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

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5 MITIGATION

5.1 INTRODUCTION

In this chapter, the Navy builds upon the Proposed Action of the Atlantic Fleet Training and Testing (AFTT) Environmental Impact Statement Draft (EIS)/Overseas Environmental Impact Statement (OEIS) that is described in Chapter 2 (Description of Proposed Action and Alternatives) and the environmental analyses described in Chapter 3 (Affected Environment and Environmental Consequences) by describing the mitigation measures that the Navy will implement to avoid or reduce potential impacts from the Proposed Action. The Navy has been mitigating impacts from its training and testing activities for more than 2 decades in accordance with past environmental compliance documents, as discussed in Section 1.2 (The Navy's Environmental Compliance at At-Sea Policy). The Navy, in coordination with the National Marine Fisheries Service (NMFS), developed its initial suite of mitigations for Phase I of environmental planning (2009–2014) and subsequently revised those mitigations for Phase II (2013–2018). For this Draft EIS/OEIS, which represents Phase III of environmental planning, the Navy reanalyzed existing Phase II mitigations. In addition, the Navy analyzed new mitigation proposals from Navy and NMFS scientists, the public, governmental agencies, and non-governmental organizations.

As described in Section 2.3.3 (Standard Operating Procedures), when conducting training and testing activities, the United States (U.S.) Department of the Navy (Navy) implements standard operating procedures that are integral to the safety of personnel, the public, and equipment; and the success of the activity. In many cases, standard operating procedures yield benefits to the resources analyzed in Chapter 3 (Affected Environment and Environmental Consequences). An example of a standard operating procedure is that ships operated by or for the Navy have personnel assigned to stand watch at all times when underway. Watch personnel undergo extensive training to qualify to stand watch. A primary duty of watch personnel is to detect and report all objects and disturbances sighted in the water that may be indicative of a threat to the ship and its crew, such as debris, a periscope, a surfaced submarine, or a surface disturbance. The standard operating procedures for vessel safety would result in a benefit to marine mammals through a reduction in the potential for vessel strike. Because standard operating procedures are essential components of the Proposed Action, they are detailed in Chapter 2 (Description of the Proposed Action and Alternatives) and factored into the Chapter 3 (Affected Environment and Environmental Consequences) environmental analyses.

The Chapter 3 (Affected Environment and Environmental Consequences) environmental analyses indicate that certain acoustic, explosive, and physical disturbance and strike stressors have the potential to impact certain biological or cultural resources (some of which have a high socioeconomic value in the Study Area). The Navy will implement mitigation for those stressors under Alternative 1 or Alternative 2 of the Proposed Action, as described in Section 5.3 (Procedural Mitigation to be Implemented) and Section 5.4 (Mitigation Areas to be Implemented). The mitigation measures are likely to result in one or more of the following benefits:

- Effect the least practicable adverse impact on marine mammal species or stocks and their habitat, and have a negligible impact on marine mammal species and stocks (as required under the Marine Mammal Protection Act [MMPA]);
- Ensure that the Proposed Action does not jeopardize the continued existence of endangered or threatened species, or result in destruction or adverse modification of critical habitat (as required under the Endangered Species Act [ESA]);

- Avoid or minimize adverse effects on essential fish habitat (as required under the Magnuson-Stevens Fishery Conservation and Management Act); and
- Avoid adversely impacting shipwrecks (as required under the Abandoned Shipwreck Act and National Historic Preservation Act).

Mitigation will be coordinated with NMFS and U.S. Fish and Wildlife Service (USFWS) through the consultation and permitting processes. The Navy and NMFS Records of Decision, MMPA Letters of Authorization, and ESA Biological Opinions will document all mitigation that the Navy will implement under the Proposed Action. Should the Navy require a change in how it implements mitigation based on national security concerns or evolving readiness requirements, the Navy will engage the appropriate agencies, and through adaptive management will reevaluate its mitigation. Details on the Navy's adaptive approach to adjusting mitigation for national security or other factors (e.g., significant advancements of the best available science) is discussed in Section 5.1.1.1.1 (Adaptive Management). This approach will be coordinated with NMFS during the permitting process, and will be included in the MMPA regulations.

To disseminate mitigation requirements to the Navy training and testing (operational) community, the Navy will input all Phase III mitigation into its Protective Measures Assessment Protocol and appropriate governing instructions. The Protective Measures Assessment Protocol is a software tool that serves as the Navy's comprehensive data source for at-sea mitigation. The software tool provides operators with notification of the required mitigation and a visual display of the planned training or testing activity location overlaid with relevant environmental data (e.g., mapped locations of shallow-water coral reefs). Navy policy requires applicable personnel to access the Protective Measures Assessment Protocol during the event planning process (i.e., prior to conducting at-sea training and testing activities) to receive mitigation instruction and to help ensure that mitigation is implemented appropriately.

5.1.1 MONITORING, RESEARCH, AND REPORTING INITIATIVES

In addition to mitigation, the Navy will continue its marine species monitoring and research programs, training and testing activity reporting, and marine species incident reporting initiatives. Many of these programs and reporting initiatives have been ongoing for more than a decade and are a compliance requirement for the MMPA or ESA. The Navy and NMFS use the information contained within monitoring, research, activity, and incident reports when evaluating the effectiveness and practicability of mitigation; when determining if adaptive adjustments to mitigation may be appropriate; and to facilitate a better understanding of the biological resources that inhabit the Study Area, as well as the impacts of the Proposed Action on those resources.

5.1.1.1 Marine Species Research and Monitoring Programs

Through its marine species research and monitoring programs, the Navy is one of the nation's single largest sponsor of scientific research and monitoring on marine species. Detailed information on these programs is provided in Section 3.0.1.1 (Marine Species Monitoring and Research Programs). Navy research programs focus on investments in basic and applied research that will increase fundamental knowledge and provide technology options for future naval capabilities. Navy monitoring programs focus on the potential effects of training and testing activities on biological resources. Monitoring reports can be found on the Navy's marine species monitoring webpage, and future reports will be posted online as they become available. Specific details regarding the content of the reports will be coordinated with the appropriate agencies through the permitting processes. Additional information

about the Navy marine species monitoring program, including its adaptive management and strategic planning components, is provided in the sections below.

5.1.1.1.1 Adaptive Management

Adaptive management is an iterative process of decision-making that accounts for changes in the environment and scientific understanding over time through a system of monitoring and feedback. Within the natural resource management community, adaptive management involves ongoing, real-time learning and knowledge creation, both in a substantive sense and in terms of the adaptive process itself. Adaptive management focuses on learning and adapting, through partnerships of natural resource managers, scientists, and other stakeholders. Adaptive management helps managers maintain flexibility in their decisions and provides them the latitude to change direction to improve understanding of ecological systems and achieve management objectives. Taking action to improve progress toward desired outcomes is another function of adaptive management.

The adaptive management review process and reporting requirements serve as the basis for evaluating performance and compliance. The adaptive management review process involves technical review meetings and ongoing discussions between the Navy, NMFS, the Marine Mammal Commission, and other experts in the scientific community. Revisions to the compliance monitoring structure as a result of adaptive management review include the development of the Strategic Planning Process (U.S. Department of the Navy, 2013), which is a planning tool for selection and management of monitoring investments, and its incorporation into the Integrated Comprehensive Monitoring Program. Recent monitoring efforts address the Integrated Comprehensive Monitoring Program top-level goals through a collection of specific regional and ocean basin studies based on scientific objectives.

5.1.1.1.2 Integrated Comprehensive Monitoring Program

The Integrated Comprehensive Monitoring Program (U.S. Department of the Navy, 2010) provides the overarching framework for coordination of the Navy's marine species monitoring efforts and serves as a planning tool to focus Navy monitoring priorities pursuant to ESA and MMPA requirements. The purpose of the Integrated Comprehensive Monitoring Program is to coordinate monitoring efforts across all regions and to allocate the most appropriate level and type of monitoring effort for each range complex based on a set of standardized objectives, regional expertise, and resource availability. Although the Integrated Comprehensive Monitoring Program does not identify specific field work or individual projects, it is designed to provide a flexible, scalable, and adaptable framework using adaptive management and strategic planning processes that periodically assess progress and reevaluate objectives.

The Integrated Comprehensive Monitoring Program is evaluated through the adaptive management review process to: (1) assess progress, (2) provide a matrix of goals and objectives, and (3) make recommendations for refinement and analysis of monitoring and mitigation techniques. This process includes conducting an annual adaptive management review meeting, at which the Navy and NMFS jointly consider the prior-year goals, monitoring results, and related scientific advances to determine if monitoring plan modifications are warranted to address program goals more effectively. Modifications to the Integrated Comprehensive Monitoring Program that result from annual adaptive management review discussions are incorporated by an addendum or revision to the Integrated Comprehensive Monitoring Program. As a planning tool, the Integrated Comprehensive Monitoring Program will be routinely updated as the program evolves and progresses. The Strategic Planning Process (U.S. Department of the Navy, 2013) serves to guide the investment of resources to most efficiently address

Integrated Comprehensive Monitoring Program objectives and intermediate scientific objectives developed through this process.

Under the Integrated Comprehensive Monitoring Program, Navy-funded monitoring relating to the effects of Navy training and testing activities on protected marine species should be designed to accomplish one or more top-level goals as described in the current version of the Integrated Comprehensive Monitoring Program charter (U.S. Department of the Navy, 2010):

- An increase in the understanding of the likely occurrence of marine mammals and ESA-listed marine species in the vicinity of the action (i.e., presence, abundance, distribution, and density of species).
- An increase in the understanding of the nature, scope, or context of the likely exposure of marine mammals and ESA-listed species to any of the potential stressors associated with the action (e.g., sound, explosive detonation, or military expended materials), through better understanding of one or more of the following: (1) the nature of the action and its surrounding environment (e.g., sound-source characterization, propagation, and ambient noise levels), (2) the affected species (e.g., life history or dive patterns), (3) the likely co-occurrence of marine mammals and ESA-listed marine species with the action (in whole or part), and (4) the likely biological or behavioral context of exposure to the stressor for the marine mammal and ESA-listed marine species (e.g., age class of exposed animals or known pupping, calving or feeding areas).
- An increase in the understanding of how individual marine mammals or ESA-listed marine species respond (behaviorally or physiologically) to the specific stressors associated with the action (in specific contexts, where possible [e.g., at what distance or received level]).
- An increase in the understanding of how anticipated individual responses, to individual stressors or anticipated combinations of stressors, may impact either: (1) the long-term fitness and survival of an individual; or (2) the population, species, or stock (e.g., through impacts on annual rates of recruitment or survival).
- An increase in the understanding of the effectiveness of mitigation and monitoring measures.
- A better understanding and record of the manner in which the authorized entity complies with the Incidental Take Authorization and Incidental Take Statement.
- An increase in the probability of detecting marine mammals (through improved technology or methods), both specifically within the mitigation zone (thus allowing for more effective implementation of the mitigation) and in general, to better achieve the above goals.

The Navy established the Scientific Advisory Group in 2011 with the initial task of evaluating current Navy monitoring approaches under the Integrated Comprehensive Monitoring Plan and existing MMPA Letters of Authorization and developing objective scientific recommendations that would form the basis for the Strategic Plan. While recommendations were fairly broad and not specifically prescriptive, the Scientific Advisory Group did provide specific programmatic recommendations that serve as guiding principles for the continued evolution of the Integrated Comprehensive Monitoring Program. Key recommendations include:

- Working within a conceptual framework of knowledge, from basic information on the occurrence of species within each range complex, to more specific matters of exposure, response, and consequences.

- Facilitating collaboration among researchers in each region, with the intent to develop a coherent and synergistic regional monitoring and research effort.
- Striving to move away from effort-based compliance metrics (e.g., completing a pre-determined amount of survey hours or days, or number of surveys). Monitoring studies should be designed and conducted according to scientific objectives, rather than on effort expended.
- Approaching the monitoring program holistically and selecting projects that offer the best opportunity to advance understanding of the issues, as opposed to establishing range-specific requirements.

5.1.1.1.3 Strategic Planning Process

The U.S. Navy marine species monitoring program has evolved and improved as a result of the adaptive management review process through changes that include:

- Recognizing the limitations of effort-based compliance metrics;
- Developing a strategic approach to monitoring based on recommendations from the Scientific Advisory Group (U.S. Department of the Navy, 2013);
- Shifting focus to projects based on scientific objectives that facilitate generation of statistically meaningful results upon which natural resources management decisions may be based;
- Focusing on priority species or areas of interest as well as best opportunities to address specific monitoring objectives to maximize return on investment; and
- Increasing transparency of the program and management standards, improving collaboration among participating researchers, and improving accessibility to data and information resulting from monitoring activities.

As a result, the Navy's marine species monitoring program has undergone a transition with the implementation of the Strategic Planning Process under MMPA authorizations. Under this process, intermediate scientific objectives serve as the basis for developing and executing new monitoring projects across Navy training and testing areas in the Atlantic and Pacific Oceans. Implementation of the Strategic Planning Process involves coordination among fleets, system commands, Chief of Naval Operations Energy and Environmental Readiness Division, NMFS, and the Marine Mammal Commission with five primary steps:

- **Identify overarching intermediate scientific objectives.** Through the adaptive management process, the Navy coordinates with NMFS as well as the Marine Mammal Commission to review and revise the list of intermediate scientific objectives that are used to guide development of individual monitoring projects. Examples include addressing information gaps in species occurrence and density, evaluating behavioral responses of marine mammals to Navy training and testing activities, and developing tools and techniques for passive acoustic monitoring.
- **Develop individual monitoring project concepts.** This step generally takes the form of soliciting input from the scientific community in terms of potential monitoring projects that address one or more of the intermediate scientific objectives. This can be accomplished through a variety of forums, including professional societies, regional scientific advisory groups, and contractor support.
- **Evaluate, prioritize, and select monitoring projects.** Navy technical experts and program managers review and evaluate all monitoring project concepts and develop a prioritized ranking. The goal of this step is to establish a suite of monitoring projects that address a cross-section of intermediate scientific objectives spread over a variety of range complexes.

- **Execute and manage selected monitoring projects.** Individual projects are initiated through appropriate funding mechanisms and include clearly defined objectives and deliverables (e.g., data, reports, publications).
- **Report and evaluate progress and results.** Progress on individual monitoring projects is updated through the Navy Marine Species Monitoring Program website as well as annual monitoring reports submitted to NMFS. Both internal review and discussions with NMFS through the adaptive management process are used to evaluate progress toward addressing the primary objectives of the Integrated Comprehensive Monitoring Program and serve to periodically recalibrate the focus of the monitoring program.

These steps serve three primary purposes: (1) to facilitate the Navy in developing specific projects addressing one or more intermediate scientific objectives; (2) to establish a more structured and collaborative framework for developing, evaluating, and selecting monitoring projects across all areas where the Navy conducts training and testing activities; and (3) to maximize the opportunity for input and involvement across the research community, academia, and industry. Furthermore, this process is designed to integrate various elements, including:

- Integrated Comprehensive Monitoring Program top-level goals
- Scientific Advisory Group recommendations
- Integration of regional scientific expert input
- Ongoing adaptive management review dialog between NMFS and the Navy
- Lessons learned from past and future monitoring of Navy training and testing
- Leveraging of research and lessons learned from other Navy-funded science programs

The Strategic Planning Process will continue to shape the future of the U.S. Navy Marine Species Monitoring Program and serve as the primary decision-making tool for guiding investments. Information on monitoring projects currently underway in the Atlantic and Pacific oceans, as well as results, reports, and publications can be accessed through the U.S. Navy Marine Species Monitoring Program website.

5.1.1.2 Training and Testing Activity Reports

The Navy developed the classified Sonar Positional Reporting System as its internal record of underwater sound sources (e.g., active sonar) used during training and testing, and to facilitate reporting pursuant to its MMPA Letters of Authorization. Using data from the Sonar Positional Reporting System and other relevant sources, the Navy will continue to provide the NMFS Office of Protected Resources with classified or unclassified (depending on the data) annual reports on the training and testing activities that use underwater sound sources. The annual training and testing activity reports will describe the level of training and testing conducted during the reporting period. Unclassified annual training and testing activity reports that have been submitted to NMFS can be found on the NMFS Office of Protected Resources webpage.

5.1.1.3 Incident Reports

To provide information on incidents involving biological resources (e.g., strikes and strandings), the Navy will continue to submit the appropriate reports to management authorities, as described below:

- **Birds:** As described in Section 2.3.3.3 (Aircraft Safety), bird strikes present an aviation safety risk for aircrews and aircraft. The Navy will report all bird strikes per standard operating procedures.

- **Marine Mammals:** If the Navy observes a strike or stranding of a marine mammal during training or testing, the Navy will notify the appropriate regulatory agency, which may include NMFS or the USFWS, immediately or as soon as operational security considerations allow. The Navy will continue to provide the appropriate personnel with training on marine mammal incidents and their associated reporting requirements to aid the data collection and reporting process (see Section 5.3.1, Environmental Awareness and Education). The plan specifies the Navy's requirements for reporting marine mammal strandings and assisting with post-stranding data collection under specific conditions. Information on marine mammal strandings is included in the U.S. Navy Marine Mammal Program (2017) technical report titled *Marine Mammal Strandings Associated with U.S. Navy Sonar Activities*. For manatee incidents, the agency contacts may include the Florida Fish and Wildlife Conservation Commission, Law Enforcement Division; the USFWS Jacksonville Ecological Field Office; the USFWS Raleigh Field Office; and the North Carolina Wildlife Resources Commission. If harassment, injury, or death of a manatee is observed, the Navy will immediately halt the training or testing activity.
- **Cultural Resources:** In the event the Navy impacts a submerged historic property (e.g., archaeological resource), it will immediately commence consultation with the appropriate State Historic Preservation Office in accordance with 36 Code of Federal Regulations section 800.13(a)(3).

5.2 MITIGATION DEVELOPMENT

Navy operators, environmental planners, and scientific experts developed mitigation that is likely to be effective at avoiding or reducing impacts on biological or cultural resources; and that is practicable to implement by the definitions provided in Section 5.2.3 (Practicability of Implementation). The Navy's mitigation is organized into two categories: procedural mitigation and mitigation areas. Background information and the Navy's methods for developing mitigation are presented in the sections below.

5.2.1 PROCEDURAL MITIGATION DEVELOPMENT

Procedural mitigation is mitigation that the Navy will implement whenever and wherever an applicable training or testing activity takes place within the Study Area. The Navy customizes procedural mitigation for each applicable training and testing activity category or stressor. Procedural mitigation generally involves: (1) the use of one or more trained Lookouts to diligently observe for specific biological resources within a mitigation zone, (2) requirements for Lookouts to immediately communicate sightings of specific biological resources to the appropriate watch station for information dissemination, and (3) requirements for the watch station to implement mitigation (e.g., halt an activity) until certain recommencement conditions have been met. To supplement the implementation of mitigation, the Navy has agreed to undertake reporting initiatives for certain activities based on previous consultations with NMFS and the USFWS, as summarized in Section 5.1.1 (Monitoring, Research, and Reporting Initiatives) and detailed where applicable in Section 5.3 (Procedural Mitigation to be Implemented). For some activities, the Navy agreed during previous consultations with NMFS or the USFWS to adapt some of its procedural mitigation for particular resources at certain locations, and plans to continue these mitigations for Phase III (e.g., mitigation for line charge testing activities for ESA-listed Gulf Sturgeon, as discussed in Section 5.3.3.10, Line Charge Testing).

Lookouts are personnel who perform similar duties as the standard watch personnel described in Section 2.3.3 (Standard Operating Procedures), such as observing for objects that could present a potential danger to the observation platform (e.g., debris in the water, incoming vessels, incoming aircraft). Lookouts have an additional duty of helping meet the Navy's mitigation requirements by

visually observing mitigation zones. Mitigation zones are areas at the surface of the water (measured as the radius from a stressor) within which training or testing activities would be halted, powered down, or modified to protect specific biological resources from an injurious impact (e.g., PTS [Permanent Threshold Shift], vessel strike). Mitigation does not pertain to stressors that do not have the potential to impact biological resources (e.g., de minimis acoustic and explosive sources). Procedural mitigation primarily involves observing for marine mammals and sea turtles; however, for some activities, Lookouts may also be required to observe for additional biological resources, such as birds, fish, jellyfish aggregations, or floating vegetation. In this chapter, the term "floating vegetation" refers specifically to floating concentrations of detached kelp paddies and *Sargassum*. The Navy observes for these additional biological resources during certain activities to protect ESA-listed species or to offer an additional layer of protection for marine mammals and sea turtles. Some biological resources can be indicators of potential marine mammal or sea turtle presence because marine mammals or sea turtles have been known to seek shelter in, feed on, or feed among them. For example, young sea turtles have been known to hide from predators and eat the algae associated with floating concentrations of *Sargassum*.

Depending on the activity, a Lookout may be positioned on a ship (i.e., surface ships and surfaced submarines), on a small boat (e.g., a rigid-hull inflatable boat), in an aircraft, on a pier, or on the shore. Certain platforms, such as aircraft and small boats, have manning or space restrictions; therefore, the Lookout on these platforms is typically an existing member of the aircraft or boat crew (e.g., pilot) who is responsible for other essential tasks (e.g., navigation). When Lookouts are positioned in aircraft, mission requirements determine the flight parameters (altitude, flight path, and speed) for the fixed-wing or rotary-wing aircraft involved in the activity. For example, most fixed-wing aircraft sorties would occur above 3,000 feet (ft.), while most rotary-wing sorties associated with mine countermeasures would occur at altitudes as low as 75–100 ft. On platforms that do not have manning and space restrictions (such as large ships), the Officer of the Deck, a member of the bridge watch team, or other personnel may be designated as the Lookout. The Navy is unable to position Lookouts on unmanned vehicles and unmanned aircraft, or have Lookouts observe during activities that use systems deployed from or towed by unmanned platforms.

The Navy's passive acoustic devices (e.g., remote acoustic sensors, expendable sonobuoys, passive acoustic sensors on submarines) can complement visual observations when passive acoustic assets are already participating in an activity. When in use, the passive acoustic assets can detect vocalizing marine mammals within the frequency bands already being monitored by Navy personnel. Passive acoustic detections would not provide range or bearing to detected animals, and therefore cannot be used to determine an animal's location or confirm its presence in a mitigation zone. Marine mammal detections made with the use of passive acoustic devices will be communicated to Lookouts to alert them of possible marine mammal presence in the vicinity. Lookouts will use the information from passive acoustic monitoring to assist their visual observations of the mitigation zone.

The Navy takes several courses of action in response to a sighting of an applicable biological resource in a mitigation zone. First, a Lookout will communicate the sighting to the appropriate watch station. Next, the watch station will implement the prescribed mitigation (e.g., powering down sonar, halting an explosion, maneuvering a vessel). If floating vegetation is observed prior to the initial start of an activity, the activity will either be relocated to an area where floating vegetation is not observed in concentrations, or the initial start of the activity will be halted until the mitigation zone is clear of floating vegetation concentrations (there is no requirement to halt activities if vegetation floats into the mitigation zone after activities commence). For sightings of marine mammals, sea turtles, or other

specified biological resources during an activity, the Navy will continue mitigating until one of the five recommencement conditions listed below has been met. The recommencement conditions are designed to allow a sighted animal to leave the mitigation zone before an activity or the use of a stressor resumes.

- The animal is observed exiting the mitigation zone;
- The animal is thought to have exited the mitigation zone based on a determination of its course, speed, and movement relative to the stressor source;
- The mitigation zone has been clear from any additional sightings for a specific wait period;
- For mobile activities, the stressor source has transited a distance equal to double that of the mitigation zone size beyond the location of the last sighting; or
- For activities using hull-mounted sonar, the ship concludes that dolphins are deliberately closing in on the ship to ride the ship's bow wave, and are therefore out of the main transmission axis of the sonar (and there are no other marine mammal sightings within the mitigation zone).

In some instances, such as if an animal dives underwater after a sighting, it may not be possible for a Lookout to visually verify if that animal has left the mitigation zone. To account for this, one of the recommencement conditions is an established post-sighting wait period. Wait periods are designed to allow animals time to resurface and be available to be sighted again before an activity or the use of a stressor resumes. The Navy assigns a 30-minute (min.) wait period to activities conducted from vessels and activities that involve aircraft that are not typically fuel constrained (e.g., maritime patrol aircraft) because 30 min. is the maximum amount of time that those activities can be halted without preventing the activity from meeting its intended objective or increasing the risk to aircraft safety. For example, ceasing the transmission of active sonar beyond 30 min. would eliminate valuable opportunities to detect submarines, objects, or other exercise targets as would be required in a real world combat situation; would reduce the sonar operator's situational awareness of the environment where the training or testing is occurring; and would therefore have a detrimental impact on the realism and effectiveness of the exercise. A 30-min. period covers the average dive times of most marine mammals, and a portion of the dive times of sea turtles and deep-diving marine mammals (i.e., sperm whales, dwarf and pygmy sperm whales [*Kogia* species], and beaked whales). The Navy assigns a shorter wait period of 10 min. to activities that involve aircraft with fuel constraints (e.g., rotary-wing aircraft [i.e., helicopters], fighter aircraft) because 10 min. is the maximum amount of time that those activities can be halted without compromising safety due to aircraft fuel restrictions. For example, ceasing bombing activities beyond 10 min. would require aircraft to depart the activity location to refuel. Multiple refueling events would extend the length of the activity by 2 to 5 times or more, which would increase pilot fatigue and the associated risk to pilot and aircraft safety, and would eliminate opportunities for aircrews to approach surface targets and deploy bombs as would be required in a real world combat situation. A 10-min. period covers a portion of the marine mammal and sea turtle dive times, but not the average dive times of all species.

The Navy worked collaboratively with the appropriate regulatory agencies to develop its procedural mitigation, and will continue to do so through the consultation processes. Data inputs included operational data, the best available science discussed in Chapter 3 (Affected Environment and Environmental Consequences), published literature, marine mammal and sea turtle range to effects data obtained through acoustic modeling, marine species monitoring and density data, and the most recent guidance from NMFS and the USFWS. Background information on the data that were used to develop the ranges to effect, such as hearing threshold metrics, is provided in Chapter 3.7 (Marine Mammals)

and Chapter 3.8 (Reptiles). A discussion about how each mitigation zone was developed, to what level of effect they likely mitigate, and if they were modified from Phase II is provided for each mitigation measure in Section 5.3 (Procedural Mitigation to be Implemented). To further consider the benefits of mitigation to marine mammals and sea turtles within the MMPA and ESA impact estimates, the Navy conservatively factored mitigation effectiveness into its quantitative analysis process, as described in the technical report titled *Quantitative Analysis for Estimating Acoustic and Explosive Impacts to Marine Mammals and Sea Turtles* (U.S. Department of the Navy, 2017a). The Navy's quantitative analysis assumes that Lookouts would not be 100 percent effective at detecting all species for every activity because of the inherent limitations of observing marine species, and since the likelihood of sighting individual animals is largely dependent on observation conditions (e.g., time of day, sea state, mitigation zone size, observation platform). This is particularly true for sea turtles and small or cryptic marine mammals.

5.2.2 Mitigation Area Development

Mitigation areas are geographic locations where the Navy will implement additional measures during all or a part of the year in the Study Area. Implementing additional measures within mitigation areas is a means for the Navy to further avoid or reduce impacts on marine mammals, to implement mitigation for stationary biological resources that are not observable by Lookouts from the water's surface, and to implement mitigation for cultural resources.

The Navy reanalyzed existing mitigation areas and considered new habitat areas suggested by the public, NMFS, and other non-Navy organizations. The Navy worked collaboratively with NMFS to develop mitigation areas using inputs from the operational community, the best available science discussed in Chapter 3 (Affected Environment and Environmental Consequences), published literature, predicted activity impact footprints, and marine species monitoring and density data. The Navy will continue to work with NMFS to finalize its mitigation areas through the consultation processes. A detailed discussion of individual mitigation areas is provided in Section 5.4 (Mitigation Areas to be Implemented). The Navy considered a mitigation area to be effective if it met all criteria listed below:

- **The mitigation area is a key area of biological or ecological importance or contains cultural resources:** The best available science suggests that the mitigation area contains submerged cultural resources (e.g., shipwrecks) or is particularly important to one or more species or resources for a biologically important life process (i.e., foraging, migration, reproduction) or ecological function (e.g., shallow-water coral reefs that provide critical ecosystem functions);
- **The mitigation would result in an avoidance or substantial reduction of impacts:** Implementing the mitigation would likely result in an avoidance or substantial reduction of impacts on: (1) species, stocks, or populations of marine mammals based on data regarding seasonality, density, and animal behavior; or (2) other biological or cultural resources based on the distribution and physical properties of the resource; and
- **The mitigation area would result in a net benefit to the biological or cultural resource:** Implementing the mitigation would not simply shift impacts from one area or species to another, resulting in a similar or worse level of effect.

5.2.3 Practicability of Implementation

Alternative 1 and Alternative 2 of the Proposed Action require access to waters throughout the Study Area within range complexes, testing ranges, pierside locations, nearshore areas, and large-scale open ocean areas of the high seas. Each of these areas play a critical role in the Navy's ability to plan,

schedule, and effectively execute military readiness activities. The Navy operational community assessed how and to what degree mitigation implementation would be compatible with planning, scheduling, and conducting training and testing activities under the Proposed Action. Data inputs included information from training, testing, and monitoring reports; and feedback from members of the training and testing community who are responsible for implementing the mitigation. On an area-by-area and activity-by-activity basis, the Navy considered mitigation to be practicable to implement if it met all criteria listed below:

- **Implementing the mitigation is safe:** The mitigation would not increase safety risks to Navy personnel and equipment, or to the public. This includes factoring in the availability of aircraft emergency landing fields and the ability to de-conflict platforms and activities to ensure that training and testing activities do not impact each other, to avoid interaction with established commercial air traffic routes, and to avoid commercial vessel shipping lanes.
- **Implementing the mitigation is sustainable:** Activities are scheduled in proximity to homeports, home bases, associated training ranges, testing facilities, air squadrons, and existing infrastructure (e.g., instrumented underwater and land ranges) to maximize capabilities and minimize fuel use, transport time, and the time personnel must spend away from home. The mitigation would not result in excessive time away from homeport for Navy personnel or an impracticable increase in resource requirements, such as wear and tear on equipment, additional fuel, additional personnel, additional funding, or undue shifting of time spent on operational obligations to other tasks (e.g., external requirements that would take time away from focusing on mission requirements); and the mitigation is within the Navy's legal authority to implement.
- **Implementing the mitigation allows the Navy to continue meeting its Title 10 requirements to successfully accomplish military readiness objectives:** The Navy requires access to a variety of realistic tactical oceanographic and environmental conditions (e.g., varied bathymetry and open sea space) to maximize training effectiveness and meet testing program requirements, and the availability of sea space and air space that is large enough for training or testing activities to be completed without physical or logistical obstructions. Activities are planned and scheduled in compliance with the Optimized Fleet Response Plan, which details instructions on manning distribution, range scheduling, operational requirements, maintenance and modernization plans, quality of work and life for personnel, achieving training capabilities, and meeting strategic readiness objectives. The mitigation would not modify training and testing activities in a way that prevents the activity from meeting their intended objectives; does not cause an erosion of capabilities or reduction in perishable skills; does not decrease training or testing realism or access to necessary environmental or oceanographic conditions; does not present national security concerns (such as a reduction in the Navy's ability to be ready, maintain deployment schedules, or respond to national emergencies; or a requirement to provide advance notification of specific times and locations of Navy platforms, such as sonar, in a way that would compromise security); does not prevent ready access to facilities or range support structures; does not impede shipboard maintenance, repairs, or pierside testing prior to at-sea operations; and does not unduly delay testing associated with required acquisition milestones or as required on an as-needed basis to meet operational requirements.

5.3 PROCEDURAL MITIGATION TO BE IMPLEMENTED

The first procedural mitigation (Section 5.3.1, Environmental Awareness and Education) is designed to aid Lookouts and other personnel with observation, environmental compliance, and reporting

responsibilities. The remaining procedural mitigations are organized by stressor type and training or testing activity category.

5.3.1 Environmental Awareness and Education

The Navy will continue implementing procedural mitigation to provide environmental awareness and education to the appropriate personnel to aid visual observation, environmental compliance, and reporting responsibilities, as outlined in Table 5.3-1.

Table 5.3-1: Procedural Mitigation for Environmental Awareness and Education

Procedural Mitigation Description
Stressor or Activity • All training and testing activities, as applicable
Resource Protection Focus • Marine mammals • Sea turtles
Number of Lookouts and Observation Platform • Not applicable
Mitigation Zone Size and Mitigation Requirements • Appropriate personnel (including civilian personnel) involved in mitigation and training or testing activity reporting under the Proposed Action will complete one or more modules of the U.S Navy Afloat Environmental Compliance Training Series, as identified in their career path training plan. Modules include: – **Introduction to the U.S. Navy Afloat Environmental Compliance Training Series.** The introductory module provides information on environmental laws (e.g., ESA, MMPA) and the corresponding responsibilities that are relevant to Navy training and testing activities. The material explains why environmental compliance is important in supporting the Navy's commitment to environmental stewardship. – **Marine Species Awareness Training.** All bridge watch personnel, Commanding Officers, Executive Officers, maritime patrol aircraft aircrews, anti-submarine warfare and mine warfare rotary-wing aircrews, Lookouts, and equivalent civilian personnel must successfully complete the Marine Species Awareness Training prior to standing watch or serving as a Lookout. The Marine Species Awareness Training provides information on sighting cues, visual observation tools and techniques, and sighting notification procedures. Navy biologists developed Marine Species Awareness Training to improve the effectiveness of visual observations for biological resources, focusing on marine mammals and sea turtles, and including floating vegetation, jellyfish aggregations, and flocks of seabirds. – **U.S. Navy Protective Measures Assessment Protocol.** This module provides the necessary instruction for accessing mitigation requirements during the event planning phase using the Protective Measures Assessment Protocol software tool. – **U.S. Navy Sonar Positional Reporting System and Marine Mammal Incident Reporting.** This module provides instruction on the procedures and activity reporting requirements for the Sonar Positional Reporting System and marine mammal incident reporting.

The Navy directs Lookouts and other watch personnel to comply with environmental compliance responsibilities (e.g., mitigation, reporting requirements) before, during, and after the conduct of training and testing activities. Marine Species Awareness Training was first developed in 2007 and has since undergone numerous updates to ensure that the content remains current, with the most recent product approved by NMFS and released in 2014. In 2014, the Navy developed a series of educational training modules, known as the Afloat Environmental Compliance Training program, to ensure Navy-wide compliance with environmental requirements. The Afloat Environmental Compliance Training program (including the updated Marine Species Awareness Training) helps Navy personnel from the most junior Sailors to Commanding Officers gain a better understanding of their personal environmental compliance roles and responsibilities. Additional information on the Protective Measures Assessment Protocol is provided in Section 5.1 (Introduction), and additional information on training and testing

activity and incident reports is provided in Section 5.1.1 (Monitoring, Research, and Reporting Initiatives).

From an operational perspective, the interactive web-based format of the U.S. Navy Afloat Environmental Compliance Training Series is ideal for providing engaging and educational content that is cost effective and convenient to access by personnel who oftentimes face rotating job assignments. Navy scientists and planners have observed improvements in the quality and accuracy of training and testing activity reports, incident reports, and Sonar Positional Reporting System reports submitted by the operators. Improved reporting quality indicates that the U.S. Navy Afloat Environmental Compliance Training Series is helping to facilitate Navy-wide environmental compliance as intended.

Navy scientists and planners have also observed progression in the level of knowledge and understanding about the Navy's environmental compliance responsibilities among Lookouts and members of the operational community since the development of the U.S. Navy Afloat Environmental Compliance Training Series. This indicates that the environmental awareness and education program is helping to improve the effectiveness of mitigation implementation. From 2007 through May 2017, the Navy reported 4 whale strikes in the Study Area (an average of 0.39 per year), with the last strike occurring in 2012. For the 10-year period (1997-2006) prior to the implementation of the original Marine Species Awareness Training in 2007, the Navy reported 15 whale strikes during Navy activities (an average of 1.5 per year) in the Study Area, which is more than three times the amount reported for 2007-2017. It is likely that the implementation of the Marine Species Awareness Training starting in 2007, and the additional U.S. Navy Afloat Environmental Compliance Training Series modules starting in 2014, has contributed to this reduction in strikes. A more detailed analysis of marine mammal vessel strikes is presented in Section 3.7.3.4.1 (Impacts from Vessels and In-Water Devices).

5.3.2 Acoustic Stressors

The Navy will implement procedural mitigation to avoid or reduce potential impacts on biological resources from the acoustic stressors or activities discussed in the sections below.

5.3.2.1 Active Sonar

The Navy will continue implementing procedural mitigation to avoid the potential for marine mammals and sea turtles to be exposed to levels of sound that could result in injury (i.e., PTS) from active sonar to the maximum extent practicable, as outlined in Table 5.3-2. This measure is a continuation from Phase II with a clarification that the mitigation zone for low-frequency active sonar sources at 200 decibels (dB) or more will be the same as the mitigation implemented for hull-mounted mid-frequency active sonar; whereas low-frequency active sonar sources below 200 dB will implement the same mitigation zone as high-frequency active sonar and mid-frequency active sonar sources that are not hull-mounted.

Table 5.3-2: Procedural Mitigation for Active Sonar

Procedural Mitigation Description
Stressor or Activity • Low-frequency active sonar, mid-frequency active sonar, high-frequency active sonar • For vessel-based active sonar activities, mitigation applies only to sources that are positively controlled and deployed from manned surface vessels (e.g., sonar sources towed from manned surface platforms). • For aircraft-based active sonar activities, mitigation applies only to sources that are positively controlled and deployed from manned aircraft that do not operate at high altitudes (e.g., rotary-wing aircraft). Mitigation does not apply to active sonar sources deployed from unmanned aircraft or aircraft operating at high altitudes (e.g., maritime patrol aircraft).

Table 5.3-2: Procedural Mitigation for Active Sonar (continued)

Procedural Mitigation Description
Resource Protection Focus • Marine mammals • Sea turtles (only for sources below 2 kHz)
Number of Lookouts and Observation Platform • Hull-mounted sources: – Platforms without space or manning restrictions while underway: 2 Lookouts at the forward part of the ship – Platforms with space or manning restrictions while underway: 1 Lookout at the forward part of a small boat or ship – Platforms using active sonar while moored or at anchor (including pierside): 1 Lookout – Pierside sonar testing activities at Port Canaveral, Florida and Kings Bay, Georgia: 4 Lookouts • Sources that are not hull-mounted: – 1 Lookout on the ship or aircraft conducting the activity
Mitigation Zone Size and Mitigation Requirements • Prior to the start of the activity (e.g., when maneuvering on station), observe for floating vegetation, marine mammals, and sea turtles; if resource is observed, do not commence use of active sonar. • Low-frequency active sonar at or above 200 dB and hull-mounted mid-frequency active sonar will implement the following mitigation zones: – During the activity, observe for marine mammals and sea turtles (for sources below 2 kHz); power down active sonar transmission by 6 dB if resource is observed within 1,000 yards (yd.) of the sonar source; power down by an additional 4 dB (10 dB total) if resource is observed within 500 yd. of the sonar source; and cease transmission if resource is observed within 200 yd. of the sonar source. • Low-frequency active sonar below 200 dB, mid-frequency active sonar sources that are not hull mounted, and high-frequency active sonar will implement the following mitigation zone: – During the activity, observe for marine mammals and sea turtles (for sources below 2 kHz); cease active sonar transmission if resource is observed within 200 yd. of the sonar source. • To allow a sighted marine mammal or sea turtle to leave the mitigation zone, the Navy will not recommence active sonar transmission until one of the recommencement conditions has been met: (1) the animal is observed exiting the mitigation zone; (2) the animal is thought to have exited the mitigation zone based on a determination of its course, speed, and movement relative to the sonar source; (3) the mitigation zone has been clear from any additional sightings for 10 min. for aircraft-deployed sonar sources or 30 min. for vessel-deployed sonar sources; (4) for mobile activities, the active sonar source has transited a distance equal to double that of the mitigation zone size beyond the location of the last sighting; or (5) for activities using hull-mounted sonar, the ship concludes that dolphins are deliberately closing in on the ship to ride the ship's bow wave, and are therefore out of the main transmission axis of the sonar (and there are no other marine mammal sightings within the mitigation zone). • The Navy will notify the Port Authority prior to the commencement of pierside sonar testing activities at Port Canaveral, Florida and Kings Bay, Georgia. At these locations, the Navy will conduct active sonar activities during daylight hours to ensure adequate sightability of manatees and sea turtles, and will equip Lookouts with polarized sunglasses. After completion of pierside sonar testing activities at Port Canaveral and Kings Bay, the Navy will continue to observe for marine mammals and sea turtles for 30 min. within the mitigation zone. The Navy will implement a reduction of at least 36 dB from full power for mid-frequency active sonar transmissions at Kings Bay. The Navy will communicate sightings of manatees and sea turtles made during or after pierside sonar testing activities at Kings Bay to the Georgia Department of Natural Resources sightings hotline, Base Natural Resources Manager, and Port Operations. Communications will include information on the time and location of a sighting, the number and size of animals sighted, a description of any research tags (if present), and the animal's direction of travel. Port Operations will disseminate the sightings information to other vessels operating near the sighting and will keep logs of all manatee sightings.

Section 3.7.3.1.2 (Impacts from Sonar and Other Transducers) and Section 3.8.3.1.2 (Impacts from Sonar and Other Transducers) provide a full analysis of the potential impacts of sonar on marine mammals and sea turtles, respectively, and include the impact ranges for various source bins. Due to sea turtle hearing capabilities, the mitigation only applies to sea turtles during the use of sources below 2 kilohertz (kHz). For low-frequency active sonar at 200 dB or more and hull-mounted mid-frequency active sonar, sources in bin MF1 have the longest predicted ranges to PTS. For sources within bin MF1, the 1,000-yd.

and 500-yd. power down mitigation zones extend beyond the average ranges to PTS for all functional hearing groups. The 200-yd. shut down mitigation zone for bin MF1 extends beyond the average range to PTS for all hearing groups except high-frequency cetaceans. The impact ranges for the 200-yd. shut down mitigation zone were calculated based on full power transmissions and do not consider that the impact ranges would be reduced if one or both of the power down mitigations is implemented prior as required. Implementing the mitigation would likely help avoid or reduce the potential for exposure to higher levels of sound that may result in threshold shifts that are recoverable (i.e., TTS [Temporary Threshold Shift]). The mitigation would be even more protective for low-frequency active sonar at 200 dB or more and hull-mounted mid-frequency active sonar sources that fall within lower source bins with shorter impact ranges. Observing for indicators of marine mammal and sea turtle presence will further help avoid or reduce impacts on these resources within the mitigation zones.

For low-frequency active sonar below 200 dB, mid-frequency active sonar sources that are not hull mounted, and high-frequency active sonar, sources in bin HF4 have the longest predicted ranges to PTS. For sources within bin HF4, the 200-yd. shut down mitigation zone extends beyond the average range to PTS for all functional hearing groups. Implementing the 200-yd. shut down mitigation zone would likely help avoid or reduce the potential for exposure to higher levels of sound that may result in threshold shifts that are recoverable (i.e., TTS). The mitigation would be even more protective for low-frequency active sonar below 200 dB, mid-frequency active sonar sources that are not hull mounted, and high-frequency active sonar sources that fall within lower source bins with shorter impact ranges. Observing for indicators of marine mammal and sea turtle presence will further help avoid or reduce impacts on these resources within the mitigation zones.

The additional mitigation at Port Canaveral and Kings Bay will provide additional protection for sea turtles and manatees during pierside testing at these locations. The analysis in Section 3.7.3.1.2 (Impacts from Sonar and Other Transducers) indicates that pygmy and dwarf sperm whales (*Kogia* species) are the only deep-diving marine mammal species that could potentially experience PTS impacts from active sonar in the Study Area. Therefore, the 30-min. recommencement wait period for vessel-deployed sources would cover the average dive times of marine mammal species that could experience PTS from sonar in the mitigation zone, except for *Kogia* species. The 10-min. period for aircraft-deployed sources would cover a portion of the marine mammal dive times, but not the average dive times of all species.

Input from the Navy operational community indicates that the mitigation detailed in Table 5.3-2 is practicable to implement and that Lookouts can reasonably be expected to maintain situational awareness and visually observe the mitigation zones during typical activity conditions. Because the mitigation zones extend beyond the average ranges to PTS for all functional hearing groups, increasing the mitigation zone size would not result in a substantial reduction of injurious impacts. Furthermore, any increase in mitigation zone size or observation requirements would be impracticable to implement due to implications for safety, sustainability, and ability to continue meeting Title 10 requirements to successfully accomplish military readiness objectives. For example, some activities involve participation by rotary-wing aircraft that use dipping sonar or sonobuoys to locate submarines or submarine targets. Expanding the mitigation zones would result in a greater area over which active sonar transmission would need to be ceased in response to a sighting. Additional shut downs during training activities would extend the length of the activity in way that would compromise safety due to aircraft fuel restrictions and increased pilot fatigue. For a second example, anti-submarine warfare training involving the use of mid-frequency active sonar typically involves the periodic use of active sonar to develop the "tactical picture," or an understanding of the battle space (e.g., area searched or unsearched, identifying

false contacts, and understanding the water conditions). Developing the tactical picture can take several hours, days, or weeks; therefore, each additional shut down can result in the loss of several days' worth of training due to the loss of awareness of the tactical situation through the stopping and starting of active sonar. A third example is that the Navy must test its active sonar systems in the same manner and in the same conditions under which they will be operated during military readiness training exercises and real world combat situations. Additional stopping and starting of active sonar during testing activities would prevent the Navy from validating whether systems and sources perform as expected; and to determine whether they are operationally effective, suitable, survivable, and safe for their intended uses by the fleet.

In addition to procedural mitigation, the Navy will implement mitigation for the use of active sonar within mitigation areas to further avoid or reduce impacts on marine mammals, as described in Section 5.4.2 (Mitigation Areas off the Northeastern United States), Section 5.4.3 (Mitigation Areas off the Mid-Atlantic and Southeastern United States), and Section 5.4.4 (Mitigation Areas in the Gulf of Mexico).

5.3.2.2 Air Guns

The Navy developed new procedural mitigation for Phase III to avoid the potential for marine mammals and sea turtles to be exposed to levels of sound that could result in injury (i.e., PTS) from air gun testing activities to the maximum extent practicable, as outlined in Table 5.3-3.

Table 5.3-3: Procedural Mitigation for Air Guns

Procedural Mitigation Description
Stressor or Activity • Air guns
Resource Protection Focus • Marine mammals • Sea turtles
Number of Lookouts and Observation Platform • 1 Lookout positioned on a ship or pierside
Mitigation Zone Size and Mitigation Requirements • 150 yd. around the air gun: – Prior to the start of the activity (e.g., when maneuvering on station), observe for floating vegetation, marine mammals, and sea turtles; if resource is observed, do not commence use of air guns. – During the activity, observe for marine mammals and sea turtles; if resource is observed, cease use of air guns. – To allow a sighted marine mammal or sea turtle to leave the mitigation zone, the Navy will not recommence the use of air guns until one of the recommencement conditions has been met: (1) the animal is observed exiting the mitigation zone; (2) the animal is thought to have exited the mitigation zone based on a determination of its course, speed, and movement relative to the air gun; (3) the mitigation zone has been clear from any additional sightings for 30 min.; or (4) for mobile activities, the air gun has transited a distance equal to double that of the mitigation zone size beyond the location of the last sighting.

Section 3.7.3.1.3 (Impacts from Air Guns) and Section 3.8.3.1.3 (Impacts from Air Guns) provide a full analysis of the potential impacts of air guns on marine mammals and sea turtles, respectively, including the air gun impact ranges for 1, 10, and 100 pulses. The ranges to effect for 100 pulses are longer than the ranges to effect for 10 pulses. For 100 pulses, the mitigation zone extends beyond the average ranges to PTS for all functional hearing groups. The mitigation would be even more protective for air gun activities that use less than 100 pulses, since these activities have even shorter impact ranges. Implementing the mitigation would likely help avoid or reduce the potential for exposure to higher levels of sound that may result in threshold shifts that are recoverable (i.e., TTS). The small mitigation zone size and proximity to the observation platform will help increase the likelihood that Lookouts

would detect all marine mammals and sea turtles that are available to be observed. The 30-min. recommencement wait period would cover the average dive times of the marine mammal species that could be present in the mitigation zone. Observing for indicators of marine mammal and sea turtle presence will further help avoid or reduce impacts on these resources.

Input from the testing community indicates that the mitigation detailed in Table 5.3-3 is practicable to implement and that Lookouts can reasonably be expected to maintain situational awareness and visually observe the mitigation zones during typical testing conditions. Because the mitigation zone extends beyond the average ranges to PTS for all functional hearing groups, increasing the mitigation zone size would not result in a substantial reduction of injurious impacts. Furthermore, any increase in mitigation zone size or observation requirements would be impracticable to implement due to implications for the Navy's ability to conduct testing associated with required acquisition milestones or as required on an as-needed basis to meet operational requirements. Air guns are used during some testing activities, such as semi-stationary equipment testing events, to determine the functionality of air gun equipment. The Navy must test air guns in the same manner and in the same conditions under which they will be operated during military readiness training exercises and real world combat situations. Additional stopping and starting of air gun testing events would extend the length of testing events, which would increase time at sea for vessels and increase fuel usage. Additional mitigation would prevent the Navy from validating whether air guns perform as expected; and to determine whether they are operationally effective, suitable, survivable, and safe for their intended uses by the fleet.

5.3.2.3 Pile Driving

The Navy is incorporating pile driving procedural mitigation from the 2015 Environmental Assessment for Joint Logistics Over-the-Shore Training at Joint Expeditionary Base Little Creek-Fort Story, Virginia Beach, Virginia and Marine Corps Base Camp Lejeune, Jacksonville, North Carolina to avoid the potential for marine mammals and sea turtles to be exposed to levels of sound that could result in injury (i.e., PTS) from pile driving and pile extraction to the maximum extent practicable, as outlined in Table 5.3-4. The Navy is increasing the mitigation zone by 40 yd. for Phase III.

Table 5.3-4: Procedural Mitigation for Pile Driving

Procedural Mitigation Description
Stressor or Activity • Pile driving and pile extraction sound during Elevated Causeway System training
Resource Protection Focus • Marine mammals • Sea turtles
Number of Lookouts and Observation Platform • 1 Lookout positioned on the shore, the elevated causeway, or a small boat

Table 5.3-4: Procedural Mitigation for Pile Driving (continued)

Procedural Mitigation Description
Mitigation Zone Size and Mitigation Requirements • 100 yd. around the pile driver: – 30 min. prior to the start of the activity, observe for floating vegetation, marine mammals, and sea turtles; if resource is observed, do not commence impact pile driving or vibratory pile extraction. – During the activity, observe for marine mammals and sea turtles; if resource is observed, cease impact pile driving or vibratory pile extraction. – To allow a sighted marine mammal or sea turtle to leave the mitigation zone, the Navy will not recommence pile driving until one of the recommencement conditions has been met: (1) the animal is observed exiting the mitigation zone; (2) the animal is thought to have exited the mitigation zone based on a determination of its course, speed, and movement relative to the pile driving location; or (3) the mitigation zone has been clear from any additional sightings for 30 min. • In the Navy Cherry Point Range Complex, the Navy will maintain a log detailing any sightings or injuries to manatees during pile driving. If a manatee was sighted during the activity, upon completion of the activity, the Navy project manager or civilian equivalent will prepare a report that summarizes all information on manatees encountered and submit the report to the USFWS, Raleigh Field Office. The Navy will report any injury of a manatee to the USFWS, NMFS, and the North Carolina Wildlife Resources Commission.

Section 3.7.3.1.4 (Impacts from Pile Driving) and Section 3.8.3.1.4 (Impacts from Pile Driving) provide a full analysis of the potential impacts of pile driving on marine mammals and sea turtles, respectively, and include the approximate impact ranges for impact pile driving and vibratory pile extraction. The ranges to effect from impact pile driving are longer than the ranges to effect for vibratory pile extraction. For impact pile driving, the mitigation zone extends beyond the maximum ranges to PTS for all functional hearing groups. The mitigation would be even more protective for vibratory pile extraction, since it has even shorter impact ranges. Implementing the mitigation would likely help avoid or reduce the potential for exposure to higher levels of sound that may result in threshold shifts that are recoverable (i.e., TTS). The small mitigation zone size and proximity to the observation platform will help increase the likelihood that Lookouts would detect all marine mammals and sea turtles that are available to be observed. The 30-min. recommencement wait period would cover the average dive times of the marine mammal species that could be present in the mitigation zone. Observing for indicators of marine mammal and sea turtle presence will further help avoid or reduce impacts on these resources. The additional mitigation in the Navy Cherry Point Range Complex will help facilitate a better understanding of manatee presence and potential impacts from pile driving at this location.

Input from training community indicates that the mitigation detailed in Table 5.3-4 is practicable to implement and that Lookouts can reasonably be expected to maintain situational awareness and visually observe the mitigation zone during typical activity conditions. Because the mitigation zone extends beyond the average ranges to PTS for all functional hearing groups, increasing the mitigation zone size would not result in a substantial reduction of injurious impacts. Furthermore, any additional increase in mitigation zone size (beyond what is depicted in Table 5.3-4), mitigation techniques, or observation requirements would be impracticable to implement due to implications for the Navy's ability to continue meeting Title 10 requirements to successfully accomplish military readiness objectives. For example, the use of additional mitigation techniques employed by commercial construction projects (e.g., bubble curtains and other sound attenuation devices) would decrease the realism of the Elevated Causeway System training. Delays to the training schedule would result if causeway sections are not assembled on time due to additional stopping and starting of the pile driver, which would modify the activity in a way that prevents it from meeting its intended objectives.

5.3.2.4 Weapons Firing Noise

The Navy will continue implementing procedural mitigation to avoid the potential for marine mammals and sea turtles to be exposed to levels of sound that could result in injury (i.e., PTS) from weapons firing noise to the maximum extent practicable, as outlined in Table 5.3-5.

Table 5.3-5: Procedural Mitigation for Weapons Firing Noise

Procedural Mitigation Description
Stressor or Activity • Weapons firing noise associated with large-caliber gunnery activities
Resource Protection Focus • Marine mammals • Sea turtles
Number of Lookouts and Observation Platform • 1 Lookout positioned on the ship conducting the firing • Depending on the activity, the Lookout could be the same one described in Section 5.3.3.3 (Explosive Medium-Caliber and Large-Caliber Projectiles) or Section 5.3.4.3 (Small-, Medium-, and Large-Caliber Non-Explosive Practice Munitions)
Mitigation Zone Size and Mitigation Requirements • 30° on either side of the firing line out to 70 yd. from the muzzle of the weapon being fired: – Prior to the start of the activity, observe for floating vegetation, marine mammals, and sea turtles; if resource is observed, do not commence weapons firing. – During the activity, observe for marine mammals and sea turtles; if resource is observed, cease weapons firing. – To allow a sighted marine mammal or sea turtle to leave the mitigation zone, the Navy will not recommence weapons firing until one of the recommencement conditions has been met: (1) the animal is observed exiting the mitigation zone; (2) the animal is thought to have exited the mitigation zone based on a determination of its course, speed, and movement relative to the firing ship; (3) the mitigation zone has been clear from any additional sightings for 30 min.; or (4) for mobile activities, the firing ship has transited a distance equal to double that of the mitigation zone size beyond the location of the last sighting.

Section 3.7.3.1.7 (Impacts from Weapons Noise) and Section 3.8.3.1.7 (Impacts from Weapons Noise) provide a full analysis of the potential impacts of weapons noise on marine mammals and sea turtles, respectively, and include a qualitative discussion of the sound generated by weapons firing. As described in Section 3.0.3.3.1.6 (Weapons Firing, Launch, and Inert Impact), underwater sounds would be strongest just below the surface and directly under the firing point. Any sound that enters the water only does so within a narrow cone below the firing point or path of the projectile. The mitigation zone extends beyond the distance to which marine mammals and sea turtles would be expected to experience PTS from weapons firing noise. The small mitigation zone size and proximity to the observation platform will help increase the likelihood that Lookouts would detect all marine mammals and sea turtles that are available to be observed. Observing for indicators of marine mammal and sea turtle presence will further help avoid or reduce impacts on these resources.

Input from the operational community indicates that the mitigation detailed in Table 5.3-5 is practicable to implement and that Lookouts can reasonably be expected to maintain situational awareness and visually observe the mitigation zones during typical activity conditions. Because the mitigation zone extends beyond the average ranges to PTS for all functional hearing groups, increasing the mitigation zone size would not result in a substantial reduction of injurious impacts. Furthermore, any increase in mitigation requirements would be impracticable to implement due to implications for the Navy's ability to continue meeting Title 10 requirements to successfully accomplish military readiness objectives. For example, additional stopping and starting of a large-caliber gunnery training exercise would reduce the gun crew's abilities to engage surface targets and practice defensive marksmanship as would be

required in a real world combat situation, which would modify the activity in a way that prevents it from meeting its intended objectives. During large-caliber gun testing activities, surface combatants conduct testing of large-caliber guns to defend against surface targets. The Navy must test its large-caliber guns in the same manner and in the same conditions under which they will be operated during military readiness training exercises and real world combat situations. Additional stopping and starting of large-caliber gunnery testing events would prevent the Navy from validating whether large-caliber guns perform as expected; and to determine whether they are operationally effective, suitable, survivable, and safe for their intended uses by the fleet.

5.3.2.5 Aircraft Overflight Noise

The Navy will continue implementing procedural mitigation to avoid the potential for aircraft overflights to disturb nesting birds during applicable activities, as outlined in Table 5.3-6.

Table 5.3-6: Procedural Mitigation for Aircraft Overflight Noise

Procedural Mitigation Description
Stressor or Activity • Aircraft overflight noise
Resource Protection Focus • Birds (ESA-listed piping plovers and other nesting birds)
Number of Lookouts and Observation Platform • Not applicable
Mitigation Zone Size and Mitigation Requirements • 1 nautical mile (NM) from the beach within the Virginia Capes Range Complex during explosive mine neutralization activities involving Navy divers: – Rotary-wing aircraft will maneuver to maintain distance (except when transiting offshore from Norfolk Naval Station). • 3,000 ft. elevation and 1,000 yd. from Fisherman Island National Wildlife Refuge off the coast of Cape Charles, Virginia during explosive mine neutralization activities involving Navy divers: – When transiting offshore from Norfolk Naval Station, rotary-wing aircraft will maneuver to maintain altitude and distance.

Section 3.9.3.1.6 (Impacts from Aircraft Overflight Noise) provides a full analysis of the potential impacts of aircraft overflight noise on birds. One of the highest concentration areas for rotary-wing aircraft training is located adjacent to fleet concentration areas at Naval Station Norfolk (lower Chesapeake Bay and off the coast of Virginia Beach, Virginia). This area is located nearby important nesting habitat for the ESA-listed piping plover and other birds that breed along Virginia's barrier islands. The Navy's mitigation for aircraft overflight noise will help avoid potential disturbances to nesting birds within the Virginia Capes Range Complex and Fisherman Island National Wildlife Refuge during applicable activities.

Input from the operational community indicates that the mitigation detailed in Table 5.3-6 is practicable to implement. Any increase in mitigation requirements would be impracticable to implement due to implications for safety and sustainability. For example, requiring a shoreline buffer that is larger or that applies to additional locations from those identified in Table 5.3-6 would increase the safety risk associated with extending distance offshore and accelerated fatigue-life of aircraft, as well as increasing fuel cost.

5.3.3 EXPLOSIVE STRESSORS

The Navy will implement procedural mitigation to avoid or reduce potential impacts on biological resources from the explosive stressors or activities discussed in the sections below. Section 3.7.3.2

(Explosive Stressors) and Section 3.8.3.2 (Explosive Stressors) provide a full analysis of the potential impacts of explosives on marine mammals and sea turtles, respectively, including impact ranges.

5.3.3.1 Explosive Sonobuoys

The Navy will continue implementing procedural mitigation to avoid or reduce the potential for marine mammals and sea turtles to be exposed to levels of energy that could result in injury (i.e., PTS) from explosive sonobuoys to the maximum extent practicable, as outlined in Table 5.3-7. The mitigation for Phase III includes a 250-yd. increase in the mitigation zone size for sonobuoys using up to 2.5-lb. net explosive weight so that all explosive sonobuoys will implement a 600-yd. mitigation zone, regardless of net explosive weight.

Table 5.3-7: Procedural Mitigation for Explosive Sonobuoys

Procedural Mitigation Description
Stressor or Activity • Explosive sonobuoys
Resource Protection Focus • Marine mammals • Sea turtles
Number of Lookouts and Observation Platform • 1 Lookout positioned in an aircraft or on small boat
Mitigation Zone Size and Mitigation Requirements • 600 yd. around an explosive sonobuoy: – Prior to the start of the activity (e.g., during deployment of a sonobuoy field, which typically lasts 20–30 min.), conduct passive acoustic monitoring for marine mammals, and observe for floating vegetation, marine mammals, and sea turtles; if resource is visually observed, do not commence sonobuoy or source/receiver pair detonations. – During the activity, observe for marine mammals and sea turtles; if resource is observed, cease sonobuoy or source/receiver pair detonations. – To allow a sighted marine mammal or sea turtle to leave the mitigation zone, the Navy will not recommence the use of explosive sonobuoys until one of the recommencement conditions has been met: (1) the animal is observed exiting the mitigation zone; (2) the animal is thought to have exited the mitigation zone based on a determination of its course, speed, and movement relative to the sonobuoy; or (3) the mitigation zone has been clear from any additional sightings for 10 min. when the activity involves aircraft that have fuel constraints, or 30 min. when the activity involves aircraft that are not typically fuel constrained.

Explosive sonobuoys in bin E4 (e.g., Improved Extended Echo Ranging Sonobuoys) have longer impact ranges than other explosive sonobuoys used in the Study Area. For bin E4, the mitigation zone extends beyond the average ranges to PTS for all functional hearing groups except high-frequency cetaceans, low-frequency cetaceans, and phocids. The mitigation would be more protective for explosive sonobuoys in bin E1 or bin E3 (e.g., MK-61 SUS) with shorter impact ranges. Implementing the mitigation would likely help avoid or reduce the potential for some exposures to higher levels of energy that may result in threshold shifts that are recoverable (i.e., TTS).

Some activities that use explosive sonobuoys involve detonations of a single sonobuoy or sonobuoy pair, while other activities involve deployment of a field of sonobuoys that may be dispersed over a large distance. Lookouts would have a better likelihood of detecting marine mammals and sea turtles when observing the mitigation zone around a single sonobuoy, sonobuoy pair, or a smaller sonobuoy field than when observing a sonobuoy field dispersed over a large distance. When observing large sonobuoy fields, Lookouts would be more likely to detect large visual cues (e.g., whale blows or large pods of dolphins) than individual marine mammals, cryptic marine mammal species, and sea turtles. Observing

for indicators of marine mammal and sea turtle presence will further help avoid or reduce impacts on these resources within the mitigation zones.

Input from the testing community indicates that the mitigation detailed in Table 5.3-7 is practicable to implement and that Lookouts can reasonably be expected to maintain situational awareness and visually observe the mitigation zones during typical testing conditions. Any additional increase in mitigation zone size (beyond what is depicted in Table 5.3-7) or observation requirements would be impracticable to implement due to implications for safety, sustainability, and the Navy's ability to conduct testing associated with required acquisition milestones or as required on an as-needed basis to meet operational requirements. For example, during sonobuoy lot acceptance testing, sonobuoys are deployed from vessels and aircraft to verify the integrity and performance of a lot or group of sonobuoys in advance of delivery to the fleet for operational use. The Navy must test sonobuoys in the same manner and in the same conditions under which they will be operated during military readiness training exercises and real world combat situations. Modifying flight patterns, the number of sonobuoys deployed, or the size of the sonobuoy field would prevent the Navy from validating whether explosive sonobuoys perform as expected; and to determine whether they are operationally effective, suitable, survivable, and safe for their intended uses by the fleet. Additional stopping and starting of the activity would force aircraft to depart the activity location to refuel, which would reduce the aircrew's situational awareness of the environment where the activity is occurring and increase pilot fatigue and the associated risk to pilot and aircraft safety, and would decrease the realism of the event. Increasing the number of observation platforms would result in an increased safety risk due to airspace conflicts or the presence of additional vessels within an explosive sonobuoy field.

In addition to procedural mitigation, the Navy will implement mitigation for the use of Improved Extended Echo Ranging Sonobuoys within mitigation areas to further avoid or reduce impacts on marine mammals (see Section 5.4.2, Mitigation Areas off the Northeastern United States and Section 5.4.3, Mitigation Areas off the Mid-Atlantic and Southeastern United States).

5.3.3.2 Explosive Torpedoes

The Navy will continue implementing procedural mitigation to avoid or reduce the potential for marine mammals and sea turtles to be exposed to levels of energy that could result in injury (i.e., PTS) from explosive torpedoes to the maximum extent practicable, as outlined in Table 5.3-8.

Table 5.3-8: Procedural Mitigation for Explosive Torpedoes

Procedural Mitigation Description
Stressor or Activity • Explosive torpedoes
Resource Protection Focus • Marine mammals • Sea turtles
Number of Lookouts and Observation Platform • 1 Lookout positioned in an aircraft

Table 5.3-8: Procedural Mitigation for Explosive Torpedoes (continued)

Procedural Mitigation Description
Mitigation Zone Size and Mitigation Requirements • 2,100 yd. around the intended impact location: – Prior to the start of the activity (e.g., during deployment of the target), conduct passive acoustic monitoring for marine mammals, and observe for floating vegetation, jellyfish aggregations, marine mammals, and sea turtles; if resource is visually observed, do not commence firing. – During the activity, observe for marine mammals, sea turtles, and jellyfish aggregations; if resource is observed, cease firing. – To allow a sighted marine mammal or sea turtle to leave the mitigation zone, the Navy will not recommence firing until one of the recommencement conditions has been met: (1) the animal is observed exiting the mitigation zone; (2) the animal is thought to have exited the mitigation zone based on a determination of its course, speed, and movement relative to the intended impact location; or (3) the mitigation zone has been clear from any additional sightings for 10 min. when the activity involves aircraft that have fuel constraints, or 30 min. when the activity involves aircraft that are not typically fuel constrained. – After completion of the activity, observe for marine mammals and sea turtles; if any injured or dead resources are observed, follow established incident reporting procedures.

Bin E11 has the longest impact ranges for explosive torpedoes used in the Study Area. For bin E11, the mitigation zone extends beyond the average ranges to PTS for all functional hearing groups except high-frequency cetaceans, low-frequency cetaceans, and phocids. The mitigation would be more protective for explosive torpedoes in lower bins (e.g., bin E8) with shorter impact ranges. Implementing the mitigation would likely help avoid or reduce the potential for some exposures to higher levels of energy that may result in threshold shifts that are recoverable (i.e., TTS).

Explosive torpedo activities involve detonations at a target that is located down range of the firing platform. Due to the distance between the mitigation zone and the observation platform, Lookouts would have a better likelihood of detecting large visual cues (e.g., whale blows or large pods of dolphins) than individual marine mammals, cryptic marine mammal species, and sea turtles. As described in Section 3.8 (Reptiles), some species of sea turtles forage on jellyfish, and some of the locations (such as off the northeastern United States) where explosive torpedo activities could occur support high densities of jellyfish throughout parts of the year. Observing for indicators of marine mammal and sea turtle presence (including jellyfish aggregations) will further help avoid or reduce impacts on these resources within the mitigation zone. The post-activity observations for marine mammals and sea turtles will help the Navy determine if any resources were injured during the activity.

Input from the operational community indicates that the mitigation detailed in Table 5.3-8 is practicable to implement and that Lookouts can reasonably be expected to maintain situational awareness and visually observe the mitigation zone during typical testing conditions. Any increase in mitigation zone size or observation requirements would be impracticable to implement due to implications for safety, sustainability, the Navy's ability to meet Title 10 requirements to successfully accomplish military readiness objectives, and the Navy's ability to conduct testing associated with required acquisition milestones or as required on an as-needed basis to meet operational requirements. During activities using explosive torpedoes, air, surface, or submarine crews employ explosive torpedoes against artificial targets to train operators to fire torpedoes as would be required in a real world combat situation and to verify their integrity and performance in advance of delivery to the fleet for operational use. Additional stopping and starting of the activity would force aircraft to depart the activity location to refuel, which would reduce the aircrew's abilities to approach surface targets and launch torpedoes, would increase

pilot fatigue and the associated risk to pilot and aircraft safety, and would reduce the realism of the event.

In addition to procedural mitigation, the Navy will implement mitigation for explosive torpedoes within mitigation areas to further avoid or reduce impacts on marine mammals (see Section 5.4.2, Mitigation Areas off the Northeastern United States and Section 5.4.3, Mitigation Areas off the Mid-Atlantic and Southeastern United States).

5.3.3.3 Explosive Medium-Caliber and Large-Caliber Projectiles

The Navy will continue implementing procedural mitigation to avoid or reduce the potential for marine mammals and sea turtles to be exposed to levels of energy that could result in injury (i.e., PTS) from gunnery activities using explosive medium-caliber and large-caliber projectiles to the maximum extent practicable, as outlined in Table 5.3-9. The mitigation is a continuation from Phase II for air-to-surface activities, and a 400-yd. increase in the mitigation zone size for surface-to-surface activities.

Table 5.3-9: Procedural Mitigation for Explosive Medium-Caliber and Large-Caliber Projectiles

Procedural Mitigation Description
Stressor or Activity • Gunnery activities using explosive medium-caliber and large-caliber projectiles • Mitigation applies to activities using a surface target
Resource Protection Focus • Marine mammals • Sea turtles
Number of Lookouts and Observation Platform • 1 Lookout on the vessel or aircraft conducting the activity • For activities using explosive large-caliber projectiles, depending on the activity, the Lookout could be the same as the one described in Section 5.3.2.4 (Weapons Firing Noise)
Mitigation Zone Size and Mitigation Requirements • 200 yd. around the intended impact location for air-to-surface activities using explosive medium-caliber projectiles, or • 600 yd. around the intended impact location for surface-to-surface activities using explosive medium-caliber projectiles, or • 1,000 yd. around the intended impact location for surface-to-surface activities using explosive large-caliber projectiles: – Prior to the start of the activity (e.g., when maneuvering on station), observe for floating vegetation, marine mammals, and sea turtles; if resource is observed, do not commence firing. – During the activity, observe for marine mammals and sea turtles; if resource is observed, cease firing. – To allow a sighted marine mammal or sea turtle to leave the mitigation zone, the Navy will not recommence firing until one of the recommencement conditions has been met: (1) the animal is observed exiting the mitigation zone; (2) the animal is thought to have exited the mitigation zone based on a determination of its course, speed, and movement relative to the intended impact location; (3) the mitigation zone has been clear from any additional sightings for 10 min. for aircraft-based firing or 30 min. for vessel-based firing; or (4) for activities using mobile targets, the intended impact location has transited a distance equal to double that of the mitigation zone size beyond the location of the last sighting.

Of the activities that will implement the 1,000-yd. mitigation zone, explosive large-caliber projectiles in bin E5 (e.g., 5-in. projectiles) have the longest impact ranges. For bin E5, the 1,000-yd. mitigation zone extends beyond the average ranges to PTS for all functional hearing groups except high-frequency cetaceans. Of the activities that will implement the 600-yd. or 200-yd. mitigation zones, explosive medium-caliber projectiles in bin E2 (e.g., 40-millimeter [mm] projectiles) have the longest impact ranges. For bin E2, both the 600-yd. mitigation zone and 200-yd. mitigation zone extend beyond the average ranges to PTS for all functional hearing groups except high-frequency cetaceans. The mitigation zones would be even more protective during the use of the smaller explosive projectiles (e.g., bin E1)

with shorter impact ranges. Implementing the mitigation would likely help avoid or reduce the potential for some exposures to higher levels of energy that may result in threshold shifts that are recoverable (i.e., TTS).

Large-caliber gunnery activities involve the firing of projectiles at a target located up to 6 NM down range from the firing ship. Medium-caliber gunnery activities involve vessels or aircraft firing projectiles at targets that may be located up to 4,000 yd. from the firing platform, although typically the targets for these activities are much closer. Lookouts would have a better likelihood of detecting marine mammals and sea turtles when observing mitigation zones around targets that are located close to the firing platform. When observing activities that use a target located far from the firing platform, Lookouts would be more likely to detect large visual cues (e.g., whale blows or large pods of dolphins) than individual marine mammals, cryptic marine mammal species, and sea turtles. When aircraft are firing, Lookouts would have a better vantage point for observing the mitigation zone, particularly when the target is located far from the firing platform. Observing for indicators of marine mammal and sea turtle presence will further help avoid or reduce impacts on these resources within the mitigation zone, particularly when observing from aircraft and when the target is located close to the firing platform.

Input from the operational community indicates that the mitigation detailed in Table 5.3-9 is practicable to implement and that Lookouts can reasonably be expected to maintain situational awareness and visually observe the mitigation zones during typical activity conditions. Any additional increase in mitigation zone size (beyond those depicted in Table 5.3-9) or observation requirements would be impracticable to implement due to implications for safety, sustainability, the Navy's ability to meeting Title 10 requirements to successfully accomplish military readiness objectives, and the Navy's ability to conduct testing associated with required acquisition milestones or as required on an as-needed basis to meet operational requirements. The Navy will implement larger mitigation zones for large-caliber gunnery activities than medium-caliber gunnery activities due to the nature of how the activities are conducted. For example, large-caliber gunnery activities are conducted from surface combatants, many of which have access to high-powered binoculars mounted on the ship deck, which can assist Lookouts in observing a larger mitigation zone. As described in Section 5.2.1 (Procedural Mitigation Development), certain platforms, such as the small boats and aircraft used during explosive medium-caliber gunnery exercises, have manning or space restrictions; therefore, the Lookout for these activities is typically an existing member of the aircraft or boat crew who is responsible for other essential tasks (e.g., navigation). Some surface-to-surface medium-caliber gunnery activities involve small boat crews that approach and engage targets simulating other boats, floating mines, or near shore land targets. During these activities, observations could occur when a small boat is moving at high speed; therefore, the Lookout must focus attention on a smaller mitigation zone to ensure safety of personnel and equipment. Air-to-surface medium-caliber gunnery exercises would involve fighter aircraft descending on a target, or rotary-wing aircraft flying a racetrack pattern around a target and descending on the target using a forward-tilted firing angle. The Lookout must focus attention on the immediate vicinity of the activity to ensure safety of personnel and equipment. For all medium-caliber and large-caliber gunnery activities, additional stopping and starting of the exercise would reduce the gun crew's abilities to engage surface targets and practice defensive marksmanship as would be required in a real world combat situation, which would modify the activity in a way that prevents it from meeting its intended objectives. Increasing the number of observation platforms (e.g., positioning additional observers closer to the target) would result in an increased safety risk due to the presence of additional platforms nearby an intended impact location or in the path of an explosive projectile.

In addition to procedural mitigation, the Navy will implement mitigation for gunnery activities within mitigation areas to further avoid or reduce impacts on marine mammals (see Section 5.4.3, Mitigation Areas off the Mid-Atlantic and Southeastern United States), as well as seafloor resources (see Section 5.4.1, Mitigation Areas for Seafloor Resources).

5.3.3.4 Explosive Missiles and Rockets

The Navy will continue implementing procedural mitigation to avoid or reduce the potential for marine mammals and sea turtles to be exposed to levels of energy that could result in injury (i.e., PTS) from explosive missiles and rockets to the maximum extent practicable, as outlined in Table 5.3-10. The mitigation is a continuation from Phase II for missiles and rockets using 0.6–20 lb. net explosive weight and 251–500 lb. net explosive weight, with a 1,100-yd. increase in mitigation zone size for missiles and rockets using 21–250 lb. net explosive weight for enhanced protection.

Table 5.3-10: Procedural Mitigation for Explosive Missiles and Rockets

Procedural Mitigation Description
Stressor or Activity • Aircraft-deployed explosive missiles and rockets • Mitigation applies to activities using a surface target
Resource Protection Focus • Marine mammals • Sea turtles
Number of Lookouts and Observation Platform • 1 Lookout positioned in an aircraft
Mitigation Zone Size and Mitigation Requirements • 900 yd. around the intended impact location for missiles or rockets with 0.6–20 lb. net explosive weight, or • 2,000 yd. around the intended impact location missiles with 21–500 lb. net explosive weight: – Prior to the start of the activity (e.g., during a fly-over of the mitigation zone), observe for floating vegetation, marine mammals, and sea turtles; if resource is observed, do not commence firing. – During the activity, observe for marine mammals and sea turtles; if resource is observed, cease firing. – To allow a sighted marine mammal or sea turtle to leave the mitigation zone, the Navy will not recommence firing until one of the recommencement conditions has been met: (1) the animal is observed exiting the mitigation zone; (2) the animal is thought to have exited the mitigation zone based on a determination of its course, speed, and movement relative to the intended impact location; or (3) the mitigation zone has been clear from any additional sightings for 10 min. when the activity involves aircraft that have fuel constraints, or 30 min. when the activity involves aircraft that are not typically fuel constrained.

For explosive missiles with 21–500 lb. net explosive weight, missiles in bin E10 (e.g., Harpoon missiles) have the longest impact ranges. For bin E10, the 2,000-yd. mitigation zone extends beyond the average ranges to PTS for all functional hearing groups except high-frequency cetaceans. The mitigation would be even more protective for smaller explosive projectiles with shorter impact ranges (e.g., missiles in bin E9). Implementing the mitigation would likely help avoid or reduce the potential for some exposures to higher levels of energy that may result in threshold shifts that are recoverable (i.e., TTS).

For explosive missiles and rockets with 0.6–20 lb. net explosive weight, missiles in bin E6 (e.g., Hellfire missiles) have the longest impact ranges. For bin E6, the 900-yd. mitigation zone extends beyond the average ranges to PTS for all functional hearing groups except high-frequency cetaceans. The mitigation would be even more protective during the use of smaller explosive projectiles with shorter impact ranges (e.g., rockets in bin E3). Implementing the mitigation would likely help avoid or reduce the potential for some exposures to higher levels of energy that may result in threshold shifts that are recoverable (i.e., TTS).

Missile and rocket exercises involve a ship or aircraft firing munitions at a target that is typically located up to 15 NM away, and infrequently up to 75 NM away from the firing platform. The mitigation only applies to aircraft-deployed missiles and rockets because aircraft can fly over the intended impact area prior to firing a missile. Observation of the mitigation zone is not possible when missiles and rockets are fired from a ship due to the distance between the firing ship and the intended impact location. Even when aircraft are firing, there is a chance that animals could enter the mitigation zone after the aircraft conducts its close-range mitigation zone observations and before firing begins (once the aircraft has transited to its firing position). Due to the distance between the mitigation zone and the observation platform, Lookouts would have a better likelihood of detecting marine mammals and sea turtles during the close-range observations, and are less likely to detect these resources once positioned at the firing location, particularly individual marine mammals, cryptic marine mammal species, and sea turtles. Observing for indicators of marine mammal and sea turtle presence will further help avoid or reduce impacts on these resources within the mitigation zone during the close-range observations.

Input from the operational community indicates that the mitigation detailed in Table 5.3-10 is practicable to implement and that Lookouts can reasonably be expected to maintain situational awareness and visually observe the mitigation zone prior to the start of the activity with a fly-over of the mitigation zone during typical activity conditions. Any increase in mitigation requirements beyond what is included in Table 5.3-10 would be impracticable to implement due to implications for safety and the Navy's ability to continue meeting Title 10 requirements to successfully accomplish military readiness objectives. During Missile Exercise Air-to-Surface activities, fixed-wing and rotary-wing aircraft train to approach and defend against enemy surface targets (e.g., ships or small boats) as they would in real world combat situations. During an Air-to-Surface Missile Test, fixed-wing or rotary-wing aircraft fire missiles at surface targets to evaluate the weapons system or as part of another systems integration test to verify the integrity and performance of explosive missiles in advance of delivery to the fleet for operational use. The Navy will implement larger mitigation zones for missiles using 21–500 lb. net explosive weight than missiles and rockets using 0.6–20 lb. net explosive weight due to the nature of how these activities are conducted. During activities using missiles in the larger net explosive weight category, aircraft that fire the missiles (e.g., maritime patrol aircraft) have the capability of mitigating within a larger area for this activity due to a larger fuel capacity, which would be required considering the size of the mitigation zone and distance being flown between the intended impact location and firing position. During activities using missiles in the smaller net explosive weight category, aircraft that fire the missiles (e.g., rotary-wing aircraft) are more restricted in fuel capacity. Additional stopping and starting of the activity would force aircraft to depart the activity location to refuel, reduce the aircrew's abilities to approach surface targets and fire missiles, increase pilot fatigue and the associated risk to pilot and aircraft safety, modify the training activity in a way that prevents it from meeting its intended objectives, and reduce the realism of the activity (particularly for aircraft that have fuel constraints). Reducing realism of a testing event would prevent the Navy from validating whether explosive missiles perform as expected; and to determine whether they are operationally effective, suitable, survivable, and safe for their intended uses by the fleet. Increasing the number of observation platforms during training or testing (e.g., positioning additional observers closer to the intended impact location) would result in an increased safety risk due to the presence of additional aircraft nearby the intended impact location or in the path of an explosive missile.

In addition to procedural mitigation, the Navy will implement mitigation for explosive missiles and rockets within mitigation areas to further avoid or reduce impacts on marine mammals (see Section

5.4.3, Mitigation Areas off the Mid-Atlantic and Southeastern United States), as well as seafloor resources (see Section 5.4.1, Mitigation Areas for Seafloor Resources).

5.3.3.5 Explosive Bombs

The Navy will continue implementing procedural mitigation to avoid or reduce the potential for marine mammals and sea turtles to be exposed to levels of energy that could result in injury (i.e., PTS) from explosive bombs to the maximum extent practicable, as outlined in Table 5.3-11.

Table 5.3-11: Procedural Mitigation for Explosive Bombs

Procedural Mitigation Description
Stressor or Activity • Explosive bombs
Resource Protection Focus • Marine mammals • Sea turtles
Number of Lookouts and Observation Platform • 1 Lookout positioned in the aircraft conducting the activity
Mitigation Zone Size and Mitigation Requirements • 2,500 yd. around the intended target: – Prior to the start of the activity (e.g., when arriving on station), observe for floating vegetation, marine mammals, and sea turtles; if resource is observed, do not commence bomb deployment. – During target approach, observe for marine mammals and sea turtles; if resource is observed, cease bomb deployment. – To allow a sighted marine mammal or sea turtle to leave the mitigation zone, the Navy will not recommence bomb deployment until one of the recommencement conditions has been met: (1) the animal is observed exiting the mitigation zone; (2) the animal is thought to have exited the mitigation zone based on a determination of its course, speed, and movement relative to the intended target; (3) the mitigation zone has been clear from any additional sightings for 10 min.; or (4) for activities using mobile targets, the intended target has transited a distance equal to double that of the mitigation zone size beyond the location of the last sighting.

Explosive bombs in bin E12 (e.g., 2,000-lb. bombs) have the longest impact ranges of any bomb used in the Study Area. For bin E12, the 2,500-yd. mitigation zone extends beyond the average ranges to PTS for all functional hearing groups except high-frequency cetaceans. The mitigation would be more protective during the use of smaller bombs with shorter impact ranges (e.g., 250-lb. bombs). Implementing the mitigation would likely help avoid or reduce the potential for some exposures to higher levels of energy that may result in threshold shifts that are recoverable (i.e., TTS).

Bombing exercises involve a participating aircraft deploying munitions at a surface target located beneath the firing platform. During target approach, aircraft maintain a relatively steady altitude of approximately 1,500 ft., and Lookouts will, by necessity for safety and mission success, primarily focus their attention on the water surface below and surrounding the location of bomb deployment. The Lookout's vantage point will serve as an advantage for observing marine mammals and sea turtles within this area. Lookouts would have a better likelihood of detecting individual marine mammals and sea turtles that are in the central portion of the mitigation zone (around the target location where Lookout attention will be focused), and would be more likely to detect large visual cues (e.g., whale blows or large pods of dolphins) than individual marine mammals, cryptic marine mammal species, and sea turtles near the perimeter of the mitigation zone. Observing for indicators of marine mammal and sea turtle presence will further help avoid or reduce impacts on these resources within the mitigation zone.

Input from the operational community indicates that the mitigation detailed in Table 5.3-11 is practicable to implement and that Lookouts can reasonably be expected to maintain situational awareness and visually observe the mitigation zone during typical activity conditions. Any increase in mitigation zone size or observation requirements would be impracticable to implement due to implications for safety, the Navy's ability to continue meeting Title 10 requirements to successfully accomplish military readiness objectives, and the Navy's ability to conduct testing associated with required acquisition milestones or as required on an as-needed basis to meet operational requirements. For example, during a Bombing Exercise Air-to-Surface, fixed-wing aircrews deliver bombs against stationary floating targets, towed targets, or maneuvering targets. Additional stopping and starting of the exercise would reduce the aircrew's abilities to approach surface targets and deliver bombs as would be required in a real world combat situation, which would modify the activity in a way that prevents it from meeting its intended objectives. Similarly, during an Air-to-Surface Bombing Test, fixed-wing aircraft test the delivery of bombs against surface targets with the goal of evaluating the bomb, the bomb carry and delivery system, and any associated systems that may have been newly developed or enhanced. The Navy must test explosive bombs and their associated systems in the same manner and in the same conditions under which they will be operated during real world combat situations. Additional stopping and starting of the activity would force aircraft to depart the activity location to refuel, which would reduce the aircrew's abilities to approach surface targets and deploy bombs, would increase pilot fatigue and the associated risk to pilot and aircraft safety, and would reduce the realism of the event. This would prevent the Navy from validating whether explosive bombs and their associated systems perform as expected; and to determine whether they are operationally effective, suitable, survivable, and safe for their intended uses by the fleet.

In addition to procedural mitigation, the Navy will implement mitigation for explosive bombs within mitigation areas to further avoid or reduce impacts on marine mammals (see Section 5.4.2, Mitigation Areas off the Northeastern United States and Section 5.4.3, Mitigation Areas off the Mid-Atlantic and Southeastern United States), as well as seafloor resources (see Section 5.4.1, Mitigation Areas for Seafloor Resources).

5.3.3.6 Sinking Exercises

The Navy will continue implementing procedural mitigation to avoid or reduce the potential for marine mammals and sea turtles to be exposed to levels of energy that could result in injury (i.e., PTS) during sinking exercises the maximum extent practicable, as outlined in Table 5.3-12.

Table 5.3-12: Procedural Mitigation for Sinking Exercises

Procedural Mitigation Description
Stressor or Activity • Sinking exercises
Resource Protection Focus • Marine mammals • Sea turtles
Number of Lookouts and Observation Platform • 2 Lookouts (one positioned in an aircraft and one on a vessel)

Table 5.3-12: Procedural Mitigation for Sinking Exercises (continued)

Procedural Mitigation Description
Mitigation Zone Size and Mitigation Requirements • 2.5 NM around the target ship hulk: – 90 min. prior to the first firing, conduct aerial observations for floating vegetation, jellyfish aggregations, marine mammals, and sea turtles; if resource is observed, do not commence firing. – During the activity, conduct passive acoustic monitoring and visually observe for marine mammals and sea turtles from the vessel; if resource is visually observed, cease firing. – Immediately after any planned or unplanned breaks in weapons firing of longer than 2 hours, observe for marine mammals and sea turtles from the aircraft and vessel; if resource is observed, do not commence firing. – To allow a sighted marine mammal or sea turtle to leave the mitigation zone, the Navy will not recommence firing until one of the recommencement conditions has been met: (1) the animal is observed exiting the mitigation zone; (2) the animal is thought to have exited the mitigation zone based on a determination of its course, speed, and movement relative to the target ship hulk; or (3) the mitigation zone has been clear from any additional sightings for 30 min. – For 2 hours after sinking the vessel (or until sunset, whichever comes first), observe for marine mammals and sea turtles; if any injured or dead resources are observed, follow established incident reporting procedures.

Bin E12 has the longest impact ranges for the types of explosives used during a sinking exercise in the Study Area. For bin E12, the mitigation zone extends beyond the average ranges to PTS for all functional hearing groups except high-frequency cetaceans. The mitigation would be more protective for explosives in lower bins with shorter impact ranges used during a sinking exercise (e.g., bin E5 and bin E10). Implementing the mitigation would likely help avoid or reduce the potential for some exposures to higher levels of energy that may result in threshold shifts that are recoverable (i.e., TTS).

A sinking exercise is a specialized training exercise that provides an opportunity for ship, submarine, and aircraft crews to use multiple weapons systems to deliver explosive ordnance to deliberately sink a deactivated vessel. The exercise occurs only in daylight hours and typically lasts from 4–8 hours over the course of 1–2 days. Because the activity is scheduled to ensure that it is conducted only in daylight hours, it is unlikely that the 2-hour post-activity observation period would be shortened due to nightfall; therefore, during typical activity conditions, the Navy will be able to complete the full 2-hour post-activity observation period. There is a chance that animals could enter the mitigation zone after the aircraft conducts its close-range mitigation zone observations and before firing begins (once the aircraft has transited to its distant firing position). The Lookout positioned on the vessel would have a better likelihood of detecting individual marine mammals and sea turtles that are in the central portion of the mitigation zone (near the target ship hulk). Near the perimeter of the mitigation zone, the Lookout would be more likely to detect large visual cues (e.g., whale blows or large pods of dolphins) than individual marine mammals, cryptic marine mammal species, and sea turtles. The Lookout positioned in an aircraft would be able to assist the vessel-based Lookout by observing the entire mitigation zone, including near the perimeter, because the aircraft would be able to transit a larger area more quickly (e.g., during range clearance), and would offer a better vantage point. As described in Section 3.8 (Reptiles), some species of sea turtles forage on jellyfish in the region where this activity occurs. Observing for indicators of marine mammal and sea turtle presence will further help avoid or reduce impacts on these resources within the mitigation zone. The post-activity observations for marine mammals and sea turtles will help the Navy determine if any resources were injured during the activity. The Navy will follow the incident reporting procedures outlined in Section 5.1.1.3 (Incident Reports) if an incident is detected at any time during the training exercise, including during the post-activity observations.

Input from the training community indicates that the mitigation detailed in Table 5.3-12 is practicable to implement and that Lookouts can reasonably be expected to maintain situational awareness and visually observe the mitigation zone during typical training conditions. Any increase in mitigation zone size or observation requirements would be impracticable to implement due to implications for safety, sustainability, and the Navy's ability to continue meeting Title 10 requirements to successfully accomplish military readiness objectives. Increasing the number of observation platforms (e.g., positioning additional observers closer to the target or adding aircraft to observe the perimeter of the mitigation zone) would not be possible due to restrictions on manpower and available resources (e.g., vessels, aircraft), and would result in an increased safety risk due to the presence of additional platforms nearby an intended impact location or in the path of explosive projectiles. Additional stopping and starting of the exercise would reduce the crews' abilities to train with coordinated tactics to practice firing explosive ordnance on a full-size ship target, and would force aircraft to depart the activity location to refuel (which would reduce the aircrew's situational awareness of the environment where the activity is occurring and extend the length of the activity in way that would compromise safety due to increased pilot fatigue), which would modify the activity in a way that prevents it from meeting its intended objectives.

5.3.3.7 Explosive Mine Countermeasure and Neutralization Activities

The Navy will continue implementing procedural mitigation to avoid or reduce the potential for marine mammals and sea turtles to be exposed to levels of energy that could result in injury (i.e., PTS) during explosive mine countermeasure and neutralization activities to the maximum extent practicable, as outlined in Table 5.3-13. The mitigation applies to all explosive mine countermeasure and neutralization activities except those that involve the use of Navy divers, which are discussed in Section 5.3.3.8 (Explosive Mine Countermeasure Activities Involving Navy Divers).

Table 5.3-13: Procedural Mitigation for Explosive Mine Countermeasure and Neutralization Activities

Procedural Mitigation Description
Stressor or Activity • Explosive mine countermeasure and neutralization activities
Resource Protection Focus • Marine mammals • Sea turtles
Number of Lookouts and Observation Platform • 1 Lookout positioned on a vessel or in an aircraft when implementing the smaller mitigation zone • 2 Lookouts (one positioned in an aircraft and one on a small boat) when implementing the larger mitigation zone

Table 5.3-13: Procedural Mitigation for Explosive Mine Countermeasure and Neutralization Activities (continued)

Procedural Mitigation Description
Mitigation Zone Size and Mitigation Requirements • 600 yd. around the detonation site for activities using 0.1–5-lb. net explosive weight, or • 2,100 yd. around the detonation site for activities using 6–650 lb. net explosive weight (including high explosive target mines): – Prior to the start of the activity (e.g., when maneuvering on station; typically, 10 min. when the activity involves aircraft that have fuel constraints, or 30 min. when the activity involves aircraft that are not typically fuel constrained), observe for floating vegetation, marine mammals, and sea turtles; if resource is observed, do not commence detonations. – During the activity, observe for marine mammals and sea turtles; if resource is observed, cease detonations. – To allow a sighted marine mammal or sea turtle to leave the mitigation zone, the Navy will not recommence detonations until one of the recommencement conditions has been met: (1) the animal is observed exiting the mitigation zone; (2) the animal is thought to have exited the mitigation zone based on a determination of its course, speed, and movement relative to detonation site; or (3) the mitigation zone has been clear from any additional sightings for 10 min. when the activity involves aircraft that have fuel constraints, or 30 min. when the activity involves aircraft that are not typically fuel constrained. – After completion of the activity, observe for marine mammals and sea turtles (typically 10 min. when the activity involves aircraft that have fuel constraints, or 30 min. when the activity involves aircraft that are not typically fuel constrained); if any injured or dead resources are observed, follow established incident reporting procedures.

For activities using 6–650 lb. net explosive weight, charges in bin E11 (e.g., 650-lb. high explosive target mines) have the longest impact ranges. For bin E11, the 2,100-yd. mitigation zone extends beyond the average ranges to PTS for all functional hearing groups except high-frequency cetaceans, low-frequency cetaceans, and phocids. For activities using 0.1–5 lb. net explosive weight, charges in bin E4 (e.g., 5-lb. net explosive weight charges) have the longest impact ranges. For bin E4, the 600-yd. mitigation zone extends beyond the average ranges to PTS for all functional hearing groups except high-frequency cetaceans, low-frequency cetaceans, and phocids. The mitigation zones will be more protective during the use of smaller explosive charges (e.g., bin E2) with shorter impact ranges. Implementing the mitigation would likely help avoid or reduce the potential for some exposures to higher levels of energy that may result in threshold shifts that are recoverable (i.e., TTS).

The Navy employs various mine warfare sensors to detect, classify, and neutralize mines to protect Navy ships and submarines. Examples of the systems and devices used in these activities include airborne mine neutralization systems, magnetic systems, remotely operated vehicles, and unmanned underwater vehicles. The types of charges used in these activities are positively controlled, which means the detonation is controlled by the personnel conducting the activity and is not authorized until the area is clear at the time of detonation. For the smaller charges (bin E4 and below), the small mitigation zone size will help increase the likelihood that Lookouts would detect marine mammals and sea turtles that are available to be observed. Due to their lower vantage point, Lookouts on small boats would be more likely to detect large visual cues (e.g., whale blows or large pods of dolphins) or splashes of individual marine mammals than cryptic marine mammal species and sea turtles near the mitigation zone perimeter. The use of an aircraft in addition to a vessel to observe the larger sized mitigation zone would help increase the chance that marine mammals and sea turtles would be observed for those activities. Observing for indicators of marine mammal and sea turtle presence will further help avoid or reduce impacts on these resources within the mitigation zones.

Input from the operational community indicates that the mitigation detailed in Table 5.3-13 is practicable to implement and that Lookouts can reasonably be expected to maintain situational awareness and visually observe the mitigation zones during typical activity conditions. Any increases in mitigation zone size or observation requirements would be impracticable to implement due to implications for safety and the Navy's ability to continue meeting Title 10 requirements to successfully accomplish military readiness objectives. For example, during Mine Countermeasures – Mine Neutralization – Remotely Operated Vehicle training exercises, ship, small boat, and rotary-wing aircraft crews train to locate and neutralize mines. Additional stopping and starting of the exercise would reduce the crews' abilities to disable mines as would be required in a real world combat situation, which would modify the activity in a way that prevents it from meeting its intended objectives. For another example, Airborne Mine Neutralization Systems Test events evaluate the system's ability to detect and destroy mines from an airborne mine countermeasures-capable rotary-wing aircraft in advance of delivery to the fleet for operational use. The Navy must test its mine neutralization systems in the same manner and in the same conditions under which they will be operated during military readiness training exercises and real world combat situations. Additional stopping and starting of the activity would prevent the Navy from validating whether mine neutralization systems perform as expected; and to determine whether they are operationally effective, suitable, survivable, and safe for their intended uses by the fleet.

In addition to procedural mitigation, the Navy will implement mitigation for these activities within mitigation areas to further avoid or reduce impacts on marine mammals (see Section 5.4.2, Mitigation Areas off the Northeastern United States and Section 5.4.3, Mitigation Areas off the Mid-Atlantic and Southeastern United States), as well as seafloor resources (see Section 5.4.1, Mitigation Areas for Seafloor Resources).

5.3.3.8 Explosive Mine Neutralization Activities Involving Navy Divers

The Navy will continue implementing procedural mitigation to avoid or reduce the potential for marine mammals and sea turtles to be exposed to levels of energy that could result in injury (i.e., PTS) during explosive mine neutralization activities involving Navy divers (who may be explosive ordnance disposal personnel) to the maximum extent practicable, as outlined in Table 5.3-14. The mitigation for Phase III includes an increase in the mitigation zone size for positive control charges in bin E4 or below and bin E7 for enhanced protections and consistency across activities.

Table 5.3-14: Procedural Mitigation for Explosive Mine Neutralization Activities Involving Navy Divers

Procedural Mitigation Description
Stressor or Activity • Explosive mine neutralization activities involving Navy divers
Resource Protection Focus • Marine mammals • Sea turtles
Number of Lookouts and Observation Platform • 2 Lookouts (two small boats with one Lookout each, or one Lookout on a small boat and one in a rotary-wing aircraft) when implementing the smaller mitigation zone • 4 Lookouts (two small boats with two Lookouts each), and a pilot or member of an aircrew will serve as an additional Lookout if aircraft are used during the activity, when implementing the larger mitigation zone

Table 5.3-14: Procedural Mitigation for Explosive Mine Neutralization Activities Involving Navy Divers (continued)

Procedural Mitigation Description
Mitigation Zone Size and Mitigation Requirements • The Navy will not set time-delay firing devices (0.1–20 lb. net explosive weight) to exceed 10 min. • 500 yd. around the detonation site during activities under positive control using 0.1–20 lb. net explosive weight, or • 1,000 yd. around the detonation site during all activities using time-delay fuses (0.1–20 lb. net explosive weight) and during activities under positive control using 21–60 lb. net explosive weight charges: – Prior to the start of the activity (e.g., when maneuvering on station for activities under positive control; 30 min. for activities using time-delay firing devices), observe for floating vegetation, marine mammals, and sea turtles; if resource is observed, do not commence detonations or fuse initiation. – During the activity, observe for marine mammals and sea turtles; if resource is observed, cease detonations or fuse initiation. – All divers placing the charges on mines will support the Lookouts while performing their regular duties and will report all sightings to their supporting small boat or Range Safety Officer. – To the maximum extent practicable depending on mission requirements, safety, and environmental conditions, boats will position themselves near the mid-point of the mitigation zone radius (but outside of the detonation plume and human safety zone), will position themselves on opposite sides of the detonation location (when two boats are used), and will travel in a circular pattern around the detonation location with one Lookout observing inward toward the detonation site and the other observing outward toward the perimeter of the mitigation zone. – If used, aircraft will travel in a circular pattern around the detonation location to the maximum extent practicable. – To allow a sighted marine mammal or sea turtle to leave the mitigation zone, the Navy will not recommence detonations or fuse initiation until one of the recommencement conditions has been met: (1) the animal is observed exiting the mitigation zone; (2) the animal is thought to have exited the mitigation zone based on a determination of its course, speed, and movement relative to the detonation site; or (3) the mitigation zone has been clear from any additional sightings for 10 min. during activities under positive control with aircraft that have fuel constraints, or 30 min. during activities under positive control with aircraft that are not typically fuel constrained and during activities using time-delay firing devices. – After completion of an activity using time-delay firing devices, observe for marine mammals and sea turtles for 30 min.; if any injured or dead resources are observed, follow established incident reporting procedures. • From March through September within 3.2 NM of an estuarine inlet and within 1.6 NM of the shoreline in the Navy Cherry Point Range Complex, the Navy will not conduct explosive mine neutralization activities involving Navy divers to avoid sea turtles near nesting beaches during the nesting season.

The types of charges used during explosive mine neutralization activities involving Navy divers are either positively controlled (i.e., the detonation is controlled by the personnel conducting the activity and is not authorized until the area is clear at the time of detonation), or initiated using a time-delay fuse (i.e., the detonation is fused with a specified time-delay by the personnel conducting the activity and is not authorized until the area is clear at the time the fuse is initiated, but cannot be terminated once the fuse is initiated due to human safety concerns). For activities using the 1,000-yd. mitigation zone, explosives in bin E7 (e.g., 60-lb. net explosive weight charges) have the longest impact ranges. For bin E7, the 1,000-yd. mitigation zone extends beyond the average ranges to PTS for all functional hearing groups that could potentially occur in the locations where this activity takes place except low-frequency cetaceans. High-frequency cetaceans and phocids also have average ranges to PTS that are longer than the mitigation zone; however, they are unlikely to occur in the areas where these activities take place. All activities using a time-delay fuse (which have a maximum charge size of 20-lb. net explosive weight) will implement the 1,000-yd. mitigation zone. The mitigation would be more protective during the use of smaller charges with shorter impact ranges, including those using time-delay fuses (e.g., bin E6). Implementing the mitigation would likely help avoid or reduce the potential for some exposures to higher levels of energy that may result in threshold shifts that are recoverable (i.e., TTS).

For activities using the 500-yd. mitigation zone, positive control charges in bin E6 (e.g., 20-lb. net explosive weight) have the longest impact ranges. For bin E6, the 500-yd. mitigation zone also extends beyond the average ranges to PTS for all functional hearing groups that could potentially occur in the locations where this activity takes place except low-frequency cetaceans. High-frequency cetaceans and phocids also have average ranges to PTS that are longer than the mitigation zone; however, they are unlikely to occur in the areas where these activities take place. The mitigation would be more protective during the use of smaller positive control charges (e.g., bin E5, bin E4) with shorter impact ranges. Implementing the mitigation would likely help avoid or reduce the potential for some exposures to higher levels of energy that may result in threshold shifts that are recoverable (i.e., TTS).

For the 1,000-yd. mitigation zone, the use of two additional Lookouts increases the likelihood that Lookouts would detect marine mammals and sea turtles across the larger mitigation zone size. For the 500-yd. mitigation zone, the smaller mitigation zone size increases the likelihood that Lookouts would detect marine mammals and sea turtles. Due to their low vantage point on the water, Lookouts in small boats would be more likely to detect large visual cues (e.g., whale blows or large pods of dolphins) or the splashes of individual marine mammals than cryptic marine mammal species and sea turtles near the perimeter of the mitigation zone. When rotary-wing aircraft are used, Lookouts positioned in an aircraft would have a better vantage point for observing out to the perimeter of either mitigation zone size. For activities using a time-delay fuse, there is a remote chance that animals may swim into the mitigation zone after the fuse has been initiated. During activities under positive control, the Navy can cease detonations at any time in response to a sighting of a marine mammal or sea turtle. Observing for indicators of marine mammal and sea turtle presence will further help avoid or reduce impacts on these resources within the mitigation zones.

Input from the operational community indicates that the mitigation detailed in Table 5.3-14 is practicable to implement and that Lookouts can reasonably be expected to maintain situational awareness and visually observe the mitigation zones during typical activity conditions. Any increases in mitigation zone size or observation requirements beyond what is presented in Table 5.3-14 would be impracticable to implement due to implications for safety, sustainability, and the Navy's ability to continue meeting Title 10 requirements to successfully accomplish military readiness objectives. For example, during Mine Neutralization – Explosive Ordnance Disposal exercises, Navy divers train to disable threat mines with explosive charges to create a safe channel for friendly vessels to transit. As described in Section 5.2.1 (Procedural Mitigation Development), certain platforms, such as the small boats used during Mine Neutralization – Explosive Ordnance Disposal exercises, have manning or space restrictions; therefore, the Lookouts for this activity are typically existing members of the boat crews who are responsible for other essential tasks (e.g., navigation, dive support). Because this activity involves training Navy divers in the safe handling of explosive charges, the Lookouts must focus attention on the activity area to ensure safety of personnel and equipment. Based on the number of personnel involved in each activity, if the mitigation zone size increased, the Navy would need to redirect the attention of the existing Lookouts to observe a larger area (which would increase safety risks due to directing attention away from mission requirements), add personnel to serve as additional Lookouts on the existing observation platform (which is not possible due to space restrictions for the small boats already participating in the activity), or add additional observation platforms (which is not possible due to restrictions on manpower and available resources [e.g., small boats, rotary-wing aircraft]). Furthermore, additional stopping and starting of the exercise would reduce the divers' abilities to detect, identify, evaluate, and disable mines as would be required in a real world combat situation, which would modify the activity in a way that prevents it from meeting its intended objectives.

In addition to procedural mitigation, the Navy will implement mitigation for these activities within mitigation areas to further avoid or reduce impacts on marine mammals (see Section 5.4.2, Mitigation Areas off the Northeastern United States and Section 5.4.3, Mitigation Areas off the Mid-Atlantic and Southeastern United States), as well as seafloor resources (see Section 5.4.1, Mitigation Areas for Seafloor Resources).

5.3.3.9 Maritime Security Operations – Anti-Swimmer Grenades

The Navy will continue implementing procedural mitigation to avoid or reduce the potential for marine mammals and sea turtles to be exposed to levels of energy that could result in injury (i.e., PTS) from anti-swimmer grenades during Maritime Security Operations to the maximum extent practicable, as outlined in Table 5.3-15.

Table 5.3-15: Procedural Mitigation for Maritime Security Operations – Anti-Swimmer Grenades

Procedural Mitigation Description
Stressor or Activity • Maritime Security Operations – Anti-Swimmer Grenades
Resource Protection Focus • Marine mammals • Sea turtles
Number of Lookouts and Observation Platform • 1 Lookout positioned on the small boat conducting the activity
Mitigation Zone Size and Mitigation Requirements • 200 yd. around the intended detonation location: – Prior to the start of the activity (e.g., when maneuvering on station), observe for floating vegetation, marine mammals, and sea turtles; if resource is observed, do not commence detonations. – During the activity, observe for marine mammals and sea turtles; if resource is observed, cease detonations. – To allow a sighted marine mammal or sea turtle to leave the mitigation zone, the Navy will not recommence detonations until one of the recommencement conditions has been met: (1) the animal is observed exiting the mitigation zone; (2) the animal is thought to have exited the mitigation zone based on a determination of its course, speed, and movement relative to the intended detonation location; (3) the mitigation zone has been clear from any additional sightings for 30 min.; or (4) the intended detonation location has transited a distance equal to double that of the mitigation zone size beyond the location of the last sighting.

Explosives used during Maritime Security Operations – Anti-Swimmer Grenades exercises are in bin E2 (e.g., 0.5-lb. net explosive weight). For bin E2, the mitigation zone extends beyond the average ranges to PTS for all functional hearing groups that could potentially occur in the locations where this activity takes place. High-frequency cetaceans have an average range to PTS that is longer than the mitigation zone; however, they are unlikely to occur in the areas where this activity takes place. Implementing the mitigation would likely help avoid or reduce the potential for some exposures to higher levels of energy that may result in threshold shifts that are recoverable (i.e., TTS). The small mitigation zone size will help increase the likelihood that Lookouts would detect marine mammals and sea turtles that are available to be observed, and observing for indicators of marine mammal and sea turtle presence will further help avoid or reduce impacts on these resources within the mitigation zone.

Input from the training community indicates that the mitigation detailed in Table 5.3-15 is practicable to implement and that Lookouts can reasonably be expected to maintain situational awareness and visually observe the mitigation zone during typical activity conditions. Any increase in mitigation zone size or observation requirements would be impracticable to implement due to implications for safety and sustainability. As described in Section 5.2.1 (Procedural Mitigation Development), certain platforms,

such as the small boats used during Maritime Security Operations – Anti-Swimmer Grenades exercises, have manning or space restrictions; therefore, the Lookout for this activity is typically an existing member of the boat crew who is responsible for other essential tasks (e.g., navigation). Because this activity involves training crews in the safe handling of explosive hand grenades, the Lookout must focus attention on the immediate vicinity of the activity to ensure safety of personnel and equipment. If the mitigation zone size increased, the Navy would need to redirect the attention of the existing Lookout to observe a larger area (which would increase safety risks due to directing attention away from mission requirements), add personnel to serve as additional Lookouts on the existing observation platform (which is not possible due to space restrictions for the small boats already participating in the activity), or add additional observation platforms (which is not possible due to restrictions on manpower and available resources [e.g., small boats]).

In addition to procedural mitigation, the Navy will implement mitigation for in-water detonations within mitigation areas to further avoid or reduce impacts on marine mammals (see Section 5.4.2, Mitigation Areas off the Northeastern United States and Section 5.4.3, Mitigation Areas off the Mid-Atlantic and Southeastern United States).

5.3.3.10 Line Charge Testing

The Navy will continue implementing procedural mitigation to avoid or reduce the potential for marine mammals and sea turtles to be exposed to levels of energy that could result in injury (i.e., PTS) from line charge testing to the maximum extent practicable, as outlined in Table 5.3-16. The mitigation would also help avoid or reduce impacts on fish, including ESA-listed Gulf sturgeon, at applicable locations seasonally.

Table 5.3-16: Procedural Mitigation for Line Charge Testing

Procedural Mitigation Description
Stressor or Activity • Line charge testing
Resource Protection Focus • Marine mammals • Sea turtles • Fish (Gulf sturgeon)
Number of Lookouts and Observation Platform • 1 Lookout positioned on a vessel
Mitigation Zone Size and Mitigation Requirements • 900 yd. around the intended detonation location: – Prior to the start of the activity (e.g., when maneuvering on station), observe for floating vegetation, marine mammals, and sea turtles; if resource is observed, do not commence detonations. – During the activity, observe for marine mammals and sea turtles; if resource is observed, cease detonations. – To allow a sighted marine mammal or sea turtle to leave the mitigation zone, the Navy will not recommence detonations until one of the recommencement conditions has been met: (1) the animal is observed exiting the mitigation zone; (2) the animal is thought to have exited the mitigation zone based on a determination of its course, speed, and movement relative to the intended detonation location; or (3) the mitigation zone has been clear from any additional sightings for 30 min. • From March through September (sea turtle nesting season), the Navy will not conduct line charge testing at night. • From October through March (Gulf sturgeon migration season), Navy will not conduct line charge testing except within a designated location on Santa Rosa Island.

The maximum size of explosives used in this activity falls within bin E14 (e.g., 2,500-lb. high blast explosive). For bin E14, the mitigation zone likely extends beyond the average ranges to PTS for all

functional hearing groups that could potentially occur in the locations where this activity takes place. High-frequency cetaceans, low-frequency cetaceans, and phocids have average ranges to PTS that are longer than the mitigation zone; however, they are unlikely to occur in the area where this activity takes place. Implementing the mitigation would likely help avoid or reduce the potential for some exposures to higher levels of energy that may result in threshold shifts that are recoverable (i.e., TTS).

During line charge testing, surface vessels deploy line charges to test the capability to safely clear surf zone areas for sea-based expeditionary forces. Line charges consist of a 350-ft. detonation cord with explosives lined from one end to the other end in a series of 5-lb. increments. Lookouts would have a better likelihood of detecting individual marine mammals and sea turtles that are in the near-range or central portion of the mitigation zone. Lookouts would be more likely to detect large visual cues (e.g., whale blows or large pods of dolphins) or the splashes of individual marine mammals than cryptic marine mammal species and sea turtles near the perimeter of the mitigation zone (e.g., near the shoreline). Observing for indicators of marine mammal and sea turtle presence will further help avoid or reduce impacts on these resources within the mitigation zones. Naval Surface Warfare Center, Panama City Division Testing Range is currently the Navy's only location capable of supporting this type of activity. Not conducting line charge testing at night from March through September will help avoid or reduce potential impacts on green, Kemp's ridley, loggerhead, and leatherback sea turtles during the time of day when they would be most likely to transit to and from their nesting beaches during nesting season. Not conducting line charge testing activities from October through March (except within a designated location on Santa Rosa Island) will help avoid or reduce potential impacts on ESA-listed Gulf sturgeon during their seasonal migration from the Gulf of Mexico winter and feeding grounds to the spring and summer natal (hatching) rivers (the Yellow, Choctawhatchee, and Apalachicola Rivers).

Input from the testing community indicates that the mitigation detailed in Table 5.3-16 is practicable to implement and that Lookouts can reasonably be expected to maintain situational awareness and visually observe the mitigation zone during typical activity conditions. Any increase in mitigation would be impracticable to implement due to implications for safety, sustainability, and the Navy's ability to conduct testing associated with required acquisition milestones or as required on an as-needed basis to meet operational requirements. Based on the size of the mitigation zone and number of personnel involved in this activity, if the mitigation zone size increased, the Navy would need to add additional observation platforms, which is not possible due to restrictions on manpower and available resources (e.g., vessels). Furthermore, additional stopping and starting of the activity would result in additional time on station, could unduly delay testing schedules, and would reduce the vessel's ability to verify the capability to safely clear surf zone areas for sea-based expeditionary forces; and would therefore decrease the realism of the event.

5.3.3.11 Ship Shock Trials

The Navy will continue implementing procedural mitigation to avoid or reduce the potential for marine mammals and sea turtles to be exposed to levels of energy that could result in injury (i.e., PTS) from ship shock trials to the maximum extent practicable, as outlined in Table 5.3-17. The Navy will continue to provide detailed ship shock trial mitigation to NMFS for review and approval approximately 1-year prior to each event.

Table 5.3-17: Procedural Mitigation for Ship Shock Trials

Procedural Mitigation Description
Stressor or Activity • Ship shock trials
Resource Protection Focus • Marine mammals • Sea turtles
Number of Lookouts and Observation Platform • At least 10 Lookouts or trained marine species observers (or a combination thereof) positioned either in an aircraft or on multiple vessels (i.e., a Marine Animal Response Team boat and the test ship) • If aircraft are used, Lookouts or trained marine species observers will be in an aircraft and on multiple vessels • If aircraft are not used, a sufficient number of additional Lookouts or trained marine species observers will be used to provide vessel-based visual observation comparable to that achieved by aerial surveys
Mitigation Zone Size and Mitigation Requirements • The Navy will not conduct ship shock trials in the Jacksonville Operating Area during North Atlantic right whale calving season from November 15 through April 15. • The Navy develops detailed ship shock trial monitoring and mitigation plans approximately 1-year prior to an event and will continue to provide these to NMFS for review and approval. • Pre-activity planning will include selection of one primary and two secondary areas where marine mammal populations are expected to be the lowest during the event, with the primary and secondary locations located more than 2 NM from the western boundary of the Gulf Stream for events in the Virginia Capes Range Complex or Jacksonville Range Complex. • If it is determined during pre-activity surveys that the primary area is environmentally unsuitable (e.g., observations of marine mammals or presence of concentrations of floating vegetation), the shock trial could be moved to a secondary site in accordance with the detailed mitigation and monitoring plan provided to NMFS. • 3.5 NM around the ship hull: – Prior to the detonation (at the primary shock trial location) in intervals of 5 hours, 3 hours, 40 min., and immediately before the detonation, observe for floating vegetation, marine mammals, and sea turtles; if resource is observed, do not trigger the detonation. – During the activity, observe for marine mammals, sea turtles, large schools of fish, jellyfish aggregations, and flocks of seabirds; if resource is observed, cease triggering the detonation. – To allow a sighted marine mammal or sea turtle to leave the mitigation zone, the Navy will not recommence the triggering of a detonation until one of the recommencement conditions has been met: (1) the animal is observed exiting the mitigation zone; (2) the animal is thought to have exited the mitigation zone based on a determination of its course, speed, and movement relative to the ship hull; or (3) the mitigation zone has been clear from any additional sightings for 30 min. – After completion of each detonation, observe for marine mammals and sea turtles; if any injured or dead resources are observed, follow established incident reporting procedures and halt any remaining detonations until the Navy can consult with NMFS and review or adapt the mitigation, if necessary. – After completion of the ship shock trial, conduct additional observations during the following 2 days (at a minimum) and up to 7 days (at a maximum); if any injured or dead resources are observed, follow established incident reporting procedures.

Bin E17 has the longest impact ranges for explosives used during ship shock trials in the Study Area. For bin E17, the mitigation zone extends beyond the average ranges to PTS for all functional hearing groups that could potentially occur in the locations where this activity takes place except high-frequency cetaceans and low-frequency cetaceans. Phocids also have an average range to PTS that is longer than the mitigation zone; however, they are unlikely to occur in the areas where this activity takes place. The mitigation would be more protective for small ship shock trials using explosives in lower bins (e.g., bin E16) with shorter impact ranges. Implementing the mitigation would likely help avoid or reduce the potential for some exposures to higher levels of energy that may result in threshold shifts that are recoverable (i.e., TTS).

Lookouts positioned in aircraft will have the best vantage point for observing the large mitigation zone. During small ship shock trials, aerial surveys are not always operationally feasible due to resource limitations; however, if vessels are used as the sole observation platform, the Navy's use of additional vessels will ensure that the observation of the mitigation zone is comparable to what would be achieved when aircraft are used. The mitigation zone represents the maximum area that would likely be effective at avoiding or reducing impacts on marine mammals and sea turtles during ship shock trials based on the amount of time it takes for vessels and aircraft to patrol the area. The longer a vessel or aircraft spends transiting the survey area, the less focused the survey becomes at observing individuals that may be present close to the detonation. Even with the intensive observation effort that will be used during ship shock trials, there is a chance that animals could enter the mitigation zone at one end while the observation platforms are conducting observations in other locations. Lookouts would have a better likelihood of detecting marine mammals and sea turtles that are in the central portion of the mitigation zone (around the ship hull) and during closer-range observations, but are not likely to detect these resources at the far side of the mitigation zone perimeter. At far distances, Lookouts would have a better likelihood of detecting large visual cues (e.g., whale blows or large pods of dolphins) than individual marine mammals, cryptic marine mammal species, and sea turtles. Observing for indicators of marine mammal and sea turtle presence will further help avoid or reduce impacts on these resources within the mitigation zone. The Navy will observe for additional marine mammal and sea turtle indicators during this activity (large schools of fish, jellyfish aggregations, and flocks of seabirds) as an added precaution. The post-detonation and post-activity observations for marine mammals and sea turtles will help the Navy determine if any resources were injured during the activity. The Navy will follow the incident reporting procedures outlined in Section 5.1.1.3 (Incident Reports) if an incident is detected at any time during the testing event, including during the post-activity observations.

Input from the testing community indicates that the mitigation detailed in Table 5.3-17 is practicable to implement and that Lookouts can reasonably be expected to maintain situational awareness and visually observe the mitigation zone during typical testing conditions. Any increase in mitigation zone size or observation requirements would be impracticable to implement due to implications for safety, sustainability, and the Navy's ability to conduct testing associated with required acquisition milestones. The Navy must test its new classes and upgrades of ships to determine whether they are operationally effective, suitable, survivable, and safe for use by the fleet. Based on the size of the mitigation zone and number of personnel involved in this activity, if the mitigation zone size increased, the Navy would need to add additional observation platforms, which is not possible due to restrictions on manpower and available resources (e.g., vessels, aircraft). Additional stopping and starting of the activity would extend the length of the activity in way that would compromise safety due to aircraft fuel restrictions and increased pilot fatigue, could unduly delay testing schedules, and would result in an increased safety risk due to airspace conflicts or the presence of additional vessels in an area where high blast explosives are being used.

5.3.4 Physical Disturbance and Strike Stressors

The Navy will implement procedural mitigation to avoid or reduce potential impacts on biological resources from the physical disturbance and strike stressors or activities discussed in the sections below. Section 3.7.3.4 (Physical Disturbance and Strike Stressors) and Section 3.8.3.4 (Physical Disturbance and Strike Stressors) provide a full analysis of the potential impacts of physical disturbance and strikes on marine mammals and sea turtles, respectively. Appendix F (Military Expended Material and Direct Strike Impact Analysis) presents the impact footprints and direct strike calculations.

5.3.4.1 Vessel Movement

The Navy will continue implementing procedural mitigation to avoid the potential for physical disturbance and strike of marine mammals from vessel movement to the maximum extent practicable, as outlined in Table 5.3-18.

Table 5.3-18: Procedural Mitigation for Vessel Movement

Procedural Mitigation Description
Stressor or Activity • Vessel movement • The mitigation will not be applied if: (1) the vessel's safety is threatened, (2) the vessel is restricted in its ability to maneuver (e.g., during launching and recovery of aircraft or landing craft, during towing activities, when mooring, etc.), or (3) the vessel is operated autonomously.
Resource Protection Focus • Marine mammals
Number of Lookouts and Observation Platform • 1 Lookout on the vessel that is underway
Mitigation Zone Size and Mitigation Requirements • 500 yd. around whales: – When underway, observe for marine mammals; if a whale is observed, maneuver to maintain distance. • 200 yd. around all other marine mammals (except bow-riding dolphins and pinnipeds hauled out on man-made navigational structures, port structures, and vessels): – When underway, observe for marine mammals; if a marine mammal other than a whale, bow-riding dolphin, or hauled-out pinniped is observed, maneuver to maintain distance. • While underway in the turning basins, channels, and waterways adjacent to Naval Station Mayport, the Navy will comply with all federal, state, and local Manatee Protection Zones and reduce speed in accordance with established operational safety and security procedures. The Navy will ensure that small boats operating out of Naval Station Mayport will be fitted with manatee propeller guards. Pursuant to the Naval Station Mayport Integrated Natural Resource Management Plan, the Navy will provide manatee awareness education to Harbor Operations personnel, require that manatee sightings are communicated to other vessels in the vicinity, and maintain signage at select locations that will alert personnel of the potential presence of manatees and the requirements and procedures for reporting manatee sightings. For information on protective measures pertaining to activities not conducted under the Proposed Action, see the Integrated Natural Resources Management Plan for Naval Station Mayport. • When mooring pierside at Kings Bay, Georgia, the Navy will ensure proper fendering techniques (e.g., the use of buoys that keep submarines 20 ft. off the quay wall) to prevent submarines from injuring a manatee.

The mitigation zones for vessel movement are based on guidance from NMFS and the USFWS for vessel strike avoidance. The small mitigation zone size and proximity to the observation platform will help increase the likelihood that Lookouts would detect marine mammals that are available to be observed while vessels are underway. As discussed in Section 5.3.1 (Environmental Awareness and Education), it is likely that the implementation of the Marine Species Awareness Training starting in 2007, and the additional U.S. Navy Afloat Environmental Compliance Training Series modules starting in 2014, has contributed to a reduction in vessel strikes. The additional mitigation at Naval Station Mayport and Kings Bay will further help avoid impacts to manatees at these locations.

Input from the operational community indicates that the mitigation detailed in Table 5.3-18 is practicable to implement and that Lookouts can reasonably be expected to maintain situational awareness and visually observe the mitigation zone during typical activity conditions. In addition, some vessels that operate autonomously have imbedded sensors that aid in their avoidance of large objects, which may help avoid physical disturbance and strike of marine mammals from certain unmanned vehicles, even though the mitigation zone will not be visually observed.

In addition to procedural mitigation, the Navy will implement mitigation for vessel movement within mitigation areas to further avoid impacts on marine mammals (see Section 5.4.2, Mitigation Areas off the Northeastern United States and Section 5.4.3, Mitigation Areas off the Mid-Atlantic and Southeastern United States).

5.3.4.2 Towed In-Water Devices

The Navy will continue implementing procedural mitigation to avoid the potential for physical disturbance and strike of marine mammals from towed in-water devices to the maximum extent practicable, as outlined in Table 5.3-19.

Table 5.3-19: Procedural Mitigation for Towed In-Water Devices

Procedural Mitigation Description
Stressor or Activity • Towed in-water devices • Mitigation applies to devices that are towed from a manned surface platform or manned aircraft • The mitigation will not be applied if the safety of the towing platform or in-water device is threatened
Resource Protection Focus • Marine mammals
Number of Lookouts and Observation Platform • 1 Lookout positioned on the manned towing platform
Mitigation Zone Size and Mitigation Requirements • 250 yd. around marine mammals: – When towing an in-water device, observe for marine mammals; if resource is observed, maneuver to maintain distance.

The small mitigation zone size and proximity to the observation platform will help increase the likelihood that Lookouts would detect marine mammals that are available to be observed when manned vessels or manned aircraft are towing in-water devices. Vessels involved in towing in-water devices will implement the mitigation described in Section 5.3.4.1 (Vessel Movement), in addition to the mitigation outlined in Table 5.3-19.

Input from the operational community indicates that the mitigation detailed in Table 5.3-19 is practicable to implement and that Lookouts can reasonably be expected to maintain situational awareness and visually observe the mitigation zone during typical activity conditions. Any increase in mitigation requirements would be impracticable to implement due to the limited maneuverability of towed in-water devices.

5.3.4.3 Small-, Medium-, and Large-Caliber Non-Explosive Practice Munitions

The Navy will continue implementing procedural mitigation to avoid or reduce the potential for physical disturbance and strike of marine mammals and sea turtles from small-, medium-, and large-caliber non-explosive practice munitions to the maximum extent practicable, as outlined in Table 5.3-20.

Table 5.3-20: Procedural Mitigation for Small-, Medium-, and Large-Caliber Non-Explosive Practice Munitions

Procedural Mitigation Description
Stressor or Activity • Gunnery activities using small-, medium-, and large-caliber non-explosive practice munitions • Mitigation applies to activities using a surface target
Resource Protection Focus • Marine mammals • Sea turtles
Number of Lookouts and Observation Platform • 1 Lookout positioned on the platform conducting the activity • Depending on the activity, the Lookout could be the same as the one described in Section 5.3.2.4 (Weapons Firing Noise)
Mitigation Zone Size and Mitigation Requirements • 200 yd. around the intended impact location: – Prior to the start of the activity (e.g., when maneuvering on station), observe for floating vegetation, marine mammals, and sea turtles; if resource is observed, do not commence firing. – During the activity, observe for marine mammals and sea turtles; if resource is observed, cease firing. – To allow a sighted marine mammal or sea turtle to leave the mitigation zone, the Navy will not recommence firing until one of the recommencement conditions has been met: (1) the animal is observed exiting the mitigation zone; (2) the animal is thought to have exited the mitigation zone based on a determination of its course, speed, and movement relative to the intended impact location; (3) the mitigation zone has been clear from any additional sightings for 10 min. for aircraft-based firing or 30 min. for vessel-based firing; or (4) for activities using a mobile target, the intended impact location has transited a distance equal to double that of the mitigation zone size beyond the location of the last sighting.

Based on the military expended material impact footprints calculated in Appendix F (Military Expended Material and Direct Strike Impact Analysis), the mitigation zone for this activity is several times larger than the impact footprint for the largest projectiles (large-caliber non-explosive practice munitions) used for these activities. The mitigation would be even more protective during the use of small-caliber and medium-caliber non-explosive projectiles with smaller impact footprints.

Large-caliber gunnery activities involve the firing of projectiles at a target located up to 6 NM down range from the firing ship. Small- and medium-caliber gunnery activities involve vessels or aircraft firing projectiles at targets that may be located up to 4,000 yd. from the firing platform, although typically the targets for these activities are much closer. Lookouts would have a better likelihood of detecting marine mammals and sea turtles when observing mitigation zones around targets that are located close to the firing platform. When observing activities that use a target located far from the firing platform, Lookouts would be more likely to detect large visual cues (e.g., whale blows or large pods of dolphins) than individual marine mammals, cryptic marine mammal species, and sea turtles.

Input from the operational community indicates that the mitigation detailed in Table 5.3-20 is practicable to implement and that Lookouts can reasonably be expected to maintain situational awareness and visually observe the mitigation zones during typical activity conditions.

In addition to procedural mitigation, the Navy will implement mitigation for small-, medium-, and large-caliber non-explosive practice munitions within mitigation areas to further avoid or reduce impacts on marine mammals (see Section 5.4.3, Mitigation Areas off the Mid-Atlantic and Southeastern United States), as well as seafloor resources (see Section 5.4.1, Mitigation Areas for Seafloor Resources).

5.3.4.4 Non-Explosive Missiles and Rockets

The Navy will continue implementing procedural mitigation to avoid or reduce the potential for physical disturbance and strike of marine mammals and sea turtles from non-explosive missiles and rockets to the maximum extent practicable, as outlined in Table 5.3-21.

Table 5.3-21: Procedural Mitigation for Non-Explosive Missiles and Rockets

Procedural Mitigation Description
Stressor or Activity • Aircraft-deployed non-explosive missiles and rockets • Mitigation applies to activities using a surface target
Resource Protection Focus • Marine mammals • Sea turtles
Number of Lookouts and Observation Platform • 1 Lookout positioned in an aircraft
Mitigation Zone Size and Mitigation Requirements • 900 yd. around the intended impact location: – Prior to the start of the activity (e.g., during a fly-over of the mitigation zone), observe for floating vegetation, marine mammals, and sea turtles; if resource is observed, do not commence firing. – During the activity, observe for marine mammals and sea turtles; if resource is observed, cease firing. – To allow a sighted marine mammal or sea turtle to leave the mitigation zone, the Navy will not recommence firing until one of the recommencement conditions has been met: (1) the animal is observed exiting the mitigation zone; (2) the animal is thought to have exited the mitigation zone based on a determination of its course, speed, and movement relative to the intended impact location; or (3) the mitigation zone has been clear from any additional sightings for 10 min. when the activity involves aircraft that have fuel constraints, or 30 min. when the activity involves aircraft that are not typically fuel constrained.

Based on the military expended material impact footprints calculated in Appendix F (Military Expended Material and Direct Strike Impact Analysis), the mitigation zone for this activity is several times larger than the impact footprint for the largest non-explosive missile. The mitigation would be even more protective during the use of smaller non-explosive missiles and rockets with smaller impact footprints.

Missile and rocket exercises involve a participating ship or aircraft firing munitions at a target that is typically located up to 15 NM away, and infrequently up to 75 NM away. The mitigation only applies to aircraft-deployed missiles and rockets because aircraft can travel close to the intended impact area prior to commencing firing. Observation of the mitigation zone is not possible when missiles and rockets are fired from a ship due to the distance between the firing ship and the intended impact location. Even when aircraft are firing, there is a chance that animals could enter the mitigation zone after the aircraft conducts its close-range mitigation zone observations and before firing begins (once the aircraft has transited to its distant firing position). Due to the distance between the mitigation zone and the observation platform, Lookouts would have a better likelihood of detecting marine mammals and sea turtles during the close-range observations, but are not likely to detect these resources once positioned at the firing location. Observing for indicators of marine mammal and sea turtle presence will further help avoid or reduce impacts on these resources within the mitigation zone during the close-range observations.

Input from the operational community indicates that the mitigation detailed in Table 5.3-21 is practicable to implement and that Lookouts can reasonably be expected to maintain situational awareness and visually observe the mitigation zone prior to the start of the activity with a close-range fly-over during typical activity conditions.

In addition to procedural mitigation, the Navy will implement mitigation for non-explosive missiles and rockets within mitigation areas to further avoid or reduce impacts on marine mammals (see Section 5.4.3, Mitigation Areas off the Mid-Atlantic and Southeastern United States), as well as seafloor resources (see Section 5.4.1, Mitigation Areas for Seafloor Resources).

5.3.4.5 Non-Explosive Bombs and Mine Shapes

The Navy will continue implementing procedural mitigation to avoid or reduce the potential for physical disturbance and strike of marine mammals and sea turtles from non-explosive bombs and mine shapes the maximum extent practicable, as outlined in Table 5.3-22.

Table 5.3-22: Procedural Mitigation for Non-Explosive Bombs and Mine Shapes

Procedural Mitigation Description
Stressor or Activity • Non-explosive bombs • Non-explosive mine shapes during mine laying activities
Resource Protection Focus • Marine mammals • Sea turtles
Number of Lookouts and Observation Platform • 1 Lookout positioned in an aircraft
Mitigation Zone Size and Mitigation Requirements • 1,000 yd. around the intended target: – Prior to the start of the activity (e.g., when arriving on station), observe for floating vegetation, marine mammals, and sea turtles; if resource is observed, do not commence bomb deployment or mine laying. – During approach of the target or intended minefield location, observe for marine mammals and sea turtles; if resource is observed, cease bomb deployment or mine laying. – To allow a sighted marine mammal or sea turtle to leave the mitigation zone, the Navy will not recommence bomb deployment or mine laying until one of the recommencement conditions has been met: (1) the animal is observed exiting the mitigation zone; (2) the animal is thought to have exited the mitigation zone based on a determination of its course, speed, and movement relative to the intended target or minefield location; (3) the mitigation zone has been clear from any additional sightings for 10 min.; or (4) for activities using mobile targets, the intended target has transited a distance equal to double that of the mitigation zone size beyond the location of the last sighting.

Based on the military expended material impact footprints calculated in Appendix F (Military Expended Material and Direct Strike Impact Analysis), the mitigation zone for this activity is several times larger than the impact footprint for non-explosive bombs and mine shapes. The mitigation would be even more protective during the use of smaller non-explosive bombs and mine shapes with smaller impact footprints.

Bombing exercises and activities involving mine laying involve a participating aircraft deploying munitions or mine shapes at a surface target or in an intended minefield location beneath the platform. During approach of the target or intended minefield location, aircraft maintain a relatively steady altitude of approximately 1,500 ft., and Lookouts will, by necessity for safety and mission success, primarily focus their attention on the water surface below and surrounding the location of bomb or mine shape deployment. Due to the mitigation zone size and vantage point from an aircraft, Lookouts should be able to observe the entire mitigation zone while still maintaining situational awareness. Observing for indicators of marine mammal and sea turtle presence will further help avoid or reduce impacts on these resources within the mitigation zone.

Input from the operational community indicates that the mitigation detailed in Table 5.3-22 is practicable to implement and that Lookouts can reasonably be expected to maintain situational awareness and visually observe the mitigation zone during typical activity conditions.

In addition to procedural mitigation, the Navy will implement mitigation for non-explosive bombs and mine shapes within mitigation areas to further avoid or reduce impacts on marine mammals (see Section 5.4.2, Mitigation Areas off the Northeastern United States and Section 5.4.3, Mitigation Areas off the Mid-Atlantic and Southeastern United States), as well as seafloor resources (see Section 5.4.1, Mitigation Areas for Seafloor Resources).

5.4 MITIGATION AREAS TO BE IMPLEMENTED

The Navy will implement the procedural mitigation presented in Section 5.3.2 (Acoustic Stressors), Section 5.3.3 (Explosive Stressors), and Section 5.3.4 (Physical Disturbance and Strike Stressors) to avoid or reduce potential impacts on marine mammals and other biological resources whenever and wherever training and testing activities occur. In addition, the Navy will implement mitigation under Alternative 1 or Alternative 2 of the Proposed Action within several different types of mitigation areas to further avoid or reduce potential impacts on biological or cultural resources to the maximum extent practicable as warranted by the Chapter 3 (Affected Environment and Environmental Consequences) analyses and the best available science. As discussed in the sections below, the Navy's mitigation areas include areas where the Navy will not conduct, will minimize, or will modify certain activities, or will follow additional reporting or communication procedures (i.e., mitigation areas for seafloor resources and mitigation areas designed for North Atlantic right whales); and areas where the Navy will implement planning restrictions on the numbers of activities or amount of sonar hours (i.e., various planning awareness mitigation areas).

5.4.1 MITIGATION AREAS FOR SEAFLOOR RESOURCES

As outlined in Table 5.4-1 and shown in Figure 5.4-1, Figure 5.4-2, and Figure 5.4-3, the Navy will implement mitigation to avoid or reduce impacts on seafloor resources from explosives and physical disturbance and strike from military expended materials and anchorages in mitigation areas throughout the Study Area.

Table 5.4-1: Mitigation Areas for Seafloor Resources

Mitigation Area Description
Resource Protection Focus • Shallow-water coral reefs • Live hard bottom • Artificial reefs • Shipwrecks
Stressor or Activity • Explosives • Physical disturbance and strikes

Table 5.4-1: Mitigation Areas for Seafloor Resources (continued)

Mitigation Area Description
Mitigation Area Requirements (year-round) • **Within the anchor swing circle of shallow-water coral reefs, live hard bottom, artificial reefs, and shipwrecks:** – The Navy will not conduct precision anchoring (except in designated anchorages). • **Within a 350-yd. radius of shallow-water coral reefs, live hard bottom, artificial reefs, and shipwrecks:** – The Navy will not conduct explosive mine countermeasure and neutralization activities, or explosive mine neutralization activities involving Navy divers. • **Within a 350-yd. radius of shallow-water coral reefs:** – The Navy will not conduct explosive or non-explosive small-, medium-, and large-caliber gunnery activities using a surface target; explosive or non-explosive missile and rocket activities using a surface target; and explosive or non-explosive bombing and mine laying activities. • **Within the South Florida Ocean Measurement Facility Testing Range:** – The Navy will use real-time geographic information system and global positioning system (along with remote sensing verification) during deployment, installation, and recovery of anchors and mine-like objects and during deployment of bottom-crawling unmanned underwater vehicles in waters deeper than 10 ft. to avoid shallow-water coral reefs and live hard bottom. – Vessels deploying anchors, mine-like objects, and bottom-crawling unmanned underwater vehicles will aim to hold a relatively fixed position over the intended mooring or deployment location using a dynamic positioning navigation system with global positioning system. – The Navy will minimize vessel movement and drift in accordance with mooring installation and deployment plans, and will conduct activities during sea and wind conditions that allow vessels to maintain position and speed control during deployment, installation, and recovery of anchors, mine-like objects, and bottom-crawling unmanned underwater vehicles. – Vessels will operate within waters deep enough to avoid bottom scouring or prop dredging, with at least a 1-ft. clearance between the deepest draft of the vessel (with the motor down) and the seafloor at mean low water. – The Navy will not anchor vessels or spud over shallow-water coral reefs and live hard bottom. – The Navy will use semi-permanent anchoring systems that are assisted with riser buoys over soft bottom habitats to avoid contact of mooring cables with shallow-water coral reefs and live hard bottom.

5.4.1.1 Resource Description

Seafloor resources fulfill important ecosystem functions. Live hard bottom habitats and artificial structures (e.g., artificial reefs, shipwrecks) provide attachment substrate for algae and invertebrates, such as corals, seaweed, and sponges. These substrates in turn support a community of organisms, such as fish, shrimp, crabs, barnacles, worms, and sea cucumbers. Shallow-water coral reefs provide substrate, shelter, and food for hundreds of invertebrate species, sea turtles, fishes, and other biological resources. They are one of the most productive and diverse assemblages on Earth.

In addition to their ecosystem functions, historic shipwrecks are classified as archaeological resources, and are an important part of U.S. maritime history. Dive sites occur throughout nearshore areas of the Study Area where there are shipwrecks, artificial reefs, and shallow-water coral reefs, making these resources highly valuable from a socioeconomic standpoint. For additional information on the biological, cultural, and socioeconomic importance of seafloor resources and their associated ecosystem components, refer to Chapter 3.3 (Vegetation), Chapter 3.4 (Invertebrates), Chapter 3.5 (Habitats), Chapter 3.6 (Fishes), Chapter 3.7 (Marine Mammals), Chapter 3.8 (Reptiles), Chapter 3.10 (Cultural Resources), and Chapter 3.11 (Socioeconomics).

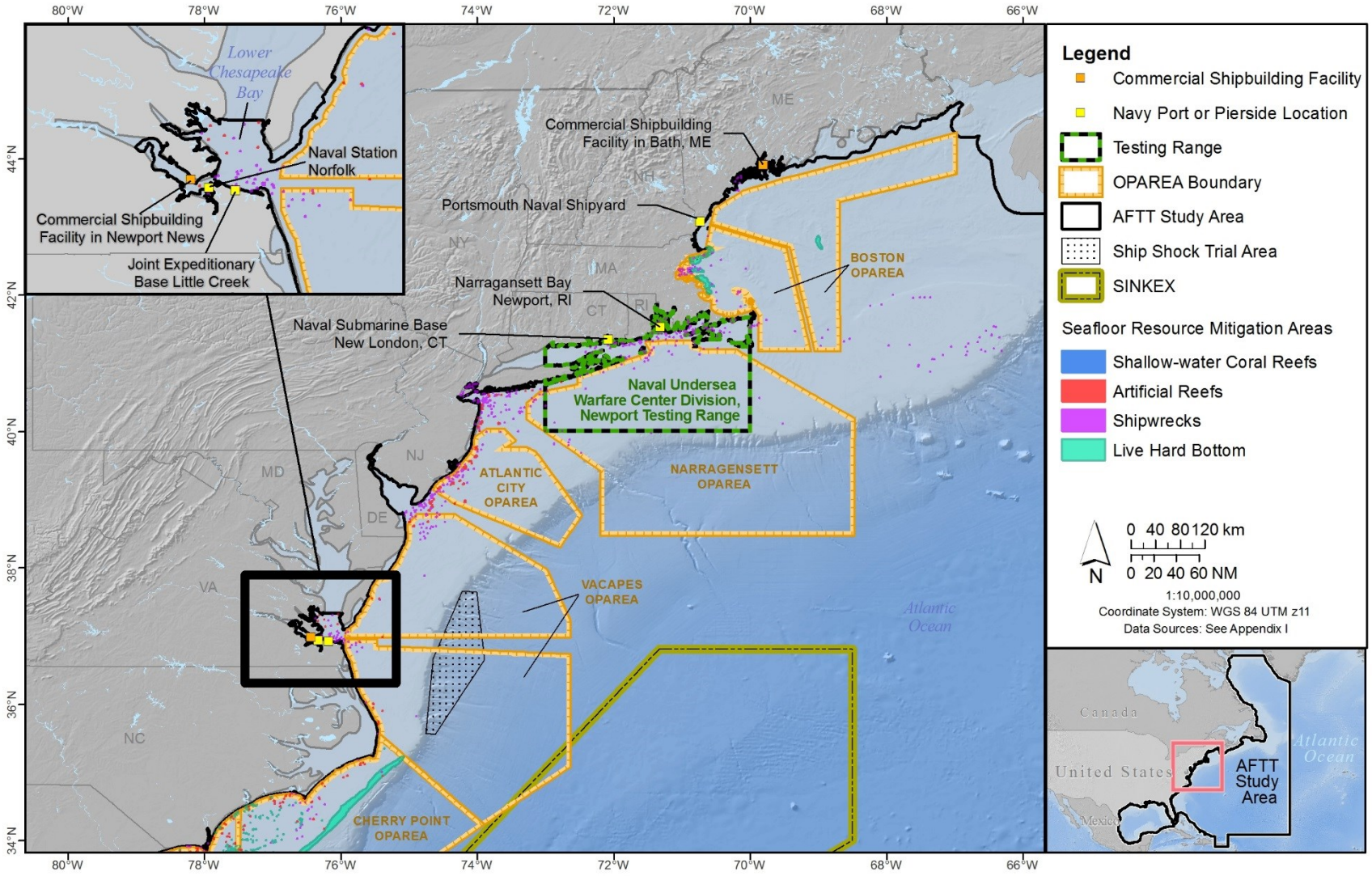
5.4.1.2 Mitigation Area Assessment

Without mitigation, explosives and physical disturbance and strike stressors could potentially impact shallow-water coral reefs, live hard bottom, artificial reefs, shipwrecks, and their associated ecosystem

components during certain training and testing activities in the Study Area. The Navy developed mitigation areas as either the anchor swing circle diameter or a 350-yd. radius around a seafloor resource, as indicated by the best available georeferenced data. Mitigating within the anchor swing circle will allow protection of seafloor resources during precision anchoring activities when factoring in environmental conditions that could affect anchoring position and swing circle size (such as winds, currents, and water depth). For other activities applicable to the mitigation, a 350-yd. radius around a seafloor resource is a conservatively sized mitigation area that will provide protection well beyond the maximum expected impact footprint (e.g., crater and expelled material radius) of the explosives and non-explosive practice munitions used in the Study Area. As described in Appendix F (Military Expended Material and Direct Strike Impact Analysis), the military expended material with the largest footprint that applies to the mitigation is an explosive mine with a 650-lb. net explosive weight, which has an estimated impact footprint of approximately 14,800 square ft. and an associated radius of 22.7 yd. The 350-yd. mitigation zone is well beyond the maximum expected direct impact footprint for the activities listed in Table 5.4-1, and further mitigates some level of indirect impact from explosive disturbances. The other applicable explosive activities and non-explosive practice munitions are expected to have a smaller impact footprint; therefore, the mitigation area will result in additional protection during those activities. Mitigation would help the Navy avoid or reduce impacts from explosives and physical disturbance and strike stressors on seafloor resources, and consequently to any biological or cultural resources that inhabit, shelter, rest, feed, or occur in the mitigation areas.

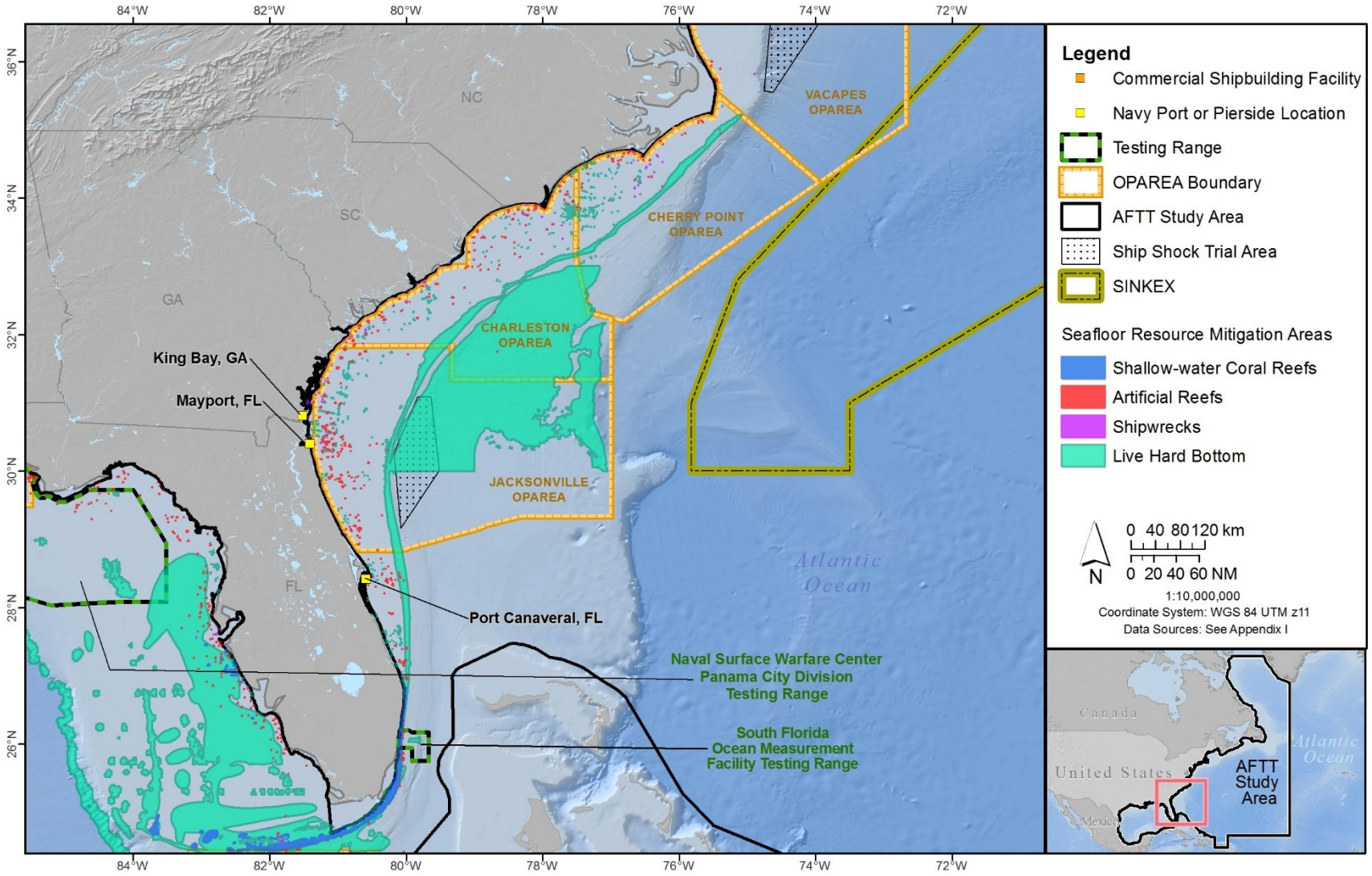
To aid in the implementation of seafloor resource mitigation, the Navy will include maps of the best available georeferenced data (i.e., where the available data accurately indicate the natural boundary of a seafloor resource and are not generalized within large geometric areas, such as large grid cells) in the Protective Measures Assessment Protocol for shallow-water coral reefs, artificial reefs, live hard bottom, and shipwrecks. These mitigation measures only apply to georeferenced resources because the Navy requires accurate resource identification and mapping for the mitigation to be effective and practicable to implement. Point and transect data will also be included if actual moderate- to high-relief live hard bottom is being documented. This criterion excludes some data (e.g., grid-based live hard bottom polygons and indicator fish transects). The shipwreck data documented in Section 3.5 (Habitats) were refined to only accurate positions using the following criteria: (1) not an obstruction, sounding, unknown (non-wreck), dump site, mooring buoy, sewer outfall, piling, or rock; (2) high or medium accuracy location; (3) not disproved; (4) not an approximate position (applied to medium accuracy only); and (5) source information provided.

Input from the operational community indicates that the mitigation detailed in Table 5.4-1 is practicable to implement. Implementing additional mitigation for other activities or types of seafloor resources would not allow the Navy to continue meeting its Title 10 requirements to successfully accomplish military readiness objectives (e.g., would decrease access to necessary environmental or oceanographic conditions; would prevent ready access to facilities or range support structures; could unduly delay testing associated with required acquisition milestones or as required on an as-needed basis to meet operational requirements); and therefore, would not be practicable to implement.



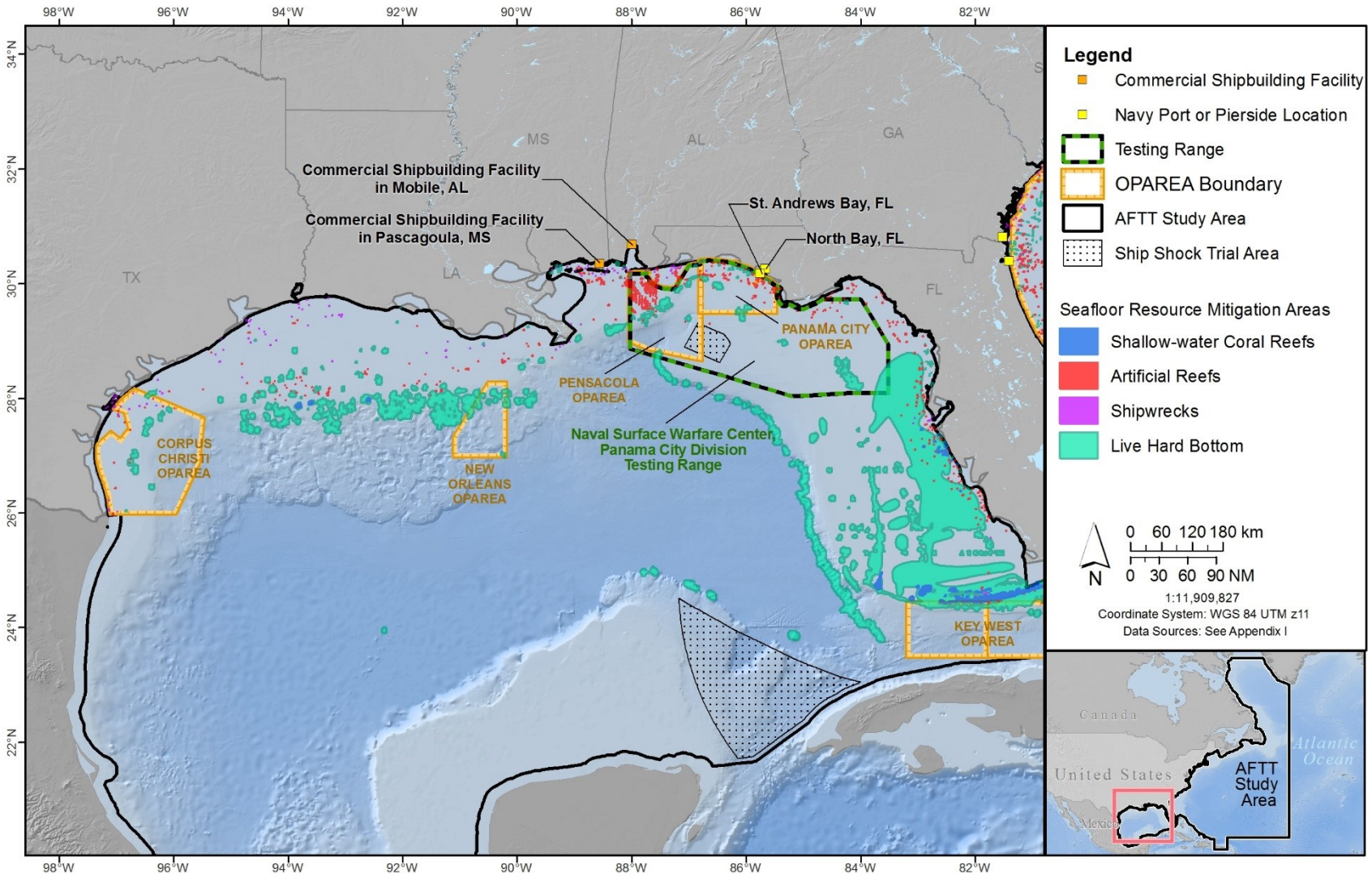
Notes: AFTT: Atlantic Fleet Training and Testing; OPAREA: Operating Area; SINKEX: sinking exercise

Figure 5.4-1: Seafloor Resource Mitigation Areas off the Northeastern United States



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

Figure 5.4-2: Seafloor Resource Mitigation Areas off the Mid-Atlantic and Southeastern United States



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

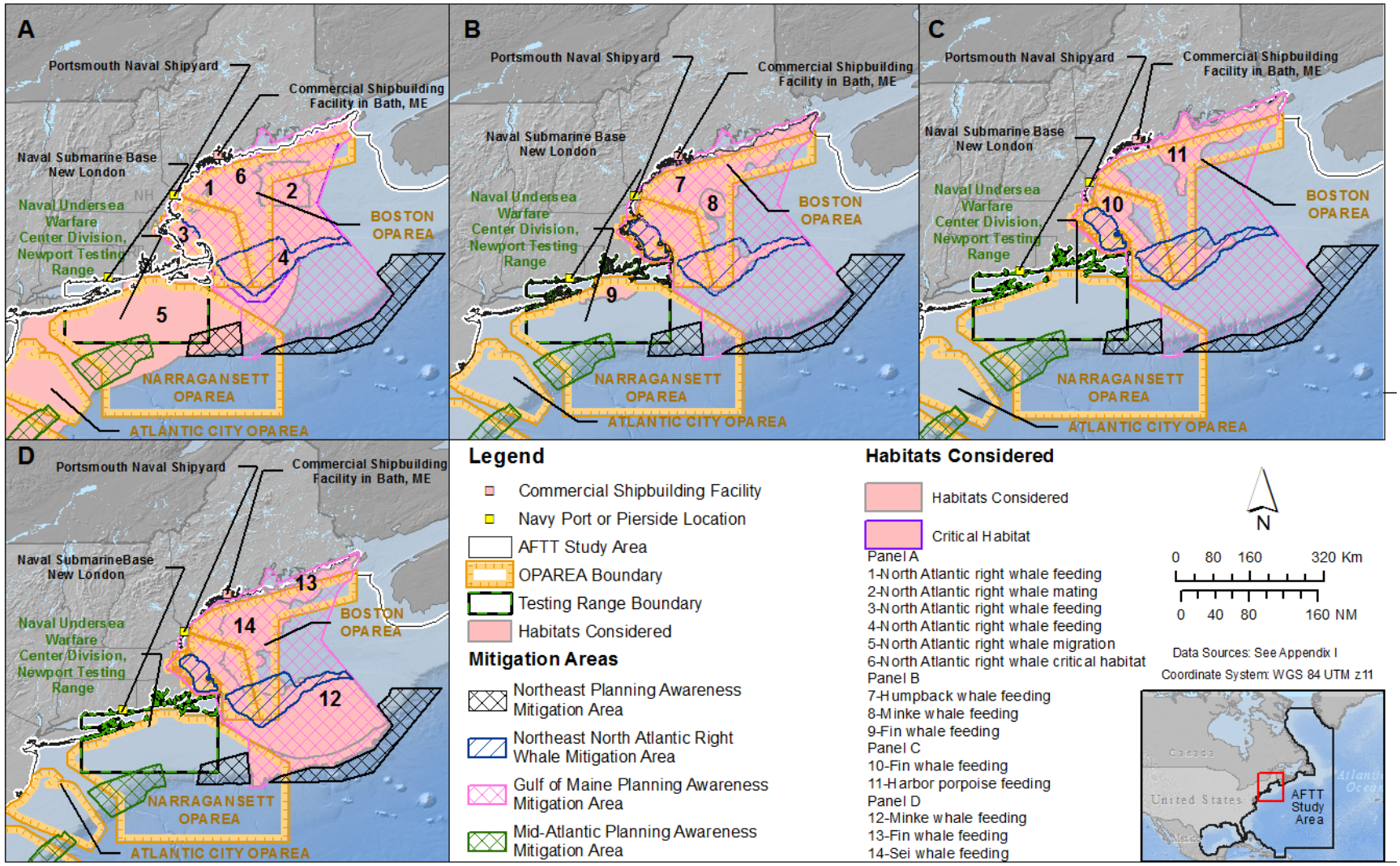
Figure 5.4-3: Seafloor Resource Mitigation Areas in the Gulf of Mexico

5.4.2 MITIGATION AREAS OFF THE NORTHEASTERN UNITED STATES

As described in Table 5.4-2 and shown in Figure 5.4-4, the Navy will implement additional mitigation to further avoid or reduce impacts on marine mammals from acoustic, explosive, and physical disturbance and strike stressors from the Proposed Action in waters off the northeastern United States. The mitigation is a continuation from Phase II with an addition of the Gulf of Maine Planning Awareness Mitigation Area.

Table 5.4-2: Mitigation Areas off the Northeastern United States

Mitigation Area Description
Resource Protection Focus • Marine mammals
Stressor or Activity • Sonar • Explosives • Physical disturbance and strikes
Mitigation Area Requirements • **Northeast North Atlantic Right Whale Mitigation Areas (year-round):** – The Navy will minimize the use of low-frequency active sonar, mid-frequency active sonar, and high-frequency active sonar to the maximum extent practicable. – The Navy will not use Improved Extended Echo Ranging sonobuoys (within 3 NM of the mitigation area), explosive and non-explosive bombs, in-water detonations, and explosive torpedoes. – For activities using non-explosive torpedoes, the Navy will conduct activities during daylight hours in Beaufort sea state 3 or less. The Navy will use three Lookouts (one positioned on a vessel and two in an aircraft during dedicated aerial surveys) to observe the vicinity of the activity. An additional Lookout will be positioned on the submarine, when surfaced. Immediately prior to the start of the activity, Lookouts will observe for floating vegetation and marine mammals; if the resource is observed, the activity will not commence. During the activity, Lookouts will observe for marine mammals; if observed, the activity will cease. To allow a sighted marine mammal to leave the area, the Navy will not recommence the activity until one of the recommencement conditions has been met: (1) the animal is observed exiting the vicinity of the activity; (2) the animal is thought to have exited the vicinity of the activity based on a determination of its course, speed, and movement relative to the activity location; or (3) the area has been clear from any additional sightings for 30 min. During transits and normal firing, ships will maintain a speed of no more than 10 knots. During submarine target firing, ships will maintain speeds of no more than 18 knots. During vessel target firing, ship speeds may exceed 18 knots for brief periods of time (e.g., 10–15 min.). – For all activities, before vessel transits, the Navy will conduct a web query or email inquiry to the National Oceanographic and Atmospheric Administration Northeast Fisheries Science Center's North Atlantic Right Whale Sighting Advisory System to obtain the latest North Atlantic right whale sightings information. Vessels will use the obtained sightings information to reduce potential interactions with North Atlantic right whales during transits. Vessels will implement speed reductions after they observe a North Atlantic right whale, if they are within 5 NM of a sighting reported to the North Atlantic Right Whale Sighting Advisory System within the past week, and when operating at night or during periods of reduced visibility. • **Gulf of Maine Planning Awareness Mitigation Area (year-round):** – The Navy will not plan major training exercises (Composite Training Unit Exercises or Fleet Exercises/Sustainment Exercises), and will not conduct more than 200 hours of hull-mounted mid-frequency active sonar per year. – If the Navy needs to conduct major training exercises or more than 200 hours of hull-mounted mid-frequency active sonar per year for national security, it will provide NMFS with advance notification and include the information in any associated training activity or monitoring reports. • **Northeast Planning Awareness Mitigation Areas (year-round):** – The Navy will avoid planning major training exercises (Composite Training Unit Exercises or Fleet Exercises/Sustainment Exercises) to the maximum extent practicable. – The Navy will not conduct more than four major training exercises per year (all or a portion of the exercise). – If the Navy needs to conduct additional major training exercises for national security, it will provide NMFS with advance notification and include the information in any associated training activity or monitoring reports.



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

Figure 5.4-4: Mitigation Areas and Habitats Considered off the Northeastern United States

5.4.2.1 Resource Description

When developing mitigation areas off the northeastern United States, the Navy considered habitats for numerous marine mammal species, including areas that have been identified by NMFS as critical habitat, or by LaBrecque et al. (2015a) as biologically important areas. The considered areas are listed below, described in the following sections, and shown in Figure 5.4-4.

- Fin whale feeding area in the northern Gulf of Maine (June through October)
- Fin whale feeding area in the southern Gulf of Maine (year-round)
- Fin whale feeding area east of Montauk Point (March through October)
- Harbor porpoise small and resident population in the Gulf of Maine (July through September)
- Humpback whale feeding area in the Gulf of Maine, Stellwagen Bank, and the Great South Channel (March through December)
- Minke whale feeding area in the central Gulf of Maine - Parker Ridge and Cashes Ledge (March through November)
- Minke whale feeding area in the southwestern Gulf of Maine and Georges Bank (March through November)
- North Atlantic right whale critical habitat (northeastern U.S. foraging area; year-round)
- North Atlantic right whale mating area in the central Gulf of Maine (November through January)
- North Atlantic right whale feeding area on Jeffreys Ledge (June through July, October through December)
- North Atlantic right whale feeding area on Cape Cod Bay and Massachusetts Bay (February through April)
- North Atlantic right whale feeding area in the Great South Channel and on the northern edge of Georges Bank (April through June)
- North Atlantic right whale migratory corridor along the U.S. East Coast (upper portion) (November through December, March through April)
- Sei whale feeding area in the northeast Atlantic (May through November)

5.4.2.1.1 Fin Whales

Three areas in the AFTT Study Area have been identified as biologically important fin whale feeding areas by LaBrecque et al. (2015a): (1) June to October in the northern Gulf of Maine; (2) year-round in the southern Gulf of Maine; and (3) March to October east of Montauk Point (which is located off the eastern tip of Long Island, New York). These areas were substantiated through vessel-based survey data, photo-identification data, and expert judgment.

Fin whales are often seen closer to shore after periodic patterns of upwelling (upward water motion) and the resultant increased prey density (Azzellino et al., 2008). This species is highly adaptable, often following its prey off the continental shelf (Azzellino et al., 2008; Panigada et al., 2008). Fin whales feed primarily in higher latitudes from March through October when primary prey availability is high (Mizroch et al., 1984a), but more recently have been found to also feed in more southerly latitudes (Silva et al., 2013). New England waters are considered the primary feeding grounds for fin whales (Waring et al., 2016). Another important fin whale feeding area is located south of New England and directly east of Montauk Point (between the 15-m and 50-m contours)(Hain et al., 1992). Though most of the published literature on fin whale feeding areas is based on older data (more than 10 years old), LaBrecque et al.

(2015a) noted that unpublished sighting data of feeding fin whales from the Provincetown Center for Coastal Studies (1984–2011) spatially coincides with previously published data, indicating that these feeding areas are still important. In addition, data from Waring et al. (2016) and Palka (2012) show that fin whales have continued to use these areas at least seasonally.

Fin whale sightings and acoustic detections are highest in New England waters during spring and summer (Hain et al., 1992; Morano et al., 2012b; Waring et al., 2014). Agler et al. (1993) reported that fin whales were seen in the southern Gulf of Maine from March to October, while fin whales in the northern Gulf of Maine were seen only from June to October. In the southwestern Gulf of Maine, Provincetown Center for Coastal Studies recorded sightings of feeding fin whales in all months of the year; therefore, feeding in the southern Gulf of Maine is considered to occur year-round (LaBrecque et al., 2015a).

Photo-identification records collected from 1974–1988 show that individual female fin whales exhibit feeding site fidelity in areas of the northern Gulf of Maine (lower Bay of Fundy, Seal Island, and Mt. Desert Rock, Maine) and southern Gulf of Maine (Great South Channel, Jeffreys Ledge, and Stellwagen Bank)(Agler et al., 1993). Waring et al. (2016) also asserts that there is evidence of site fidelity by females, and perhaps some segregation by sexual, maturational, or reproductive class in the feeding area (Agler et al., 1993). Photo-identification records from 1980–1987 identified 156 individual fin whales within the Massachusetts Bay area feeding grounds (Seipt et al., 1990). During this period, approximately 62 percent of the 156 individuals were observed more than once and 45 percent were photographed in multiple years, some as many as 8 years (Seipt et al., 1990). An estimated 49 percent of the fin whales sighted in this study were sighted again within the same year (Seipt et al., 1990). Multi-year photo-identification data from the Gulf of Maine and Massachusetts Bay shows that individual fin whales displayed site fidelity over successive years.

For additional information about fin whale habitats and geographic range, see Section 3.7.2.2.4.2 (Habitat and Geographic Range).

5.4.2.1.2 Harbor Porpoise

One area in the AFTT Study Area was identified as a biologically important area for a small and resident population of harbor porpoises in the Gulf of Maine from July through September (LaBrecque et al., 2015a). The area was delineated based on NMFS vessel and aerial surveys, genetic analyses, strandings, and bycatch reports, which have identified the area as having high concentrations of harbor porpoises seasonally (LaBrecque et al., 2015a).

Harbor porpoises occur from the Bay of Fundy to North Carolina in the U.S. Atlantic Ocean. During summer (July to September), harbor porpoises are concentrated in the northern Gulf of Maine and southern Bay of Fundy region, generally in waters less than 150 meters (m) deep (Gaskin, 1977; Kraus et al., 1983; Palka, 1995a; Palka, 1995b), with a few sightings in the upper Bay of Fundy and on the northern edge of Georges Bank (Palka, 2000). During fall (October to December) and spring (April to June), harbor porpoises are widely dispersed from New Jersey to Maine, with lower densities farther north and south. During winter (January to March), intermediate densities of harbor porpoises can be found in waters off New Jersey to North Carolina, and lower densities are found in waters off New York to New Brunswick, Canada (Waring et al., 2016).

Unlike other cetacean species that use the Gulf of Maine and Bay of Fundy in the summer, there does not appear to be a temporally coordinated migration or a specific migratory route to and from the region (LaBrecque et al., 2015a). Some portion of the population is thought to use the region year-round

(National Marine Fisheries Service, 2014; National Oceanic and Atmospheric Administration, 2015). Satellite tagging results from 1994 and 1995 showed that some harbor porpoises were commonly found in the waters around the 92-m isobath, indicating that this area may be a migratory route from the Bay of Fundy to the lower Gulf of Maine (Read & Westgate, 1997). Additional data is needed to show the extent of movement patterns of this harbor porpoise population.

For additional information about harbor porpoise habitats and geographic range, see Section 3.7.2.3.27.2 (Habitat and Geographic Range).

5.4.2.1.3 Humpback Whales

One area in the AFTT Study Area was identified by LaBrecque et al. (2015a) as a biologically important area for humpback whale feeding from March to December. The feeding area includes the Gulf of Maine, Stellwagen Bank, and the Great South Channel, and has been substantiated through photo-identification data, aerial, and vessel survey data, radio tracking data and expert judgment (LaBrecque et al., 2015a).

Humpback feeding habitats are typically shallow banks or ledges with high seafloor relief (Hamazaki, 2002; Payne et al., 1990a). In the western North Atlantic, humpback whales feed during spring, summer and fall over a large geographic range including the Gulf of Maine, the Gulf of St. Lawrence, Newfoundland Grand Banks, Labrador Sea, West Greenland, and the Scotian Shelf (Cetacean and Turtle Assessment Program, 1982; Kenney & Winn, 1986; Stevick et al., 2006; Whitehead, 1982). Roberts et al. (2016) shows the highest occurrences in the areas south of Jeffreys Ledge, especially Stellwagen Bank, the Great South Channel, and Western Georges Bank.

The Gulf of Maine stock was designated as a separate feeding stock (Waring et al., 2016) based upon the strong fidelity by individual whales to this region. Humpback whales feed in the Gulf of Maine from March through December, with most feeding activity observed in June and July. Studies of humpback whale ecology in the Gulf of Maine have been ongoing since the mid-1970s (Clapham et al., 1993; Clapham & Mattila, 1990; Clapham & Mayo, 1987; Hazen et al., 2009; Payne et al., 1986; Weinrich et al., 1997; Weinrich & Kuhlberg, 1991) and their distribution in this region has been largely correlated to abundance of prey species, although behavior and bathymetry are factors influencing foraging strategy (Payne et al., 1990b). Humpback whales are frequently piscivorous when in New England waters, feeding on herring (*Clupea harengus*), sand lance (*Ammodytes* spp.), and other small fishes. In the northern Gulf of Maine, euphausiids are also a frequent prey item (Paquet et al., 1997). Payne et al. (1986) suggested that an increase in the number of humpback whale sightings in the southwest Gulf of Maine since 1978 was concurrent with an increase in the number of sand lance in the same area. However, a significant correlation between humpback whale sightings on Georges Bank where sand lance was abundant was not found. Researchers found that environmental factors, such as topography, combined with foraging behavior (and not solely prey distribution) influences humpback whale feeding distribution (Payne et al., 1986).

For additional information about humpback whale habitats and geographic range, see Section 3.7.2.3.1.2 (Habitat and Geographic Range).

5.4.2.1.4 Minke Whales

Two areas in the AFTT Study Area have been identified as biologically important areas for minke whale feeding from March to November by LaBrecque et al. (2015a): (1) Central Gulf of Maine around Parker Ridge and Cashes Ledges, and (2) waters less than 200-m in the southern and southwestern section of

the Gulf of Maine, including Georges Bank, the Great South Channel, Cape Cod Bay, Massachusetts Bay, Stellwagen Bank, Cape Anne, and Jeffreys Ledge. The identification of these areas was substantiated through vessel-based survey data and expert judgment (LaBrecque et al., 2015a).

Spring to fall are when minke whales are most abundant in New England waters, while during winter the species appears to be largely absent (LaBrecque et al., 2015a; Risch et al., 2013). From May through September, minke whales are most abundant in New England waters, including the Gulf of Maine, Cape Cod Bay, the Great South Channel, and Georges Bank (Waring et al., 2016). Year-round acoustic monitoring in Stellwagen Bank (2006 and 2007–2010) detected minke whale vocalizations from August to mid-November, with 88 percent occurring in September and October, and only a few detections from March to June (Risch et al., 2013).

Minke whales have been observed feeding in the Great South Channel and adjacent waters from March through November (LaBrecque et al., 2015a). During vessel-based surveys from 1988 to 2011, the Provincetown Center for Coastal Studies recorded 19 sightings of individual minke whales feeding in waters less than 150 m along the northern edge of Georges Bank, Great South Channel, Stellwagen Bank, and off Race Point, Massachusetts (LaBrecque et al., 2015a). From 1998 to 2009, the Northeast Fisheries Science Center aerial survey team recorded 15 sightings of minke whales feeding during all survey months (March to July and October) in waters less than 200 m (LaBrecque et al., 2015a). Twenty-one observations of surface or apparent surface feeding of minke whales were recorded from March through September during surveys within the 100-m isobath in the Great South Channel, along Cape Anne, and at Jeffreys Ledge (Cetacean and Turtle Assessment Program, 1982). Between 1979 and 1992, there were 27 confirmed sightings of minke whales feeding at the surface in Cape Cod Bay, Massachusetts Bay, and at Stellwagen Bank (Murphy, 1995). These sightings were recorded during dedicated marine mammal research cruises and on whale-watching vessels. Feeding group size was recorded in 24 of the 27 sightings; 2 sightings were of pairs of individuals, 1 sighting was of 3 individuals, and single individuals account for the rest of the 24 sightings recorded with group size.

From these published and unpublished sightings of minke whale feeding activity, LaBrecque et al. (2015a) defined the minke whale feeding biologically important areas to be in waters less than 200 m in the southern and southwestern section of the Gulf of Maine, including Georges Bank, the Great South Channel, Cape Cod Bay and Massachusetts Bay, Stellwagen Bank, Cape Anne, and Jeffreys Ledge. Sightings of minke whale feeding in the shallow waters around Parker Ridge and Cashes Ledge led LaBrecque et al. (2015a) to identify an additional area in the central Gulf of Maine as a biologically important minke whale feeding area. Roberts et al. (2016) habitat-based density modeling shows a markedly higher density pattern in these areas from April through October.

For additional information about minke whale habitats and geographic range, see Section 3.7.2.3.2.2 (Habitat and Geographic Range).

5.4.2.1.5 North Atlantic Right Whales

One area in the AFTT Study Area has been designated by NMFS as critical habitat for North Atlantic right whale feeding, which includes the Gulf of Maine and Georges Bank region. As described in Section 3.7.2.2.2.2 (Habitat and Geographic Range), NMFS designated the critical habitat in 2016 to replace two smaller critical habitats that had been previously designated in 1994. Overlapping this critical habitat are four areas that have been identified by LaBrecque et al. (2015a) as biologically important areas for North Atlantic right whale: (1) a feeding area on Jeffreys Ledge (June through July, October through December), (2) feeding areas in Cape Cod Bay and Massachusetts Bay (February through April), (3)

feeding areas in the Great South Channel and the northern edge of Georges Bank (April through June), and (4) a migration area (November through December, March through April). See Section 5.4.3.1.3 (North Atlantic Right Whales) for a discussion of the southern portion of the migration area.

North Atlantic right whales primarily feed on copepods (a type of zooplankton)(Jefferson et al., 2015; Waring et al., 2016) off the northeastern United States between February and December (Baumgartner & Mate, 2003; Baumgartner et al., 2003; Kenney et al., 1986; Weinrich et al., 2000). North Atlantic right whales arrive in Cape Bod Bay and Massachusetts Bay to feed in late winter, with peak abundance in March and April (Hamilton & Mayo, 1990; Mayo et al., 2004; National Oceanic and Atmospheric Administration, 2012). Recent passive acoustic studies indicate that North Atlantic right whale presence and calls are persistent in Massachusetts Bay throughout most of the year, except during July and August (Morano et al., 2012a; Mussoline et al., 2012). Calling rates were found to be highest from January through May with a peak in April (Mussoline et al., 2012).

Aerial surveys conducted by NMFS and the Provincetown Center for Coastal Studies in the springs of 1999–2006 found North Atlantic right whales along the northern edge of Georges Bank, in the Great South Channel, in Georges Basin, and in various locations in the Gulf of Maine. This sightings data show that North Atlantic right whales display a strong seasonal occurrence in these areas (Pace & Merrick, 2008). Tagged North Atlantic right whales have been found to forage at the surface and near the bottom in the Great South Channel depending on where copepods are in the water column (Baumgartner et al., 2011; Winn et al., 1995). Most of the spring feeding that occurs in the Great South Channel and northern edge of Georges Bank takes place from April to June, with a peak in May (Cetacean and Turtle Assessment Program, 1982; Kenney et al., 1995).

Individual North Atlantic right whales and mother-calf pairs depart the Great South Channel for the Bay of Fundy and Roseway Basin in late summer and fall (Brown et al., 2009). During this time, whales have been observed feeding at Jeffreys Ledge in the western Gulf of Maine. Recorded feeding activity at Jeffreys Ledge has been compiled from Cetacean and Turtle Assessment Program (1982) surveys, whale-watching trips, and the North Atlantic right whale sightings database. Each source of data supported two seasonal peaks in sightings: summer sightings from July to August (which mainly comprised of mother-calf pairs), and fall sightings from October to December (which included all age classes). Jeffreys Ledge may serve as a stopover feeding area, especially when whales may be transiting to and from the northern waters (Weinrich et al., 2000). Sightings in the Jeffreys Ledge region peak between October and November (Weinrich et al., 2000; Weinrich et al., 2005), and skim feeding and near-surface feeding have been observed during the fall (Longley, 2012; Weinrich et al., 2000). Acoustic recordings from Jeffreys Ledge (2004–2005) have detected right whale calls from November to May, with the highest call rates from November to February (Mussoline et al., 2012). More dedicated surveys during the fall and early winter, as well as studies of the physical and oceanographic characteristics of Jeffreys Ledge would provide more insight into the importance of this area as habitat for the North Atlantic right whale (Weinrich et al., 2000).

In addition to the feeding areas, one location in the AFTT Study Area (the central Gulf of Maine, including the Outer Falls and Cashes Ledge) was identified by LaBrecque et al. (2015a) as a biologically important area for North Atlantic right whale mating, based on a demographic comparison of North Atlantic right whale habitats conducted by Cole et al. (2013). The mating area was delineated based on the greatest number of sightings in the central Gulf of Maine and bathymetry contours to include the Outer Falls and Cashes Ledge (LaBrecque et al., 2015a). Some North Atlantic right whales (mostly pregnant females and juveniles) return to the calving grounds off the southeastern United States in

December and January, but the location of the rest of the population during the winter months is currently unknown. It is believed that the remaining population resides in the cold, offshore waters off the northeastern United States where prey availability is high (Bort et al., 2015). Recent research suggests that North Atlantic right whales are present in the Gulf of Maine throughout the winter and may be using the central Gulf of Maine, including Outer Falls and Cashes Ledge, as a potential mating area (Bort et al., 2015; Cole et al., 2013). Cole et al. (2013) found that North Atlantic right whales aggregate in the central Gulf of Maine during their believed conception period (November to January) and that a large amount of reproductively successful males and females occur in the area during these months, when compared to other regions that were analyzed (e.g., Bay of Fundy, Great South Channel, and Jeffreys Ledge). About half of the North Atlantic right whale population was sighted in this area between 2002 and 2008, with a little less than half of the individuals identified as males (including some that were known fathers). Passive acoustic monitoring conducted by Bort et al. (2015) also showed that the central Gulf of Maine is a seasonally important habitat for right whales, with male display and mating behaviors possibly occurring at high rates in this area. Cole et al. (2013) does not refute the idea of conception possibly occurring outside of the identified mating area during the believed conception period, or that this population may have another mating area that has yet to be identified. Longley (2012) proposes that Jeffreys Ledge may also be used for mating (in addition to feeding), since the timing of North Atlantic right whale sightings in this area corresponds with when mating is believed to occur (Kraus et al., 2007); however, mating activities in this area have yet to be confirmed. Cole et al. (2013) suggests that a longer time series dataset is needed to determine how stable the central Gulf of Maine is as a mating area.

Overlapping a portion of the critical habitat and feeding area in the Great South Channel and the northern edge of Georges Bank is an area that was identified by LaBrecque et al. (2015a) as a biologically important area for North Atlantic right whale migration from November through December and March through April (see Section 5.4.3.1, North Atlantic Right Whales for a discussion on the southern portion of this area). North Atlantic right whales undertake large seasonal migrations, with some of the population traveling to cold, productive waters during the spring and summer to feed, as well as to warmer waters during the winter to calve, or to other unknown wintering areas (Kenney, 2008; Roberts et al., 2016; Whitt et al., 2013). LaBrecque et al. (2015a) identified a migratory corridor along the East Coast of the United States that is used by North Atlantic right whales during southward migrations to the calving grounds in November and December, and northward migrations to the feeding areas, the Bay of Fundy, and other unknown areas in March and April. The subset of the population that has been observed migrating between the northern feeding grounds and southern calving grounds includes reproductively mature and pregnant females, juveniles, and young calves (Federal Register 81 [17]: 4838-4874). North Atlantic right whales are believed to migrate along the continental shelf (Schick et al., 2009; Whitt et al., 2013); however, it is unknown if the whales use the whole shelf area or just the nearshore waters (LaBrecque et al., 2015a). Tagging results from an analysis by Schick et al. (2009) suggest that the migratory corridor is broader than was initially estimated, and that suitable habitat exists beyond 20 NM from the coast, a distance that is presumed to represent the primary migratory pathway (National Marine Fisheries Service, 2008). NMFS has not defined critical habitat for North Atlantic right whale migration due to the lack of information on migratory routes and the lack of data that would be needed to identify essential physical and biological features (Federal Register 81 [17]: 4838-4874).

For additional information about North Atlantic right whale habitats and geographic range, see Section 3.7.2.2.2.2 (Habitat and Geographic Range).

5.4.2.1.6 Sei Whales

One area in the AFTT Study Area was identified as a biologically important area for sei whale feeding from May to November by LaBrecque et al. (2015a). The identification of this area was substantiated thorough vessel and aerial survey data, feeding information from commercial whale watching trips, and expert judgment (LaBrecque et al., 2015a). The area extends from the 25-m contour off coastal Maine and Massachusetts to the 200-m contour in the central Gulf of Maine, including the northern shelf break area of Georges Bank. The feeding area also includes the southern shelf break area of Georges Bank from 100–2,000 m and the Great South Channel.

The sei whale is the only rorqual species that seems to have evolved the ability to capture prey both by engulfment (as do the other rorquals) or by skimming on relatively low prey concentrations (as do North Atlantic right whales and bowhead whales)(Prieto et al., 2012). This adaptation is reflected in the variety of prey recorded for the species. The sei whale has the most extensive diet of any baleen whale, including copepods, euphausiids, amphipods, decapods, cephalopods, and fish; however, prey preferences are highly dependent on ocean basin and swarming characteristics of the prey (Prieto et al., 2012). Sei whales in the North Atlantic are largely planktivorous, feeding primarily on copepods, and secondarily on euphausiids (Baumgartner et al., 2011; Cetacean and Turtle Assessment Program, 1982; Flinn et al., 2002; Jonsgard & Darling, 1977; Kenney & Winn, 1986; Mizroch et al., 1984b; Prieto et al., 2012). Baumgartner et al. (2011) suggests that the distribution and vertical migrations of copepods influence the distribution, abundance, and calling behaviors of sei whales in the southwestern Gulf of Maine. Baumgartner and Fratantoni (2008) found that sei whale calling rates increased during the day when vertically migrating copepods were at depth, but decreased at night when the copepods had migrated to the surface. They hypothesized that sei whales are unable to feed on deep layers of copepods, and that increased calling behavior during the day may be associated with a reduction in feeding on copepods, and either an increase in socializing with conspecifics or switching to a different prey species (Baumgartner & Fratantoni, 2008).

Sei whales were once believed to visit the inshore waters of the Gulf of Maine (including the Great South Channel) only occasionally in response to increases in the availability of copepods (Payne et al., 1990b; Schilling et al., 1992); however, research by Baumgartner et al. (2011) in the Great South Channel (2004 to 2010) suggests that sei whales were reasonably common in this area in most years. Sightings from the Cetacean and Turtle Assessment Program (1982) surveys and data from the NMFS shipboard surveys Waring et al. (2014) suggested that peak abundance of sei whales in U.S. Atlantic waters occurs in spring, particularly along the shelf break of Georges Bank, into the Northeast Channel, and southwest to Hydrographer Canyon. Roberts et al. (2016) habitat-based density modeling shows a slightly different occurrence pattern, with highest densities in the LaBrecque et al. (2015a) identified feeding areas in May and June. LaBrecque et al. (2015a) suggested that feeding activity in U.S. Atlantic waters was concentrated from May to November, with a peak in July and August, but the authors did not specify which locations.

For additional information about sei whale habitats and geographic range, see Section 3.7.2.2.5.2 (Habitat and Geographic Range).

5.4.2.2 Mitigation Area Assessment

The Navy uses the Northeast Range Complexes and adjacent waters to support major training exercises, torpedo exercises, tracking exercises, Civilian Port Defense – Homeland Security Anti-Terrorism/Force Protection exercises, missile and rocket exercises, Maritime Security Operations – Anti-Swimmer

Grenades activities, gunnery exercises, submarine sonar maintenance and system checks, kilo dip tests, at-sea sonar testing, acoustic and oceanographic research, and other training and testing activities. The Navy developed the mitigation areas identified in Table 5.4-2 to provide further protection for marine mammals in areas that the best available science suggests are important to multiple species of marine mammals for foraging, migrating, and potentially reproduction, either year-round or for part of the year (depending on the species). Implementing the mitigation within mitigation areas off the northeastern United States would result in an avoidance or substantial reduction of impacts on marine mammal species (including harbor porpoises and fin, humpback, minke, North Atlantic right, and sei whales) in these areas.

The Navy will continue implementing mitigation within the Northeast North Atlantic Right Whale Mitigation Areas to provide further protections for North Atlantic right whales in two of their most important feeding areas (the Great South Channel and Cape Cod Bay). By minimizing the use of active sonar and not using certain explosives or non-explosive practice munitions, the Navy will continue to avoid or reduce the potential for impacts on North Atlantic right whales (as well as other marine mammal species that are present in these areas). Conducting activities using non-explosive torpedoes during daylight hours in Beaufort sea state 3 or less will help increase the effectiveness of Lookouts observing for marine mammals during these activities. The mitigation to obtain the latest sighting information from the North Atlantic Right Whale Sighting Advisory System will help vessels avoid North Atlantic right whales during all training and testing activities. The North Atlantic Right Whale Sighting Advisory System is a National Oceanographic and Atmospheric Administration program that collects sightings information off the northeastern United States from aerial surveys, shipboard surveys, whale watching vessels, and opportunistic sources, such as the U.S. Coast Guard, commercial ships, fishing vessels, and the public.

Mitigation within the Northeast Planning Awareness Mitigation Areas and the Gulf of Maine Planning Awareness Mitigation Area is designed to help the Navy further avoid or reduce impacts from active sonar on marine mammals that inhabit, feed in, mate in, or migrate through the northeast region. Each of these mitigation areas overlaps a portion of the North Atlantic right whale migration habitat identified by LaBrecque et al. (2015a). The Northeast Planning Awareness Mitigation Areas are situated among highly productive environments (e.g., persistent oceanographic features associated with upwellings) and steep bathymetric contours. They extend across the shelf break and contain several underwater canyons that have been associated with marine mammal feeding and abundance. For example, fin whales are known to follow prey off the continental shelf (Azzellino et al., 2008; Panigada et al., 2008), and sei whale abundance is high in two locations within the Northeast Planning Awareness Mitigation Areas: along the shelf break of Georges Bank and near Hydrographer Canyon (Waring et al., 2014). Newly developed for Phase III, the Gulf of Maine Planning Awareness Mitigation Area extends throughout the entire Gulf of Maine and southward over Georges Bank. In addition to a portion of the North Atlantic right whale migration area identified by LaBrecque et al. (2015a), this new mitigation area encompasses the entire North Atlantic right whale critical habitat (including the areas that were expanded in 2016), as well as 11 of the 12 areas identified in this region by LaBrecque et al. (2015a) as biologically important areas for fin, sei, minke, humpback, and North Atlantic right whale feeding; North Atlantic right whale mating; and a small and resident population of harbor porpoises.

The Navy can restrict the number of major training exercises planned within the Northeast Planning Awareness Mitigation Areas and Gulf of Maine Planning Awareness Mitigation Area because the Navy is not tied to a specific range support structure in this area for major training exercises within the AFTT

Study Area. The topography and bathymetry in this portion of the Study Area (a wide continental shelf leading to the shelf break) affords a wider range of opportunities to plan and execute major training exercises. The Navy determined that mitigation to restrict the number of hull-mounted mid-frequency active sonar hours conducted annually in the Gulf of Maine Planning Awareness Mitigation Area would be practicable to implement based on an operational assessment of past sonar use, projected future training and testing needs in the region, and consideration of fleet concentration areas in the Study Area.

The Navy does not have the same flexibility to relocate, restrict, or limit all major training exercises, the number of sonar hours used, or other training and testing activities beyond what is detailed in Table 5.4-2. The Navy conducts air warfare, anti-submarine warfare, mine warfare, expeditionary warfare, and surface warfare activities off the northeastern United States because this region provides valuable access to air and sea space conditions that mimic real world conditions to ensure safety of personnel, skill proficiency, and validation of testing program requirements. For training, areas in this region where exercises are scheduled to occur are chosen to allow for the realistic tactical development of the myriad of training scenarios that Navy units are required to complete to be mission effective. For example, Civilian Port Defense – Homeland Security Anti-Terrorism/Force Protection exercises (which may occur pierside in Boston, Massachusetts), involve mine warfare to train maritime security personnel to protect civilian ports and harbors against enemy efforts to interfere with access to these ports. The locations and scenarios for this training activity are selected according to Department of Homeland Security strategic goals and evolving world events; therefore, implementing additional mitigation for this event would have implications for national security. Locations for other training activities are chosen due to the proximity to training ranges (e.g., Boston Operating Area), available airspace (e.g., warning area W-107A in the Atlantic City Range Complex), unobstructed sea space (e.g., throughout the Narragansett Operating Area), aircraft emergency landing fields (e.g., Naval Undersea Warfare Center Division, Newport), and with consideration for public safety (e.g., located a safe distance away from commercial fishing activities). When scheduling activities, the Navy considers the need to minimize sea space and airspace conflicts within the northeast region and throughout the entire Study Area. Events may change mid-activity based on evaluators' assessments of performance and other conditions (such as weather or mechanical issues), which may preclude the use of planning restrictions for major training events and other activities as a mitigation measure. Daily fluctuations in training and testing schedules and objectives could mean that, on any given day, vessels may depend on discrete locations in waters off the northeastern United States for discrete purposes.

Due to its positioning within the boundary of the Naval Undersea Warfare Center Division, Newport Testing Range, the Navy will not develop a mitigation area for one of the habitats considered in Section 5.4.2.1 (Resource Description), the area east of Montauk Point that was identified by LaBrecque et al. (2015a) as a biologically important area for fin whale feeding. The Naval Undersea Warfare Center Division, Newport Testing Range provides critical sea space for the use of active sonar during Anti-Submarine Warfare Mission Package Testing events and other testing activities. The Naval Undersea Warfare Center Division, Newport Testing Range and other areas where testing events are scheduled to occur are chosen to allow the Navy to test systems in a variety of bathymetric and environmental conditions to ensure functionality and accuracy in real world environments. Testing ranges are typically located near the support facilities of the systems commands, which provide critical safety and infrastructure support and technical expertise necessary to conduct range testing. For example, the Navy performs acoustic and oceanographic research in continental shelf areas off the northeastern United States that involves active acoustic transmissions used for engineering tests of acoustic sources,

validation of ocean acoustic models, tests of signal processing algorithms, and characterization of acoustic interactions with the ocean bottom. Test locations are selected due to the importance of researching shallow-water acoustic propagation, the occurrence of seafloor types that are of particular interest in ocean acoustics, the occurrence of three-dimensional bathymetric phenomena (e.g., Hudson Canyon), and the logistical support available from university research vessels and the Naval Undersea Warfare Center Division, Newport. The length of the acoustic and oceanographic research experiments (and therefore the amount of acoustic source usage) is due to the need to observe systems with different acoustic parameters (e.g., frequency, directionality, signal) under a variety of environmental conditions (e.g., wind, waves, pre- and post-storms). For another example, the Navy conducts Emerging Mine Countermeasure Research in the three most appropriate environments to test mine countermeasure systems when considering how mine systems would be used by an adversary. The shallow waters off the coast of the northeastern United States provide a critical testing environment due to the bottom types and water depths in this location.

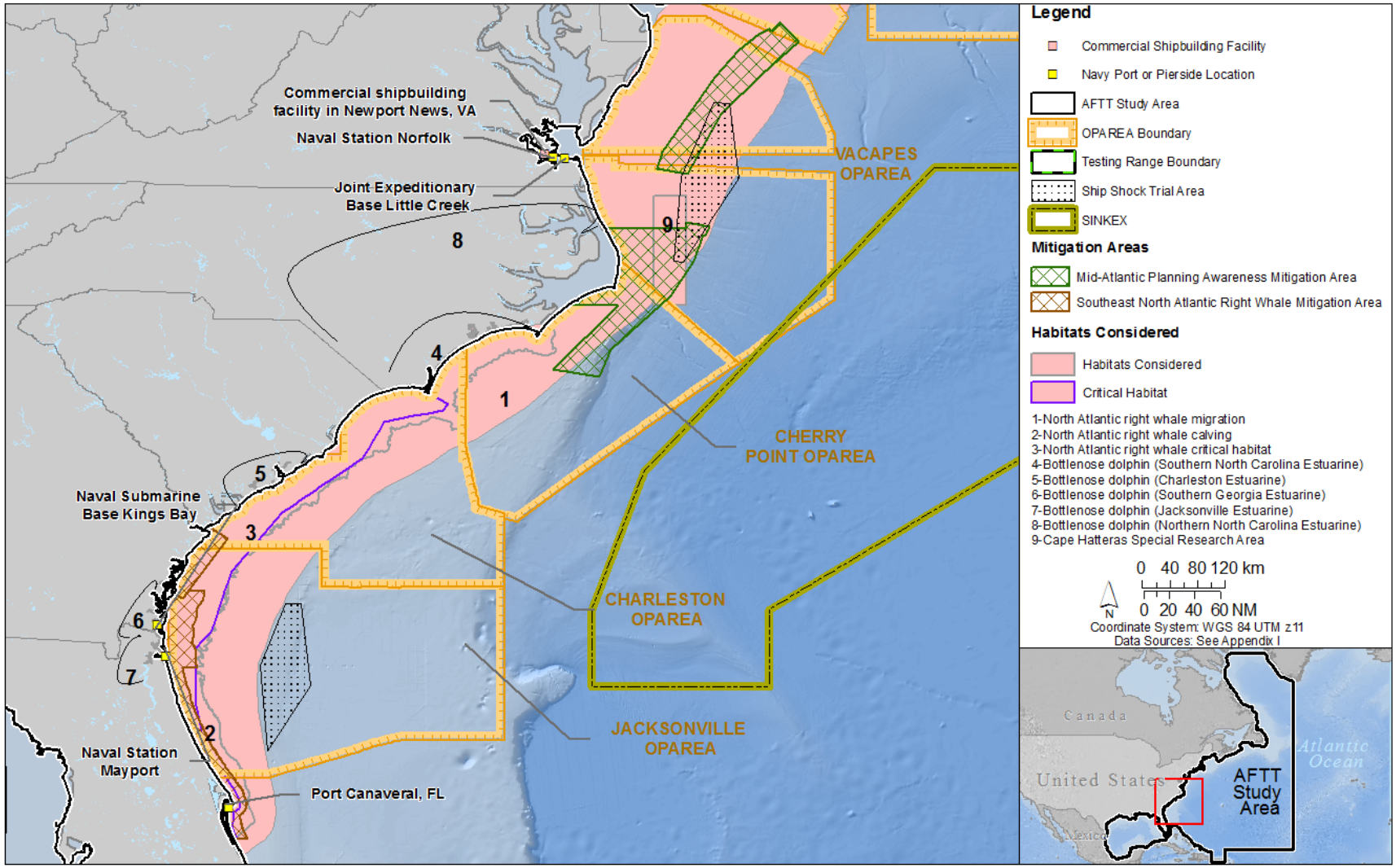
In summary, further restrictions on the level, number, or timing (seasonal or time of day) of training or testing activities would have a significant impact on the ability for units to meet their individual training and certification requirements; on the ability to certify strike groups to deploy to meet national security tasking; on the ability to meet testing program requirements and required acquisition milestones; on operational costs due to increased fuel, maintenance, and time required to complete activities; on the safety risk associated with extending distance offshore and accelerated fatigue-life of aircraft; on training and testing realism due to reduced access to necessary environmental or oceanographic conditions; and on the ability for Navy Sailors to train and become proficient in using the sensors and weapons systems as would be required in a real world combat situation. Therefore, implementing additional mitigation beyond what is described in Table 5.4-2 for mitigation areas off the northeastern United States would be impracticable due to implications for safety, sustainability, and the Navy's ability to continue meeting its Title 10 requirements to successfully accomplish military readiness objectives.

5.4.3 Mitigation Areas off the Mid-Atlantic and Southeastern United States

As described in Table 5.4-3 and shown in Figure 5.4-5, the Navy will implement additional mitigation to further avoid or reduce impacts on marine mammals from acoustic, explosive, and physical disturbance and strike stressors from the Proposed Action in waters off the mid-Atlantic and southeastern United States. The mitigation is a continuation from Phase II with an expansion of the Southeast North Atlantic Right Whale Mitigation Area.

Table 5.4-3: Mitigation Areas off the Mid-Atlantic and Southeastern United States

Mitigation Area Description
Resource Protection Focus • Marine mammals
Stressor or Activity • Sonar • Explosives • Physical disturbance and strikes
Mitigation Area Requirements • **Southeast North Atlantic Right Whale Mitigation Area (November 15 through April 15):** – The Navy will not conduct: (1) low-frequency active sonar (except as noted below), (2) mid-frequency active sonar (except as noted below), (3) high-frequency active sonar, (4) missile and rocket activities (explosive and non-explosive), (5) small-, medium-, and large-caliber gunnery activities, (6) Improved Extended Echo Ranging sonobuoy activities, (7) explosive and non-explosive bombing activities, (8) in-water detonations, and (9) explosive torpedo activities. – To the maximum extent practicable, the Navy will minimize the use of: (1) helicopter dipping sonar, (2) low-frequency active sonar and hull-mounted mid-frequency active sonar used for navigation training, and (3) low-frequency active sonar and hull-mounted mid-frequency active sonar used for object detection exercises. – Before transiting or conducting training or testing activities, the Navy will initiate communication with the Fleet Area Control and Surveillance Facility, Jacksonville to obtain Early Warning System North Atlantic right whale sightings data. The Fleet Area Control and Surveillance Facility, Jacksonville will advise vessels of all reported whale sightings in the vicinity to help vessels and aircraft reduce potential interactions with North Atlantic right whales. Commander Submarine Force U.S. Atlantic Fleet will coordinate any submarine operations that may require approval from the Fleet Area Control and Surveillance Facility, Jacksonville. Vessels will use the obtained sightings information to reduce potential interactions with North Atlantic right whales during transits. Vessels will implement speed reductions after they observe a North Atlantic right whale, if they are within 5 NM of a sighting reported within the past 12 hours, or when operating at night or during periods of poor visibility. To the maximum extent practicable, vessels will minimize north-south transits. • **Mid-Atlantic Planning Awareness Mitigation Areas (year-round):** – The Navy will avoid planning major training exercises (Composite Training Unit Exercises or Fleet Exercises/Sustainment Exercises) to the maximum extent practicable. – The Navy will not conduct more than four major training exercises per year (all or a portion of the exercise). – If the Navy needs to conduct additional major training exercises for national security, it will provide NMFS with advance notification and include the information in any associated training activity or monitoring reports.



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

Figure 5.4-5: Mitigation Areas and Habitats Considered off the Mid-Atlantic and Southeastern United States

5.4.3.1 Resource Description

When developing mitigation areas off the mid-Atlantic and southeastern United States, the Navy considered habitats for numerous marine mammal species, including areas that have been identified by NMFS as critical habitat or habitats with high marine mammal abundance, and by LaBrecque et al. (2015a) as biologically important areas. The considered areas are listed below, described in the following sections, and shown in Figure 5.4-5.

- North Atlantic right whale critical habitat (southeastern U.S. calving area; mid-November through late April)
- North Atlantic right whale calving habitat in the southeast Atlantic (mid-November through late April)
- North Atlantic right whale migratory corridor along the U.S. East Coast (southern portion) (November through December, March through April)
- Bottlenose dolphin Northern North Carolina Estuarine System small and resident population (year-round)
- Bottlenose dolphin Southern North Carolina Estuarine System small and resident population (year-round)
- Bottlenose dolphin Charleston Estuarine System small and resident population (year-round)
- Bottlenose dolphin Southern Georgia Estuarine System small and resident population (year-round)
- Bottlenose dolphin Jacksonville Estuarine System small and resident population (year-round)
- Cape Hatteras Special Research Area (year-round)

5.4.3.1.1 Bottlenose Dolphins

Five areas that overlap the AFTT Study Area have been identified by LaBrecque et al. (2015a) as biologically important areas for small and resident populations of bottlenose dolphins along the U.S. East Coast: (1) the Northern North Carolina Estuarine System Population, (2) the Southern North Carolina Estuarine System Population, (3) the Charleston Estuarine System Population, (4) the Southern Georgia Estuarine System Population, and (5) the Jacksonville Estuarine System Population. The areas were recognized through various methods, including photo-identification, vessel surveys, satellite tagging, and genetic analyses, which have identified the populations as individual stocks that use the coastal waters as important reproductive, migration, and feeding areas.

The bottlenose dolphin coastal morphotype is continuously distributed along the U.S. East Coast south of Long Island, New York, around the Florida peninsula, and along the Gulf of Mexico coast. Although the structure of the individually recognized stocks is somewhat uncertain, it appears to be complex. Not every portion of the coast appears to be a significantly important bottlenose dolphin habitat; however, scientific evidence suggests that important breeding grounds, migration habitat, and foraging grounds for the individually recognized bottlenose dolphin coastal morphotypes are scattered throughout coastal waters. The Charleston Estuarine System Population has high site fidelity based on data collected through photo-identification, remote biopsy, capture-release, and radio-tracking (Speakman et al., 2006). Within the Charleston Estuarine System population, 839 animals have been individually identified, with 115 animals being observed up to 10 times over periods up to 10 years. The Southern Georgia Estuarine System also has high genetic and site fidelity. Of the animals within this population, biopsy results indicate that there is a significant genetic differentiation with those animals from the

Northern Georgia and Southern South Carolina resident populations (Waring et al., 2016). Further studies are required to better understand the residency patterns of the Northern North Carolina Estuarine System Population, the Southern North Carolina Estuarine System Population, and the Jacksonville Estuarine System Population. Due to ongoing photo-identification studies (including Navy-funded monitoring efforts), the full habitat extent of several of these small and resident populations is subject to change as new information becomes available (LaBrecque et al., 2015a).

For additional information about bottlenose dolphin habitats and geographic range, see Section 3.7.2.3.10.2 (Habitat and Geographic Range).

5.4.3.1.2 Cape Hatteras Special Research Area

NMFS designated the Cape Hatteras Special Research Area as part of the Pelagic Longline Take Reduction Plan in January 2009 (National Marine Fisheries Service, 2009a). The area was designated due to high rates of pilot whale and Risso's dolphin bycatch in the U.S. East Coast Atlantic pelagic longline fishery. Unique oceanographic properties exist in the area due to how the Gulf Stream separates from the continental slope to the deep ocean, and southward-flowing continental shelf waters from the Middle Atlantic Bight converge with northward-flowing continental shelf waters from the South Atlantic Bight. These water flow patterns support upwelling events and high biodiversity, two features that indicate an area could have high value for marine mammal feeding. NMFS management measures for the Cape Hatteras Special Research Area are applicable to fisheries and do not apply to Navy activities; however, the Navy is considering this area due to its potential as an important marine mammal feeding area.

Numerous species of marine mammals occur in the Cape Hatteras Special Research Area, including beaked, fin, humpback, minke, and sperm whales; and pilot whales, bottlenose, short-beaked common, Atlantic spotted, striped, Clymene, and Risso's dolphins. The area is also used seasonally during migrations by numerous species, including the North Atlantic right whale. Navy monitoring data supports this area as having high diversity and density of marine mammals, including extremely high encounter rates for beaked whales. The Navy has been conducting aerial and vessel-based surveys off Cape Hatteras since July 2009 and acoustic monitoring since 2011. Between 2009 and 2015, 14 species or species groups were observed during vessel-based surveys, totaling more than 500 animals observed (Foley et al., 2015). Vessel-based surveys typically took place during the spring, summer, and fall. Aerial surveys were conducted year-round, with one to two survey days per month, depending on weather conditions. During the most recent aerial surveys conducted over 16 days in January and December 2015, 13 species were observed, totaling 160 sightings and more than 5,000 individual cetaceans (McAlarney et al., 2016). The species observed included bottlenose, Atlantic spotted, short-beaked common, Risso's, striped, and Clymene dolphins; and short-finned pilot, Cuvier's beaked, True's beaked, sperm, humpback, minke, fin, mesoplodont beaked, and Kogia whales.

Satellite tagging of several deep-diving marine mammal species has also recently been conducted in the Cape Hatteras Special Research Area. In 2015, satellite tags were deployed on four species of cetaceans (bottlenose dolphin, Cuvier's beaked whale, short-finned pilot whale, and short-beaked common dolphin)(Baird et al., 2016). The findings from this study indicate that the continental slope area off Cape Hatteras is likely an important location for several deep-diving species. One deep-diving species, the sperm whale, is found east and northeast of Cape Hatteras throughout winter months (Waring et al., 2015). Sperm whales inhabit the area year-round; however, distribution primarily shifts north in the summer. Pilot whales (primarily short-finned) are commonly observed in waters off Cape Hatteras, generally along the continental shelf edge (Waring et al., 2016). Some species (such as Cuvier's beaked

whales) remained near the slope within the Cape Hatteras Special Research Area, while other species (such as short-finned pilot whales) traveled into more northern and southern waters before returning to the Cape Hatteras Special Research Area (Baird et al., 2016).

5.4.3.1.3 North Atlantic Right Whales

One area in waters off the southeastern United States has been designated by NMFS as critical habitat for the North Atlantic right whale. The southern critical habitat area includes the coast of North Carolina, South Carolina, Georgia, and Florida, which are key areas essential for calving. As described in Section 3.7.2.2.2.2 (Habitat and Geographic Range), NMFS designated the critical habitat in 2016 to replace a smaller critical habitat that had been previously designated in 1994. Overlapping this critical habitat is an area that was identified by LaBrecque et al. (2015a) as a biologically important area for North Atlantic right whale calving from mid-November to late April, and an area identified by LaBrecque et al. (2015a) as a biologically important area for North Atlantic right whale migration from November through December and March through April. See Section 5.4.2.1.5 (North Atlantic Right Whales) for a discussion of the northern portion of the migration area.

Waters off the southeastern United States are the primary wintering ground for calving females, other adults, and juvenile North Atlantic right whales. These waters are the only known calving ground for North Atlantic right whales, and are used from November to April. North Atlantic right whales typically give birth from December to March (Knowlton et al., 1994; Kraus et al., 2007). Most sightings of neonates and calves have occurred during aerial surveys off southern Georgia and northeastern Florida (Garrison, 2007; Hamilton et al., 2007). During passive acoustic monitoring and visual surveys conducted off Savannah, Georgia and Jacksonville, Florida from 2009–2011, North Atlantic right whales were detected between November and April at both survey locations. More calls and sightings were recorded off Jacksonville than Savannah (Soldevilla et al., 2014). Aerial surveys sponsored by the Navy offshore of Jacksonville, Florida between 2009 and 2016 resulted in the following sightings: (1) a single whale approximately 40 NM offshore, (2) a female giving birth 40 NM offshore in March 2010 (U.S. Department of the Navy, 2011), (3) three whales approximately 20–25 NM offshore, and (4) two whales approximately 10 NM from shore. In the fall and winter of 2009–2010, Navy-sponsored acoustic recorders were deployed between 60–150 kilometers offshore of Jacksonville. Although sightings typically occur most frequently within continental shelf waters from northeastern Florida to southeastern Georgia during the fall and winter, there were no North Atlantic right whale vocalizations detected during this passive acoustic monitoring study (Charif et al., 2015).

Sighting rates within North Atlantic right whale calving habitat have shown a correlation with water temperature and depth. One study found sighting rates to be highest in waters with sea surface temperatures less than 22°C and water depths between 10–20 m (Good, 2008). Gowan and Ortega-Ortiz (2014) found that sea surface temperature and water depth are significant factors in predicting North Atlantic right whale abundance on calving grounds. Using temperature and depth as habitat predictors, calving could occur over continental shelf waters as far north as Cape Lookout, North Carolina (Good, 2008; Keller et al., 2012). Navy-sponsored monitoring conducted off Cape Hatteras, North Carolina in 2011 and in Onslow Bay, North Carolina in 2007 confirmed the winter occurrence of North Atlantic right whales in these areas (U.S. Department of the Navy, 2014). During surveys conducted off the coast of North Carolina in the winters of 2001 and 2002, researchers sighted eight calves, suggesting that the calving grounds may extend as far north as Cape Fear, North Carolina (Waring et al., 2016). The species has also been observed in winter around Cape Canaveral, Florida (Keller et al., 2006) and off South Carolina (McLellan et al., 2004).

LaBrecque et al. (2015a) used aerial sightings data and habitat analyses of sea surface temperatures and water depths to delineate the North Atlantic right whale calving area as extending from Cape Lookout, North Carolina to Cape Canaveral, Florida. The area encompasses waters from the shoreline to the 25-m isobath from mid-November through late April. Only a few sightings of calves have been reported outside of this area, such as a calf apparently born in the Gulf of Maine in the spring of 2007 (Patrician et al., 2009) and a newborn with its mother sighted off Plymouth Harbor, New England in January 2013 (LaBrecque et al., 2015a).

North Atlantic right whales undertake large seasonal migrations, with some of the population traveling to cold, productive waters during the spring and summer to feed, to warmer waters during the winter to calve, or to other unknown wintering areas (Kenney, 2008; Roberts et al., 2016; Whitt et al., 2013). LaBrecque et al. (2015a) identified a migratory corridor along the East Coast of the United States that is used by North Atlantic right whales during southward migrations to the calving grounds in November and December, and northward migrations to the feeding areas, the Bay of Fundy, and other unknown areas in March and April. The subset of the population that has been observed migrating between the northern feeding grounds and southern calving grounds includes reproductively mature and pregnant females, juveniles, and young calves (Federal Register 81 [17]: 4838-4874). North Atlantic right whales are believed to migrate along the continental shelf (Schick et al., 2009; Whitt et al., 2013); however, it is unknown if the whales use the whole shelf area, or just the nearshore waters (LaBrecque et al., 2015a). Analysis by (Schick et al., 2009) of a tagging survey suggest that the migratory corridor is broader than was initially estimated, and that suitable habitat exists beyond 20 NM from the coast, a distance that is presumed to represent the primary migratory pathway (National Marine Fisheries Service, 2008). NMFS has not defined critical habitat for North Atlantic right whale migration due to the lack of information on migratory routes and the lack of data that would be needed to identify essential physical and biological features (Federal Register 81 [17]: 4838-4874).

Recent passive acoustic monitoring studies have detected the presence of North Atlantic right whales along the mid-Atlantic coast throughout the year (Hodge et al., 2015; Oedekoven et al., 2015; Salisbury et al., 2015; Whitt et al., 2013). North Atlantic right whales were acoustically detected across all seasons along the coastal waters of North Carolina and Georgia in 2009. Seasonal occurrence peaked during fall off Georgia and during winter off North Carolina; however, a secondary peak occurrence was also recorded from June to July off Georgia, a season during which North Atlantic right whales were not previously believed to be in this region (Hodge et al., 2015). North Atlantic right whales were detected every month from June 2012 to June 2013 between the Virginia coast and the continental shelf. Whales were detected more in fall when they are thought to be migrating to the south; however, a high number of calls were also detected in late winter and early spring when whales are thought to be migrating to the northern feeding grounds (Salisbury et al., 2015). Additional monitoring is needed over a longer time span to better understand the seasonal occurrence of North Atlantic right whales in mid-Atlantic waters.

For additional information about North Atlantic right whale habitats and geographic range, see Section 3.7.2.2.2.2 (Habitat and Geographic Range).

5.4.3.2 Mitigation Area Assessment

The waters off the mid-Atlantic and southeastern United States encompass part of the primary water space in the AFTT Study Area where unit-level training, integrated training, and deployment certification exercises occur. The Navy also uses waters off the mid-Atlantic and southeastern United States for testing components of air warfare, mine warfare, surface warfare, anti-submarine warfare, electronic

warfare, vessels and vessel signatures, unmanned systems; and other areas, such as chemical and biological simulant testing. Within nearshore areas, the Navy conducts pierside sonar testing at Kings Bay, Georgia; Norfolk, Virginia; and Port Canaveral, Florida. The Navy developed the mitigation areas identified in Table 5.4-3 to provide further protection for marine mammals during training and testing activities in areas that the best available science suggests are important to multiple species of marine mammals for foraging, migrating, and reproduction either year-round or for part of the year (depending on the species). Implementing the mitigation within mitigation areas off the mid-Atlantic and southeastern United States would result in an avoidance or substantial reduction of impacts on marine mammal species (including North Atlantic right whales) in these areas.

The Navy will continue implementing seasonal mitigation within a previously-designated mitigation area off southern Georgia and Florida, and will extend those mitigations northward approximately 50 NM up the coast of northern Georgia from the shoreline out to 10–12 NM. This newly-expanded mitigation area is known as the Southeast North Atlantic Right Whale Mitigation Area. By minimizing or not conducting active sonar (depending on the source), and not conducting activities that involved the use of explosives or non-explosive practice munitions, the Navy will avoid impacts on North Atlantic right whales in their only known calving area during the calving season. The mitigation would consequently also help the Navy avoid impacts on other marine mammal species that are present in the mitigation area during the North Atlantic right whale calving season. The mitigation pertaining to vessels, including the continued participation in and sponsoring of the Early Warning System, will help Navy vessels avoid North Atlantic right whales during transits and training and testing activities. The Early Warning System is a comprehensive information exchange network dedicated to reducing the risk of vessel strikes to North Atlantic right whales off the southeast United States from all mariners (i.e., Navy and non-Navy vessels). Navy participants include the Fleet Area Control and Surveillance Facility, Jacksonville; Commander, Naval Submarine Forces, Norfolk, Virginia; and Naval Submarine Support Command. The Navy, U.S. Coast Guard, U.S. Army Corps of Engineers, and NMFS collaboratively sponsor daily aerial surveys from December 1 through March 31 (weather permitting) to observe for North Atlantic right whales from the shoreline out to approximately 30–35 NM offshore. Aerial surveyors relay sightings information to all mariners transiting within the North Atlantic right whale calving habitat (e.g., commercial vessels, recreational boaters, and Navy ships).

The Southeast North Atlantic Right Whale Mitigation Area encompasses a portion of the North Atlantic right whale migration and calving areas identified by LaBrecque et al. (2015a) and a portion of the North Atlantic right whale critical habitat, which was expanded by NMFS in 2016. As background, on 27 January 2016, NMFS issued a Final Rule (81 FR 4838) extending the North Atlantic right whale critical habitat northward and eastward from the prior designation. In the 2016 Final Rule, NMFS determined that the essential features for the expanded critical habitat area were water depth, water temperature, and sea surface roughness. Through the critical habitat expansion process, NMFS determined that current and future Navy mitigation areas should be correlated with the occurrence of North Atlantic right whales, and not with the critical habitat boundary or its essential features (due to implications for national security that would result from the Navy being required to expand its mitigation area to mirror the boundaries of the expanded critical habitat).

In reviewing the best available science and operational data to develop mitigation areas for the Proposed Action, the Navy identified an opportunity to expand the mitigation area for North Atlantic right whales off the southeastern United States in a way that would enhance protections for the species, while balancing the practicability of implementation. The best available density data for the Study Area

shows that the Navy's Southeast North Atlantic Right Whale Mitigation Area encompasses the areas of highest density in the region (Roberts et al., 2016; U.S. Department of the Navy, 2017b), with extremely low density values extending beyond the mitigation area. Although North Atlantic right whales have been sighted on rare occasions east of the mitigation area, these irregular sightings represent individual animals that were located outside of the higher use habitats that represent the primary occurrence of the population. Overall, most North Atlantic right whale sightings made during Navy and NMFS surveys have occurred in or very near the Southeast North Atlantic Right Whale Mitigation Area, which further indicates that the mitigation area may have the highest seasonal abundance of North Atlantic right whales in waters off the mid-Atlantic and southeastern United States. Further expansions of the mitigation area beyond what is outlined in Table 5.4-3 would likely not result in increased avoidance or substantial reduction of impacts on North Atlantic right whales in this area due to the already low potential for impacts outside of the mitigation area.

Mitigation within the Mid-Atlantic Planning Awareness Mitigation Areas is designed to help the Navy further avoid or reduce impacts from sonar on marine mammals that inhabit, feed in, reproduce in, or migrate through this region. Both of the Mid-Atlantic Planning Awareness Mitigation Areas overlap a portion of the North Atlantic right whale migration habitat identified by LaBrecque et al. (2015a), and one of the areas overlaps much of the Cape Hatteras Special Research Area. The Mid-Atlantic Planning Awareness Mitigation Areas are situated among highly productive environments (e.g., persistent oceanographic features associated with upwellings) and steep bathymetric contours in the Mid-Atlantic. They extend across large swaths of shelf break, and contain several underwater canyons that have been associated with high marine mammal diversity. For example, during recent passive acoustic monitoring surveys in Norfolk Canyon, Virginia, researchers detected vocalizations of blue, fin, minke, sei, sperm, beaked, Kogia, and humpback whales, as well as Risso's dolphins and unidentified delphinid species (Hodge et al., 2016). The Navy can restrict the number of major training exercises within the Mid-Atlantic Planning Awareness Mitigation Areas because the Navy is not tied to a specific range support structure in this area for major training exercises within the AFTT Study Area. The topography and bathymetry in this portion of the Study Area (a wide continental shelf leading to the shelf break) affords a wider range of opportunities to plan and execute major training exercises.

The Navy does not have the same flexibility to relocate, restrict, or limit all major training exercises or other training and testing activities beyond what is detailed in Table 5.4-3. The Navy conducts training and testing activities off the mid-Atlantic and southeastern United States because this region provides valuable access to air and sea space conditions that mimic real world conditions to ensure safety of personnel, skill proficiency, and validation of testing program requirements. For training, areas in this region where exercises are scheduled to occur are chosen to allow for the realistic tactical development of the myriad of training scenarios that Navy units are required to complete to be mission effective. Certain activities, such as deployment certification exercises using integrated warfare components, require large areas of the littorals and open ocean for realistic and safe training. Locations for other training activities are chosen due to the proximity of associated training ranges (e.g., Jacksonville Range Complex), available airspace (e.g., avoiding airspace conflicts with major airports such as Jacksonville International Airport), unobstructed sea space, aircraft emergency landing fields (e.g., Naval Air Station Jacksonville), and with consideration for public safety (e.g., avoiding areas popular for recreational boating). When scheduling activities, the Navy considers the need to minimize sea space and airspace conflicts within the mid-Atlantic and southeast region and throughout the entire Study Area. Events may change mid-activity based on evaluators' assessments of performance and other conditions (such as weather or mechanical issues), which may preclude the use of planning restrictions for major training

events and other activities as a mitigation measure. Daily fluctuations in training and testing schedules and objectives could mean that, on any given day, vessels may depend on discrete locations in waters off the northeastern United States for discrete purposes.

The Jacksonville Operating Area represents a critical training sea space that is necessary to prepare naval forces for combat. Training in this area, such as mine countermeasure training, is vital to ensure that Navy units are familiar with this region and will be able to operate and defend the U.S. mainland from adversaries. Additional mitigation, for example, expanding the Southeast Atlantic Right Whale Mitigation Area eastward to mirror the boundary of the expanded critical habitat, would require training to move farther out to sea, which would reduce a unit's training opportunities by taking time away from training to transit to a more distant training area. This would also result in training being conducted offshore in water conditions that do not accurately reflect the types of environments where real world activities would occur. Increased transit times would also result in additional fuel consumption and expenditures, which could serve as a limiting factor for Navy surface units, whose available underway times are constrained by fuel expenses. For surface-to-surface and air-to-surface small-, medium-, and large-caliber gunnery and missile and rocket activities, events must be conducted in proximity to the target storage and deployment location in Mayport, Florida. Targets used for these activities have limitations on how far offshore they can be safely employed and controlled. Shifting events farther offshore would preclude the Navy from safely employing and controlling the targets necessary to conduct these training and testing activities, which would significantly impact the Navy's ability to effectively complete the exercise, and would cause an increased safety risk to Navy personnel and equipment, as well as to civilians.

Due to their positioning within nearshore areas where the Navy conducts training activities, the Navy will not develop mitigation areas for several of the habitats considered in Section 5.4.3.1.1 (Bottlenose Dolphins) that were identified by LaBrecque et al. (2015a) as a biologically important areas for bottlenose dolphin small and resident populations. The Navy uses select coastal areas along the U.S. East Coast for inland training activities, such as Kings Bay, Georgia; Charleston Harbor, South Carolina; and St. John's River, Florida. These waters overlap the habitat extent of bottlenose dolphins within the Southern Georgia Estuarine System Population, Charleston Estuarine System Population, and Jacksonville Estuarine System Population, respectively. It is critical for national security that these activities occur in these areas as planned to provide training realism and access to the necessary environmental conditions. For example, Civilian Port Defense – Homeland Security Anti-Terrorism/Force Protection exercises (which may occur pierside in Kings Bay, Georgia), involve mine warfare to train maritime security personnel to protect civilian ports and harbors against enemy efforts to interfere with access to these ports. The locations and scenarios for this training activity are selected according to Department of Homeland Security strategic goals and evolving world events; therefore, implementing additional mitigation for this event would have implications for national security. Furthermore, because training activities are limited within these areas, and to a greater degree within the habitat extent of the Northern North Carolina Estuarine System and Southern North Carolina Estuarine System, implementing additional mitigation would not result in an avoidance or substantial reduction of impacts on bottlenose dolphins in these areas.

Areas where testing events are scheduled to occur are chosen to allow the Navy to test systems in a variety of bathymetric and environmental conditions to ensure functionality and accuracy in real world environments. Test locations are typically located near the support facilities of the systems commands, which provide critical safety, platform, and infrastructure support and technical expertise necessary to

conduct testing (e.g., proximity to air squadrons). Expanding the mitigation area beyond what is included in Table 5.4-3 would encroach upon the primary water space where these testing activities are scheduled to occur for the same reasons provided above for training. One example of an important bathymetric feature that provides testing realism and access to necessary environmental or oceanographic conditions in this region is Blake Plateau, which starts at the Continental shelf slope and extends eastward. Other pierside, nearshore, and offshore waters provide critical environments for a multitude of testing activities in this region.

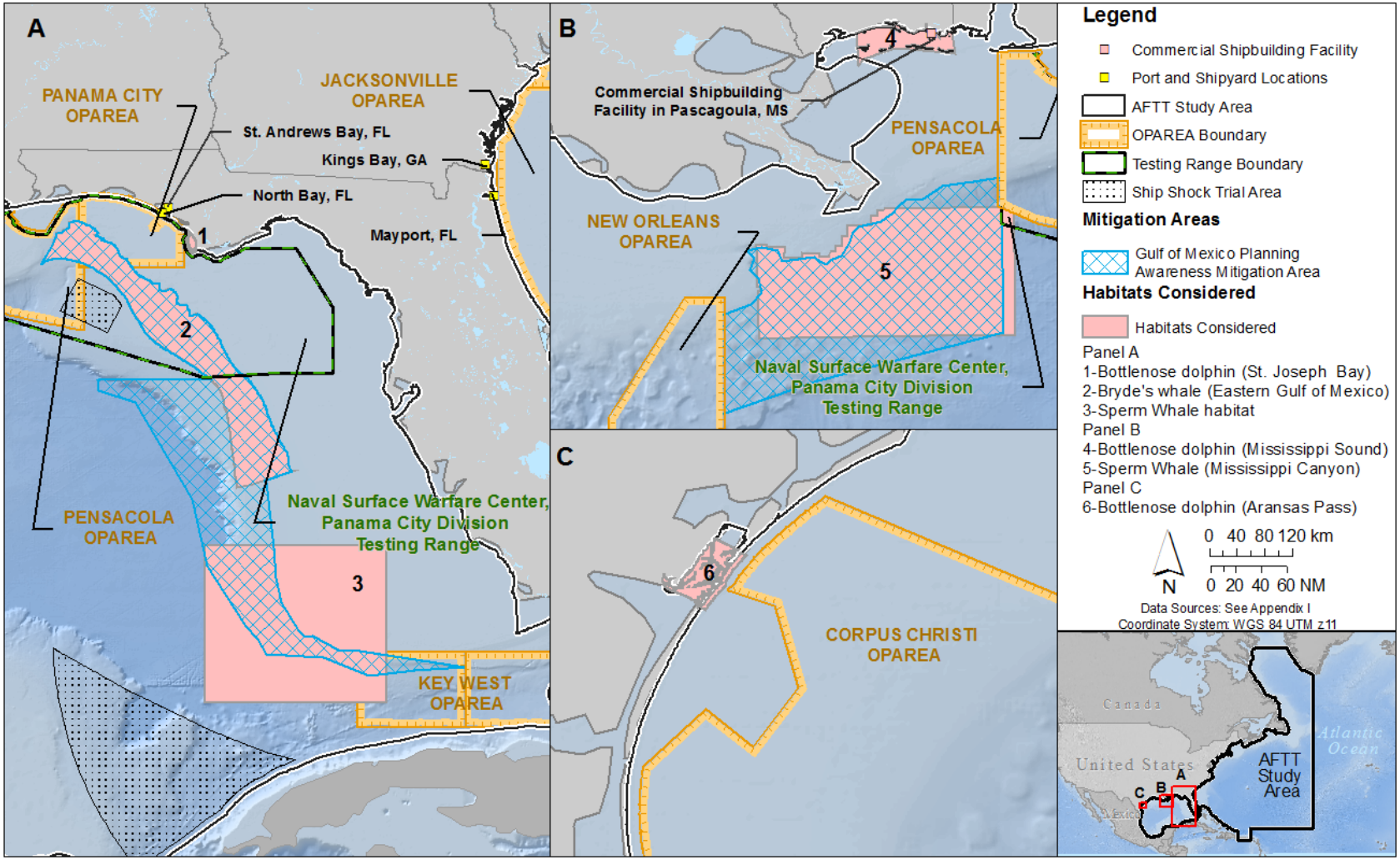
In summary, further restrictions on the level, number, or timing (seasonal or time of day) of training or testing activities would have a significant impact on the ability for units to meet their individual training and certification requirements; on the ability to certify strike groups to deploy to meet national security tasking; on the ability to meet testing program requirements and required acquisition milestones; on operational costs due to increased fuel, maintenance, and time required to complete activities; on the safety risk associated with extending distance offshore and accelerated fatigue-life of aircraft; on training and testing realism due to reduced access to necessary environmental or oceanographic conditions; and on the ability for Navy Sailors to train and become proficient in using the sensors and weapons systems as would be required in a real world combat situation. Therefore, implementing additional mitigation beyond what is described in Table 5.4-2 for mitigation areas off the mid-Atlantic and southeastern United States would be impracticable due to implications for safety, sustainability, and the Navy's ability to continue meeting its Title 10 requirements to successfully accomplish military readiness objectives.

5.4.4 Mitigation Areas in the Gulf of Mexico

As described in Table 5.4-4 and shown in Figure 5.4-6, the Navy will implement additional mitigation to further avoid or reduce impacts on marine mammals from active sonar used under the Proposed Action in the Gulf of Mexico. The mitigation is a continuation from Phase II.

Table 5.4-4: Mitigation Areas in the Gulf of Mexico

Mitigation Area Description
Resource Protection Focus • Marine mammals
Stressor or Activity • Sonar
Mitigation Area Requirements • **Gulf of Mexico Planning Awareness Mitigation Areas (year-round):** – The Navy will avoid planning major training exercises (Composite Training Unit Exercises or Fleet Exercises/Sustainment Exercises) to the maximum extent practicable. – The Navy will not conduct more than one major training exercise per year (all or a portion of the exercise) in each Gulf of Mexico Planning Awareness Mitigation Area under Alternative 2; or any under Alternative 1. – If the Navy needs to conduct additional major training exercises for national security, it will provide NMFS with advance notification and include the information in associated training activity or monitoring reports.



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

Figure 5.4-6: Mitigation Areas and Habitats Considered in the Gulf of Mexico

5.4.4.1 Resource Description

When developing mitigation areas in the Gulf of Mexico, the Navy considered habitats for numerous marine mammal species, including areas that have been identified by LaBrecque et al. (2015b) as biologically important areas. The considered areas are listed below, described in the following sections, and shown in Figure 5.4-6.

- Bryde's whale small and resident population in the Gulf of Mexico (year-round)
- Sperm whale habitat in Mississippi Canyon (year-round)
- Sperm whale habitat west of Key West and the Dry Tortugas (year-round)
- Bottlenose dolphin Aransas Pass small and resident area (year-round)
- Bottlenose dolphin Mississippi Sound small and resident area (year-round)
- Bottlenose dolphin St. Joseph Bay small and resident area (year-round)

5.4.4.1.1 Bottlenose Dolphins

Three areas in the AFTT Study Area have been identified by LaBrecque et al. (2015b) as biologically important areas for small and resident populations of bottlenose dolphins in the Gulf of Mexico: (1) Aransas Pass, (2) Mississippi Sound, and (3) St. Joseph Bay. The areas were recognized through various methods, including photo-identification, vessel surveys, satellite tagging, and genetic analyses, which have identified the populations as individual stocks that use the coastal waters as reproductive, migration, and feeding areas (LaBrecque et al., 2015b). The bottlenose dolphin coastal morphotype is continuously distributed along the U.S. East Coast south of Long Island, New York; around the Florida peninsula; and along the Gulf of Mexico coast. Although the structure of the individually recognized stocks is somewhat uncertain, it appears to be complex. Not every portion of the coast appears to be a significantly important marine mammal habitat; however, scientific evidence suggests that important breeding grounds, migration habitat, and foraging grounds for the individually recognized bottlenose dolphin coastal morphotypes are scattered throughout coastal waters. In the Gulf of Mexico, the Aransas Pass area displays a low level of site fidelity year-round with the most recent study reporting that 35 of 782 individually identified animals were re-sighted over 3 years (1991–1994)(Weller, 1998). In the Gulf of Mexico, the Mississippi Sound area contains animals that display greater site fidelity, with the most recent study reporting that up to 71 individuals display year-round residency and up to 109 animals displayed seasonal fidelity (Mackey, 2010). The St. Joseph Bay area also contains a small portion of St. Andrew's Bay, with potential mixing of animals between the two areas (LaBrecque et al., 2015b); however, only St. Joseph Bay is located within the Study Area. Within St. Josephs Bay, a resident population of between 78 and 152 animals was identified (Balmer et al., 2008). Animals from the St. Joseph Bay population are known to move into the mouth of St. Andrew's Bay and into the nearshore areas (LaBrecque et al., 2015b). Due to ongoing photo-identification studies (including Navy-funded monitoring efforts), the full habitat extent of several of these small and resident populations is subject to change as new information becomes available (LaBrecque et al., 2015a, 2015b).

For additional information about bottlenose dolphin habitats and geographic range, see Section 3.7.2.3.10.2 (Habitat and Geographic Range).

5.4.4.1.2 Bryde's Whales

One area in the AFTT Study Area was identified by LaBrecque et al. (2015b) as a biologically important area for a small and resident population of Bryde's whales in the Gulf of Mexico. The area was identified through vessel and aerial surveys, passive acoustic monitoring, and genetic analyses (LaBrecque et al.,

2015b). A recent genetic analysis suggests that the population found in this area is genetically distinct from other Bryde's whales (Rosel & Wilcox, 2014).

Bryde's whales are thought to be the most common baleen whale in the Gulf of Mexico (Würsig et al., 2000). They are the only baleen whale known to occur year-round in this region (Jefferson & Schiro, 1997). Bryde's whales have been observed exclusively within the northeastern Gulf of Mexico and there is evidence to suggest that this area is more important for this species than any other area within the Gulf of Mexico. Most of the sighting records of Bryde's whales in the northern Gulf of Mexico are from NMFS abundance surveys (Waring et al., 2016), which have been conducted during spring and summer months over several years (Davis et al., 2000; Davis & Fargion, 1996; Hansen et al., 1996; Hansen et al., 1995; Jefferson & Schiro, 1997; Maze-Foley & Mullin, 2006; Mullin & Fulling, 2004; Mullin & Hoggard, 2000). During surveys conducted throughout the oceanic waters of the U.S. Gulf of Mexico, Bryde's whales have been observed between the 100-m and 300-m isobaths in the northeastern Gulf of Mexico. The most recent NMFS Gulf of Mexico abundance survey took place during summer 2009. Three Bryde's whale sightings were recorded seaward of the 100-m depth contour (Waring et al., 2016). More recent surveys in the Gulf of Mexico have been conducted by the Atlantic Marine Assessment Program for Protected Species. During a 2011 survey in the northeastern Gulf of Mexico, three Bryde's whale sightings were reported along the 200-m depth contour (National Marine Fisheries Service, 2011).

Passive acoustic recorders deployed in DeSoto Canyon over 53 days recorded 680 calls attributed to Bryde's whales (Sirovic et al., 2014). Calls were consistently recorded between March and July, and in October and January. It was also noted that there was a lack of calls during November and December. During those times when calls were detected, there was a peak in late June with a relatively high number of calls also recorded in later March, early April, and early January (Sirovic et al., 2014). In addition to sightings and acoustic data, there are stranding records in the Gulf of Mexico from throughout the year (Würsig et al., 2000). Further studies are required to understand how Bryde's whales use the northeastern Gulf of Mexico for biological life processes, such as reproduction and feeding.

For additional information about Bryde's whale habitats and geographic range, see Section 3.7.2.3.3.2 (Habitat and Geographic Range).

5.4.4.1.3 Sperm Whales

Two areas in the AFTT Study Area have been suggested as potentially important areas for sperm whales in the Gulf of Mexico: Mississippi Canyon and an area west of Dry Tortugas, Florida. Animals within the Northern Gulf of Mexico Stock have been determined to be genetically distinct from other sperm whale stocks (Jochens et al., 2008; Waring et al., 2016).

Aerial and line transect surveys in the northern Gulf of Mexico indicate that numerous marine mammal species, including sperm whales, are widely distributed throughout the northern Gulf of Mexico year-round. Most sperm whale sightings in the Gulf of Mexico have occurred in waters greater than 200 m, over the upper continental slope, and out to deeper waters (more than 2,000 m)(Baumgartner et al., 2001; Davis et al., 2000; Mullin et al., 1994a; Waring et al., 2016). Researchers have identified the Mississippi Canyon and the Mississippi River Delta as an area where sperm whales are sighted consistently throughout the year (Baumgartner et al., 2001; Davis et al., 1998; Maze-Foley & Mullin, 2006; Mullin & Fulling, 2004; Mullin et al., 1994b; Ruiz-Cooley & Engelhaupt, 2010; Weller et al., 2000). The Mississippi Canyon region is noted as being important sperm whale habitat (Davis et al., 1998; Weller et al., 2000). A summer 2009 NMFS vessel survey in the northern Gulf of Mexico reported 39

sperm whale sightings, of which at least 2 were within the Mississippi Canyon area (National Marine Fisheries Service, 2009b). It is thought that the Mississippi River plume and its associated high primary productivity may be the reason that sperm whales aggregate in the area, and may be an important feeding habitat during years when biological productivity is high (Jochens et al., 2008; Mullin et al., 2004; Weller et al., 2000). Prey species and their relation to sperm whale distribution patterns have not yet been identified for this area (Jochens et al., 2008). However, researchers have found a correlation between the influx of nutrients from the Mississippi River, water flow patterns, and the distribution and abundance of sperm whales (Biggs et al., 2005; Jochens et al., 2008). Photo-identification, while limited, also suggests that sperm whales in the northern Gulf of Mexico may exhibit differing levels of site fidelity within this region on an annual basis (Jochens et al., 2008; Weller et al., 2000).

Researchers have identified a second potential sperm whale aggregation location as the southeastern region of the northern Gulf of Mexico, an area west of the Dry Tortugas (Maze-Foley & Mullin, 2006; Mullin & Fulling, 2004; Mullin et al., 2004). Surveys conducted by NMFS Southeast Fisheries Science Center and the Bureau of Ocean Energy Management in the southeastern portion of the Gulf between June and August of 2012 resulted in observations of 29 sperm whales, all in water deeper than 1,000 m and within the area west of the Dry Tortugas (National Marine Fisheries Service, 2013). This area is thought to have high levels of primary productivity that is influenced by the Loop Current and other dynamic water flow patterns, such as the Tortugas Gyre (Mullin & Fulling, 2004). Sperm whales have been observed in multiple seasons within the area, particularly in locations with steep bathymetry (National Marine Fisheries Service, 2013). Further studies are required to understand how sperm whales use these areas in the Gulf of Mexico for biological life processes, such as reproduction and feeding.

For additional information about sperm whale habitats and geographic range, see Section 3.7.2.2.6.2 (Habitat and Geographic Range).

5.4.4.2 Mitigation Area Assessment

The Gulf of Mexico encompasses part of the primary water space in the AFTT Study Area where unit-level training, integrated training, and deployment certification exercises occur (as well as supporting composite training unit exercises under Alternative 2). The Navy also uses the Gulf of Mexico for testing components of air warfare, mine warfare, surface warfare, anti-submarine warfare, electronic warfare, vessels and vessel signatures, unmanned systems; and other areas including submersibles, line charges, and semi-stationary equipment testing. The Navy developed the mitigation areas identified in Table 5.4-4 to provide further protection for marine mammals during training activities in areas that the best available science suggests are important to small and resident populations of Bryde's whales and sperm whales. Implementing the mitigation within the Gulf of Mexico Planning Awareness Mitigation Areas would result in an avoidance or substantial reduction of impacts from active sonar on these species in these areas. The Gulf of Mexico Planning Awareness Mitigation Areas fully encompass the Bryde's whale small and resident population habitat area identified by LaBrecque et al. (2015b), and overlap most of the Mississippi Canyon sperm whale habitat area and a portion of sperm whale habitat area west of the Dry Tortugas discussed in Section 5.4.4.1.3 (Sperm Whales). The Gulf of Mexico Planning Awareness Mitigation Areas are situated among highly productive environments (e.g., persistent oceanographic features associated with upwellings) and steep bathymetric contours. They extend across large swaths of shelf break, and contain underwater canyons (such as the Mississippi Canyon and DeSoto Canyon) that have been associated with marine mammal abundance. The Navy can restrict the number of major training exercises within the Gulf of Mexico Planning Awareness Mitigation Areas because the Navy is not tied to a specific range support structure in this area for major training exercises within the AFTT

Study Area. The topography and bathymetry in this portion of the Study Area (a wide continental shelf leading to the shelf break) affords a wider range of opportunities to plan and execute major training exercises.

The Navy does not have the same flexibility to relocate, restrict, or limit major training exercises or other training and testing activities beyond what is detailed in Table 5.4-4. The Navy conducts training and testing activities in the Gulf of Mexico because this region provides valuable access to air and sea space conditions that mimic real world conditions to ensure safety of personnel, skill proficiency, and validation of testing program requirements. For training, areas in this region where exercises are scheduled to occur are chosen to allow for the realistic tactical development of the myriad of training scenarios Navy units are required to complete to be mission effective. Certain activities, such as deployment certification exercises using integrated warfare components, require large areas of the littorals and open ocean for realistic and safe training. Locations for other training activities are chosen due to the proximity of associated training ranges (e.g., Pensacola Operating Area), available airspace (e.g., avoiding airspace conflicts with major airports, such as Key West International Airport), unobstructed sea space (e.g., throughout the New Orleans Operating Area), aircraft emergency landing fields (e.g., Naval Air Station Corpus Christi), and with consideration of public safety (e.g., avoiding areas popular for recreational boating). Areas where testing events are scheduled to occur are chosen to allow the Navy to test systems in a variety of bathymetric and environmental conditions to ensure functionality and accuracy in real world environments. Test locations are typically located near the support facilities of the systems commands, which provide critical safety, platforms, infrastructure support and technical expertise necessary to conduct testing (e.g., proximity to air squadrons). For example, the Navy has designated the Key West Operating Area as a back-up location for sonobuoy lot acceptance testing when the primary area of San Clemente Island, California is not available. The Key West Operating Area is particularly valuable due to the favorable weather conditions (e.g., low sea state) that are typical of the area. The Navy anticipates the following impacts on testing if activities in this area were restricted or limited: increased operational costs due to fuel, maintenance, and time required to complete test events; safety risk associated with extending distance offshore and accelerated fatigue-life of aircraft; and reduced realistic testing scenarios. Expanding the mitigation area beyond what is included in Table 5.4-4 would encroach upon the primary water space where testing activities are scheduled to occur.

When scheduling activities, the Navy considers the need to minimize sea space and airspace conflicts within the Gulf of Mexico and throughout the entire Study Area. Events may change mid-activity based on evaluators' assessments of performance and other conditions (such as weather or mechanical issues), which may preclude the use of planning restrictions for major training events and other activities as a mitigation measure. Daily fluctuations in training and testing schedules and objectives could mean that, on any given day, vessels may depend on discrete locations in waters of the Gulf of Mexico for discrete purposes.

Due to their positioning within nearshore areas where the Navy conducts critical training and testing activities, the Navy will not develop mitigation areas for several of the habitats considered in Section 5.4.4.1.1 (Bottlenose Dolphins) that were identified by LaBrecque et al. (2015b) as biologically important areas for bottlenose dolphin small and resident populations. The Navy uses select coastal areas throughout the Gulf of Mexico for inland training and testing activities. These waters overlap the habitat extent of bottlenose dolphins within the Aransas Pass, Mississippi Sound, and St. Joseph Bay small and resident populations. It is critical for national security that these activities occur in these areas as

planned to provide realism and access to the necessary environmental conditions. For example, the Navy conducts pierside sonar testing and propulsion testing during sea trials near Pascagoula, Mississippi in a location that overlaps with the Mississippi Sound bottlenose dolphin small and resident population. For another example, Civilian Port Defense – Homeland Security Anti-Terrorism/Force Protection exercises (which may occur pierside in Corpus Christi, Texas), involve mine warfare to train maritime security personnel to protect civilian ports and harbors against enemy efforts to interfere with access to these ports. The locations and scenarios for this training activity are selected according to Department of Homeland Security strategic goals and evolving world events; therefore, implementing additional mitigation for this event would have implications for national security. Furthermore, because training and testing activities are limited within these areas, implementing additional mitigation would not result in an avoidance or substantial reduction of impacts of bottlenose dolphins in these areas.

In summary, further restrictions on the level, number, or timing (seasonal or time of day) of training or testing activities would have a significant impact on the ability for units to meet their individual training and certification requirements; on the ability to certify strike groups to deploy to meet national security tasking; on the ability to meet testing program requirements and required acquisition milestones; on operational costs due to increased fuel, maintenance, and time required to complete activities; on the safety risk associated with extending distance offshore and accelerated fatigue-life of aircraft; on training and testing realism due to reduced access to necessary environmental or oceanographic conditions; and on the ability for Navy Sailors to train and become proficient in using the sensors and weapons systems as would be required in a real world combat situation. Therefore, implementing additional mitigation beyond what is described in Table 5.4-4 for mitigation areas in the Gulf of Mexico would be impracticable due to implications for safety, sustainability, and the Navy's ability to continue meeting its Title 10 requirements to successfully accomplish military readiness objectives.

5.5 Measures Considered but Eliminated

During the mitigation development process, the Navy considered several measures that did not meet the appropriate balance between being effective and practicable to implement. This section provides information on those measures and why the Navy will not implement them.

5.5.1 Measures Pertaining to Acoustic and Explosive Stressors

As described in Chapter 1 (Purpose and Need), the Proposed Action was developed in accordance with training and testing mission and program requirements. The fulfillment of these requirements ensures that the Navy meets its mission to maintain, train, and equip combat-ready naval forces capable of winning wars, deterring aggression, and maintaining freedom of the seas. As described in Section 1.4.1 (Why the Navy Trains), military readiness training must be as realistic as possible to provide the experiences vital to success and survival during military operations. Training requirements have been developed through many years of iteration and adaptation, and are designed to ensure that Sailors achieve the levels of readiness needed to properly respond to the multitude of contingencies they may face during real world combat. As described in Section 1.4.3 (Why the Navy Tests), the requirements to test are designed to support the full lifecycle of product and service delivery from the initial research and development, to acquisition and deployment, to operations and logistics support, including maintenance, repair, and modernization of Navy platforms, weapon systems, and components. The testing community must test and evaluate the platform, system, or upgrade to validate whether it performs as expected and to determine whether it is operationally effective, suitable, survivable, and safe for its intended use by the fleet.

The Navy has received public comments asking for additional procedural mitigation that pertains to modifying how, how much, and when the Navy uses active sonar and explosives during training and testing activities. Discussion of those measures are presented in the sections below.

5.5.1.1 Reducing Training and Testing with Active Sonar, Modifying Sonar Sound Sources, and Time-of-Day Restrictions

As discussed in Chapter 2 (Description of Proposed Action and Alternatives), the Navy assessed future sonar and explosive training needs based on numerous factors and data inputs, such as compliance with the Optimized Fleet Response Plan. The Navy developed the action alternatives for this Draft EIS/OEIS to allow comparison of two levels of sonar use that would meet the purpose and need. To provide a range of analyses of the Navy's requirements, under Alternative 1 the Navy would request authorization for incidental takes of marine mammals under the MMPA for fewer hours of mid-frequency active sonar compared to Alternative 2.

Training with active sonar is essential to national security because active sonar is the only reliable technology for detecting and tracking enemy diesel-electric submarines. Sonar equipment power levels are set consistent with mission requirements of training under the Proposed Action. Modifying sonar signals, reducing sonar source levels, and reducing training or testing (restrictions on the number of hours or use during a certain time of day) with mid-frequency active sonar as additional mitigation beyond what the Navy will implement as described in Section 5.3 (Procedural Mitigation to be Implemented) and Section 5.4 (Mitigation Areas to be Implemented) would not allow the Navy to achieve satisfactory levels of readiness needed to meet the purpose and need.

The Navy uses active sonar only when it is essential to a training mission or testing program requirement since active sonar has the potential to alert opposing forces to the operating platform's presence. Passive sonar and other available sensors are used in concert with active sonar to the maximum extent practicable. The ability to operate mid-frequency active sonar is a highly perishable skill that must be repeatedly practiced under realistic conditions. During training exercises, sonar operators learn how to avoid interference and sound-reducing clutter from varying ocean floor topographies and environmental conditions, learn how to coordinate their efforts with other sonar operators in a strike group, develop skill proficiency in detecting and tracking submarines, and practice the focused endurance vital to effectively working as a team in shifts around the clock until the conclusion of a training exercise.

Anti-submarine warfare training involving the use of mid-frequency active sonar typically involves the periodic use of active sonar to develop the "tactical picture," or an understanding of the battle space (e.g., area searched or unsearched, identifying false contacts, and understanding the water conditions). Developing the tactical picture can take several hours, days, or weeks, and typically occurs over vast waters with varying environmental and oceanographic conditions. Operators of sonar equipment are always cognizant of the environmental variables affecting sound propagation. Training during both good visibility (e.g., daylight, favorable weather conditions) and low visibility (e.g., nighttime, inclement weather conditions) is vital because environmental differences between day and night and varying weather conditions affect sound propagation and the detection capabilities of sonar. Temperature layers that move up and down in the water column and ambient noise levels can vary significantly between night and day, which affects sound propagation and could affect how sonar systems are operated. Reducing or securing power in low-visibility conditions as a mitigation would affect a commander's ability to develop the tactical picture and would prevent sonar operators from training in realistic conditions. During integrated training, multiple vessels and aircraft may participate in an exercise using different dimensions of warfare simultaneously. If one of these training elements were

impacted (e.g., if effective sonar training were not possible), the training value of the other elements would also be degraded.

The Navy must also test its active sonar systems in the same manner and in the same conditions under which they will be operated during military readiness training exercises and real world combat situations. Some systems have a nighttime testing requirement; therefore, these tests cannot occur only in daylight hours or wait for the weather to become clear before or during a test event. Reducing or securing power in low visibility conditions would decrease the Navy's ability to determine whether systems are operationally effective, suitable, survivable, and safe for their intended use by the fleet.

For additional information on the Navy's need to train and test in a variety of locations and oceanographic conditions, see Section 5.5.3 (Measures Pertaining to Oceanographic Features or Geographic Locations).

5.5.1.2 Replacing Active Sonar Training with Computer Simulated Activities

The Navy has received requests to replace active sonar training with computer simulated activities. The Navy currently uses computer simulation to augment training and testing whenever possible. Computer simulation can provide familiarity and complement live training; however, it cannot provide the fidelity and level of training necessary to prepare naval forces for deployment. Furthermore, simulation cannot replicate all the possible environmental scenarios found in the real world and therefore cannot completely replace training and testing with active sonar. The Navy is required to operationally test major platforms, systems, and components of these platforms and systems in realistic combat conditions before full-scale production or delivery to the fleet can occur. In testing a system that is being developed, simulation can be used during the initial stages of development, but ultimately the system must be tested under real world conditions. Systems that have undergone maintenance need to be tested (not simulated) to ensure that the system is operating correctly. Replacing active sonar training and testing with computer simulated activities beyond the Navy's current use of simulation fails to meet the purpose and need. Therefore, the Navy will continue to use simulation to augment training and testing whenever possible, but will not replace training or testing with active sonar for computer simulated activities as a mitigation.

5.5.1.3 Restricting the Use of Explosives

The locations and timing of the training and testing activities that use explosives vary throughout the Study Area based on range scheduling, mission requirements, testing program requirements, and the safety and mission considerations outlined in Section 2.3.3 (Standard Operating Procedures), and information provided in Appendix A (Navy Activity Descriptions). Training and testing activities that use explosives must mimic real world conditions (including periods of low visibility for certain activities) to ensure safety of personnel, skill proficiency, and validation of testing program requirements.

Training activities that involve explosive ordinance are inherently different from those that involve non-explosive practice munitions. For example, during a Bombing Exercise Air-to-Surface using non-explosive practice munitions, aircrews learn valuable skills to locate and accurately deliver munitions on a target. A critical component of a Bombing Exercise Air-to-Surface that uses explosives cannot be taught with non-explosive practice munitions, which is the assembly, loading, delivery, and assessment of the explosive bomb. The explosive bombing training exercise starts with ground personnel, who must practice the building and loading of explosive munitions. Training includes the safe handling of explosive material, configuring munitions to precise specifications, and the loading of munitions onto aircraft. Aircrew must then identify a target and safely deliver fused munitions, discerning if the bomb was

assembled correctly, and determining bomb damage assessments based on how and where the explosive detonated. Restricting the use of explosives as a mitigation during training would impede the ability for personnel to develop critical skill proficiency and would result in significant safety risks.

Testing of explosive ordnance is necessary to quantify the compatibility of weapons with the platform from which they would be launched or released. Such testing requires the use of the actual explosive ordnance that would be used during training exercises and real world combat situations. Restricting the use of explosives as a mitigation during testing would impede the ability to determine whether weapons systems are operationally effective, suitable, survivable, and safe for their intended use by the fleet.

5.5.2 Measures Pertaining to Procedural Mitigation

The Navy has received public comments asking for additional procedural mitigation relating to ramp-up procedures, vessel speed restrictions, the use of additional Lookouts, more expansive mitigation zones, adopting foreign navy mitigation, and increasing reporting requirements. Discussion of those measures are presented in the sections below.

5.5.2.1 Implementing Active Sonar Ramp-Up Procedures

The Navy has received requests to use ramp-up as a mitigation for active sonar training and testing activities in the Study Area. Ramp-up is used during seismic surveys and some foreign navy sonar activities. Ramping up involves slowly increasing sound levels over a certain length of time until the optimal source level is reached. The intent of ramping up a sound source is to alert marine mammals with a low sound level to deter them from the area and avoid higher levels of sound exposure. As discussed in Von Benda-Beckmann et al. (2014) and Dunlop et al. (2016), implementing ramp-up as a mitigation may be effective for some activities in some situations; however the best available science does not suggest that ramp-up would be an effective mitigation tool for U.S. Navy active sonar training and testing activities. Von Benda-Beckmann et al. (2014) found that the main factors limiting ramp-up effectiveness for a typical anti-submarine warfare activity are a high source level, a moving sonar source, and long silences between consecutive sonar transmissions. Based on the source levels, vessel speeds, and sonar transmission intervals that will be used during typical active sonar training activities under the Proposed Action, the Navy has determined that ramp-up would be an ineffective mitigation during training activities. Furthermore, the use of ramp-up is not representative of real world situations and would significantly impact training realism and effectiveness. For example, during an anti-submarine warfare exercise using active sonar, ramp-ups have the potential to alert opponents (e.g., target submarines) to the transmitting vessel's presence. This would defeat the purpose of the training by allowing the target submarine to detect the searching unit and take evasive measures, thereby denying the sonar operator the opportunity to learn how to locate the submarine. The Navy will not implement ramp-up during training activities because training with reduced realism would alter Sailors' abilities to effectively operate in a real world combat situation and a diminished ability for sonar operators to gain skill proficiency and achieve mission success; thereby resulting in an increased risk to personnel safety.

The Navy will also not implement ramp-up during testing activities because doing so would impede the Navy's ability to collect essential data for evaluation of a system's capabilities. Program requirements determine test parameters to accurately determine whether a system is meeting its operational and performance requirements.

5.5.2.2 Restricting Vessel Speed

The Navy has received requests to restrict the speed of vessels participating in training and testing activities as a mitigation to help reduce the potential for striking marine mammals. As described in Section 2.3.3 (Standard Operating Procedures), as a standard operating procedure, Navy vessels operate in accordance with the navigation rules established by the U.S. Coast Guard. All vessels operating on the water are required to follow the International Navigation Rules (COMDTINST M16672.2D). Navigation rules are formalized in the Convention on the International Regulations for Preventing Collisions at Sea, 1972. Applicable navigation requirements include, but are not limited to, Rule 5 (Lookouts) and Rule 6 (Safe Speed). These rules require that vessels proceed at a safe speed so that proper and effective action can be taken to avoid collision and be stopped within a distance appropriate to the prevailing circumstances and conditions. As discussed in Section 3.0.3.3.4.1 (Vessels and In-Water Devices), Navy ships transit at speeds that are optimal for fuel conservation or to meet operational requirements. Large Navy ships typically operate at average speeds of between 10 and 15 knots, which for reference, is slower than large commercial vessels, such as container ships that steam at approximately 24 knots during normal operations (Maloni et al., 2013).

The Navy will continue implementing mitigation to avoid interactions with marine mammals during activities that involve vessel movements (see Section 5.3.4.1, Vessel Movement and Section 5.4, Mitigation Areas to be Implemented). Based on the historical Navy vessel strike data presented in Appendix F (Military Expended Materials and Direct Strike Calculations) and the analysis on vessel strikes presented in Section 3.7.3.4.1 (Impacts from Vessels and In-Water Devices), with the implementation of mitigation, the likelihood of a Navy vessel striking a marine mammal is extremely low. The Navy will not implement mitigation that restricts vessel speed beyond what is described in Section 5.4 (Mitigation Areas to be Implemented) because Navy vessel operators need to learn to operate vessels as they would in real world combat situations (including being able to react to changing tactical situations and evaluate system capabilities). For some activities, vessels must maintain a certain speed to carry out the activity safely. For example, during flight operations, an aircraft carrier must maintain a certain wind speed over the deck to launch or recover aircraft. Depending on wind conditions, the aircraft carrier itself must travel at a certain speed to generate the wind required to launch or recover aircraft. Vessel speed restrictions would prevent vessel operators from gaining skill proficiency, would prevent the Navy from properly testing vessel capabilities (e.g., full power propulsion testing during sea trials), and could significantly increase the time and fuel it takes to reach training and testing locations; therefore, the mitigation would have significant impacts on the Navy's ability to train and test, and would prevent the Navy from meeting its mission requirements.

5.5.2.3 Increasing Passive Acoustic Monitoring and Visual Observations

The Navy has received requests to increase the use of passive acoustic monitoring devices, use thermal detection devices for visual monitoring, increase the number of Lookouts used, and use third party observers during training and testing. For mitigation during an activity that is not part of the Proposed Action (Surveillance Towed Array Sensor System low-frequency active sonar), the Navy uses the towed passive acoustic array already participating in the activity in combination with a specially designed adjunct high-frequency marine mammal monitoring sonar (known as "HF/M3") that operates like a fish finder used by commercial and recreational fishermen. The Navy is not able to use the HF/M3 adjunct system during training and testing activities that will occur under the Proposed Action because the system cannot be installed on tactical sonar ships due to limitations in space, manning, and the resources needed to design, build, install, and maintain them. Although the Navy will not install adjunct

marine mammal monitoring devices for mitigation during training and testing under the Proposed Action, the Navy will continue to monitor for marine mammals with Navy assets that have passive acoustic monitoring capabilities and are already participating in the activity, when applicable (see Section 5.3, Procedural Mitigation to be Implemented).

The Navy is continuing to improve its capabilities to use range instrumentation to aid in the passive acoustic detection of marine mammals. For example, at the Southern California Offshore Range (SCORE) off California, the Pacific Missile Range Facility (PMRF) off Kauai, Hawaii, and the Atlantic Undersea Test and Evaluation Center (AUTEC) in the Bahamas, the Navy has capabilities to monitor instrumented ranges in real-time or through data recorded by hydrophones, which is helping to facilitate a better understanding of the species that are present in these areas. The Navy has sponsored numerous studies on marine mammal occurrence, distribution, and behavior at its instrumented ranges through the marine species monitoring program. For information on the marine species monitoring program, see Section 3.0.1.1 (Marine Species Monitoring and Research Programs) and Section 5.1.1.1 (Marine Species Research and Monitoring Programs). At this time within the Study Area, the Navy does not have the capability or resources to monitor instrumented ranges real-time for the purpose of mitigation, or to construct additional instrumented ranges as a tool to aid in the implementation of mitigation.

The Navy has been investigating the use of thermal detection systems with automatic marine mammal detection algorithms for future use, including for autonomous platforms. Thermal detection system technology is designed to allow observers to detect the difference in temperature between a surfaced marine mammal (i.e., the body or blow of a whale) and the environment (i.e., the water and air). Thermal detection systems are more useful in some environments than others (e.g., cold environments that would have a large temperature differential between an animal's temperature and the environment), and for some species than others (e.g., detection of blows may be easier than detection of a body, particularly at a distance). Although they may be reliable in many applications and environments, the current technologies have limitations regarding water temperature and other environmental conditions, such as rain and fog, for which further effectiveness studies are required (Zitterbart et al., 2013). At this time, the Navy will not use thermal detection systems to assist with the implementation of mitigation because they have not been sufficiently studied both in terms of their effectiveness within the environmental conditions found in the Study Area and their compatibility with Navy training and testing. The Navy plans to continue researching thermal detection technology to determine their effectiveness and compatibility with Navy applications.

For mitigation involving the use of Lookouts, the Navy's procedural mitigation presented in Section 5.3 (Procedural Mitigation to be Implemented) represents the maximum practicable level of resources that the Navy can commit to observing mitigation zones. The number of Lookouts designated for each activity is dependent upon the number of personnel that will be involved in the training or testing activity (manning restrictions) and the number and type of assets available (resource and space restrictions). Platforms such as the Littoral Combat Ship are minimally manned and are therefore physically unable to accommodate more than one Lookout or divert personnel from duties associated with safe and secure operation of propulsion, weapons, and damage control systems that ensure the safety of the ship's crew. Training and testing activities are carefully planned with respect to personnel duties. The Navy will not designate additional Lookouts during training and testing because doing so would either require adding personnel, for which there would be no additional space, or reassigning duties, which would divert Navy personnel from essential tasks required to meet mission objectives or testing program requirements.

Except for ship shock trials, the Navy will not maintain third-party observers as a mitigation during training and testing activities. Training and testing activities often occur simultaneously and in various regions throughout the Study Area, some of which last for days or weeks at a time. The Navy exercises the option to use third-party observers in combination with Lookouts during ship shock trials primarily because of the requirement to conduct marine species monitoring for multiple days after the event, which would detract Navy personnel from mission-essential tasks. The number of third-party civilian vessels or aircraft that would be needed to observe other Navy training and testing activities to aid in mitigation implementation would be impracticable due to implications for safety and sustainability. If Navy vessels were required to host third-party observers, conflicts would arise based on limited passenger capacities and the need to overcome security clearance issues. Training and testing event planning includes careful consideration of capacity limitations when placing personnel on the vessels involved in each activity. Navy personnel who serve as Lookouts fulfill other primary duties; therefore, the Navy is unable to substitute a Navy Lookout with a third-party observer without resulting in either a berthing shortage (or other exceedance of space limitations) or impacting the ability for the Lookout's other mission-essential duties to be completed. The use of third-party observers would also present national security concerns due to the requirement to provide advance notification of specific times and locations of Navy platforms (e.g., vessels using active sonar). Further, the presence of third-party aircraft or vessels near military readiness activities (e.g., gunnery training activities using explosive large-caliber projectiles, air-to-surface warfare activities) would present an obvious collision risk and other safety concerns. Many of the training and testing activities take place far from land, which would limit the amount of time that third-party observers would be on station based on fuel restrictions, and would present a safety concern should mechanical problems arise. Reliance on the availability of third-party personnel to perform observations during an activity would be impracticable because training and testing activity timetables oftentimes cannot be precisely fixed, and are instead based on the free-flow development of tactical situations. Waiting for third-party aircraft or vessels to complete surveys, refuel, or be on station would slow progress and diminish the realism of the activity. The use of third-party observers to conduct pre- or post-activity biological resource observations would be an ineffective mitigation because marine mammals would likely move into or out of the activity area, and mitigation must be implemented at the time the activity is taking place.

5.5.2.4 Increasing the Size and Types of Mitigation Zones

The Navy has received requests to increase the size of its mitigation zones and extend the implementation of mitigation zones to all training and testing activities. For a description of how the Navy developed its mitigation zones, see Section 5.2.1 (Procedural Mitigation Development). For this DEIS/OEIS, the Navy designed its mitigation zones to avoid or reduce injurious impacts to the maximum extent practicable. Observing mitigation zones that are larger than those identified in Section 5.3 (Procedural Mitigation to be Implemented) would be impracticable based on implications for safety, sustainability, or the ability for the Navy to continue meeting its Title 10 requirements to successfully accomplish military readiness objectives for the reasons specified for each stressor or activity.

For some activities, the Navy does not have the resources (e.g., personnel, vessels, aircraft) to maintain the number of additional Lookouts or observer platforms that would be needed to effectively observe a larger mitigation zone size. As mitigation zone sizes increase, the area of observation increases by an order of magnitude. For instance, if a mitigation zone were to increase from 1,000 yd. to 4,000 yd., the area that must be observed increases sixteen-fold. Implementation of procedural mitigation is most

effective when mitigation zones are appropriately sized to be realistically observed during typical training and testing activity conditions.

For other activities, a larger mitigation zone size would likely result in additional stopping and starting of training and testing activities, which would extend the length of the events, increase time at sea and the associated fuel use, increase pilot fatigue, and decrease realism of the events. For example, during anti-submarine warfare training involving the use of mid-frequency active sonar, developing the tactical picture can take several hours, days, or weeks; therefore, each additional shut down can result in the loss of several days' worth of training due to the loss of awareness of the tactical situation through the stopping and starting of active sonar. Additional stopping and starting of active sonar during testing activities would prevent the Navy from validating whether systems and sources perform as expected; and to determine whether they are operationally effective, suitable, survivable, and safe for their intended uses by the fleet. For activities that involve aircraft, additional stopping and starting of an activity would require aircraft to depart the activity location to refuel. Multiple refueling events would extend the length of the activity by 2 to 5 times or more, which would increase pilot fatigue and the associated risk to pilot and aircraft safety, and would eliminate opportunities for training as would be required in a real world combat situation, or testing as required to meet program requirements.

The Navy is unable to implement mitigation zones for every activity, such as for missile, rocket, and gunnery activities against airborne targets. Unlike surface targets, most airborne targets are recoverable aerial drones; therefore, direct impact with the target is designed not to occur. For example, telemetry-configured anti-air missiles used in training are designed to detonate (or simulate a detonation) near a target, but not as a result of a direct strike on a target. Given the speed of the missile and the mobile target, the high altitudes involved, and the long ranges that missiles typically travel, it is not possible to definitively predict or to effectively observe where the missile fragments will fall. The potential expended material fall zone can only be predicted within tens of miles for long range events, which can be more than 80 NM from the firing location; and thousands of yards for shorter events, which can occur within several thousand yards from the firing location. For gunnery activities using medium- and large-caliber munitions, the potential military expended material fall zone can only be predicted within thousands of yards, which can be up to 7 NM from the firing location. These areas are too large to be effectively observed for marine mammals and sea turtles. Furthermore, the potential risk to marine mammals and sea turtles from events against an airborne target is limited to the animal being directly struck by falling military expended materials (there would be no impact from explosives). Based on the extremely low potential for military expended materials to co-occur in space and time with a marine mammal or sea turtle at or near the surface of the water, the potential for a direct strike is negligible. Additional information on military expended materials is provided in Appendix F (Military Expended Material and Direct Strike Impact Analysis).

5.5.2.5 Adopting Mitigation Measures of Foreign Navies

The Navy has received requests to adopt the mitigation measures implemented by foreign navies. Mitigation measures are carefully developed for and assessed by each individual navy based on potential impacts of their activities on the biological resources that live in their areas of operation, and the practicability of mitigation implementation. Mitigation developed for one navy would not necessarily be effective at reducing potential impacts on marine species, nor practicable to implement by all navies. For example, some navies implement sonar ramp-up as a mitigation, but as described in Section 5.5.2.1 (Implementing Active Sonar Ramp-up Procedures), the U.S. Navy has determined that it would be an ineffective mitigation measure for the training and testing activities that will be conducted

under the Proposed Action. Similarly, all navies must operate in accordance with their mission and testing program requirements. The U.S. Navy's readiness considerations differ from those of foreign navies based on each navy's strategic reach, global mission, country-specific legal requirements, and geographic considerations. Most non-U.S. navies do not possess an integrated strike group and do not have integrated training requirements. The U.S. Navy's training is built around the integrated warfare concept and is based on the U.S. Navy's capabilities, the threats faced, the operating environment, and the overall mission. The U.S. Navy will implement the mitigations presented in Section 5.3 (Procedural Mitigation to be Implemented) and Section 5.4 (Mitigation Areas to be Implemented) because they have been determined to be effective at reducing impacts from the Proposed Action and practicable to implement by the U.S. Navy. Although the U.S. Navy will not implement all mitigation undertaken by foreign navies, the U.S. Navy will implement several mitigation measures and other environmental compliance actions that are not required of all other navies. For example, as discussed in Section 5.1.1 (Monitoring, Research, and Reporting Initiatives), the U.S. Navy will continue to sponsor scientific monitoring and research, and comply with stringent reporting requirements.

5.5.2.6 Increasing Reporting Requirements

The Navy has received requests to increase its reporting requirements. As discussed in Section 5.1.1 (Marine Species Monitoring, Research, and Reporting Initiatives), the Navy developed its reporting requirements in conjunction with NMFS and consistent with mission requirements, balancing the usefulness of the information to be collected with the practicability of collecting it. The Navy's training and testing activity reports are designed to verify implementation of mitigation; comply with current permits, authorizations, and consultation requirements; and improve future environmental analyses. Through its marine species monitoring and research programs, the Navy is the nation's single largest sponsor of scientific monitoring and research on marine species. Additional information on the Navy marine species monitoring program is provided in Section 3.0.1.1 (Marine Species Monitoring and Research Programs). The Navy will not increase reporting requirements as a mitigation because any additional requirement to generate marine species observation reports during a training or a testing activity would draw the event participants' attentions away from the complex tactical tasks they are primarily obligated to perform (such as driving a warship or engaging in a gunnery activity), which would adversely impact personnel safety, public health and safety, and the effectiveness of the military readiness activity. Lookouts are not trained to make species-specific identification, and would not be able to provide detailed scientific data if more detailed reports were to be required.

5.5.3 Measures Pertaining to Oceanographic Features or Geographic Locations

The Navy has received public comments asking for additional mitigation within certain geographic locations based on the locations of marine mammal habitat and oceanographic features (e.g., bathymetry, environmental conditions, distances from shore, distances from isobaths). There are certain geographic areas where the Navy does not typically conduct certain training or testing activities due to operational parameters (e.g., water depth) and planning considerations (e.g., ensuring public safety), as discussed in Section 2.3.3 (Standard Operating Procedures) and Appendix A (Navy Activity Descriptions). Refer to Section 6.1.2 (Marine Protected Areas) for information on Navy activities that are expected to occur within marine protected areas and National Marine Sanctuaries in the Study Area.

The Navy incorporates requirements for public health and safety and safety of personnel when planning training and testing activities. Safety restrictions may include limits on the proximity to commercial shipping lanes to minimize sea space conflicts, and air traffic corridors to minimize airspace conflicts with military, commercial, and civilian aircraft. These types of limitations shape how exercise planners

develop and implement training scenarios (e.g., integrated training activities involving the defense of aircraft carriers from submarines). Daily fluctuations in training and testing schedules and objectives could mean that, on any given day, vessels may depend on discrete locations in the Study Area for discrete purposes. Training and testing events may change mid-activity based on evaluators' assessments of performance and other conditions (such as weather or mechanical issues), which may preclude the use of planning restrictions for major training events and other activities as a mitigation measure.

The Navy typically conducts training and testing in proximity to certain facilities, range complexes, and testing ranges to reduce travel time and funding required for conducting training away from a unit's home base. Activities involving the use of rotary-wing aircraft typically occur in proximity to shore or refueling stations due to fuel restrictions and personnel safety. Mitigation based on distance from shore would impact the safety of training and testing activities by requiring activities to take place in more remote areas where safety support may be limited. Testing ranges are typically located near the support facilities of the systems commands, which provide critical infrastructure support and technical expertise necessary to conduct testing. Logistical support of range testing can only be efficiently and effectively supported when the support is co-located with the testing activities. Test range site locations and associated field activities were originally established to support specific Navy mission testing needs using a selection process that included testing requirements, cost of living, availability of personnel, and low level of crowding from industry and development. These same principles also apply to pierside and at-sea testing that must occur in proximity to naval shipyards and Navy contractor shipyards.

Many training and testing activities require continuous access to large and unobstructed areas, consisting potentially of thousands of square miles of ocean and air space, to provide personnel the ability to develop competence and confidence in their capabilities across multiple types of weapons and sensors. For example, major exercises using integrated warfare components require large areas of the littorals, open ocean, and nearshore areas for realistic and safe anti-submarine warfare training. Anti-submarine warfare training involving the use of mid-frequency active sonar typically involves the periodic use of active sonar to develop the "tactical picture," or an understanding of the battle space (e.g., area searched or unsearched, identifying false contacts, and understanding the water conditions). Developing the tactical picture can take several hours, days, or weeks, and typically occurs over vast areas with varying physical and oceanographic conditions. Sonar operators must be trained to handle bottom bounce and sound passing through changing currents, eddies, and across changes in ocean temperature, pressure, salinity, depth, and in surface ducting conditions. Submarines may hide in the higher ambient noise levels of the shallow waters of coastal environments and surface ducts, making training in these conditions critical for sonar operators.

Surface ducting is a condition when water conditions (e.g., temperature layers and lack of wave action) result in little sound energy penetrating beyond a narrow layer near the surface of the water. Submarines have long been known to take advantage of the phenomena associated with surface ducting to avoid being detected by sonar. When surface ducting occurs, active sonar becomes more useful near the surface but less useful at greater depths. Training with active sonar in surface ducting conditions is a critical component of military readiness because sonar operators need to learn how sonar transmissions are altered due to surface ducting, how submarines may take advantage of them, and how to operate sonar effectively in this environment. Similarly, systems must be tested in a variety of bathymetric and environmental conditions to ensure functionality and accuracy in real world environments. Avoiding surface ducting conditions would be impracticable because ocean conditions contributing to surface

ducting change frequently, and surface ducts can be of varying duration. Surface ducting can also lack uniformity and may or may not extend over a large geographic area, making it difficult to determine where to reduce power and for what periods. As noted by the U.S. Supreme Court in Winter v. Natural Resource Defense Council, 555 U.S. 7 (2008), because surface ducting conditions occur relatively rarely and are unpredictable, it is especially important for the Navy to be able to train under these conditions when they occur.

In addition to the procedural mitigation presented in Section 5.3 (Procedural Mitigation to be Implemented), the Navy will implement mitigation within the designated mitigation areas presented in Section 5.4 (Mitigation Areas to be Implemented). For example, as described in Section 5.4.1 (Mitigation Areas for Seafloor Resources), the Navy will implement mitigation within mitigation areas around seafloor resources that serve vital ecological functions or are important cultural resources (many of which also have a high socioeconomic value). Additional restrictions, such as a blanket limitation or reduction of training and testing with sonar or explosives within broad-scale areas of water (e.g., embayments and large swaths of the littorals and open ocean), or within areas that are vital to mission requirements would be impracticable because it would prevent the Navy from accessing certain facilities, range complexes, testing ranges, and open ocean areas with the unique, challenging, and diverse environmental and oceanographic conditions (e.g., bathymetry, topography, surface fronts, and variations in sea surface temperature) needed to achieve the highest skill proficiency and most accurate testing results possible. Threats to national security are constantly evolving and the Navy requires the ability to adapt training and testing to meet these emerging threats. Restricting access to broad-scale areas of water would also impact the ability for Navy training and testing to evolve as the threat evolves. Eliminating opportunities for the Navy to train and test in a myriad of at-sea conditions would put U.S. forces at a tactical disadvantage during real world missions when facing adversaries who were not restricted from training and testing in such locations, and would present a risk to national security if adversaries were to be alerted to the environmental conditions within which the U.S. Navy was prohibited from training and testing.

5.6 MITIGATION SUMMARY

Table 5.6-1 and Table 5.6-2 summarize the mitigation that the Navy will implement under Alternative 1 or Alternative 2 of the Proposed Action. Figure 5.6-1 displays the mitigation areas for marine mammals in the Study Area. Unless specified otherwise in the tables, the mitigation applies year-round. For specific requirements, additional information, and clarifications to the tables' general summaries, see Section 5.3 (Procedural Mitigation to be Implemented) and Section 5.4 (Mitigation Areas to be Implemented).

Table 5.6-1: Summary of Procedural Mitigation to be Implemented

Stressor or Activity	*Summary of Mitigation Requirements*	*Resource Protection Focus*
Environmental Awareness and Education	Afloat Environmental Compliance Training program for applicable personnel	Marine mammals, sea turtles
Active Sonar	Depending on sonar source: 1,000 yd. power down, 500 yd. power down, and 200 yd. shut down; or 200 yd. shut down	Marine mammals, sea turtles
Air Guns	150 yd.	Marine mammals, sea turtles
Pile Driving	100 yd.	Marine mammals, sea turtles
Weapons Firing Noise	30° on either side of the firing line out to 70 yd.	Marine mammals, sea turtles

Table 5.6-1: Summary of Procedural Mitigation to be Implemented (continued)

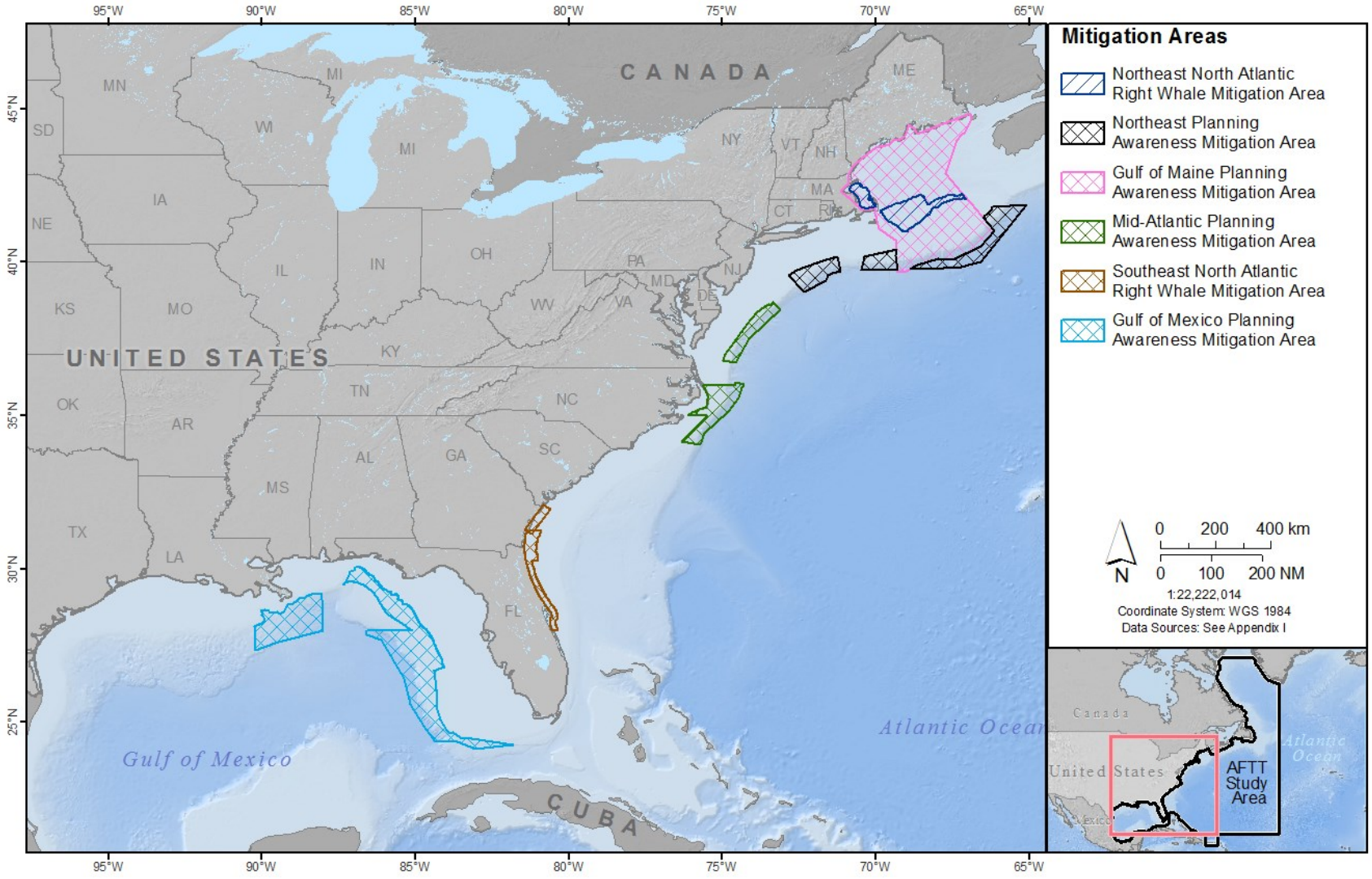
Stressor or Activity	*Summary of Mitigation Requirements*	*Resource Protection Focus*
Aircraft Overflight Noise	Distance from shore in the Virginia Capes Range Complex and Fisherman Island National Wildlife Refuge during explosive mine neutralization activities involving Navy divers	Birds (piping plover and other nesting birds)
Explosive Sonobuoys	600 yd.	Marine mammals, sea turtles
Explosive Torpedoes	2,100 yd.	Marine mammals, sea turtles
Explosive Medium- Caliber and Large-Caliber Projectiles	1,000 yd. (large-caliber projectiles), 600 yd. (medium-caliber projectiles during surface-to-surface activities), or 200 yd. (medium-caliber projectiles during air-to-surface activities)	Marine mammals, sea turtles
Explosive Missiles and Rockets	900 yd. (0.6–20 lb. net explosive weight), or 2,000 yd. (21–500 lb. net explosive weight)	Marine mammals, sea turtles
Explosive Bombs	2,500 yd.	Marine mammals, sea turtles
Sinking Exercises	2.5 NM	Marine mammals, sea turtles
Explosive Mine Countermeasure and Neutralization Activities	600 yd. (0.1–5 lb. net explosive weight), or 2,100 yd. (6–650 lb. net explosive weight)	Marine mammals, sea turtles
Explosive Mine Neutralization Activities Involving Navy Divers	500 yd. (0.1–20 lb. net explosive weight for positive control charges), or 1,000 yd. (21–60 lb. net explosive weight for positive control charges and all charges using time-delay fuses)	Marine mammals, sea turtles
Maritime Security Operations – Anti-Swimmer Grenades	200 yd.	Marine mammals, sea turtles
Line Charge Testing	900 yd.	Marine mammals, sea turtles, Gulf sturgeon
Ship Shock Trials	3.5 NM	Marine mammals, sea turtles
Vessel Movement	500 yd. (whales), or 200 yd. (other marine mammals)	Marine mammals
Towed In-Water Devices	250 yd.	Marine mammals
Small-, Medium-, and Large-Caliber Non-Explosive Practice Munitions	200 yd.	Marine mammals, sea turtles
Non-Explosive Missiles and Rockets	900 yd.	Marine mammals, sea turtles
Non-Explosive Bombs and Mine Shapes	1,000 yd.	Marine mammals, sea turtles

Table 5.6-2: Summary of Mitigation to be Implemented within Mitigation Areas

Mitigation Area	*Summary of Mitigation Requirements*
Mitigation Areas for Seafloor Resources	
Shallow-water coral reefs	• The Navy will not conduct precision anchoring (except in designated anchorages). • The Navy will not conduct explosive mine countermeasure and neutralization activities, or mine neutralization activities involving Navy divers. • The Navy will not conduct explosive or non-explosive small-, medium-, and large-caliber gunnery activities using a surface target. • The Navy will not conduct explosive or non-explosive missile and rocket activities using a surface target. • The Navy will not conduct explosive or non-explosive bombing or mine laying activities. • Within the South Florida Ocean Measurement Facility Testing Range, the Navy will implement additional measures, such as using real-time positioning and remote sensing information to avoid shallow-water coral reefs during deployment, installation, and recovery of anchors and mine-like objects, and during deployment of bottom-crawling unmanned underwater vehicles.

Table 5.6-2: Summary of Mitigation to be Implemented within Mitigation Areas (continued)

Mitigation Area	*Summary of Mitigation Requirements*
Mitigation Areas for Seafloor Resources (continued)	
Live hard bottom	• The Navy will not conduct precision anchoring (except in designated anchorages). • The Navy will not conduct explosive mine countermeasure and neutralization activities, or mine neutralization activities involving Navy divers. • Within the South Florida Ocean Measurement Facility Testing Range, the Navy will implement additional measures, such as using real-time positioning and remote sensing information to avoid live hard bottom during deployment, installation, and recovery of anchors and mine-like objects, and during deployment of bottom-crawling unmanned underwater vehicles.
Artificial reefs, Shipwrecks	• The Navy will not conduct precision anchoring (except in designated anchorages). • The Navy will not conduct explosive mine countermeasure and neutralization activities, or mine neutralization activities involving Navy divers.
Mitigation Areas for Marine Mammals	
Northeast North Atlantic Right Whale Mitigation Area	• The Navy will minimize use of active sonar to the maximum extent practicable. • The Navy will not use explosives that detonate in the water. • Non-explosive torpedo testing will be conducted during daylight hours in Beaufort sea state 3 or less; three Lookouts (one on a vessel and two in an aircraft during dedicated aerial surveys) and an additional Lookout on the submarine (when surfaced) will be used; during transits, ships will maintain a speed of no more than 10 knots; during firing, ships will maintain a speed of no more than 18 knots except for brief periods of time (e.g., 10–15 min.) during vessel target firing. • Navy will obtain the latest North Atlantic right whale sightings data. • Vessels will implement speed reductions after they observe a North Atlantic right whale, if they are within 5 NM of a sighting reported within the past week, and when operating at night or during periods of reduced visibility.
Gulf of Maine Planning Awareness Mitigation Area	• The Navy will not plan major training exercises. • The Navy will not conduct more than 200 hours of hull-mounted mid-frequency active sonar per year.
Northeast Planning Awareness Mitigation Areas, Mid-Atlantic Planning Awareness Mitigation Areas	• The Navy will avoid planning major training exercises to the maximum extent practicable. • The Navy will not conduct more than four major training exercises per year (all or a portion of the exercise).
Southeast North Atlantic Right Whale Mitigation Area (November 15 through April 15)	• The Navy will not conduct active sonar except as necessary for navigation and object detection training, and dipping sonar. • The Navy will not expend explosive or non-explosive ordnance. • The Navy will obtain the latest North Atlantic right whale sightings data. • Vessels will implement speed reductions after they observe a North Atlantic right whale, if they are within 5 NM of a sighting reported within the past 12 hours, and when operating at night or during periods of reduced visibility. • To the maximum extent practicable, vessels will minimize north-south transits.
Gulf of Mexico Planning Awareness Mitigation Areas	• The Navy will avoid planning major training exercises to the maximum extent practicable. • The Navy will not conduct more than one major training exercise per year (all or a portion of the exercise) in each area under Alternative 2; or any under Alternative 1.



Notes: AFTT: Atlantic Fleet Training and Testing

Figure 5.6-1: Summary of Mitigation Areas for Marine Mammals in the Study Area

References

Agler, B. A., R. L. Schooley, S. E. Frohock, S. K. Katona, & I. E. Seipt. (1993). Reproduction of photographically identified fin whales, *Balaenoptera physalus*, from the Gulf of Maine. *Journal of Mammalogy, 74*, 577–587.

Azzellino, A., S. Gaspari, S. Airoldi, & B. Nani. (2008). Habitat use and preferences of cetaceans along the continental slope and the adjacent pelagic waters in the western Ligurian Sea. *Deep Sea Research Part I: Oceanographic Research Papers, 55*(3), 296–323.

Baird, R. W., D. L. Webster, Z. Swaim, H. J. Foley, D. B. Anderson, & A. J. Read. (2016). Spatial use by odontocetes satellite tagged off Cape Hatteras, North Carolina in 2015. Final report. Virginia Beach, VA.

Balmer, B. C., R. S. Wells, S. M. Nowacek, D. P. Nowacek, L. H. Schwake, W. A. McLellan, F. S. Scharf, T. K. Rowles, L. J. Hansen, T. R. Spradlin, & D. A. Pabst. (2008). Seasonal abundance and distribution patterns of common bottlenose dolphins (*Tursiops truncatus*) near St. Joseph Bay, Florida, USA. *Journal of Cetacean Research and Management, 10*(2), 157–167.

Baumgartner, M. F., & D. M. Fratantoni. (2008). Diel periodicity in both sei whale vocalization rates and the vertical migration of their copepod prey observed from ocean gliders. *Limnology and Oceanography, 53*(5part2), 2197–2209.

Baumgartner, M. F., N. S. J. Lysiak, C. Schuman, J. Urban-Rich, & F. W. Wenzel. (2011). Diel vertical migration behavior of *Calanus finmarchicus* and its influence on right and sei whale occurrence. *Marine Ecology Progress Series, 423*, 167–184.

Baumgartner, M. F., & B. R. Mate. (2003). Summertime foraging ecology of North Atlantic right whales. *Marine Ecology Progress Series, 264*, 123–135.

Baumgartner, M. F., K. D. Mullin, L. N. May, & T. D. Leming. (2001). Cetacean habitats in the northern Gulf of Mexico. *Fishery Bulletin, 99*, 219–239.

Baumgartner, M. F., C. T. V. N., R. G. Campbell, G. J. Teegarden, & E. G. Durbin. (2003). Associations between North Atlantic right whales and their prey, *Calanus finmarchicus*, over diel and tidal time scales. *Marine Ecology Progress Series, 264*, 155–166.

Biggs, D. C., A. E. Jochens, M. K. Howard, S. F. DiMarco, K. D. Mullin, R. R. Leben, F. E. Muller-Karger, & C. Hu. (2005). Eddy forced variations in on- and off-margin summertime circulation along the 1000-m isobath of the northern Gulf of Mexico, 2000–2003, and links with sperm whale distributions along the middle slope. *161*, 71–85.

Bort, J., S. M. Van Parijs, P. T. Stevick, E. Summers, & S. Todd. (2015). North Atlantic right whale *Eubalaena glacialis* vocalization patterns in the central Gulf of Maine from October 2009 through October 2010. *Endangered Species Research, 26*(3), 271–280.

Brown, M. W., D. Fenton, K. Smedbol, C. Merriman, K. Robichaud-Leblanc, & J. D. Conway. (2009). Recovery Strategy for the North Atlantic Right Whale (*Eubalaena glacialis*) in Atlantic Canadian Waters *Species at Risk Act Recovery Strategy Series* (pp. 66): Fisheries and Oceans Canada.

Cetacean and Turtle Assessment Program. (1982). *A Characterization of Marine Mammals and Turtles in the Mid and North Atlantic Areas of the U.S. Outer Continental Shelf*. (Contract Number AA551-CT8-48). Kingston, RI: University of Rhode Island, Graduate School of Oceanography.

Charif, R. A., C. S. Oedekoven, A. Rahaman, B. J. Estabrook, L. Thomas, & A. N. Rice. (2015). Development of Statistical Methods for Assessing Changes in Whale Vocal Behavior in Response to Mid-Frequency Active Sonar. Final Report: Prepared for U.S. Fleet Forces Command. Submitted to Naval Facilities Engineering Command Atlantic, Norfolk, Virginia, under Contract No. N62470-10-3011, Task Order 39, issued to HDR Inc., Virginia Beach, Virginia. 20 March 2015.

Clapham, P. J., L. S. Baraff, C. A. Carlson, M. A. Christian, D. K. Mattila, C. A. Mayo, M. A. Murphy, & S. Pittman. (1993). Seasonal occurrence and annual return of humpback whales, *Megaptera novaeangliae*, in the southern Gulf of Maine. *Canadian Journal of Zoology, 71*(2), 440–443.

Clapham, P. J., & D. K. Mattila. (1990). Humpback whale songs as indicators of migration routes. *Marine Mammal Science, 6*(2), 155–160.

Clapham, P. J., & C. A. Mayo. (1987). Reproduction and recruitment of individually identified humpback whales, *Megaptera novaeangliae*, observed in Massachusetts Bay, 1979-1985. *Canadian Journal of Zoology, 65*(12), 2853–2863.

Cole, T. V. N., P. K. Hamilton, A. Henry, P. A. Duley, R. M. Pace, III, B. N. White, & T. R. Frasier. (2013). Evidence of a North Atlantic right whale *Eubalaena glacialis* mating ground. *Endangered Species Research, 21*, 55–64.

Davis, R. W., W. E. Evans, & B. Würsig, (Eds.). (2000). Cetaceans, sea turtles and seabirds in the northern Gulf of Mexico: Distribution, abundance and habitat associations (Vol. I: Executive Summary). New Orleans, LA: Minerals Management Service.

Davis, R. W., & G. S. Fargion. (1996). Distribution and Abundance of Marine Mammals in the North-central and Western Gulf of Mexico (Vol. 1: Executive Summary, pp. 27): U.S. Department of the Interior, Minerals Management Service.

Davis, R. W., G. S. Fargion, N. May, T. D. Leming, M. Baumgartner, W. E. Evans, L. J. Hansen, & K. Mullin. (1998). Physical habitat of cetaceans along the continental slope in the north-central and western Gulf of Mexico. *Marine Mammal Science, 14*(3), 490–507.

Dunlop, R. A., M. J. Noad, R. D. McCauley, E. Kniest, R. Slade, D. Paton, & D. H. Cato. (2016). Response of humpback whales (*Megaptera novaeangliae*) to ramp-up of a small experimental air gun array. *Marine Pollution Bulletin, 103*(1–2), 72–83.

Flinn, R. D., A. W. Trites, & E. J. Gregr. (2002). Diets of fin, sei, and sperm whales in British Columbia: an analysis of commercial whaling records, 1963-1967. *Marine Mammal Science, 18*(3), 663–679.

Foley, H., Z. Swaim, D. Waples, & A. J. Read. (2015). Deep divers and satellite tagging projects in the Virginia Capes OPAREA – Cape Hatteras, NC: January 2014–December 2014. Draft report (N. Prepared for U.S. Fleet Forces Command. Submitted to Naval Facilities Engineering Command Atlantic, Virginia, under Contract No. N62470-10-3011, Task Orders 14, 38, and 48, Trans.). Virginia Beach, VA.

Garrison, L. P. (2007). Defining the North Atlantic Right Whale Calving Habitat in the Southeastern United States: An Application of a Habitat Model. *National Oceanic and Atmospheric Administration Technical Memorandum, NMFS-SEFSC-553*, 66.

Gaskin, D. E. (1977). Harbour porpoise, *Phocoena phocoena* (L.), in the western approaches to the Bay of Fundy 1969–75 *Report of the International Whaling Commission* (Vol. 27, pp. 487–492).

Good, C. P. (2008). *Spatial ecology of the North Atlantic right whale (Eubalaena glacialis).* (PhD dissertation), Duke University, Durham, NC.

Gowan, T. A., & J. G. Ortega-Ortiz. (2014). Wintering habitat model for the North Atlantic right whale (*Eubalaena glacialis*) in the southeastern United States. *PLoS ONE, 9*(4), e95126.

Hain, J. H. W., M. J. Ratnaswamy, R. D. Kenney, & H. E. Winn. (1992). The fin whale, *Balaenoptera physalus*, in waters of the northeastern United States continental shelf. *Reports of the International Whaling Commission, 42*, 653–670.

Hamazaki, T. (2002). Spatiotemporal prediction models of cetacean habitats in the mid-western North Atlantic Ocean (from Cape Hatteras, North Carolina, U.S.A. to Nova Scotia, Canada). *Marine Mammal Science, 18*(4), 920–939.

Hamilton, P. K., A. R. Knowlton, & M. K. Marx. (2007). Right whales tell their own stories: the photo-identification catalog. In S. D. Kraus & R. M. Rolland (Eds.), *The urban whale: North Atlantic right whales at a crossroads* (pp. 75–104). Cambridge, MA: Harvard University Press.

Hamilton, P. K., & C. A. Mayo. (1990). Population characteristics of right whales (*Eubalaena glacialis*) observed in Cape Cod and Massachusetts Bays, 1978-1986 *Reports of the International Whaling Commission, Special Issue* (Vol. 12, pp. 203–208).

Hansen, L. J., K. D. Mullin, T. A. Jefferson, & G. P. Scott. (1996). Visual surveys aboard ships and aircraft. In R. W. Davis & G. S. Fargion (Eds.), *Distribution and abundance of marine mammals in the northcentral and western Gulf of Mexico* (Vol. II: Technical Report, pp. 55–132). New Orleans, LA: Mineral Management Service.

Hansen, L. J., K. D. Mullin, & C. L. Roden. (1995). Estimates of cetacean abundance in the northern Gulf of Mexico from vessel surveys (pp. 9). Miami, FL: Southeast Fisheries Science Center.

Hazen, E. L., A. S. Friedlaender, M. A. Thompson, C. R. Ware, M. T. Weinrich, P. N. Halpin, & D. N. Wiley. (2009). Fine-scale prey aggregations and foraging ecology of humpback whales, *Megaptera novaeangliae*. *Marine Ecology Progress Series, 395*, 75–89.

Hodge, K. B., C. A. Muirhead, J. L. Morano, C. W. Clark, & A. N. Rice. (2015). North Atlantic right whale occurrence near wind energy areas along the mid-Atlantic US coast: implications for management. *Endangered Species Research, 28*, 225–234.

Hodge, L., J. Stanistreet, & A. Read. (2016). Passive Acoustic Monitoring for Marine Mammals at Site A in Norfolk Canyon, June 2014–April 2015 *Submitted to Naval Facilities Engineering Command Atlantic, Norfolk, Virginia under Contract No. N62470-10-D-3011, Task Order CTO 0051, issued to HDR, Inc.* Norfolk, VA.

Jefferson, T. A., & A. J. Schiro. (1997). Distribution of cetaceans in the offshore Gulf of Mexico. *Mammal Review, 27*, 27–50.

Jefferson, T. A., M. A. Webber, & R. L. Pitman. (2015). *Marine Mammals of the World: A Comprehensive Guide to Their Identification* (2nd ed.): Academic Press.

Jochens, A., D. Biggs, D. Engelhaupt, J. Gordon, C. Hu, N. Jaquet, M. Johnson, R. Leben, B. Mate, P. Miller, J. Ortega-Ortiz, A. Thode, P. Tyack, & B. Wursig. (2008). *Sperm whale seismic study in the Gulf of Mexico: Synthesis report*. New Orleans, LA: U.S. Dept. of the Interior, Minerals Management Service, Gulf of Mexico OCS Region.

Jonsgard, A., & K. Darling. (1977). On the biology of the eastern North Atlantic sei whale, *Balenoptera borealis* lesson *Rep. Int. Whal. Commn* (pp. 124–129).

Keller, C. A., L. I. Ward-Geiger, W. B. Brooks, C. K. Slay, C. R. Taylor, & B. J. Zoodsma. (2006). North Atlantic right whale distribution in relation to sea-surface temperature in the southeastern United States calving grounds. *Marine Mammal Science, 22*(2), 426–445.

Keller, C. A., L. I. Ward-Geiger, W. B. Brooks, C. K. Slay, C. R. Taylor, & B. J. Zoodsma. (2012). Application of a habitat model to define calving habitat of the North Atlantic right whale in the southeastern United States. *Endangered Species Research, 18*, 73–87.

Kenney, R. D. (2008). North Atlantic, north Pacific, and southern right whales (*Eubalaena glacialis, E. japonica*, and *E. australis*). In W. F. Perrin, B. Wursig & J. G. M. Thewissen (Eds.), *Encyclopedia of Marine Mammals* (2nd ed., pp. 962–972). San Diego, CA: Academic Press.

Kenney, R. D., M. A. M. Hyman, R. E. Owen, G. P. Scott, & H. E. Winn. (1986). Estimation of prey densities required by western North Atlantic right whales. *Marine Mammal Science, 2*(1), 1–13.

Kenney, R. D., & H. E. Winn. (1986). Cetacean high-use habitats of the northeast United States continental shelf. *Fishery Bulletin, 84*(2), 345–357.

Kenney, R. D., H. E. Winn, & M. C. Macaulay. (1995). Cetacean in the Great South Channel, 1979-1989: right whale (*Eubalaena glacialis*). *Continental Shelf Research, 15*, 385–414.

Knowlton, A. R., S. D. Kraus, & R. D. Kenney. (1994). Reproduction in North Atlantic right whales (*Eubalaena glacialis*). *Canadian Journal of Zoology, 72*, 1297–1305.

Kraus, S. D., R. M. Pace, & T. R. Frasier. (2007). *High investment, low return: The strange case of reproduction in Eubalaena glacialis*. Cambridge, MA: Harvard University Press.

Kraus, S. D., J. H. Prescott, & G. S. Stone. (1983). Harbor porpoise, *Phocoena phocoena*, in the U.S. coastal waters off the Gulf of Maine: A survey to determine seasonal distribution and abundance (pp. 22): National Marine Fisheries Service.

LaBrecque, E., C. Curtice, J. Harrison, S. M. Van Parijs, & P. N. Halpin. (2015a). Biologically Important Areas for Cetaceans Within U.S. Waters—East Coast Region. *Aquatic Mammals, 41*(1), 17–29.

LaBrecque, E., C. Curtice, J. Harrison, S. M. Van Parijs, & P. N. Halpin. (2015b). Biologically Important Areas for Cetaceans Within U.S. Waters—Gulf of Mexico Region. *Aquatic Mammals, 41*(1), 30–38.

Longley, K. (2012). *Investigating the Role of an Understudied North Atlantic Right Whale Habitat: Right Whale Movement, Ecology, and Distribution in Jeffreys Ledge.* (Graduate Masters Theses Graduate Masters Theses), University of Massachusetts Boston. (Paper 105)

Mackey, A. D. (2010). *Site fidelity and association patterns of bottlenose dolphins (Tursiops truncatus) in the Mississippi Sound.* (M.A. M.A. Thesis), University of Southern Mississippi, Hattiesburg, MS.

Maloni, M., J. A. Paul, & D. M. Gligor. (2013). Slow steaming impacts on ocean carriers and shippers. *Maritime Economics & Logistics, 15*(2), 151–171.

Mayo, C. A., O. C. Nichols, M. K. Bessinger, M. K. Marx, C. L. Browning, & M. W. Brown. (2004). Surveillance, Monitoring and Management of North Atlantic Right Whales in Cape Cod Bay and Adjacent Waters - 2004 (pp. 126). Provincetown, MA: Center for Coastal Studies.

Maze-Foley, K., & K. D. Mullin. (2006). Cetaceans of the oceanic northern Gulf of Mexico: Distributions, group sizes and interspecific associations. *Journal of Cetacean Research and Management, 8*(2), 203–213.

McAlarney, R., E. Cummings, W. McLellan, & D. A. Pabst. (2016). Aerial Surveys for Protected Species in the Cape Hatteras and Norfolk Canyon Regions (A. Naval Facilities Engineering Command, Norfolk Virginia, Trans.). Virginia Beach, VA: U.S. Fleet Forces Command.

McLellan, W. A., E. Meagher, L. Torres, G. Lovewell, C. Harper, K. Irish, B. Pike, & A. D. Pabst. (2004). *Winter right whale sightings from aerial surveys of the coastal waters of the U.S. Mid-Atlantic*. Paper presented at the 15th Biennial Conference on the Biology of Marine Mammals.

Mizroch, S. A., D. W. Rice, & J. M. Brewick. (1984a). The fin whale, *Balaenoptera physalus*. *Marine Fisheries Review, 46*(4), 20–24.

Mizroch, S. A., D. W. Rice, & J. M. Brewick. (1984b). The sei whale, *Balaenoptera borealis*. *Marine Fisheries Review, 46*(4), 25–29.

Morano, J. L., A. N. Rice, J. T. Tielens, B. J. Estabrook, A. Murray, B. L. Roberts, & C. W. Clark. (2012a). Acoustically detected year-round presence of right whales in an urbanized migration corridor. *Conserv Biol, 26*(4), 698–707.

Morano, J. L., D. P. Salisbury, A. N. Rice, K. L. Conklin, K. L. Falk, & C. W. Clark. (2012b). Seasonal and geographical patterns of fin whale song in the western North Atlantic Ocean. *J. Acoust. Soc. Am., 132*(2), 1207–1212.

Mullin, K. D., & G. L. Fulling. (2004). Abundance of cetaceans in the oceanic northern Gulf of Mexico, 1996–2001. *Marine Mammal Science, 20*(4), 787–807.

Mullin, K. D., L. V. Higgins, T. A. Jefferson, & L. J. Hansen. (1994a). Sightings of the Clymene dolphin (*Stenella clymene*) in the Gulf of Mexico. *Marine Mammal Science, 10*(4), 464–470.

Mullin, K. D., & W. Hoggard. (2000). Visual surveys of cetaceans and sea turtles from aircraft and ships. In R. W. Davis, W. E. Evans & B. Würsig (Eds.), *Cetaceans, sea turtles and seabirds in the northern Gulf of Mexico: Distribution, abundance and habitat associations* (Vol. II, pp. 111–172). New Orleans, LA: Minerals Management Service.

Mullin, K. D., W. Hoggard, & L. J. Hansen. (2004). Abundance and seasonal occurrence of cetaceans in outer continental shelf and slope waters of the north-central and northwestern Gulf of Mexico. *Gulf of Mexico Science, 22*(1), 62–73.

Mullin, K. D., W. Hoggard, C. L. Roden, R. R. Lohoefener, & C. M. Rogers. (1994b). Cetaceans on the upper continental slope in the north-central Gulf of Mexico. *Fishery Bulletin, 92*(4), 773–786.

Murphy, M. A. (1995). Occurrence and group characterisitics of minke whales, *Balaenoptera acutorostrata*, in Massachusetts Bay and Cape Cod Bay. *Fishery Bulletin, 93*, 577–585.

Mussoline, S. E., D. Risch, L. T. Hatch, M. T. Weinrich, D. N. Wiley, M. A. Thompson, P. J. Corkeron, & S. M. Van Parijs. (2012). Seasonal and diel variation in North Atlantic right whale up-calls: implications for management and conservation in the northwestern Atlantic Ocean. *Endangered Species Research, 17*, 17–26.

National Marine Fisheries Service. (2008). *Compliance Guide for Right Whale Ship Strike Reduction Rule (50 C.F.R. 224.105)*. (OMB Control #0648-0580). National Oceanic and Atmospheric Administration Retrieved from http://www.nmfs.noaa.gov/pr/pdfs/shipstrike/compliance_guide.pdf.

National Marine Fisheries Service. (2009a). *Environmental Assessment, Regulatory Impact Review, and Final Regulatory Flexibility Analysis for the Final Pelagic Longline Take Reduction Plan*. St.

Petersburg, FL: U.S. Department of Commerce, National Oceanic and Atmospheric Administration, National Marine Fisheries Service.

National Marine Fisheries Service. (2009b). *Sperm Whale (Physeter macrocephalus): 5-Year Review: Summary and Evaluation*. Silver Spring, MD: National Marine Fisheries Service Office of Protected Resources.

National Marine Fisheries Service. (2011). *2011 Annual Report of a Comprehensive Assessment of Marine Mammal, Marine Turtle, and Seabird Abundance and Spatial Distribution in US Waters of the Western North Atlantic Ocean*. Woods Hole, MA and Miami, FL.

National Marine Fisheries Service. (2013). *Cruise results NOAA ship Gordon Gunter cruise GU 12-02(67) 7 June–6 August 2012, southeast Gulf Of Mexico sperm whale study*. Pascagoula, MS: U.S. Depart. of Commerce, National Oceanic and Atmospheric Administration, national Marine Fisheries Service, Mississippi Laboratories.

National Marine Fisheries Service. (2014). *2014 Annual Report of a Comprehensive Assessment of Marine Mammal, Marine Turtle, and Seabird Abundance and Spatial Distribution in US Waters of the Western North Atlantic Ocean*. Woods Hole, MA and Miami, FL.

National Oceanic and Atmospheric Administration. (2012). *North Atlantic right whale (Eubalaena glacialis) 5-year review: Summary and evaluation*. Gloucester, MA.

National Oceanic and Atmospheric Administration. (2015). 2015 Annual Report to a Comprehensive Assessment of Marine Mammal, Marine Turtle, and Seabird Abundance and Spatial Distribution in US Waters of the Western North Atlantic Ocean–AMAPPS II: Northeast Fisheries Science Center, Southeast Fisheries Science Center,.

Oedekoven, C., E. Fleishman, P. Hamilton, J. S. Clark, & R. S. Schick. (2015). Expert elicitation of seasonal abundance of North Atlantic right whales *Eubalaena glacialis* in the mid-Atlantic. *Endangered Species Research, 29*, 51–58.

Pace, R. M., III, & R. L. Merrick. (2008). Northwest Atlantic Ocean habitats important to the conservation of North Atlantic right whales (*Eubalaena glacialis*). *Northeast Fisheries Science Center Reference Document*(08–07), 30.

Palka, D. (1995a). Influences on spatial patterns of Gulf of Maine harbor porpoises. In A. S. Blix, L. Walloe & O. Ulltang (Eds.), *Whales, Seals, Fish and Man* (pp. 69–75): Elsevier Science.

Palka, D. (2000). Abundance of the Gulf of Maine/Bay of Fundy harbor porpoise based on shipboard and aerial surveys during 1999 (pp. 29): Northeast Fisheries Science Center.

Palka, D. L. (1995b). Abundance estimate of Gulf of Maine harbor porpoise. *Report of the International Whaling Commision, 16*, 27–50.

Palka, D. L. (2012). *Cetacean Abundance Estimates in U.S. Northwestern Atlantic Ocean Waters from Summer 2011 Line Transect Survey*. U.S. Department of Commerce, Northeast Fisheries Science Center Reference Document 12–29. Available from: National Marine Fisheries Service, 166 Water Street, Woods Hole, MA 02543-1026, or online at http://www.nefsc.noaa.gov/nefsc/publications/.

Panigada, S., M. Zanardelli, M. Mackenzie, C. Donovan, F. Melin, & P. S. Hammond. (2008). Modelling habitat preferences for fin whales and striped dolphins in the Pelagos Sanctuary (Western Mediterranean Sea) with physiographic and remote sensing variables. *Remote Sensing of Environment, 112*(8), 3400–3412.

Paquet, D., C. Haycock, & H. Whitehead. (1997). Numbers and seasonal occurrence of humpback whales (*Megaptera novaeangliae*) off Brier Island, Nova Scotia. . *Canadian Field-Naturalist, 11*, 548–552.

Patrician, M. R., I. S. Biedron, H. C. Esch, F. W. Wenzel, L. A. Cooper, P. K. Hamilton, A. H. Glass, & M. F. Baumgartner. (2009). Evidence of a North Atlantic right whale calf (*Eubalaena glacialis*) born in northeastern U.S. waters. *Marine Mammal Science, 25*(2), 462–477.

Payne, P. M., D. W. Heinemann, & L. A. Selzer. (1990a). A Distributional Assessment of Cetaceans in Shelf/Shelf-Edge and Adjacent Slope Waters of the Northeastern United States Based on Aerial and Shipboard Surveys, 1978–1988 (pp. 108). Woods Hole, MA: U.S. Department of Commerce, National Oceanic and Atmospheric Administration, National Marine Fisheries Service, Northeast Fisheries Science Center.

Payne, P. M., J. R. Nicolas, L. O'Brien, & K. D. Powers. (1986). The distribution of the humpback whale, *Megaptera novaeangliae*, on Georges Bank and in the Gulf of Maine in relation to densities of the sand eel, *Ammodytes americanus*. *Fishery Bulletin, 84*(2), 271–278.

Payne, P. M., D. N. Wiley, S. B. Young, S. Pittman, P. J. Clapham, & J. W. Jossi. (1990b). Recent fluctuations in the abundance of baleen whales in the southern Gulf of Maine in relation to changes in selected prey. *Fishery Bulletin, 88*(4), 687–696.

Prieto, R., D. Janiger, M. Silva, G. T. Waring, & J. M. Goncalves. (2012). The forgotten whale: a bibliometric analysis and literature review of the North Atlantic sei whale *Balaenoptera borealis*. *Mammal Review, 42*(3), 235–272.

Read, A. J., & A. J. Westgate. (1997). Monitoring the movements of harbour porpoises (*Phocoena phocoena*) with satellite telemetry. *Marine Biology, 130*, 315–322.

Risch, D., C. W. Clark, P. J. Dugan, M. Popescu, U. Siebert, & S. M. Van Parijs. (2013). Minke whale acoustic behaviour and multi-year seasonal and diel vocalization patterns in Massachusetts Bay, USA. *Marine Ecology Progress Series, 489*, 279–295.

Roberts, J. J., B. D. Best, L. Mannocci, E. Fujioka, P. N. Halpin, D. L. Palka, L. P. Garrison, K. D. Mullin, T. V. N. Cole, C. B. Khan, W. A. McLellan, D. A. Pabst, & G. G. Lockhart. (2016). Habitat-based cetacean density models for the U.S. Atlantic and Gulf of Mexico. *Scientific Reports*.

Rosel, P. E., & L. A. Wilcox. (2014). Genetic evidence reveals a unique lineage of Byrde's whales in the northern Gulf of Mexico. *Endangered Species Research, 25*, 19–34.

Ruiz-Cooley, R. I., & D. Engelhaupt. (2010). *Trophic aspects of sperm whales (Physeter macrocephalus) in the northern Gulf of Mexico using stable isotopes of carbon and nitrogen*. New Orleans, LA: U.S. Dept. of the Interior, Minerals Management Service, Gulf of Mexico OCS Region.

Salisbury, D. P., C. W. Clark, & A. N. Rice. (2015). Right whale occurrence in the coastal waters of Virginia, U.S.A.: Endangered species presence in a rapidly developing energy market. *Marine Mammal Science, 32*(2), 508–519.

Schick, R. S., P. N. Halpin, A. J. Read, C. K. Slay, S. D. Kraus, B. R. Mate, M. F. Baumgartner, J. J. Roberts, B. D. Best, C. P. Good, S. R. Loarie, & J. S. Clark. (2009). Striking the right balance in right whale conservation. *Canadian Journal of Fisheries and Aquatic Sciences, 66*, 1399–1403.

Schilling, M. R., I. Seipt, M. T. Weinrich, S. E. Frohock, A. E. Kuhlberg, & P. J. Clapham. (1992). Behavior of individually identified sei whales, *Balaenoptera borealis,* during an episodic influx into the southern Gulf of Maine in 1986. *Fishery Bulletin, 90*, 749–755.

Seipt, I. E., P. J. Clapham, C. A. Mayo, & M. P. Hawvermale. (1990). Population Characteristics of Individually Identified Fin Whales (*Balaenoptera physalus*) in Massachusetts Bay. *Fishery Bulletin, 88*, 271–278.

Silva, M. A., R. Prieto, I. Jonsen, M. F. Baumgartner, & R. S. Santos. (2013). North Atlantic blue and fin whales suspend their spring migration to forage in middle latitudes: building up energy reserves for the journey? *PLoS ONE, 8*(10), e76507.

Sirovic, A., H. R. Bassett, S. C. Johnson, S. M. Wiggins, & J. A. Hildebrand. (2014). Bryde's whale calls recorded in the Gulf of Mexico. *Marine Mammal Science, 30*(1), 399–409.

Soldevilla, M. S., A. N. Rice, C. W. Clark, & L. P. Garrison. (2014). Passive acoustic monitoring on the North Atlantic right whale calving grounds. *Endangered Species Research, 25*, 115–140.

Speakman, T., E. Zolman, J. Adams, R. H. Defran, D. Laska, L. Schwacke, J. Craigie, & P. Fair. (2006). *Temporal and Spatial Aspects of Bottlenose Dolphin Occurrence in Coastal and Estuarine Waters near Charleston, South Carolina*. Charleston, SC: NOAA/NOS/NCCOS.

Stevick, P. T., J. Allen, P. J. Clapham, S. K. Katona, F. Larsen, J. Lien, D. K. Mattila, P. J. Palsbøll, R. Sears, J. Sigurjónsson, T. D. Smith, G. A. Vikingsson, N. Øien, & P. S. Hammond. (2006). Population spatial structuring on the feeding grounds in north Atlantic humpback whales (*Megaptera novaeangliae*). *Journal of Zoology, 270*, 244–255.

U.S. Department of the Navy. (2010). *Navy Integrated Comprehensive Monitoring Plan*.

U.S. Department of the Navy. (2011). *Marine Species Monitoring for the U.S. Navy's Virginia Capes, Cherry Point and Jacksonville Range Complexes; Annual Report for 2010*. U.S. Department of the Navy, United States Fleet Forces Command.

U.S. Department of the Navy. (2013). *U.S. Navy Strategic Planning Process for Marine Species Monitoring*.

U.S. Department of the Navy. (2014). Marine Species Monitoring Report for the U.S. Navy's Atlantic Fleet Active Sonar Training (AFAST) and Virginia Capes, Cherry Point, Jacksonville, and Gulf of Mexico Range Complexes - Annual Report 2013: Department of the Navy, United States Fleet Forces Command, Norfolk, VA.

U.S. Department of the Navy. (2017a). *Quantitative Analysis for Estimating Acoustic and Explosive Impacts to Marine Mammals and Sea Turtles*. Space and Naval Warfare System Command, Pacific and Naval Undersea Warfare Center, Newport.

U.S. Department of the Navy. (2017b). U.S. Navy Marine Species Density Database Phase III for the Atlantic Fleet Training and Testing Study Area *NAVFAC Atlantic Technical Report* (Vol. Naval Facilities Engineering Command Atlantic, pp. 277). Norfolk, VA.

U.S. Navy Marine Mammal Program. (2017). *Marine Mammal Strandings Associated with U.S. Navy Sonar Activities*. SPAWAR Systems Center Pacific.

Von Benda-Beckmann, A. M., P. J. Wensveen, P. H. Kvadsheim, F. P. Lam, P. J. Miller, P. L. Tyack, & M. A. Ainslie. (2014). Modeling effectiveness of gradual increases in source level to mitigate effects of sonar on marine mammals. *Conservation Biology, 28*(1), 119–128.

Waring, G. T., E. Josephson, K. Maze-Foley, & P. E. Rosel, (Eds.). (2014). *U.S. Atlantic and Gulf of Mexico Marine Mammal Stock Assessments–2013*. Woods Hole, MA: US Department of Commerce, National Marine Fisheries Service.

Waring, G. T., E. Josephson, K. Maze-Foley, P. E. Rosel, (Eds.), B. Byrd, T. V. N. Cole, L. Engleby, L. P. Garrison, J. Hatch, A. Henry, S. C. Horstman, J. Litz, M. C. Lyssikatos, K. D. Mullin, C. Orphanides, R. M. Pace, D. L. Palka, M. Soldevilla, & F. W. Wenzel. (2016). *U.S. Atlantic and Gulf of Mexico Marine Mammal Stock Assessments–2015*.

Waring, G. T., K. Maze-Foley, & P. E. Rosel, (Eds.). (2015). *US Atlantic and Gulf of Mexico Marine Mammal Stock Assessments–2014*.

Weinrich, M., M. Martin, R. Griffiths, J. Bove, & M. Schilling. (1997). A shift in distribution of humpback whales, *Megaptera novaeangliae*, in response to prey in the southern Gulf of Maine. *Fishery Bulletin, 95*(4), 826–836.

Weinrich, M. T., R. D. Kenney, & P. K. Hamilton. (2000). Right whales (*Eubalaena glacialis*) on Jeffreys Ledge: A habitat of unrecognized importance? . *Marine Mammal Science, 16*(2), 326–337.

Weinrich, M. T., & A. E. Kuhlberg. (1991). Short-term association patterns of humpback whale (*Megaptera novaeangliae*) groups on their feeding grounds in the southern Gulf of Maine. *Canadian Journal of Zoology, 69*(12), 3005–3011.

Weinrich, M. T., K. Sardi, & C. Pekarcik. (2005). Fall boat-based surveys on Jeffrey's Ledge for North Atlantic right whales distribution, abundance, behavior, ecology, photo-identification: a semi-annual report, September 1, 2004−March 1, 2005 *Submitted in fulfillment of award number: NA04NMF4720401*. Gloucester, MA: The New England Whale Center of New England.

Weller, D. W. (1998). *Global and regional variation in the biology and behavior of bottlenose dolphins* (PhD. PhD. Dissertation), Texas A&M University, College Station, TX.

Weller, D. W., B. Wursig, S. K. Lynn, & A. J. Schiro. (2000). Preliminary findings on the occurrence and site fidelity of photo-identified sperm whales (*Physeter macrocephalus*) in the northern Gulf of Mexico. *Gulf of Mexico Science, 18*(1), 35–39.

Whitehead, H. (1982). Populations of humpback whales in the northwest Atlantic. *Reports of the International Whaling Commission, 32*, 345–353.

Whitt, A. D., K. Dudzinski, & J. R. Laliberté. (2013). North Atlantic right whale distribution and seasonal occurrence in nearshore waters off New Jersey, USA, and implications for management. *Endangered Species Research, 20*(1), 59–69.

Winn, H. E., J. D. Goodyear, R. D. Kenney, & R. O. Petricig. (1995). Dive patterns of tagged right whales in the Great South Channel. *Continental Shelf Research, 15*(4-5), 593–611.

Würsig, B., T. A. Jefferson, & D. J. Schmidly. (2000). *The marine mammals of the Gulf of Mexico*: Texas A&M University Press.

Zitterbart, D. P., L. Kindermann, E. Burkhardt, & O. Boebel. (2013). Automatic round-the-clock detection of whales for mitigation from underwater noise impacts. *PLoS ONE, 8*(8), e71217.

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