a prime location and training environment for both Army and Navy amphibious operations and Joint Logistics-Over-the-Shore training events.

U.S. Coast Guard

Several different Coast Guard commands and assets conduct operations in the study area. Commander, Fifth Coast Guard District, and Commander, Coast Guard Atlantic Area, and their staffs, including 24-hour command center personnel, are located in the Portsmouth Federal Building in Portsmouth, Virginia.

Coast Guard commands and assets in proximity to, and which conduct operations within the study area are as follows:

Commander, Coast Guard Atlantic Area

Seven 270' medium endurance cutters are currently homeported in Portsmouth, Virginia with an additional two scheduled to arrive summer 2021.

- USCGC BEAR
- USCGC SENECA
- USCGC HARRIET LANE
- USCGC FORWARD
- USCGC TAMPA
- USCGC LEGARE
- USCGC NORTHLAND
- USCGC ESCANABA (arriving 2021)
- USCGC SPENCER (arriving 2021)

Two 210' medium endurance cutters are located at Joint Base Little Creek in Virginia Beach, Virginia.

- USCGC VIGOROUS
- USCGC DEPENDABLE

Commander, Fifth Coast Guard District

Aid to Navigation Cutters and Construction Tenders homeported within the study area include:

- USCGC FRANK DREW – Portsmouth, Virginia
- USCGC KENNEBEC – Portsmouth, Virginia
- USCGC SLEDGE – Baltimore, Maryland
- USCGC JAMES RANKIN – Baltimore, Maryland
- USCGC WILLIAM TATE – Philadelphia, Pennsylvania

Sentinel-class 154-foot fast response cutters that operate within the study area, yet are homeported outside the area include:

- USCGC NATHAN BRUCKENTHAL – Ft. Macon, North Carolina
- USCGC RICHARD SNYDER – Ft. Macon, North Carolina
- USCGC ANGELA MC SHAN – Cape May, New Jersey
- USCGC ROLLIN FRITCH – Cape May, New Jersey
- USCGC LAWRENCE LAWSON – Cape May, New Jersey

Aid to Navigation Tenders that operate within the study area, yet are homeported outside the area include:

- USCGC SMILAX – Ft. Macon, North Carolina
- USCGC MAPLE – Ft. Macon, North Carolina

Operational units known as Sectors and Air Stations are subunits of the Commander, Fifth Coast Guard District. Sector Commands oversee search and rescue stations and 87' patrol boats. Air Stations house Search and Rescue aircraft and personnel.

Sector Virginia

Sector Virginia personnel are located on Base Portsmouth and in the downtown Norfolk Federal Building. Sector Virginia sub-units include:

- Six multi-mission boat stations (Portsmouth, Little Creek, Cape Charles, Wachapreague, Milford Haven and Chincoteague, Virginia)
- Five 87' patrol boats located at Stations Little Creek and Portsmouth, Virginia
- Three Aids-To-Navigation Teams (Hampton Roads, Milford Haven and Chincoteague, Virginia)
- Sector Field Office in Chincoteague, Virginia

Sector Maryland – National Capital Region (MD-NCR)

Sector Maryland – National Capital Region (MD-NCR) personnel are located on the Coast Guard Yard in Baltimore, Maryland. Sector MD-NCR sub-units include:

- Three Aids-To-Navigation Teams (Baltimore, Crisfield, and Potomac, Maryland)
- Eight multi-mission boat stations (Annapolis, Crisfield, Curtis Bay, Stillpond, Ocean City, Oxford, St. Inigoes, Maryland and Washington D.C.)
- One 65' ice breaking tug in Baltimore, Maryland

Sector North Carolina

Sector North Carolina personnel are located in downtown Wilmington, North Carolina and Field Offices at Cape Hatteras and Fort Macon, North Carolina. Sector North Carolina sub-units include:

- Three Aids-To-Navigation Teams (Fort Macon, Oak Island, and Wanchese, North Carolina)
- Two Sector Field Offices (Cape Hatteras and Fort Macon, North Carolina)
- Eight multi-mission boat stations (Elizabeth City, Oregon Inlet, Hatteras Inlet, Hobucken, Fort Macon, Emerald Isle, Wrightsville Beach, and Oak Island, North Carolina)
- One 65' inland buoy tender

Air Station Elizabeth City

Air Station Elizabeth City personnel are located on Base Elizabeth City in Elizabeth City, North Carolina. Air Station assets include medium range MH-60 helicopters and long range C-130-J aircraft for search and rescue operations in the study area. The Atlantic Area and Fifth District Commanders direct aviation assets at the request of local Sector Commanders in support of SAR cases.

Military Operating Areas

Virginia Capes Operating Area (VACAPES)

The VACAPES OPAREA is an expansive geographic region in coastal waters offshore Maryland, Virginia, and North Carolina, and consists of specific air, surface, and subsurface operating space supporting a wide range of Atlantic Fleet and Naval Systems Command military test and training activities.

Fleet Area Control and Surveillance Facility, Virginia Capes (FACSFAC VACAPES) located at Naval Air Station Oceana in Virginia Beach, Virginia, manages the VACAPES OPAREA. FACSFAC VACAPES controls Special Use Airspace, which consists of Warning and Restricted Areas, Military Operating Areas, Air Traffic Control Assigned Airspace, and Surface and Subsurface Operating Areas. The VACAPES Complex includes the Navy's Surface Combat Systems Center (SCSC) on the Eastern Shore of Virginia and the Shipboard Electronic Systems Evaluation Facility (SESEF) located at the Navy's Joint Expeditionary Base Little Creek - Fort Story in Virginia Beach, Virginia. Both facilities support development, testing, and calibration of naval combat systems, sensors, and navigation equipment. SCSC operations include various offshore surface-to-surface and surface-to-air weapons employment, in particular, long-range missile tests. SESEF operations in sea space east of Virginia Beach, Virginia, include functional checks and measurement of shipboard tactical instrumentation systems. Accurate calibration and standardization require precise pre-planned timing, location, and uninterrupted movement of combatant vessels to complete onboard instrumentation assessments and analysis.

Navy and Marine Corps training occurs daily throughout the VACAPES OPAREA. Events and activities include small, unit-level training, as well as large, full-scale exercise and certification events consisting of Carrier and Expeditionary Strike Groups and accompanying air, surface, and submarine component tactical platforms and opposing force assets.

Testing and training throughout the VACAPES OPAREA includes a wide range of simulated, inert, and live fire weapons employment in support of all naval warfare missions and pre-deployment combat certification requirements.

Offshore Renewable Energy Installations

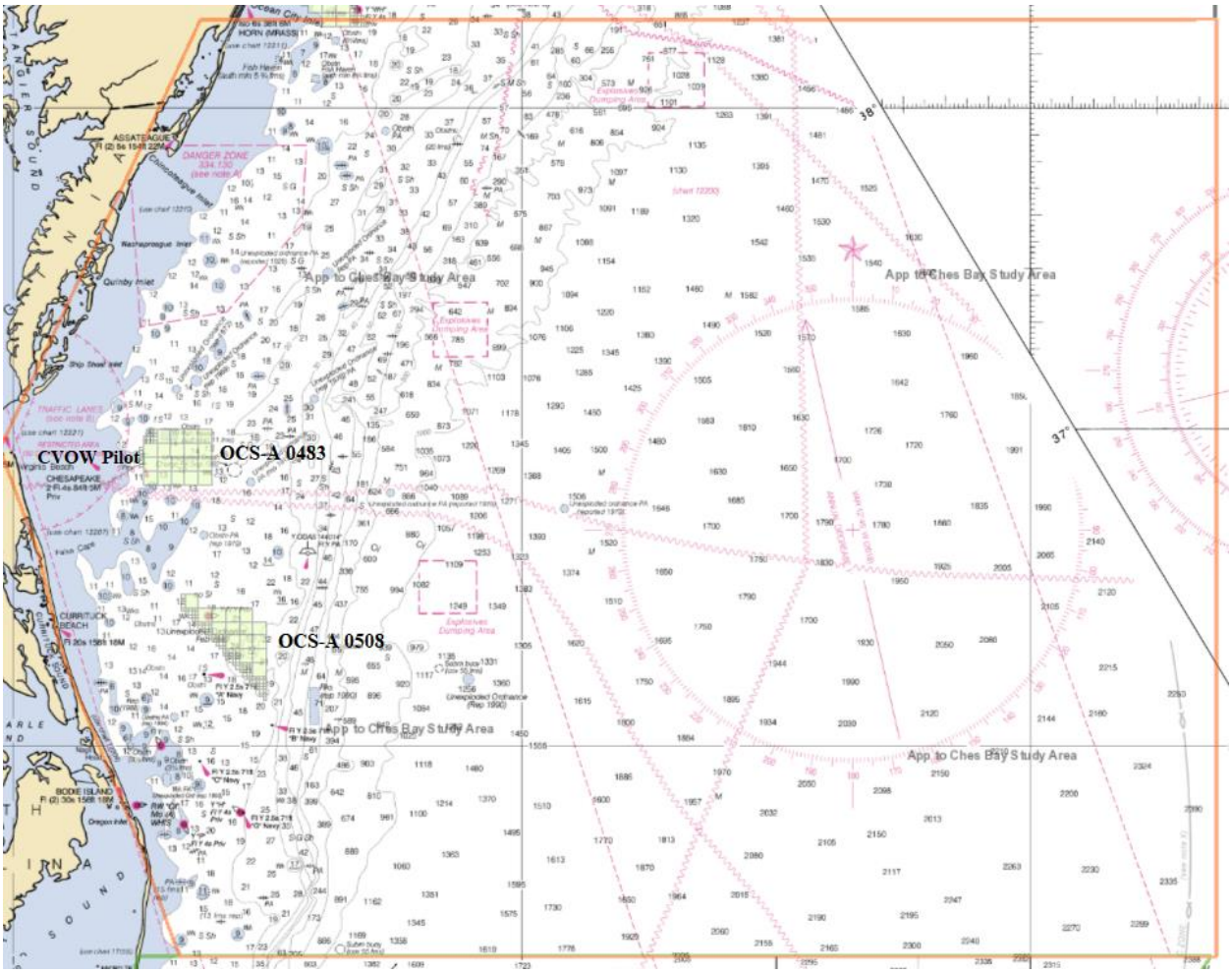

Figure D.1

Coastal Virginia Offshore Wind Pilot (CVOW Pilot)

Dominion Energy's CVOW Pilot project is the second offshore wind project in the nation, the first constructed in federal waters, and the first owned by an electric utility company. The CVOW Pilot constructed two six-megawatt wind turbines, on a site leased by the Virginia Department of Mines, Minerals and Energy (DMME), 27 miles off the coast of Virginia Beach, Virginia. In addition to the two turbines, the CVOW Pilot includes a subsea cable buried under the seabed, landing ashore through a 1,000-meter conduit installed under the beach. As of October 2020, the two turbines in the CVOW Pilot project have been installed, are operating and delivering power to the onshore electric grid. Dominion Energy is awaiting a full technical review with Bureau of Ocean Energy Management (BOEM), at which point full commercial operations will be declared.

Coastal Virginia Offshore Wind Commercial (CVOWC) – OCS-A 0483

Dominion Energy intends to build the nation's largest offshore wind farm off the coast of Virginia — a 205-turbine installation that would power 650,000 homes at peak wind. If it gains state and federal approvals, the $7.8 billion project would deliver 880 megawatts of energy by 2024 and a total of 2,600 megawatts by 2026. The turbines would be constructed on 112,800 acres that Dominion is leasing from the federal government 27 miles off the coast of Virginia Beach, Virginia.

In September 2019, Virginia Governor Ralph Northam signed Executive Order Forty-Three directing the DMME to develop a plan of action to produce one hundred percent of Virginia's electricity from carbon-free energy sources by 2050.[11] On April 12, 2020, the Clean Economy Act was signed and "establishes requirements regarding the development by Dominion Energy Virginia of qualified offshore wind projects having an aggregate rated capacity of not less than 5,200 megawatts by January 1, 2034."[12]

The CVOWC project plans installation in three phases of approximately 880MW each. Dominion Energy submitted a Construction and Operations Plan to BOEM on December 17, 2020 for sufficiency review and subsequent approval. On April 19, 2021, the Federal Permitting Improvement Steering Council posted to the Permitting Dashboard a comprehensive Federal permitting timetable for CVOWC. According to the permitting timetable, CVOWC will complete federal review and permitting in September 2023.[13] Pending regulatory approval, the first phase is expected to begin delivery of renewable energy in 2024, with additional phases coming online in 2025 and 2026.

Kitty Hawk Wind Energy Area – OCS-A 0508

On August 11, 2014, BOEM announced that it had identified three Wind Energy Areas (WEA) offshore of North Carolina. The Kitty Hawk WEA is located approximately 24 NM east of Kitty Hawk, North Carolina and extends approximately 25.7 NM in a general southeast direction.

On January 17, 2017, BOEM announced the publication of the Final Sale Notice (FSN) for a lease sale in the Kitty Hawk WEA to Avangrid Renewables, LLC, hereinafter Avangrid. On September 18, 2019, Avangrid submitted a Site Assessment Plan (SAP) for commercial wind lease OCS-A 0508. BOEM has deemed the SAP complete and sufficient and will approve, disapprove, or approve with modifications the proposed site assessment activities. On December 11, 2020, Avangrid submitted a Construction and Operations Plan to BOEM for sufficiency review and subsequent approval. On April 19, 2021, the Federal Permitting Improvement Steering Council posted to the Permitting Dashboard a comprehensive Federal permitting timetable for Kitty Hawk Wind. According to the permitting timetable, Kitty Hawk will complete federal review and permitting in December 2024.

[11] Northam, R.S. 2019.
[12] Virginia General Assembly, 2020.
[13] See Kitty Hawk Offshore Wind Project Permitting Dashboard (Performance.gov).

Routing Measures

International Maritime Organization Routing Measures

In the study area, existing routing measures, "In the Approaches to Chesapeake Bay", include two TSS and one precautionary area. The TSS are designed to aid navigation safety and the prevention of collisions at the approaches to the Chesapeake Bay. The routes are split into an eastern approach and a southern approach. It is recommended that vessels entering or departing from the Chesapeake Bay use these routes. Following the PARS conducted in 2002, the southern approach deep water route was recommended for ships drawing greater than 42 feet and naval aircraft carriers. It is noted that the results of this PARS finds this recommendation is not always followed and there is deep draft traffic (ships with greater than 45 foot draft) that use the eastern approach TSS. The precautionary area is located between the TSS and the Thimble Shoal and Chesapeake Channels.

Pilotage

Virginia state law governs the pilotage requirements for the approach to the Chesapeake Bay. Virginia Code Title 54.1 states "The master of every vessel, other than vessels exclusively engaged in the coastwise trade and those made exempt by United States statutes, inward bound from sea to any port in Virginia or any intermediate or other point in Hampton Roads, the Virginia waters of Chesapeake Bay, or in any navigable river in Virginia which flows into Chesapeake Bay or Hampton Roads, shall take the first Virginia pilot that offers his services." The normal pilot boarding area is located within the precautionary area between the TSS and the Thimble Shoal and Chesapeake Channels.

Regulated Navigation Area

The Coast Guard has defined a regulated navigation area (RNA) for the Chesapeake Bay entrance in Title 33 Code of Federal Regulations 165.501. The offshore zone lies within the study area. The RNA requirements apply to most vessels operating within the area, except vessels engaged in law enforcement, aid to navigation service and waterways survey and maintenance activities.

Danger Zones

There are two danger zones within the PARS area. A danger zone south of the entrance to the Chesapeake Bay is defined in 33 CFR 334.380 to alert vessels to the presence of a naval firing range in the Atlantic Ocean off Virginia Beach, VA. Vessels are directed to proceed with caution and proceed directly without delay through the area.

A second danger zone in the Atlantic Ocean off Wallops Island and Chincoteague Inlet, Virginia is defined in 33 CFR 334.130. This danger zone prohibits persons and vessels from entering the zone when rocket launches are conducted. Advance notice of scheduled launch operations are issued via weekly Notice to Mariners.

Proposed Shipping Safety Fairways

The ANPRM published in 2020 proposed fairways along the Atlantic Coast from Florida to Maine. The fairway system detailed in the ANPRM was heavily considered and is represented in all the traffic analysis and incident modeling conducted for this study. Although these fairways are still in a proposed status, it is assumed that they will be refined and implemented, and therefore traffic densities within were factored into the analysis conducted by this study. Figure D.2 illustrates the proposed fairways in the study area.

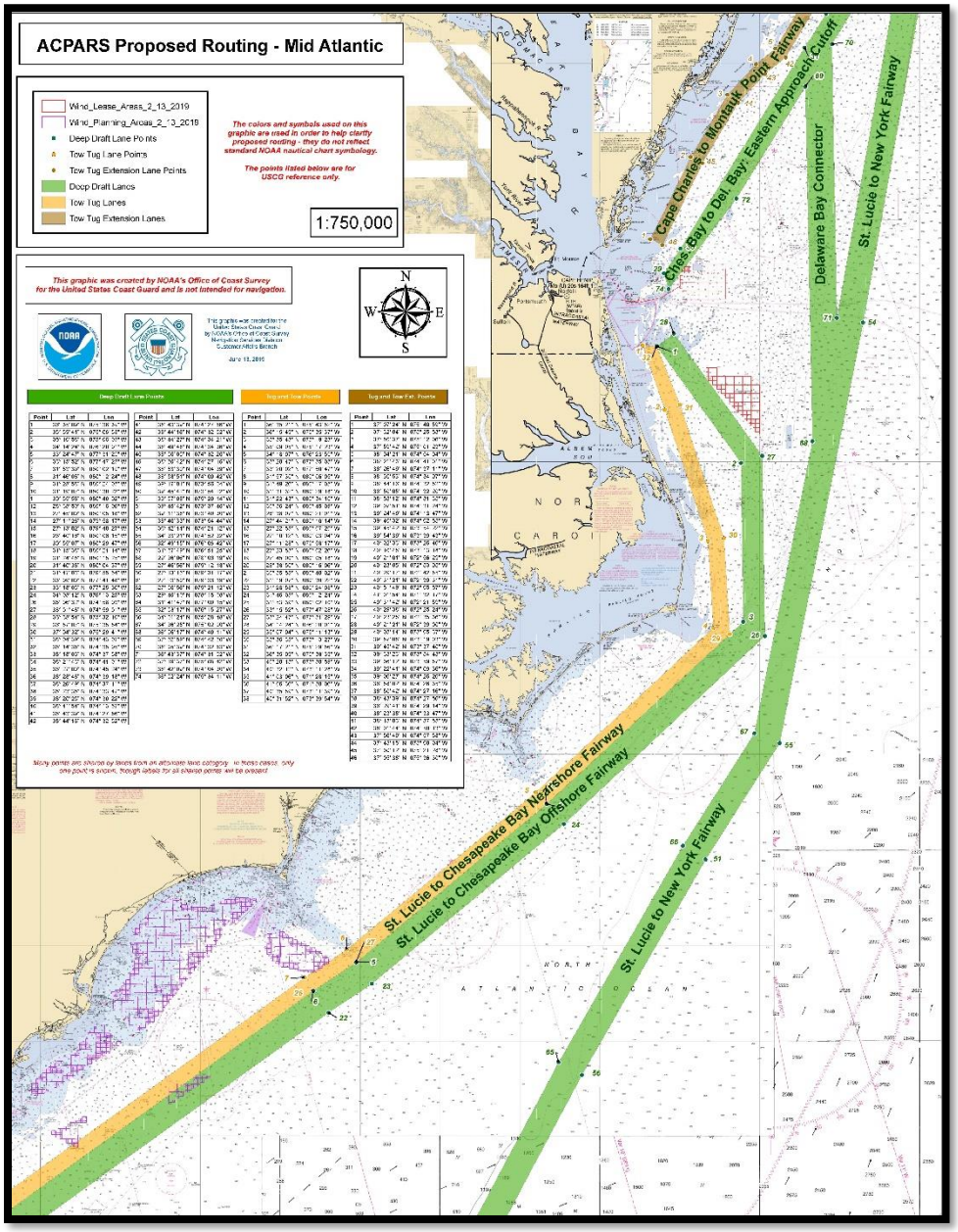

Figure D.2

E. Maritime Data, Trends and Analysis

Meteorological Data

The implementation of routing measures or fairways will not mitigate weather related impacts to navigation safety. There are diurnal tides and stable bottom conditions within the study area. Seasonal heavy weather occurs in the late summer and mid-winter. The Port of Virginia has been shut down due to severe weather a total of eight times during the period from 2015-2019, ranging from zero to three days in any given year. Historical data from weather buoys and historic hurricane tracks follow in figures E.1 through E.7.

National Buoy Data Center Station 44014 located at Cape Henry, Virginia Beach

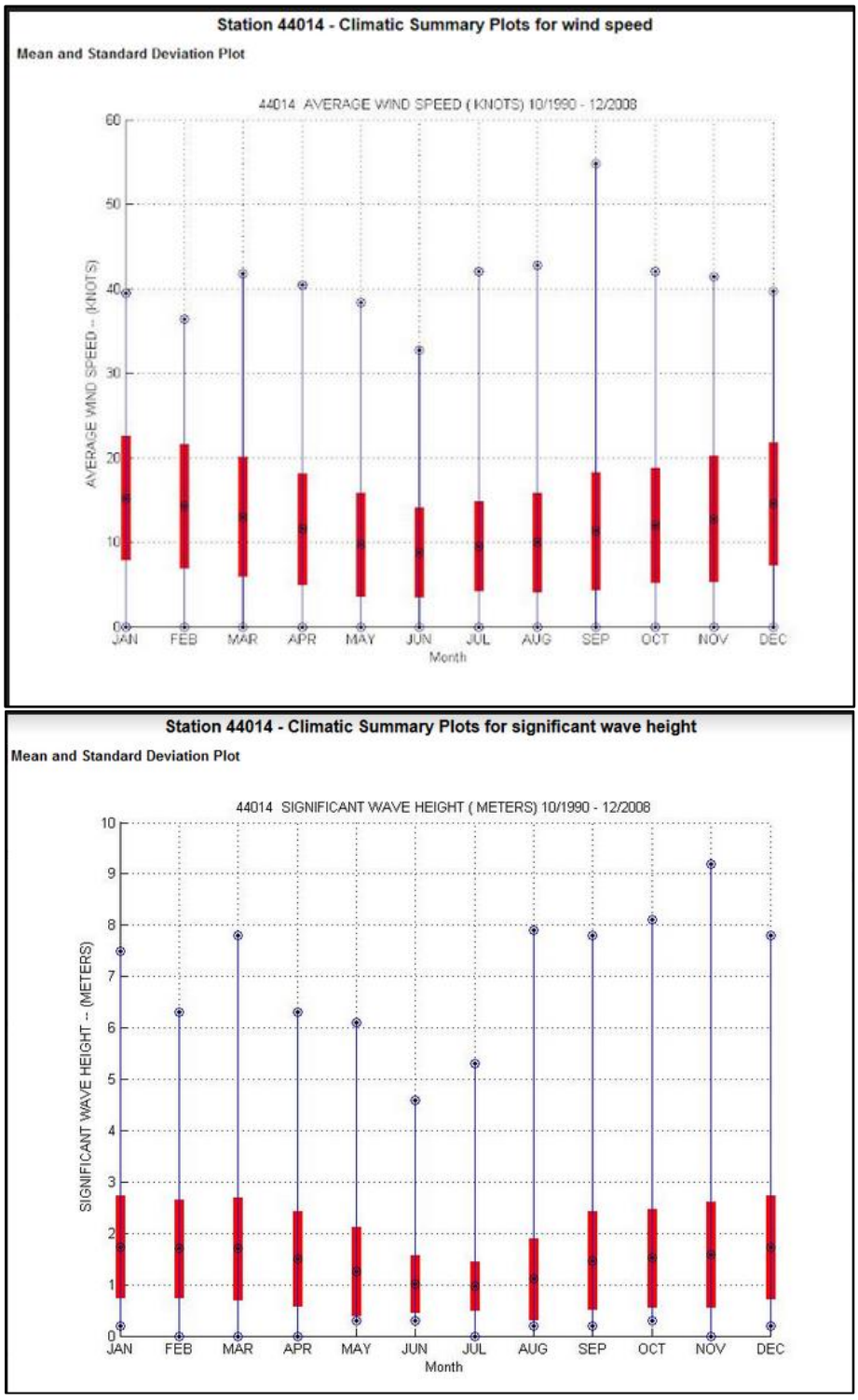

Figure E.1

National Ocean Service Buoy 44064 located at the Chesapeake Bay Bridge Tunnel

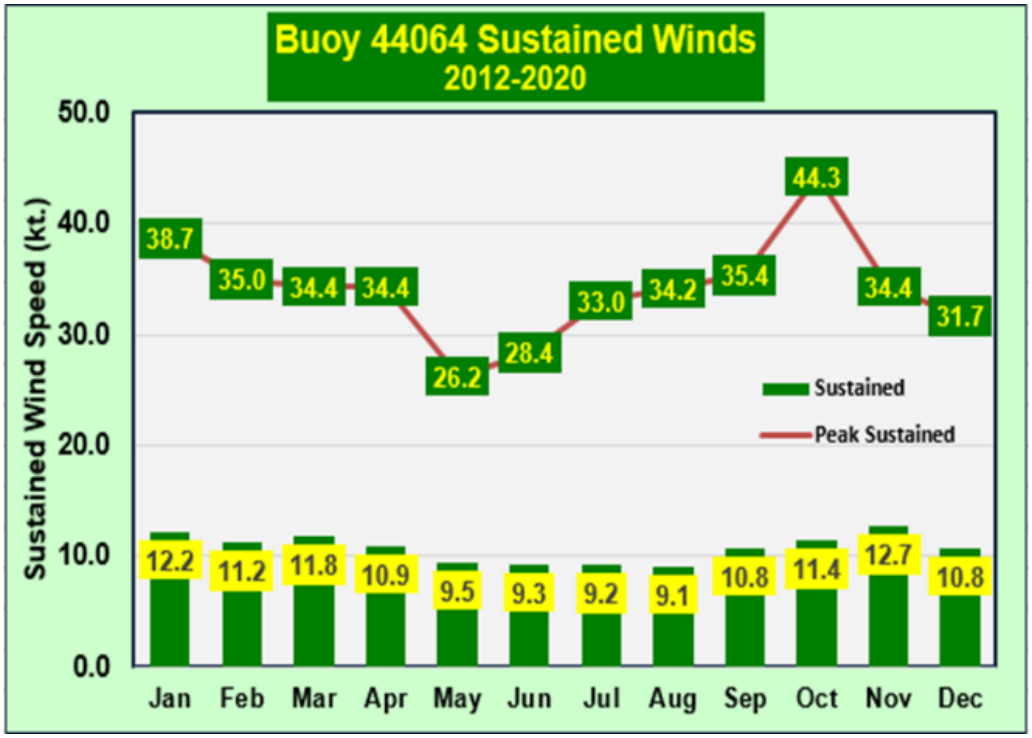

Figure E.2

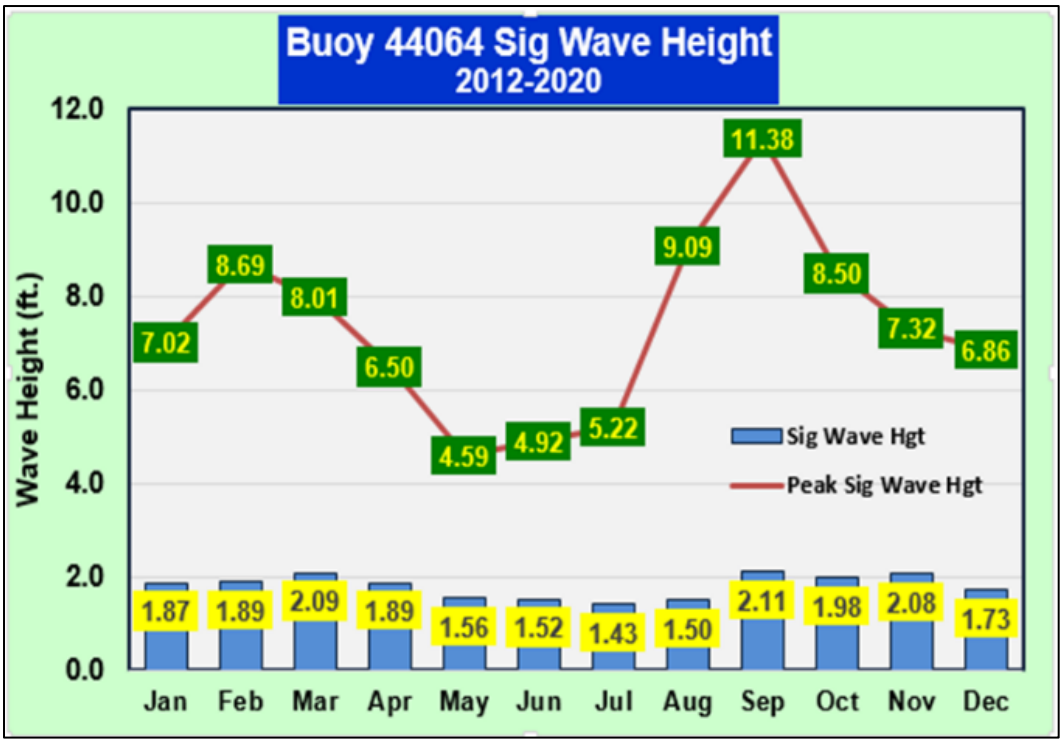

Figure E.3

Historical charts of North Atlantic Hurricane tracking 2016-2019

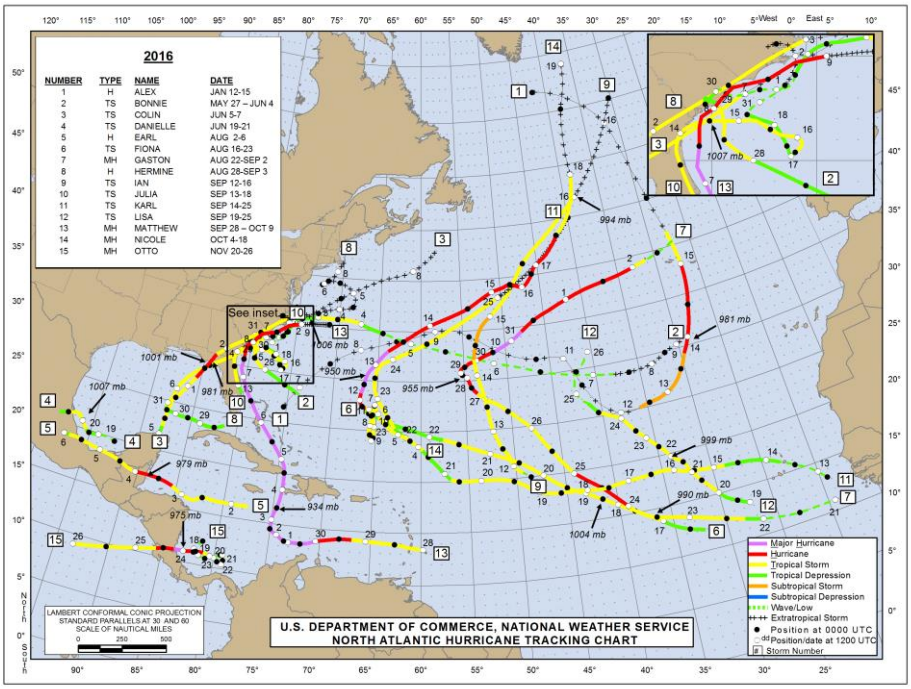

Figure E.4

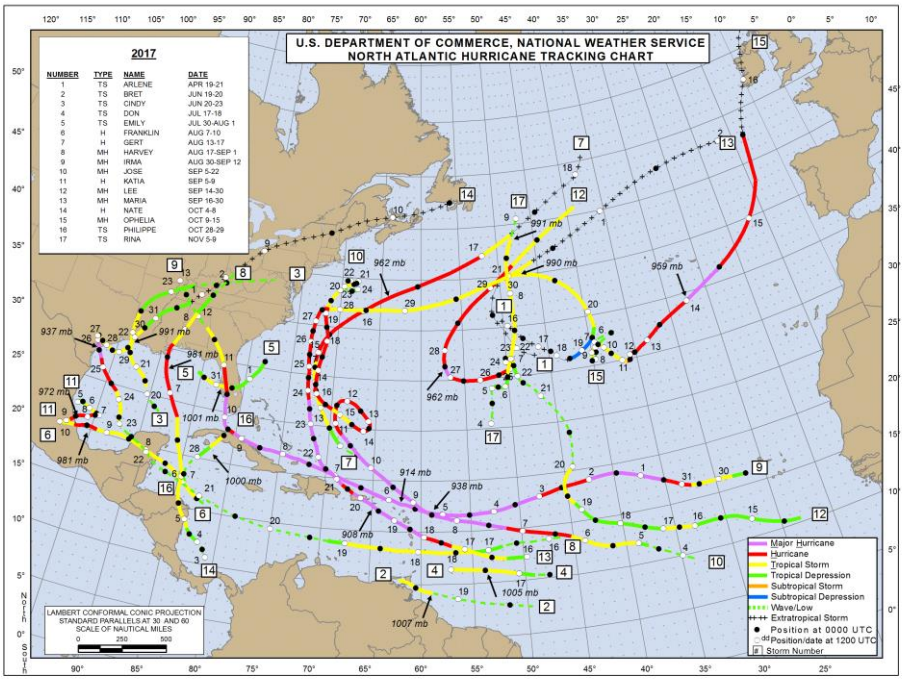

Figure E.5

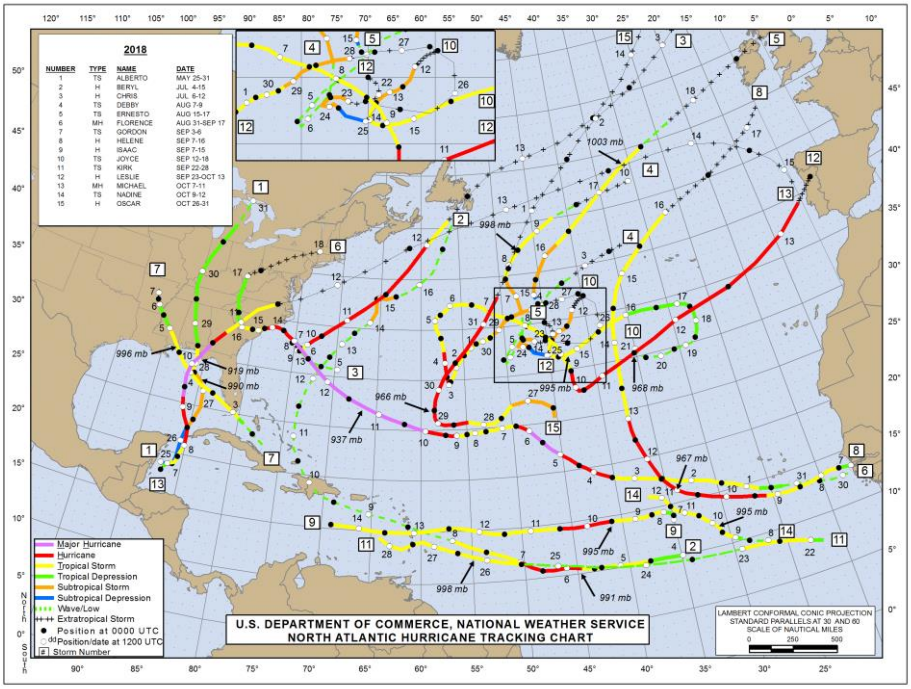

Figure E.6

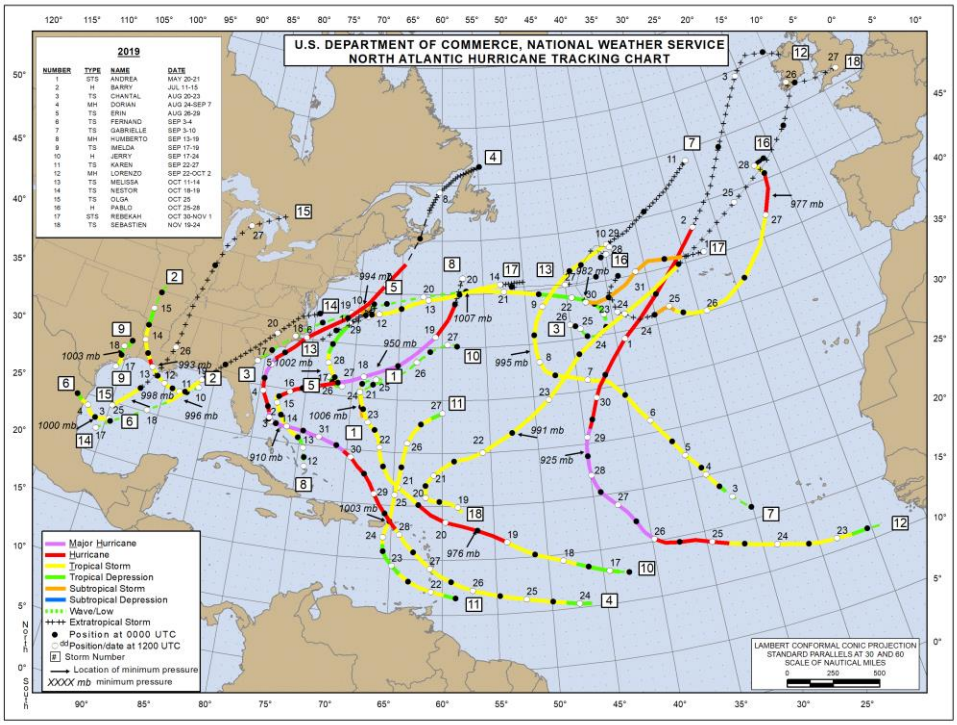

Figure E.7

Coast Guard Activity

Coast Guard activities within the study area include search and rescue, *marine inspection, marine environmental response,* maritime law enforcement, high value asset escorts, high interest vessel boardings, living marine resource enforcement, aids to navigation maintenance, and marine casualty/accident investigations. *With an increase in activity due to the construction, operation, and maintenance of OREI (to include the attraction of recreational sightseeing and fishing), we anticipate a moderate increase in vessel activity, which could lead to increases in Coast Guard activities; however, not enough to affect study conclusions related to port access.* We recognize Coast Guard missions will continue to occur with the same guidance and practical operations, despite any changes in the marine transportation system, world shipping patterns and future offshore development.

Search and Rescue Activity Data

Coast Guard search and rescue cases offshore are coordinated by the District Command Center in Portsmouth, Virginia, and local units from the appropriate Sector and Air Station are used in these cases. A detailed graphic of SAR case locations during the period 2010-2019 is included in the appendices. The annual SAR case count for activities within the study area is in Table E.1.

SAR ACTIVITIES	
Year	**Case Count**
2010	28
2011	24
2012	40
2013	31
2014	26
2015	65
2016	84
2017	101
2018	95
2019	102
Grand Total	**596**

Table E.1

This PARS further analyzed the nature of the distress which initiated the search and rescue case. The causes were broken into general casualty types listed in Table E.2 below and counted by type and year.

Case Type	2010	2011	2012	2013	2014	2015	2016	2017	2018	2019	Total
Adrift				1	1			1	2	3	8
Allision								1			1
Beset	1			1	1	1	5	3	3	4	19
Capsize			4	1			3	4	3	4	19
Collision	1			1			1				3
Disabled	7	11	14	14	5	23	34	44	34	34	220
Distress	8	5	8	4	6	10	9	10	11	20	91
Escort						1		1	12	2	16
Fire	2							3	1	2	8
Grounding	4	4	9	4	7	13	7	9	8	7	72
Law Enforcement						3	1	1			5
Medical	1	2	1	2	3	5	7	6	3	6	36
Person In the Water	3	1			1	5	5	10	8	7	40
Taking on Water	1	1	4	3	2	4	12	8	9	13	57
Total	**28**	**24**	**40**	**31**	**26**	**65**	**84**	**101**	**95**	**102**	**596**

Table E.2

An analysis of Coast Guard search and rescue cases from District Five, Sector Virginia and Sector North Carolina command centers resulted in the scatter plot of locations in Figure E.8. The majority of these cases are within the approaches to the Chesapeake Bay. Historical evidence and frequency does not provide statistically significant data to show that current routing measures, nor future revisions to the routing measures, would lessen the frequency of the need for CG assets to conduct search and rescue. The Fifth Coast Guard District anticipates a possible increase in search and rescue cases within the OREI with a possible rise in recreational boating activity when offshore structures create underwater habitats.

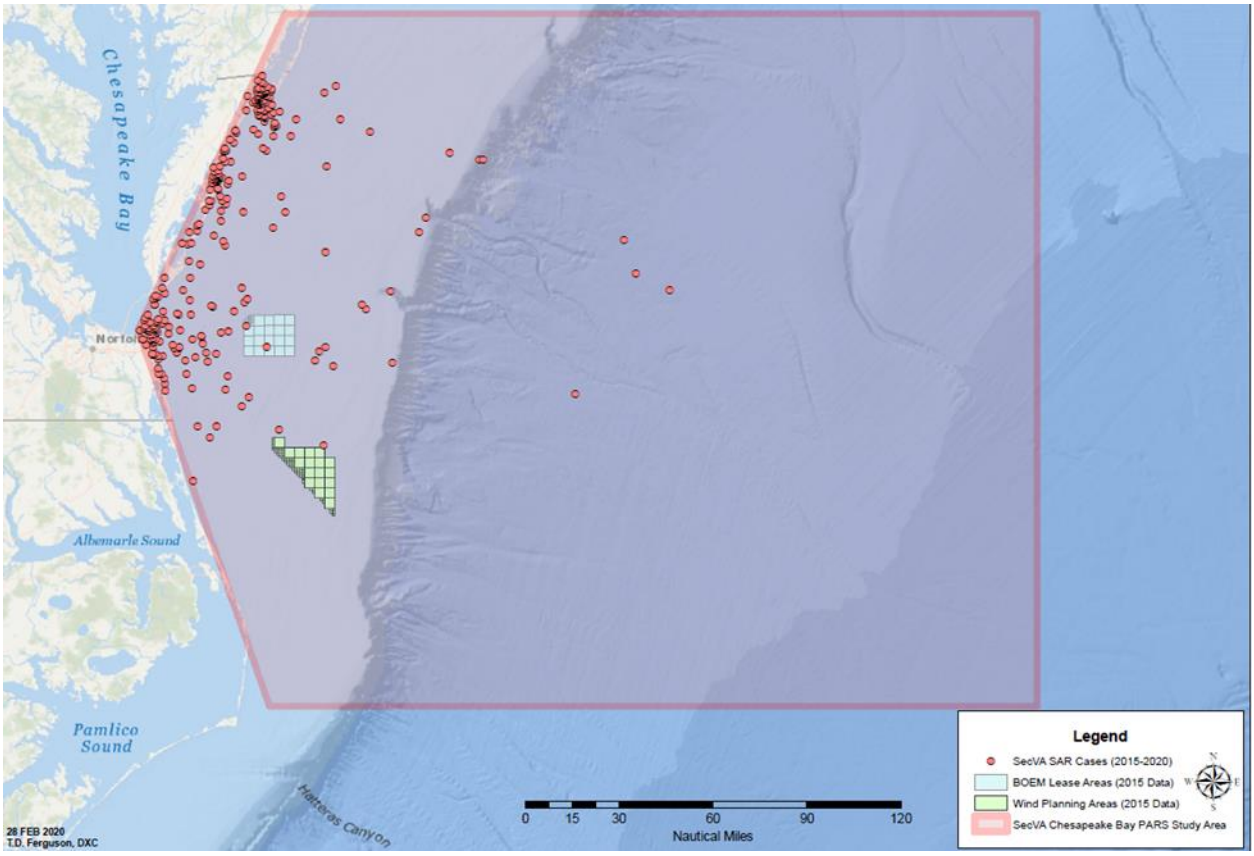

Figure E.8

Marine Casualty Data

Marine casualty cases are conducted when a casualty or accident defined in 46 CFR 4.03-1 occurs in federal waters. These cases are investigated by Sector personnel and their details are documented in the Coast Guard database, Marine Information for Safety and Law Enforcement (MISLE). The case files from Sectors Virginia and North Carolina within the study area were analyzed. A lack of standardization in data entry hampered analysis. To refine the data and resolve the disparity, pollution cases, medical evacuation, law enforcement and personnel action case files were removed from the dataset as unrelated to the PARS. Remaining case files were plotted on a chart of the study area, categorized by initial event type (e.g. Fire, Flooding, Allision, etc). Case narratives were provided by Coast Guard Office of Investigations, CG-INV-2, to further determine if there were any casualty patterns in the data that provided guiding direction to the study focus with respect to port approach needs. Cases in and around the approaches to Chesapeake Bay and the proposed OREI leases were further analyzed as pertinent to the study. Historic data shows material failures as the most frequent initiating event and represents the highest number of cases. Study of the past ten years (2010-2019) of marine casualty data in Table E.3 illustrates no clear pattern, nor does it indicate any predominant case type in the future. There were no casualties actually plotted in the OREI areas, and in the areas surrounding the OREI, there are less than ten activities to consider.

Casualty Type	2010	2011	2012	2013	2014	2015	2016	2017	2018	2019	Total
Allision		1	2		1	1	1	1		1	8
Capsize										1	1
Collision		1		2					1		4
Fire - Initial	1	1									2
Flooding - Initial	1	1								1	3
Flooding - Progressive					1						1
Grounding	6	3	2	3	3	3		1		3	24
Loss of Electrical Power	1		3					1			5
Loss/Reduction of Vessel Propulsion/Steering	1	3		1					2	2	9
Material Failure/Malfunction	11	9	4	11	12	8	2		13	10	80
Sinking				1							1
Vessel Maneuver		2	1			1		2		1	7
Wave(s) Strikes/Impacts									1		1
Total	**21**	**21**	**12**	**18**	**17**	**13**	**3**	**5**	**17**	**19**	**146**

Table E.3

Further analysis identified case types for the marine casualties that occurred within the study area over the last five years and is plotted in Figure E.9. The predominant types of casualties near the CVOWC project and the approaches to the existing TSS were loss of maneuverability, electrical power or propulsion.

Current data indicates large vessel traffic proceeds through the OREI lease areas. It is assumed when the OREI structures are built, large vessels will route around the OREI. Merging traffic around the OREI projects may increase the risk of marine casualties due to collision or allision. Enclosure 2 models this traffic pattern change. The Fifth Coast Guard District considers future routing measure establishment may mitigate this risk to an acceptable level.

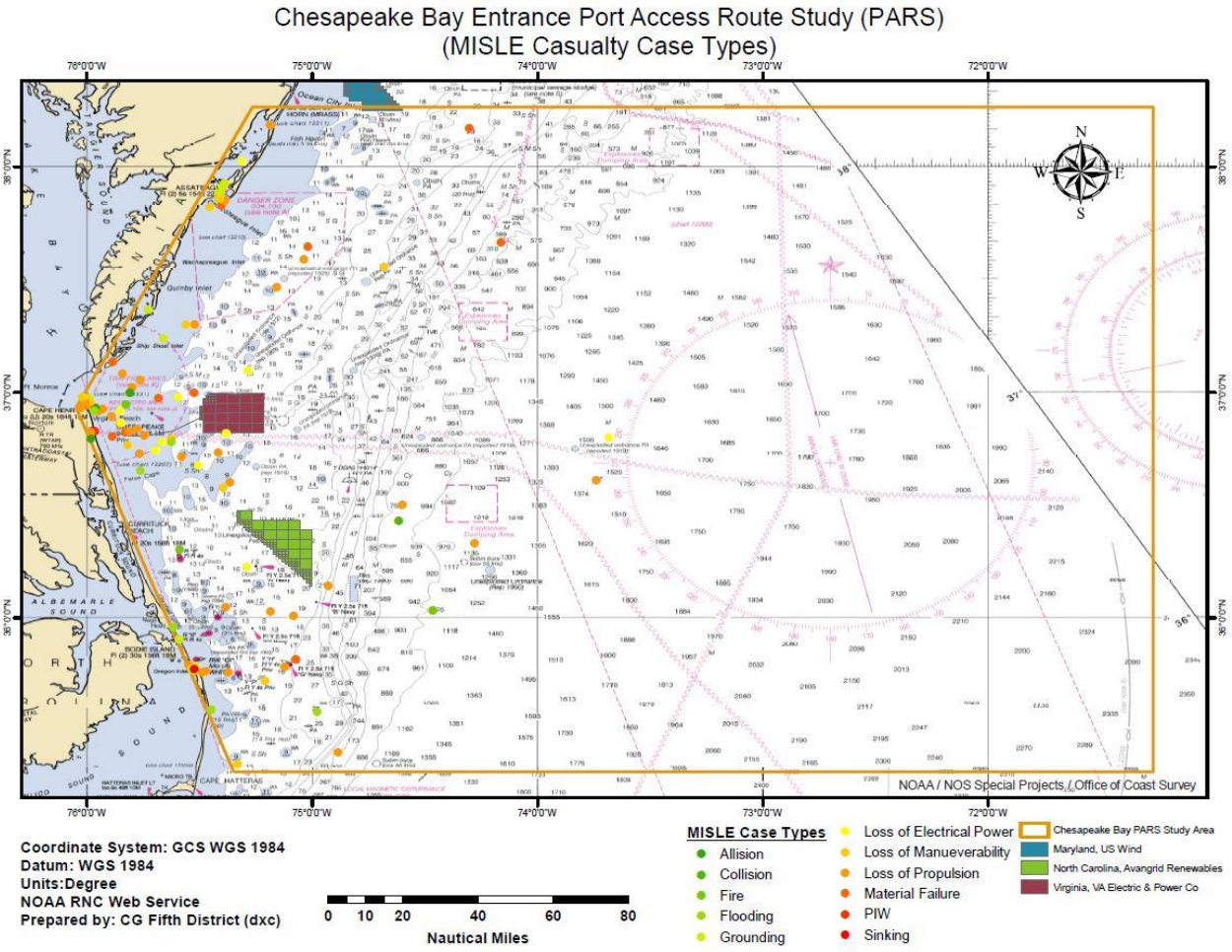

Figure E.9

Commercial Fishing Vessel Activity

Current Activity

Interviews with local fishing vessel operators reveal that commercial fishing predominant in the study area includes gill netters who operate between five and 13 miles offshore, and fixed pot anglers that operate seasonally. Transiting vessels may enter the turbine fields at their own risk, using prudent seamanship to determine safe routes from port to offshore grounds. *Comments received on the draft report from the Responsible Offshore Development Alliance (RODA) suggest the majority of fishing in the area consists of hook and line fishing. AIS data shows 147 unique vessels operated in the Kitty Hawk OREI, between 2017 and 2019, and 109 in the CVOWC OREI during that period. The Fifth Coast Guard District determined that routing measures, which direct deep draft vessels, should not impact commercial hook and line or fixed pot fishing in and around the OREI.*

Seasonal variability was observed for commercial fishing vessel (CFV) operations. CFV transits of Chesapeake Bay entrance peak in the fall (October through December) and reached minimum values in winter (January through February). Additionally, the distribution of track directions were seen to vary over the course of the year, with a majority of track lines trending southeasterly from the mouth of the bay along the coast earlier in the year and northeasterly later in the year.

The Fifth Coast Guard District recognizes that Automatic Identification System (AIS) data is not comprehensive of all CFVs in the study area. National Marine Fisheries Service (NMFS) data from Mid Atlantic Regional Council on the Ocean (MARCO) data portal showed no significant fishing activity (track lines <5 knots for any species) in the CVOWC or Kitty Hawk project areas. Transit paths show CFVs transit around the OREI and therefore pose minimal increased risk to navigation safety. *Further analysis of the AIS dataset showed average lengths for fishing vessels in the study area under 200 feet in length, which was used to determine safe transit widths. See Figure E.10.*

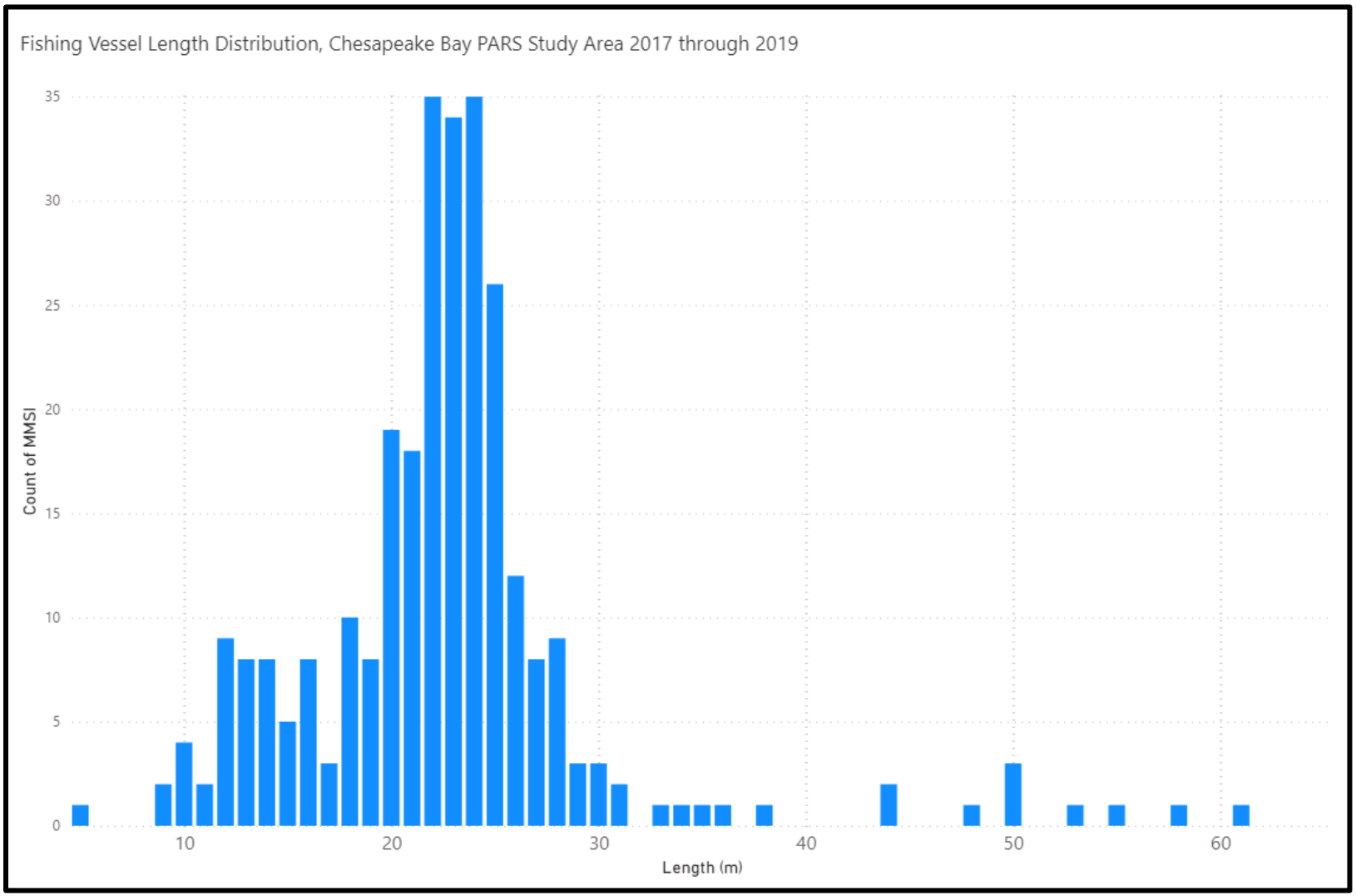
Fishing Vessel Length Distribution, Chesapeake Bay PARS Study Area 2017 through 2019
Count of MMSI
0
5
10
15
20
25
30
35
10
20
30
40
50
60
Length (m)

Figure E.10

Safe widths for transit lanes

To determine if routing measures or fairways through any designated OREIs are necessary, the Fifth Coast Guard District used the World Association for Waterborne Transport Infrastructure (PIANC), MarCom Working Group Report to calculate the minimum width needed for a transit lane based on length of vessels and frequency of transits. The Fifth Coast Guard District reviewed recent AIS CFV transit data, local vessel inspection data, and BOEM study 2016-040, Collaborative Fisheries Planning for Virginia Offshore Wind Energy Data. A vessel length of 200 feet allowed for the maximum vessel size in the area and provided a margin of error for safe navigation. To provide adequate space for each vessel to safely transit, the calculation takes two times the ship's length multiplied by a factor based on the number of vessels using the route annually and includes an additional safety margin.[14] The calculation is this:

*200 (vessel length in feet) * 2 (minimum safe distance) * 2 (multiplier for less than 4,400 vessels per year)*

*200 * 2 * 2 = 800 feet or 244 meters*

The PIANC study discusses the need to account for a ship's ability to conduct a full round turn within the traffic lane in the event it must take action to avoid a collision. Using IMO Standards for Ship Manoeuverability (IMO resolution MSC.137 (76) and MSC/Circ. 1053), the diameter of a full round turn is approximately equal to six times the ship's length.

*200 (vessel length in feet) * 6 = 1200 feet or 366 meters*

PIANC further discusses applying a 500-meter (1,640 feet) margin to the shipping lane to account for safety zones around wind turbines as referenced in Article 60 of the United Nations Convention on the Law of the Sea (UNCLOS). Of note, UNCLOS article 60 states the safety zone, "shall not exceed a distance of 500 meters," further the PIANC study states the safety zone, "is for 'protection of the structure' and is not meant as a safe distance for safe manoeuvring according to COLREGs".17 A 500-meter distance may be excessive or overly conservative for vessels 200 feet in length or less, as these smaller vessels are significantly more maneuverable and responsive than larger ships.

PIANC also adds a distance of 0.3 NM to account for any deviation a ship may take for evasive maneuvers to avoid a collision. The Fifth Coast Guard District considered this distance as an unnecessary addition into the calculation since the distances between turbines will provide a reasonable escape route for a vessel 200 feet in length.

For comparison purposes, the minimum width for a transit lane for vessels up to 200 feet (75% of all vessels in data set) in length is calculated with various safety margins (500 meters, 250 meters and 0 meters) on both sides of the lane. See Table E.4.

[14] World Association for Waterborne Transport Infrastructure. *Interaction between offshore wind farms and maritime navigation.* 2018.

Safety Margin (meters/feet)	*Traffic lane width (feet/nautical miles)*
500 / 1,640	*6,480 / 1.08*
250 / 820	*4,840 / 0.80*
0 / 0	*3,200 / 0.53*

Table E.4

Based on this, the Fifth Coast Guard District concludes the minimum width for a transit lane for vessels 200 feet in length should be between 0.53 and 1.08 nautical miles, with 0.80 to 1.08 nautical miles being preferred. Larger and less maneuverable vessels will likely avoid transiting within the lease area, therefore the formal establishment of shipping safety fairways or other routing measures within an OREI is not necessary.

To be clear, the Fifth Coast Guard District is not setting a minimum spacing requirement between offshore structures with these study calculations. The calculations have been included only to illustrate what would be considered safe navigation parameters for the majority of CFVs that transit through the OREI in the study area.

Challenges associated with the COVID-19 global pandemic limited the Fifth Coast Guard District's contact with local CFV operators; however, the Fifth Coast Guard District was able to confirm with them that the analysis in BOEM 2016-040, (*Collaborative Fisheries Planning for Virginia's Offshore Wind Energy Area)* [15] is accurate and commercial fishing activity is not expected to increase significantly. The size of CFVs in the study area contribute to our recommendation that no further routing measures are necessary to address navigation safety related to CFV activity. Should fishing activity significantly change as the result of these OREIs, the Fifth Coast Guard District may revisit this conclusion.

Vessels engaged in fishing

Vessels engaged in fishing may require additional sea room for safe navigation; however, this study did not attempt to determine minimum safe distances for such activity. Potential impacts to fisheries and vessels engaged in fishing will be evaluated during BOEM's project specific environmental assessment process.

Recreational Boating Activity

Pleasure vessel transits of the Chesapeake Bay Entrance peak in the late summer through early autumn (August through October) with minimal values in winter and early spring (January through April). AIS data for pleasure craft equipped with transponders is included in the traffic analysis found in Enclosure 1.

[15] U.S. Department of the Interior. 2016.

Based on interviews with local sport fishermen, the Fifth Coast Guard District concludes that an OREI will result in an increase of recreational boating activity within the area. Wrecks and other seabed habitats targeted by recreational fishermen are found within the CVOWC project in a designated fish haven *(locally known as Triangle Wrecks or Reef).* The study confirmed transits are common from the Chesapeake Bay and Rudee Inlet, Virginia, to an offshore fishing ground approximately 27 NM east of the lease area, as noted on the Mid-Atlantic Ocean Data Portal.[16]

BOEM 2016-040 further determined recreational vessel activity within the lease area fluctuates based on the status of the fishery. Ground fishing will likely improve with the development of the turbine field.[17] This study considers that additional recreational vessel activity may lead to an increase in search and rescue events. Proposed routing measures do not generally apply to recreational vessels; however, they illustrate areas where commercial traffic occurs. The Fifth Coast Guard District concludes that routing measures will improve recreational vessel operator awareness of the presence of commercial traffic in and around the OREIs, and may mitigate some of this potential risk. The study did not attempt to determine minimum safe distances for fishing within the OREI. These impacts will be evaluated during BOEM's environmental assessment for individual projects.

Global Shipping Trends

General implications of the trend towards larger ships on ports.

Industries are adapting their cargo to the container shipping method - containerization. Commodities such as malt, peat moss, fertilizers, timber, scrap and waste products are now containerized to a greater extent. It is likely that in the next decade 90 percent of the general global cargo will be shipped in containers. By using a container, a door to door concept can be more efficient. Cargo can be transported directly from the mill to the consignee, or even directly to the consumer, making it more efficient and reducing the risk of damages.

The size of the largest vessels in the world's shipping fleets have more than doubled over the past two decades. In 2005, the largest container ships could transport just under 10,000 Twenty-Foot Equivalent Units (TEU). Today the vast majority of new construction orders are for ships that can carry over 10,000 TEU. Shipping lines are already beginning to order 22,000 TEU ships.

Many of the ships displaced by these large vessels have been scrapped, but shipping lines are deploying 6,000-10,000 TEU vessels in different ways, leading to a cascading effect in which ships being replaced by larger vessels on the major trade lanes are being deployed in secondary trade routes. The trend toward larger ships affects all ports, big and small. Although the largest ships generally do not come to North America, U.S. ports are increasingly handling larger vessels than before. In many ports, larger ships may lead to fewer port arrivals and departures. Alternatively, many other ports may experience a higher frequency of transits due to lightering

[16] Found at https://midatlanticocean.org.
[17] U.S. Department of the Interior. 2016.

operations that improve port access where channel or cargo handling constraints preclude use of larger vessels.

The widening of the Panama Canal creates opportunities. Ports of 55 feet or greater depth and port cranes that feature larger reach and higher above-deck stowage are likely to attract newer, larger generations of container ships. Ports that are constantly improving access, waterside and shore infrastructure and offer high productivity, labor stability and supply chain efficiency will benefit significantly. To improve competitiveness, ports are investing in bigger and wider access channels, longer quays, bigger cranes and better intermodal connections. They are working with multiple stakeholders to ensure that the surrounding region will have the necessary warehousing and distribution centers for the super-sized loads.

Larger vessels put greater pressure on the ports and terminal operators. In some ports, it results in conflicts and congestion, and raises several operational questions. Not all ports are designed to accommodate giant ships; waterways may not be sufficient for the vessel to enter the port, or they may not have the capacity to handle cargo efficiently.

Comments to the draft report from the Port of Virginia, the Virginia Maritime Association, and local container operator, CMA-CGM, state larger container ships will continue to call more frequently to the Chesapeake Bay approaches. This trend may lead to a shift from coastwise traffic, historically seen in container vessel routes, to a first in / last out routing pattern. This pattern creates more direct east-west traffic between the Chesapeake Bay entrance and European ports. A shift in routes like this supports additional connector fairways between the shipping safety fairways in the ANPRM and the TSSs in the approach to the Chesapeake Bay. The Fifth Coast Guard District proposes an additional east-west fairway north of the CVOWC project area to facilitate future traffic. Detailed coordinates are included in Table F.1.

AIS Vessel Traffic Analysis

The full traffic analysis conducted by the Coast Guard Navigation Center is in Enclosure 1.

AIS Vessel Traffic Densities and Routes

The majority of large commercial vessel traffic entering the Chesapeake Bay is either containerized or bulk coal. These vessels follow common track lines when entering and departing the port. The remaining cargo traffic falls generally along similar track lines, and therefore no further commercial traffic separation was done in these vessel density maps. The following categories were determined to provide a comprehensive overview of the tracks into and out of the Chesapeake Bay entrance. Military vessels, a major factor in this study, are categorized as Other by AIS.

Vessel categories:
Container
Cargo (bulk carriers, tankers, Ro-Ro, other cargo)
Fishing

Towing/Pushing
Passenger
Recreational
Other

Draft categories were separated to illustrate the larger, deeper ships that are occurring more frequently as container terminals and ship capacity increases.

Draft categories:
Less than 35'
Between 35' and 45'
Greater than 45'

Traffic density maps were produced to distinguish different vessel traffic patterns, high value vessel (high capacity passenger vessels) traffic patterns, and the unique traffic patterns of the towing/pushing industry through the study area. These density maps provide a broad overview of current traffic patterns found in the study area and are located in Enclosure 1. Figure E.10 is an example of a traffic density map that shows all vessel routes that crossed the entrance of the Chesapeake Bay in 2019.

Each map also illustrates the shipping safety fairways along the Atlantic Coast published in the Proposed Rule, 85 Fed. Reg. 37034 (June 19, 2020).

IMO established routing measures recommend vessels with a draft greater than 42' use the southern approach TSS for entry and exit to the bay; however, heat maps show a distinct concentration of traffic in this draft concentration that uses the eastern approach. More detailed information can be seen in the density maps found in Enclosure 1.

Figure E.11 illustrates a traffic density map for all ships in 2019 with routes that crossed the entrance to the Chesapeake Bay. The report concludes deep draft vessels that currently transit through the CVOWC area may, in the future, route around, north or south, of the project area to maintain navigation safety.

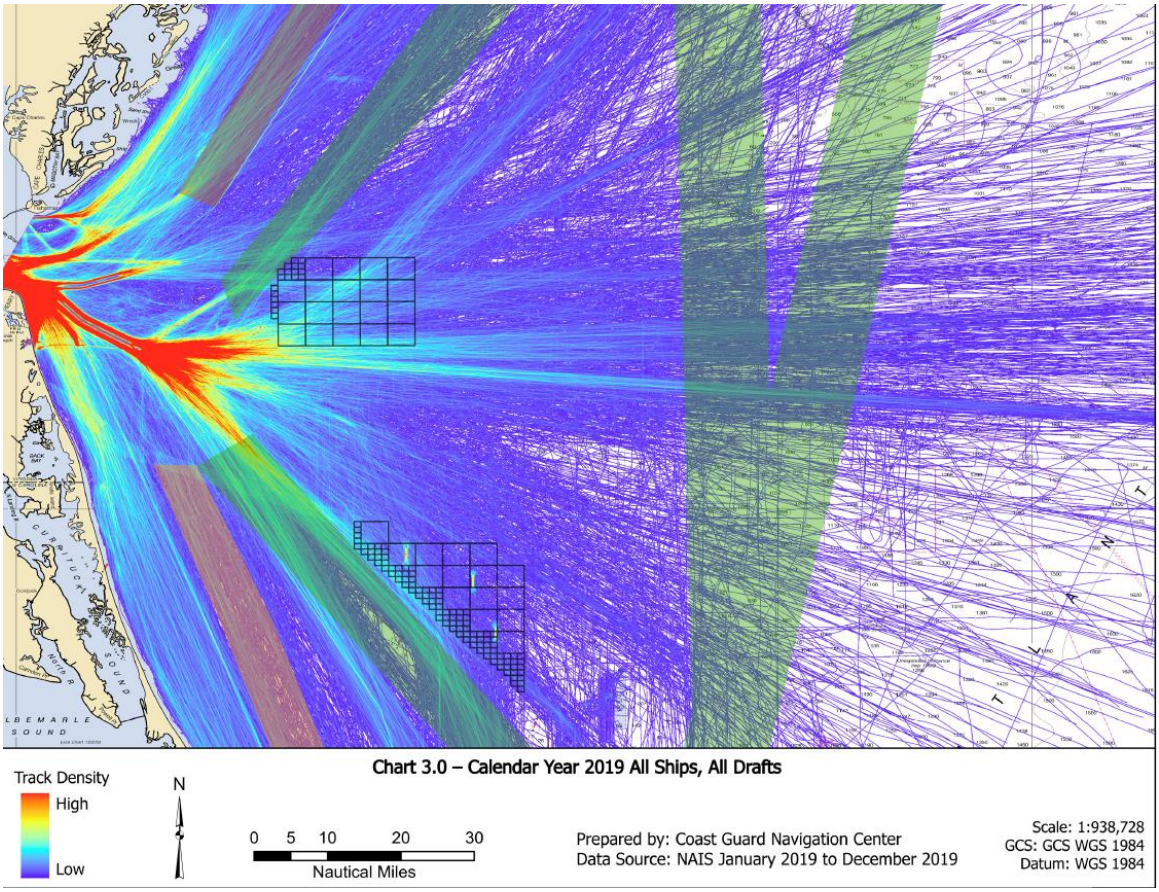
Chart 3.0 – Calendar Year 2019 All Ships, All Drafts
Track Density
High
Low
N
0 5 10 20 30
Nautical Miles
Prepared by: Coast Guard Navigation Center
Data Source: NAIS January 2019 to December 2019
Scale: 1:938,728
GCS: GCS WGS 1984
Datum: WGS 1984

Figure E.11

Navigational Safety Risk Assessment Methodology

International Association of Marine Aids to Navigation and Lighthouse Authorities (IALA) Waterway Risk Assessment Program (IWRAP) – IWRAP is a modeling tool developed by the IALA to assess maritime incident frequency (collisions, allisions and groundings). Using IWRAP, based on information about traffic volume and composition, route geometry and bathymetry, the frequency of collisions, allisions and groundings in the study area is estimated based on changes in a case study.

Existing Case (Alpha) – In the Alpha case, waterway characteristics are entered and AIS data imported to determine collision frequencies with no structures in place. Established traffic legs or routes were drawn and entered into the IWRAP (see Figure E.11). Bell shaped curves on either side of the leg illustrate the probability that vessels of a certain size and type will transit within the defined distance either side of the leg. The distance from the leg is illustrated by the length of the line perpendicular to the traffic leg. Green curves illustrate inbound traffic and blue curves illustrate outbound traffic. The Alpha case shows no significant change to traffic patterns from the 2011 ACPARS.

Future Cases – Three additional cases, Bravo, Charlie and Delta, were created to assess future changes. These cases validate the proposed Atlantic Coast shipping safety fairways.

In the Bravo case, traffic was not re-routed to proposed shipping safety fairways but current routes were analyzed with the proposed OREI development in place. The frequency of allision with a fixed structure increases in this case due to the introduction of offshore structures. Collision incident frequency remains the same as the Alpha case because there are no assumed vessel route changes.

In the Charlie case, traffic was re-routed to proposed fairways around the OREIs. The frequency of allision with a fixed structures increases from the Alpha case (with no structures); however frequency is lower than the Bravo case where vessels route through the OREI structures. The frequency of vessel collisions increases as expected when vessels converge into a smaller amount of sea space. The Fifth Coast Guard District proposes connector fairways to potentially mitigate incident frequency by directing traffic around the OREI. This creates minimal impact on traditional vessel routes and a large precautionary area where this convergence occurs to reduce the frequency of collisions.

In the Delta case, traffic was routed into a two-way pattern within the proposed fairways. This resulted in a reduction in allision cases when half the vessel traffic moved away from the fixed offshore structures. Limitations in the software due to the increased complexity in the case resulted in a failure to quantify significant reduction in collision frequency.

Impact of Offshore Wind Energy Installations – The Fifth Coast Guard District concludes deep draft traffic will likely route around the OREIs in the approach to the Chesapeake Bay. This is consistent with current maritime practice in European waters where OREI exist, and local subject matter experts (vessel operators and harbor pilots) have confirmed. Enclosure 2 illustrates this by moving AIS data to new routes in the Charlie case. This results in increased

frequency of collisions as vessel routes converge around the OREI. The Delta case attempted to show lower collision incidence by separating traffic in a two-way routing measure. Enclosure 2 provides detailed quantitative analysis of these changes. The Fifth Coast Guard District proposes a combination of measures to mitigate the risk of collision.

Shipping Safety Fairways, like those in ANPRM, 85 Fed. Reg. 37034 (June 19, 2020) ensure adequate sea space for ships to avoid collision under normal conditions. The Fifth Coast Guard District recommends additional shipping safety fairways, described in Section F, to preserve sea space from future offshore structures. These fairways enable vessel traffic to converge further offshore in less congested waters. The Fifth Coast Guard District concludes the recommended fairways, precautionary area, and two-way route in Section F preserve space from additional offshore development and lower the risk of vessel collisions. This facilitates co-existence between OREI and maritime traffic in a safe manner with little impact to vessel routes.

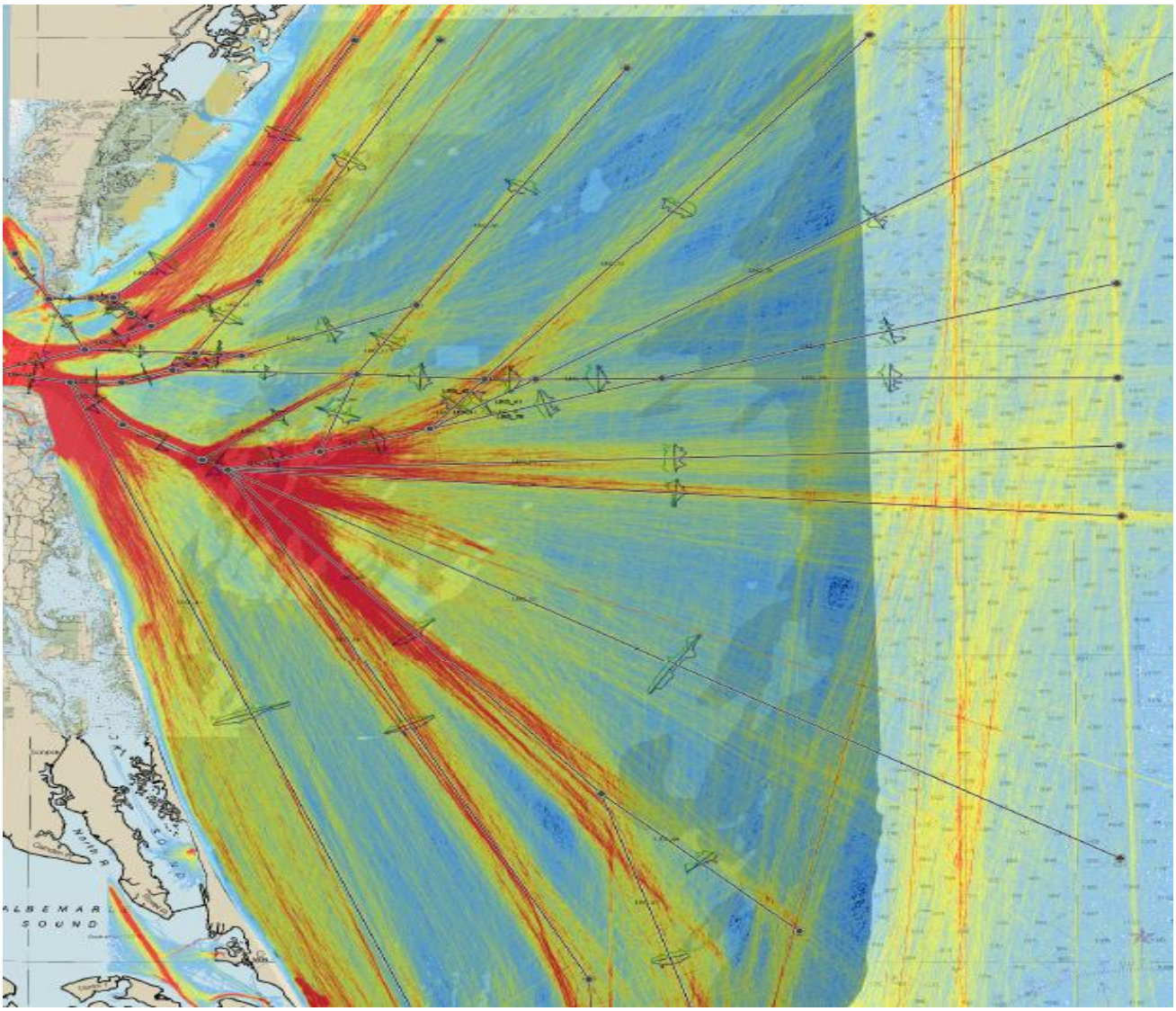

Figure E.12

Safe Transit Widths for connector fairways

To determine the width of connector fairways, the Fifth Coast Guard District used the World Association for Waterborne Transport Infrastructure (PIANC), MarCom Working Group Report to calculate the minimum width needed for a transit lane based on length of vessels and frequency of transits. The calculation takes two times the ship's length, multiplied by a factor based on the number of vessels using the route annually, and includes an additional safety margin.[18] The vessel with the greatest length to transit the area is projected to be 1,300 feet, so that is the size used in the calculation to allow the greatest margin of error for safe navigation. The average number of total ship transits over the 2017-2019 time period was determined to be 10,199. Using PIANC, a factor for three vessels side by side was used for this calculation. The calculation for safe width is this:

*1,300 (vessel length in feet) * 2 (minimum safe distance) * 3 (multiplier for between 4,400 and 18,000 vessels per year)*

*1,300 * 2 * 3 = 7,800 feet or 2,377 meters*

The PIANC study discusses the need to account for a ship's ability to conduct a full round turn within the traffic lane in the event it must take action to avoid a collision. Using IMO Standards for Ship Manoeuverability (IMO resolution MSC.137 (76) and MSC/Circ. 1053), the diameter of a full round turn is approximately equal to six times the ship's length. The calculation for maneuvering space is this:

*1,300 (vessel length in feet) * 6 = 7,800 feet or 2,377 meters.*

PIANC further discusses applying a 500-meter (1,640 feet) margin to the shipping lane to account for safety zones around wind turbines, as referenced in Article 60 of the United Nations Convention on the Law of the Sea (UNCLOS). Of note, UNCLOS article 60 states the safety zone, "shall not exceed a distance of 500 meters," and the PIANC study explicitly states the safety zone, "is for 'protection of the structure' and is not meant as a safe distance for safe manoeuvring [sic] according to COLREGs". PIANC also adds a distance of 0.3 NM to account for any deviation a ship may take for evasive maneuvers to avoid a collision.

Thus, the final calculation for safe transit width is this:

2,377m (safe width) + 2,377m (maneuvering space) + 500m (UNCLOS margin) + 0.3 NM = 5,809m or 3.1 NM

Adding in a safety margin of 2 NM based on the Coast Guard Marine Planning Guidelines, the Fifth Coast Guard District proposes a width of 5.0 NM for connector fairways to accommodate future Ultra Large Container Vessels in the approaches to the Chesapeake Bay.

[18] World Association for Waterborne Transport Infrastructure. *Interaction between offshore wind farms and maritime navigation.* 2018.

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F.Recommendations and Conclusions

Recommendations:

The Fifth Coast Guard District recommends a change to the IMO precautionary area, the addition of two connector fairways, and modifications to the ACPARS fairways in order to mitigate increased incident potential in the approaches to the Chesapeake Bay resulting from offshore development, mixing traffic, and future port activity. The existing TSSs should remain as charted.

International Maritime Organization Routing Measures

Precautionary Area: A precautionary area is charted to the east of the IMO adopted vessel routing system, "In the Approaches to Chesapeake Bay", approximately located between the Eastern and Southern approaches. While charted, this precautionary area has not been adopted by IMO and was not established in 33 CFR 167. It was established via a chart correction in Notice to Mariners 0005/1999 resulting from a collision involving a USN vessel conducting calibration tests in a maneuvering area between the TSSs. The Fifth Coast Guard District recommends this precautionary area be expanded as described by the coordinates in Table F.1 and submitted to IMO for adoption. This expansion will preserve the natural deep water isobath identified in Enclosure 1 between the TSSs and the proposed CVOWC project. This new precautionary area will encompass a part of the ACPARS Chesapeake Bay to Delaware Bay connector fairway. A modification to that fairway may be considered before the final rule is implemented.

ACPARS Shipping Safety Fairways

Chesapeake Bay to Delaware Bay Eastern Approach Cutoff Fairway: This PARS confirmed a Chesapeake Bay to Delaware Bay connector route is warranted. However, the angle of approach to the Delaware Bay should be modified as in Figure F.1 in order to increase available maneuvering space for crossing vessels in the northern portion of this PARS area. This will also allow space for offshore anchoring in the approach to the Delaware Bay. Maritime stakeholders support the need for anchorage space. Traffic analysis provided in Enclosure 1 supports that this modification will not significantly change current patterns and ensures existing routes are maintained and preserved.

Delaware Bay Connector Fairway: As a result of our recommendation to modify the Chesapeake to Delaware Bay Eastern Approach Cutoff Fairway, the Fifth Coast Guard District finds a modification to the Delaware Bay Connector Fairway is reasonable. Follow on PARS for the Seacoast of New Jersey will address any further routing measure recommendations in the approach to the Delaware Bay, including the existing TSS and precautionary areas.

Cape Charles to Montauk Point Fairway: Modifying the nearshore shipping safety fairway westward along the Delaware, Maryland, Virginia peninsula (DELMARVA) is supported by current traffic and vessel operators. Traffic analysis of tug and tow transits in the Fifth Coast

Guard District supports the single offshore shipping safety fairway for all large traffic transiting offshore of the Delaware Bay entrance. An additional analysis of coastwise tug and barge traffic between North Carolina and New Jersey is included as Enclosure 3, and supports a modification of the nearshore shipping safety fairway along the DELMARVA peninsula between Chesapeake Bay and Delaware Bay. If a transit further offshore is preferred, mariners have the ability to use the Chesapeake Bay to Delaware Bay Eastern Approach Cutoff Fairway to avoid the mixing of traffic in the entrance to the Delaware Bay. Any shipping safety fairway is available for all vessel traffic and fishing is not prohibited within.

The traffic analysis provided in Enclosure 1 shows international routes connecting the approach to the Chesapeake Bay supports these fairways. *Comments from port and industry stakeholders led the Fifth Coast Guard District to modify our proposal and expand our recommended fairways.*

Chesapeake Bay Connectors to Precautionary Area (North and South): *In the draft PARS a two-way route was proposed to connect the Delaware Bay Connector Fairway and the precautionary area. This was modified based on comments received to the draft, and proposed as a fairway instead of a two-way route to allow vessels maximum maneuvering room and flexibility. Additionally, two fairways (one North and one South) around the CVOWC OREI are now proposed. Coordinates listed in Table F.1.*

Regulated Navigation Area

Sector Virginia has highlighted a need to amend the existing RNA defined in Title 33 CFR 165.501. Though the inland portion of this RNA lies outside the study area, as part of the PARS it was considered and changes are recommended. Sector Virginia intends to draft a subsequent rulemaking to reflect recent changes in anchorage grounds, Sector Command Center processes, and comport to local speed restrictions in the Elizabeth River.

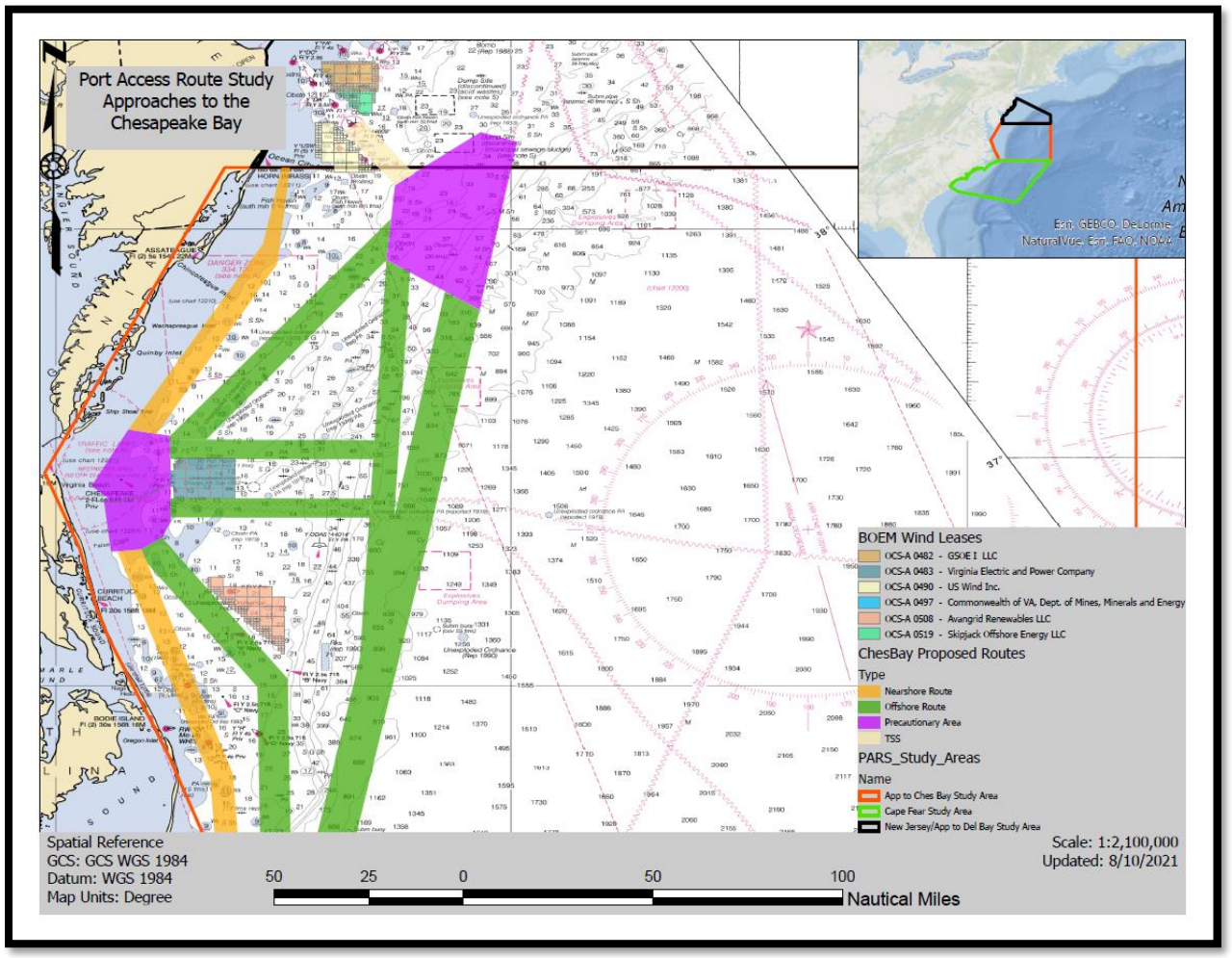
Port Access Route Study
Approaches to the
Chesapeake Bay
BOEM Wind Leases
OCS-A 0482 - GSOE I LLC
OCS-A 0483 - Virginia Electric and Power Company
OCS-A 0490 - US Wind Inc.
OCS-A 0497 - Commonwealth of VA, Dept. of Mines, Minerals and Energy
OCS-A 0508 - Avangrid Renewables LLC
OCS-A 0519 - Skipjack Offshore Energy LLC
ChesBay Proposed Routes
Type
Nearshore Route
Offshore Route
Precautionary Area
TSS
PARS_Study_Areas
Name
App to Ches Bay Study Area
Cape Fear Study Area
New Jersey/App to Del Bay Study Area
Spatial Reference
GCS: GCS WGS 1984
Datum: WGS 1984
Map Units: Degree
50 25 0 50 100
Nautical Miles
Scale: 1:2,100,000
Updated: 8/10/2021

Figure F.1

Recommendation	Detailed description
IMO Precautionary Area	Expand precautionary area in the TSS approach areas connecting points: 37.1229 N 75.6819 W 36.8747 N 75.8446 W 36.8145 N 75.7903 W 36.5894 N 75.7594 W 36.5853 N 75.6477 W 36.6481 N 75.5364 W 37.0485 N 75.4999 W 36.8386 N 75.7716 W 36.8241 N 75.4999 W
Chesapeake Bay Approach Connector - South	Establish a shipping safety fairway extending from the Delaware Bay Connector to the precautionary area to preserve a route that runs south of the CVOWC project. This route is bounded by the following points: 36.7378 N 75.4976 W 36.8213 N 75.4976 W 36.8200 N 74.6196 W 36.7366 N 74.6251 W
Chesapeake Bay Approach Connector - North	*Establish a shipping safety fairway extending from the Delaware Bay Connector to the precautionary area to preserve a route that runs north of the CVOWC project. This route is bounded by the following points:* *37.0777 N 75.4998 W* *37.0762 N 74.6024 W* *36.9928 N 74.6080 W* *36.9942 N 75.4991 W*
ACPARS Chesapeake Bay to Delaware Bay Eastern Approach Cutoff Fairway	Re-orient the Chesapeake Bay to Delaware Bay Eastern Approach Cutoff Fairway to the following points: 37.0115 N 75.4080 W 37.0668 N 75.5279 W 38.2666 N 74.1719 W 38.2667 N 74.2993 W
ACPARS Cape Charles to Montauk Point Fairway	Re-orient the Cape Charles to Montauk Fairway to the following points between Chesapeake Bay and Delaware Bay: 37.1271 N 75.6803 W 37.0823 N 75.5759 W 37.8488 N 75.0306 W 37.9371 N 75.0912 W 38.2593 N 74.9763 W 38.2568 N 75.0072 W

Recommendation	Detailed description
ACPARS Delaware Bay Connector Fairway	Re-orient the Delaware Bay Connector Fairway to the following points between the St. Lucie to New York Fairway and the Off Delaware Bay Southern Approach Cutoff Fairway: 36.1087 N 74.6672 W 36.7269 N 74.5172 W 38.2549 N 74.4140 W 38.1868 N 74.5296 W

Table F.1

Conclusions:

The Fifth Coast Guard District concludes the increased frequency of collision or allision anticipated as shipping traffic maneuvers around future offshore developments is best mitigated by a combination of IMO resolutions (precautionary area and two-way route) and shipping safety fairways found above. The Fifth Coast Guard District recommends the Coast Guard Office of Navigation Systems (CG-NAV) incorporate these alternatives into the ANPRM for fairways and propose they be established by an IMO resolution. Data provided in the enclosures support such an action. The Fifth Coast Guard District concludes this provides a balanced approach to marine planning, addresses multiple waterway users, and encourages future safety of navigation.

Alternative Suggestions:

The Fifth Coast Guard District assessed additional alternatives proposed by public comments and stakeholder outreach.

Alternative 1: Widen ACPARS St. Lucie to Chesapeake Bay Offshore Fairway to ensure safe navigation of towing vessel operators.

Assessment: The Fifth Coast Guard District finds traffic analysis and frequency as provided in this study does not support this alternative. The current proposed ACPARS width is adequate for safe vessel transits.

Alternative 2: Establish additional shipping safety fairway between the two OREI (CVOWC and Kitty Hawk) in the study area. Maritime stakeholders suggest this is necessary to preserve sea space from further offshore development and ensure safety of navigation around OREI.

Assessment: The Fifth Coast Guard District does not agree this alternative is necessary at this time. DoD charted OPAREAs and discussions with BOEM on future offshore development do not support a need for shipping safety fairways in this area. Too many fairways may cause confusion and not improve the safety of navigation around the OREI in the approaches to the Chesapeake Bay. Our current data does not support a modification to the St. Lucie to Chesapeake Bay nearshore fairway at this time. The Fifth Coast Guard District finds the shipping safety fairways as currently proposed by the ACPARS ANPRM are sufficient to ensure safe navigation as offshore development matures in the southern portion of the study area. Stakeholder engagement also suggested this alternative preserve all sea space between the CVOWC and Kitty Hawk OREI. The Fifth Coast Guard District could not find similar fairways anywhere else in the world; therefore, we do not recommend.

Alternative 3: Establish additional shipping safety fairway or two-way route north of the CVOWC OREI.

Assessment: *The Fifth Coast Guard District moved this forward as a proposal in the final report.*

G. Final Report Comments and Modifications

Comments and responses to draft report

Comments of general support or dissatisfaction
The Virginia Marine Resources Commission (VMRC) concluded the proposed approaches should not negatively affect the VMRC enforcement capabilities and policies.
Dominion Energy believed a new lease area will be made available to meet Virginia's offshore wind goals. Dominion believes the Chesapeake Bay PARS analysis and proposed fairways will support this potential.
American Clean Power (ACP (formerly American Wind Energy Association)) generally supported the proposed modifications to the ACPARS fairways. ACP did not concur with a Chesapeake Bay to Delaware Bay connector fairway and opposed a standard two nautical mile setback from routing measures or fairways to any offshore structure. They believe this would help to ensure space is available for future offshore energy development as requested to meet stated goals for Virginia and North Carolina.
Comments regarding fishing in the study area
The Mid Atlantic Fisheries Management Council is concerned with the ability of commercial and recreational fishing vessels to continue to safely fish and transit the wind energy areas and believed the report does not provide sufficient consideration to navigation within the wind energy area. The commenter is concerned with the lack of search and rescue operation detail as found in the Massachusetts Rhode Island PARS. Commenter requested the PARS provide more detail on the types of fishing activity within the study area.
The Responsible Offshore Development Alliance (RODA) provided input on behalf of whelk and sea bass anglers in the area. The commenter stated that fishing does occur near and within the current lease area. The commenter suggested that Coast Guard contact the operators to ensure missing data points can be counted (whelk fishery & VMS data), and noted that sea bass anglers are actively fishing in the proposed two-way route.
Comments regarding future shipping trends and needs for navigation safety into the future
The Port of Virginia presented data that demonstrated an increase in ship size and infrastructure investment in the port, combined with approved dredge projects, will attract even larger ships. This suggests the future capability to change shipping routes

from coastwise trade to first in/last out services for the Chesapeake Bay/Port of Virginia. This future trend will require a separate two-way route north of the Virginia lease area and supports the need for a larger precautionary area in the vicinity of the 'CB' buoy.
The American Waterways Operators requested a nine-mile wide fairway for towing vessel safety that includes a two-mile buffer from the fairway and adjacent offshore development. The commenter also believed two routes (near and off shore) are required to accommodate towing traffic and mitigate mixing traffic types (towing and deep draft).
Compagnie Maritime d'Affretement – Compagnie Generale Maritime ((CMA-CGM) (America)) requested a two-way route north of the Virginia lease to accommodate larger ships into the future.
The Virginia Maritime Association (VMA) stated that shipping has changed since the original Commercial Virginia Offshore Wind (CVOW) lease was established. The VMA suggested fairways provide greater flexibility over a two-way route, and proposed the addition of a fairway north of the CVOW lease area to accommodate larger, deeper ships calling on the port now and into the future.
Comments on Maritime Security and National Defense Operation:
United States Fleet Forces desired coordination if these proposals result in vessel movement directives and guidelines. The commenter was concerned that the two-way route south of the CVOW lease area may impact military training tactics and procedures. This must be communicated to mariners for safety if the route is established.

Changes to draft in response to comments

The proposed fairways now include a new connector fairway running east-west north of the CVOW lease area. This fairway will enable further space for larger ships to transit through the naturally occurring deep-water slough in the proposed precautionary area. The originally proposed two-way route, south of CVOWC, is now proposed as a fairway. The addition of another fairway provides for a larger separation of traffic entering and exiting the Chesapeake Bay entrance, mitigating the frequency of vessel meeting situations. Transit lane widths were calculated in this final report and specific coordinates for these proposals are listed in Table F.1. The location of these fairways was discussed and reviewed by local port stakeholders and the Commonwealth of Virginia to ensure de-confliction with future state energy goals.

The report concludes, based on recent AIS traffic data and future Ultra Large Container Vessel build orders provided by the VMA, that the proposed ANPRM shipping safety fairway widths are sufficient to accommodate nearshore and offshore vessel transits.

Coast Guard missions, including search and rescue, are considered throughout the NEPA process for individual OREI. The scope of the PARS does not include analysis of these missions with respect to OREI. Impacts to Coast Guard missions are addressed in the Environmental Assessment under NEPA for each individual project.

Additional analysis and detail in Section E reflect comments from commercial fishing representatives and deep draft operators. Specific changes and additions are identified in italicized type.

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H. Appendices

1. Definitions

Allision: a collision between a moving vessel and a fixed or anchored object.

Area to be Avoided**:** an area within defined limits in which either navigation is particularly hazardous or it is exceptionally important to avoid casualties and which should be avoided by all ships, or certain classes of ships.

Automated Identification System: automatic tracking system that supplements marine radar and is used as a method of collision avoidance and to distinguish and plot vessel traffic patterns.

Hydrokinetic Energy: energy created by the constant flow of ocean currents across the world's oceans.

Navigation Safety Corridor: Coast Guard term used to describe regular vessel traffic pattern derived from density plots using AIS information.

Offshore Renewable Energy Installation: an energy development project designed offshore to harness either wind or hydrokinetic energy for onshore consumers.

Port Approaches: navigation routes followed by vessels entering or departing from a or to a primary transit route.

Precautionary area: an area within defined limits where ships must navigate with particular caution and within which the direction of traffic flow may be recommended.

Recommended Route: a route of undefined width, for the convenience of vessels in transit, which is often marked by centerline buoys.

Regulated Navigation Area (RNA): a water area within a defined boundary for which regulations for vessels navigating within the area have been established under 33 CFR 165.

Routing System: any system of one or more routes or routing measures aimed at reducing the risk of casualties; including traffic separation schemes, two-way routes, recommended tracks, areas to be avoided, no anchoring areas, inshore traffic zones, roundabouts, precautionary areas and deep-water routes.

Shipping Safety Fairways: a lane or corridor in which no artificial island or fixed structure, whether temporary or permanent, will be permitted. Temporary underwater obstacles may be permitted under certain conditions described for specific areas in Title 33 CFR 166, Subpart B. Aids to navigation approved by the U.S. Coast Guard may be established in a fairway.

Traffic Separation Scheme (TSS)*:* a routing measure aimed at the separation of opposing streams of traffic by appropriate means and by the establishment of traffic lanes; or other options that may be available to facilitate safe navigation.

Two-Way Route: a route within defined limits inside which two-way traffic is established, aimed at providing safe passage of ships through waters where navigation is difficult or dangerous.

Wind Energy Areas: designated areas within the U.S. EEZ which are reserved for leasing to energy companies for the purpose of developing offshore wind turbine fields to harness wind energy.

2. Table of Abbreviations

ACPARS	Atlantic Coast Port Access Route Study	NOAA	National Oceanic and Atmospheric Administration
AIS	Automatic Identification System	OREI	Offshore Renewable Energy Installation
BOEM	Bureau of Ocean Energy Management	RNA	Regulated Navigation Area
CFR	Code of Federal Regulations	SAP	Site Assessment Plan
CFV	Commercial Fishing Vessel	SAR	Search and Rescue
COP	Construction and Operations Plan	TSS	Traffic Separation Scheme
DELMARVA	Delaware-Virginia-Maryland	USCG	United States Coast Guard
IMO	International Maritime Organization	VMS	Vessel Monitoring System
MARCO	Mid-Atlantic Regional Council of the Ocean	VTR	Vessel Trip Report
NMFS	National Marine Fisheries Service	WEA	Wind Energy Area

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I. Enclosures

1. Coast Guard Navigation Center Traffic Analysis

The traffic analysis encompasses the area study area defined by the Chesapeake Bay PARS. It evaluates annual trends and unique or significant variations relating to the quantity, characteristics, and routes of the vessels transiting the Chesapeake Bay entrance.[19] This analysis does not evaluate coastal traffic that does not transit the mouth of Chesapeake Bay. The Coast Guard Navigation Center prepared this enclosure for the Fifth Coast Guard District and Coast Guard Headquarters to support this study using the following:

- 2017 and 2018 Vessel AIS track line data downloaded from Marine Cadastre
- 2019 Vessel AIS five-minute aggregated point data obtained from the USCG Nationwide Automatic Identification System (NAIS)
- Marine Cadastre's ArcMAP toolbox TrackBuilder 3.1[20]
- USCG Standard Workstation running ESRI's desktop GIS program ArcMAP 10.5.1
- Study area as defined in Agency Docket Number USCG-2019-0862 in the Federal Register

[19] 33 CFR §80.510 Chesapeake Bay Entrance, VA. A line drawn from Cape Charles Light to Cape Henry Light.
[20] https://coast.noaa.gov/digitalcoast/tools/track-builder.html

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2. IALA Waterway Risk Assessment Program (IWRAP) Analysis

The Coast Guard Navigation Center prepared this report to illustrate and model traffic incident frequencies using the IALA Waterways Risk Assessment Program (IWRAP) software. The full set of case studies analyzed for this report are in the following enclosure.

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3. Coast Guard Navigation Center Tug and Tow Analysis

The Fifth Coast Guard District enlisted the Coast Guard Navigation Center to conduct a detailed traffic analysis of tug and tow vessel transits within the study are. This analysis extended into the adjacent PARS for the Seacoast of New Jersey including the approach to the Delaware Bay. Data and analysis found in this enclosure support our proposed modification to the Cape Charles to Montauk Point Fairway westward along the DELMARVA peninsula.

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