Final
Environmental Impact Statement/Overseas Environmental Impact Statement
Atlantic Fleet Training and Testing

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3.11 SOCIOECONOMICS

SOCIOECONOMICS SYNOPSIS

The United States (U.S.) Department of the Navy (Navy) considered all potential stressors that socioeconomics could potentially be exposed to from the Proposed Action. The following conclusions have been reached for the Preferred Alternative (Alternative 1):

- Accessibility: Limits on accessibility to marine areas used by the public (e.g., fishing areas) in the Navy training and testing areas would be temporary and of short duration (hours). Restrictions would be lifted, and conditions would return to normal upon completion of training and testing activities. Minimal impacts on commercial and recreational fishing and tourism may occur; however, limits on accessibility would not result in a direct loss of income, revenue or employment, resource availability, or quality of experience. No impacts on sources for energy production and distribution, mineral extraction, commercial transportation and shipping, and aquaculture are anticipated.
- Airborne Acoustics: Because the majority of Navy training and testing activities are conducted far from where tourism and recreational activities are concentrated, the impact of airborne noise would be negligible. The public may intermittently hear noise from transiting ships or aircraft overflights if they are in the general vicinity of a training or testing activity, but these occurrences would be infrequent. The infrequent exposure to airborne noise would not result in a direct loss of income, revenue or employment, resource availability, or quality of experience. No impacts on sources for energy production and distribution, mineral extraction, commercial transportation and shipping, and aquaculture are anticipated.
- Physical Disturbance and Strikes: Because the majority of Navy training and testing activities are conducted farther from shore than where most recreational activities are concentrated, the potential for a physical disturbance or strike affecting recreational fishing or tourism is negligible. In locations where Navy training or testing occurs in nearshore areas (e.g., pierside), the Navy coordinates with civilian organizations to assure safe and unimpeded access and use of those areas. Based on the Navy's standard operating procedures and the large expanse of the testing and training ranges, the likelihood of a physical disturbance or strike disrupting sources for energy production and distribution, mineral extraction, commercial transportation and shipping, commercial and recreational fishing, aquaculture, and tourism would be negligible. Therefore, direct loss of income, revenue or employment, resource availability, or quality of experience would not be expected.

3.11.1 INTRODUCTION AND METHODS

This section provides an overview of the characteristics of socioeconomic resources in the Atlantic Fleet Training and Testing (AFTT) Study Area (Study Area) and describes in general terms the methods used to analyze potential impacts on these resources from the Proposed Action.

The Council on Environmental Quality regulations implementing the National Environmental Policy Act state that when economic or social effects and natural or physical environmental effects are interrelated, the Environmental Impact Statement/Overseas Environmental Impact Statement (EIS/OEIS)

will discuss these effects on the human environment (40 Code of Federal Regulations [CFR] section 1508.14). The Council on Environmental Quality regulations state that the "human environment shall be interpreted comprehensively to include the natural and physical environment and the relationship of people with that environment." To the extent that the ongoing and proposed Navy training and testing activities in the Study Area could affect the natural or physical environment, the socioeconomic analysis evaluates how elements of the human environment might be affected. The Navy identified six broad socioeconomic elements based on their association with human activities and livelihoods in the Study Area. Each of these socioeconomic resources is an aspect of the human environment that involves economics (e.g., employment, income, or revenue) and social conditions (e.g., enjoyment and quality of life) associated with the marine environment of the Study Area. Therefore, this evaluation considered potential impacts on six elements:

- sources for energy production and distribution (water, wind, oil and gas)
- mineral extraction
- commercial transportation and shipping
- commercial and recreational fishing
- aquaculture
- tourism

The baseline for identifying the socioeconomic conditions in the Study Area was derived using relevant published information from sources that included federal, state, regional, and local government agencies and databases, academic institutions, conservation organizations, technical and professional organizations, and private groups. Previous environmental studies were also reviewed for relevant information.

The alternatives were evaluated based on the potential and the degree to which training and testing activities could impact socioeconomic resources. The potential for impacts depends on the likelihood that the training and testing activities would interface with public activities or infrastructure. Factors considered in the analysis include whether there would be temporal or spatial interfaces between the public or infrastructure and Navy training and testing. If there is potential for this interface, factors considered to estimate the degree to which an exposure could impact socioeconomics include whether there could be an impact on livelihood, quality of experience, resource availability, income, or employment. If there is no expected potential for the public to interface with an activity, the impacts would be considered negligible.

3.11.2 Affected Environment

This section describes the six socioeconomic resources associated with human activities and livelihoods in the Study Area. The primary area of interest for assessing potential impacts on socioeconomic resources is the U.S. territorial waters in the North Atlantic Ocean and the Gulf of Mexico (seaward of the mean high water line to 12 nautical miles [NM]). Limited socioeconomic resources outside this area of interest (i.e., that portion of the U.S. Exclusive Economic Zone between 12 and 200 NM from shore) are also described when relevant to human activities.

3.11.2.1 Sources of Energy Production and Distribution

There are three primary sources of energy production in the Study Area: water, wind, and oil and gas. Each of these activities is described in this section.

3.11.2.1.1 Water

Hydropower is derived from the force of moving water. Hydrokinetic power is a type of hydropower that is derived from fast-moving marine or estuarine currents driven by waves, tides, or offshore ocean currents (U.S. Department of Energy, 2015b). The Federal Energy Regulatory Commission licenses hydropower projects. The Bureau of Ocean Energy Management has jurisdiction to issue leases, easements, and rights-of-way for hydrokinetic projects in Federal waters.

The Wind and Water Power Technologies Office within the U.S. Department of Energy's Office of Energy Efficiency and Renewable Energy provided over $133 million in funding for 97 marine and hydrokinetic projects from Fiscal Year 2008–2014, almost exclusively to private industry and universities or colleges. Projects in 24 states, including 11 states located adjacent to the AFTT Study Area, have received funding. Nearly 45 percent ($58 million) of the funding went to the Atlantic coast and Gulf coast geographic regions, with Maine receiving over $18 million. Some of the strongest wave and tidal resource potential in the continental United States resides off the coast of Maine (U.S. Department of Energy, 2015b).

The Federal Energy Regulatory Commission has issued licenses for four hydrokinetic projects, two of which are tidal projects located on the Atlantic coast: the Cobscook Bay Tidal Project in Maine and the Roosevelt Island Tidal Energy Project in New York City. Neither of these projects are located within the AFTT Study Area, but both demonstrate the feasibility of similar projects located farther offshore. In 2012, the Cobscook Bay Tidal Project in Maine marked the first time in U.S. history that a commercial tidal project connected to the electric power grid. Verdant Power, Inc. completed the Roosevelt Island Tidal Energy Project in New York City's East River and continues to develop the technology. The Cobscook Bay license extends through January 31, 2020, and the Roosevelt Island license extends through December 31, 2022 (Federal Energy Regulatory Commission, 2015). A license allows the licensee to construct and operate a hydrokinetic electric generation facility for up to either 30 or 50 years, depending on the type of license.

The United States has no commercial offshore hydrokinetic energy generating capacity at this time. As of April 2018, the Federal Energy Regulatory Commission had two active hydrokinetic preliminary permits. Both of the permitted projects are located on the Atlantic coast. The permit for the Western Passage Tidal Energy project located off the coast of Maine near the city of Eastport was issued on July 13, 2016, and expires on June 30, 2019. The project will test 15 hydrokinetic tidal devices, each consisting of a 500-kilowatt turbine-generator unit (MarineEnergy.biz, 2017). The Cape Cod Canal and Bourne Tidal project located in the Cape Cod Canal in Massachusetts was issued a permit on September 22, 2016, and the permit expires on August 31, 2019 (Federal Energy Regulatory Commission, 2015, 2018a, 2018b). Both projects are located in state waters. Although a preliminary permit does not authorize construction of a commercial device, it allows the applicant to conduct studies and secure data necessary to determine the feasibility of commercial development. The Fort Pierce Inlet Tidal project located off the Florida coast was active from May 2015 through April 2018 and was the first lease issued to test ocean current energy equipment in Federal waters. The project study area and lease blocks permitted by the Bureau of Ocean Energy Management are within the Study Area; however, the project permit is no longer active.

The Navy is playing a role in the development of hydrokinetic technologies by allowing developers to test scale models of their wave energy converter equipment in the wave-making facility at Naval Surface Warfare Center, Carderock in Maryland (U.S. Department of Energy, 2015a). On a broader scale, the U.S. Department of Agriculture and the Navy signed a Memorandum of Understanding in early 2010 to

advance the production of renewable energy by sharing technical, program management, and financial expertise (U.S. Department of the Navy, 2010).

A variety of other companies and academic institutions continue to conduct research on and develop hydrokinetic technologies for deployment and eventual commercial use along the Atlantic and Gulf coasts. Their activities may include sea trials, small-scale prototype testing, and research that may use instruments such as acoustic Doppler profile current sensors, digital recording sonar, and underwater video and still photography taken from unmanned underwater vehicles.

3.11.2.1.2 Wind

Wind energy is derived from the force of moving air that causes large wind turbine blades to rotate. The blades are connected to an electric generator that converts the mechanical energy from the wind into electricity, which is then transferred to the electrical power grid (U.S. Department of Energy, 2017). The first commercial offshore wind farm in the United States came online and reached commercial operation in December 2016. The Block Island Wind Farm, located in state waters off Block Island, Rhode Island, was developed by Deepwater Wind, LLC and is capable of generating 30 megawatts of power using five wind turbines (Deepwater Wind, 2018a, 2018b).

A National Offshore Wind Strategy: Creating an Offshore Wind Energy Industry in the United States, was prepared in 2011 to support development of a world-class offshore wind industry in the United States (U.S. Department of Energy & U.S. Department of the Interior, 2011). The Bureau of Ocean Energy Management developed a regulatory framework to review proposed offshore wind projects in federal waters and launched the "Smart from the Start" initiative to facilitate siting, leasing, and construction of new projects (Bureau of Ocean Energy Management, 2013). In general, this process includes the following steps:

- Wind energy areas that appear most suitable for wind energy development are identified.
- Requests for interest and calls for information are issued for new wind energy areas to support lease sale environmental assessments.
- Environmental assessments are completed for the wind energy areas, allowing the lease sale process to move forward.
- A lease sale is held. Issuance of a commercial lease gives the lessee the exclusive right to subsequently seek Bureau of Ocean Energy Management approval for development of the leasehold. The lease does not grant the lessee the right to construct any facilities; rather, the lease grants the right to use the leased area to gather resource and site characterization information and develop plans, which must be approved by the Bureau of Ocean Energy Management before the lessee can move on to the next stage of the process.
- Project-specific National Environmental Policy Act review (typically an EIS) is conducted, and plans for construction and operation are approved before beginning construction of individual wind power facilities.

Since 2009, the Bureau of Ocean Energy Management's Office of Renewable Energy Programs has issued 13 commercial wind energy leases for offshore wind farm development to the following companies for projects located within or adjacent to the Study Area (Bureau of Ocean Energy Management, 2018):

- Cape Wind Associates, LLC, for an area totaling 29,425 acres (ac.) offshore of Massachusetts (2010).

- Bluewater Wind Delaware, LLC, for an area totaling 96,430 ac. offshore of Delaware (2012). Assigned to Garden State Offshore Energy, LLC, in 2016.
- Deepwater Wind New England, LLC, for two lease areas totaling 164,750 ac. offshore of Rhode Island and Massachusetts (2013).
- Virginia Electric and Power Company (Dominion Virginia Power) for an area totaling 112,799 ac. offshore of Virginia (2013).
- US Wind, Inc. for an area totaling 183,353 ac. offshore of New Jersey (2016).
- US Wind Inc., for two lease areas totaling 79,707 ac. offshore of Maryland (2014).
- Offshore MW LLC for an area totaling 166,886 ac. offshore of Massachusetts (2015). Offshore MW LLC changed its name to Vineyard Wind LLC. In 2017.
- RES America Developments, Inc., for an area totaling 187,523 ac. offshore of Massachusetts (2015). Assigned to Bay State Wind LLC in 2016.
- RES America Developments, Inc. for an area totaling 160,480 ac. offshore of New Jersey (2016). Assigned to Ocean Wind LLC in 2016.
- Statoil Wind US LLC. for an area totaling 79,350 acres offshore of New York (2017).
- Avangrid Renewables, LLC. for an area totaling 122,405 acres offshore of North Carolina (2017).

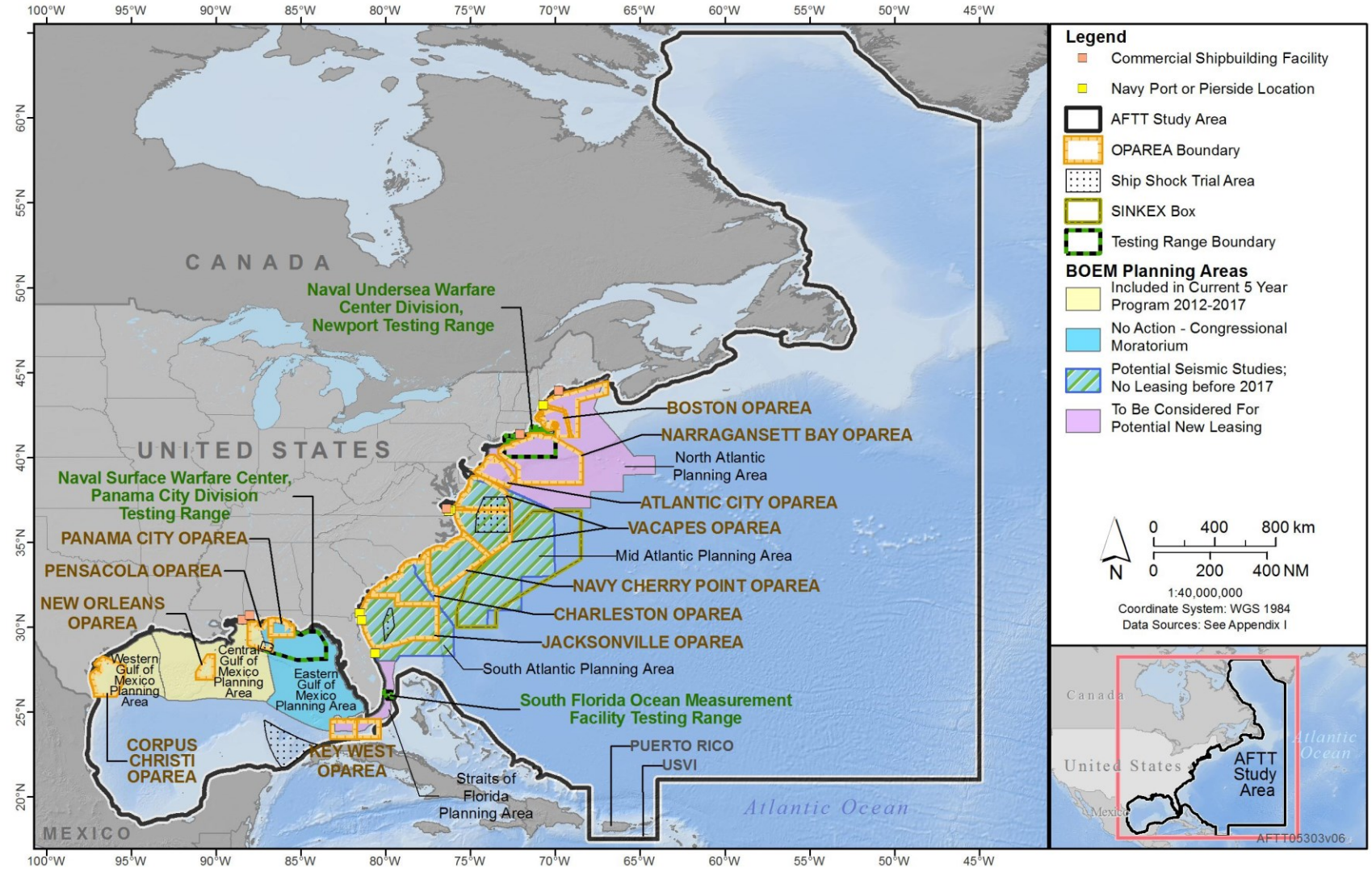
The Bureau of Ocean Energy Management grants rights-of-way allowing developers to build electricity transmission lines connecting commercial windfarms and other offshore renewable energy installations to the on-shore electrical grid. The Bureau executed a right-of-way grant in 2014 for a cable project that will support the Block Island Wind Farm, a wind project located in Rhode Island state waters. The Bureau expects to receive additional unsolicited applications for right-of-way grants in the future (Bureau of Ocean Energy Management, 2015a). Other offshore windfarm projects are expected in the coming years for both research and commercial development in state and federal waters.

Approximately 3 NM offshore of Atlantic City, New Jersey, and within state waters, Fishermen's Energy of New Jersey plans to install six four-megawatt turbines in support of a demonstration and research project. The Fishermen's Energy project had been delayed but was revived by New Jersey state government legislation. The project will test new and developing technology and conduct research on potential environmental impacts associated with offshore windfarms (Post, 2018).

Two research lease requests were received from the Virginia Department of Mines, Minerals and Energy. In response to both requests, the Bureau determined there was no competing interest in the lease areas. One of the research leases, referred to as the Virginia Offshore Wind Technology Advancement Project, was executed in March 2015. This was the first research lease to be issued in U.S. federal waters (Bureau of Ocean Energy Management, 2015b). The Bureau finalized an Environmental Assessment and issued a Finding of No Significant Impact for the proposed project in July 2015. As part of this project, Dominion Virginia Power will install two six-megawatt direct-drive wind turbines 26 miles (mi.) off the coast of Virginia Beach, Virginia.

3.11.2.1.3 Oil and Gas

The Bureau of Ocean Energy Management administers Outer Continental Shelf Oil and Gas Leasing Programs. The Bureau divides the outer continental shelf into planning areas, which are further divided into lease blocks that can be leased from the government by the public (e.g., oil and gas companies) for resource extraction (Figure 3.11-1).



Notes: AFTT: Atlantic Fleet Training and Testing; OPAREA: Operating Area; BOEM: Bureau of Ocean Energy Management; SINKEX: Sinking Exercise; VACAPES: Virginia Capes

Figure 3.11-1: Bureau of Ocean Energy Management Planning Areas

As of January 1, 2016, there were 4,457 active oil and gas leases totaling 23,989,693 ac. in the Gulf of Mexico Continental Shelf Oil Region, which is divided into three planning areas (Bureau of Ocean Energy Management, 2016):

- Western Planning Area, 907 active leases and 5,143,073 ac. leased
- Central Planning Area, 3,505 active leases and 18,574,590 ac. leased
- Eastern Planning Area, 48 active leases and 264,030 ac. leased

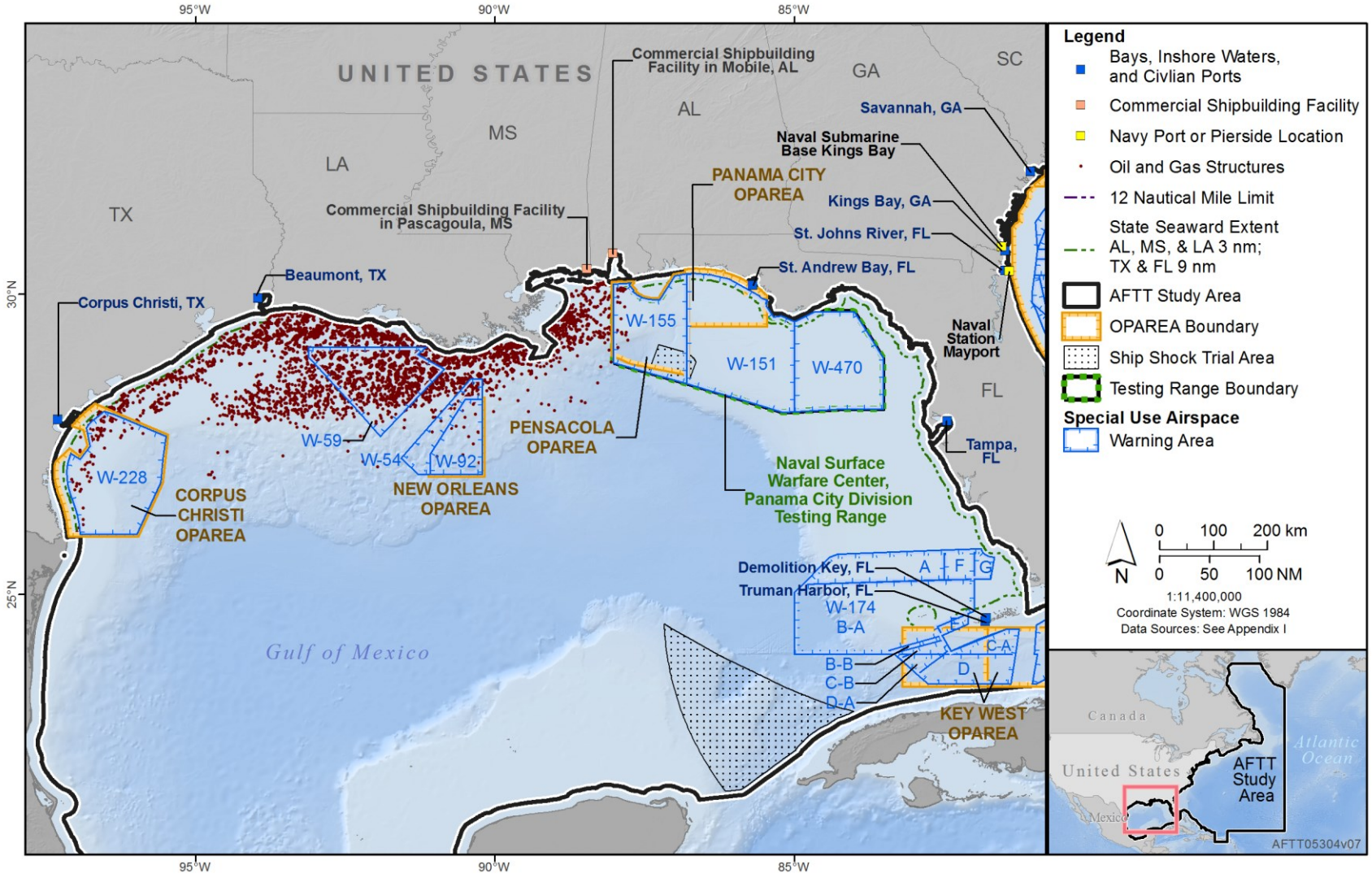
There are 1,866 fewer active leases in the Gulf of Mexico than in 2011, which represents a decrease of 9,916,106 leased acres (Bureau of Ocean Energy Management, 2011, 2016).

Drilling for oil and gas has taken place in offshore Canadian Atlantic waters since 1967; however, Canada has imposed a moratorium on drilling in the Canadian portion of the Georges Bank until December 31, 2022 (Nova Scotia Canada, 2015). Gas was discovered in 1971 off of Sable Island approximately 225 kilometers offshore of Nova Scotia, which is within the Study Area. Natural gas production began in 1999 and continues today. Gas is transported through an undersea pipeline linking production wells with on-shore facilities. The Sable Offshore Energy Project produced over 112 million cubic meters of natural gas in November 2015. However, average monthly production has decreased steadily since 2008, when approximately 400 million cubic meters were produced monthly. The project life expectancy was 25 years when drilling started in 1999, which, unless revised, means the project will end in 2024 (Canada-Nova Scotia Offshore Petroleum Board, 2015).

The Gulf of Mexico is the only portion of the Study Area where energy production from oil and gas occurs in U.S. territorial waters. In 2014, total oil production in the Gulf of Mexico was nearly 395 million barrels and valued at $37 billion (National Ocean Economics Program, 2015a). Natural gas production in 2014 totaled over 829 million Mcf (the unit “Mcf” is 1,000 [M] cubic feet [cf]), which was valued at $3.8 billion. The majority of oil and gas structures and the pipelines linking those structures with on shore processing and refining facilities are located off of Louisiana and do not overlap with Navy testing ranges and Operating Areas (OPAREA) (Figure 3.11-2, Figure 3.11-3).

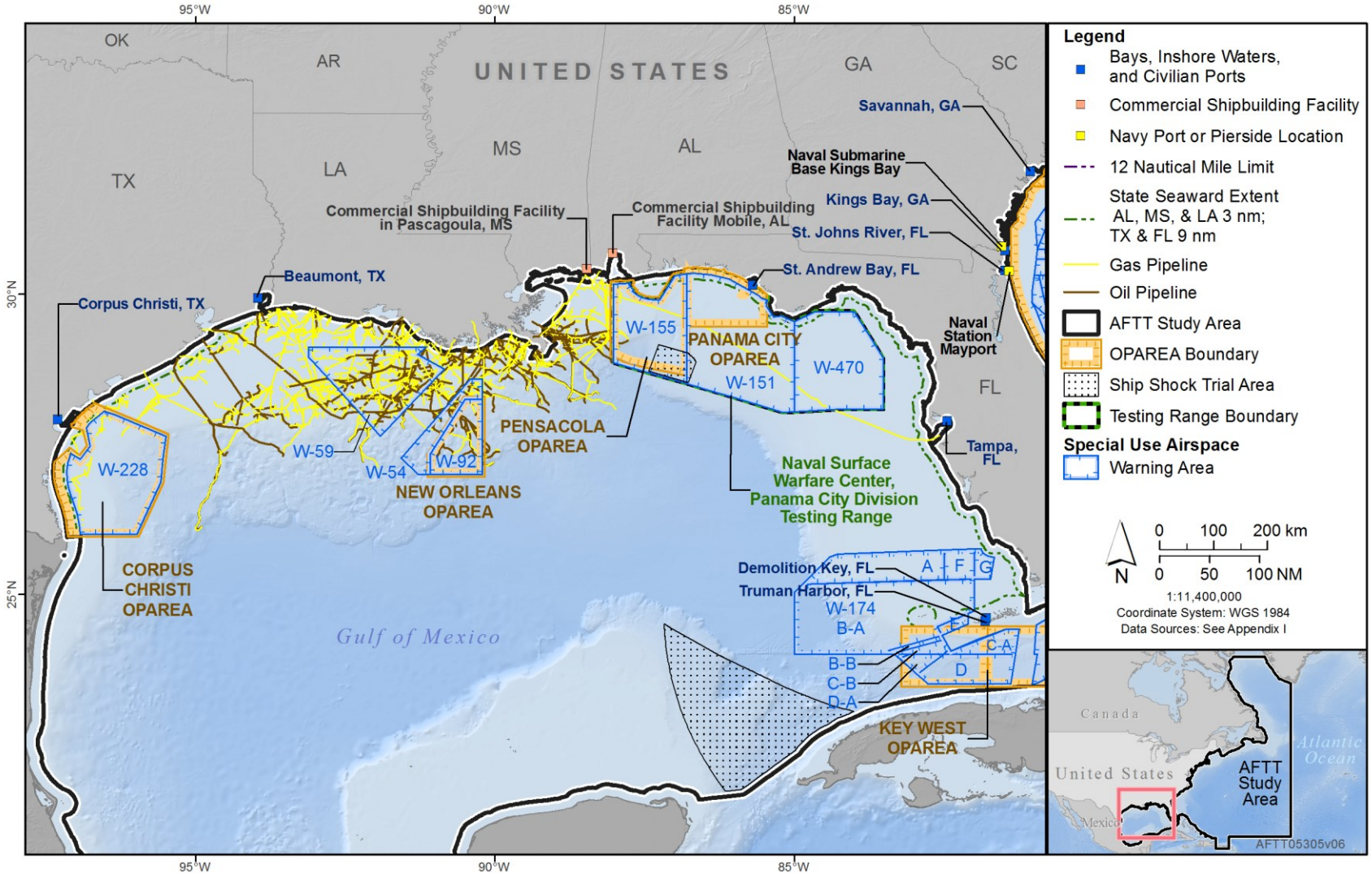
3.11.2.2 Mineral Extraction

Extraction of minerals along the Atlantic and Gulf coasts involves primarily hard minerals (e.g., sand, gravel, and other minerals) extracted from the outer continental shelf. Heavy minerals (e.g., titanium and zircon) used in a number of commercial industries are also potential offshore resources. The Bureau of Ocean Energy Management is responsible for assessing the mineral resources on the U.S. outer continental shelf to determine if they can be extracted in an environmentally sound manner.



Notes: AFTT: Atlantic Fleet Training and Testing; OPAREA: Operating Area

Figure 3.11-2: Oil and Gas Structures in the Gulf of Mexico



Notes: AFTT: Atlantic Fleet Training and Testing; OPAREA: Operating Area

Figure 3.11-3: Active and Proposed Oil and Gas Pipelines in the Gulf of Mexico

Two types of lease conveyances for sand and gravel and other non-energy minerals are used by the Bureau: (1) noncompetitive negotiated agreements, which can only be used for public works projects funded by federal, state, or local government agencies; and (2) competitive lease sales, for which any qualified person may submit a bid. Between 2009 and 2016, the Bureau executed 21 leases in six states: Florida, Louisiana, North Carolina, South Carolina, New Jersey, and Virginia (Bureau of Ocean Energy Management, 2015c). Projects include:

- New Jersey (Long Beach Island),
- Virginia (Dam Neck, Sandbridge, and Wallops Flight Facility),
- North Carolina (Bogue Banks),
- South Carolina (Charleston Offshore Dredged Material Disposal Site Sand Borrow Project, Folly Beach),
- Florida (Patrick Air Force Base, Longboat Key, Martin County, Pinellas County, Duval County, and Brevard South Reach), and
- Louisiana (Whiskey Island, Caminada Headlands, Cameron Parish, and Raccoon Island Phase B).

Sand and gravel transported from offshore sites are primarily used to restore coastal areas that have been eroded by storms or sea level rise. Over the past 20 years, more than 109 million cubic yards of sediment have been extracted and transported to coastal communities and federal agencies, including the Navy, for shoreline restoration projects (Bureau of Ocean Energy Management, 2015c). A number of areas along the U.S. Atlantic coast were severely damaged in 2012 by Hurricane Sandy. The Bureau has coordinated with other federal agencies, including the Federal Emergency Management Agency and the U.S. Army Corps of Engineers, on restoration projects at Sandbridge Beach, Virginia; Wallops Island, Virginia; Brevard County, Florida; and Long Beach Island, New Jersey (Bureau of Ocean Energy Management, 2015d).

In February 2014, the Bureau released its Final Programmatic EIS analyzing potential impacts of geological and geophysical surveys of the seafloor; the Record of Decision was signed in July 2014 (Bureau of Ocean Energy Management, 2014). The survey region extends from Delaware Bay to Cape Canaveral, Florida. Geological and geophysical surveys are conducted prior to initiating mineral extraction or offshore development projects, such as windfarms, oil and gas exploration, or hydropower projects, to determine the best use of an area. The Bureau of Ocean Energy Management regulates offshore activities to protect the environment and ensure safety of personnel and the public (Bureau of Ocean Energy Management, 2015c).

3.11.2.3 Commercial Transportation and Shipping

Commercial transportation and shipping encompasses marine and air traffic within the Study Area. Military use of the offshore sea and air space is generally compatible with civilian use, with Navy ships accounting for less than 1 percent of the total ship presence in the Study Area (Mintz, 2012). Training and testing activities that are not compatible with commercial transportation and shipping (e.g., weapons firing) typically occur in Navy OPAREAs far from commercially used waterways and inside Special Use Airspace, as described in Section 3.11.2.3.2 (Air Transport). Upcoming training and testing activities are announced to commercial vessel and aircraft operators by use of Notices to Mariners issued by the U.S. Coast Guard, Notices to Airmen issued by the Federal Aviation Administration, and marine band radio, as needed. The Navy procedures for planning and management of activities are

provided in the Chief of Naval Operations Instruction 3770.2K, Airspace Procedures and Planning Manual (U.S. Department of the Navy, 2007).

Scheduling and planning procedures for activities on range complexes (including testing activities in the Northeast Range Complexes) are issued through the Navy's Fleet Area Control and Surveillance Facilities Virginia Capes in Virginia Beach, Virginia and the Fleet Area Control and Surveillance Facilities Jacksonville located in Jacksonville, Florida. Testing ranges have their own procedures for aviation safety, such as the Naval Surface Warfare Center, Panama City Division Instruction (U.S. Department of the Navy, 2008) and Naval Undersea Warfare Center Division, Newport Instruction (U.S. Department of the Navy, 2009).

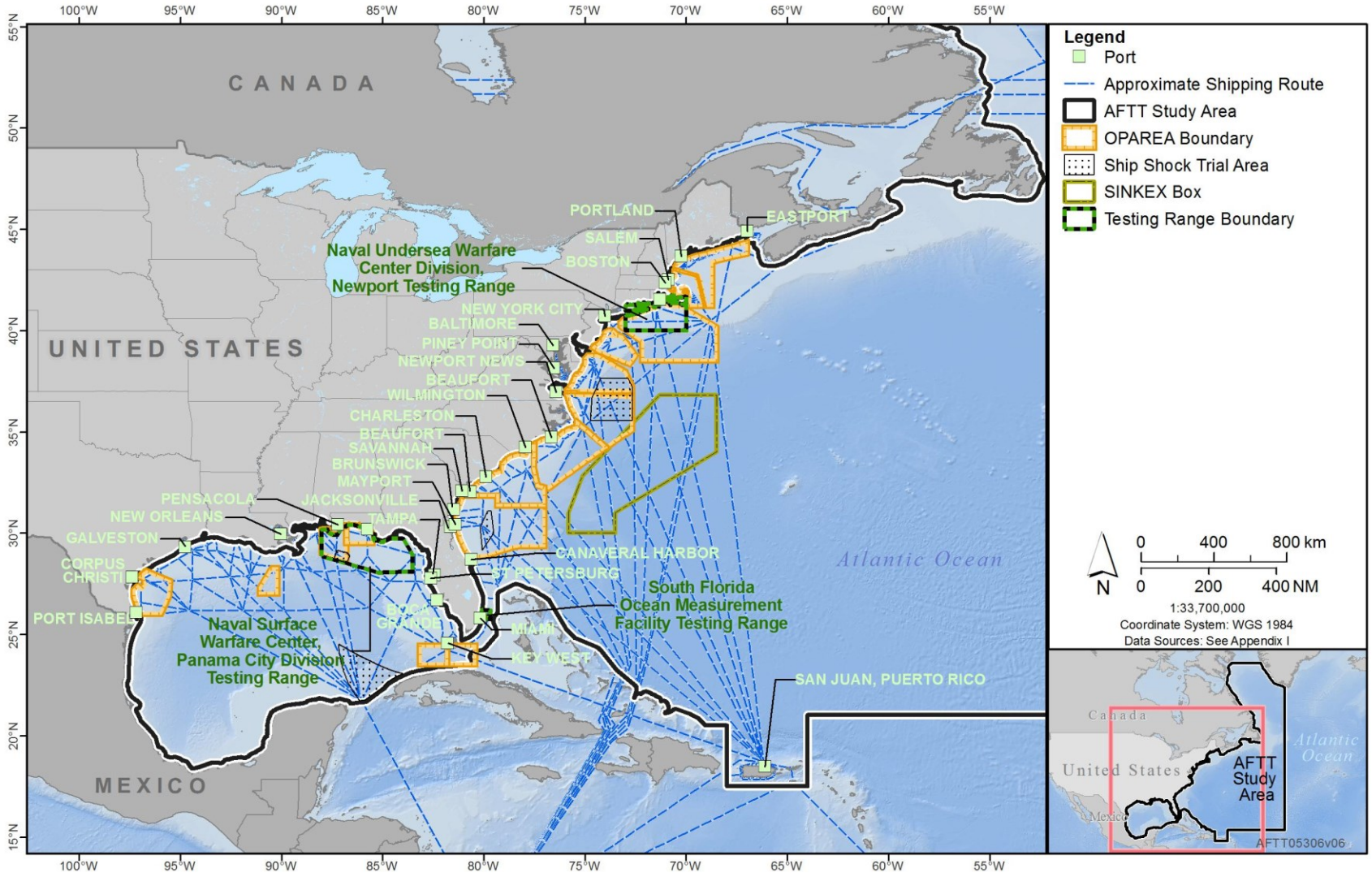
3.11.2.3.1 Ocean Transportation

Ocean transportation is the transit of commercial, private, and military vessels at sea, including submarines. The U.S. Atlantic coast and the Gulf of Mexico are heavily traveled by marine vessels, with numerous waterways and commercial shipping lanes traversing the range complexes (Figure 3.11-4).

Most of the waterways in the Study Area are accessible to commercial vessels; however, some areas are restricted. These restrictions can be permanent or temporary. The National Oceanic and Atmospheric Administration issues nautical charts that reflect designated restricted zones. In accordance with Title 33 CFR part 72, the U.S. Coast Guard and Department of Homeland Security publish marine information pertaining to waterways (i.e., danger zones and restricted areas; see below). Notices to Mariners provide information to private and commercial vessels on temporary closures. These navigational warnings are disseminated by broadcast notices on maritime frequency radio, weekly publications by the appropriate U.S. Coast Guard Navigation Center, and global positioning system navigation charts. They provide information about duration and location of closures due to activities that are potentially detrimental to surface vessels. Vessels are responsible for being aware of designated danger areas in surface waters and any Notices to Mariners that are in effect. Operators of recreational or commercial vessels have a duty to abide by maritime requirements as administered by the U.S. Coast Guard.

The flow of vessel traffic in congested waters, especially near coastlines, is controlled by the use of directional shipping lanes for large vessels, including cargo ships, container ships, and tankers, and flow controls for all vessels in harbors, bays, and ports to ensure that ports-of-entry remain as uncongested as possible. Navy vessels and non-military vessels alike adhere to regulations governing shipping traffic in these areas. There are fewer restrictions controlling open-ocean vessel traffic. In most cases, the factors that influence vessel traffic include: adequate depth of water, weather conditions (primarily affecting smaller recreational vessels), availability and location of fish for commercial and recreational fishing vessels, and hazards to navigation. Large commercial shipping vessels generally follow well-established routes that enable efficient transport of goods between ports. Recreational boating activities fluctuate seasonally, with increased activity in summer when warmer weather and more daylight hours offer more opportunity for recreational boating activities.

Certain areas of surface water within the Study Area are designated as danger zones, safety zones, security zones, or restricted areas as described in the CFR and established by the U.S. Coast Guard and the U.S. Army Corps of Engineers. These areas may limit access to non-military activities on either a fulltime or temporary timeframe. Detailed information on these areas is provided in the CFR as referenced in the following brief descriptions.



Notes: AFTT: Atlantic Fleet Training and Testing; OPAREA: Operating Area; SINKEX: Sinking Exercise

Figure 3.11-4: Commercially Used Waterways and Major Ports in the Study Area

Information on danger zones and restricted areas is found in 33 CFR part 334 (Navigation and Navigable Waters, Danger Zone and Restricted Area Regulations). A danger zone is a defined water area (or areas) used for target practice, bombing, rocket firing, or other especially hazardous activities. Danger zones may be closed to the public on a fulltime or intermittent basis, as stated in the regulations specific to individual danger zones. A restricted area is a defined water area prohibiting or limiting public access to provide security for government property and to protect the public from risk of injury or damage to property arising from the government's use of the area.

Information on safety zones and security zones is found in 33 CFR part 165 (Regulated Navigation Areas and Limited Access Areas). Safety zones are specifically addressed in 33 CFR part 165.20 Subpart C (Safety Zones). A safety zone is defined as a water area, shore area, or a combination of water and shore area to which, for safety or environmental purposes, access is limited to authorized persons, vehicles, or vessels. A safety zone may be stationary and described by fixed limits, or it may be described as a zone around a vessel in motion. Security zones are defined in 33 CFR part 165.30 Subpart D (Security Zones). A security zone is defined as an area of land, water, or a combination of land and water areas that are designated by the Captain of the Port or District Commander for a time period deemed necessary to prevent damage or injury to any vessel or waterfront facility; to safeguard ports, harbors, territories, or waters of the United States; or to ensure that the rights and obligations of the United States are observed.

In addition to the regulations described above, a naval vessel protection zone as described in 33 CFR part 165.20 Subpart G (Protection of Navy Vessels) states that no vessel or person is allowed within 100 yards of a large U.S. Navy vessel unless authorized by the U.S. Coast Guard, the senior naval officer present in command, or an official patrol.

Furthermore, all vessels shall operate at the minimum speed necessary to maintain a safe course, unless required to maintain a greater speed by navigational rules, and shall proceed as directed by the U.S. Coast Guard, the senior naval officer present in command, or the official patrol.

When a vessel is within a naval vessel protection zone the following rules apply:

- To request authorization to operate within 100 yards of a large U.S. Navy vessel, contact the U.S. Coast Guard, the senior naval officer present in command, or the official patrol on VHF-FM channel 16.

When conditions permit, the U.S. Coast Guard, senior naval officer present in command, or the official patrol should:

- Give advance notice on VHF-FM channel 16 of all large U.S. naval vessel movements;
- Permit vessels constrained by their navigational draft or restricted in their ability to maneuver to pass within 100 yards of a large U.S. naval vessel in order to ensure a safe passage in accordance with the navigation rules;
- Permit commercial vessels anchored in a designated anchorage area to remain at anchor when within 100 yards of passing large U.S. naval vessels; and
- Permit vessels that must transit via a navigable channel or waterway to pass within 100 yards of a moored or anchored large U.S. naval vessel with minimal delay consistent with security.

Danger zones, restricted areas, safety zones, and security zones located in the Study Area are described in Section 3.11.3.1 (Impacts on Accessibility). A representation of the density of commercial and military vessel traffic in the Study Area is shown in Figures 3.0-10 and 3.0-11 in Section 3.0 (Introduction). Sections 3.11.2.3.1.1 (Northeast Range Complex) through 3.11.2.3.1.12 (Pierside Locations [Gulf of Mexico]) provide more detailed information on ocean transportation within the range complexes located within the Study Area.

3.11.2.3.1.1 Northeast Range Complex

The Boston Range Complex, Narragansett Bay Range Complex, and Atlantic City Range Complex are referred to collectively as the Northeast Range Complexes. These range complexes include Special Use Airspace with associated warning areas and surface and subsurface sea space. See Chapter 2 (Description of Proposed Action and Alternatives) for maps and additional details on range complexes in the Study Area.

Military Ocean Traffic

The Fleet Forces Atlantic Exercise Coordination Center is responsible for coordinating OPAREA training assignments, ranges, airspace, mobile sea range assets, fixed and mobile targets, Large Area Tracking Range, and electronic attack. Testing activities are conducted in accordance with Narragansett Bay Shallow Water Test Facility Instruction 8590.1E (U.S. Department of the Navy, 2009). The Fleet Forces Atlantic Exercise Coordination Center coordinates with all Department of Defense (DoD), government, and civilian agencies to ensure compliance with all requirements and regulations for the safe use of ranges, assets, and services. Detailed information on vessel types and the general distribution of vessels within the Study Area is provided in Section 3.0.3.3.4.1 (Vessels and In-Water Devices).

Civilian Ocean Traffic

The U.S. Atlantic coast has some of the busiest shipping lanes in the world, and a large volume of ship traffic transits the area. Maritime traffic includes ships traveling along the coastline between ports in New England and the mid-Atlantic as well as to ports in eastern Canada and across the Atlantic to Europe (Figure 3.11-4).

Commercial (domestic and international) shipping constitutes the majority of this traffic while commercial ferries operate from every coastal state from Maine to Maryland, with the exception of New Hampshire. One primary shipping lane is off northern New England, with many arteries leading to ports in Massachusetts, New Hampshire, and Maine. The majority of the eastern portion of the Boston Range Complex is free from commercial traffic, but commercial traffic can be expected in the western part of the OPAREA. Several primary shipping lanes crisscross the Narragansett Bay Range Complex, leading to the major ports of New York City, New York; Newark, New Jersey; and Providence, Rhode Island. Similarly, the Atlantic City Range Complex contains several primary shipping lanes leading from New York City and Newark to ports in Delaware Bay and the mid-Atlantic United States. It is therefore highly likely that commercial ship traffic would be encountered along shipping routes throughout the greater part of all the Northeast Range Complexes.

Some of the busiest ports in the United States are located adjacent to the Northeast Range Complexes. The port complex of New York City/New Jersey was ranked third in total trade in the United States in 2016. Over 133 million tons of goods passed through the port in 2016 (U.S. Army Corps of Engineers, 2017). New England's largest port, Boston, is ranked 37th in total trade with just over 17 million tons of imports and exports, and the Port of Boston is rapidly becoming one of the fastest-growing high-end cruise ship markets in the country. The port complex of New York City/New Jersey has more scheduled

services to a wider variety of trade lanes than any other port in North America. The port complex also processes more 20-foot container units than any other port on the Atlantic coast of the United States. Only the California ports of Long Beach and Los Angeles process more containers (U.S. Maritime Administration, 2015). The port complex of Halifax, Canada, is closer to northern Europe than any other major North American port, and the complex is frequently used as the first inbound port or last outbound port for vessels transiting between Europe and in North America. Vessels traveling along this route will pass through the northern portion of the Study Area.

In 2016, there were over 11.8 million recreational vessels registered in the United States; approximately 1.3 million (11 percent) were registered in the eight states along the coast from Maine to Maryland (U.S. Coast Guard, 2017). Over 90 percent of registered recreational vessels in United States in 2016 were 26 feet (ft.) in length or less, suggesting that most of these vessels are unlikely to travel far from shore for extended periods of time (U.S. Coast Guard, 2017). Recreational boating trips originating along the coast from Maine to Maryland could potentially travel into the Northeast Range Complexes. Many sites known to be fishing hotspots attract both recreational fishers and divers depending on the species and season. These fishing and diving hotspots (including artificial reefs and shipwrecks) may be used throughout the year, but use is highest during summer. Most recreational boat traffic is within a few miles of shore, while potentially hazardous U.S. Navy activities occur farther offshore.

Many popular dive sites are located at the mouth of Massachusetts Bay within the Gerry E. Studds Stellwagen Bank National Marine Sanctuary. The 638 square nautical miles (NM^2) marine sanctuary also offers several submerged shipwrecks (National Oceanic and Atmospheric Administration, 2010).

3.11.2.3.1.2 Naval Undersea Warfare Center Division, Newport Testing Range

The Naval Undersea Warfare Center Division, Newport Testing Range includes the waters of Narragansett Bay, Rhode Island Sound, Block Island Sound, Buzzards Bay, Vineyard Sound, and Long Island Sound. Three restricted areas are within the Naval Undersea Warfare Center Division, Newport Testing Range:

- The Coddington Cove restricted area (adjacent to Naval Undersea Warfare Center Division, Newport Testing Range) provides an area with piers and ships representative of a working harbor area for harbor/swimmer defense type testing.
- The Narragansett Bay Restricted Area (6.1 NM^2 area surrounding Gould Island) includes the Hole Test Area, which provides a deepwater test capability, and the Gould Island Acoustic Communications and Tracking Range, an undersea range, within the boundaries of the North Test Area.
- The Rhode Island Sound Restricted Area is a rectangular box (27.2 NM^2) in Rhode Island and Block Island sounds.

3.11.2.3.1.3 Virginia Capes Range Complex

Military Ocean Traffic

The Virginia Capes OPAREA covers approximately 27,661 NM^2 of sea space off the coast of Delaware, Maryland, Virginia, and North Carolina. About 70 surface ships and submarines are homeported in Norfolk, Virginia. The Fleet Forces Atlantic Exercise Coordination Center is responsible for coordinating activities within the OPAREA, and with all DoD, government, and civilian agencies, to ensure compliance with all requirements and regulations for the safe use of range assets and services. The Fleet Area Control and Surveillance Facility, Virginia Capes has authority to coordinate services and firing notices,

issue weekly target and OPAREA schedules, and prescribe necessary additional regulations governing matters within the Virginia Capes Range Complex.

Civilian Ocean Traffic

Ships transiting the lower Chesapeake Bay area follow two primary commercially used shipping lanes: the Thimble Shoals Channel, which leads to Hampton Roads, Virginia; and the Chesapeake Channel, which leads to points north, including the Port of Baltimore. These two channels pass over the underwater (tunnel) sections of the Chesapeake Bay Bridge-Tunnel system, which connects the City of Virginia Beach to Cape Charles on the Eastern Shore. The Port of Baltimore was ranked 16th in total trade among U.S. ports in 2016, with over 38 million tons of goods passing through the port (U.S. Army Corps of Engineers, 2017). Over half of the shipments were foreign exports, which would pass through the Chesapeake Bay and into the Virginia Capes OPAREA on their way across the Atlantic Ocean or towards the Panama Canal.

The nearshore areas of the Virginia Capes OPAREA, in particular, are heavily traveled, because of their proximity to commercial ports in both Delaware and Virginia, including the port of Virginia in Norfolk, Virginia, the second-busiest port facility on the U.S. Atlantic coast, and the Port of Wilmington, Delaware, which is located on the Delaware River at the head of the Delaware Bay. In 2016, the Port of Virginia processed 54 million tons of imports and exports, ranking 13th among all U.S. ports and second among East Coast ports in total volume traded (U.S. Army Corps of Engineers, 2017). In 2017, the port handled 1,746 port calls, an average of about five per day and a decrease of near 10 percent over 2016 . Assuming that each port call is associated with two vessel transits (inbound and outbound), nearly 4,000 vessel transits passed from the Port of Virginia (Norfolk) through the lower Chesapeake Bay and into the Virginia Capes OPAREA in 2016. In addition to commercial shipping vessels, commercial ferries operate off the shores of Delaware, Maryland, Virginia, and North Carolina.

Recreational transportation activities offshore consist of game and sport fishing, charter boat fishing, sport diving, dolphin and whale watching, sailing, and power cruising. Approximately, 11.8 million recreational vessels were registered in the United States in 2016; over 90 percent are under 26 ft. and 42 percent are under 16 ft. in length, suggesting that most of these vessels are unlikely to travel far from shore for extended periods of time. The five coastal states from Virginia to Florida maintained 2.3 million registered recreational vessels in 2016, approximately 20 percent of all recreational vessels registered in the United States (U.S. Coast Guard, 2017).

3.11.2.3.1.4 Pierside Locations (mid-Atlantic area)

Military Pierside Locations

Eight pierside locations in the mid-Atlantic area are considered in this Final EIS/OEIS. The pierside locations are the Navy-contractor shipyard in Bath, Maine; Portsmouth Naval Shipyard in Kittery, Maine; the Navy-contractor shipyard and the Naval Submarine Base in Groton, Connecticut; the Navy-contractor shipyard in Newport News, Virginia; Naval Station Norfolk, Norfolk, Virginia; Joint Expeditionary Base Little Creek-Fort Story, Virginia Beach, Virginia; and Norfolk Naval Shipyard, Portsmouth, Virginia.

The shipyard in Bath, Maine is on the Kennebec River approximately 12 mi. above the mouth of the river in southern Maine. There is little waterborne traffic to Bath except barge traffic to the shipyard and vessels bound for repairs. Some fish carriers travel to a cannery north of Bath (Marine World Database, 2009). The U.S. Coast Guard established a 150-yard radius safety zone around the dry dock associated

with the contractor facility. The safety radius is only activated when the dry dock is deployed in its dredged basin hole near the center of the Kennebec River.

The Portsmouth Naval Shipyard in Kittery, Maine is on Seavey Island in Portsmouth Harbor on the Piscataqua River. The Port of Portsmouth, located across the Piscataqua River in New Hampshire, is ranked 103rd among U.S. ports in total trade, but 48th in foreign imports, bringing in nearly 2 million tons of imported goods in 2016 (U.S. Army Corps of Engineers, 2017). The port received 96 port calls in 2015, including 65 from tankers transporting petroleum fuels and oils, and 21 from bulk carriers, which transport cargo such as gypsum, salt, and asphalt (U.S. Maritime Administration, 2016). The primary mission of the Portsmouth Naval Shipyard is the overhaul, repair, and modernization of Los Angeles class-submarines. Military ocean traffic is composed of submarines entering and leaving the facility for maintenance.

The Navy-contractor shipyard and the Naval Submarine Base New London in Groton, Connecticut, are on the Thames River, a short river and tidal estuary stretching 15 mi. and emptying in the New London Harbor and Long Island Sound. Military ocean traffic is from vessels traveling to and from the shipyard and the Naval Submarine Base. The U.S. Coast Guard operates a cutter and miscellaneous small craft in the Thames River and New London Harbor. Recreational boating, fishing vessels, and ferry services also use the Thames River. Hess Oil operates a privately owned dock that supports oil and chemical barges.

The Navy-contractor shipyard in Newport News, Virginia, designs, builds, and refuels the U.S. Navy's nuclear-powered aircraft carriers and is one of two facilities within the United States that design and build nuclear-powered submarines. The shipyard is situated along 2 mi. of the James River, a tributary of the Chesapeake Bay.

Naval Station Norfolk, the largest naval complex in the world, supports the operational readiness of the U.S. Atlantic Fleet. Situated at the mouth of the Chesapeake Bay, this naval station is homeport to more than 70 surface and subsurface vessels. Joint Expeditionary Base Little Creek–Fort Story is used as a cantonment area and for outdoor training; it is also at the mouth of the Chesapeake Bay, 7 mi. east of Naval Station Norfolk. Joint Expeditionary Base West (Little Creek) is homeport to a variety of surface vessels. The Norfolk Naval Shipyard, situated along the Elizabeth River, is one of the largest shipyards in the world. It has the ability to overhaul and repair any ship in the U.S. Fleet. The shipyard also repairs, overhauls, and modernizes various submarine classes.

Civilian Pierside Locations

The Port of Virginia operates the Norfolk International Terminals, Portsmouth Marine Terminal, and Newport News Marine Terminal. In 2017, the Port of Virginia had 1,746 ship calls, transported 2.8 million container units, and moved 22 million short tons of cargo.

3.11.2.3.1.5 Navy Cherry Point Range Complex

Military Ocean Traffic

The Navy Cherry Point OPAREA sea space covers 18,617 NM^2 off the east coasts of North Carolina and South Carolina. The Fleet Forces Exercise Atlantic Coordination Center is responsible for coordinating training OPAREA assignments, ranges, airspace, mobile sea range assets, fixed and mobile targets, Large Area Tracking Range, and electronic attack. The Fleet Forces Atlantic Exercise Coordination Center coordinates with all DoD, government, and civilian agencies to ensure compliance with all requirements and regulations for the safe use of ranges, assets, and services. The Fleet Area Control and Surveillance Facility, Virginia Capes has authority to coordinate services and firing notices, issue weekly target and

OPAREA schedules, and prescribe necessary additional regulations governing matters within the Navy Cherry Point Range Complex.

Civilian Ocean Traffic

The southeast coast of the United States is heavily traveled by marine vessels, with several commercial ports near U.S. Navy OPAREAs like Wilmington, North Carolina; Charleston, South Carolina; Savannah, Georgia; and Jacksonville, Florida. Recreational vessels range throughout the coastal waters, depending on season and weather conditions. North Carolina had over 367,000 registered recreational vessels in 2016, which ranked as the fourth highest total among Atlantic coast states (U.S. Coast Guard, 2017). There are over 200 free water access areas in North Carolina coast, the majority of which are located along or near the coastline (North Carolina Wildlife Resources Commission, 2016).

Travel between the most popular cruising destinations in the area does not require traversing OPAREAs; however, larger recreational vessels, in particular sailboats and motor cruisers in the 50 ft. and larger class, can travel considerable distances offshore and are capable of entering offshore OPAREAs.

Recreational dive vessels travel to shipwrecks that provide habitat suitable for development of artificial reefs and are popular destinations for divers. Divers frequent the Cape Hatteras offshore area because of its volume of artificial reefs provided by shipwrecks (Dive Hatteras, 2003). Billed as the "Graveyard of the Atlantic," the waters of North Carolina, especially Cape Lookout, Cape Fear, Cape Hatteras, and Oregon Inlet, offer many opportunities for wreck diving (Thomas, 2011). For information on shipwrecks within the OPAREAs, see Section 3.10 (Cultural Resources).

The Monitor National Marine Sanctuary is a dive site approximately 16 mi. south-southeast of Cape Hatteras, North Carolina. This sanctuary was established in 1975 to protect the remains of the U.S.S. Monitor. Maritime archaeological expeditions are conducted in the summer, and public diving at this site is available by permit. Waters surrounding the sanctuary are known to contain thousands of other shipwrecks (National Oceanic and Atmospheric Administration, 2015a).

3.11.2.3.1.6 Jacksonville Range Complex

Military Ocean Traffic

The Jacksonville and Charleston OPAREAs, within the Jacksonville Range Complex, cover 50,000 NM^2 of sea space off the coasts of North Carolina, South Carolina, Georgia, and Florida. The Fleet Forces Atlantic Exercise Coordination Center is responsible for coordinating training OPAREA assignments, ranges, airspace, mobile sea range assets, fixed and mobile targets, the Large Area Tracking Range system, and electronic attack. The Fleet Forces Atlantic Exercise Coordination Center coordinates with all DoD, government, and civilian agencies to ensure compliance with all requirements and regulations for the safe use of ranges, assets, and services. The Fleet Area Control and Surveillance Facility, Jacksonville has authority to coordinate services and firing notices, issue weekly target and OPAREA schedules, and prescribe necessary additional regulations governing matters within the Jacksonville Range Complex.

Civilian Ocean Traffic

The nearshore areas of the Jacksonville Range Complex, near the Jacksonville commercial port in particular, are heavily traveled. Recreational activities consist primarily of motor boating, game and sport fishing, jet skiing, waterskiing, shrimping, sailing, sport diving, and bird and whale watching. Recreational boats range throughout the coastal waters, depending on season and weather conditions. A commercial ferry crosses the St. Johns River between Mayport, Florida, and Fort George Island, Florida.

Popular sport diving sites within the range complex consist of natural and artificial reefs. Off the South Carolina coast, these include shipwrecks (with about 30 wrecks in the Charleston OPAREA), as well as artificial and natural reefs. Popular shipwreck and submerged artificial reefs can be found at various depths from 13 to over 30 meters (m), both close to shore and at farther distances (Coastal Scuba, 2007). One of the most popular dive sites off the Georgia coast is Gray's Reef. The area is one of the largest nearshore live-bottom reefs of the southeastern United States (National Oceanic and Atmospheric Administration, 2015b). The associated Gray's Reef National Marine Sanctuary, which is used little by divers because of depth, strong currents, and frequent high levels of turbidity, is 16 mi. off Sapelo Island, Georgia, and encompasses 22 NM^2 of live-bottom habitat. Divers who do venture out to the sanctuary can access the reef from numerous facilities between Savannah and Brunswick, Georgia (National Oceanic and Atmospheric Administration, 2014).

3.11.2.3.1.7 South Florida Ocean Measurement Facility Testing Range

The Naval Surface Warfare Center Carderock Division, South Florida Ocean Measurement Facility operates an offshore testing area in support of various Navy and non-Navy programs. The South Florida Ocean Measurement Facility Testing Range is adjacent to the Port Everglades entrance channel in Fort Lauderdale, Florida. This test area includes an extensive cable field within a restricted anchorage area, as well as two designated submarine OPAREAs.

The South Florida Ocean Measurement Facility Testing Range does not include identified Special Use Airspace. The airspace adjacent to South Florida Ocean Measurement Facility Testing Range is managed by the Fort Lauderdale International Airport. Air operations at the South Florida Ocean Measurement Facility Testing Range are coordinated with Fort Lauderdale International Airport by the air units involved in the test events.

3.11.2.3.1.8 Key West Range Complex

Military Ocean Traffic

The Key West OPAREA is 8,288 NM^2 of offshore surface and subsurface area south of Key West, Florida within the Straits of Florida between the United States and Cuba. Because the Key West Range Complex is offshore of mainland areas, air and boat travel are possible within the range complex. Commander, Submarine Force, U.S. Atlantic Fleet, is the Submarine Operations Control Authority for the Eastern Seaboard and, as such, controls all water-space management and prevention of mutual interference for subsurface activities in the Key West Range Complex (U.S. Department of the Navy, 2013). Units are required to obtain clearance for all hazardous or exclusive activities within the OPAREA from the Commanding Officer, Naval Air Station Key West.

Within the Key West OPAREA and warning areas, all units conducting firing or other hazardous activity must comply with Section 8, Chapter 1 of the U.S. Atlantic Fleet Instruction Manual 3120.26 and all Fleet Exercise Publications. Officers in charge of exercises are not permitted to fire munitions or jettison aerial targets unless the area is confirmed to be clear of non-participating civilian and military units (U.S. Department of the Navy, 2013). Naval Air Station Key West would coordinate with the U.S. Coast Guard on issuing Notices to Mariners and with the Federal Aviation Administration on issuing Notices to Airmen, as applicable.

Civilian Ocean Traffic

Commercial and recreational boat traffic is common throughout the Florida Keys and the Gulf of Mexico. Cruise ships have regular routes in the area, and commercial fishing boats use this area frequently.

Commercial ferries cross the Florida Straits between Key West, Florida, and Dry Tortugas National Park, Florida. Additionally, dive and tourist boats cruise the waters and take visitors to the Dry Tortugas National Park.

Large cargo ships, including tankers and dry cargo carriers, cruise ships, fishing vessels, recreational vessels, and research vessels, operate in the Straits of Florida. Most of the cargo and cruise ships are foreign-flagged vessels, while the majority of recreational, fishing, and research vessels are domestic. Historically, the Straits of Florida have been the access route for all ships entering the Gulf of Mexico and those transiting from the north and east to the Panama Canal, making the Florida Straits one of the most heavily trafficked areas in the world (Roberts, 2007). According to the International Maritime Organization, approximately 8,000 large cargo ships and several hundred cruise ships transit the area on an annual basis (International Maritime Organization, 2016).

In 2002, the Florida Keys National Marine Sanctuary and surrounding waters were designated a Particularly Sensitive Sea Area under the International Maritime Organization (International Maritime Organization, 2016). As a result of this designation, some restrictions have been imposed on commercial maritime transit through the Straits of Florida. Commercial maritime vessels may be required to transit farther out to sea and within the boundaries of the Key West Range Complex.

3.11.2.3.1.9 Pierside Locations (Southeast Atlantic Area)

Three pierside locations in the southeast Atlantic area are considered in this EIS/OEIS: Naval Submarine Base Kings Bay, Kings Bay, Georgia; Naval Station Mayport, Jacksonville, Florida; and Port Canaveral, Port Canaveral, Florida.

Located near the mouth of the St. Mary's River in Cumberland Sound, Naval Submarine Base Kings Bay is the east coast home to the Trident nuclear power submarines. Kings Bay is approximately 30 mi. from both the Port of Brunswick, Georgia, and the Port of Jacksonville, Florida. Traffic in the Cumberland Sound is primarily recreational boats, and some of the marine traffic in the area is submarine traffic to and from the Naval Submarine Base Kings Bay.

Naval Station Mayport is located where the St. Johns River meets the Atlantic Ocean. This facility is home to 22 U.S. Navy ships and can accommodate 34 ships in its harbor. The St. Johns River supports heavy recreational and commercial traffic, and it provides the Port of Jacksonville access to the Atlantic Ocean. Cruise lines offer passenger cruise service from the Port of Jacksonville to the Caribbean.

Port Canaveral is the second-busiest port in the world for multiday passenger cruises, with six terminals exclusively for cruise passenger use (Port Canaveral, 2016). In 2016, Port Canaveral had 1,388 cruise ship port calls and serviced nearly 4 million passengers (American Association of Port Authorities, 2017b). In 2015, Port Canaveral was ranked 91st in total trade, with 3.1 million tons passing through the port, and 44th in foreign trade imports (U.S. Army Corps of Engineers, 2016). The port is shared with the Navy, which uses Trident Wharf and Poseidon Wharf to service U.S. Navy submarines.

3.11.2.3.1.10 Naval Surface Warfare Center, Panama City Division Testing Range

The Naval Surface Warfare Center, Panama City Division Testing Range is located off the panhandle of Florida and Alabama, extending from the shoreline to 120 NM seaward, and includes St. Andrew Bay. Special Use Airspace associated with Naval Surface Warfare Center, Panama City Division Testing Range includes warning areas overlying and east of the Pensacola and the Panama City OPAREAs. The warning areas include W-151, W-155, and W-470. This testing range includes the sea space within the Gulf of Mexico from the mean high tide line to 120 NM offshore.

3.11.2.3.1.11 Gulf of Mexico Range Complex

Military Ocean Traffic

The OPAREAs associated with the Gulf of Mexico Range Complex, including the Panama City, Pensacola, New Orleans, and Corpus Christi OPAREAs, cover approximately 17,000 NM² of sea space offshore of Florida, Alabama, Mississippi, Louisiana, and Texas. The Fleet Forces Atlantic Exercise Coordination Center is responsible for coordinating training OPAREA assignments, ranges, airspace, mobile sea range assets, fixed and mobile targets, Large Area Tracking Range, and electronic attack. The Fleet Forces Atlantic Exercise Coordination Center coordinates with all DoD, government, and civilian agencies to ensure compliance with all requirements and regulations for the safe use of ranges, assets, and services. The Fleet Area Control and Surveillance Facility, Jacksonville has authority to coordinate services and firing notices, issue weekly target and OPAREA schedules, and prescribe necessary additional regulations governing matters within the Gulf of Mexico Range Complex. The scheduling authority coordinates with the U.S. Coast Guard to issue Notices to Mariners and with the Federal Aviation Administration to issue Notices to Airmen, as applicable. Through close coordination, controlling authorities ensure that hazardous activities are carefully scheduled to avoid conflicts with civilian activities and that safety standards are maintained while allowing the maximum amount of civilian access to airspace and sea space. The Navy does not conduct as much vessel training in the Gulf of Mexico Range Complex as it does in other range complexes in the Study Area. Refer to Table 2.6-1 in Chapter 2 (Description of Proposed Action and Alternatives) for numbers of training activities expected to occur in the Gulf of Mexico Range Complex annually.

Civilian Ocean Traffic

The Gulf of Mexico is heavily traveled by marine vessels, with several major commercial shipping ports located near U.S. Navy OPAREAs, including the ports of South Louisiana; New Orleans, Louisiana; Houston, Texas; and Corpus Christi, Texas. The Port of South Louisiana was the top ranked U.S. port by cargo tonnage with near 262 million tons of cargo processed in 2016 (American Association of Port Authorities, 2017a). The Port of Houston was ranked second among U.S. ports with just under 248 million tons of total trade. Overall, 7 of the top 10 U.S. ports ranked by total trade (tonnage) in 2016 are located in Gulf States. In addition to South Louisiana and Houston, the other five ports are New Orleans (fourth); Beaumont, Texas (fifth); Corpus Christi (sixth); Baton Rouge, Louisiana (eighth); and Mobile, Alabama (tenth) (American Association of Port Authorities, 2017a).

Recreational activities offshore consist of game and sport fishing, charter boat fishing, sport diving, sailing, power cruising, and other boating activities. Commercial ferries operate off the shores of Texas (Corpus Christi and Galveston), Louisiana (Cameron), Mississippi (Ship Island and Gulfport), and Alabama (Dauphin Island and Fort Morgan). There are approximately 1.3 million recreational vessels registered in the Gulf States (excluding Florida vessels which were counted with southeast Atlantic states) (U.S. Coast Guard, 2017). The number of vessels is approximately 11 percent of all recreational vessels registered in the United States and is about the same as the number of vessels registered in coastal states from Maine to Maryland. Popular sport diving and fishing sites within the Gulf of Mexico consist of natural and artificial reefs, including shipwrecks. A popular diving destination in the Gulf is the Flower Garden Banks National Marine Sanctuary, which consists of the East and West Flower Garden Banks and Stetson Bank. The three areas in the 42 NM^2 sanctuary are approximately 130 mi. northeast of the Corpus Christi OPAREA and approximately 190 mi. west of the New Orleans OPAREA (National Oceanic and Atmospheric Administration, 2016b).

3.11.2.3.1.12 Pierside Locations (Gulf of Mexico)

One pierside location in the Gulf of Mexico is considered in this Final EIS/OEIS. The Navy-contractor shipyard in Pascagoula, Mississippi, is strategically located where the Pascagoula River flows into the Mississippi Sound. Construction services for surface combatants, amphibious assault and transport, U.S. Coast Guard cutters, and fleet support occur at this shipyard. The Port of Pascagoula, located at the mouth of the Pascagoula River, is the largest seaport in Mississippi. The port handled over 26 million tons of goods in 2016 and is ranked 24th in total trade and 21st in total foreign trade (imports and exports) among U.S. ports (American Association of Port Authorities, 2017a).

3.11.2.3.2 Air Transport

Most of the airspace in the Study Area is accessible to general aviation (recreational, private, corporate) and commercial aircraft; however, like waterways, some areas are temporarily off limits to civilian and commercial use. The Federal Aviation Administration has established Special Use Airspace that refers to airspace of defined dimensions wherein activities must be confined because of their nature or in which limitations may be imposed upon aircraft operations that are not part of those activities (Federal Aviation Administration Order 7400.21). Special Use Airspace in the Study Area includes the following:

- Restricted Area Airspace: Areas where aircraft are subject to restriction due to the existence of unusual (often invisible) hazards to aircraft (e.g., release of munitions). Some areas are under strict control of the DoD, and some are shared with nonmilitary agencies.
- Military Operations Area: Areas typically below 18,000 ft. used to separate or segregate certain nonhazardous military flight activities from instrument flight rules traffic and to identify visual flight rules traffic where these activities are conducted.
- Warning Area: Areas of defined dimensions, extending from 3 NM outward from the coast of the United States that serve to warn non-participating aircraft of potential danger.
- Air Traffic Controlled Assigned Airspace: Airspace established by the Federal Aviation Administration for the purpose of providing air traffic segregation between specified activities being conducted within the assigned airspace and other Instrument Flight Rules traffic.

Notices to Airmen are created and transmitted by government agencies and airport operators to alert aircraft pilots of any hazards en route or at a specific location. The Federal Aviation Administration issues Notices to Airmen to disseminate information on upcoming or ongoing military exercises with resulting airspace restrictions. Civilian aircraft operators are responsible for being aware of restricted areas in airspace and any Notices to Airmen in effect. Pilots have a duty to abide by aviation rules as administered by the Federal Aviation Administration.

Fleet Area Control and Surveillance Facility, Virginia Capes and Fleet Area Control and Surveillance Facility, Jacksonville provide instruction for training activities involving military air operations (including Naval Air Systems Command testing activities). Naval Surface Warfare Center, Panama City Division Testing Range and Naval Undersea Warfare Center Division, Newport Testing Range instructions provide guidance for testing activities, including air operations. The Federal Aviation Administration has established Special Use Airspace (Chapter 2, Description of Proposed Action and Alternatives) overlying the Study Area for military activities (i.e., restricted area airspace and warning areas).

The Federal Aviation Administration has established commercial air corridors for commercial traffic. The use of commercial air corridors, along with the use of Notices to Airmen, provides for safe and efficient air traffic control.

3.11.2.4 Commercial and Recreational Fishing

3.11.2.4.1 Commercial Fishing

Commercial and recreational fishing takes place throughout much of the Study Area from waters adjacent to the mainland and offshore islands to offshore banks and deep waters far from land. Many different types of fishing gear are used by commercial and recreational fishers in the Study Area, such as gillnets, longline gear, troll gear, trawls, seines, traps or pots, harpoons, and hook and line (U.S. Department of the Navy, 2005, 2015). Many fishing activities are seasonal and occur at varying degrees of intensity and duration throughout the year.

Commercial and recreational fishing is subject to state and federal regulations and laws. The U.S. Coast Guard enforces regulations of the U.S. commercial fishing fleet. The National Oceanic and Atmospheric Administration's Office of Law Enforcement enforces domestic laws and international treaty requirements designed to ensure global fisheries resources are maintained at healthy levels for the future. As part of that effort, the National Marine Fisheries Service assesses the status of fisheries stocks to assist marine resources managers in maintaining sustainable fisheries as well as healthy ecosystems and productive coastal communities. Fisheries stock assessment reports contain information on the status of the stock, such as the annual and historic catch, and, if a stock is depleted, the steps required to rebuild a healthy stock capable of sustaining commercial and recreational fisheries.

The management of fisheries is conducted on a regional basis to allow participatory governance by knowledgeable people with a stake in fishery management. Eight regional fishery management councils are responsible for developing fishery management plans for the fisheries in their jurisdiction. The plans focus on the status of the fishery in waters seaward of state waters within each region. Each fishery management plan describes a variety of management tools, including geographic and seasonal fishery closures, catch limits and quotas, size and age limits, gear restrictions, and access controls to manage the fishery resources. Nationwide, 44 fishery management plans provide a framework for managing the harvest of 230 major fish stocks or stock complexes that make up 90 percent of the commercial harvest. Other species, designated as highly migratory species in fisheries regulations, such as tunas, swordfish, sharks, and billfish are found throughout the Pacific Ocean and migrate across council jurisdictional boundaries. Regional offices of the National Marine Fisheries Service manage these species and engage stakeholders and governmental groups in the management of these species at both domestic and international levels.

Determining whether a catch is considered a commercial or recreational catch depends on how the catch is used. A catch is considered commercial if sold for profit at the port (e.g., to a processor). While a chartered recreational fishing trip results in a commercial gain for a charter boat captain, the catch is retained by the fisher and is not sold at the port for a profit. Therefore, the catch is considered recreational. Commercial fishers often target more than one species and land their catch in multiple ports, depending on the season, to maximize their economic return. Recreational fishers primarily use hook and line (also referred to as rod and reel or pole and line), and a small number also use spearfishing gear (Southwick Associates, 2013).

The National Marine Fisheries Service Office of Science and Technology maintains commercial landing data derived from comprehensive surveys of all coastal states' landings (National Marine Fisheries Service, 2015c). The number of pounds of fish caught in the U.S. Atlantic region by commercial fishers has been decreasing since a peak in 1956 (Figure 3.11-5), although the total value of fish caught has been steadily increasing since the early 1970s (National Marine Fisheries Service, 2015c). In 2005, the

price per pound for all species combined exceeded $1.00 for the first time, but then declined from 2007 through 2009 during the economic recession. Since 2010, the value of the catch has trended upwards (National Marine Fisheries Service, 2015c).

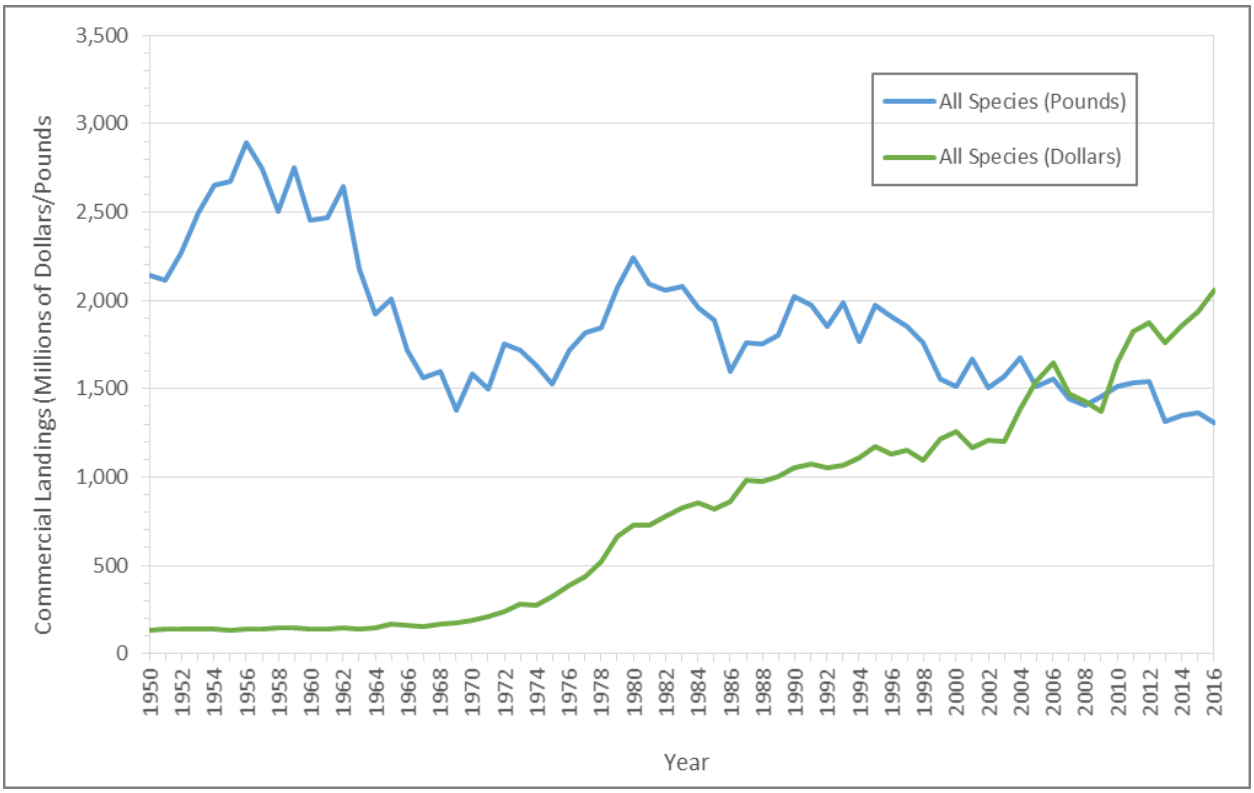


Figure 3.11-5: Commercial Landings Since 1950 in Atlantic Coast States

In the Gulf of Mexico, the highest catch totals (pounds) occurred in the mid-1980s and have gradually declined since (Figure 3.11-6). Similar to the catch in the Atlantic, the value of commercial landings in the Gulf of Mexico increased steadily through the mid-1980s. With the exception of the year 2000, growth remained flat until 2010 and has since trended upwards, with the value of the 2014 catch exceeding $1 billion for the first time (National Marine Fisheries Service, 2015c). However, the value of the catch in 2015 and 2016 fell below $1 billion.

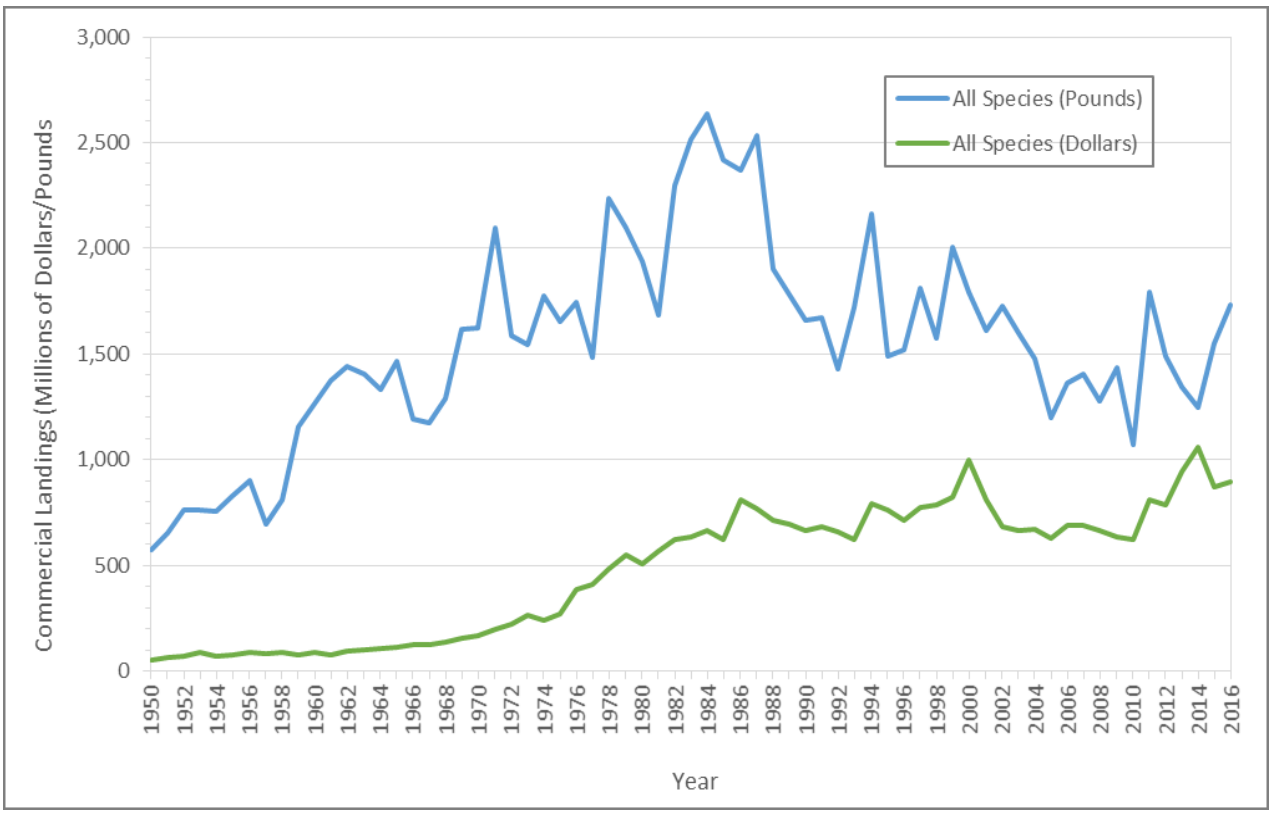


Figure 3.11-6: Commercial Landings Since 1950 in Gulf Coast States

Commercial fishing occurs in federally managed waters (3–200 NM) and within state waters (out to 3 NM; 9 NM for Texas and Florida's west coast). Each state's natural resources or wildlife management department manages fisheries in state waters using an organizational structure similar to the structure used by federal managers. Quotas can be placed on species at the federal or state level to manage landings and sustain the fishery. These may include seasonal closures or gear restrictions specific to a particular fishery. Table 3.11-1 shows the commercial species with the highest value in 2016 for each of the 18 coastal states in the Study Area. American lobster and sea scallops were the two most lucrative species both in the northeast and overall for all 18 coastal states. Combined these two species had a value of over $1 billion in 2016. Off the mid-Atlantic, blue crab is the most valuable species, and along the Atlantic coast from South Carolina to Florida, shrimp are the most valuable catch. In the Gulf of Mexico, over 1 billion pounds of menhaden were landed in Louisiana, and, combined with the total for Mississippi, menhaden were valued at over $140 million in 2016. Of all the species listed in Table 3.11-1, menhaden are the only vertebrate ("fish") species. All other species are invertebrates, and most of those are benthic species (e.g., lobsters and crabs) (National Marine Fisheries Service, 2018a). Additional information on commercially important species is in Sections 3.4 (Invertebrates) and 3.6 (Fishes).

Table 3.11-1: Value of Top Commercial Catch in Atlantic and Gulf States, 2016

State	*Species*	*Catch (Pounds)*	*Value (Dollars)*
Maine	American lobster	132,531,000	540,335,139
New Hampshire	American lobster	5,781,837	30,370,906
Massachusetts	Sea scallop	22,845,729	281,210,347
Rhode Island	Longfin squid	22,508,475	28,423,823

Table 3.11-1: Value of Top Commercial Catch in Atlantic and Gulf States, 2016 (continued)

State	*Species*	*Catch (Pounds)*	*Value (Dollars)*
Connecticut	Sea scallops	530,242	5,880,876
New York	Northern quahog (clam)	2,173,059	11,951,812
New Jersey	Sea scallop	10,491,244	123,369,150
Delaware	Blue crab	4,555,178	9,144,630
Maryland	Blue crab	36,721,568	54,426,092
Virginia	Sea scallop	4,529,495	51,325,283
North Carolina	Blue crab	24,732,129	20,738,465
South Carolina	Marine Shrimp	2,665,916	6,746,504
Georgia	White shrimp	1,998,110	5,284,582
Florida (Atlantic coast)	White shrimp	4,791,846	12,807,638
Florida (Gulf coast)	Caribbean spiny lobster	5,014,422	41,249,030
Alabama	Brown shrimp	12,830,091	32,760,985
Mississippi	Menhaden	294,189,312	10,973,261
Louisiana	Menhaden	1,068,689,545	132,105,452
Texas	Brown shrimp	38,309,340	96,170,706

Source: National Marine Fisheries Service (2018a)

3.11.2.4.2 Recreational Fishing

There were about 11.8 million registered recreational vessels in the United States in 2016. Approximately 42 percent of these vessels are registered in the 18 coastal states within the Study Area (U.S. Coast Guard, 2017). Many of these vessels are used for saltwater sport fishing, which has long been one of America's most popular recreational activities. Recreational fishing also influences the economies in many coastal communities by providing jobs, income, and sales. In 2015, approximately 9 million recreational anglers across the United States took 61 million saltwater fishing trips around the country. Approximately 90 percent of these recreational angler trips were off the U.S. Atlantic (56 percent) and Gulf (34 percent) coasts (National Marine Fisheries Service, 2016a). In 2015, 55 percent of the recreational catch (measured by numbers of fish) was taken from inland waters. Almost 35 percent came from state waters and just over 10 percent of the catch came from the U.S. territorial sea out to the Exclusive Economic Zone. The majority of trips in the Atlantic and Gulf of Mexico fished primarily in inland waters (i.e., estuaries) (National Marine Fisheries Service, 2016a).

Favored fishing areas change over time with fluctuations in fish populations and communities, preferred target species, or fishing modes and styles. Popular fishing sites are characterized by relative ease of access, ability to anchor or secure the boat, and abundant presence of target fish. Fishers focusing on areas of bottom relief not only catch reef-associated fish but also coastal open water species that may be attracted to the habitat. Popular fishing areas and dive sites are located throughout the coastal and nearshore waters of the Study Area and generally decrease in number with increasing distance from shore. Numerous fishing and diving sites are located along the Atlantic and Gulf coasts, in every state boarding the Study Area and in Puerto Rico and the U.S. Virgin Islands.

From 2012 through 2017, the marine recreational catch (total number of fish harvested + total released) in the Study Area ranged from a low of 301 million in 2017 to a peak of 413 million in 2013 (Figure 3.11-7). On average, over 60 percent of the catch is released each year. The catch has been trending downward since 2013, and the number of fish harvested has declined each year since 2013.

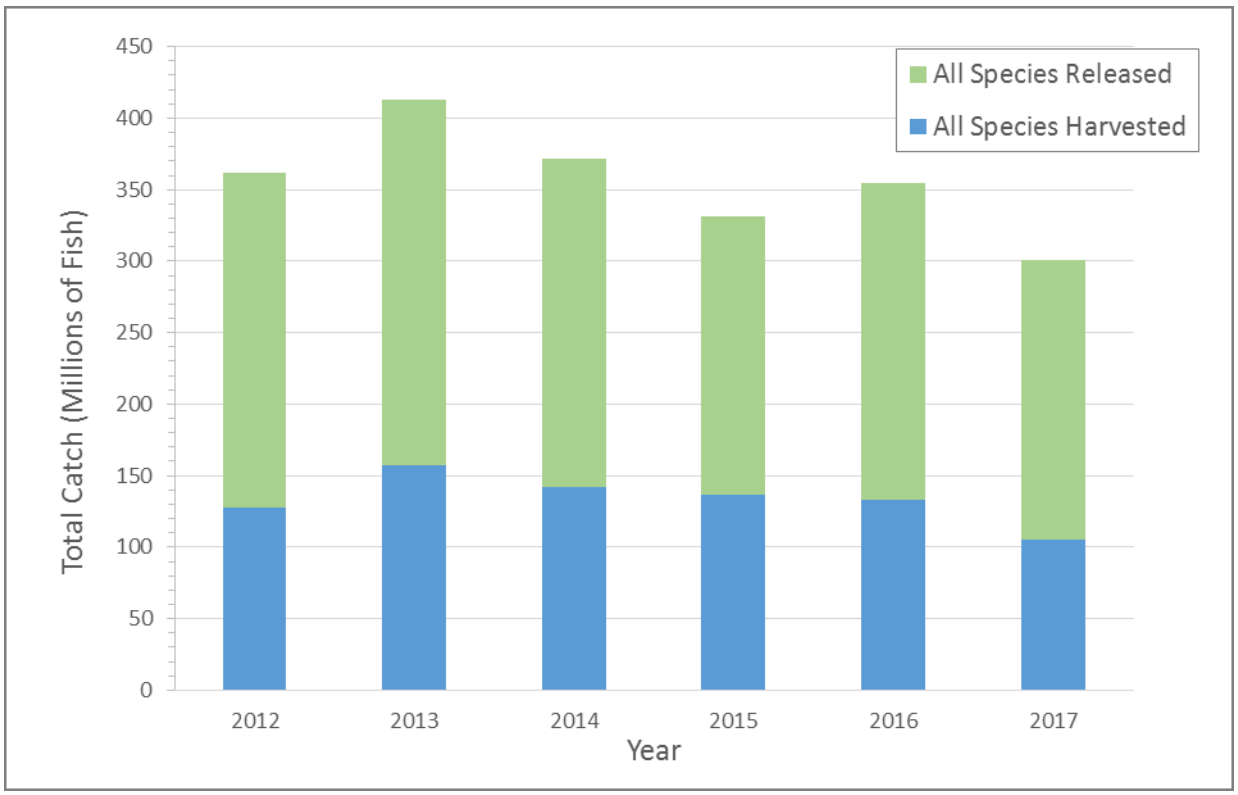


Figure 3.11-7: Annual Recreational Catch of All Species for the 18 Coastal States (2012–2017)

The top five recreational species, measured by the total catch, in the Atlantic states between 2012 and 2017 were black sea bass, summer flounder, Atlantic croaker, bluefish, and striped bass (National Marine Fisheries Service, 2018b) (Figure 3.11-8). Catch totals for Florida are included with the Gulf States; separate catch totals for Florida's east and west coasts were not provided in National Marine Fisheries Service (2017). The species most commonly caught on Atlantic coast trips that fished primarily in federally managed waters (3 to 200 NM) were black sea bass, summer flounder, haddock, Atlantic cod, and Atlantic mackerel (National Marine Fisheries Service, 2017). Data on the total catch from only federal waters are not available; however, measured by the number of fish caught in all waters off the Atlantic coast in 2016, black sea bass ranked first (16.7 million fish), summer flounder second (14.2 million), Atlantic mackerel seventh (6.5 million), haddock ranked 20th (1.7 million fish), and Atlantic cod 25th (1.2 million fish) (National Marine Fisheries Service, 2018b). Three of the top 10 species most frequently caught in federal waters are among the most frequently caught species overall.

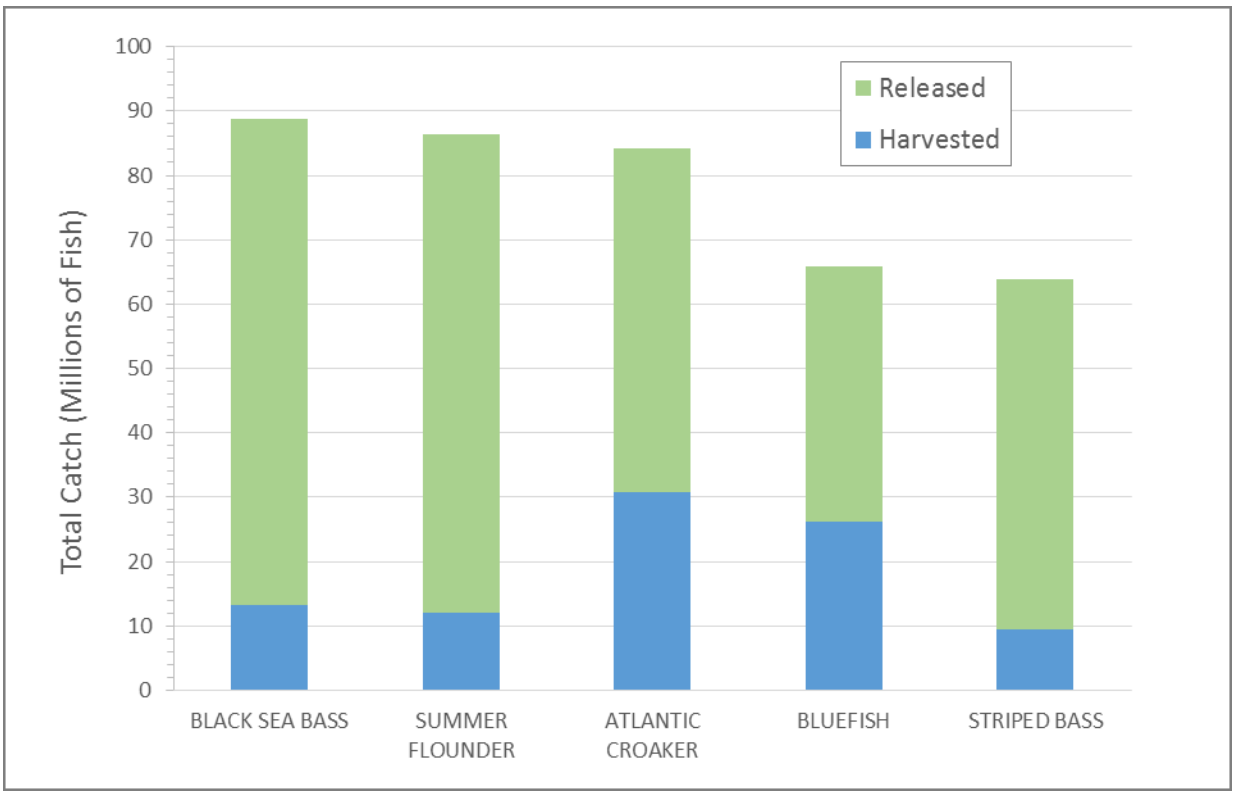


Figure 3.11-8: Top Five Recreational Species Caught in the Atlantic States (2012–2017)

The top five recreational species, measured by the number of fish caught, in the Gulf states between 2012 and 2017 were spotted seatrout, scaled sardine, pinfish, gray snapper, and hardhead catfish (National Marine Fisheries Service, 2018b) (Figure 3.11-9). Excluding bait fishes, the species most commonly caught in the Gulf of Mexico were spotted seatrout, gray snapper, hardhead catfish, red drum, and red snapper. The species most commonly caught on trips that fished primarily in federally managed waters were red snapper, white grunt, red grouper, black seabass, and gray triggerfish (National Marine Fisheries Service, 2017). Data on the total catch from only federal waters are not available; however, measured by the number of fish caught in all waters in the Gulf of Mexico in 2016, red snapper ranked eighth (4.9 million), white grunt ranked 16th (3.7 million fish), black seabass ranked 23rd (2.2 million), gray triggerfish ranked 25th (1.9 million), and red grouper ranked 30th (1.4 million) (National Marine Fisheries Service, 2018b). Only one species, red snapper, is among the top 10 species caught by recreational fishers in the Gulf of Mexico.

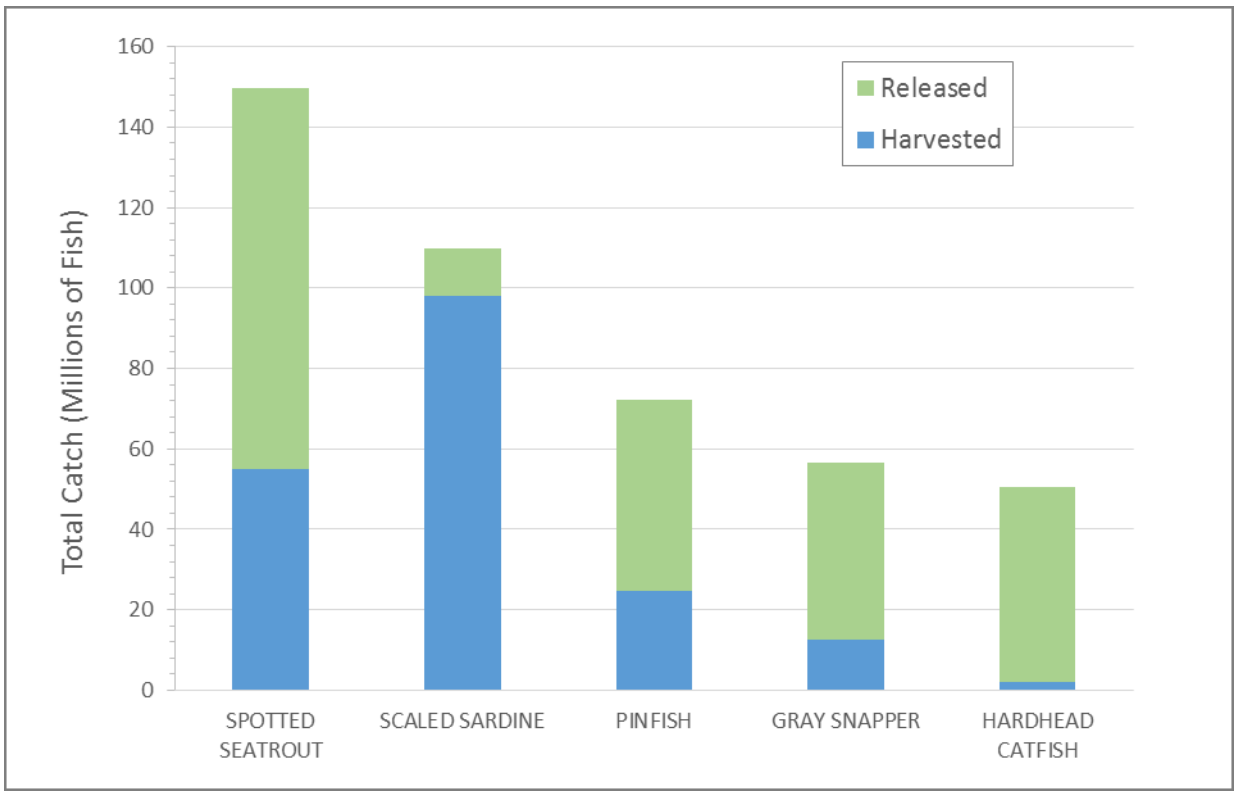


Figure 3.11-9: Top Five Recreational Species Caught in the Gulf States (2012–2017)

Recreational fishing is a popular pastime in coastal areas of both the Atlantic Ocean and Gulf of Mexico. In 2015, more than 65.21 million residents of Atlantic coast states participated in marine recreational fishing. All participants, including visitors, took nearly 34 million trips and caught approximately 188 million fish. About 25 percent of the trips were made off Florida's Atlantic coast, 14 percent off North Carolina, almost 13 percent off New Jersey, almost 10 percent off New York, nearly 8 percent off South Carolina shores, nearly 7 percent off Maryland, and more than 6 percent off Massachusetts. Together, Rhode Island, Connecticut, and Virginia, accounted for 13 percent of the trips, and Maine, New Hampshire, Delaware, and Georgia accounted for the remaining 4 percent of trips (National Marine Fisheries Service, 2016a).

In the Gulf of Mexico in 2015, nearly 2.7 million residents of Gulf Coast states participated in marine recreational fishing. All participants, including visitors, took 21 million trips and caught almost 143 million fish. About 65 percent of the trips were made off Florida's Gulf coast, nearly 12 percent off Louisiana, 11 percent off Alabama, more than 7 percent off Mississippi, and approximately 5 percent off Texas shores (National Marine Fisheries Service, 2016a).

As reported above, approximately 10 percent of the recreational fishing catch is from federal waters (i.e., between 3 and 200 NM from shore) (National Marine Fisheries Service, 2016a). However, this approximation, based on the total number of fish caught, can vary considerably depending on the species targeted. For the top five species caught off the Atlantic and Gulf coasts in 2016, the percentage caught in federal waters (nationally, not just in the Study Area) ranged from 0.01 percent for spotted seatrout to 15 percent for pinfish (Figure 3.11-10, Figure 3.11-11). Only 1 of the 10 top species caught in the Study Area exceeded the 10 percent national average in 2016 for the number of fish caught in federal waters (pinfish off the Gulf coast).

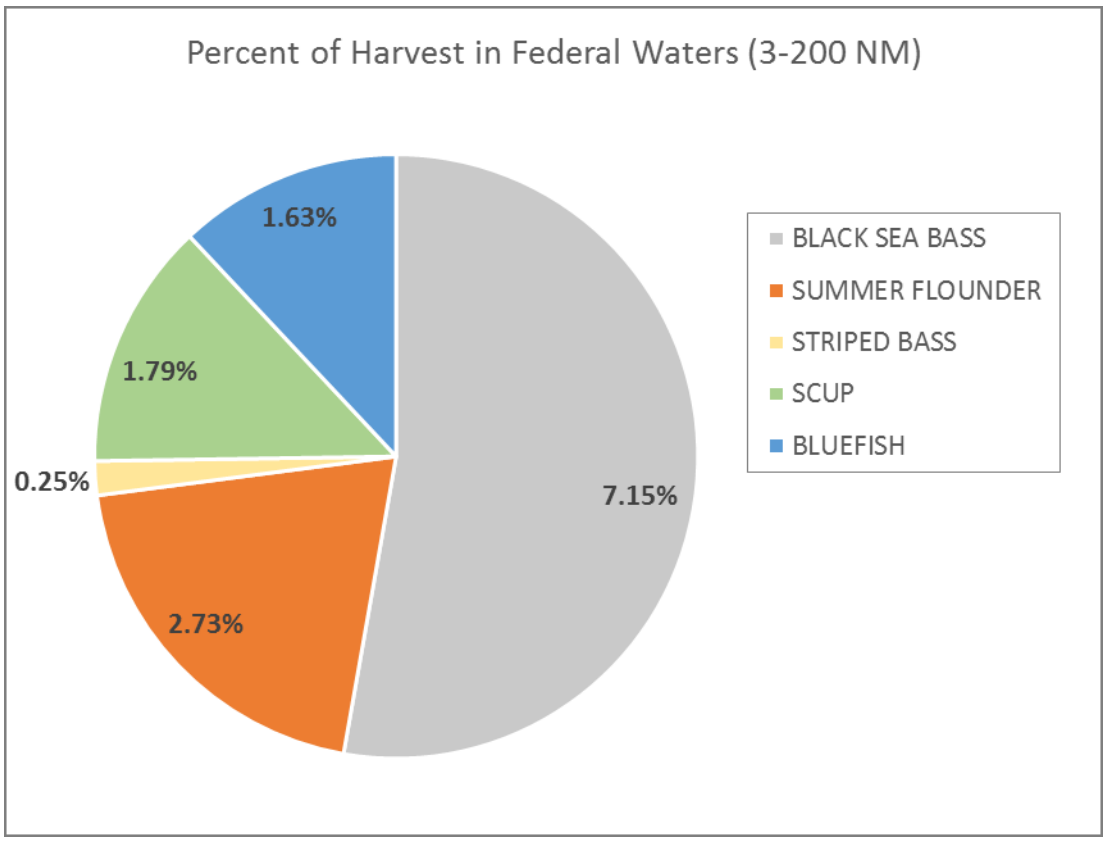


Figure 3.11-10: Percent of Harvest in Federal Waters for Top Five Atlantic Coast Recreational Species (Measured By Number of Fish Caught) in 2016

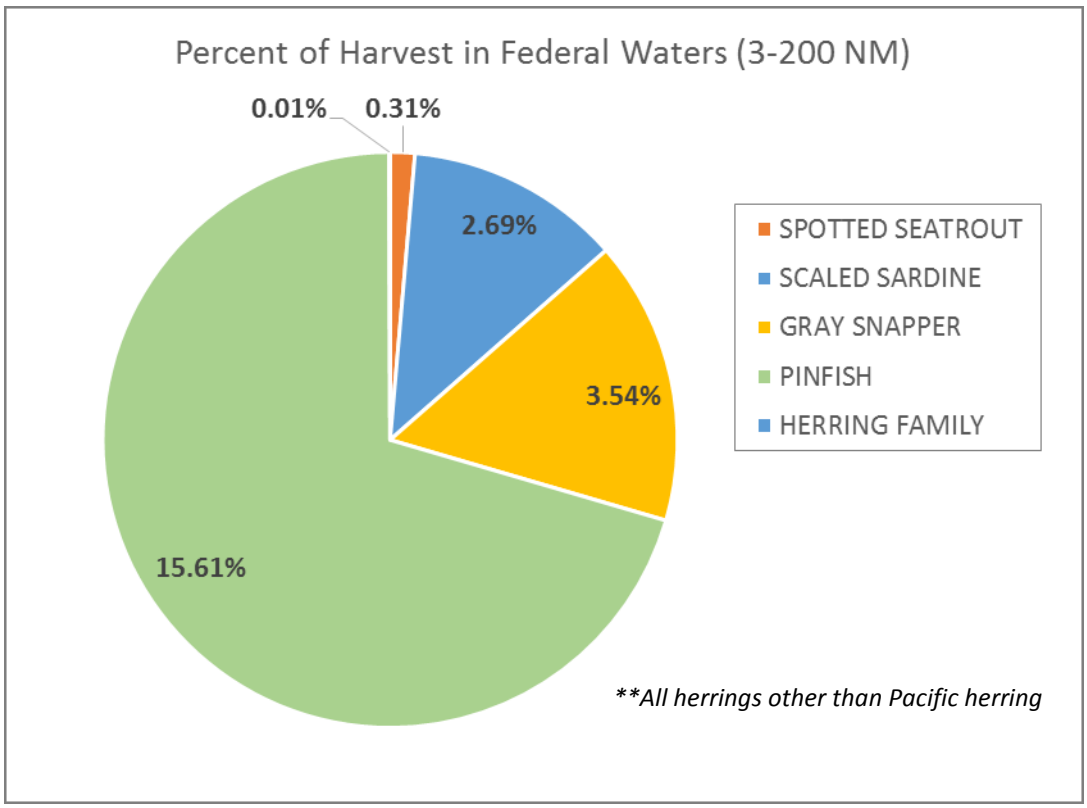


Figure 3.11-11: Percent of Harvest in Federal Waters for Top Five Gulf Coast Recreational Species (Measured By Number of Fish Caught) in 2016

The contribution of recreational fishing activities to the economy of coastal states is measured by state level impacts, including jobs, sales, income, and value added to the economy from expenditures on fishing trips and durable equipment. The economic impacts of recreational fishing for the five New England coastal states (Maine, New Hampshire, Massachusetts, Rhode Island, and Connecticut) are summarized in Table 3.11-2. The latest data available are from 2014.

Table 3.11-2: Economic Benefit of Recreational Fishing Expenditures in the Northeast in 2014

Economic Factor	*State*				
	ME	*NH*	*MA*	*RI*	*CT*
Number of Recreational Fishing Trips (thousands)	539	252	3,397	1,099	1,364
Jobs Supported by Recreational Fishing	1,051	563	14,264	4,439	2,993
Sales (millions of dollars)	85	53	1,391	421	290
Income (millions of dollars)	36	25	688	199	138
Value-Added (millions of dollars)	56	35	996	301	216

Source: (National Marine Fisheries Service, 2016b)

Massachusetts receives the greatest economic benefit from recreational fishing in the New England region, followed by Rhode Island. New Hampshire benefits from recreational fishing the least, likely due to its relatively small expanse of coastline.

The economic impacts of recreational fishing for the six Mid-Atlantic coastal states (New York, New Jersey, Delaware, Maryland, Virginia, and North Carolina) are summarized in Table 3.11-3. The latest data available are from 2014. New Jersey and North Carolina receive the greatest economic benefit from

recreational fishing in the Mid-Atlantic region, with over 15,000 jobs and approximately $1 billion added to each state's economy. The economic benefit from recreational fishing to New Jersey's economy is second only to Florida among U.S. coastal states. Delaware has the lowest economic benefit from recreational fishing expenditures in the region.

Table 3.11-3: Economic Benefit of Recreational Fishing Expenditures in the Mid-Atlantic in 2014

Economic Factor	*State*					
	NY	*NJ*	*DE*	*MD*	*VA*	*NC*
Number of Recreational Fishing Trips (thousands)	3,955	4,869	868	2,473	2,182	4,954
Jobs Supported by Recreational Fishing	9,561	19,962	1,562	7,721	5,218	16,007
Sales (millions of dollars)	976	2,037	142	727	474	1,529
Income (millions of dollars)	467	956	62	339	213	636
Value-Added (millions of dollars)	719	1,457	98	513	335	990

Source: (National Marine Fisheries Service, 2016b)

The economic impacts of recreational fishing for the southeast Atlantic coastal states (South Carolina, Georgia, and Florida's Atlantic coast) are summarized in Table 3.11-4. The latest data available are from 2014.

Table 3.11-4: Economic Benefit of Recreational Fishing Expenditures in the Southeast Atlantic in 2014

Economic Factor	*State*		
	SC	*GA*	*FL (Atlantic)*
Number of Recreational Fishing Trips (thousands)	2,221	827	9,644
Jobs Supported by Recreational Fishing	6,224	2,145	44,789
Sales (millions of dollars)	545	190	4,782
Income (millions of dollars)	220	88	2,022
Value-Added (millions of dollars)	344	136	3,122

Source: (National Marine Fisheries Service, 2016b)

As shown in Table 3.11-4, recreational fishing on the Florida's Atlantic coast supports the greatest number of jobs and generates the highest sales value of all the states along the entire U.S. Atlantic coast. Recreational fishing in Monroe County and the City of Key West is a major generator of economic activity and contributes $500 million annually (National Oceanic and Atmospheric Administration, 2005). The diverse fishing opportunities are reflected in an abundance of tournaments offered year round. Fished species include sailfish, bonefish, kingfish, snook, redfish, tarpon, dolphinfish, grouper, snapper, blackfin tuna, marlin, wahoo, and others. Tournaments can take place on the weekends, but many occur during the week (Monroe County Tourist Development Council, 2010).

The economic impacts of recreational fishing for the Gulf States (Florida's Gulf coast, Alabama, Mississippi, Louisiana, and Texas) are summarized in Table 3.11-5. The latest data available are from 2014. Florida's Gulf coast benefits tremendously from recreational fishing, with nearly $16 billion in sales, income, and value added from recreational fishing expenditures. Florida's Gulf coast recreational fishing industry supports more jobs and more trips that any other state bordering the Study Area. Excluding Florida's Atlantic coast, Texas and Louisiana generate the third- and fourth-most sales from expenditures of all U.S. coastal states, respectively.

Table 3.11-5: Economic Benefit of Recreational Fishing Expenditures in the Gulf of Mexico in 2014

Economic Factor	*State*				
	Florida (Gulf)	*AL*	*MS*	*LA*	*TX*
Number of Recreational Fishing Trips (thousands)	15,179	2,169	1,480	2,188	--
Jobs Supported by Recreational Fishing	70,109	14,124	4,174	15,241	16,496
Sales (millions of dollars)	7,468	1,071	374	1,620	1,825
Income (millions of dollars)	3,161	540	158	662	757
Value-Added (millions of dollars)	4,869	828	247	1,029	1,205

Note: (--) Data Not Available
Source: (National Marine Fisheries Service, 2016b)

Various organizations host recreational fishing tournaments throughout the year in the 18 coastal states, although, recreational fishing in the New England and the Mid-Atlantic states occur primarily in summer and into early fall when temperatures are warmer and there are more daylight hours. Most tournaments take place on weekends (Friday through Sunday) or from the middle of the week through the weekend (Wednesday to Sunday). Most fishing takes place at hotspots like canyons and seamounts.

It is unlikely that a substantial amount of recreational fishing occurs on the high seas (greater than 200 NM from shore). The size of a ship capable of safely transiting into the high seas would exceed the size of most recreational vessels registered with the U.S. Coast Guard (U.S. Coast Guard, 2017).

3.11.2.5 Aquaculture

Aquaculture is the farming of aquatic organisms such as fish, shellfish, and plants. Aquaculture operations are often in coastal environments and can be on land with a nearby water source or in bays, estuaries, or marine waters (National Marine Fisheries Service, 2015a). The National Oceanic and Atmospheric Administration regulates offshore marine aquaculture and crafted the National Offshore Aquaculture Act of 2007, which charges National Oceanic and Atmospheric Administration with establishing stringent standards and coordination of offshore efforts with states (Carlowicz, 2007).

The U.S. marine aquaculture industry is relatively small compared with world aquaculture production. In 2013, U.S. aquaculture production totaled 100 million pounds of fish, molluscs, and crustaceans valued at $400 million (National Marine Fisheries Service, 2015b). World aquaculture production generates over $70 billion in annually. Only about one-third of U.S. aquaculture production is marine species. The largest sector of the U.S. marine aquaculture industry is molluscs (oysters, clams, mussels), which accounts for about two-thirds of total U.S. marine aquaculture production. Atlantic salmon is the leading species for marine finfish aquaculture (42 million pounds), while oysters have the highest volume (44 million pounds) for marine shellfish production. Shellfish aquaculture industries can be found in all coastal regions of the United States; the Pacific Coast states produce more shellfish by value ($112 million), while the Gulf coast states produce more by volume (24 million pounds) (National Marine Fisheries Service, 2015b). Current production takes place mainly on land, in ponds, and in coastal waters under state jurisdiction.

Aquaculture has become a fast-growing food industry because of consumer demands. The U.S. Department of Agriculture maintains a database on sales value from aquaculture. In 2013, sales of aquaculture products in the United States accounted for $1.4 billion. The production of molluscs (oysters, mussels, and clams) was 23 percent of the total sales, and fin fish raised as a source of food

(e.g., catfish and salmon) accounted for 52 percent of total sales. The 18 coastal states in the Study Area contributed approximately 57 percent of total aquaculture sales in 2013. These data include all aquaculture sales (inland, freshwater, and marine). However, the importance of the industry to the coastal states is evident, and saltwater aquaculture production has been increasing over the past several years, even as freshwater production is declining (U.S. Department of Agriculture, 2014).

Most aquaculture farms within the Study Area are located in state waters. Based on 2013 census data compiled by the U.S. Department of Agriculture (2014), aquaculture operations occur in the 18 states of the Study Area. Florida and Massachusetts have the greatest number of saltwater farms with 169 and 133, respectively.

Massachusetts and New Hampshire conducted aquaculture research projects in offshore federal waters. In 2007, both states received funding for these projects from the National Oceanic and Atmospheric Administration (National Oceanic and Atmospheric Administration, 2007a). The University of New Hampshire's Atlantic Marine Aquaculture Center was established in 2006 after completion of the Open Ocean Aquaculture Demonstration Project, which in cooperation with the National Oceanic and Atmospheric Administration raised finfish in the open ocean for noncommercial purposes (University of New Hampshire, 2016). The site is located 6 NM off the coast of New Hampshire. Two projects were funded in Massachusetts. The Massachusetts Institute of Technology developed a self-propelled, open-ocean drifter for fish farming. The pilot study attempted to assess the effects of movement of the drifter cage on fish behavior. The second project, conducted by the Marine Biological Laboratory at Woods Hole, worked to condition black sea bass to respond to an acoustic signal when being fed in a controlled, laboratory environment, so that they could be released into an open-ocean environment and recaptured at a later date (National Oceanic and Atmospheric Administration, 2007b). The National Oceanic and Atmospheric Administration continues to fund aquaculture projects in several states along the U.S. Atlantic and Gulf coasts (National Oceanic and Atmospheric Administration, 2016a).

Atlantic salmon are cultivated in coastal waters off the coast of Maine. The 2011 harvest of 24 million pounds contributed revenue of $55 million. Maine also cultivated blue mussels, American and European oysters, Atlantic cod, quahogs, sea scallops, and green sea urchins (Maine Department of Marine Resources, 2012). The dominant industry along the northeastern coastline is shellfish production in estuaries, bays, and wetlands (Morse & Pietrak, 2009). The only estuary that falls in part of the Northeast Range Complexes is Narragansett Bay, on the north side of Rhode Island Sound. Rhode Island cultivates eastern oysters and northern quahogs. About 123 ac. (50 hectares) are leased for aquaculture production (Rice & Leavitt, 2009).

In the mid-Atlantic area, aquaculture is composed of shellfish production in estuaries, bays, and wetlands. In 1980, the lower Chesapeake Bay, near the Virginia Capes Range Complex, accounted for 50 percent of the U.S. oyster harvest. However, in recent years, overharvesting and disease have depleted the oyster beds to less than 1 percent of their peak abundance (Kearney, 2003). States in the area are encouraging shellfish aquaculture to aid in the restoration (Webster et al., 2009). Virginia cultivates eastern oysters and hard clams using bottom cultivation. However, methods of cultivation for the oyster are evolving from the traditional planting on the bottom to a more intensive method using cages, racks, and floats (Murray & Oesterling, 2009). Virginia accounts for 30 percent of eastern oyster aquaculture sales (U.S. Department of Agriculture, 2014).The mine warfare training areas in the Chesapeake Bay are not in the immediate vicinity of shellfish aquaculture.

Aquaculture in the southeast region includes farms for hybrid striped bass, red drum, saltwater shrimp, and eastern oysters. Louisiana accounts for 42 percent of all crustacean (e.g., shrimp and crabs) sold in the country. Combined, Alabama and Mississippi produced 43 percent of food fish sales from aquaculture in 2013 (U.S. Department of Agriculture, 2014).

3.11.2.6 Tourism

Coastal tourism and recreation include the full range of tourism, leisure, and recreationally oriented activities that take place in the coastal zone and the offshore coastal waters. These activities include coastal tourism development (e.g., hotels, resorts, restaurants, food industry, vacation homes, and second homes) and the infrastructure supporting coastal development (e.g., retail businesses, marinas, fishing tackle stores, dive shops, fishing piers, recreational boating harbors, beaches, and recreational fishing facilities). Also included are ecotourism and recreational activities such as recreational boating, cruises, swimming, surfing, snorkeling, diving, and sightseeing (National Oceanic and Atmospheric Administration, 1998).

Tourism is a component of the regional economy of coastal states included in the Study Area. Although there is no comprehensive database for tourism, available data show that tourist activities bring billions of dollars to communities within the coastal states. Benefits from tourism include direct spending as well as indirect benefits from contributions to key business sectors such as food, lodging, arts, culture, and music. The National Ocean Economics Program provides a range of socioeconomic information along the U.S. coast and in coastal waters. The National Ocean Economics Program defines the ocean economy as the economic activity that indirectly or directly uses the ocean as an input. Table 3.11-6 presents ocean economy data by state specific to the tourism and recreation sector for 2014. The table shows the impact of the marine tourism and recreation industry in coastal counties on states' employment and gross domestic product. The impact of tourism and recreation varies widely among the states, from 1 percent of ocean industries in Texas up to 83 percent in New York and South Carolina (New York includes data from the Great Lakes region). For 15 of the 18 coastal states, the tourism and recreation industry accounts for more than half of ocean industry jobs. Texas and Louisiana have the lowest percentage of ocean industry jobs dependent on tourism and recreation. Industries associated with offshore mineral extraction are the largest contributor to employment and gross domestic product in those states (National Ocean Economics Program, 2015b).

The tourist and recreation industry surrounding recreational boating is significant along the coast of the Atlantic Ocean and the Gulf of Mexico. Self-contained underwater breathing apparatus (SCUBA) diving is a popular recreational activity in this area due to the occurrence of numerous reefs and shipwrecks. Typical considerations for recreational self-contained underwater breathing apparatus (SCUBA) divers relevant to all portions of the Study Area are dive depth limitations. Specifically, the Professional Association of Diving Instructors (one of several scuba diving instructional organizations) suggests that certified open-water divers limit their dives to 60 ft. More experienced divers are generally limited to 100 ft. (Professional Association of Diving Instructors, 2011). Many shipwrecks and artificial reefs that are popular diving spots in Florida are at depths ranging from 50 to 90 ft. (Associated Oceans LLC, 2011).

Marine mammal watching, often referred to as whale watching, includes any cetacean species such as dolphins, whales, and porpoises. Tours are conducted by boat, aircraft, or from land. This type of marine tourism includes any of these activities, formal or informal, that possess at least some commercial component whereby consumers view, swim with, or listen to any of these approximately 83 cetacean

species (Hoyt, 2001). Cruises for seal watching are also available in Maine (New Harbor), Massachusetts (Cape Cod), and Rhode Island (Newport) and Connecticut (Groton, Stony Creek, and Niantic).

Hoyt conducted the most recent, comprehensive survey of the whale-watching industry (Hoyt, 2001). In the northeast, the industry focuses on the various whales summering in waters off New England. Whale watching occurs in 22 communities in New England. The majority of operations occur within Massachusetts, where 17 operators conduct whale watching out of popular ports such as Gloucester, Provincetown, Boston, Barnstable, and Plymouth. The 25-year focus of whale watching on the Stellwagen Bank area contributed to its popularity and helped establish the Gerry E. Studds Stellwagen Bank National Marine Sanctuary, which sits at the mouth of Massachusetts Bay. In the southeast, concentrations of the whale watching industry are highest in Hilton Head Island, South Carolina; St. Petersburg, Florida; Panama City, Florida; and Jupiter, Florida. Numerous single operators exist in cities extending along the entire west coast of Florida, all the way to Key West. During a comprehensive survey, approximately 4.3 million people participated in the industry, contributing nearly $357 million in sales to operators of whale watching tours (Hoyt, 2001).

Table 3.11-6: Ocean Economy Data for the Tourism and Recreation Sector by State, 2014

State	*Gross Domestic Product: Tourism and Recreation (Dollars)*	*Percent of all Ocean Industries Gross Domestic Product*	*Tourism and Recreation Employment (Number of Jobs)*	*Percent of all Ocean Industries Employment*
Alabama	507,870,525	22	15,138	56
Connecticut	1,519,176,670	36	34,032	72
Delaware	577,779,055	73	17,530	87
Florida	16,822,577,569	66	365,831	84
Georgia	518,405,327	42	14,847	62
Louisiana	1,882,346,306	8	45,116	41
Maine	1,176,551,058	48	29,785	65
Maryland	2,741,572,336	42	64,976	72
Massachusetts	3,078,180,777	51	67,117	79
Mississippi	400,452,144	23	13,221	43
New Hampshire	279,656,760	20	6,931	51
New Jersey	3,117,260,812	40	82,392	68
New York*	18,296,430,382	83	285,525	91
North Carolina	1,076,758,010	60	36,468	88
Rhode Island	1,365,241,796	68	32,967	83
South Carolina	2,645,396,646	83	61,175	90
Texas	1,470,544,931	1	43,584	22
Virginia	1,809,539,194	22	58,669	51

Shows percent of tourism and recreation employment and gross domestic product compared to all other ocean industries: construction, living resources, minerals, ship and boat building, transportation, and tourism and recreation.

*Includes data from counties adjacent to the Great Lakes.

Source: National Ocean Economics Program (2015b)

3.11.3 Environmental Consequences

This section evaluates how and to what degree the activities described in Chapter 2 (Description of Proposed Action and Alternatives) could impact socioeconomic resources of the Study Area. Tables 2.6-1 through 2.6-4 present the baseline and proposed training and testing activity locations for each

alternative including the number of events occurring annually and over a five-year period. Each socioeconomic resource stressor is introduced, analyzed by alternative, and analyzed for training and testing activities. Appendix B (Activity Stressor Matrices) shows the stressors that were considered for analysis of socioeconomic resources. The stressors vary in intensity, frequency, duration, and location within the Study Area. The primary stressors applicable to socioeconomic resources in the Study Area and that are analyzed include the following:

- **Accessibility** (availability of access on the ocean and in the air)
- **Airborne acoustics** (weapons firing, aircraft, and vessel noise)
- **Physical disturbance and strikes** (aircraft, vessels and in-water devices, military expended materials)

Secondary stressors resulting in indirect impacts on socioeconomic resources are discussed in Section 3.11.4 (Secondary Stressors). This section evaluates the impacts of the alternatives on the economy of the region of influence as well as social impacts. The evaluation addresses how the action alters the way individuals live, work, play, relate to one another, and function as members of society. Because proposed AFTT activities are predominantly offshore, socioeconomic impacts would be associated with economic activity, employment, income, and social conditions (i.e., enjoyment and quality of life) of industries or operations that use the ocean resources within the Study Area. Although there are no permanent population centers in the region of influence and the typical socioeconomic considerations such as population, housing, and employment are not applicable, this section will analyze the potential for economic impacts on marine-based activities and coastal communities. When considering impacts on recreational activities such as fishing, boating, and tourism, both the economic impact associated with revenue from recreational tourism and public enjoyment of recreational activities are considered.

The proposed AFTT training and testing activities were evaluated to identify specific components that could act as stressors by directly or indirectly affecting sources of energy generation, mineral extraction, commercial transportation and shipping, commercial and recreational fishing, aquaculture, and tourism. For each stressor, a discussion of impacts on these sources is included for each alternative. The analysis includes consideration of mitigations that the Navy will implement to the benefit of high-value socioeconomic resources in the Study Area.

The evaluation indicated that the relative potential for socioeconomic impacts would be similar across various areas and marine ecosystems in the Study Area. Therefore, the analysis of environmental consequences was not broken down by large marine ecosystem. Based on an initial screening of potential impacts of sonar maintenance and testing, pierside locations have been eliminated from detailed consideration in the analysis of impacts on energy, mineral extraction, and transportation and shipping. Elimination of these resources was based on the extremely limited potential for active sonar to damage infrastructure or interfere with transportation operations.

3.11.3.1 Impacts on Accessibility

Navy training and testing activities have the potential to temporarily change access to the ocean or airspace for a variety of human activities associated with sources of energy generation, mineral extraction, commercial transportation and shipping, commercial and recreational and fishing, aquaculture, tourism, and other recreational activities in the Study Area. Warning Areas, Restricted Areas, and Danger Zones are designated along the Atlantic and Gulf coasts. These designated areas are

shown in Figure 3.11-12 through Figure 3.11-15. These small areas may be used for especially hazardous activities and are defined to prohibit or limit public access to the area. They generally provide security or protection for the public from risks of damage or injury arising from activities occurring in that area. Danger zones and restricted areas listed in the CFR and presented by section number in Figure 3.11-12 through Figure 3.11-15 may be closed to the public full time or intermittently, as stated in the regulations (33 CFR section 334).

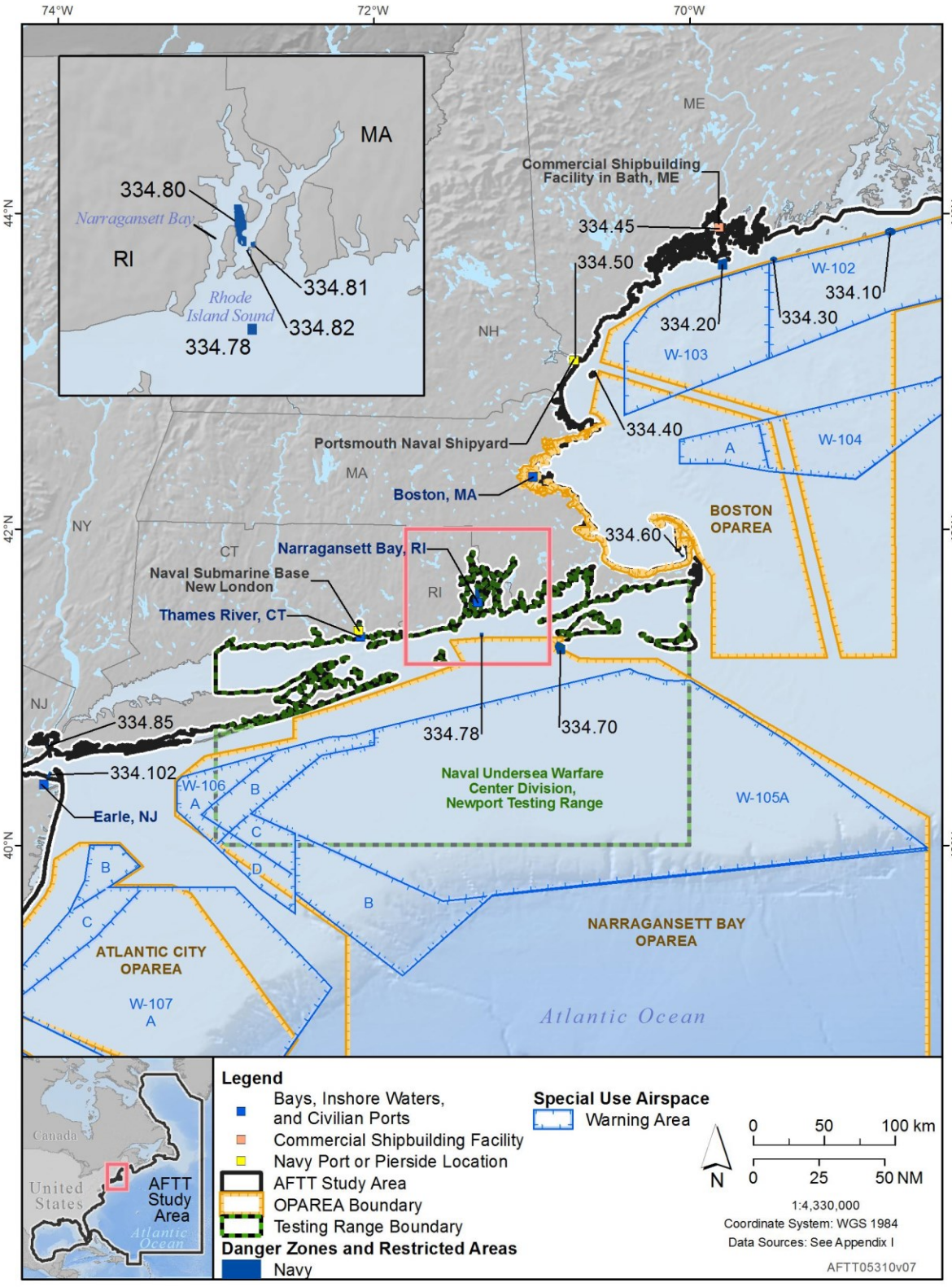
When training or testing activities are scheduled that require specific areas to be free of non-participating vessels and aircraft due to public safety concerns, the Navy requests that the U.S. Coast Guard and Federal Aviation Administration issue Notices to Mariners and Notices to Airmen, respectively, to warn the public of upcoming Navy activities. Many training and testing activities occur in established restricted areas or danger zones as published on navigational and aeronautical charts. Some frequently used areas have standing Notices to Mariners and Notices to Airmen to allow real-time, immediate use.

Limits on accessibility to certain areas of the Study Area due to Navy training and testing would essentially remain unchanged from the current conditions. If access by the public to an area is hindered to the extent that equipment (e.g., fishing gear) cannot be monitored or used, then there would be an impact if this condition would directly contribute to loss of income, revenue, or employment. Disturbance to human activities associated with payrolls, revenue, or employment is quantified by the amount of time the activity may be halted or rerouted and the ability to perform the task in another location.

The Navy is not proposing to add any new restricted areas and proposes to continue the same type of temporary area closures that have occurred for decades. Many of the restricted areas identified on these figures are artifacts of past military activities and are not currently scheduled (e.g., Small Point Mining Range off the coast of Maine).

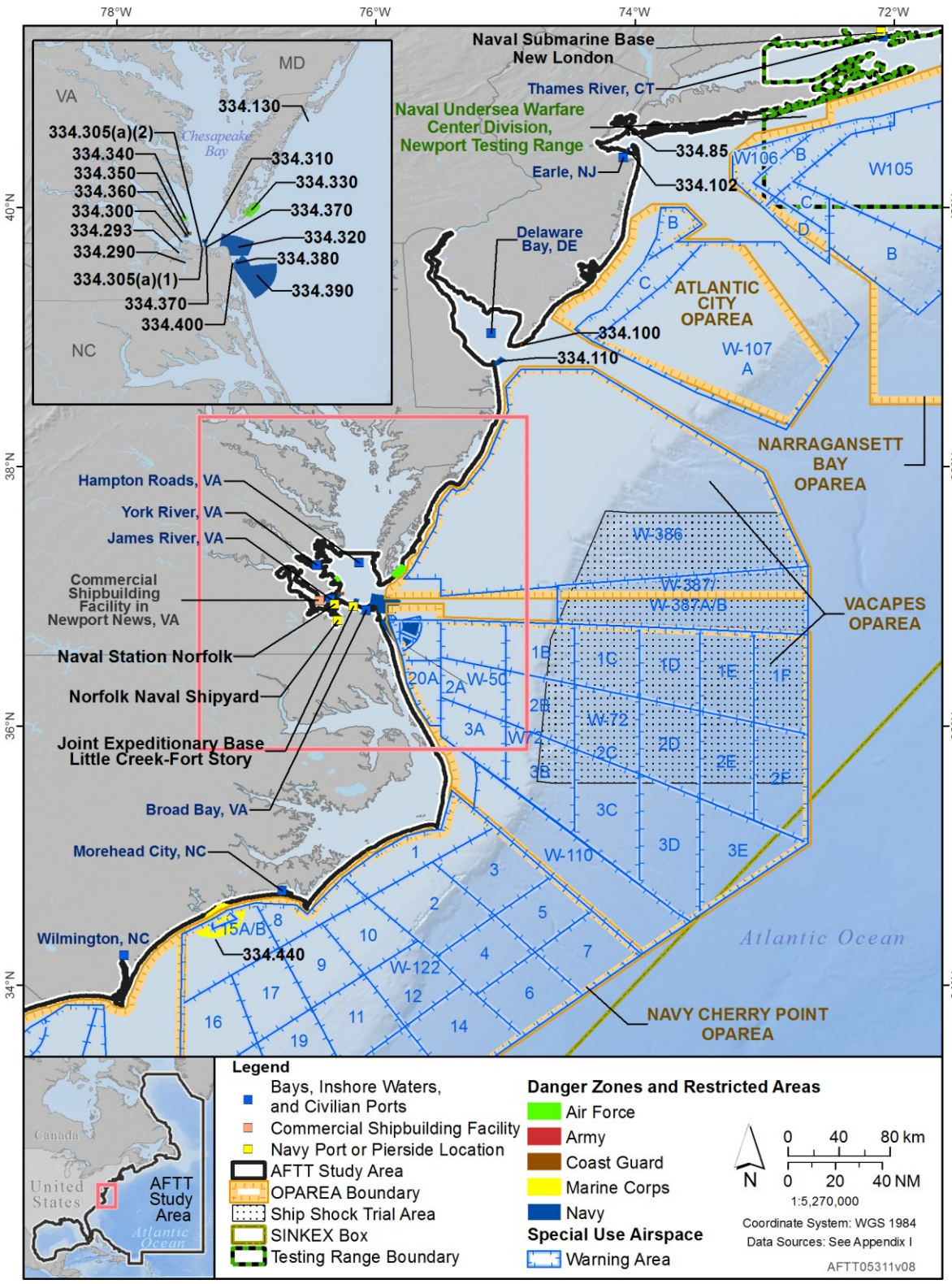
Accessibility, or restrictions to the availability of air and ocean space, would be a temporary condition. While mariners and pilots have a responsibility to be aware of conditions on the ocean and in the air, it is not expected that direct conflicts in accessibility would occur. The locations of restricted areas are published and available to mariners and pilots, who typically review such information before boating or flying in any area. Restricted areas are typically avoided by experienced mariners and pilots. Prior to initiating a training activity, the Navy would follow standard operating procedures to visually scan an area to ensure that nonparticipants are not present. If nonparticipants are present, the Navy delays, moves, or cancels its activity. Accessibility is no longer restricted once the activity concludes. In addition, project review and approval processes for many ongoing and planned offshore projects in the Study Area (i.e., oil and gas leasing, and wind energy projects) have integrated Navy input and review to reduce the potential for conflicts to air and ocean space. Therefore, there would be minimal potential for access to the ocean and airspace to directly impact human activities.

The Federal Aviation Administration is responsible for all of the national airspace, and the DoD and the Federal Aviation Administration cooperate in managing the airspace used by the military to support training and testing requirements. Special Use Airspace (Military Operations Areas and Restricted Areas over land, and Warning Areas over the ocean) is scheduled by the military and is released to the Federal Aviation Administration when not in use by the military. For special use airspace that is below 18,000 ft., non-military air routes already overlay Special Use Airspace. The Navy accommodates the needs of commercial and civilian aviation by maintaining a working relationship with the Federal Aviation Administration.



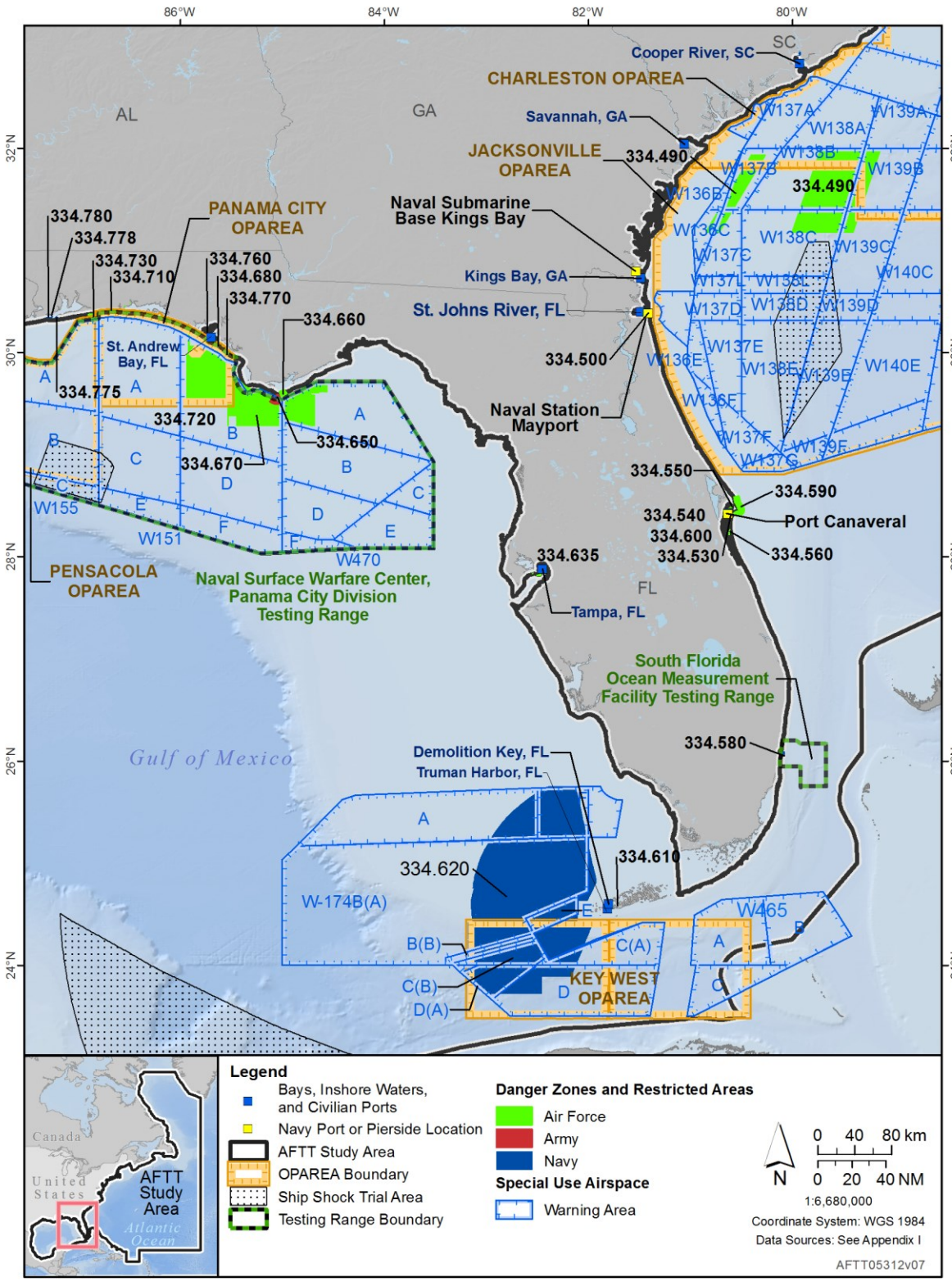
Notes: (1) AFTT: Atlantic Fleet Training and Testing; OPAREA: Operating Area (2) The numerical labels refer to the part of 33 CFR Section 334 defining the danger zone or restricted area

Figure 3.11-12: Danger Zones and Restricted Areas in the Northeast Atlantic Ocean



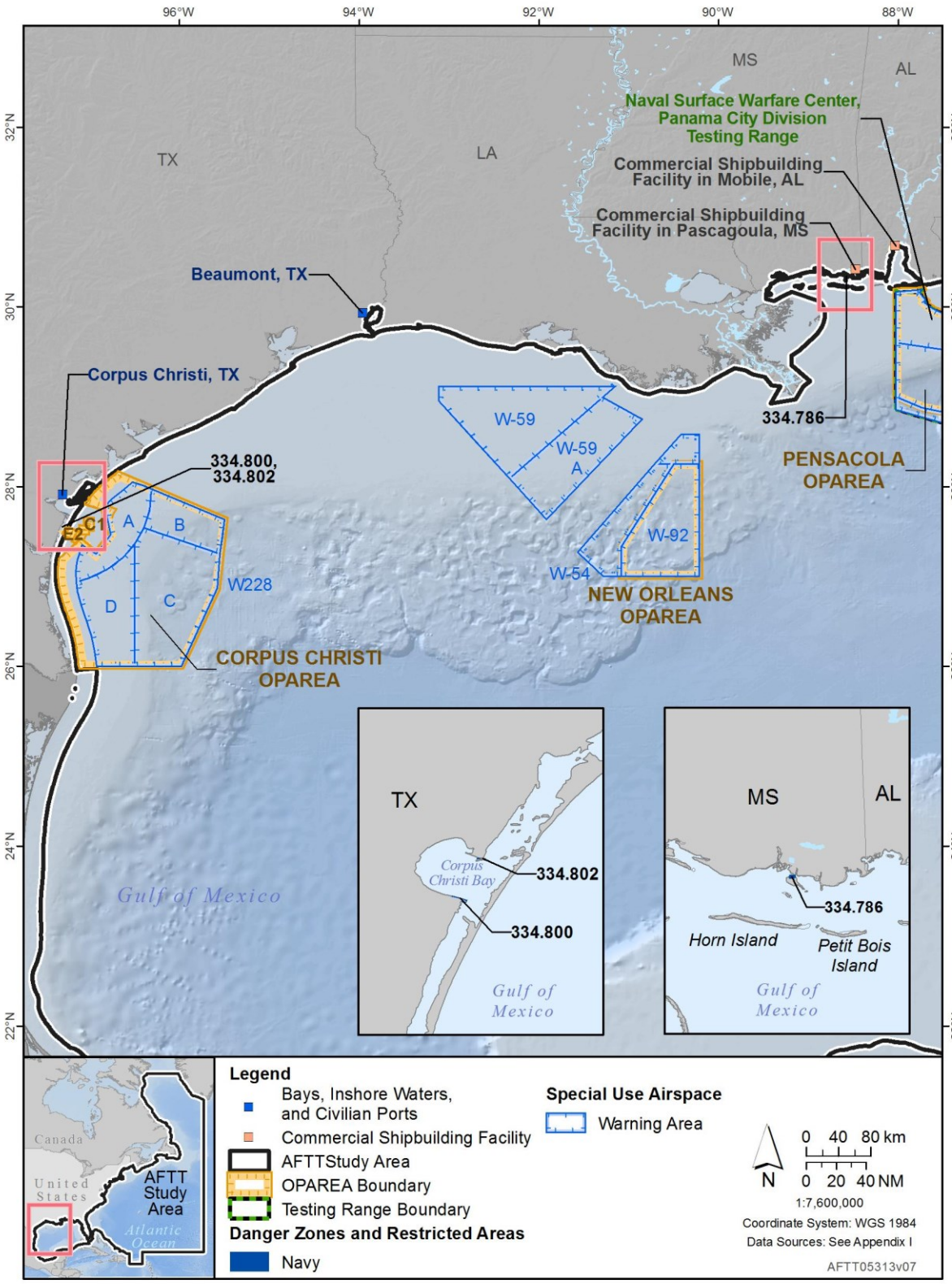
Notes: (1) AFTT: Atlantic Fleet Training and Testing; OPAREA: Operating Area; VACAPES: Virginia Capes; SINKEX: Sinking Exercise
(2) The numerical labels refer to the part of 33 CFR Section 334 defining the danger zone or restricted area

Figure 3.11-13: Danger Zones and Restricted Areas in the Mid-Atlantic Ocean



Notes: (1) AFTT: Atlantic Fleet Training and Testing; OPAREA: Operating Area (2) The numerical labels refer to the part of 33 CFR Section 334 defining the danger zone or restricted area

Figure 3.11-14: Danger Zones and Restricted Areas in the Southeast Atlantic Ocean and Eastern Gulf of Mexico



Notes: (1) AFTT: Atlantic Fleet Training and Testing; OPAREA: Operating Area (2) The numerical labels refer to the part of 33 CFR Section 334 defining the danger zone or restricted area

Figure 3.11-15: Danger Zones and Restricted Areas in the Western Gulf of Mexico

3.11.3.1.1 Impacts on Socioeconomic Activities from Limiting Accessibility

3.11.3.1.1.1 Sources of Energy Production and Distribution

Water

Water-related energy generation facilities are planned in state waters along the east coast, and preliminary permits have been issued by the Federal Energy Regulatory Commission for production of renewable energy (tidal and wave energy), including a residential tidal energy project for underwater turbines along the shoreline near the shipyard in Bath, Maine. In accordance with the 2010 Memorandum of Understanding between the U.S. Department of Agriculture and the U.S. Navy (U.S. Department of the Navy, 2010), the Navy participates in the siting and review of renewable energy projects by sharing technical information with the objective of ensuring compatibility and minimizing conflicts in shared space. Research and testing activities by academic institutions for water energy technology is conducted along the Atlantic coast and Florida and would continue to be conducted in consideration of existing restricted areas on the ocean. Therefore, access to water-related sources of energy generation in the Study Area would not be hindered and there would be no change to operations during AFTT training or testing activities.

Wind

While the United States has no offshore wind energy generating capacity at this time, such projects are in the early planning stages. The U.S. Department of the Interior has approved an ocean lease to Cape Wind Associates, LLC to construct 130 wind turbines in Nantucket Sound within the Study Area. There are no Navy activities at or immediately near the Cape Wind Associates, LLC lease blocks. Access to this future wind energy site would not be hindered, and there would be no change to operations during AFTT training or testing activities.

Similar projects have been proposed along the East Coast. In November 2010, the Department of the Interior announced the “Smart from the Start” initiative to accelerate development of wind energy along the Atlantic Outer Continental Shelf. The initiative calls for the identification of areas on the Atlantic Outer Continental Shelf that appear most suitable for commercial wind energy and for the opening of these areas for leasing and site assessment. Areas from Maine to Florida have been identified for offshore wind energy development. The resultant wind energy areas will be developed and refined through extensive consultation with other federal agencies, to include the Navy and the Intergovernmental Renewable Energy Task Force of each affected state.

Future offshore wind energy projects projected along the Atlantic coast and Florida will be proposed and developed in consideration of existing DoD restricted area airspace and sea space required in support of military operations. Therefore, access to future offshore wind energy sites would not be hindered, and there would be no change to operations during AFTT training or testing activities.

Oil and Gas Production

While there are many oil and natural gas leases and an extensive oil and natural gas pipeline network in the Gulf of Mexico, conflicts with military activities are avoided through cooperative efforts between the DoD and oil and gas operators. Because the DoD plays an active role in the oversight of proposed oil and gas lease areas on the outer continental shelf, lease areas would generally not be approved in, or in conflict with, established or otherwise restricted offshore military use areas. In cases where such areas are leased, stipulations to the leases are established to resolve conflicts. Future oil and natural gas production interests along the Atlantic coast and Gulf of Mexico would operate in consideration of existing restricted areas on the ocean and in the air. Therefore, access to future oil and natural gas

infrastructure would not be hindered, and there would be no change to operations during AFTT training or testing activities.

3.11.3.1.1.2 Mineral Extraction

Mineral extraction sites operate with the use of vessels and equipment that traverse the open ocean or are stationary (e.g., suction hopper dredges). Extraction of sand and gravel can be accomplished with the use of submerged or floating pipelines. Any changes in accessibility to offshore sites would not be expected to result in rerouting of vessels or postponing of operations. Any changes in accessibility for sand and gravel mining, or borrow sites, would have a short-term duration (typically one and one-half to four hours per location). Direct impacts on mineral extraction activities would be negligible.

3.11.3.1.1.3 Commercial Transportation and Shipping

There are no anticipated impacts on commercial shipping activities in the Study Area since naval vessels conducting hazardous activities generally occur away from commercially used waterways.

Any direct impacts on private civilian transportation activities from rerouting or postponing activities would be negligible due to advance public notification through the use of Notices to Mariners and Notices to Airmen and the primarily short-term duration (typically one and one-half to four hours per location) of military activities.

3.11.3.1.1.4 Commercial and Recreational Fishing

Favored fishing areas change over time with fluctuations in fish populations and communities, preferred target species, or fishing modes and styles. Popular fishing sites are characterized by relative ease of access (most recreational fishing trips occur in state waters), ability to anchor or secure the boat, and abundant presence of target fish. Impacts on commercial and recreational fishing may result when Navy activities restrict access to fishing areas or if Navy activities cause fish to abandon a popular fishing site. Refer to Section 3.6.3.1.1.4 (Physiological Stress) in Section 3.6 (Fishes) for analysis and discussion of potential population-level impacts Navy training and testing may have on fishes. The Navy strives to conduct its operations in a manner compatible with commercial and recreational ocean users by minimizing temporary access restrictions. Notices to Mariners allow commercial and recreational fishing boats to adjust their routes to avoid temporary restricted areas. Given the size of the Study Area, the opportunities for Navy activities to interfere with commercial and recreational fishing are minimal because the majority of fishing would occur closer to the shore. Because the proposed activities would not lead to a noticeable change in Navy presence, and because the proposed locations for these activities do not differ much from historical use, it is unlikely that commercial and recreational fishing activities would be noticeably affected by Navy activities requiring area restrictions.

3.11.3.1.1.5 Aquaculture

As discussed for commercial and recreational fishing, the federal government, through the U.S. Army Corps of Engineers, U.S. Coast Guard, U.S. Fish and Wildlife Service, the National Marine Fisheries Service, and U.S. Environmental Protection Agency, implements an assurance that U.S. navigational routes are maintained when approving aquaculture lease stipulations. Thus, it is assumed that whenever possible, close coordination between all users of the waterway would be required under the aquaculture lease stipulations. Navy activities that could impact aquaculture would not be planned close to inshore or offshore areas with aquaculture activities. Because the proposed activities would not lead to a noticeable change in Navy presence and because the proposed locations for these activities do not differ much from historical use, there would be no direct effect on the use of remotely operated feed

buoys at the University of New Hampshire offshore demonstration site or on divers who monitor the growth cages at shellfish or vegetation aquaculture sites.

3.11.3.1.1.6 Tourism

Tourism activities make an appreciable contribution to the overall economy within the Study Area. The Navy strives to conduct its operations in a manner compatible with recreational ocean users by minimizing temporary access restrictions. Published notices allow recreational users to adjust their routes to avoid temporary restricted areas.

Mariners and pilots engaged in tourism-related activities have a responsibility to be aware of conditions on the ocean and in the air. The locations of restricted areas are published and available to mariners and pilots, who typically review such information before boating or flying in any area. Restricted areas are typically avoided by mariners and pilots. The Navy would follow standard operating procedures to visually scan an area to ensure that nonparticipants are not present. If nonparticipants are present, the Navy delays, moves, or cancels its activity. Accessibility is no longer restricted once the activity concludes. Any changes to accessibility of air and ocean space would be a temporary condition for marine-related tourist and recreational activities. The revenues listed in Tables 3.11-2 through 3.11-5 would not be impacted by limiting access because restrictions on access would be temporary. The proposed activities would not lead to a noticeable change in Navy presence, and the proposed locations for these activities do not differ much from historical use; therefore, it is unlikely tourism would be noticeably affected by Navy activities requiring area restrictions.

The Navy has received comments on previous EISs expressing concern that marine mammals could be extirpated from areas where they have been observed or otherwise available for whale watching and similar recreational or tourist activities. As described in detail in Section 3.7 (Marine Mammals), Navy training and testing has been occurring in the same areas for decades, and there are no data or other information to indicate that populations of any marine mammals, including those popular with whale watchers, have been or would be affected. This assessment is based on four indicators from areas in the Pacific where Navy training and testing has continued for decades: (1) evidence suggesting or documenting increases in the numbers of marine mammals present in areas where Navy operates, (2) examples of documented presence and site fidelity of species and long-term residence by individual animals of some species, (3) use of training and testing areas for breeding and nursing activities, and (4) eight years of comprehensive monitoring data indicating a lack of any observable effects to marine mammal populations as a result of Navy training and testing activities. Therefore, no effects on wildlife viewing and other wildlife-dependent recreational activities and no economic effects on tourism (such as whale watching) and related businesses dependent on observing wildlife in their natural habitats are anticipated.

3.11.3.1.1.7 Impacts on Accessibility under Alternative 1

Impacts on Accessibility under Alternative 1 for Training Activities

Under Alternative 1, potential accessibility issues would be associated primarily with air warfare, surface warfare, anti-submarine warfare, mine warfare, amphibious warfare, and expeditionary warfare. Training activities in these warfare areas would continue at current levels and within established ranges and training locations, including the Virginia Capes, Navy Cherry Point, Jacksonville, Key West, and Gulf of Mexico Range Complexes and Other AFTT Areas. There would be no anticipated impacts on energy production, mineral extraction, commercial transportation and shipping, commercial and recreational fishing, aquaculture, or tourism because inaccessibility to areas of co-use would be temporary and of

short duration (typically one and one-half to four hours per location). Based on the Navy's standard operating procedures and the large expanse of the training ranges, accessibility issues would be negligible.

Impacts on Accessibility under Alternative 1 for Testing Activities

Under Alternative 1, potential accessibility issues would be associated primarily with air warfare, surface warfare, anti-submarine warfare, mine warfare, amphibious warfare, expeditionary warfare, sea trials, shock trials, and other weapons platform testing. Testing activities would continue at current levels and within established training and testing ranges, including the Northeast, Virginia Capes, Navy Cherry Point, Jacksonville, Key West, and Gulf of Mexico Range Complexes; Naval Undersea Warfare Center Division, Newport Testing Range; Naval Surface Warfare Center, Panama City Testing Range; and Other AFTT Areas. There would be no anticipated impacts on energy production, mineral extraction, commercial transportation and shipping, commercial and recreational fishing, aquaculture, or tourism because inaccessibility to areas of co-use would be temporary and of short duration (typically one and one-half to four hours per location). Based on the Navy's standard operating procedures and the large expanse of the training ranges, accessibility impacts would be negligible.

3.11.3.1.1.8 Impacts on Accessibility under Alternative 2

Alternative 2 consists of the activities described under Alternative 1 but with a nominal increase in the use of some sonar systems, explosives, and associated vessel and aircraft activity. The locations of these activities would remain the same as described under Alternative 1. Alternative 2 also includes the training and testing of personnel required for proficiency with these systems.

Impacts on Accessibility under Alternative 2 for Training Activities

Under Alternative 2, potential accessibility issues would be the same as those associated with Alternative 1. There would be no changes to the Navy's standard operating procedures for public access to ocean and airspace. There would be no anticipated impacts from Alternative 2 training activities on energy production, mineral extraction, commercial transportation and shipping, commercial and recreational fishing, aquaculture, or tourism, because inaccessibility to areas of co-use would be temporary and of short duration (typically one and one-half to four hours per location). Based on the Navy's standard operating procedures and the expansion of the Study Area, accessibility issues would be minor.

Impacts on Accessibility under Alternative 2 for Testing Activities

Under Alternative 2, potential accessibility issues would be the same as those associated with Alternative 1. Testing of some sonar systems would increase nominally within the Study Area. There would be no changes to the Navy's standard operating procedures for public access to testing ranges and other areas used for testing. There would be no anticipated impacts from Alternative 2 testing activities on energy production, mineral extraction, commercial transportation and shipping, commercial and recreational fishing, aquaculture, or tourism because inaccessibility to areas of co-use would be temporary and short duration (typically one and one-half to four hours per location). Based on the Navy's standard operating procedures and the expansion of the Study Area, accessibility issues would be minor.

3.11.3.1.1.9 Impacts on Accessibility under the No Action Alternative

Under the No Action Alternative, the Navy would not conduct the proposed training and testing activities in the AFTT Study Area. Various accessibility stressors (e.g., limits on access to desirable fishing

locations) would not be introduced into the marine environment. Training and testing activities have occurred throughout the Study Area for decades, resulting in and sustaining increases in jobs, military and civilian infrastructure, and population growth in numerous towns, cities, and regions located along the Atlantic and Gulf coasts. While it is reasonable to assume that ceasing training and testing activities associated with the Proposed Action would make certain areas where the Navy has conducted training and testing more accessible (i.e., available to the public more often), Navy OPAREAs and testing ranges are used for other purposes and would likely remain in place for the foreseeable future. Military activities would continue to occur in some of the same areas. Furthermore, the Navy has implemented a number of methods to communicate upcoming activities that would result in temporary restrictions on access to training and testing areas. These methods, which include Notices to Mariners, Notices to Airmen, broadcasts on marine band radio, website postings, and direct communication with the public through media and local organizations, serve to reduce impacts of limits on accessibility.

Ceasing training and testing activities may reduce the number and types of jobs available in locations where the Navy is a vital or even the primary economic driver sustaining local communities. For example, the use of munitions and other equipment used for training and testing activities under the Proposed Action would no longer be needed and, consequently, the number of jobs supporting those industries may be reduced or, alternatively, some jobs may be relocated. The secondary effects from reducing personnel who support Navy training and testing activities could include a decline in local business and a decrease in the need for infrastructure, such as schools. If jobs are relocated, a smaller population may no longer be able to sustain the local economy that developed to support the larger population. While more complex studies at the local level would need to be conducted to quantify potential socioeconomic impacts from ceasing training and testing activities, it is highly likely that many coastal communities would be impacted.

3.11.3.1.2 Summary of Potential Impacts on Accessibility

Access restrictions in the Navy training and testing areas would be temporary, and these conditions would return to normal upon completion of training and testing activities. These conditions would not result in a direct loss of income, revenue, employment, resource availability, or quality of experience.

3.11.3.2 Impacts from Airborne Acoustics

As an environmental stressor, loud noises, sonic booms, and vibrations generated from Navy training and testing activities such as weapons firing, in-air explosions, and aircraft transiting have the potential to disrupt wildlife and humans in the Study Area. The public might intermittently hear noise from ships or aircraft overflights if they are in the general vicinity of a training or testing event, but there would be no impact on public health and safety because of the infrequency and duration of events (Section 3.12, Public Health and Safety).

3.11.3.2.1 Impacts on Socioeconomic Activities from Airborne Acoustics

Airborne noise would not impact energy production and distribution, mineral extraction, commercial transportation and shipping, or aquaculture. Based on the analysis of impacts from the Proposed Action, fish would not experience substantial impacts from airborne acoustics (Section 3.6, Fishes). Marine invertebrates (Section 3.4, Invertebrates), also important commercial fishery resources, would not be affected by airborne acoustics because most marine species are limited in their ability to detect airborne sound. Therefore, airborne noise from Navy activities would not impact the availability of commercially and recreationally valuable species.

Noise interference could decrease public enjoyment of recreational activities. These effects would occur on a temporary basis, only when weapons firing, in-air explosions, and aircraft transiting occur. Of these activities, Navy activities involving weapons firing and in-air explosions would only occur when the Navy can confirm the area is clear of commercial and recreational boaters and other nonparticipants, reducing the likelihood these activities would be a disturbance.

An aircraft traveling at supersonic speeds has the potential to generate sonic booms heard at ground level. A sonic boom is the "thunder-like" noise a person on the ground hears when an aircraft flies overhead faster than the speed of sound (i.e., supersonic). Not all supersonic flights generate sonic booms that are detectable on the ground. When a sonic boom reaches ground level it may vary widely in intensity. The factors that influence the occurrence and intensity of a sonic boom include the weight, size, and shape of the aircraft; the altitude, attitude, and flight path of the aircraft; and the weather or atmospheric conditions where the boom is generated and at ground level.

Sonic booms shall not be intentionally generated below 30,000 ft. of altitude unless over water and more than 30 NM from inhabited coastal areas or islands, although deviation from these guidelines may be authorized for tactical missions that require supersonic speeds, phases of formal training requiring supersonic speeds or research, test and operational suitability test flights that require supersonic speeds (U.S. Department of the Navy, 2016). Supersonic test flights regularly occur in airspace, referred to as the supersonic Test Track, located at least 3 NM offshore and within W-386 in the Virginia Capes Range Complex. The test track extends along the coastline of the Delmarva Peninsula, which separates the Chesapeake Bay to the west and the Atlantic Ocean to the east, and includes portions of Delaware, Maryland, and Virginia. The majority of supersonic flights are in support of Naval Air Systems Command Research Development Acquisition Testing & Evaluation activities, but Navy training flights may also use the Test Track. In addition, other military aircraft and even commercial test flights have used the Test Track in the past. Supersonic test flights in the Test Track are conducted under highly controlled conditions to enable the collection of empirical data that are used to evaluate the performance, reliability, and safety of new aircraft systems under high airspeed conditions.

NAVAIR has received noise complaints from coastal residents in Virginia, Maryland, Delaware and as far north as New Jersey, associated with 15 Navy supersonic flights over a three-year period, for an average of five supersonic flights per year. Therefore, due to the infrequent occurrence of sonic booms, they are unlikely to deter a resident or tourist from participating in a recreational activity (e.g., a fishing trip) in near shore or offshore areas. Most naval aircraft training and testing would occur well out to sea, while civilian recreational activities are concentrated within a few miles of shore, resulting in minimal overlap and negligible impacts. Tourism and recreational activity revenue (Table 3.11-6) is not expected to be impacted by airborne noise.

3.11.3.2.1.1 Impacts from Airborne Acoustics under Alternative 1

Impacts from Airborne Acoustics under Alternative 1 for Training Activities

Under Alternative 1, potential airborne noise impacts would be associated primarily with air warfare, surface warfare, anti-submarine warfare, mine warfare, and amphibious warfare. Training activities in these warfare areas would continue at current levels and within established ranges and training locations, including the Northeast, Virginia Capes, Navy Cherry Point, Jacksonville, Key West, and Gulf of Mexico Range Complexes. There would be no anticipated impacts on energy production and distribution, mineral extraction, commercial transportation and shipping, commercial and recreational fishing, and aquaculture, because acoustic conditions would have no effect on these activities and the

training area would be free of nonparticipants. Navy operational procedures and practices are already in place to avoid impacts on civilian activities in the training areas. Navy training activities producing airborne noise typically occur infrequently and have a short duration (hours). Therefore, airborne noise impacts on tourism and recreational activity would be negligible.

Impacts from Airborne Acoustics under Alternative 1 for Testing Activities

Under Alternative 1, potential airborne noise impacts would be associated primarily with air warfare, surface warfare, anti-submarine warfare, mine warfare, amphibious warfare, sea trials, and other weapons platform testing. Testing activities would continue at current levels and within established training and testing ranges, including the Northeast, Virginia Capes, Navy Cherry Point, Jacksonville, Key West, and Gulf of Mexico Range Complexes; Naval Undersea Warfare Center Division, Newport Testing Range; and Naval Surface Warfare Center, Panama City Division Testing Range. There would be no anticipated impacts on energy production and distribution, mineral extraction, commercial transportation and shipping, commercial and recreational fishing, and aquaculture, because acoustic conditions would have no effect on these activities and the testing area would be free of nonparticipants. Navy operational procedures and practices are already in place to avoid impacts on civilian activities in the testing areas. Navy testing activities producing airborne noise typically occur infrequently and have a short duration (hours).

When the airspace is available and testing requirements allow, supersonic flights are scheduled offshore to avoid potential impacts from sonic booms. However, in some instances, supersonic flights cannot be moved due to mission requirements or airspace congestion. Since atmospheric conditions can affect the intensity of a sonic boom, the wind speed, wind direction, air temperature, and atmospheric pressure are all monitored prior to a supersonic testing event to help determine the likelihood that a sonic boom would be detected at ground level. However, atmospheric conditions can change rapidly in the offshore environment, which can affect the intensity of a sonic boom at ground level. While the pre-flight check of atmospheric conditions may have indicated that there would be a low probability of a sonic boom reaching the coastline, if conditions change during the flight an unexpectedly intense sonic boom may be detected at ground level. To help limit impacts from supersonic test flights, test pilots receive annual noise mitigation training to maintain their awareness of the potential noise impacts resulting from their flights. Based on the analysis presented in the sections above, any infrequent and brief airborne noise impacts on tourism and recreational activity would be negligible.

3.11.3.2.1.2 Impacts from Airborne Acoustics under Alternative 2

Alternative 2 consists of the activities described under Alternative 1 but with a nominal increase in the use of some sonar systems, explosives, and associated vessel and aircraft activity. The locations of these activities would remain the same as described under Alternative 1. Alternative 2 also includes the training and testing of personnel required for proficiency with these systems.

Impacts from Airborne Acoustics under Alternative 2 for Training Activities

Under Alternative 2, airborne noise issues would be the same as those associated with Alternative 1, with the exception of a nominal increase in vessel and aircraft activity associated with an increase in the use of some sonar systems. However, the increase in airborne noise would be negligible. There would be no anticipated impacts from Alternative 2 training activities on energy production and distribution, mineral extraction, commercial transportation and shipping, commercial and recreational fishing, aquaculture, or tourism, because acoustic conditions would have no effect on these activities and the training area would be free of nonparticipants. Navy operational procedures and practices are already in

place to avoid impacts on ongoing activities in the testing areas. Navy training activities producing airborne noise typically occur infrequently and have a short duration (hours). Therefore, airborne noise impacts on tourism and recreational activity would be negligible.

Impacts from Airborne Acoustics under Alternative 2 for Testing Activities

Under Alternative 2, airborne noise issues would be the same as those associated with Alternative 1, with the exception of a nominal increase in vessel and aircraft activity associated with an increase in the use of some sonar systems and explosives. However, the increase in airborne noise would be negligible. There would be no anticipated impacts from Alternative 2 testing activities on energy production and distribution, mineral extraction, commercial transportation and shipping, commercial and recreational fishing, and aquaculture, because acoustic conditions would have no effect on these activities and the testing area would be free of nonparticipants. Navy operational procedures and practices are already in place to avoid impacts on ongoing activities in the testing areas. Navy testing activities producing airborne noise typically occur infrequently and have a short duration (hours). Therefore, airborne noise impacts on tourism and recreational activity would be negligible.

3.11.3.2.1.3 Impacts from Airborne Acoustics under the No Action Alternative

Under the No Action Alternative, the Navy would not conduct the proposed training and testing activities in the AFTT Study Area. Various airborne acoustic stressors (e.g., noise affecting tourism) would not be introduced into the marine environment. Training and testing activities have occurred throughout the Study Area for decades, resulting in and sustaining increases in jobs, military and civilian infrastructure, and population growth in numerous towns, cities, and regions located along the Atlantic and Gulf coasts. While it is reasonable to assume that ceasing training and testing activities associated with the Proposed Action would reduce airborne noise, the effect would be negligible, because other commercial and non-military activities (e.g., shipping and recreational boating) that produce airborne noise occur at a higher tempo and closer to shore than Navy training and testing activities.

Ceasing training and testing activities may reduce the number and types jobs available in locations where the Navy is a vital or even the primary economic driver sustaining local communities. For example, the use of munitions and other equipment used for training and testing activities would no longer be needed and, consequently, the number of jobs supporting those industries may be reduced or alternatively, some jobs may be relocated. The secondary effects from reducing personnel who conduct and support Navy training and testing activities could include a decline in local business and a decrease in the need for infrastructure, such as schools. If jobs are relocated, a smaller population may no longer be able to sustain the local economy that developed to support the larger population. While more complex studies at the local level would need to be conducted to quantify potential socioeconomic impacts from ceasing training and testing activities, it is highly likely that many coastal communities would be impacted.

3.11.3.2.2 Summary of Potential Impacts from Airborne Acoustics

Because the majority of Navy training and testing activities are conducted far from where tourism and recreational activities are concentrated, the impact of airborne noise would be negligible. The public might intermittently hear noise from transiting ships or aircraft overflights if they are in the general vicinity of a training or testing activity, but these occurrences would be infrequent. The infrequent exposure to airborne noise would not result in a direct loss of income, revenue or employment, resource availability, or quality of experience.

3.11.3.3 Physical Disturbance and Strike Stressors

The evaluation of impacts on socioeconomic resources from physical stressors focuses on direct physical encounters or collisions with objects moving through the water or air (e.g., vessels, aircraft, unmanned devices, and towed devices), dropped or fired into the water (non-explosive practice munitions, other military expended materials, and seafloor devices), or resting on the ocean floor (anchors, mines, and targets) that may damage or encounter civilian equipment. Physical disturbances that damage equipment and infrastructure could disrupt the collection and transport of products, which may impact industry revenue or operating costs.

Navy training and testing equipment and vessels moving through the water could collide with non-Navy vessels and equipment. Most of the training and testing activities involve vessel movement and use of towed devices. However, the likelihood that a Navy vessel would collide with a non-Navy vessel is remote, because of the use of navigational aids or buoys separating vessel traffic, shipboard lookouts, radar, and marine band radio communications by both Navy and civilians. Therefore, the potential to impact commercial transportation and shipping by physical disturbance or strike is negligible and requires no further analysis.

Aircraft conducting training or testing activities in the Study Area operate in designated military special use airspace (e.g., warning areas, military operations areas, and restricted areas). All aircraft, military and civilian, are subject to Federal Aviation Administration regulations, which define permissible uses of designated airspace, and are implemented to control those uses. These regulations are intended to accommodate the various categories of aviation, whether military, commercial, or general aviation. By adhering to these regulations, the likelihood of civilian aircraft coming into contact with military aircraft or munitions is remote. In addition, Navy aircraft follow procedures outlined in Navy air operations manuals, which are specific to a warning area or other special use airspace, and which describe procedures for operating safely when civilian aircraft are in the vicinity.

Military expended materials can physically interact with civilian equipment and infrastructure. Many of the training and testing activities use military expended materials including chaff, flares, projectiles, casings, target fragments, missile fragments, rocket fragments, ballast weights, and mine shapes.

3.11.3.3.1 Impacts on Socioeconomic Activities from Physical Disturbance and Strike Stressors

3.11.3.3.1.1 Sources of Energy Production and Distribution

The evaluation of impacts on energy production and distribution in the Study Area from physical disturbances or strikes focuses on objects moving through the water or air, dropped into the water, or resting on the ocean floor that may damage equipment or otherwise inhibit production. Military expended materials that damage equipment and infrastructure could disrupt energy production and distribution, which may impact industry revenue and operating costs. The Navy does not perform activities that would release military expended materials near known, submerged equipment or infrastructure. Therefore, the probability that Navy activities would disrupt energy production and distribution or damage infrastructure by physical strikes would be negligible.

3.11.3.3.1.2 Mineral Extraction

Similar to the potential impacts on sources of energy production, physical disturbances or strikes could damage equipment and inhibit extraction processes. Military expended materials that inadvertently snag, entangle, or damage sand and gravel extraction equipment or disrupt the sand and gravel

extraction process may impact industry revenue and operating costs. The Navy implements standard operating procedures for clearing training and testing areas before initiating hazardous activities. Navy activities that expend materials that ultimately reside on the seafloor are typically conducted in offshore waters beyond the location of accessible sand and gravel sources. If military expended materials were encountered during the extraction process, they would first encounter the dragheads, which are the first point of contact with bottom materials on a suction dredger. The dragheads and the extraction process are designed with the expectation that debris may be encountered during the extraction process. The dragheads aid in filtering out debris to reduce the likelihood of a blockage from debris encountered during the dredging or extraction process. The Navy would avoid conducting training and testing in areas of mineral extraction, and it is unlikely that military expended materials from training and testing activities would be transported onto sand and gravel sources. Therefore, the potential for Navy activities to disrupt or disturb mineral extraction vessels or equipment by physical disturbances or strikes would be negligible.

3.11.3.3.1.3 Commercial Transportation and Shipping

There would be no anticipated impacts on commercial transportation activities in the Study Area, because naval vessels and aircraft conducting training and testing generally conduct these activities far from commercially used waterways and airways. While physical disturbances or strikes could damage commercial marine vessels or aircraft, the Navy implements standard operating procedures for clearing training and testing areas of all nonparticipants before initiating hazardous activities. Therefore, the potential for Navy activities to disrupt or disturb commercial vessels or aircraft by physical disturbances or strikes would be negligible.

3.11.3.3.1.4 Commercial and Recreational Fishing

The majority of commercial and recreational fishing in the Study Area takes place in state waters, less than 3 NM from shore, where the Navy conducts very limited training and testing activities. Approximately 10 percent of fish caught during recreational fishing trips are caught in federal waters, which extend seaward beyond 3 NM from shore (9 NM for Texas, Puerto Rico, and Florida's Gulf coast). Therefore, most recreational fishing would occur far from physical disturbances and strikes associated with training and testing activities. Some commercial fishing may occur beyond state waters in Navy training and testing areas and could be affected by the proposed activities if those activities were to alter fish population levels in those areas to such an extent that commercial fishers would no longer be able to find their target species. As described in Section 3.6.3 (Fishes, Environmental Consequences), the behavioral responses that could occur from various types of physical stressors associated with training and testing activities would not compromise the general health or condition of fishes or populations of fishes.

Section 3.6.3 (Fishes, Environmental Consequences) also evaluated potential impacts on fish habitat from physical disturbances, strikes (by small-, medium-, and large-projectiles), and the use of electromagnetic and towed devices. Physical disturbances and strikes would be concentrated within designated gunnery box areas, resulting in localized disturbances of hard bottom areas, but could occur anywhere in the Study Area. Direct and indirect impacts on the fishes using hard bottom habitat in the Study Area could occur. The use of electromagnetic devices would not harm fishes, result in behavioral responses, or affect habitat. The use of towed devices may result in short-term and localized movement of fishes to avoid the device; however, long-term avoidance of an area is not anticipated. Impacts on populations of fishes in the Study Area would not be expected, and, therefore, loss of revenue or

employment by commercial fishers would not occur. No impacts on recreational fishing in the Study Area would be anticipated.

Commercial fishing activities have the potential to be impacted by military equipment placed in the water column or on the seafloor for use during Navy training and testing activities. This equipment could include ship anchors; moored or bottom-mounted targets, mines, and mine shapes; bottom-mounted tripods; and the use of towed system and attachment cables. Many different types of commercial fishing gear are used in the Study Area, including gillnets, longline gear, troll gear, trawls, seines, and traps or pots. Bottom fishing gear is the most common type of fishing gear used in the Study Area and is used to capture some of the most valued species (Table 3.11-1), and commercial bottom-fishing activities, such as dredging, bottom trawling, long lines, and pots and traps have the greatest potential to be impacted by materials expended during training and testing activities and that ultimately reside on the seafloor. For example, military expended materials, such as decelerators/parachutes, cables, and guidance wires, would ultimately sink to the seafloor and could inadvertently snag, entangle, and damage fishing equipment. Interaction with bottom-fishing gear could result in the loss of or damage to commercial fishing gear and Navy equipment. If events such as these were to occur, they could result in loss of income, revenue, and employment. Entanglement by fiber optic cables and guidance wires expended during training and testing activities would not result in destruction or adverse modification of fish habitat and is unlikely to be encountered by commercial fishers. Even if encountered, fiber optic cables are brittle and are likely to break easily if entangled with fishing gear.

The Navy recovers many of the targets (e.g., mines and mine shapes) and target fragments used in training and testing activities, and would continue to do so to minimize the potential for interaction with fishing gear and fishing vessels. Unrecoverable items are typically small, constructed of soft materials (e.g., cardboard boxes or tethered target balloons), or are intentionally designed to sink to the bottom after serving their purpose (such as expended 55-gallon steel drums), so that they would not represent a collision risk to vessels, including commercial fishing vessels. Although larger expended items, such as 55-gallon drums, may pose a risk to certain types of fishing gear used for bottom fishing, the probability of encountering such an item is remote given the large area over which expended materials would be distributed; the depth of the water where most activities using expended materials would occur; and the tendency for larger, heavier materials to become embedded in soft sediments, making them less likely to be snagged by fishing gear.

Based on the large size of the Study Area, the limited areas of concentrated military activity, and the advance release of Notices to Mariners prior to conducting activities, impacts on commercial or recreational fishing from physical disturbances and strikes in the Study Area would be rare; were they to occur, they would have a negligible economic impact on the commercial or recreational fishing industries.

3.11.3.3.1.5 Aquaculture

There are no anticipated direct impacts from physical stressors on the aquaculture industry, because there are no aquaculture farms in any of the range complexes or testing ranges, the directional waterways used by naval vessels, or the training areas in the Chesapeake Bay. There is a limited possibility that physical disturbances on the ocean floor such as ship anchoring, expended material residing on the seafloor, moored mines, bottom-mounted tripods, and the use of towed systems and attachment cables could inadvertently damage aquaculture gear. However, the shallow water,

nearshore locations of most aquaculture activities would not coincide with the locations of training and testing activities that have the potential to impact aquaculture.

3.11.3.3.1.6 Tourism

While Navy training and testing activities can occur throughout the Study Area, most (especially hazardous) activities occur well out to sea. Most civilian recreational activities engaged in by both tourists and residents take place within a few miles of land or in many cases along the shoreline.

Recreational diving and snorkeling activities within the Study Area take place primarily at known diving sites, including shipwrecks and artificial reefs. The locations of these popular sites are well documented, boats are typically well marked, and diver-down flags would be visible from, and avoided by, Navy ships conducting training and testing activities. As a result, conflicts between training and testing activities within the offshore areas and recreational diving and snorkeling would not occur.

Other tourism activities such as whale watching, boating, or use of other watercraft or aircraft may occur farther offshore. Activities occurring farther from shore would usually be conducted from larger boats that are typically well marked and visible to Navy ships conducting training and testing activities. Individual boaters engaged in tourism activities such as whale watching monitor navigational information to avoid Navy training and testing areas. Vessel operators are responsible for being aware of designated danger zones in surface waters and any Notices to Mariners that are in effect. Operators of recreational or commercial vessels are responsible for abiding by U.S. Coast Guard maritime regulations. In conjunction with these responsibilities, Navy standard operating procedures require Navy vessels to ensure that an area is clear of nonparticipants before initiating training and testing activities. Conflicts between Navy training and testing in offshore areas and whale watching or other offshore recreational activities would not occur. The Navy would continue to recover larger pieces of targets used in certain training and testing activities so that target debris would not pose a collision risk to civilian vessels. Unrecoverable pieces of targets are typically small, constructed of soft materials such as cardboard, are pieces of a tethered target balloons, or are designed to sink to the seafloor after use and would not damage civilian vessels if encountered.

Changes to offshore tourism activities in the Study Area would not be expected, and, therefore, loss of revenue or employment associated with tourism would not be expected as a result of training and testing activities.

3.11.3.3.1.7 Impacts from Physical Disturbance and Strike Stressors under Alternative 1

Impacts from Physical Disturbance and Strike Stressors under Alternative 1 from Training Activities

Under Alternative 1, potential physical disturbance and strike impacts would be associated primarily with air warfare, surface warfare, anti-submarine warfare, mine warfare, and amphibious warfare. Training activities in these warfare areas would continue at current levels and within established ranges and training locations, including the Northeast, Virginia Capes, Navy Cherry Point, Jacksonville, Key West, and Gulf of Mexico Range Complexes.

There would be no anticipated impacts on energy production and distribution, mineral extraction, commercial transportation and shipping, commercial and recreational fishing, aquaculture, or tourism, because of the large size of the Study Area, the limited areas of operations, and implementation of the Navy's standard operating procedures, which includes ensuring that an area is clear of all non-participating vessels before training activities take place. In addition, the Navy provides advance

notification of training activities to the public through Notices to Mariners and postings on Navy websites. Damage to or loss of commercial equipment, such as fishing gear, energy production equipment, and mineral extraction equipment, from interaction with Navy vessels, equipment, or other expended materials is unlikely. The Navy recovers many practice munitions (e.g., mines and mine shapes) for reuse following the activity. The Navy also recovers larger floating objects or materials, such as targets or target fragments, to avoid having them become hazards to navigation. Smaller objects that remain in the water column would be unlikely to pose a risk to commercial equipment. Furthermore, the Navy will implement mitigation to avoid impacts from explosives and physical disturbance and strike stressors on seafloor resources in mitigation areas throughout the Study Area (Section 5.4.1, Mitigation Areas for Seafloor Resources). The mitigation areas will benefit shallow-water coral reefs, live hard bottom, artificial reefs, and shipwrecks, which are valuable components of the snorkeling, diving, and fishing industries. Considering the expansive size of the Navy's OPAREAs, the disbursement of military expended materials over these large areas, and the Navy's standard operation procedures and existing mitigation measures (Chapter 5, Mitigation), impacts from physical disturbances and strikes on energy production and distribution, mineral extraction, commercial transportation and shipping, commercial and recreational fishing, aquaculture, and tourism would be negligible.

Impacts from Physical Disturbance and Strike Stressors under Alternative 1 from Testing Activities

Under Alternative 1, potential physical disturbance and strike would be associated primarily with air warfare, surface warfare, anti-submarine warfare, mine warfare, amphibious warfare, sea trials, and other weapons platform testing. Testing activities would continue at current levels and within established training and testing ranges, including the Northeast, Virginia Capes, Navy Cherry Point, Jacksonville, Key West, and Gulf of Mexico Range Complexes; Naval Undersea Warfare Center Division, Newport Testing Range; and Naval Surface Warfare Center, Panama City Division Testing Range.

There would be no anticipated impacts on energy production and distribution, mineral extraction, commercial transportation and shipping, commercial and recreational fishing, aquaculture, or tourism, because the Navy's standard operating procedures require that a testing area is clear of nonparticipants before initiating testing activities. Furthermore, the Navy will implement mitigation to avoid impacts from explosives and physical disturbance and strike stressors on seafloor resources in mitigation areas throughout the Study Area (Section 5.4.1, Mitigation Areas for Seafloor Resources). The mitigation areas will benefit shallow-water coral reefs, live hard bottom, artificial reefs, and shipwrecks, which are valuable components of the snorkeling, diving, and fishing industries. Considering the expansive size of the Navy's OPAREAs and testing ranges, the wide distribution of military expended materials over these large areas, implementation of standard operating procedures and mitigation, and impacts from physical disturbances and strikes on commercial and recreational fishing, the likelihood of a physical disturbance or strike disrupting commercial or recreational activities in the Study Area would be negligible. Therefore, loss of revenue or employment changes to socioeconomic activities and resources in the Study Area would not be expected.

3.11.3.3.1.8 Impacts from Physical Disturbance and Strike Stressors under Alternative 2

Alternative 2 consists of the activities described under Alternative 1 but with a nominal increase in the use of some sonar systems and explosives associated vessel and aircraft activity. The locations of these activities would remain the same as described under Alternative 1. Alternative 2 also includes the training and testing of personnel required for proficiency with these systems.

Impacts from Physical Disturbance and Strike Stressors under Alternative 2 from Training Activities

Under Alternative 2, potential physical disturbance and strike impacts would be the same as described under Alternative 1, with the exception of a nominal increase in vessel and aircraft activity associated with an increase in the use of some sonar systems. However, the increase in the probability of a physical disturbance or strike would be negligible. There would be no anticipated impacts on energy production and distribution, mineral extraction, commercial transportation and shipping, commercial and recreational fishing, aquaculture, or tourism, because of the large size of the Study Area, the limited areas of operations, and implementation of the Navy's standard operating procedures, which includes ensuring that an area is clear of all non-participating vessels before training activities take place. In addition, the Navy provides advance notification of training activities to the public through Notices to Mariners and postings on Navy websites. Damage to or loss of commercial equipment, such as fishing gear, energy production equipment, and mineral extraction equipment, from interaction with Navy equipment or other expended materials is unlikely. The Navy recovers many practice munitions (e.g., mines and mine shapes) for reuse following the activity. The Navy also recovers larger floating objects or materials, such as targets or target fragments, to avoid having them become hazards to navigation. Smaller objects that remain in the water column would be unlikely to pose a risk to commercial equipment. Considering the expansive size of the Navy's OPAREAs, the disbursement of military expended materials over these large areas, and the Navy's standard operation procedures and mitigation measures (Chapter 5, Mitigation), impacts from physical disturbances and strikes on energy production and distribution, mineral extraction, commercial transportation and shipping, commercial and recreational fishing, aquaculture, and tourism would be negligible.

Impacts from Physical Disturbance and Strike Stressors under Alternative 2 from Testing Activities

Under Alternative 2, potential physical disturbance and strike impacts would be the same as described under Alternative 1, with the exception of a nominal increase in vessel and aircraft activity associated with an increase in the use of some sonar systems and explosives. However, the increase in the probability of a physical disturbance or strike would be negligible. There would be no anticipated impacts on energy production and distribution, mineral extraction, commercial transportation and shipping, commercial and recreational fishing, aquaculture, or tourism, because of the large size of the Study Area, the limited areas of operations, and implementation of the Navy's standard operating procedures, which includes ensuring that an area is clear of all non-participating vessels before testing activities take place. In addition, the Navy provides advance notification of testing activities to the public through Notices to Mariners and postings on Navy websites. Damage to or loss of commercial equipment, such as fishing gear, energy production equipment, mineral extraction equipment, from interaction with Navy equipment or other expended materials is unlikely. The Navy recovers many practice munitions (e.g., mines and mine shapes) for reuse following the activity. The Navy also recovers larger floating objects or materials, such as targets or target fragments, to avoid having them become hazards to navigation. Smaller objects that remain in the water column would be unlikely to pose a risk to commercial equipment. Considering the expansive size of the Navy's OPAREAs, the disbursement of military expended materials over these large areas, and the Navy's standard operation procedures and mitigation measures (Chapter 5, Mitigation), impacts from physical disturbances and strikes energy production and distribution, mineral extraction, commercial transportation and shipping, commercial and recreational fishing, aquaculture, and tourism would be negligible.

3.11.3.3.1.9 Impacts from Physical Disturbance and Strike Stressors under the No Action Alternative

Under the No Action Alternative, the Navy would not conduct the proposed training and testing activities in the AFTT Study Area. Various physical disturbance and strike stressors (e.g., disruption to fishing) would not be introduced into the marine environment. Training and testing activities have occurred throughout the Study Area for decades, resulting in and sustaining increases in jobs, military and civilian infrastructure, and population growth in numerous towns, cities, and regions located along the Atlantic and Gulf coasts. While it is reasonable to assume that ceasing training and testing activities associated with the Proposed Action would reduce the potential for disruption of civilian activities from physical disturbances or strikes, the effect would be negligible, because the likelihood of a disturbance, as described under Alternative 1, is already negligible.

Ceasing training and testing activities may reduce the number and types of jobs available in locations where the Navy is a vital or even the primary economic driver sustaining local communities. For example, the use of munitions and other equipment used for training and testing activities would no longer be needed, and, consequently, the number of jobs supporting those industries may be reduced or, alternatively, some jobs may be relocated. The secondary effects from reducing personnel who support Navy training and testing activities could include a decline in local business and a decrease in the need for infrastructure, such as schools. If jobs are relocated, a smaller population may no longer be able to sustain the local economy that developed to support the larger population. While more complex studies at the local level would need to be conducted to quantify potential socioeconomic impacts from ceasing training and testing activities, it is highly likely that many coastal communities would be impacted to varying degrees.

3.11.3.3.2 Summary of Potential Impacts from Physical Disturbance and Strike Stressors

Because the majority of Navy training and testing activities are conducted far from where commercial and recreational activities are concentrated, the potential for a physical disturbance or strike would be negligible. The public might intermittently observe a transiting ship or aircraft flying overhead if they are in the general vicinity of a training or testing activity, but these occurrences would be infrequent and of short duration. The Navy does not typically train or test in areas close to civilian infrastructure and activities and, based on the Navy's standard operating procedures and the large expanse of the testing and training ranges, the likelihood of a physical disturbance or strike disrupting commercial or recreational activities in the Study Area would be negligible. Therefore, loss of revenue or employment changes to socioeconomic activities and resources in the Study Area would not be expected.

3.11.4 Secondary Stressors

Socioeconomics could be indirectly impacted by training and testing activities if changes to physical and biological resources were to alter the way energy production and distribution, mineral extraction, commercial transportation and shipping, commercial and recreational fishing, aquaculture, or tourism were conducted.

Impacts on sediment and water quality, fishes, invertebrates, and marine mammals were considered to be potential secondary stressors to socioeconomic resources. Impacts on sediment and water quality have the potential to affect habitat for fishes and invertebrates that are of vital importance to the commercial fishing industry, as well as recreational fishes and aquaculture and the local industries that support those activities. A portion of the tourism industry is also dependent on coastal and marine-based activities in both the Atlantic and Gulf coast regions and could be affected by impacts on

fisheries. No indirect or secondary impacts on energy production and distribution and commercial transportation and shipping are anticipated.

Mineral extraction activities could be impacted if training and testing activities alter marine habitats in a way that reduces the availability of sand for beach nourishment projects. Long-term deposition of Navy expended materials on the ocean bottom was examined as a condition that could diminish availability of suitable sand for extraction. Mineral extraction operations could also be impacted if there were increases in costs due to the need to find alternate sites or if removal of military expended materials from active sites was required before extraction could commence. Because of the large size of the Study Area, the availability of offshore mineral resources along the Atlantic and Gulf coasts, and the likelihood that training and testing activities that expend materials would occur farther offshore, loss of revenue would not be expected. As discussed in Section 3.2 (Sediments and Water Quality), military expended materials would not impact sediment quality and availability or the cost of extracting mineral resources. Therefore, there would be no indirect socioeconomic impacts associated with training and testing activities on mineral extraction.

Commercial and recreational fishing, aquaculture, and tourism could be impacted if the proposed training and testing activities impacted fish or invertebrate populations to such an extent that species abundance was no longer sufficient to support these socioeconomic activities. Disturbances to marine mammal populations that result in abandonment of areas where whales are known to occur could impact the whale watching industry. However, no secondary impacts on socioeconomic resources would occur based on the results of analyses presented in Sections 3.4 (Invertebrates), 3.6 (Fishes), and 3.7 (Marine Mammals). These sections concluded that there would be no population-level impacts on marine species from training and testing activities, including from the use of sonar and other transducers. Therefore, indirect or secondary impacts on energy production and distribution, mineral extraction, commercial transportation and shipping, commercial and recreational fishing, aquaculture, and tourism are not anticipated.

3.11.5 Summary of Potential Impacts on Socioeconomics

This section evaluates the potential impacts on socioeconomic resources from all stressors combined. The analysis and conclusions for the potential impacts from each of the individual stressors are discussed in the sections above. Stressors associated with Navy training and testing activities do not typically occur in isolation but rather occur in some combination. For example, anti-submarine warfare activities can include elements of airborne acoustics, physical disturbance and strike, and accessibility restrictions that are all coincident in space and time. An analysis of the combined impacts of all stressors considers the potential consequences of aggregate exposure to all stressors and the repetitive or additive consequences of exposure over multiple years. The stressors from the proposed training and testing activities that have the potential to impact socioeconomic resources include limits on accessibility to air and sea space within the Study Area, airborne acoustics, physical disturbances and strikes, and indirect impacts resulting from availability of resources (e.g., mineral resources and fisheries).

3.11.5.1 Combined Impacts of All Stressors under Alternative 1

Under Alternative 1, training and testing activities would be widely dispersed throughout the Study Area, limiting the potential for co-occurrence of stressors from multiple training or testing activities being conducted at the same time but in a different location. Certain training and testing activities may return to a specific geographic location to use its unique physical characteristics. Repeatedly using the

same area may limit accessibility to that area for commercial or recreational activities relative to a less-frequently used area. The Navy typically uses established ranges, warning areas, and danger zones for training and testing activities that are conducted repeatedly over time. Many commercial and recreational users in the region are familiar with the locations of Navy activities, which allows for better planning and fewer instances of conflict. When an area needs to be temporarily closed to the public, the Navy notifies the public through Notices to Mariners and Notices to Airmen issued by the U.S. Coast Guard and the Federal Aviation Administration, respectively, ahead of time to avoid potential conflicts with the public. If multiple, incompatible training or testing activities need to use a specific location, the activities would not be scheduled at the same time, and stressors associated with each activity would not occur at the same time. Therefore, an increase in impacts resulting from a combination of stressors occurring simultaneously is not expected.

3.11.5.2 Combined Impacts of All Stressors under Alternative 2

The number and types of training and testing activities that would be conducted under Alternative 2 is similar to those described under Alternative 1 (see Chapter 2, Description of Proposed Action and Alternatives). Therefore, the combined impacts of all stressors under Alternative 2 would be the same as described under Alternative 1.

3.11.5.3 Combined Impacts of All Stressors under the No Action Alternative

Under the No Action Alternative, the Navy would not conduct the proposed training and testing activities in the AFTT Study Area. Therefore, training and testing activities would not limit accessibility to air and sea space (although other Navy activities would still use established ranges, warning areas, and danger zones), generate airborne noise, or cause physical disturbances and strikes. No impacts on socioeconomic resources from these stressors would occur.

Ceasing the proposed training and testing activities may reduce the number and types of jobs available in locations where the Navy is a vital or even the primary economic driver sustaining local communities. For example, the use of munitions and other equipment used for training and testing activities would no longer be needed, and, consequently, the number of jobs supporting those industries may be reduced or, alternatively, some jobs may be relocated. The secondary effects from reducing personnel who support Navy training and testing activities could include a decline in local business and a decrease in the need for infrastructure, such as schools. If jobs are relocated, a smaller population may no longer be able to sustain the local economy that developed to support the larger population. While more complex studies at the local level would need to be conducted to quantify potential socioeconomic impacts from ceasing training and testing activities, it is highly likely that many coastal communities would be impacted to varying degrees.

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