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50 CFR Part 218

Taking and Importing Marine Mammals; Taking Marine Mammals Incidental to U.S. Marine Corps Training Exercises at Brant Island Bombing Target and Piney Island Bombing Range, USMC Cherry Point Range Complex, North Carolina; Proposed Rule

DEPARTMENT OF COMMERCE

National Oceanic and Atmospheric Administration

50 CFR Part 218

[Docket No. 131119976–3976–01]

RIN 0648–BD79

Taking and Importing Marine Mammals; Taking Marine Mammals Incidental to U.S. Marine Corps Training Exercises at Brant Island Bombing Target and Piney Island Bombing Range, USMC Cherry Point Range Complex, North Carolina

AGENCY: National Marine Fisheries Service (NMFS), National Oceanic and Atmospheric Administration (NOAA), Commerce.

ACTION: Proposed rule; request for comments.

SUMMARY: NMFS has received a request from the U.S. Marine Corps (Marine Corps) for authorization to take marine mammals, specifically bottlenose dolphins (*Tursiops truncatus*), by harassment, incidental to training operations at the Marine Corps' Cherry Point Range Complex, North Carolina from September 2014 to September 2019. In this action, NMFS proposes to amend the regulations to establish a framework for authorizing the take of marine mammals incidental to the Marine Corps' military training operations, and to issue a subsequent Letter of Authorization to the Marine Corps, which would contain mitigation, monitoring, and reporting requirements. Per the Marine Mammal Protection Act (MMPA), NMFS requests comments on its proposal to issue regulations and a subsequent Letter of Authorization to the Marine Corps.

DATES: NMFS must receive comments on or before August 14, 2014.

ADDRESSES: You may submit comments on this document, identified by NOAA–NMFS–2014–0082, by any one of the following methods:

- *Electronic Submissions:* Submit all electronic public comments via the Federal e-Rulemaking Portal. Go to: *http://www.regulations.gov/#!docketDetail;D=NOAA-NMFS-2014-0082,* click the ''Comment Now!'' icon, complete the required fields, and enter or attach your comments.
- *Mail:* Submit written comments to the Chief, Permits and Conservation Division, Office of Protected Resources, National Marine Fisheries Service, 1315 East-West Highway, Silver Spring, MD 20910–3225.

Instructions: NMFS may not consider comments sent by any other method, to any other address or individual, or received after the end of the comment period. All comments received are a part of the public record and *http://www.regulations.gov* will generally post comments for public viewing without change. All personal identifying information (e.g., name, address, etc.), confidential business information, or otherwise sensitive or protected information voluntarily submitted by the commenter may be publicly accessible. NMFS will accept anonymous comments (enter N/A in the required fields if you wish to remain anonymous) and attachments to electronic comments in Microsoft Word, Excel, or Adobe PDF file formats only.

The public may obtain a copy of the Marine Corps' application containing a list of references used in this document by visiting the Web page at: *http://www.nmfs.noaa.gov/pr/permits/incidental.htm#applications.* The public may also view documents cited in this proposed rule, by appointment, during regular business hours at the above address. To help NMFS process and review comments more efficiently, please use only one of the described methods to submit comments.

FOR FURTHER INFORMATION CONTACT: Jeannine Cody, National Marine Fisheries Service, Office of Protected Resources, (301) 427–8401.

SUPPLEMENTARY INFORMATION:

Executive Summary

This proposed regulation, under the Marine Mammal Protection Act (MMPA; 16 U.S.C. 1361 *et seq.*), establishes a framework for authorizing the take of marine mammals incidental to the Marine Corps' military training operations at the Brant Island Bombing Target (BT–9) and Piney Island Bombing Range (BT–11) located within the Marine Corps' Cherry Point Range Complex in Pamlico Sound, North Carolina.

The Marine Corps conducts military training to meet its statutory responsibility to organize, train, equip, and maintain combat-ready forces. The Marine Corps training activities include air-to-ground weapons delivery, weapons firing, and water-based training occurring at the BT–9 and BT–11 bombing targets located within the Marine Corps' Cherry Point Range Complex in Pamlico Sound, North Carolina. The Marine Corps' training activities are military readiness activities under the MMPA as defined by the National Defense Authorization Act for Fiscal Year 2004 (NDAA; Public Law 108–136).

Purpose and Need for This Regulatory Action

NMFS received an application from the Marine Corps requesting 5-year regulations and one, 5-year Letter of Authorization to take marine mammals, specifically bottlenose dolphins (*Tursiops truncatus*), by harassment, injury, and mortality incidental to training operations at BT–9 and BT–11 bombing targets from September 2014 to September 2019. These operations, which constitute a military readiness activity, have the potential to cause behavioral disturbance, serious injury, and mortality to marine mammals.

Section 101(a)(5)(A) of the MMPA directs the Secretary of Commerce (Secretary) to allow, upon request, the incidental, but not intentional taking of small numbers of marine mammals by U.S. citizens who engage in a specified activity (other than commercial fishing) within a specified geographical region if, after notice and public comment, the agency makes certain findings and issues regulations.

This proposed regulation would establish a framework to authorize take of marine mammals, incidental to the Marine Corps' training exercises through NMFS' issuance of one, 5-year Letter of Authorization to the Marine Corps, which would contain mitigation, monitoring, and reporting requirements.

Legal Authority for the Regulatory Action

Section 101(a)(5)(A) of the MMPA and our implementing regulations at 50 CFR part 216, subpart I provide the legal basis for issuing the 5-year regulations and subsequent Letter of Authorization. In the case of military readiness activities, such as those proposed to be conducted by the Marine Corps, the specified geographical region and small numbers provisions of section 101(a)(5)(A) do not apply.

Summary of Major Provisions Within the Proposed Regulation

The following provides a summary of some of the major provisions within this proposed rulemaking for the Marine Corps' training exercises at Brant Island Bombing Target–BT–9 and Piney Island Bombing Range–BT–11 in Pamlico Sound, North Carolina. The Marine Corps' adherence to the proposed mitigation, monitoring, and reporting measures listed below would achieve the least practicable adverse impact on the affected marine mammals. They include:

• Required pre- and post-exercise monitoring of the training areas to detect the presence of marine mammals during training exercises.

• Required monitoring of the training areas during active training exercises with required suspensions/delays of training activities if a marine mammal enters within designated mitigation zones.

• Required reporting of stranded or injured marine mammals in the vicinity of the BT–9 and BT–11 bombing targets located within the Marine Corps' Cherry Point Range Complex in Pamlico Sound, North Carolina to the NMFS Marine Mammal Stranding Network.

• Required research on a real-time acoustic monitoring system to automate detection of bottlenose dolphins in the training areas.

Cost and Benefits

This proposed rule, specific only to the Marine Corps' training activities in BT–9 and BT–11 bombing targets, is not significant under Executive Order 12866—Regulatory Planning and Review.

Availability of Supporting Information

In 2009, the Marine Corps prepared an Environmental Assessment (EA) titled, ''Environmental Assessment MCAS Cherry Point Range Operations,'' in accordance with the National Environmental Policy Act (NEPA; 42 U.S.C. 4321 *et seq.*) and the regulations published by the Council on Environmental Quality. The EA is available at: *http://www.nmfs.noaa.gov/pr/permits/incidental.htm#applications.* In 2009, the Marine Corps issued a Finding of No Significant Impact (FONSI) for its activities, which is also available at the same internet address.

After evaluating the Marine Corps' application and the 2009 EA, NMFS has determined that there are changes to the proposed action (i.e., increased ammunitions levels) and new environmental impacts (i.e., the use of revised thresholds for estimating potential impacts on marine mammals from explosives) not addressed in the 2009 document. Thus, NMFS has determined that a Supplemental Environmental Assessment (SEA) is necessary, and the agency intends to prepare a SEA incorporating relevant portions of the Marine Corps' EA by reference. Information in the Marine Corps' application including the 2014 addendum, its 2009 EA, and this notice of proposed rulemaking collectively provide the environmental information related to the proposed regulations and subsequent 5-year Letter of Authorization for public review and comment. NMFS will review all comments submitted in response to this notice as we complete the NEPA process, including whether to issue a FONSI, prior to finalizing the MMPA rulemaking.

SUPPLEMENTARY INFORMATION:

Background

Section 101(a)(5)(A) of the Marine Mammal Protection Act (MMPA; 16 U.S.C. 1361 *et seq.*) directs the Secretary to allow, upon request, the incidental, but not intentional taking of small numbers of marine mammals by U.S. citizens who engage in a specified activity (other than commercial fishing) within a specified geographical region if, after notice and public review, NMFS makes certain findings and issues regulations.

NMFS shall grant authorization for the incidental takings if the agency finds that the total taking will have a negligible impact on the species or stock(s), and will not have an unmitigable adverse impact on the availability of the species or stock(s) for subsistence uses (where relevant). Further, the authorization for incidental takings must set forth the permissible methods of taking; other means of effecting the least practicable adverse impact on the species or stock and its habitat; and requirements pertaining to the mitigation, monitoring, and reporting of such taking.

NMFS has defined ''negligible impact'' in 50 CFR 216.103 as ''an impact resulting from the specified activity that cannot be reasonably expected to, and is not reasonably likely to, adversely affect the species or stock through effects on annual rates of recruitment or survival.''

The National Defense Authorization Act of 2004 (NDAA; Public Law 108–136) removed the ''small numbers'' and ''specified geographical region'' limitations indicated earlier and amended the definition of harassment as it applies to a ''military readiness activity'' to read as follows: (i) Any act that injures or has the significant potential to injure a marine mammal or marine mammal stock in the wild [Level A Harassment]; or (ii) any act that disturbs or is likely to disturb a marine mammal or marine mammal stock in the wild by causing disruption of natural behavioral patterns, including, but not limited to, migration, surfacing, nursing, breeding, feeding, or sheltering, to a point where such behavioral patterns are abandoned or significantly altered [Level B Harassment].

Summary of Request

On January 28, 2013, NMFS received an application from the Marine Corps requesting a rulemaking and subsequent Letter of Authorization for the take of marine mammals incidental to training exercises conducted at Brant Island Bombing Target (BT–9) and Piney Island Bombing Range (BT–11) bombing targets at the USMC Cherry Point Range Complex located within Pamlico Sound, North Carolina.

On March 29, 2013, per the regulations at 50 CFR 216.104(b)(1)(i), NMFS began the public review process by publishing a Notice of Receipt in the **Federal Register** (78 FR 19224).

The Marine Corps plans to conduct weapons delivery training exercises (air-to-surface and surface-to-surface) at the two water-based bombing targets located within the Cherry Point Range Complex in North Carolina.

The proposed activities would occur between September 2014 and September 2019, year-round, day or night. The Marine Corps proposes to use small arms, large arms, bombs, rockets, grenades, and pyrotechnics for the air-to-surface and surface-to-surface training exercises, which qualify as military readiness activities.

The following specific aspects of the proposed exercises are likely to result in the take of marine mammals: exposure to sound and pressure from underwater detonations or direct strike by ordnance. Thus, the Marine Corps and NMFS anticipate that take, by Level B (behavioral) and Level A harassment of individuals of Atlantic bottlenose dolphin (*Tursiops truncatus*) would result from the training exercises. Due to the small potential for serious injury and mortality, the Marine Corps has also requested authorization for serious injury and mortality of up to 30 bottlenose dolphins over the course of the 5-year regulations.

The proposed regulations would establish a framework for authorizing incidental take in a future 5-year Letter of Authorization (LOA). The LOA, if approved, would authorize the take of Atlantic bottlenose dolphins (*Tursiops truncatus*), by Level A harassment, Level B (behavioral) harassment, and serious injury and mortality.

NMFS has issued three, one-year Incidental Harassment Authorizations to the Marine Corps under section 101(a)(5)(D) of the MMPA for the conduct of similar training exercises from 2010 to 2014 (75 FR 72807, November 26, 2010; 77 FR 87, January 3, 2012; and 78 FR 42042, July 15, 2013). The Marine Corps' current

Incidental Harassment Authorization expires in 2014.

NMFS is committed to the use of the best available science in its decision making. NMFS uses an adaptive, transparent process that allows for both timely scientific updates and public input into agency decisions regarding the use of acoustic research and thresholds. NMFS is currently in the process of re-evaluating acoustic thresholds based on the best available science, as well as how NMFS applies these thresholds under the MMPA to all activity types. This re-evaluation could potentially result in changes to the acoustic thresholds or their application as they apply to future Marine Corps training activities at BT–9 and BT–11. However, it is important to note that while changes in acoustic thresholds may affect the enumeration of ''takes,'' they do not necessarily change the evaluation of population level effects or the outcome of the negligible impact analysis. In addition, while acoustic criteria may also inform mitigation and monitoring decisions, the Marine Corps will implement an adaptive management program that will address new information allowing for the modification of mitigation and/or monitoring measures as appropriate.

Description of the Specified Activity

Overview

The Marine Corps must meet its statutory responsibility to organize, train, equip, and maintain combat-ready Marine Corps forces at the BT–9 and BT–11 bombing targets in Pamlico Sound, North Carolina. The bombing targets provide unique training environments and are of vital importance to the readiness of Marine Corps forces.

The types of ordnances proposed for use at the BT–9 and BT–11 bombing targets include gun ammunition (small and large arms), rockets, grenades, bombs, and pyrotechnics. Training for any activity may occur year-round, day or night, with no seasonal restrictions.

Active sonar is not a component of these specified training exercises and air-to-ground firing exercises do not impact the water; therefore, NMFS has not included a discussion of marine mammal harassment from active sonar operations within this notice.

Dates and Duration

The proposed activities would occur between September 2014 and September 2019. Each type of proposed exercise may occur year-round, day or night. Approximately 15 percent of the activities would occur at night.

NMFS proposes regulations to govern the Marine Corps' training activities at the BT–9 and BT–11 bombing targets within the USMC Cherry Point Range Complex to be effective from September 8, 2014 to September 7, 2019. The Marine Corps is requesting a 5-year Letter of Authorization for these activities.

Location of Proposed Activities

The Marine Corps administers and uses the BT–9 and BT–11 bombing targets (See Figure 1), located at the convergence of the Neuse River and Pamlico Sound, North Carolina, for the purpose of training military personnel in the skill of ordnance delivery by aircraft and small watercraft.

The BT–9 area is a water-based bombing target and mining exercise area located approximately 52 kilometers (km) (32.3 miles (mi)) northeast of Marine Air Corps Station Cherry Point. The U.S. Army Corps of Engineers, Wilmington District has defined a danger zone (prohibited area) by a 6 statute-mile (sm) diameter boundary around BT–9 (33 CFR 334.420). This restriction prohibits non-military vessels within the designated area. The BT–9 target area ranges in depth from 1.2 to 6.1 meters (m) (3.9 to 20 feet (ft)), with the shallow areas concentrated along the Brandt Island Shoal. The target itself consists of three ship hulls grounded on Brant Island Shoals, located approximately 4.8 km (3.0 mi) southeast of Goose Creek Island.

The BT–11 area encompasses a total of 50.6 square kilometers (km^2) (19.5 square miles (mi^2)) on Piney Island located in Carteret County, NC. The target prohibited area, at a radius of 1.8 sm, is roughly centered on Rattan Bay and includes approximately 9.3 km^2 (3.6 mi^2) of water and water depths range from 0.3 m (1.0 ft) along the shoreline to 3.1 m (10.1 ft) in the center of Rattan Bay. Water depths in the center of Rattan Bay range from approximately 2.4 to 3 m (8 to 10 ft) with bottom depths ranging from 0.3 to 1.5 m (1 to 5 ft) adjacent to the shoreline of Piney Island. The in-water stationary targets of BT–11 consist of a barge and patrol boat located in roughly the center of Rattan Bay. The Marine Corps also use on an intermittent basis for strafing at water- and land-based targets, a second danger zone, with an inner radius of 1.8 sm and outer radius of 2.5 sm and also roughly centered on Rattan Bay.

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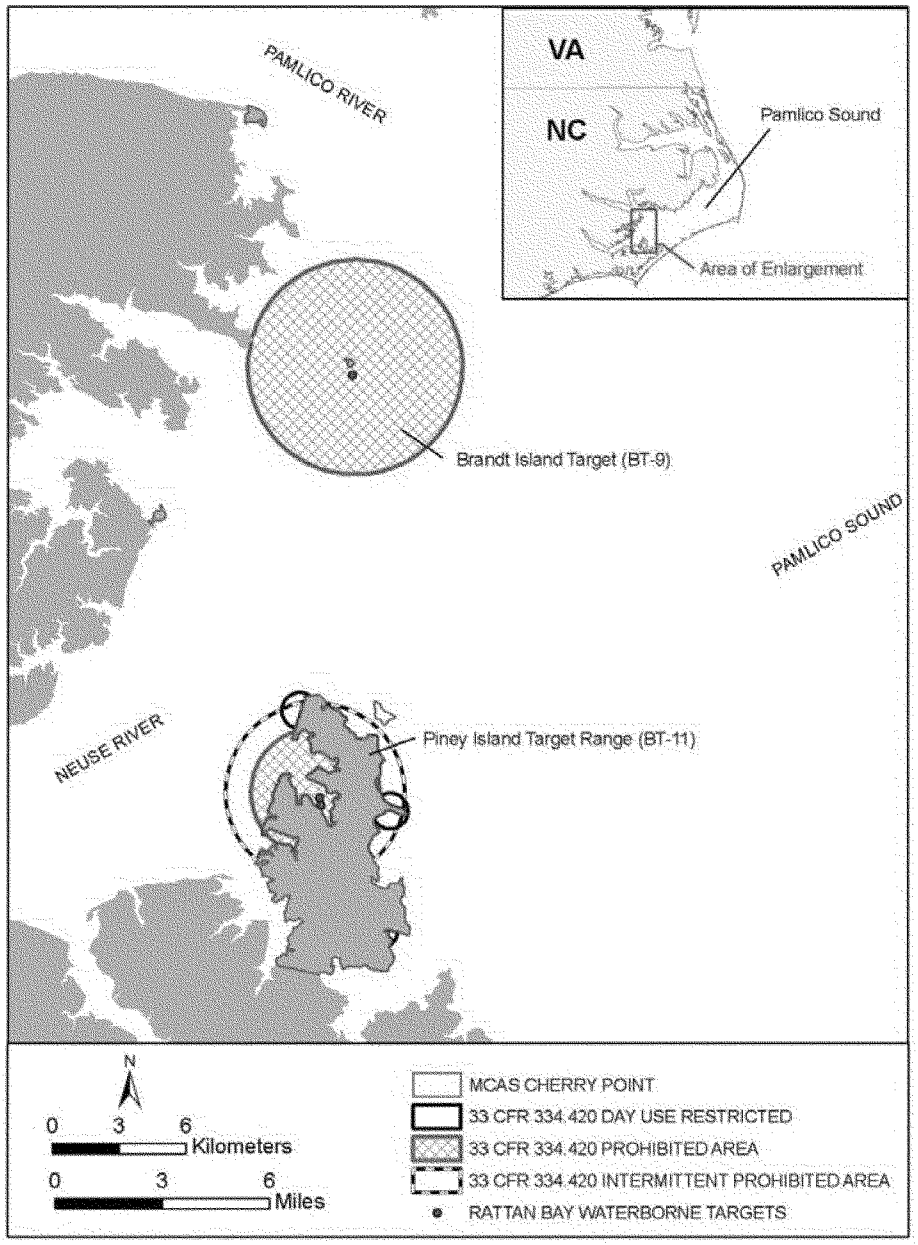

Figure 1. Brant Island Bombing Target (BT-9) and Piney Island Bombing Range (BT-11) bombing targets at the USMC Cherry Point Range Complex located within Pamlico Sound, North Carolina.

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The Marine Corps conducts all inert and live-fire exercises at BT–9 and BT–11 so that all ammunition and other ordnances strike and/or fall on the land or water-based targets or within the existing danger zones or water restricted areas. Military forces close danger zones to the public on an intermittent or full-time basis for hazardous operations such as target practice and ordnance firing. They also prohibit or limit public access to water restricted areas to provide security for government property and/or to protect the public from the risks of injury or damage that could occur from the government's use of that area (33 CFR 334.2). Surface danger zones are designated areas of rocket firing, target practice, or other hazardous operations (33 CFR 334.420). The surface danger zone (prohibited area) for BT–9 is a 4.8 km (3.0 mi) radius centered on the south side of Brant Island Shoal. The surface danger zone for BT–11 is a 2.9 km (1.8 mi) radius centered on a barge target in Rattan Bay. NMFS refers the reader to Section 3 of the Marine Corps' application for more detailed information on the locations and timing restrictions related to these zones.

Detailed Description of the Proposed Activities

The following sections describe the training activities that have the potential to affect marine mammals present within the BT–9 and BT–11 bombing targets. These activities fall into two categories based on the ordnance delivery method: (1) Surface-to-surface gunnery exercises; and (2) air-to-surface bombing exercises.

Surface-to-Surface Exercises

Gunnery exercises are the only category of surface-to-surface activity currently conducted within BT–9 or BT–11. Surface-to-surface gunnery firing exercises typically involve Special Boat Team personnel firing munitions from a machine gun and 40 mm grenade launchers at a water-based target or throwing concussion grenades into the water (e.g., not at a specific target) from a small boat. The number and type of boats used depend on the unit using the boat and the particular training mission. These include: Small unit river craft, combat rubber raiding craft, rigid hull inflatable boats, and patrol craft. These boats may use inboard or outboard, diesel or gasoline engines with either propeller or water jet propulsion systems.

The Marine Corps propose to use a maximum of six boats ranging in size from 7.3 to 26 m (24 to 85 ft) to conduct surface-to-surface firing activities. Each boat would travel between 0 to 20 knots (kts) (0 to 23 miles per hour (mph)) with an average of two vessels to approach and engage the intended targets. The boats typically travel in linear paths and do not operate erratically.

Boat sorties occur in all seasons and the number of sorties conducted at each range may vary from year to year based on training needs and worldwide operational tempo. The majority of boat sorties at BT–9 originate from Marine Corps Air Station Cherry Point's Navy boat docks, but they may also originate from the State Port in Morehead City, NC, Marine Corps Base Camp Lejeune, and U.S. Coast Guard Station Hobucken in Pamlico Sound. The majority of boat sorties at BT–11 originate from launch sites within the range complex.

There is no specific schedule associated with the use of BT–9 or BT–11 by the small boat teams. However, the Marine Corps schedules the exercises for 5-day blocks with exercises at various times throughout the year. Variables such as deployment status, range availability, and completion of crew specific training requirements influence the exercise schedules. Table 1 in this document outlines the number of surface-to-surface exercises that occurred between 2011 and 2013 by bombing target area.

TABLE 1—COUNTS OF SURFACE-TO-SURFACE SORTIES CONDUCTED IN CALENDAR YEARS 2011, 2012, AND 2013 IN BT–9 AND BT–11

Year	BT–9	BT–11
2011	223	105
2012	322	106
2013	87	62

The direct-fire gunnery exercises (i.e., all targets are within the line of sight of the military personnel) at BT–9 would typically use 7.62 millimeter (mm) or .50 caliber (cal) machine guns; 40 mm grenade machine guns; or G911 concussion hand grenades. The proposed exercises at BT–9 are usually live-fire exercises. At times Marine Corps personnel would use blanks (inert ordnance) so that the boat crews could practice ship-handling skills during training without being concerned with the safety requirements involved with live weapons.

The Marine Corps estimates that it could conduct up to approximately 354 vessel-based sorties annually at BT–9. This estimate includes the highest number of sorties conducted over the past three years (322) plus an additional 10 percent increase (32) in sorties to account for interannual variation based on future training needs and worldwide operational tempo.

The direct-fire gunnery exercises at BT–11 would include the use of small arms, large arms, bombs, rockets, and pyrotechnics. All munitions fired within the BT–11 range are non-explosive with the exception of the small explosives in the single charges. No live firing occurs at BT–11. The Marine Corps estimates that it could conduct up to approximately 117 vessel-based sorties annually at BT–11. This estimate includes the highest number of sorties conducted over the past three years (106) plus an additional 10 percent increase (11) in sorties to account for interannual variation based on future training needs and worldwide operational tempo.

Air-to-Surface Exercises

Air-to-surface training exercises involve fixed-, rotary-, or tilt-wing aircraft firing munitions at targets on the water's surface or on land (as in the case of BT–11). There are four types of air-to-surface activities conducted within BT–9 and BT–11. They include: Mine laying, bombing, gunnery, or rocket exercises. Table 2 in this document outlines the number of air-to-surface exercises that occurred in 2011, 2012, and 2013 by bombing target area.

TABLE 2—COUNTS OF AIR-TO-SURFACE EXERCISES CONDUCTED IN CALENDAR YEARS 2011, 2012, AND 2013 IN BT–9 AND BT–11

Year	BT–9	BT–11
2011	1,554	4,251
2012	842	11,706
2013	407	1,177

The Marine Corps estimates that it could conduct up to approximately 1,709 air-based based sorties annually at BT–9. This estimate includes the highest number of sorties conducted over the past three years (1,554) plus an additional 10 percent increase (155) in sorties to account for interannual variation based on future training needs and worldwide operational tempo.

For the BT–11 area, the Marine Corps estimates that it could conduct up to approximately 12,877 air-based based sorties annually. This estimate includes the highest number of sorties conducted over the past three years (11,706) plus an additional 10 percent increase (1,171) in sorties to account for interannual variation based on future training needs and worldwide operational tempo.

The following sections provide more detail on each exercise type that the Marine Corps proposes to conduct over the next five years.

Mine Laying Exercises: Aircraft With Inert Shapes

Mine laying exercises are simulations only, meaning that mine detonations would not occur during training. These exercises, regularly conducted at the BT–9 bombing target, involve the use of fixed-wing aircraft (F/A–18F Hornet Strike Fighter, P–3 Orion, or P–8 Poseidon) flying undetected to the target area using either a low- or high-altitude tactical flight pattern. When the aircraft reaches the target area, the pilot would deploy a series of inert mine shapes in an offensive or defensive pattern into the water. The aircraft would make multiple passes along a pre-determined flight azimuth dropping one or more of the inert shapes each time.

The mine-laying exercises at BT–9 would include the use of MK–62, MK–63, MK–76, BDU–45, and BDU–48 inert training shapes. Each inert shape weighs 500, 1000, 25, 500, and 10 pounds (lbs), respectively.

Bombing Exercises: Fixed-Wing Aircraft With Inert Bombs

Pilots train to destroy or disable enemy ships or boats during bombing exercises. These exercises, conducted at BT–9 or BT–11, normally involve the

use of two to four fixed-wing aircraft (i.e., an F/A–18F Hornet Strike Fighter or AV–8 Harrier II) approaching the target area from an altitude of approximately 152 m (500 ft) up to 4,572 m (15,000 ft). When the aircraft reach the target area, they establish a predetermined racetrack pattern relative to the target and deliver the bombs. Participating aircraft follow the same flight path during subsequent target ingress, ordnance delivery, target egress, and downwind pattern. The Marine Corps uses this type of pattern to ensure that only one aircraft releases ordnance at any given time.

The pilots deliver the bombs against targets at BT–9 or BT–11, day or night; the average time to complete this type of exercise is approximately one hour. There is no set level or pattern of amount of sorties conducted and there are no cluster munitions authorized for use during bombing exercises.

The bombing exercises would typically use unguided MK–76, BDU–45, MK–82, and MK–83 inert training bombs (25, 500, 500, and 1,000 lbs, respectively); precision-guided munitions consisting of laser-guided bombs (inert); and laser-guided training rounds (inert, but contains a small impact-initiated spotting charge).

For unguided munitions, the typical release altitudes are 914 m (3,000 ft) or above 4,572 m (15,000 ft). The typical release altitude for precision-guided munitions is 1.8 km (1.1 mi) or greater in altitude. For laser-guided munitions, onboard laser designators, laser designators from support aircraft, or ground support personnel use lasers to illuminate the certified targets. For either weapons delivery system, the lowest minimum altitude for ordnance delivery (inert bombs) would be 152 m (500 ft).

Gunnery Exercises: Aircraft With Cannons

During air-to-surface gunnery exercises with cannons, pilots train to destroy or disable enemy ships, boats, or floating/near-surface mines from aircraft with mounted cannons equal to or larger than 20 mm. The Marine Corps proposes to use either fixed-wing (F/A–18F Hornet Strike Fighter or an AV–8 Harrier II) or rotary-wing (AH–1 Super Cobra), tilt-rotor (V–22), and other aircraft to conduct gunnery exercises at BT–9 or BT–11. During the exercise (i.e., strafing run), two aircraft would approach the target area from an altitude of approximately 914 m (3,000 ft) and within a distance of 1,219 m (4,000 ft) from the target, begin to fire a burst of approximately 30 rounds of munitions before reaching an altitude of 305 m (1,000 ft) to break off the attack. Each aircraft would reposition for another strafing run until each aircraft expends its exercise ordnance of approximately 250 rounds (approximately 8–12 passes per aircraft per exercise). This type of gunnery exercise would typically use a Vulcan M61A1/A2, 20 mm cannon or a GAU–12, 25 mm cannon. The Marine Corps proposes to use inert munitions for these exercises. The aircraft deliver the ordnance against targets at BT–9 or BT–11, day or night. The average time to complete this type of exercise is approximately 1 hour.

Gunnery Exercises: Aircraft With Machine Guns

During air-to-surface gunnery exercises with machine guns, pilots train to destroy or disable enemy ships, boats, or floating/near-surface mines with aircraft using mounted machine guns. The Marine Corps proposes to use rotary-wing (CH–52 Super Stallion, UH–1 Iroquois Huey, CH–46 Sea Knight, MV–22 Osprey, or H–60 Hawk series, and other types) aircraft to conduct gunnery exercises at BT–9 or BT–11. During the exercise an aircraft would fly around the target area at an altitude between 15 and 30 m (50 and 100 ft) in a 91 m (300 ft) racetrack pattern around the water-based target. Each gunner would expend approximately 400 rounds of 7.62 mm ammunition and 200 rounds of .50 cal ammunition in each exercise. The aircraft deliver the ordnance against the bombing targets at BT–9 or BT–11, day or night. The average time to complete this type of exercise is approximately one hour.

Rocket Exercises

The Marine Corps proposes to carry out rocket exercises similar to the bombing exercises. Fixed- and rotary-wing aircraft crews launch rockets at surface maritime targets, day and night, to train for destroying or disabling enemy ships or boats. These operations employ 2.75-inch and 5-inch rockets (4.8 and 15.0 lbs net explosive weight, respectively). Generally, personnel would deliver an average of approximately 14 rockets per sortie. As with the bombing exercises, there is no set level or pattern of amount of sorties conducted.

Munitions and Estimated Annual Expenditures

Tables 3 and 4 in this document provide a list and expenditure levels of the live and inert ordnance proposed for use at BT–9 and BT–11, respectively.

There are several varieties of ordnance and net explosive weights (for live munition used at BT–9) can vary according to type. All practice bombs are inert but simulate the same ballistic properties of service type bombs. They are either solid cast metal bodies or thin sheet metal containers. Since practice bombs contain no explosive filler, a practice bomb signal cartridge (smoke) serves as a visual observation of weapon target impact.

High explosive detonations convert almost instantly into a gas at very high pressure and temperature. Under the pressure of the gases generated, the weapon case expands and breaks into fragments. The air surrounding the casing compresses and transmits a shock (blast) wave. Typical initial values for a high-explosive weapon are 200 kilobars of pressure (1 bar = 1 atmosphere) and 5,000 degrees Celsius (9,032 degrees Fahrenheit).

The Marine Corps proposes to use five types of explosive sources at BT–9: 2.75-inch Rocket High Explosives, 5-inch Rocket High Explosives, 30 mm High Explosives, 40 mm High Explosives, and G911 grenades. All munitions proposed for use at BT–11are inert (not live).

TABLE 3—TYPE OF ORDNANCE, NET EXPLOSIVE WEIGHT, AND PROPOSED LEVELS OF ANNUAL EXPENDITURES AT BT–9

Proposed ordnance	Net explosive weight in pounds (lbs)	Proposed number of rounds
Small arms excluding .50 cal (7.62 mm)	N/A, inert	525,610
.50 cal	N/A, inert	568,515
Large arms—live (30 mm)	0.1019	3,432
Large arms—live (40 mm)	0.1199	10,420
Large arms—inert (20, 25, 30, and 40 mm)	N/A	120,405
Rockets—live (2.75-inch)	4.8	220
Rockets—live (5-inch)	15.0	68

TABLE 3—TYPE OF ORDNANCE, NET EXPLOSIVE WEIGHT, AND PROPOSED LEVELS OF ANNUAL EXPENDITURES AT BT–9—Continued

Proposed ordnance	Net explosive weight in pounds (lbs)	Proposed number of rounds
Rockets—inert (2.75-inch rocket, 2.75-inch illumination, 2.75-inch white phosphorus, 2.75-inch red phosphorus; 5-inch rocket, 5-inch illumination, 5-inch white phosphorus, 5-inch red phosphorus).	N/A	844
Grenades—live (G911)	0.5	144
Bombs—inert (BDU–45 practice bomb, MK–76 practice bomb, MK–82 practice bomb, MK–83 practice bomb).	0.083800–0.1676 signal cartridge only	4,460
Pyrotechnics—inert (chaff, LUU–2, self-protection flares)	N/A	4,496

TABLE 4—TYPE OF ORDNANCE, NET EXPLOSIVE WEIGHT, AND PROPOSED LEVELS OF ANNUAL EXPENDITURES AT BT–11

Proposed ordnance	Net explosive weight in pounds (lbs)	Proposed number of rounds
Small arms excluding .50 cal (7.62 mm)	N/A, inert	610,957
.50 cal	N/A, inert	366,775
Large arms—inert (20, 25, 30, and 40 mm)	N/A	240,334
Rockets—inert (2.75-inch rocket, 2.75-inch illumination, 2.75-inch white phosphorus, 2.75-inch red phosphorus; 5-inch rocket, 5-inch illumination, 5-inch white phosphorus, 5-inch red phosphorus).	N/A	5,592
Bombs—inert (BDU–45 practice bomb, MK–76 practice bomb, MK–82 practice bomb, MK–83 practice bomb).	0.083800–0.1676 signal cartridge only	22,114
Pyrotechnics—inert (chaff, LUU–2, self-protection flares, SMD SAMS).	N/A	8,912

The Marine Corps estimates that the 5-year level of expended ordnance at BT–9 and BT–11 (both surface-to-surface and air-to-surface) would be approximately 6,193,070 and 6,273,420 rounds, respectively. The approximate annual quantities of ordnance listed in Tables 3 and 4 represent conservative figures, meaning that the volume of each type of inert and explosive ordnance proposed for is the largest number that personnel could expend annually.

The Marine Corps realizes that its evolving training programs, linked to real world events, necessitate flexibility regarding the amounts of ordnance used in air-to-surface and surface-to-surface exercises. Thus, this proposed rule would account for inter-annual variability in ordnance expenditures over the course of the five years. NMFS refers the reader to Table 2–2 of the Marine Corps' application for a complete list of munitions authorized for use at the Marine Corps Air Station Cherry Point Range Complex.

Acoustic Characteristics of Ordnance

Noise generated by live or inert ordnance impacting the water and associated detonations from live ordnance may present some risk to bottlenose dolphins. Estimates of the noise fields generated in water by the impact of non-explosive (inert) ordnance indicate that the energy radiated is about one to two percent of the total kinetic energy of the impact. This energy level (and likely peak pressure levels) is well below the thresholds for predicting potential physical impacts from underwater pressure waves, because the firing of an inert projectile does not create an explosion even at 1 m (3 ft) from the impact. Therefore, NMFS and the Marine Corps do not expect that the noise generated by the in-water impact of inert ordnance would have the potential to take of marine mammals within the action area. Thus, NMFS will not consider the acoustic impacts of inert ordnance further in this document.

However, live ordnance detonated underwater introduces loud, impulsive broadband (producing sound over a wide frequency band) sounds into the marine environment and does have the potential to take marine mammals. Broadband explosives produce significant acoustic energy across several frequency decades of bandwidth. Propagation loss is sufficiently sensitive to frequency as to require model estimates at several frequencies over such a wide band. Three source parameters influence the effect of an explosive: The weight of the explosive material, the type of explosive material, and the detonation depth. The net explosive weight (or NEW) accounts for the first two parameters. The ordnance's NEW is the weight of trinitrotoluene (TNT) that produces an equivalent explosive power. The detonation depth of an explosive is particularly important due to a propagation effect known as surface-image interference. For sources located near the sea surface, a distinct interference pattern arises from the coherent sum of the two paths that differ only by a single reflection from the pressure-release surface. As the source depth and/or the source frequency decreases, these two paths increasingly and destructively interfere with each other, reaching total cancellation at the surface (barring surface-reflection scattering loss).

For this proposed rulemaking, the Marine Corps proposes to use five types of explosive sources: 2.75-inch rocket high explosives, 5-inch rocket high explosives, 30 mm high explosives, 40 mm high explosives, and G911 grenades.

The firing sequence for some of the munitions consists of a number of rapid bursts, often lasting a second or less. The maximum firing time is 10 to 15 second bursts. Due to the tight spacing in time, the Marine Corps considers each burst as a single detonation. For the energy metrics, the Marine Corps

considers the impact area of a burst using a source energy spectrum that is the source spectrum for a single detonation scaled by the number of rounds in a burst. For the pressure metrics, the impact area for a burst is the same as the impact area of a single round. For all metrics, the cumulative impact area of an event consisting of a certain number of bursts is the product of the impact area of a single burst and the number of bursts, as would be the case if the bursts are sufficiently spaced in time or location as to insure that each burst is affecting a different set of marine wildlife.

Table 5 provides a comparison of the live explosive ordnance proposed for use during 2014 through 2019. Table 5 lists the number of rounds per burst by ordnance; the acoustic characteristics of the proposed ordnance including the peak one-third octave (OTO) source level (SL); and the approximate frequency at which the peak occurs.

TABLE 5—PROPOSED LEVELS OF ORDNANCE, NET EXPLOSIVE WEIGHT, SOURCE LEVELS, AND CENTER FREQUENCIES

Proposed ordnance	New (lbs)	Rounds per burst	Source level of peak 1/3 octave (decibels, dB)	Center frequency of peak 1/3 octave (hertz, Hz)
Large arms—live (30 mm)	0.1019	30	207 dB re: 1μPa	4,032
Large arms—live (40 mm)	0.1199	5	208 dB re: 1μPa	4,032
Rockets—live (2.75-inch)	4.8	1	224 dB re: 1μPa	1,270
Rockets—live (5-inch)	15.0	1	229 dB re: 1μPa	1,008
Grenades—live (G911)	0.5	1	214 dB re: 1μPa	2,540

For ordnance detonated at shallow depths, often the source level of the explosion may breech the surface with some of the acoustic energy escaping the water column. The source levels presented in Table 5 do not account for possible venting of the acoustic energy through the water surface which the Marine Corps expects to be minor because of the low source net explosive weights and detonation depth of 1.2 m (3.9 ft).

Description of Marine Mammals in the Area of the Specified Activity

There is one species of marine mammal with possible or confirmed occurrence in the area of the specified activity: The Atlantic bottlenose dolphin (*Tursiops truncatus*) which routinely frequents Pamlico Sound (Lefebvre *et al,* 2001; DoN 2003). The region of influence for the proposed project includes estuarine waters, and does not include offshore waters.

Four out of the seven designated coastal stocks for bottlenose dolphins may occur within the proposed activity area. They include: The Western North Atlantic Northern Migratory Coastal; Western North Atlantic Southern Migratory; Northern North Carolina Estuarine System; and the Southern North Carolina Estuarine System stocks. Dolphins encountered at BT–9 and BT–11 would most likely belong to the Northern North Carolina Estuarine System and the Southern North Carolina Estuarine System stocks.

Table 6 in this document presents information on the abundance, status, and distribution of the four stocks. The reader may also refer to Section 4 of the Marine Corps' application, their 2014 application addendum, and Chapter 3 of the Marine Corps' EA for more detailed information. NMFS summarizes this information and presents updated information on the species' abundance, status, and distribution from the 2013 NMFS Stock Assessment Report. The publication is available at *http://www.nmfs.noaa.gov/pr/sars/pdf/ao2013.pdf.*

TABLE 6—GENERAL INFORMATION ON THE SPECIES/STOCKS THAT COULD POTENTIALLY OCCUR IN THE PROPOSED ACTIVITY AREAS, 2014 THROUGH 2019

Bottlenose dolphin stocks	Regulatory status [1] [2]	Stock/species abundance	Occurrence and range	Season
Western North Atlantic Northern Migratory Coastal (NMC).	MMPA—D ESA—NL	11,548 (CV = 0.36)	Occasional Coastal	Winter.
Western North Atlantic Southern Migratory (SMC).	MMPA—D ESA—NL	9,173 (CV = 0.46)	Occasional Coastal	Winter.
Northern North Carolina Estuarine System (NNCES).	MMPA—S ESA—NL	950 (CV = 0.23)	Common Estuarine	Summer–Fall.
Southern North Carolina Estuarine System (SNCES).	MMPA—S ESA—NL	118 (CV = 0.19)	Common Estuarine	Late Summer.

[1] MMPA: D = Depleted, Strategic Stock; S = Strategic Stock only; NC = Not Classified.
[2] ESA: NL = Not listed.

Bottlenose Dolphins

The bottlenose dolphin is one of the most well-known species of marine mammals. They have a robust body and a short, thick beak. Their coloration ranges from light gray to black with lighter coloration on the belly. Inshore and offshore individuals vary in color and size. Inshore animals are smaller and lighter in color, while offshore animals are larger, darker in coloration and have smaller flippers.

Bottlenose dolphins range in lengths from 1.8 to 3.8 m (6.0 to 12.5 ft) with males slightly larger than females. Adults weight from 300–1,400 lbs (136–635 kg). Generally, the species has a lifespan of 40 to 45 years for males and more than 50 years for females.

Sexual maturity varies by population and ranges from five to 13 years for females and 9 to 14 years for males. Calves, born after a 12-month gestation period, generally wean at 18 to 20 months. On average, calving occurs every 3 to 6 years.

Bottlenose dolphins are generalists and feed on a variety of prey items ''endemic'' to their habitat, foraging individually and cooperatively. Like other dolphins, bottlenose dolphins use high frequency echolocation to locate and capture prey. Coastal animals prey on benthic invertebrates and fish, and offshore animals feed on pelagic squid and fish.

Western North Atlantic Northern Migratory Coastal (NMC) Stock: This stock is not listed as threatened or endangered under the Endangered Species Act (ESA; 16 U.S.C. 1531 *et seq.*); however, it is categorized as depleted (and thus strategic) under the MMPA. The best available abundance estimate for the NMC stock is 11,548 animals (Waring *et al.,* 2014). However, there is insufficient data to determine the population trends for this stock.

Based on aerial survey data, tag-telemetry studies, photo-identification data, and genetic studies, the NMC stock of bottlenose dolphins occur along the North Carolina coast and as far north as Long Island, New York (CETAP, 1982; Kenney, 1990; Garrison *et al.,* 2003; Waring *et al.,* 2014). During summer months (July–September), this stock occupies coastal waters from the shoreline to approximately the 25-m (82-ft) isobath between the Chesapeake Bay mouth and Long Island, New York. During the winter months (January–March), the stock moves south to waters of North Carolina and occupies coastal waters from Cape Lookout, North Carolina to the Virginia–North Carolina border (Barco and Swingle, 1996; Waring *et al.,* 2014).

Western North Atlantic Southern Migratory Coastal (SMC) Stock: This stock is not listed as threatened or endangered under the Endangered Species Act (ESA; 16 U.S.C. 1531 *et seq.*); however, it is categorized as depleted (and thus strategic) under the MMPA. The best available abundance estimate for the SMC stock is 9,173 animals (Waring *et al.,* 2014). However, there is insufficient data to determine the population trends for this stock.

Based on tag-telemetry studies, the SMC stock of bottlenose dolphins occur in coastal waters between southern North Carolina and Georgia, but the stock's migratory movements and spatial distribution are the most poorly understood of the coastal stocks (Waring *et al.,* 2014). During the fall (October–December), this stock occupies waters of southern North Carolina (South of Cape Lookout) where it overlaps spatially with the Southern North Carolina Estuarine System stock in coastal waters. In winter months (January–March), the SMC stock moves as far south as northern Florida where it overlaps spatially with the South Carolina/Georgia and Northern Florida Coastal stocks. In spring (April–June), the stock moves north to waters of North Carolina where it overlaps with the Southern North Carolina Estuarine System stock and the Northern North Carolina Estuarine System stock. In summer months (July–September), the stock most likely occupies coastal waters north of Cape Lookout, North Carolina, to the eastern shore of Virginia (Waring *et al.,* 2014).

Northern North Carolina Estuarine System (NNCES) Stock: This stock is not listed as threatened or endangered under the Endangered Species Act (ESA; 16 U.S.C. 1531 *et seq.*); however, it is categorized as strategic only (not depleted) under the MMPA. The best available abundance estimate for the NNCES stock is 950 animals (Waring *et al.,* 2014). However, there is insufficient data to determine the population trends for this stock.

Based on photo-identification studies, the NNCES stock of bottlenose dolphins occur in the estuarine waters of Pamlico Sound (Waring *et al.,* 2014). The ranging patterns of bottlenose dolphins in those studies support the presence of a group of dolphins within these waters that are distinct from both dolphins occupying estuarine and coastal waters in southern North Carolina and animals in the NMC and SMC stocks that occupy coastal waters of North Carolina at certain times of the year (Read *et al.,* 2003; NMFS, 2001; NMFS, unpublished data).

During summer and fall months (July–October), the NNCES stock occupies waters of Pamlico Sound and nearshore coastal (less than 1 km (3,280 ft) from shore) and estuarine waters of central and northern North Carolina to Virginia Beach and the lower Chesapeake Bay (Waring *et al.,* 2014). It likely overlaps with animals from the SMC stock in coastal waters during these months. During late fall and winter (November–March), the NNCES stock moves out of estuarine waters and occupies nearshore coastal waters between the New River and Cape Hatteras (Waring *et al.,* 2013). It overlaps with the NMC stock during this period, particularly between Cape Lookout and Cape Hatteras. It appears that the region near Cape Lookout including Bogue Sound and Core Sound is an area of overlap with the Southern North Carolina Estuarine System stock during late summer (Waring *et al.,* 2014).

Southern North Carolina Estuarine System (SNCES) Stock: This stock is not listed as threatened or endangered under the Endangered Species Act (ESA; 16 U.S.C. 1531 *et seq.*); however, it is categorized as strategic only (not depleted) under the MMPA. The best available abundance estimate for the SNCES stock is 118 animals (Waring *et al.,* 2014). However, there is insufficient data to determine the population trends for this stock.

Based on photo-identification studies, the SNCES stock of common bottlenose dolphins occupies estuarine and nearshore coastal waters (less than 3 km from shore) between the Little River Inlet Estuary, including the estuary and the New River (Waring *et al.,* 2014). During summer and fall months (July–October), the SNCES stock occupies estuarine and nearshore coastal waters (less than 3 km (1.7 mi) from shore) between the North Carolina–South Carolina border and Core Sound. It likely overlaps with the NNCES stock in the northern portion of its range (i.e., southern Pamlico Sound) during late summer (Waring *et al.,* 2014). During late fall through spring, the SNCES stock moves south to waters near Cape Fear. In coastal waters, it overlaps with the SMC stock during this period (Waring *et al.,* 2014).

Bottlenose Dolphin Distribution Within BT–9 and BT–11

In Pamlico Sound, bottlenose dolphins concentrate in shallow water habitats along shorelines, and few, if any, individuals are present in the central portions of the sounds (Gannon, 2003; Read *et al.,* 2003a, 2003b). The dolphins utilize shallow habitats, such as tributary creeks and the edges of the Neuse River, where the bottom depth is less than 3.5 m (11.5 ft) (Gannon, 2003). Fine-scale distribution of dolphins seems to relate to the presence of topography or vertical structure, such as the steeply-sloping bottom near the shore and oyster reefs. Bottlenose dolphins may use these features to facilitate prey capture (Gannon, 2003).

In 2000, Duke University Marine Lab (Duke) conducted a boat-based mark-recapture survey throughout the estuaries, bays and sounds of North Carolina (Read *et al.,* 2003). The 2000 boat-based survey produced an estimate of 919 dolphins for the northern inshore waters divided by an estimated 5,015 km^2 (1,936 mi^2) survey area.

In a follow-on aerial study (July, 2002 to June, 2003) specifically in and around BT–9 and BT–11, Duke reported one sighting in the restricted area surrounding BT–9, two sightings in proximity to BT–11, and seven sightings in waters adjacent to the bombing targets (Maher, 2003). In total, the study observed 276 bottlenose dolphins ranging in group size from two to 70 animals.

Results of a passive acoustic monitoring effort conducted from 2006–2007 by Duke University researchers detected that dolphin vocalizations in the BT–11 vicinity were higher in August and September than vocalization detection at BT–9 (Read *et al.,* 2007). Additionally, detected vocalizations of dolphins were more frequent at night for the BT–9 area and during early morning hours at BT–11 (Read *et al.,* 2007).

Other Marine Mammals in the Proposed Action Area

The endangered West Indian manatee (*Trichechus manatus*), under the jurisdiction of the U.S. Fish and Wildlife Service, rarely occurs in the area (Lefebvre *et al,* 2001; DoN 2003). The U.S. Fish and Wildlife Service has jurisdiction over the manatee; therefore, NMFS would not include a proposed authorization to harass manatees and does not discuss this species further in this notice.

Based on the best available information, there are no observations of the endangered North Atlantic right whale (*Eubalaena glacialis*) or other large whales within Pamlico Sound or in vicinity of the bombing targets (Kenney, 2006). No suitable habitat exists for these species in the shallow Pamlico Sound or bombing target vicinity; therefore, because NMFS does not expect these species to be present in the action area, there is no potential for take (NMFS, 2012). Thus, NMFS will not discuss these species further in this notice.

Other dolphins, such as Atlantic spotted (*Stenella frontalis*) and the common dolphin (*Delphinus delphis*), have an oceanic distribution and do not venture into the shallow, brackish waters of southern Pamlico Sound. Because these species are rare and/or have extralimital occurrence in the bombing target area, NMFS will not discuss these species further in this notice.

Potential Effects of the Specified Activity on Marine Mammals

This section includes a summary and discussion of the ways that the types of stressors associated with the specified activity (e.g., ordnance detonation and vessel movement) could impact marine mammals (via observations or scientific studies). This discussion may also include reactions that NMFS considers to rise to the level of a take and those that NMFS does not consider to rise to the level of a take (for example, with acoustics, we may include a discussion of studies that showed animals not reacting at all to sound or exhibiting barely measurable avoidance).

NMFS will provide an overview of potential effects of the Marine Corps' activities in this section and describe the effects of similar activities that have occurred in the past. This section does not consider the specific manner in which the Marine Corps would carry out the proposed activity, what mitigation measures the Marine Corps would implement, and how either of those would shape the anticipated impacts from this specific activity. The ''Estimated Take by Incidental Harassment, Injury, or Mortality'' section later in this document will include a quantitative analysis of the number of individuals that NMFS expects the Marine Corps to take during this activity. The ''Negligible Impact Analysis'' section will include the analysis of how this specific activity would impact marine mammals. NMFS will consider the content of the following sections: (1) Estimated Take by Incidental Harassment, Injury, or Mortality; (2) Proposed Mitigation; and (3) Anticipated Effects on Marine Mammal Habitat, to draw conclusions regarding the likely impacts of this activity on the reproductive success or survivorship of individuals—and from that consideration—the likely impacts of this activity on the affected marine mammal populations or stocks.

The surface-to-surface and air-to-surface training exercises proposed for taking of marine mammals under these regulations have the potential to take marine mammals by exposing them to impulsive noise and pressure waves generated by live ordnance detonation at or near the surface of the water. Exposure to energy or pressure resulting from these detonations could result in non-lethal injury (Level A harassment), disturbance (Level B harassment), serious injury, and/or mortality. In addition, NMFS also considered the potential for harassment from vessel and aircraft operations. NMFS outlines the analysis of potential impacts from these factors, including consideration of the Marine Corps' analysis in its application, in the following sections. The potential effects of impulsive sound sources (underwater detonations) from the proposed training activities may include one or more of the following: tolerance, masking, disturbance, hearing threshold shift, stress response, and lethal responses.

Brief Background on Sound

An understanding of the basic properties of underwater sound is necessary to comprehend many of the concepts and analyses presented in this document. NMFS presents a summary in this section.

Sound is a wave of pressure variations propagating through a medium (e.g., water). Pressure variations occur by compressing and relaxing the medium. Sound measurements exist in two forms: Intensity and pressure. Acoustic intensity is the average rate of energy transmitted through a unit area in a specified direction (expressed in watts per square meter (W/m^2)). Acoustic intensity is rarely measured directly, but rather from ratios of pressures; the standard reference pressure for underwater sound is 1 microPascal (μPa); for airborne sound, the standard reference pressure is 20 μPa (Richardson *et al.,* 1995).

Acousticians have adopted a logarithmic scale for sound intensities, denoted in decibels (dB). Decibel measurements represent the ratio between a measured pressure value and a reference pressure value (in this case 1 μPa or, for airborne sound, 20 μPa). The logarithmic nature of the scale means that each 10-dB increase is a ten-fold increase in acoustic power (and a 20-dB increase is then a 100-fold increase in power; and a 30-dB increase is a 1,000-fold increase in power). A ten-fold increase in acoustic power does not mean that the listener perceives sound as being ten times louder, however. Humans perceive a 10-dB increase in sound level as a doubling of loudness, and a 10-dB decrease in sound level as a halving of loudness. The term ''sound pressure level'' implies a decibel measure and a reference pressure that is the denominator of the ratio. Throughout this document, NMFS uses 1 microPascal (denoted re: 1μPa) as a standard reference pressure unless noted otherwise.

It is important to note that decibel values underwater and decibel values in air are not the same (different reference pressures and densities/sound speeds between media) and one should not directly compare the two mediums. Because of the different densities of air and water and the different decibel standards (i.e., reference pressures) in air and water, a sound with the same level in air and in water would be approximately 62 dB lower in air. Thus, a sound that measures 160 dB (re: 1 μPa) underwater would have the same approximate effective level as a sound that is 98 dB (re: 20 μPa) in air.

Sound frequency is measured in cycles per second, or Hertz (abbreviated Hz), and is analogous to musical pitch; high-pitched sounds contain high frequencies and low-pitched sounds contain low frequencies. Natural sounds in the ocean span a huge range of frequencies: From earthquake noise at 5 Hz to harbor porpoise clicks at 150,000

Hz (150 kHz). These sounds are so low or so high in pitch that humans cannot even hear them; acousticians call these infrasonic (typically below 20 Hz) and ultrasonic (typically above 20,000 Hz) sounds, respectively. A single sound may consist of many different frequencies together. Acousticians characterize sounds made up of only a small range of frequencies as ''narrowband'' and sounds with a broad range of frequencies as ''broadband''; explosives are an example of a broadband sound source.

Acoustic Impacts

The effects of noise on marine mammals are highly variable. Categorization of these effects includes the following (based on Richardson *et al.,* 1995):

- The sound may be too weak to be heard at the location of the animal (i.e., lower than the prevailing ambient noise level, the hearing threshold of the animal at relevant frequencies, or both);
- The sound may be audible but not strong enough to elicit any overt behavioral response;
- The sound may elicit reactions of variable conspicuousness and variable relevance to the well-being of the marine mammal; these can range from temporary alert responses to active avoidance reactions, such as stampedes into the sea from terrestrial haul-out sites;
- Upon repeated exposure, a marine mammal may exhibit diminishing responsiveness (habituation), or disturbance effects may persist; the latter is most likely with sounds that are highly variable in characteristics, infrequent and unpredictable in occurrence (as are vehicle launches), and associated with situations that a marine mammal perceives as a threat;
- Any anthropogenic sound that is strong enough to be heard has the potential to reduce (mask) the ability of a marine mammal to hear natural sounds at similar frequencies, including calls from conspecifics, and underwater environmental sounds such as surf noise;
- If marine mammals remain in an area because it is important for feeding, breeding, or some other biologically important purpose even though there is chronic exposure to noise, it is possible that there could be sound-induced physiological stress; this might in turn have negative effects on the well-being or reproduction of the animals involved; and
- Very strong sounds have the potential to cause temporary or permanent reduction in hearing sensitivity. In terrestrial mammals, and presumably marine mammals, received sound levels must far exceed the animal's hearing threshold for there to be any temporary threshold shift (TTS) in its hearing ability. For transient sounds, there is an inverse relation to the sound level necessary to cause TTS compared to the duration of the sound. Received sound levels must be even higher for there to be risk of permanent hearing impairment (PTS). In addition, intense acoustic or explosive events may cause trauma to tissues associated with organs vital for hearing, sound production, respiration, and other functions. This trauma may include minor to severe hemorrhage.

When considering the influence of various kinds of sound on the marine environment, it is necessary to understand that different kinds of marine life are sensitive to different frequencies of sound. Current data indicate that not all marine mammal species have equal hearing capabilities (Richardson *et al.,* 1995; Southall *et al.,* 1997; Wartzok and Ketten, 1999; Au and Hastings, 2008).

Southall *et al.* (2007) designated ''functional hearing groups'' for marine mammals based on available behavioral data; audiograms derived from auditory evoked potentials; anatomical modeling; and other data. Southall *et al.* (2007) also estimated the lower and upper frequencies of functional hearing for each group. However, animals are less sensitive to sounds at the outer edges of their functional hearing range and are more sensitive to a range of frequencies within the middle of their functional hearing range.

The functional groups and the associated frequencies are:

- Low frequency cetaceans (13 species of mysticetes): Functional hearing estimates occur between approximately 7 Hz and 30 kilohertz (kHz) (extended from 22 kHz based on data indicating that some mysticetes can hear above 22 kHz; Au *et al.,* 2006; Lucifredi and Stein, 2007; Ketten and Mountain, 2009; Tubelli *et al.,* 2012);
- Mid-frequency cetaceans (32 species of dolphins, six species of larger toothed whales, and 19 species of beaked and bottlenose whales): Functional hearing estimates occur between approximately 150 Hz and 160 kHz;
- High-frequency cetaceans (eight species of true porpoises, six species of river dolphins, *Kogia,* the franciscana, and four species of *cephalorhynchids*): Functional hearing estimates occur between approximately 200 Hz and 180 kHz; and
- Pinnipeds in water: Phocid (true seals) functional hearing estimates occur between approximately 75 Hz and 100 kHz (Hemila *et al.,* 2006; Mulsow *et al.,* 2011; Reichmuth *et al.,* 2013) and otariid (seals and sea lions) functional hearing estimates occur between approximately 100 Hz to 40 kHz.

As mentioned previously in this document, one marine mammal species (of the odontocete group) is likely to occur in the proposed action area. NMFS considers a species' functional hearing group when analyzing the effects of exposure to sound on marine mammals.

Vocalization and Hearing

Bottlenose dolphins can typically hear within a broad frequency range of 0.04 to 160 kHz (Au, 1993; Turl, 1993). Electrophysiological experiments suggest that the bottlenose dolphin brain has a dual analysis system: One specialized for ultrasonic clicks and another for lower-frequency sounds, such as whistles (Ridgway, 2000). Scientists have reported a range of highest sensitivity between 25 and 70 kHz, with peaks in sensitivity at 25 and 50 kHz (Nachtigall *et al.,* 2000). Research on the same individuals indicates that auditory thresholds obtained by electrophysiological methods correlate well with those obtained in behavior studies, except at lower (10 kHz) and higher (80 and 100 kHz) frequencies (Finneran and Houser, 2006).

Sounds emitted by bottlenose dolphins fall into two broad categories: Pulsed sounds (including clicks and burst-pulses) and narrow-band continuous sounds (whistles), which usually are frequency modulated. Clicks have a dominant frequency range of 110 to 130 kHz and a source level of 218 to 228 dB re: 1 µPa (peak-to-peak) (Au, 1993) and 3.4 to 14.5 kHz at 125 to 173 dB re 1 µPa (peak-to-peak) (Ketten, 1998). Whistles are primarily associated with communication and can serve to identify specific individuals (i.e., signature whistles) (Caldwell and Caldwell, 1965; Janik *et al.,* 2006). Cook *et al.* (2004) classified up to 52 percent of whistles produced by bottlenose dolphin groups with mother-calf pairs as signature whistles. Sound production is also influenced by group type (single or multiple individuals), habitat, and behavior (Nowacek, 2005). Bray calls (low-frequency vocalizations; majority of energy below 4 kHz), for example, are used when capturing fish, specifically sea trout (*Salmo trutta*) and Atlantic salmon (*Salmo salar*), in some regions (i.e., Moray Firth, Scotland) (Janik, 2000). Additionally, whistle production has been observed to increase while

feeding (Acevedo-Gutiérrez and Stienessen, 2004; Cook *et al.,* 2004).

Effects of Impulsive Sources

Marine mammals respond to various types of anthropogenic sounds introduced in the ocean environment. Responses are highly variable and depend on a suite of internal and external factors which in turn results in varying degrees of significance (NRC, 2003; Southall *et al.,* 2007). Internal factors include: (1) Individual hearing sensitivity, activity pattern, and motivational and behavioral state (e.g., feeding, traveling) at the time it receives the stimulus; (2) past exposure of the animal to the noise, which may lead to habituation or sensitization; (3) individual noise tolerance; and (4) demographic factors such as age, sex, and presence of dependent offspring. External factors include: (1) Non-acoustic characteristics of the sound source (e.g., if it is moving or stationary); (2) environmental variables (e.g., substrate) which influence sound transmission; and (3) habitat characteristics and location (e.g., open ocean vs. confined area).

Underwater explosive detonations send a shock wave and sound energy through the water and can release gaseous by-products, create an oscillating bubble, or cause a plume of water to shoot up from the water surface. The shock wave and accompanying noise are of most concern to marine animals. Depending on the intensity of the shock wave and size, location, and depth of the animal, an animal can be injured, killed, suffer non-lethal physical effects, experience hearing related effects with or without behavioral responses, or exhibit temporary behavioral responses or tolerance from hearing the blast sound. Generally, exposures to higher levels of impulse and pressure levels would result in greater impacts to an individual animal.

Tolerance

Numerous studies have shown that underwater sounds are often readily detectable by marine mammals in the water at distances of many kilometers. However, other studies have shown that marine mammals at distances more than a few kilometers away often show no apparent response to activities of various types (Miller *et al.,* 2005). This is often true even in cases when the sounds must be readily audible to the animals based on measured received levels and the hearing sensitivity of that mammal group. Although various baleen whales, toothed whales, and (less frequently) pinnipeds have been shown to react behaviorally to underwater sound from sources such as airgun pulses or vessels under some conditions, at other times, mammals of all three types have shown no overt reactions (e.g., Malme *et al.,* 1986; Richardson *et al.,* 1995; Madsen and Mohl, 2000; Croll *et al.,* 2001; Jacobs and Terhune, 2002; Madsen *et al.,* 2002; Miller *et al.,* 2005).

Masking

Marine mammals use acoustic signals for a variety of purposes, which differ among species, but include communication between individuals, navigation, foraging, reproduction, and learning about their environment (Erbe and Farmer 2000, Tyack 2000).

Masking, or auditory interference, generally occurs when sounds in the environment are louder than and of a similar frequency to, auditory signals an animal is trying to receive. Masking is a phenomenon that affects animals that are trying to receive acoustic information about their environment, including sounds from other members of their species, predators, prey, and sounds that allow them to orient in their environment. Masking these acoustic signals can disturb the behavior of individual animals, groups of animals, or entire populations.

The extent of the masking interference depends on the spectral, temporal, and spatial relationships between the signals an animal is trying to receive and the masking noise, in addition to other factors. In humans, significant masking of tonal signals occurs as a result of exposure to noise in a narrow band of similar frequencies. As the sound level increases, though, the detection of frequencies above those of the masking stimulus decreases also. NMFS expects this principle to apply to marine mammals because of common biomechanical cochlear properties across taxa.

Richardson *et al.* (1995) argued that the maximum radius of influence of an industrial noise (including broadband low frequency sound transmission) on a marine mammal is the distance from the source to the point at which the animal can barely hear the noise. This range applies to either the hearing sensitivity of the animal or the background noise level present. Industrial masking is most likely to affect some species' ability to detect communication calls and natural sounds (i.e., surf noise, prey noise, etc.; Richardson *et al.,* 1995).

The echolocation calls of toothed whales are subject to masking by high frequency sound. Human data indicate low-frequency sound can mask high-frequency sounds (i.e., upward masking). Studies on captive odontocetes by Au *et al.* (1974, 1985, and 1993) indicate that some species may use various processes to reduce masking effects (e.g., adjustments in echolocation call intensity or frequency as a function of background noise conditions). There is also evidence that the directional hearing abilities of odontocetes are useful in reducing masking at the high-frequencies these cetaceans use to echolocate, but not at the low-to-moderate frequencies they use to communicate (Zaitseva *et al.,* 1980). A study by Nachtigall and Supin (2008) showed that false killer whales adjust their hearing to compensate for ambient sounds and the intensity of returning echolocation signals.

Holt *et al.* (2009) measured killer whale call source levels and background noise levels in the one to 40 kHz band and reported that the whales increased their call source levels by one dB SPL for every one dB SPL increase in background noise level. Similarly, another study on St. Lawrence River belugas (*Delphinapterus leucas*) reported a similar rate of increase in vocalization activity in response to passing vessels (Scheifele *et al.,* 2005).

Although masking is a phenomenon which may occur naturally, the introduction of loud anthropogenic sounds into the marine environment at frequencies important to marine mammals increases the severity and frequency of occurrence of masking. For example, baleen whales exposed to continuous low-frequency sound from an industrial source, would be present within a reduced acoustic area around where it could hear the calls of another whale. The components of background noise that are similar in frequency to the signal in question primarily determine the degree of masking of that signal. In general, there is little data about the degree to which marine mammals rely upon detection of sounds from conspecifics, predators, prey, or other natural sources. In the absence of specific information about the importance of detecting these natural sounds, it is not possible to predict the impact of masking on marine mammals (Richardson *et al.,* 1995). In general, masking effects are expected to be less severe when sounds are transient than when they are continuous.

While it may occur temporarily, NMFS does not expect auditory masking to result in detrimental impacts to an individual's or population's survival, fitness, or reproductive success. Dolphin movement is not restricted within the BT–9 or BT–11 ranges, allowing for movement out of the area to avoid masking impacts. Also,

masking is typically of greater concern for those marine mammals that utilize low frequency communications, such as baleen whales and, as such, is not likely to occur for marine mammals in BT–9 or BT–11.

Disturbance

Behavioral responses to sound are highly variable and context-specific. Many different variables can influence an animal's perception of and response to (in both nature and magnitude) an acoustic event. An animal's prior experience with a sound or sound source affects whether it is less likely (habituation) or more likely (sensitization) to respond to certain sounds in the future (animals can also be innately pre-disposed to respond to certain sounds in certain ways) (Southall *et al.,* 2007). Related to the sound itself, the perceived nearness of the sound, bearing of the sound (approaching versus retreating), similarity of the sound to biologically relevant sounds in the animal's environment (i.e., calls of predators, prey, or conspecifics), and familiarity of the sound may affect the way an animal responds to the sound (Southall *et al.,* 2007). Individuals (of different age, gender, reproductive status, etc.) among most populations will have variable hearing capabilities, and differing behavioral sensitivities to sounds that will be affected by prior conditioning, experience, and current activities of those individuals. Often, specific acoustic features of the sound and contextual variables (i.e., proximity, duration, or recurrence of the sound or the current behavior that the marine mammal is engaged in or its prior experience), as well as entirely separate factors such as the physical presence of a nearby vessel, may be more relevant to the animal's response than the received level alone.

Because the few available studies show wide variation in response to underwater sound, it is difficult to quantify exactly how sound from the Marine Corps surface-to-surface and air-to-surface training activities would affect marine mammals. Exposure of marine mammals to sound sources can result in, but is not limited to, no response or any of the following observable responses: Increased alertness; orientation or attraction to a sound source; vocal modifications; cessation of feeding; cessation of social interaction; alteration of movement or diving behavior; avoidance; habitat abandonment (temporary or permanent); and, in severe cases, panic, flight, stampede, or stranding, potentially resulting in death (Southall *et al.,* 2007). Richardson first conducted a review of marine mammal responses to anthropogenic sound in 1995. A more recent review (Nowacek *et al.,* 2007) addresses studies conducted since 1995 and focuses on observations where researchers knew or could estimate the received sound level of the exposed marine mammal(s).

The following sub-sections provide examples of behavioral responses that provide an idea of the variability in behavioral responses expected given the differential sensitivities of marine mammal species to sound and the wide range of potential acoustic sources to which a marine mammal may be exposed. Estimates of the types of behavioral responses that could occur for a given sound exposure should be determined from the literature that is available for each species or extrapolated from closely related species when no information exists.

Flight Response: A flight response is a dramatic change in normal movement to a directed and rapid movement away from the perceived location of a sound source. Relatively little information on flight responses of marine mammals to anthropogenic signals exist, although observations of flight responses to the presence of predators have occurred (Connor and Heithaus, 1996).

Response to Predators: Evidence suggests that at least some marine mammals have the ability to acoustically identify potential predators. For example, certain groups of killer whales, but not others, frequently target harbor seals residing in the coastal waters off British Columbia. The seals discriminate between the calls of threatening and non-threatening killer whales (Deecke *et al.,* 2002), a capability that should increase survivorship while reducing the energy required for attending to and responding to all killer whale calls. The occurrence of masking or hearing impairment may prevent marine mammals from responding to the acoustic cues produced by their predators. Whether or not this is a possibility depends on the duration of the masking/hearing impairment and the likelihood of encountering a predator during the time that the sound impedes predator cues. Predator evasion is typically of greater concern for coastal marine mammals. Because of the low likelihood of bottlenose dolphin predators, such as killer whales, occurring within the shallow estuarine waters of Pamlico Sound, NMFS does not consider this likely to occur within the BT–9 or BT–11 target areas.

Diving: Changes in dive behavior can vary widely. They may consist of increased or decreased dive times and surface intervals as well as changes in the rates of ascent and descent during a dive. Variations in dive behavior may reflect interruptions in biologically significant activities (e.g., foraging) or they may be of little biological significance. Variations in dive behavior may also expose an animal to potentially harmful conditions (e.g., increasing the chance of ship-strike) or may serve as an avoidance response that enhances survivorship. The impact of a variation in diving resulting from an acoustic exposure depends on what the animal is doing at the time of the exposure and the type and magnitude of the response.

Nowacek *et al.* (2004) reported disruptions of dive behaviors in foraging North Atlantic right whales when exposed to an alerting stimulus, an action, they noted, that could lead to an increased likelihood of ship strike. However, the whales did not respond to playbacks of either right whale social sounds or vessel noise, highlighting the importance of the sound characteristics in producing a behavioral reaction. Conversely, studies have observed Indo-Pacific humpback dolphins (*Sousa chinensis*) to dive for longer periods of time in areas where vessels were present and/or approaching (Ng and Leung, 2003). In both of these studies, one cannot decouple the influence of the sound exposure from the physical presence of a surface vessel, thus complicating interpretations of the relative contribution of each stimulus to the response. Indeed, the presence of surface vessels, their approach and speed of approach, seemed to be significant factors in the response of the Indo-Pacific humpback dolphins (Ng and Leung, 2003). Researchers did not find that the low frequency signals of the Acoustic Thermometry of Ocean Climate (ATOC) sound source affected dive times of humpback whales (*Megaptera novaeangliae*) in Hawaiian waters (Frankel and Clark, 2000) or overtly affected elephant seal (*Mirounga angustirostris*) dives (Costa *et al.,* 2003). They did, however, produce subtle effects that varied in direction and degree among the individual seals, illustrating the equivocal nature of behavioral effects and consequent difficulty in defining and predicting them.

Foraging: Disruption of feeding behavior can be difficult to correlate with anthropogenic sound exposure, so it is usually inferred by observed displacement from known foraging areas, the appearance of secondary indicators (e.g., bubble nets or sediment plumes), or changes in dive behavior. Noise from seismic surveys was not

found to impact the feeding behavior in western grey whales off the coast of Russia (Yazvenko *et al.,* 2007) and sperm whales (*Physeter macrocephalus*) engaged in foraging dives did not abandon dives when exposed to distant signatures of seismic airguns (Madsen *et al.,* 2006). Balaenopterid whales exposed to moderate low-frequency signals similar to the ATOC sound source demonstrated no variation in foraging activity (Croll *et al.,* 2001), whereas five out of six North Atlantic right whales exposed to an acoustic alarm interrupted their foraging dives (Nowacek *et al.,* 2004). Although the received sound pressure level at the animals was similar in the latter two studies, the frequency, duration, and temporal pattern of signal presentation were different. These factors, as well as differences in species sensitivity, are likely contributing factors to the differential response. A determination of whether foraging disruptions incur fitness consequences would require information on or estimates of the energetic requirements of the individuals and the relationship between prey availability, foraging effort, and success, and the life history stage of the animal.

Breathing: Variations in respiration naturally vary with different behaviors and variations in respiration rate as a function of acoustic exposure could co-occur with other behavioral reactions, such as a flight response or an alteration in diving. However, respiration rates in and of themselves may be representative of annoyance or an acute stress response. Mean exhalation rates of gray whales at rest and while diving were found to be unaffected by seismic surveys conducted adjacent to the whale feeding grounds (Gailey *et al.,* 2007). Studies with captive harbor porpoises (*Phocoena phocoena*) showed increased respiration rates upon introduction of acoustic alarms (Kastelein *et al.,* 2001; Kastelein *et al.,* 2006) and emissions for underwater data transmission (Kastelein *et al.,* 2005). However, exposure of the same acoustic alarm to a striped dolphin under the same conditions did not elicit a response (Kastelein *et al.,* 2006), again highlighting the importance in understanding species differences in the tolerance of underwater noise when determining the potential for impacts resulting from anthropogenic sound exposure.

Social Relationships: Sound can affect social interactions between mammals via the disruption of communication signals or by the displacement of individuals. Disruption of social relationships therefore depends on the disruption of other behaviors (e.g., caused avoidance, masking, etc.) and this notice's discussion does not provide a specific overview. However, one should consider social disruptions in the context of the relationships that are affected. Long-term disruptions of mother/calf pairs or mating displays have the potential to affect the growth and survival or reproductive effort/success of individuals, respectively.

Vocalizations (also see Masking Section): Vocal changes in response to anthropogenic noise can occur across the repertoire of sound production modes used by marine mammals, such as whistling, echolocation click production, calling, and singing. Changes may result in response to a need to compete with an increase in background noise or may reflect an increased vigilance or startle response. For example, in the presence of low-frequency active sonar, humpback whales have been observed to increase the length of their ''songs'' (Miller *et al.,* 2000; Fristrup *et al.,* 2003), possibly due to the overlap in frequencies between the whale song and the low-frequency active sonar. Some have suggested a similar compensatory effect for the presence of low frequency vessel noise for right whales; as researchers have observed right whales shift the frequency content of their calls upward while reducing the rate of calling in areas of increased anthropogenic noise (Parks *et al.,* 2007). Killer whales off the northwestern coast of the United States have been observed to increase the duration of primary calls once a threshold in observing vessel density (e.g., whale watching) was reached, which has been suggested as a response to increased masking noise produced by the vessels (Foote *et al.,* 2004). In contrast, both sperm and pilot whales potentially ceased sound production during the Heard Island feasibility test (Bowles *et al.,* 1994), although it cannot be absolutely determined whether the inability to acoustically detect the animals was due to the cessation of sound production or the displacement of animals from the area.

Avoidance: Avoidance is the displacement of an individual from an area as a result of the presence of a sound. Richardson *et al.,* (1995) noted that avoidance reactions are the most obvious manifestations of disturbance in marine mammals. It is qualitatively different from the flight response, but also differs in the magnitude of the response (i.e., directed movement, rate of travel, etc.). Often, avoidance is temporary and animals return to the area once the noise has ceased. Longer term displacement is possible, however, which can lead to changes in abundance or distribution patterns of the species in the affected region if they do not become acclimated to the presence of the sound (Blackwell *et al.,* 2004; Bejder *et al.,* 2006; Teilmann *et al.,* 2006). Studies have observed acute avoidance responses in captive porpoises and pinnipeds exposed to a number of different sound sources (Kastelein *et al.,* 2001; Finneran *et al.,* 2003; Kastelein *et al.,* 2006a, b). Short term avoidance of seismic surveys, low frequency emissions, and acoustic deterrents has also been noted in wild populations of odontocetes (Bowles *et al.,* 1994; Goold, 1996; 1998; Stone *et al.,* 2000; Morton and Symonds, 2002) and to some extent in mysticetes (Gailey *et al.,* 2007), while longer term or repetitive/chronic displacement for some dolphin groups and for manatees has been suggested to be due to the presence of chronic vessel noise (Haviland-Howell *et al.,* 2007; Miksis-Olds *et al.,* 2007).

Haviland-Howell *et al.* (2007) compared sighting rates of bottlenose dolphins within the Wilmington, North Carolina stretch of the Atlantic Intracoastal Waterway (ICW) on weekends, when recreational vessel traffic was high, to weekdays, when vessel traffic was relatively minimal. The authors found that dolphins were less often sighted in the ICW during times of increased boat traffic (i.e., on weekends) and theorized that because vessel noise falls within the frequencies of dolphin communication whistles and primary energy of most fish vocalizations, the continuous vessel traffic along that stretch of the ICW could result in social and foraging impacts. However, the extent to which these impacts affect individual health and population structure is unknown.

Orientation: A shift in an animal's resting state or an attentional change via an orienting response represent behaviors that would be considered mild disruptions if it occurred alone. As previously mentioned, the responses may co-occur with other behaviors; for instance, an animal may initially orient toward a sound source, and then move away from it. Thus, one should consider any orienting response in context of other reactions that may occur.

Vessel and Aircraft Presence: The marine mammals most vulnerable to vessel strikes are slow-moving and/or spend extended periods of time at the surface in order to restore oxygen levels within their tissues after deep dives (e.g., right whales, fin whales (*Balaenoptera physalus*), and sperm whales). Smaller marine mammals such as bottlenose dolphins (the only marine mammal known to occur in BT–9 and BT–11) are agile and move more quickly

through the water, making them less susceptible to ship strikes. NMFS and the Marine Corps are not aware of any vessel strikes of bottlenose dolphins in Pamlico Sound during training operations and both parties do not anticipate that Marine Corps vessels engaged in the specified activity would strike any marine mammals.

Dolphins within Pamlico Sound are continually exposed to recreational, commercial, and military vessels. Behaviorally, marine mammals may or may not respond to the operation of vessels and associated noise. Responses to vessels vary widely among marine mammals in general, but also among different species of small cetaceans. Responses may include attraction to the vessel (Richardson *et al.,* 1995); altering travel patterns to avoid vessels (Constantine, 2001; Nowacek *et al.,* 2001; Lusseau, 2003, 2006); relocating to other areas (Allen and Read, 2000); cessation of feeding, resting, and social interaction (Baker *et al.,* 1983; Bauer and Herman, 1986; Hall, 1982; Krieger and Wing, 1984; Lusseau, 2003; Constantine *et al.,* 2004); abandoning feeding, resting, and nursing areas (Jurasz and Jurasz 1979; Dean *et al.,* 1985; Glockner-Ferrari and Ferrari, 1985, 1990; Lusseau, 2005; Norris *et al.,* 1985; Salden, 1988; Forest, 2001; Morton and Symonds, 2002; Courbis, 2004; Bejder, 2006); stress (Romano *et al.,* 2004); and changes in acoustic behavior (Van Parijs and Corkeron, 2001). However, in some studies marine mammals display no reaction to vessels (Watkins, 1986; Nowacek *et al.,* 2003) and many odontocetes show considerable tolerance to vessel traffic (Richardson *et al.,* 1995). Dolphins may actually reduce the energetic cost of traveling by riding the bow or stern waves of vessels (Williams *et al.,* 1992; Richardson *et al.,* 1995).

Aircraft produce noise at frequencies that are well within the frequency range of cetacean hearing and also produce visual signals such as the aircraft itself and its shadow (Richardson *et al.,* 1995, Richardson and Wursig, 1997). A major difference between aircraft noise and noise caused by other anthropogenic sources is that the sound is generated in the air, transmitted through the water surface and then propagates underwater to the receiver, diminishing the received levels significantly below what is heard above the water's surface. Sound transmission from air to water is greatest in a sound cone 26 degrees directly under the aircraft.

There are fewer reports of reactions of odontocetes to aircraft than those of pinnipeds. Responses to aircraft include diving, slapping the water with pectoral fins or tail fluke, or swimming away from the track of the aircraft (Richardson *et al.,* 1995). The nature and degree of the response, or the lack thereof, are dependent upon nature of the flight (e.g., type of aircraft, altitude, straight vs. circular flight pattern). Wursig *et al.* (1998) assessed the responses of cetaceans to aerial surveys in the north central and western Gulf of Mexico using a DeHavilland Twin Otter fixed-wing airplane. The plane flew at an altitude of 229 m (751.3 ft) at 204 km/hr (126.7 mph) and maintained a minimum of 305 m (1,000 ft) straight line distance from the cetaceans. Water depth was 100 to 1,000 m (328 to 3,281 ft). Bottlenose dolphins most commonly responded by diving (48 percent), while 14 percent responded by moving away. Other species (e.g., beluga and sperm whales) show considerable variation in reactions to aircraft but diving or swimming away from the aircraft are the most common reactions to low flights (less than 500 m; 1,640 ft).

Stress Response

An acoustic source is considered a potential stressor if, by its action on the animal, via auditory or non-auditory means, it may produce a stress response in the animal. Here, the stress response will refer to an increase in energetic expenditure that results from exposure to the stressor and which is predominantly characterized by either the stimulation of the sympathetic nervous system (SNS) or the hypothalamic-pituitary-adrenal (HPA) axis (Reeder and Kramer, 2005). The SNS response to a stressor is immediate and acute and occurs by the release of the catecholamine neurohormones norepinephrine and epinephrine (i.e., adrenaline). These hormones produce elevations in the heart and respiration rate, increase awareness, and increase the availability of glucose and lipids for energy. The HPA response results in increases in the secretion of the glucocorticoid steroid hormones, predominantly cortisol in mammals. The presence and magnitude of a stress response in an animal depends on a number of factors. These include the animal's life history stage (e.g., neonate, juvenile, adult), the environmental conditions, reproductive or developmental state, and experience with the stressor. Not only will these factors be subject to individual variation, but they will also vary within an individual over time. The stress response may or may not result in a behavioral change, depending on the characteristics of the exposed animal. However, provided that a stress response occurs, NMFS assumes that some contribution is made to the animal's allostatic load. One can assume that any immediate effect of exposure that produces an injury also produce a stress response and contribute to the allostatic load. Allostasis is the ability of an animal to maintain stability through change by adjusting its physiology in response to both predictable and unpredictable events (McEwen and Wingfield, 2003). If the animal does not perceive the sound, the acoustic source would not produce tissue effects and does not produce a stress response by any other means. Thus, NMFS assumes that the exposure does not contribute to the allostatic load. Additionally, without a stress response or auditory masking, NMFS assumes that there can be no behavioral change.

Physiology-Hearing Threshold Shift

In mammals, high-intensity sound may rupture the eardrum, damage the small bones in the middle ear, or over stimulate the electromechanical hair cells that convert the fluid motions caused by sound into neural impulses sent to the brain. Lower level exposures may cause a loss of hearing sensitivity, termed a threshold shift (TS) (Miller, 1974). Incidence of TS may be either permanent, referred to as permanent threshold shift (PTS), or temporary, referred to as temporary threshold shift (TTS). The amplitude, duration, frequency, and temporal pattern, and energy distribution of sound exposure all affect the amount of associated TS and the frequency range in which it occurs. As amplitude and duration of sound exposure increase, generally, so does the amount of TS and recovery time. Human non-impulsive noise exposure guidelines are based on exposures of equal energy (the same SEL) producing equal amounts of hearing impairment regardless of how the sound energy distributes over time (NIOSH, 1998). Until recently, previous marine mammal TTS studies have also generally supported this equal energy relationship (Southall *et al.,* 2007). Three newer studies, two by Mooney *et al.* (2009a, 2009b) on a single bottlenose dolphin either exposed to playbacks of Navy mid-frequency active sonar or octave-band noise (4–8 kHz) and one by Kastak *et al.* (2007) on a single California sea lion (*Zalophus californianus*) exposed to airborne octave-band noise (centered at 2.5 kHz), concluded that for all noise exposure situations the equal energy relationship may not be the best indicator to predict TTS onset levels. Generally, with sound exposures of equal energy, those that were quieter (lower SPL) with longer duration induced TTS onset more than

louder (higher SPL) and shorter durations (more similar to noise from the Marine Corps' exercises at BT–9 and BT–11). For intermittent sounds, less threshold shift would occur than from a continuous exposure with the same energy (some recovery will occur between exposures) (Kryter *et al.,* 1966; Ward, 1997). Additionally, although TTS is temporary; very prolonged exposure to sound strong enough to elicit TTS, or shorter-term exposure to sound levels well above the TTS threshold, can cause PTS, at least in terrestrial mammals (Kryter, 1985). However, these studies highlight the inherent complexity of predicting TTS onset in marine mammals, as well as the importance of considering exposure duration when assessing potential impacts.

PTS consists of non-recoverable physical damage to the sound receptors in the ear, which can include total or partial deafness, or an impaired ability to hear sounds in specific frequency ranges; NMFS considers PTS as Level A harassment. TTS is recoverable, resulting from temporary, non-injurious impacts to hearing-related tissues. NMFS considers TTS as Level B harassment.

Permanent Threshold Shift

Auditory trauma represents direct mechanical injury to hearing related structures, including tympanic membrane rupture, disarticulation of the middle ear ossicles, and trauma to the inner ear structures such as the organ of Corti and the associated hair cells. Auditory trauma is irreversible and considered to be an injury that could result in PTS. PTS results from exposure to intense sounds that cause a permanent loss of inner or outer cochlear hair cells or exceed the elastic limits of certain tissues and membranes in the middle and inner ears and result in changes in the chemical composition of the inner ear fluids. In some cases, there can be total or partial deafness across all frequencies, whereas in other cases, the animal has an impaired ability to hear sounds in specific frequency ranges.

There is no empirical data for onset of PTS in any marine mammal for ethical reasons. Therefore, research must extrapolate PTS-onset based on hearing loss growth rates (i.e., rate of how quickly threshold shifts grow in relation to increases in decibel level; expressed in dB of TTS/dB of noise) from limited marine mammal TTS studies and more numerous terrestrial mammal TTS/PTS experiments. Typically, the magnitude of a threshold shift increases with increasing duration or level of exposure, until it becomes asymptotic (growth rate begins to level or the upper limit of TTS; Mills *et al.,* 1979; Clark *et al.,* 1987; Laroche *et al.,* 1989; Yost, 2007). One presumes that PTS is likely if reduction to the hearing threshold occurs by greater than or equal to 40 dB (i.e., 40 dB of TTS).

Temporary Threshold Shift

TTS is the mildest form of hearing impairment that can occur during exposure to a loud sound (Kryter, 1985). Southall *et al.* (2007) indicate that although PTS is a tissue injury, TTS is not because the reduced hearing sensitivity following exposure to intense sound results primarily from fatigue, not loss, of cochlear hair cells and supporting structures and is reversible. Accordingly, NMFS classifies TTS as Level B Harassment, not Level A Harassment (injury); however, NMFS does not consider the onset of TTS to be the lowest level at which Level B Harassment may occur (see Behavior section).

Southall *et al.* (2007) considers a 6 dB TTS (*i.e.,* baseline hearing thresholds are elevated by 6 dB) sufficient to be recognized as an unequivocal deviation and thus a sufficient definition of TTS onset. Researchers testing hearing in marine mammals have experimentally induced TTS in bottlenose dolphins. For example, Finneran *et al.* (2002) exposed a trained captive bottlenose dolphin to a seismic watergun simulator with a single acoustic pulse. No TTS was observed in the dolphin at the highest exposure condition (peak: 207 kiloPascals (kPa; 30 pressure per square inch (psi)); peak-to-peak: 228 dB re: 1 µPa; SEL: 188 dB re: 1 μPa^2-s). Schludt et al. (2000) demonstrated temporary shifts in masked hearing thresholds in five bottlenose dolphins occurring generally between 192 and 201 dB rms (192 and 201 dB SEL) after exposure to intense, non-pulse, 1-second tones at 3 kHz, 10 kHz, and 20 kHz. TTS onset occurred at mean sound exposure level of 195 dB rms (195 dB SEL). At 0.4 kHz, no subjects exhibited threshold shifts after SPL exposures of 193 dB re: 1 µPa (192 dB re: 1 μPa^2-s). In the same study, at 75 kHz, one dolphin exhibited a TTS after exposure at 182 dB SPL re: 1 µPa but not at higher exposure levels. Another dolphin experienced no threshold shift after exposure to maximum SPL levels of 193 dB re: 1 µPa at the same frequency. Frequencies of explosives used at the Cherry Point Range Complex range from 1–25 kHz; the range where dolphin TTS onset occurred at 195 dB rms in the Schlundt *et al.* (2000) study.

Preliminary research indicates that TTS and recovery after noise exposure are frequency dependent and that an inverse relationship exists between exposure time and sound pressure level associated with exposure (Mooney *et al.,* 2005; Mooney, 2006). For example, Nachtigall *et al.* (2003) measured TTS in a bottlenose dolphin and found an average 11-dB shift following a 30-minute net exposure to the octave-band noise (OBN) at a 7.5 kHz center frequency (maximum SPL of 179 dB re: 1 µPa; SEL: 212–214 dB re: 1 μPa^2-s). No TTS was observed after exposure to the same duration and frequency noise with maximum SPLs of 165 and 171 dB re:1 µPa. After 50 minutes of exposure to the same 7.5 kHz frequency OBN, Natchigall *et al.* (2004) measured a 4–8 dB shift (max SPL: 160 dB re: 1 µPa; SEL: 193–195 dB re: 1 μPa^2-s). Finneran *et al.* (2005) concluded that a sound exposure level of 195 dB re 1 µPa2-s is a reasonable threshold for the onset of TTS in bottlenose dolphins exposed to mid-frequency tones.

Lethal Responses

The Marine Corps proposes to use five types of explosive sources during its training exercises: 2.75-inch Rocket High Explosives, 5-inch Rocket High Explosives, 30 mm High Explosives, 40 mm High Explosives, and G911 grenades. The underwater explosions from these weapons would send a shock wave and blast noise through the water, release gaseous by-products, create an oscillating bubble, and cause a plume of water to shoot up from the water surface. The shock wave and blast noise are of most concern to marine animals. In general, potential impacts from explosive detonations can range from brief effects (such as short term behavioral disturbance), tactile perception, physical discomfort, slight injury of the internal organs and the auditory system, to death of the animal (Yelverton *et al.,* 1973; O'Keeffe and Young, 1984; DoN, 2001).

The effects of an underwater explosion on a marine mammal depend on many factors, including the size, type, and depth of both the animal and the explosive charge; the depth of the water column; and the standoff distance between the charge and the animal, as well as the sound propagation properties of the environment. Physical damage of tissues resulting from a shock wave (from an explosive detonation) constitutes an injury. Blast effects are greatest at the gas-liquid interface (Landsberg, 2000) and gas containing organs, particularly the lungs and gastrointestinal tract, are especially susceptible to damage (Goertner, 1982;

Hill 1978; Yelverton *et al.,* 1973). Nasal sacs, larynx, pharynx, trachea, and lungs may be damaged by compression/expansion caused by the oscillations of the blast gas bubble (Reidenberg and Laitman, 2003). Severe damage (from the shock wave) to the ears can include tympanic membrane rupture, fracture of the ossicles, damage to the cochlea, hemorrhage, and cerebrospinal fluid leakage into the middle ear.

Non-lethal injury includes slight injury to internal organs and the auditory system; however, delayed lethality can be a result of individual or cumulative sublethal injuries (DoN, 2001). Immediate lethal injury would be a result of massive combined trauma to internal organs as a direct result of proximity to the point of detonation (DoN, 2001). Exposure to distance explosions could result only in behavioral changes. Researchers have measured masked underwater hearing thresholds in two bottlenose dolphins and one beluga whale before and after exposure to impulsive underwater sounds with waveforms resembling distant signatures of underwater explosions (Finneran *et al.,* 2000). The authors found no temporary shifts in masked-hearing thresholds, defined as a 6-dB or larger increase in threshold over pre-exposure levels, had been observed at the highest impulse level generated (500 kg at 1.7 km, peak pressure 70 kPa); however, disruptions of the animals' trained behaviors began to occur at exposures corresponding to 5 kg at 9.3 km and 5 kg at 1.5 km for the dolphins and 500 kg at 1.9 km for the beluga whale.

Direct Strike by Inert Ordnance

Another potential risk to marine mammals is direct strike by ordnance, in which the ordnance physically hits an animal. While strike from an item falling through the water column is possible, the potential risk of a direct hit to an animal in the target area would be so low because objects sink slowly and most projectiles fired at targets usually hit those targets.

Training Debris

In addition to behavioral and physiological impacts from live fire and ammunition testing, NMFS has analyzed impacts from presence of munition debris in the water, as described in the Marine Corps' application and its 2009 EA. These impacts include falling debris, ingestion of expended ordnance, and entanglement in parachute debris.

Ingestion of marine debris by marine mammals can cause digestive tract blockages or damage the digestive system (Gorzelany, 1998; Stamper *et al.,* 2006). Debris could be either the expended ordnance or non-munition related products such as chaff and self-protection flares. Expended ordnance would be small and sink to the bottom. Chaff is composed aluminum-coated glass fibers designed to act as a visual smoke screen; hiding the aircraft from enemy radar. Chaff also serves as a decoy for radar detection, allowing aircraft to maneuver or egress from the area. The chaff, cut into dipoles range in length from 0.3 to over 2.0 inches and its major components are silica, aluminum, and stearic acid; all naturally prevalent in the environment.

Based on the dispersion characteristics of chaff, concentrations around the BTs would be low. For example, Hullar *et al.* (1999) calculated that the deployment of a single cartridge containing 150 grams of chaff would affect an 8-km by 12 km (4.97-mi by 7.46-mi) area; however, the concentration would only be about 5.4 grams per square nautical mile. This corresponds to fewer than 179,000 fibers per square nautical mile or fewer than 0.005 fibers per square foot.

Marine Corps personnel deploy self-protection flares to mislead or confuse heat-sensitive or heat-seeking anti-aircraft systems. The flares are magnesium pellets that, when ignited, burn for a short period of time (less than 10 seconds) at 2,000 degrees Fahrenheit. Personnel use air-deployed LUU–2 high-intensity illumination flares to illuminate targets, enhancing a pilot's ability to see targets while using night vision goggles. The LUU–2B Flare has a light output rating of 1.8×10^6 candlepower and at 1,000 feet altitude illuminates a circle on the ground of 500 meters (1,640 ft). The LUU–2 is housed in a pod or canister and is deployed by ejection. The mechanism has a timer on it that deploys the parachute and ignites the flare candle. The flare candle burns magnesium at high temperature, emitting an intense bright white light. The LUU–2 has a burn time of approximately five minutes while suspended from a parachute. The pyrotechnic candle consumes the flare housing, reducing flare weight, which in turn slows the rate of fall during the last two minutes of burn time. At candle burnout an explosive bolt fires, releasing one parachute support cable, which causes the parachute to collapse.

Ingestion of debris by dolphins is not likely, as dolphins typically eat fish and other moving prey items. The Marine Corps solicited information on evidence of debris ingestion from two marine mammal veterinarians who have performed many necropsies on the protected species of North Carolina's waters. In their experience, no necropsies of bottlenose dolphins have revealed evidence of munition, parachute, or chaff ingestion (pers. comm., Drs. C. Harms and D. Rostein, November 14, 2009). However, they noted that evidence of chaff ingestion would be difficult to detect. In the chance that dolphins do ingest chaff, the filaments are so fine they would likely pass through the digestive system without complication. However, if the chaff is durable enough, it might act as a linear foreign body. In such case, the intestines bunch up on the line restricting movement of the line resulting in an obstruction. The peristalsis on an immovable thin line can cause intestinal lacerations and perforations (pers. comm., C. Harms, November 14, 2009). This is a well-known complication in cats when they ingest thread, and it occurs occasionally with sea turtles ingesting fishing line. The longevity of chaff filaments, based upon dispersion rates, is unclear. Chaff exposed to synthetic seawater and aqueous environments in the pH range of 4 to 10 exhibited varying levels of degradation suggesting a short lifespan for the outer aluminum coating (Farrell and Siciliano, 1998). The underlying filament is a flexible silica core and composed of primarily silica dioxide. While no studies have been conducted to evaluate the effects of chaff ingestion on marine mammals, the effects are expected to be negligible based upon chaff concentration in the environment, size of fibers, and available toxicity data on fiberglass and aluminum. The likelihood of chaff ingestion is low given the following factors: That the size of chaff fibers are no more than 2 inches long, tidal flushing reduces concentration in the environment, and chaff degradation occurs quickly. Moreover, if swallowed by a marine mammal, the impacts would be negligible.

In summary, there is no evidence that dolphins ingest military debris, dolphins in Pamlico Sound forage on moving prey suspended in the water column while expended munition would sink and the property and dispersion characteristics of chaff make potential for ingestion discountable. Because Pamlico Sound is a tidal body of water with continuing flushing, NMFS and the Marine Corps have determined that the presence of training debris would not have an effect on dolphins in Pamlico Sound.

Although sometimes large, expended parachutes (e.g., those from the flares) are flimsy and structurally simple. The probability of entanglement with a

dolphin is low. There are no known reports of live or stranded dolphins entangled in parachute gear; fishing gear is usually the culprit of reported entanglements.

Anticipated Effects on Habitat

Detonations of live ordnance would result in temporary changes to the water environment. Munitions could hit the targets and not explode in the water. However, because the targets are located over the water (i.e., a ship's hull on a shoal), in water explosions could occur. An underwater explosion from these weapons could send a shock wave and blast noise through the water, release gaseous by-products, create an oscillating bubble, and cause a plume of water to shoot up from the water surface. However, these effects would be temporary and not expected to last more than a few seconds.

Similarly, the Marine Corps does not expect any long-term impacts with regard to hazardous constituents to occur. The Marine Corps has an active Range Environmental Vulnerability Assessment (REVA) program in place to monitor impacts to habitat from its activities. One goal of REVA is to determine the horizontal and vertical concentration profiles of heavy metals, explosives constituents, perchlorate nutrients, and dissolved salts in the sediment and seawater surrounding BT–9 and BT–11. The results of the sampling indicate that the Marine Corps did not detect explosive constituents in any sediment or water sample surrounding the bombing targets. Metals were not present above toxicity screening values. The Marine Corps detected perchlorate in a few sediment samples above the detection limit (0.21 parts per million (ppm)), but below the reporting limit (0.6 ppm). The ongoing REVA would continue to evaluate potential munitions constituent migration from operational range areas to off-range areas and Marine Corps Air Station Cherry Point.

While NMFS anticipates that the specified activity may result in marine mammals avoiding certain areas due to temporary ensonification, this impact to habitat and prey resources would be temporary and reversible. The main impact associated with the proposed activity would be temporarily elevated noise levels and the associated direct effects on marine mammals, previously discussed in this notice. Based on the preceding discussion, NMFS does not anticipate that the proposed activity would have any habitat-related effects that could cause significant or long-term consequences for individual marine mammals or their populations.

Summary of Previous Monitoring

The Marine Corps complied with the mitigation and monitoring required under the previous authorizations (2010–2013). The Marine Corps submitted final monitoring reports, which described the activities conducted and observations made. For the 2010 period, the Marine Corps did not observe any marine mammals during training exercises. The only recorded observations—which were bottlenose dolphins—occurred on two occasions by maintenance vessels engaged in target maintenance. Personnel did not observe marine mammals during range sweeps, air-to-ground or surface-to-surface activities (small boats), or during ad hoc monitoring via range cameras.

For the 2012 period, the total amount of ordnance expended at BT–9 and BT–11 was 301,687 and 955,528 rounds, respectively. During the period of the 2012 IHA, the Marine Corps did not fire any high explosive (live) munitions at BT–9. The Marine Corps do not permit high explosive (live) munitions within BT–11. Maintenance vessels engaged in target maintenance observed marine mammals on two occasions during the 2012 reporting period. Flight crews conducting range sweeps identified dolphins within the confines of Rattan Bay at BT–11 on two separate occasions: February 10, 2012 and August 16, 2012. When the sightings occurred during range sweeps, the Marine Corps suspended military training until the dolphins exited the mouth of the embayment, per Marine Corps Air Station Cherry Point Range standard operating procedures. There were no observations of marine mammals during the air-to surface or surface-to-surface activities (small boats), or during ad hoc monitoring via range cameras other than during follow-up on the two occasions of sightings made during the pre-exercise range sweeps.

Proposed Mitigation

In order to issue an incidental take authorization under section 101(a)(5)(A) of the MMPA, NMFS must set forth the permissible methods of taking pursuant to such activity, and other means of effecting the least practicable adverse impact on such species or stock and its habitat, paying particular attention to rookeries, mating grounds, and areas of similar significance, and the availability of such species or stock for taking for certain subsistence uses (where relevant).

The NDAA of 2004 amended the MMPA as it relates to military-readiness activities and the incidental take authorization process such that ''least practicable adverse impact'' shall include consideration of personnel safety, practicality of implementation, and impact on the effectiveness of the military readiness activity.

NMFS and the Marine Corps have worked to identify potential practicable and effective mitigation measures, which include a careful balancing of the likely benefit of any particular measure to the marine mammals with the likely effect of that measure on personnel safety, practicality of implementation, and impact on the ''military-readiness activity.'' NMFS refers the reader to Appendix B of the Marine Corps' application for more detailed information on the proposed mitigation measures which include the following:

1. *Visual Monitoring:* Range operators will conduct or direct visual surveys to monitor BT–9 or BT–11 for protected species before and after each exercise. Range operation and control personnel would monitor the target area through two tower mounted safety and surveillance cameras. The remotely operated range cameras are high-resolution cameras that allow viewers to see animals at the surface and breaking the surface, but not underwater. The camera system has night vision (IR) capabilities. Lenses on the camera system have a focal length of 250 mm to 1500 mm, with view angles of $2.2° \times 1.65°$ (in wide-view) and $0.55° \times 41°$ (in narrow-view) respectively. Using the night-time capabilities, with a narrow view, an observer could identify a 1-by-1 meter target out to three kilometers.

In the event that a marine mammal is sighted within 914 m (3,000 ft) of the BT–9 target area, personnel would declare the area as fouled and cease training exercises. Personnel would commence operations in BT–9 only after the animal has moved 914 m (3,000 ft) away from the target area.

For BT–11, in the event that a marine mammal is sighted anywhere within the confines of Rattan Bay, personnel would declare the water-based targets within Rattan Bay as fouled and cease training exercises. Personnel would commence operations in BT–11 only after the animal has moved out of Rattan Bay.

2. *Range Sweeps:* The VMR–1 squadron, stationed at Marine Corps Air Station Cherry Point, includes three specially equipped HH–46D helicopters. The primary mission of these aircraft, known as PEDRO, is to provide search and rescue for downed 2nd Marine Air Wing aircrews. On-board are a pilot, co-pilot, crew chief, search and rescue swimmer, and a medical corpsman. Each crew member has received extensive training in search and rescue

techniques, and is therefore particularly capable at spotting objects floating in the water.

The PEDRO crew would conduct a range sweep the morning of each exercise day prior to the commencement of range operations. The crew would also conduct post-exercise sweeps. The primary goal of the pre-exercise sweep is to ensure that the target area is clear of fisherman, other personnel, and protected species. Generally, the weekly monitoring events would include a maximum of five pre-exercise and four post-exercise sweeps. The maximum number of days that would elapse between pre- and post-exercise monitoring events would be approximately 3 days, and would normally occur on weekends.

The sweeps would occur at 100 to 300 meters (328 to 984 ft) above the water surface, at airspeeds between 60 to 100 knots (69 to 115 mph). The path of the sweep runs down the western side of BT–11, circles around BT–9 and then continues down the eastern side of BT–9 before leaving. The sweep typically takes 20 to 30 minutes to complete.

The PEDRO crew communicates directly with range personnel and can provide immediate notification to range operators of a fouled target area due to the presence of protected species. The PEDRO aircraft would remain in the area of a marine mammal sighting until the animal clears the area, if possible or as mission requirements dictate.

If the crew sights marine mammals during a range sweep, they would collect sighting data and immediately provide the information to range personnel who would take appropriate management action. Range staff would relay the sighting information to training Commanders scheduled on the range after the observation. Range personnel would enter the data into the Marine Corps' sighting database, web-interface, or report generator. Sighting data includes the following (collected to the best of the observer's ability): (1) Species identification; (2) group size; (3) the behavior of marine mammals (e.g., milling, travel, social, foraging); (4) location and relative distance from the bombing target; (5) date, time and visual conditions (e.g., Beaufort sea state, weather) associated with each observation; (6) direction of travel relative to the BT; and (7) duration of the observation.

3. *Aircraft Cold Pass:* Standard operating procedures for waterborne targets require the pilot to perform a visual check prior to ordnance delivery to ensure the target area is clear of unauthorized civilian boats and personnel, and protected species such as turtles and marine mammals. This is referred to as a ''cold'' or clearing pass. Pilots requesting entry onto the BT–9 and BT–11 airspace must perform a low-altitude, cold first pass (a pass without any release of ordnance) immediately prior to ordnance delivery at the bombing targets both day and night.

Pilots would conduct the cold pass with the aircraft (helicopter or fixed-winged) flying straight and level at altitudes of 61 to 914 m (200 to 3,000 ft) over the target area. The viewing angle is approximately 15 degrees. A blind spot exists to the immediate rear of the aircraft. Based upon prevailing visibility, a pilot can see more than one mile forward upon approach. If marine mammals are present in the target area, the Range Controller may deny ordnance delivery to the target as conditions warrant. If marine mammals are not present in the target area, the Range Controller may grant ordnance delivery as conditions warrant.

4. *Delay of Exercises:* The Marine Corps would consider an active range as fouled and not available for use if a marine mammal is present within 914 m (3,000 ft) of the target area at BT–9 or anywhere within Rattan Bay (BT–11). Therefore, if Marine Corps personnel observe a marine mammal within 914 m (3,000 ft) of the target at BT–9 or anywhere within Rattan Bay at BT–11 during the cold pass or from range camera detection, they would delay training until the marine mammal moves beyond and on a path away from 914 m (3,000 ft) from the BT–9 target or moved out of Rattan Bay at BT–11. This mitigation applies to air-to-surface and surface-to-surface exercises day or night.

5. *Vessel Operation:* All vessels used during training operations would abide by NMFS' Southeast Regional Viewing Guidelines designed to prevent harassment to marine mammals (*http://www.nmfs.noaa.gov/pr/education/southeast/*).

6. *Stranding Network Coordination:* The Marine Corps would coordinate with the local NMFS Stranding Coordinator to discuss any unusual marine mammal behavior and any stranding, beached live/dead, or floating marine mammals that may occur at any time during training activities or within 24 hours after completion of training.

NMFS has carefully evaluated the Marine Corps' proposed mitigation measures in the context of ensuring that we prescribe the means of effecting the least practicable impact on the affected marine mammal species and stocks and their habitat. NMFS' evaluation of potential measures included consideration of the following factors in relation to one another:

- The manner in which, and the degree to which, the successful implementation of the measure is expected to minimize adverse impacts to marine mammals;
- The proven or likely efficacy of the specific measure to minimize adverse impacts as planned; and
- The practicability of the measure for applicant implementation.

Any mitigation measure(s) prescribed by NMFS should be able to accomplish, have a reasonable likelihood of accomplishing (based on current science), or contribute to the accomplishment of one or more of the general goals listed here:

1. Avoidance or minimization of injury or death of marine mammals wherever possible (goals 2, 3, and 4 may contribute to this goal).

2. A reduction in the numbers of marine mammals (total number or number at biologically important time or location) exposed to training exercises that we expect to result in the take of marine mammals (this goal may contribute to 1, above, or to reducing harassment takes only).

3. A reduction in the number of times (total number or number at biologically important time or location) individuals would be exposed to training exercises that we expect to result in the take of marine mammals (this goal may contribute to 1, above, or to reducing harassment takes only).

4. A reduction in the intensity of exposures (either total number or number at biologically important time or location) to training exercises that we expect to result in the take of marine mammals (this goal may contribute to a, above, or to reducing the severity of harassment takes only).

5. Avoidance or minimization of adverse effects to marine mammal habitat, paying special attention to the food base, activities that block or limit passage to or from biologically important areas, permanent destruction of habitat, or temporary destruction/disturbance of habitat during a biologically important time.

6. For monitoring directly related to mitigation—an increase in the probability of detecting marine mammals, thus allowing for more effective implementation of the mitigation.

Based on the evaluation of the Marine Corps' proposed measures, as well as other measures considered, NMFS has determined that the proposed mitigation measures provide the means of effecting the least practicable impact on marine mammal species or stocks and their habitat, paying particular attention to rookeries, mating grounds, and areas of

similar significance while also considering personnel safety, practicality of implementation, and the impact of effectiveness of the military readiness activity.

The proposed rule comment period will afford the public an opportunity to submit recommendations, views, and/or concerns regarding this action and the proposed mitigation measures. While NMFS has determined that the proposed mitigation measures presented in this document will effect the least practicable adverse impact on the affected species or stocks and their habitat, NMFS will consider all public comments to help inform our final decision. Consequently, the proposed mitigation measures may be refined, modified, removed, or added to prior to the issuance of the final rule based on public comments received and, where appropriate, further analysis of any additional mitigation measures.

Proposed Monitoring and Reporting

In order to issue an Letter of Authorization for an activity, section 101(a)(5)(A) of the MMPA states that we must set forth ''requirements pertaining to the monitoring and reporting of such taking.'' The MMPA implementing regulations at 50 CFR 216.104(a)(13) indicate that requests for an authorization must include the suggested means of accomplishing the necessary monitoring and reporting that will result in increased knowledge of the species and our expectations of the level of taking or impacts on populations of marine mammals present in the action area.

As part of its application, the Marine Corps provided a monitoring plan, similar to that in previous Incidental Harassment Authorizations issued to them from 2010–2013, for assessing impacts to marine mammals from rocket and missile launches at Marine Air Corps Station Cherry Point. The Marine Corps proposes to conduct the following monitoring activities under these regulations. However, NMFS may modify the proposed monitoring program or supplement the monitoring based on comments or new information received from the public during the public comment period.

The Marine Corps' suggested means of accomplishing the necessary monitoring and reporting includes the following:

1. *Protected Species Observer Training:* Operators of small boats, and other personnel monitoring for marine mammals from watercraft shall be required to take the Marine Species Awareness Training (Version 2), maintained and promoted by Department of the Navy. Pilots conducting range sweeps shall be instructed on marine mammal observation techniques during routine Range Management Department briefings. This training would make personnel knowledgeable of marine mammals, protected species, and visual cues related to the presence of marine mammals and protected species.

2. *Pre- and Post-Exercise Monitoring:* The Marine Corps would conduct pre-exercise monitoring the morning of an exercise and post-exercise monitoring the morning following an exercise, unless an exercise occurs on a Friday, in which case the post-exercise sweep would take place the following Monday. Weekly monitoring events would include a maximum of five pre-exercise and four post-exercise sweeps. The maximum number of days that would elapse between pre- and post-exercise monitoring events would be approximately three days, and would normally occur on weekends. If the Marine Corps observe marine mammals during this monitoring, personnel would record sighting data identical to those collected by the PEDRO crew.

3. *Long-term Monitoring:* The Marine Corps has awarded Duke University Marine Lab (Duke) a contract to obtain abundance, group dynamics (e.g., group size, age census), behavior, habitat use, and acoustic data on the bottlenose dolphins which inhabit Pamlico Sound, specifically those around BT–9 and BT–11. Duke began conducting boat-based surveys and passive acoustic monitoring of bottlenose dolphins in Pamlico Sound in 2000 (Read *et al.,* 2003) and specifically at BT–9 and BT–11 in 2003 (Mayer, 2003). To date, boat-based surveys indicate that bottlenose dolphins may be resident to Pamlico Sound and use BT restricted areas on a frequent basis. Passive acoustic monitoring (PAM) provides more detailed insight into how dolphins use the two ranges, by monitoring for their vocalizations year-round, regardless of weather conditions or darkness. In addition to these surveys, Duke's scientists are testing a real-time passive acoustic monitoring system at BT–9 that will allow automated detection of bottlenose dolphin whistles, providing yet another method of detecting dolphins prior to training operations.

4. *Reporting:* The Marine Corps will submit an annual report to NMFS on December 7 of each year. The first report will cover the time period from issuance of the Letter of Authorization through September 7, 2015. Each annual report after that time will cover the time period from September 8th through September 7th of the following year.

The Marine Corps will submit a final comprehensive report to NMFS no later than 180 days prior to expiration of these regulations. This report must summarize the findings made in all previous reports and assess both the impacts at each of the bombing targets and the cumulative impact on bottlenose dolphin from the specified activities.

The reports will summarize the type and amount of training exercises conducted, all marine mammal observations made during monitoring, and if mitigation measures were implemented. The report will also address the effectiveness of the monitoring plan in detecting marine mammals.

General Notification of Injured or Dead Marine Mammals

The Marine Corps will systematically observe training operations for injured or disabled marine mammals. In addition, the Marine Corps will monitor the principal marine mammal stranding networks and other media to correlate analysis of any dolphin strandings that could potentially be associated with BT–9 or BT–11 training operations.

Marine Corps personnel will ensure that they notify NMFS immediately or as soon as clearance procedures allow if an injured, stranded, or dead marine mammal is found during or shortly after, and in the vicinity of, any training operations. The Marine Corps will provide NMFS with species or description of the animal(s), the condition of the animal(s) (including carcass condition if the animal is dead), location, time of first discovery, observed behaviors (if alive), and photo or video (if available).

In the event that an injured, stranded, or dead marine mammal is found by Marine Corps personnel that is not in the vicinity of, or found during or shortly after operations, the Marine Corps personnel will report the same information as listed above as soon as operationally feasible and clearance procedures allow.

General Notification of a Ship Strike

In the event of a vessel strike, at any time or place, the Marine Corps shall do the following:

- Immediately report to us the species identification (if known), location (lat/long) of the animal (or the strike if the animal has disappeared), and whether the animal is alive or dead (or unknown);
- Report to us as soon as operationally feasible the size and length of the animal, an estimate of the injury status (e.g., dead, injured but

alive, injured and moving, unknown, etc.), vessel class/type and operational status;

- Report to NMFS the vessel length, speed, and heading as soon as feasible; and
- Provide us a photo or video, if equipment is available.

Adaptive Management

NMFS may modify or augment the existing mitigation or monitoring measures (after consulting with the Marine Corps regarding the practicability of the modifications) if doing so creates a reasonable likelihood of more effectively accomplishing the goals of mitigation and monitoring set forth in the preamble of these regulations. Below are some of the possible sources of new data that could contribute to the decision to modify the mitigation or monitoring measures:

1. Results from the Marine Corps' monitoring from the previous year.
2. Results from marine mammal and sound research; or
3. Any information which reveals that marine mammals may have been taken in a manner, extent or number not authorized by these regulations or subsequent Letters of Authorization.

Research

The Marine Corps has funded surveys performed by Duke University researchers and provided financial support to augment surveys conducted by the NMFS Southeast Fisheries Science Center. Information and knowledge gained from the Marine Corps-funded research has contributed significantly to the understanding of bottlenose dolphin stocks, including their distribution and movement, in Pamlico Sound, NC.

The Marine Corps has contracted with Duke University to develop and test a real-time passive acoustic monitoring system that will allow automated detection of bottlenose dolphin whistles (Appendix C in the application). The work has been performed in two phases. Phase I was the development of an automated signal detector (a software program) to recognize the whistles of dolphins at BT–9 and BT–11. Phase II, currently in progress, is the assembly and deployment of a prototype real-time monitoring unit on one of the towers in the BT–9 range. The success of this effort will help direct future research initiatives and activities within the Marine Corps Air Station Cherry Point Range Complex. As funding becomes available and research opportunities arise, Marine Corps Air Station Cherry Point will continue to fund and participate in studies that will enhance the Marine Corps' understanding of marine mammals in Pamlico Sound.

Estimated Numbers of Marine Mammals Taken by Harassment, Injury, and Mortality

NMFS' analysis identified the lethal responses, physiological responses, and behavioral responses that could potentially result from exposure to underwater explosive detonations. In this section, we will relate the potential effects to marine mammals from underwater detonation of explosives and direct strike by ordnance to the MMPA regulatory definitions of Level A and Level B harassment, serious injury, and mortality. This section will also quantify the effects that might occur from the proposed military readiness activities in BT–9 and BT–11.

Definition of Harassment

The NDAA removed the ''small numbers'' and ''specified geographic region'' limitations indicated earlier in this document and amended the definition of harassment as it applies to a ''military readiness activity'' to read as follows: (i) Any act that injures or has the significant potential to injure a marine mammal or marine mammal stock in the wild [Level A Harassment]; or (ii) any act that disturbs or is likely to disturb a marine mammal or marine mammal stock in the wild by causing disruption of natural behavioral patterns, including, but not limited to, migration, surfacing, nursing, breeding, feeding, or sheltering, to a point where such behavioral patterns are abandoned or significantly altered [Level B Harassment].

Level B Harassment

Of the potential effects described earlier in this document, the following are the types of effects that fall into the Level B harassment category:

Behavioral Harassment—Behavioral disturbance that rises to the level described in the above definition, when resulting from exposures to non-impulsive or impulsive sound, is Level B harassment. Some of the lower level physiological stress responses discussed earlier would also likely co-occur with the predicted harassments, although these responses are more difficult to detect and fewer data exist relating these responses to specific received levels of sound. When predicting Level B harassment based on estimated behavioral responses, those takes may have a stress-related physiological component.

Acoustic Masking and Communication Impairment—NMFS considers acoustic masking to be Level B harassment, as it can disrupt natural behavioral patterns by interrupting or limiting the marine mammal's receipt or transmittal of important information or environmental cues.

Temporary Threshold Shift (TTS)—As discussed previously, TTS can affect how an animal behaves in response to the environment, including conspecifics, predators, and prey. NMFS classifies TTS (when resulting from exposure to explosives and other impulsive sources) as Level B harassment, not Level A harassment (injury).

Level A Harassment

Of the potential effects that were described earlier, the following are the types of effects that fall into the Level A Harassment category:

Permanent Threshold Shift (PTS)—PTS (resulting either from exposure to explosive detonations) is irreversible and NMFS considers this to be an injury.

Physical Disruption of Tissues Resulting from Explosive Shock Wave—NMFS classifies physical damage of tissues resulting from a shock wave (from an explosive detonation) as an injury.

Ordnance Strike—NMFS considers direct strike by ordnance associated with the specified activities to be serious injury or mortality.

Impulsive Sound Explosive Thresholds

For the purposes of this proposed regulation, NMFS has identified three levels of take for the Marine Corps' training exercises: Level B harassment; Level A harassment; and mortality (or serious injury leading to mortality). We present the acoustic thresholds for impulse sounds in this section.

In the absence of mitigation, it is likely that the activities could kill or injure marine mammals as a result of an explosive detonation, due to the response of air cavities in the body (e.g., lungs and intestines). These effects are likely to be most severe in near surface waters where the reflected shock wave creates a region of negative pressure called cavitation. Extensive lung hemorrhage is debilitating and potentially fatal. Suffocation caused by lung hemorrhage is likely to be the major cause of marine mammal death from underwater shock waves. The estimated range for the onset of extensive lung hemorrhage to marine mammals varies depending upon the animal's weight, with the smallest mammals having the greatest potential hazard range.

Table 7 summarizes the marine mammal impulsive sound explosive

thresholds used for the Marine Corps' acoustic impact modeling for marine mammal take in its application and 2009 EA. Several standard acoustic metrics (Urick, 1983) describe the thresholds for predicting potential physical impacts from underwater pressure waves. They are:

• Total energy flux density or Sound Exposure Level (SEL). For plane waves (as assumed here), SEL is the time integral of the instantaneous intensity, where the instantaneous intensity is defined as the squared acoustic pressure divided by the characteristic impedance of sea water. Thus, SEL is the instantaneous pressure amplitude squared, summed over the duration of the signal. Standard units are dB referenced to 1 re: μPa^2-s.

• ⅓-octave SEL. This is the SEL in a ⅓-octave frequency band. A ⅓-octave band has upper and lower frequency limits with a ratio of 21:3, creating bandwidth limits of about 23 percent of center frequency.

• Positive impulse. This is the time integral of the initial positive pressure pulse of an explosion or explosive-like wave form. Standard units are Pa-s or psi-ms.

• Peak pressure. This is the maximum positive amplitude of a pressure wave, dependent on charge mass and range. Standard units are psi, μPa, or Bar.

TABLE 7—IMPULSIVE SOUND EXPLOSIVE THRESHOLDS USED BY THE MARINE CORPS IN ITS PREVIOUS ACOUSTICS IMPACTS MODELING

Criterion	Criterion definition	Threshold
Mortality	Onset of severe lung injury (mass of dolphin calf: 12.2 kg) (1% probability of mortality).	31 psi-msec (positive impulse).
Level A harassment (injury)	50% animals would experience ear drum rupture, 30% animals exposed sustain permanent threshold shift.	205 dB re 1 μPa^2-s EFD (full spectrum energy).
Level A harassment (injury)	Onset of slight lung injury (mass of dolphin calf: 12.2 kg).	13 psi-msec (positive impulse).
Level B harassment	TTS and associated behavioral disruption	23 psi peak pressure
Level B harassment	TTS and associated behavioral disruption (dual criteria)	182 dB re: 1 μPa^2-s EFD,* ⅓ octave band.
Level B harassment	Sub-TTS behavioral disruption (for multiple/sequential detonations only).	177 dB re: 1 μPa^2-s EFD,* ⅓ octave band.

* **Note:** In greatest ⅓-octave band above 10 Hz or 100 Hz.

NMFS previously developed the explosive thresholds for assessing impacts of explosions on marine mammals shown in Table 7 for the shock trials of the USS Seawolf and USS Winston S. Churchill. However, at NMFS' recommendation, the Marine Corps has updated the thresholds used for onset of temporary threshold shift (TTS; Level B Harassment) and onset of permanent threshold shift (PTS; Level A Harassment) to be consistent with the thresholds outlined in the Navy's report titled, ''Criteria and Thresholds for U.S. Navy Acoustic and Explosive Effects Analysis Technical Report,'' which the Navy coordinated with NMFS. NMFS believes that the thresholds outlined in the Navy's report represent the best available science. The report is available on the internet at: *http://aftteis.com/Portals/4/aftteis/Supporting%20Technical%20Documents/Criteria_and_Thresholds_for_US_Navy_Acoustic_and_Explosive_Effects_Analysis-Apr_2012.pdf*.

Table 8 in this document outlines the revised acoustic thresholds used by NMFS for this proposed rulemaking when addressing noise impacts from explosives.

TABLE 8—IMPULSIVE SOUND EXPLOSIVE THRESHOLDS USED BY THE MARINE CORPS IN ITS CURRENT ACOUSTICS IMPACTS MODELING

Group	Behavior		Slight injury			Mortality
	Behavioral	TTS	PTS	Gastro-intestinal tract	Lung	
Mid-frequency Cetaceans.	167 dB SEL	172 dB SEL or 23 psi.	187 dB SEL or 45.86 psi.	104 psi	39.1 $M^{1/3}$ $(1+[D_{Rm}/10.081])^{1/2}$ Pa-sec. Where: M = mass of the animals in kg. D_{Rm} = depth of the receiver (animal) in meters.	91.4 $M^{1/3}$ $(1+D_{Rm}/10.081])^{1/2}$ Pa-sec Where: M = mass of the animals in kg D_{Rm} = depth of the receiver (animal) in meters

The Marine Corps conservatively modeled that all explosives would detonate at a 1.2 m (3.9 ft) water depth despite the training goal of hitting the target, resulting in an above water or on land explosion. For sources detonated at shallow depths, it is frequently the case that the explosion may breech the surface with some of the acoustic energy escaping the water column. Table 9 provides the estimated maximum range or radius, from the detonation point to the various thresholds described in Table 8.

TABLE 9—DISTANCES (m) TO HARASSMENT THRESHOLDS FROM THE MARINE CORPS' EXPLOSIVE ORDNANCE

Proposed ordnance	NEW (lbs)	Mortality	Level A harassment		Level B harassment		
			187 dB	46 psi-msec	172 dB	23 psi	167 dB
30 mm HE	0.1019	0	297.8	8.5	677.7	70	856.7
40 mm HE	0.1199	0	168.2	9.5	467.5	64.4	604.6
2.75-inch Rocket	4.8	29.3	270.4	49.1	631.5	197.3	830.4
5-inch Rocket	15.0	39.8	346.1	63.4	778.7	233.4	1,032.4
G911 Grenade	0.5	9.6	136.4	23.3	416.2	103.5	547.3

Density Estimation

The Marine Corps bases its method to estimate the number of marine mammals potentially affected using bottlenose dolphin densities (summer and winter), the amount and type of ordnance proposed, and distances to NMFS' harassment threshold criteria.

In 2000, Duke conducted a boat-based mark-recapture survey throughout the estuaries, bays and sounds of North Carolina (Read *et al.,* 2003). The 2000 boat-based survey yielded a dolphin density of 0.183 per square kilometer (km^2) (0.071 square mile (mi^2)) based on an estimate of 919 dolphins for the northern inshore waters divided by an estimated 5,015 km^2 (1,936 mi^2) survey area.

In a follow-on aerial study (July 2002–June 2003) specifically in and around BT–9 and BT–11, Duke reported one sighting in the restricted area surrounding BT–9, two sightings in proximity to BT–11, and seven sightings in waters adjacent to the bombing targets (Maher, 2003). In total, 276 bottlenose dolphins were sighted ranging in group size from two to 70 animals with mean dolphin density in BT–11 more than twice as large as the density of any of the other areas; however, the daily densities were not significantly different (Maher, 2003). The researchers calculated the estimated dolphin density at BT–9 and BT–11 based on these surveys to be 0.11 dolphins/km^2, and 1.23 dolphins/km^2, respectively.

For the proposed regulations, the Marine Corps chose to estimate take of dolphins based on the higher density reported from the summer 2000 surveys (0.183/km^2). Although the researchers conducted the aerial surveys year round and provided seasonal density estimates, the average year-round density from the aerial surveys is 0.0936, lower than the 0.183/km^2 density chosen to calculate take for purposes of these proposed regulations. Additionally, Goodman *et al.* (2007) acknowledged that boat based density estimates may be more accurate than the uncorrected estimates derived from the aerial surveys.

Estimated Take From Explosives at BT–9

In order to calculate take from ordnance, the Marine Corps considered the distances to which animals could be harassed along with dolphin density (0.183 km^2) and based take calculations for munitions firing on 100 percent water detonation. Because the goal of training is to hit the targets and not the water, NMFS considers these take estimates based on 100 percent water detonation of munitions to be conservative.

The Marine Corps' 2009 EA (Appendix B) and its addendum to its application present a detailed discussion of the computational process for the modeling, which ultimately generates two outcomes—the zones of influence and marine mammal exposures. Briefly, the Marine Corps calculated the expected acoustic harassment takes from each source on a per in-water explosive basis using the following steps:

- For the relevant environmental acoustic parameters, transmission loss (TL) estimates are computed, sampling the water column over the appropriate depth and range intervals. TL calculations are also made over non-overlapping one-third octave bands for a wide range of frequencies.
- The accumulated energy within the waters where the source is ''operating'' is sampled over a volumetric grid. At each grid point, the received energy from each source emission is modeled as the effective energy source level reduced by the appropriate propagation loss from the location of the source at the time of the emission to that grid point and summed. For the peak pressure or positive impulse, the appropriate metric is similarly modeled for each emission. The maximum value of that metric, over all emissions, is stored at each grid point.
- The impact volume for a given threshold is estimated by summing the incremental volumes represented by each grid point for which the appropriate metric exceeds that threshold.
- Finally, they estimate the number of harassments as the vector product of the animal density depth profile and the impact volume and scaled by user-specified surface animal densities.

Table 10 presents the annual estimated take of bottlenose dolphins from exposure to explosive ordnance based on current thresholds. The Marine Corps has requested, and NMFS proposes to authorize the incidental take of 323 bottlenose dolphins from Level B Harassment (behavioral and TTS) annually and 33 bottlenose dolphins from Level A Harassment (PTS) annually. Table 10 also includes estimated take by mortality (or serious injury leading to mortality) as a result of exposure to impulsive sound explosions resulting in an estimate of 5 bottlenose dolphins, annually. In consideration of the effectiveness of the mitigation measures, NMFS does not expect take by serious injury or mortality related to exposure to explosive ordnance to occur. However, because the probability is not zero, the Marine Corps has requested these takes incidental to its operations.

TABLE 10—ANNUAL AND 5-YEAR ESTIMATED TAKE OF BOTTLENOSE DOLPHINS FROM EXPOSURE TO EXPLOSIVE ORDNANCE BASED ON INDICATED THRESHOLDS

Proposed ordnance	Mortality	Serious injury	Level A harassment (PTS)	Level B harassment (TTS and behavior)	
		104 psi	187 dB SEL	172 dB SEL	167 dB SEL
30 mm HE	0	0.51	3.64	17.18	10.41
40 mm HE	0	1.81	23.78	153.84	95.37
2.75-inch Rocket	0.06	0.5	3.37	15.35	9.82
5-inch Rocket	0.03	0.27	1.59	7.21	4.77
G911 Grenade	0.004	0.8	0.06	4.60	2.91
Annual Totals*	1	4	33	199	124
5-Year Totals	25		165	1,615	

*Estimate rounded to the nearest whole number.

Estimated Take by Direct Strike of Ordnance

A potential cause of mortality (in the absence of mitigation) would be direct strike by ordnance. In the absence of mitigation, it is likely that the activities could kill or injure marine mammals as a result of ordnance hitting the animals. Table 11 presents the annual estimated take of bottlenose dolphins from direct strike by ordnance. In consideration of the effectiveness of the mitigation measures, NMFS does not expect take by serious injury or mortality related to direct strike to occur. However, because the probability is not zero, NMFS is proposing to authorize a total of five takes by mortality (or serious injury leading to mortality) related to direct strike of ordnance over the course of the 5-year regulation.

TABLE 11—ANNUAL ESTIMATED TAKE OF BOTTLENOSE DOLPHINS FROM DIRECT STRIKE BY ORDNANCE

Bombing target	Estimated annual ordnance levels	Strike probability	Estimated number of strikes	Annual estimate	5-Year estimate
BT–9	1,225,815	2.61×10^{-7}	0.32	1	5
BT–11	[1] 451,686.24	9.4×10^{-8}	0.042	0	0

[1] BT–11 based on 36 percent of the total estimated ordnance levels (1,254,684) with a deployment footprint over water. NMFS rounded estimates greater than or equal to 0.10 to 1 to be more conservative. NMFS considered the modeled numbers less than 0.10 to be discountable for estimating take.

The Marine Corps conducted modeling for the bombing targets to determine the total surface area needed to contain 99.99 percent of initial and ricochet impacts (95 percent confidence interval) for each aircraft and ordnance type. It then generated the surface area or footprints of weapon impact areas associated with air-to-ground ordnance delivery and estimated that at both BT–9 and BT–11 the probability of deployed ordnance landing in the impact footprint is essentially 1.0, since the footprints were designed to contain 99.99 percent of impacts, including ricochets. However, only 36 percent of the weapon footprint for BT–11 is over water in Rattan Bay. Water depths in Rattan Bay range from 3 m (10 ft) in the deepest part of the bay to 0.5 m (1.6 ft) close to shore.

The Marine Corps calculated the probability of hitting a bottlenose dolphin at the bombing targets by multiplying the dolphin's dorsal surface area by the density estimate of dolphins in the area. It estimated that the dorsal surface area of a bottlenose dolphin was approximately 1.425 m^2 (15.3 ft^2) with an average length and width of 2.85 m (9.3 ft) and 0.5 m (1.6 ft), respectively. Then using the density estimate of 0.183 km^2, it calculated the probability of direct strike in the waters of BT–9 as 2.61×10^{-7} and the probability of direct strike in the waters of BT–11 as 9.4×10^{-8}. The probability for BT–11 is 64 percent lower, because only 36 percent of the weapons footprint occurs over the water column. This method is the best available information for estimating the probability of ordnance striking a marine mammal in BT–9 or BT–11.

Take From Vessel Presence

Interactions with vessels are not a new experience for bottlenose dolphins in Pamlico Sound. Pamlico Sound is heavily used by recreational, commercial (fishing, daily ferry service, tugs, etc.), and military (including the Navy, Air Force, and Coast Guard) vessels year-round. The NMFS' Southeast Regional Office has developed marine mammal viewing guidelines to educate the public on how to responsibly view marine mammals in the wild and avoid causing a take (*http://www.nmfs.noaa.gov/pr/education/southeast*). The guidelines recommend that vessels should remain a minimum of 50 yards (45.7 m; 150 ft) from a dolphin, operated in a predictable manner, avoid excessive speed or sudden changes in speed or direction in the vicinity of animals, and not pursue, chase, or separate a group of animals. The Marine Corps would abide by these guidelines to the fullest extent practicable. The Marine Corps would not engage in high speed exercises if personnel detect a marine mammal within the immediate area of the bombing targets prior to training commencement and would never closely approach, chase, or pursue dolphins. Personnel monitoring on the vessels, marking success rate of target hits, and monitoring the remote camera would facilitate detection of marine mammals within the bombing targets.

Based on the description of the action, the other activities regularly occurring in the area, the species that may be exposed to the activity and their observed behaviors in the presence of vessel traffic, and the implementation of measures to avoid vessel strikes, NMFS has determined that it is unlikely that the small boat maneuvers during

surface-to-surface maneuvers would result in the take of any marine mammals, in the form of either behavioral harassment, injury, serious injury, or mortality.

Negligible Impact Analysis and Preliminary Determinations

Negligible impact is ''an impact resulting from the specified activity that cannot be reasonably expected to, and is not reasonably likely to, adversely affect the species or stock through effects on annual rates of recruitment or survival'' (50 CFR 216.103). A negligible impact finding is based on the lack of likely adverse effects on annual rates of recruitment or survival (i.e., population-level effects). An estimate of the number of Level B harassment takes, alone, is not enough information on which to base an impact determination. In addition to considering estimates of the number of marine mammals that might be ''taken'' through behavioral harassment, NMFS must consider other factors, such as the likely nature of any responses (their intensity, duration, etc.), the context of any responses (critical reproductive time or location, migration, etc.), as well as the number and nature of estimated Level A harassment takes, the number of estimated mortalities, and effects on habitat.

Pursuant to our regulations implementing the MMPA, NMFS requires an applicant to estimate the number of animals that will be ''taken'' by the specified activities (i.e., takes by harassment only, or takes by harassment, injury, serious injury, and/or death). This estimate informs the analysis that we must perform to determine whether the activity will have a ''negligible impact'' on the species or stock. In making a negligible impact determination, NMFS considers a variety of factors, including but not limited to: (1) The number of anticipated serious injuries and mortalities; (2) the number and nature of anticipated injuries (Level A harassment); (3) the number, nature, intensity, and duration of Level B harassment; and (4) the context in which the takes occur.

NMFS proposes authorizing Level A and Level B harassment and serious injury and/or mortality of bottlenose dolphins over the course of the 5-year period. The Marine Corps has described its specified activities based on best estimates of the number of sorties that it proposes to conduct training exercises at BT–9 and BT–11. The exact number of ordnance expenditures may vary from year to year, but will not exceed the 5-year total of ordnance expenditures based on the information in Tables 3 and 4. NMFS does not anticipate that the take totals proposed for authorization would exceed the 5-year totals indicated in Tables 10 and 11.

Tolerance

Depending on the intensity of the shock wave and size, location, and depth of the animal, an animal can exhibit tolerance from hearing the blast sound. However, tolerance effects on bottlenose dolphins within the bombing target areas are difficult to assess given their affinity for the area. Scientific boat based surveys conducted throughout Pamlico Sound conclude that dolphins use the areas around the BTs more frequently than other portions of Pamlico Sound (Maher, 2003), despite the Marine Corps actively training in a manner identical to the specified activities described here for years. Because of the low concentration of bottlenose dolphins present within the BT–9 and BT–11 areas, the incorporation of mitigation measures to lessen effects, and the short durations of the missions, NMFS expects that tolerance effects would be minimal and would affect a small number of marine mammals on an infrequent basis.

Masking

For reasons stated previously in this notice, NMFS expects masking effects from ordnance detonation to be minimal because masking is typically of greater concern for those marine mammals that utilize low frequency communications, such as baleen whales. While it may occur temporarily, NMFS does not expect auditory masking to result in detrimental impacts to an individual's or population's survival, fitness, or reproductive success. Dolphin movement is not restricted within the BT–9 or BT–11 ranges, allowing for movement out of the area to avoid masking impacts.

Disturbance

The probability that detonation events will overlap in time and space with marine mammals is low, particularly given the densities of marine mammals in the vicinity of BT–9 and BT–11 and the implementation of monitoring and mitigation measures. Moreover, NMFS does not expect animals to experience repeat exposures to the same sound source, as bottlenose dolphins would likely move away from the source after being exposed. In addition, NMFS expects that these isolated exposures, when received at distances of Level B behavioral harassment, would cause brief startle reactions or short-term behavioral modification by the animals. These brief reactions and behavioral changes would disappear when the exposures cease.

The Level B harassment takes would likely result in dolphins being temporarily affected by bombing or gunnery exercises. In addition, NMFS may attribute takes to animals not using the area when exercises are occurring; however, this is difficult to calculate. Instead, NMFS considers if the specified activities occur during and within habitat important to vital life functions to better inform the preliminary negligible impact determination. Read *et al.* (2003) concluded that dolphins rarely occur in open waters in the middle of North Carolina sounds and large estuaries, but instead are concentrated in shallow water habitats along shorelines. However, no specific areas have been identified as vital reproduction or foraging habitat.

NMFS and the Marine Corps have estimated that individuals of bottlenose dolphins may sustain some level of temporary threshold shift (TTS) from underwater detonations. TTS can last from a few minutes to days, be of varying degree, and occur across various frequency bandwidths. Although the degree of TTS depends on the received noise levels and exposure time, studies show that TTS is reversible. NMFS expects the animals' sensitivity to recover fully in minutes to hours based on the fact that the proposed underwater detonations are small in scale and isolated. In summary, we do not expect that these levels of received impulse noise from detonations would affect annual rates or recruitment or survival.

Stress Response

NMFS expects short-term effects such as stress during underwater detonations, as repeated exposure to sounds from underwater explosions may cause physiological stress that could lead to long-term consequences for the individual such as reduced survival, growth, or reproductive capacity. However, the time scale of individual explosions is very limited, and the Marine Corps disperses its training exercises in space and time.

Consequently, repeated exposure of individual bottlenose dolphins to sounds from underwater explosions is not likely and most acoustic effects are expected to be short-term and localized. NMFS does not expect long-term consequences for populations because the BT–9 and BT–11 areas continue to support bottlenose dolphins in spite of ongoing missions. The best available data do not suggest that there is a

decline in the Pamlico Sound population due to these exercises.

Permanent Threshold Shift

NMFS believes that many marine mammals would deliberately avoid exposing themselves to the received levels of explosive ordnance necessary to induce injury by moving away from or at least modifying their path to avoid a close approach. Also, in the unlikely event that an animal approaches the bombing target at a close distance, NMFS believes that the mitigation measures (i.e., the delay/postponement of missions) would typically ensure that animals would not be exposed to injurious levels of sound. As discussed previously, the Marine Corps utilizes both aerial and passive acoustic monitoring in addition to personnel on vessels to detect marine mammals for mitigation implementation. The potential for permanent hearing impairment and injury is low due to the incorporation of the proposed mitigation measures specified in the proposed rulemaking.

Lethal Responses

As stated previously, NMFS also proposes to authorize take by mortality (and serious injury leading to mortality), though there have been no recorded incidents of mortality or serious injury of marine mammals resulting from previous missions in BT–9 or BT–11 to date. Based on the Marine Corps' compliance with previous authorizations for the same activities, NMFS expects the proposed mitigation and monitoring measures to minimize the potential risk for serious injury or mortality and does not expect these types of takes to occur. NMFS does not expect the number of takes from mortality or serious injury to increase from previous authorizations to the Marine Corps; rather, the agency is proposing to authorize these takes for the first time.

The Marine Corps has conducted gunnery and bombing training exercises at BT–9 and BT–11 for several years and, to date, the monitoring reports do not indicate that dolphin injury, serious injury, or mortality has occurred as a result of its training exercises. Also, the Marine Corps has a history of notifying the NMFS stranding network when any injured or stranded animal comes ashore or is spotted by personnel on the water. The stranding responders have examined each of the stranded animals, confirming that it was unlikely that the Marine Corps' exercises resulted in the death or injury of the stranded marine mammal.

Summary

As described in the *Affected Species* section of this notice, bottlenose dolphin stock segregation is complex with stocks overlapping throughout the coastal and estuarine waters of North Carolina. It is not possible for the Marine Corps to determine to which stock any individual dolphin taken during training activities belongs, as this can only be accomplished through genetic testing. However, it is likely that many of the dolphins encountered would belong to the Northern or Southern North Carolina Estuarine System stocks. These stocks have abundance estimates of 950 and 118 animals, respectively and are not listed as threatened or endangered under the ESA.

In addition, the potential for temporary or permanent hearing impairment and injury is low and through the incorporation of the proposed mitigation measures specified in this document would have the least practicable adverse impact on the affected species or stocks. The information contained in the Marine Corps' application, the 2009 EA, and this document support NMFS' finding that impacts will be mitigated by implementation of a conservative safety range for marine mammal exclusion in Rattan Bay, incorporation of platform and aerial survey monitoring efforts both prior to and after detonation of explosives, and delay/postponement/cancellation of detonations whenever marine mammals or other specified protected resources are either detected within the bombing target areas or enter the bombing target areas at the time of detonation, or if weather and sea conditions preclude adequate surveillance.

The Marine Corps has complied with the requirements of the previous incidental harassment authorizations issued for similar activities, and reported few observed takes of marine mammals incidental to these training exercises.

Based on the best available information, NMFS proposes to authorize: Take by Level B harassment of 1,615 bottlenose dolphins; take by Level A harassment of 165 bottlenose dolphins; and take by mortality of 30 bottlenose dolphins. However, this represents an overestimate of the number of individuals harassed over the duration of the final rule and LOA because these totals represent much smaller numbers of individuals that may be harassed multiple times. There are no stocks known from the action area listed as threatened or endangered under the ESA. Two bottlenose dolphin stocks designated as strategic under the MMPA may be affected by the Marine Corps' activities. In this case, under the MMPA, strategic stock means a marine mammal stock for which the level of direct human-caused mortality exceeds the potential biological removal level. These include the Southern North Carolina Estuarine System and Northern North Carolina Estuarine System Stocks. NMFS does not expect the proposed action likely to result in long-term impacts such as permanent abandonment or reduction in presence with BT–9 or BT–11. No impacts are expected at the population or stock level.

For this proposed rulemaking, taking into account information presented in this notice, the Marine Corps' application and 2014 application addendum, the 2009 EA, and results from previous monitoring reports, NMFS has preliminarily determined that the total level of take incidental to authorized training exercises over the 5-year effective period of the regulations would have a negligible impact on the one marine mammal species and stocks affected at BT–9 and BT–11 in Pamlico Sound, NC.

Impact on Availability of Affected Species or Stock for Taking for Subsistence Uses

There are no relevant subsistence uses of marine mammals implicated by this action. Therefore, NMFS has determined that the total taking of affected species or stocks would not have an unmitigable adverse impact on the availability of such species or stocks for taking for subsistence purposes.

Endangered Species Act (ESA)

For the reasons explained above, this action will not affect any ESA-listed species or designated critical habitat under NMFS' jurisdiction. Therefore, there is no requirement for NMFS to consult under Section 7 of the ESA on the issuance of an Authorization under section 101(a)(5)(A) of the MMPA.

National Environmental Policy Act (NEPA)

On February 11, 2009, the Marine Corps issued a Finding of No Significant Impact for its Environmental Assessment (EA) on MCAS Cherry Point Range Operations. Based on the analysis of the EA, the Marine Corps determined that the proposed action would not have a significant impact on the human environment. NMFS adopted the Marine Corps' EA and signed a Finding of No Significant Impact on August 31, 2010. NMFS has reviewed the EA, the

application, and public comments, and has determined that a supplemental EA is warranted to address: (1) The proposed increases in ordnance usage; and (2) the use of revised thresholds for estimating potential impacts on marine mammals from explosives because these are substantial changes to the proposed action or new environmental impacts or concerns. The agency intends to prepare a SEA and incorporate relevant portions of the Marine Corps' EA by reference. The 2009 EA referenced above is available for review at *http://www.nmfs.noaa.gov/pr/permits/incidental.htm*.

Request for Information

NMFS requests interested persons to submit comments, information, and suggestions concerning the Marine Corps' application and this proposed rule (see **ADDRESSES**). All comments will be reviewed and evaluated as NMFS prepares a final rule and makes final determinations on whether to issue the requested authorization. In addition, this notice and referenced documents provide all environmental information relevant to our proposed action for the public's review and we solicit comments which we will also consider as we make final NEPA determinations.

Classification

This action has been determined to be not significant for purposes of Executive Order 12866.

The Chief Counsel for Regulation of the Department of Commerce has certified to the Chief Counsel for Advocacy of the Small Business Administration that this proposed rule, if adopted, would not have a significant economic impact on a substantial number of small entities. This proposed rule would apply only to the U.S. Marine Corps, a Federal agency, which is not considered to be a small governmental jurisdiction, small organization/business, as defined by the Regulatory Flexibility Act. This rulemaking authorizes Marine Corps Air Station Cherry Point Range Complex to take of marine mammals incidental to a specified activity. The specified activity defined in the proposed rule includes the use of explosive detonations, which are only used by the U.S. military, during training activities that are only conducted by the Marine Corps at BT–9 and BT–11. Additionally, any requirements imposed by a Letter of Authorization issued pursuant to these regulations, and any monitoring or reporting requirements imposed by these regulations, will be applicable only to Marine Corps Air Station Cherry Point Range Complex.

This action may indirectly affect a small number of contractors providing services related to reporting the impact of the activity on marine mammals, some of whom may be small businesses, but the number involved would not be substantial. Further, since the monitoring and reporting requirements are what would lead to the need for their services, the economic impact on any contractors providing services relating to reporting impacts would be beneficial. Because the Chief Counsel for Regulation certified that this proposed rule would not have significant economic impact on a substantial number of small entities, a regulatory flexibility analysis is not required and none has been prepared.

List of Subjects in 50 CFR Part 218

Exports, Fish, Imports, Indians, Labeling, Marine mammals, Penalties, Reporting and recordkeeping requirements, Seafood, Transportation.

Dated: July 9, 2014.

Samuel D. Rauch III,

Deputy Assistant Administrator for Regulatory Programs, National Marine Fisheries Service.

For reasons set forth in the preamble, 50 CFR part 218 is proposed to be amended as follows:

PART 218—REGULATIONS GOVERNING THE TAKING AND IMPORTING OF MARINE MAMMALS

■ 1. The authority citation for part 218 continues to read as follows:

Authority: 16 U.S.C. 1361 *et seq.*

■ 2. Subpart E is added to part 218 to read as follows:

Subpart E—Taking Marine Mammals Incidental to U.S. Marine Corps Training Exercises at Brant Island Bombing Target and Piney Island Bombing Range, Pamlico Sound, North Carolina

Sec.

Subpart E—Taking Marine Mammals Incidental to U.S. Marine Corps Training Exercises at Brant Island Bombing Target and Piney Island Bombing Range, Pamlico Sound, North Carolina

§ 218.40 Specified activity and location of specified activities.

(a) Regulations in this subpart apply only to the U.S. Marine Corps (Marine Corps) for the incidental taking of marine mammals that occurs in the area outlined in paragraph (b) of this section and that occurs incidental to the activities described in paragraph (c) of this section.

(b) The taking of marine mammals by the Marine Corps is only authorized if it occurs within the Brant Island Target (BT–9) and Piney Island Bombing Range (BT–11) bombing targets at the Marine Corps Air Station Cherry Point Range Complex located within Pamlico Sound, North Carolina (as depicted in Figure 3–1 of the Marine Corps' request for regulations and Letter of Authorization). The BT–9 area is a water-based bombing target and mining exercise area located approximately 52 kilometers (km) (32.3 miles (mi)) northeast of Marine Air Corps Station Cherry Point. The BT–11 area encompasses a total of 50.6 square kilometers (km^2) (19.5 square miles (mi^2)) on Piney Island located in Carteret County, North Carolina.

(c) The taking of marine mammals by the Marine Corps is only authorized of it occurs incidental to the following activities within the annual amounts of use:

(1) The level of training activities in the amounts indicated here:

(i) Surface-to-Surface Exercises—up to 471 vessel-based sorties annually at BT–9 and BT–11; and

(ii) Air-to-Surface Exercises—up to 14,586 air-based based sorties annually at BT–9 and BT–11.

(2) The use of the following live ordnance for Marine Corps training activities at BT–9, in the total amounts over the course of the five-year rule indicated here:

(i) 30 mm HE—17,160 rounds;

(ii) 40 mm HE—52,100 rounds;

(iii) 2.75-inch Rocket—1,100 rounds;

(iv) 5-inch Rocket—340 rounds; and

(v) G911 Grenade—720 rounds.

(3) The use of the following inert ordnance for Marine Corps training activities at BT–9 and BT–11, in the total amounts over the course of the five-year rule indicated here:

(i) Small arms excluding .50 cal (7.62 mm)—2,628,050 rounds at BT–9 and 3,054,785 rounds at BT–11;

(ii) 0.50 Caliber arms—2,842,575 rounds at BT–9 and 1,833,875 rounds at BT–11;

(iii) Large arms (up to 25 mm)—602,025 rounds at BT–9 and 1,201,670 rounds at BT–11;

(iv) Rockets, inert (2.75-inch rocket, 2.75-inch illumination, 2.75-inch white phosphorus, 2.75-inch red phosphorus; 5-inch rocket, 5-inch illumination, 5-inch white phosphorus, 5-inch red phosphorus)—4,220 rounds at BT–9 and 27,960 rounds at BT–11;

(v) Bombs, inert (BDU–45 practice bomb, MK–76 practice bomb, MK–82 practice bomb, MK–83 practice bomb)—4,055 rounds at BT–9 and 22,114 rounds at BT–11; and

(vi) Pyrotechnics—4,496 rounds at BT–9 and 8,912 at BT–11.

§ 218.41 Effective dates.

Regulations in this subpart are effective from September 8, 2014 until September 7, 2019.

§ 218.42 Permissible methods of taking.

(a) Under a Letter of Authorization issued pursuant to §§ 216.106 and 218.47 of this chapter, the Holder of the Letter of Authorization may incidentally, but not intentionally, take marine mammals by Level A and Level B harassment, serious injury, and mortality within the area described in § 218.40(b) of this chapter, provided the activity is in compliance with all terms, conditions, and requirements of these regulations and the appropriate Letter of Authorization.

(b) The activities identified in § 218.40(c) of this chapter must be conducted in a manner that minimizes, to the greatest extent practicable, any adverse impact on marine mammals and their habitat.

(c) The incidental take of marine mammals under the activities identified in § 218.40(c) is limited to the following species, by the indicated method of take and the indicated number:

(1) Level B Harassment:

(i) Atlantic bottlenose dolphin (*Tursiops truncatus*)—1,615.

(ii) [Reserved]

(2) Level A Harassment:

(i) Atlantic bottlenose dolphin—165.

(ii) [Reserved]

(3) Mortality:

(i) Atlantic bottlenose dolphin—30.

(ii) [Reserved]

§ 218.43 Prohibitions.

No person in connection with the activities described in § 218.40 shall:

(a) Take any marine mammal not specified in § 218.42(c);

(b) Take any marine mammal specified in § 218.42(c) other than by incidental take as specified in § 218.42(c)(1),(c)(2), (c)(3), and (c)(4);

(c) Take a marine mammal specified in § 218.42(c) if such taking results in more than a negligible impact on the species or stocks of such marine mammal; or

(d) Violate, or fail to comply with, the terms, conditions, and requirements of these regulations or a Letter of Authorization issued under §§ 216.106 and 218.47 of this chapter.

§ 218.44 Mitigation.

(a) The activities identified in § 218.40(c) must be conducted in a manner that minimizes, to the greatest extent practicable, adverse impacts on marine mammals and their habitats. When conducting operations identified in § 218.40(c), the mitigation measures contained in the Letter of Authorization issued under §§ 216.106 and 218.47 of this chapter must be implemented. These mitigation measures include, but are not limited to:

(b) Training Exercises at BT–9 and BT–11:

(1) Safety Zone:

(i) The Marine Corps shall establish and monitor a safety zone for marine mammals comprising the entire Rattan Bay area at BT–11.

(ii) [Reserved]

(2) For training exercises, the Marine Corps shall comply with the monitoring requirements, including pre-mission and post-mission monitoring, set forth in § 218.45(4).

(3) When detonating explosives:

(i) If personnel observe any marine mammals within the safety zone prescribed in paragraph (b)(1) of this section, or if personnel observe marine mammals that are on a course that will put them within designated safety zone prior to surface-to-surface or air-to-surface training exercises, the Marine Corps shall delay ordnance delivery and/or explosives detonations until all marine mammals are no longer within the designated safety zone.

(ii) If personnel cannot reacquire marine mammals detected in the safety zone after delaying training missions, the Marine Corps shall not commence activities until the next verified location of the animal is outside of the safety zone and the animal is moving away from the mission area.

(iii) If personnel are unable to monitor the safety zone prescribed in paragraph (b)(1) of this section, the Marine Corps shall delay training exercises.

(iv) If daytime weather and/or sea conditions preclude adequate surveillance for detecting marine mammals, the Marine Corps shall postpone training exercises until adequate sea conditions exist for adequate monitoring of the safety zone prescribed in paragraph (b)(1) of this section.

(4) Pre-Mission and Post-Mission Monitoring:

(i) Range operators shall conduct or direct visual surveys to monitor BT–9 or BT–11 for marine mammals before and after each exercise. Range operation and control personnel shall monitor the target area through two tower-mounted safety and surveillance cameras.

(ii) Range operators shall use the surveillance camera's night vision (i.e., infrared) capabilities to monitor BT–9 or BT–11 for marine mammals during night-time exercises.

(iii) For BT–11, in the event that a marine mammal is sighted anywhere within the confines of Rattan Bay, personnel shall declare the water-based targets within Rattan Bay as fouled and cease training exercises. Personnel shall commence operations in BT–11 only after the animal has moved out of Rattan Bay.

(5) Range Sweeps:

(i) The Marine Corps shall conduct a range sweep the morning of each exercise day prior to the commencement of range operations.

(ii) The Marine Corps shall also conduct a range sweep after each exercise following the conclusion of range operations.

(iii) Marine Corps Air Station personnel shall conduct the sweeps by aircraft at an altitude of 100 to 300 meters (328 to 984 ft) above the water surface, at airspeeds between 60 to100 knots.

(iv) The path of the sweeps shall run down the western side of BT–11, circle around BT–9, and then continue down the eastern side of BT–9 before leaving the area.

(v) The maximum number of days that shall elapse between pre- and post-exercise monitoring events shall be approximately 3 days, and will normally occur on weekends.

(6) Cold Pass by Aircraft:

(i) For waterborne targets, the pilot must perform a low-altitude visual check immediately prior to ordnance delivery at the bombing targets both day and night to ensure the target area is clear of marine mammals. This is referred to as a ''cold'' or clearing pass.

(ii) Pilots shall conduct the cold pass with the aircraft (helicopter or fixed-winged) flying straight and level at altitudes of 61 to 914 m (200 to 3,000 ft) over the target area.

(iii) If marine mammals are present in the target area, the Range Controller shall deny ordnance delivery to the target as conditions warrant. If marine mammals are not present in the target area, the Range Controller may grant clearance to the pilot as conditions warrant.

(7) Vessel Operation:

(i) All vessels used during training operations shall abide by NMFS' Southeast Regional Viewing Guidelines designed to prevent harassment to marine mammals (*http://www.nmfs.noaa.gov/pr/education/southeast/*).

§ 218.45 Requirements for monitoring and reporting.

(a) The Holder of the Letter of Authorization issued pursuant to §§ 216.106 and 218.47 of this chapter for activities described in § 218.40(c) is required to conduct the monitoring and reporting measures specified in this section and § 218.44 and any additional monitoring measures contained in the Letter of Authorization.

(b) The Holder of the Letter of Authorization is required to cooperate with the National Marine Fisheries Service, and any other Federal, state, or local agency monitoring the impacts of the activity on marine mammals. Unless specified otherwise in the Letter of Authorization, the Holder of the Letter of Authorization must notify the Director, Office of Protected Resources, National Marine Fisheries Service, or designee, by letter or telephone (301–427–8401), at least 2 weeks prior to any modification to the activity identified in § 218.40(c) that has the potential to result in the serious injury, mortality, or Level A or Level B harassment of a marine mammal that was not identified and addressed previously.

(c) Monitoring Procedures for Missions at BT–9 and BT–11:

(1) The Holder of this Authorization shall:

(i) Designate qualified on-site individual(s) to record the effects of training exercises on marine mammals that inhabit Pamlico Sound;

(ii) Require operators of small boats, and other personnel monitoring for marine mammals from watercraft to take the Marine Species Awareness Training (Version 2), provided by the Department of the Navy.

(iii) Instruct pilots conducting range sweeps on marine mammal observation techniques during routine Range Management Department briefings. This training would make personnel knowledgeable of marine mammals, protected species, and visual cues related to the presence of marine mammals and protected species.

(iv) Continue the Long-Term Monitoring Program to obtain abundance, group dynamics (e.g., group size, age census), behavior, habitat use, and acoustic data on the bottlenose dolphins which inhabit Pamlico Sound, specifically those around BT–9 and BT–11.

(v) Continue the Passive Acoustic Monitoring (PAM) Program to provide additional insight into how dolphins use BT–9 and BT–11 and to monitor for vocalizations.

(vi) Continue to refine the real-time passive acoustic monitoring system at BT–9 to allow automated detection of bottlenose dolphin whistles.

(d) Reporting. (1) Unless specified otherwise in the Letter of Authorization, the Holder of the Letter of Authorization shall conduct all of the monitoring and reporting required under the LOA and shall submit an annual and comprehensive report to the Director, Office of Protected Resources, National Marine Fisheries Service by a date certain to be specified in the LOA. This report must include the following information:

(i) Date and time of each training exercise;

(ii) A complete description of the pre-exercise and post-exercise activities related to mitigating and monitoring the effects of the training exercises on marine mammal populations;

(iii) Results of the monitoring program, including numbers by species/stock of any marine mammals injured or killed as a result of the training exercises and number of marine mammals (by species, if possible) that may have been harassed due to presence within the applicable safety zone;

(iv) A detailed assessment of the effectiveness of sensor-based monitoring in detecting marine mammals in the area of the training exercises; and

(v) Results of coordination with coastal marine mammal stranding networks. The Marine Corps shall coordinate with the local NMFS Stranding Coordinator to discuss any unusual marine mammal behavior and any stranding, beached (live or dead), or floating marine mammals that may occur at any time during training activities or within 24 hours after completion of training.

(2) The Marine Corps shall submit an annual report to NMFS on December 7 of each year. The first report shall cover the time period from issuance of the Letter of Authorization through September 7, 2015. Each annual report after that time shall cover the time period from September 8th through September 7th.

(3) The final comprehensive report on all marine mammal monitoring and research conducted during the period of these regulations shall be submitted to the Director, Office of Protected Resources, National Marine Fisheries Service at least 180 days prior to expiration of these regulations or 180 days after the expiration of these regulations if new regulations will not be requested.

(4) General Notification of Injured or Dead Marine Mammals:

(i) The Marine Corps shall systematically observe training operations for injured or disabled marine mammals. In addition, the Marine Corps shall monitor the principal marine mammal stranding networks and other media to correlate analysis of any dolphin strandings that could potentially be associated with BT–9 or BT–11 training operations.

(ii) Marine Corps personnel shall notify NMFS immediately, or as soon as clearance procedures allow, if an injured, stranded, or dead marine mammal is found during or shortly after, and in the vicinity of, any training operations. The Marine Corps shall provide NMFS with species or description of the animal(s), the condition of the animal(s) (including carcass condition if the animal is dead), location, time of first discovery, observed behaviors (if alive), and photo or video (if available).

(iii) In the event that an injured, stranded, or dead marine mammal is found by Marine Corps personnel that is not in the vicinity of, or found during or shortly after operations, the Marine Corps personnel will report the same information listed above as soon as operationally feasible and clearance procedures allow.

(5) General Notification of a Ship Strike:

(i) In the event of a vessel strike, at any time or place, the Marine Corps shall do the following:

(ii) Immediately report to NMFS the species identification (if known), location (lat/long) of the animal (or the strike if the animal has disappeared), and whether the animal is alive or dead (or unknown);

(iii) Report to NMFS as soon as operationally feasible the size and length of the animal, an estimate of the injury status (e.g., dead, injured but alive, injured and moving, unknown, etc.), vessel class/type, and operational status;

(iv) Report to NMFS the vessel length, speed, and heading as soon as feasible; and

(v) Provide NMFS with a photo or video, if equipment is available.

§ 218.46 Applications for Letters of Authorization.

To incidentally take marine mammals pursuant to these regulations, the U.S. citizen (as defined at § 216.103) conducting the activities identified in

§ 218.40 must apply for and obtain either an initial Letter of Authorization in accordance with §§ 216.106 and 218.47 of this chapter or a renewal under § 218.48 of this chapter.

§ 218.47 Letter of Authorization.

(a) To incidentally take marine mammals pursuant to these regulations, the Marine Corps must apply for and obtain a Letter of Authorization.

(b) A Letter of Authorization, unless suspended or revoked, may be effective for a period of time not to exceed the expiration date of these regulations.

(c) If a Letter of Authorization expires prior to the expiration date of these regulations, the Marine Corps must apply for and obtain a renewal of the Letter of Authorization.

(d) In the event of any changes to the activity or to mitigation and monitoring measures required by a Letter of Authorization, the Marine Corps must apply for and obtain a modification of the Letter of Authorization as described in § 218.48.

(e) The Letter of Authorization shall set forth:

(1) Permissible methods of incidental taking;

(2) Means of effecting the least practicable adverse impact (i.e., mitigation) on the species, its habitat, and on the availability of the species for subsistence uses; and

(3) Requirements for monitoring and reporting.

(f) Issuance of the Letter of Authorization shall be based on a determination that the level of taking will be consistent with the findings made for the total taking allowable under these regulations.

(g) Notice of issuance or denial of a Letter of Authorization shall be published in the **Federal Register** within 30 days of a determination.

§ 218.48 Renewals and Modifications of Letters of Authorization.

(a) A Letter of Authorization issued under § 216.106 and § 218.47 of this chapter for the activity identified in § 218.40 shall be renewed or modified upon request by the applicant, provided that:

(1) The proposed specified activity and mitigation, monitoring, and reporting measures, as well as the anticipated impacts, are the same as those described and analyzed for these regulations (excluding changes made pursuant to the adaptive management provision in § 218.47(c)(1) of this chapter), and

(2) NMFS determines that the mitigation, monitoring, and reporting measures required by the previous Letter of Authorization under these regulations were implemented.

(b) For Letter of Authorization modification or renewal requests by the applicant that include changes to the activity or the mitigation, monitoring, or reporting (excluding changes made pursuant to the adaptive management provision in § 218.47(c)(1)) that do not change the findings made for the regulations or result in no more than a minor change in the total estimated number of takes (or distribution by species or years), NMFS may publish a notice of proposed Letter of Authorization in the **Federal Register**, including the associated analysis illustrating the change, and solicit public comment before issuing the Letter of Authorization.

(c) A Letter of Authorization issued under § 216.106 and § 218.47 of this chapter for the activity identified in § 218.40 may be modified by NMFS under the following circumstances:

(1) *Adaptive Management.* NMFS may modify (including augment) the existing mitigation, monitoring, or reporting measures (after consulting with the Marine Corps regarding the practicability of the modifications) if doing so creates a reasonable likelihood of more effectively accomplishing the goals of the mitigation and monitoring set forth in the preamble for these regulations.

(i) Possible sources of data that could contribute to the decision to modify the mitigation, monitoring, or reporting measures in a Letter of Authorization include:

(A) Results from the Marine Corps' monitoring from the previous year(s);

(B) Results from other marine mammal and/or sound research or studies; or

(C) Any information that reveals marine mammals may have been taken in a manner, extent, or number not authorized by these regulations or subsequent Letters of Authorization.

(ii) If, through adaptive management, the modifications to the mitigation, monitoring, or reporting measures are substantial, NMFS shall publish a notice of proposed Letter of Authorization in the **Federal Register** and solicit public comment.

(2) *Emergencies.* If NMFS determines that an emergency exists that poses a significant risk to the well-being of the species or stocks of marine mammals specified in § 218.42(c) of this chapter, a Letter of Authorization may be modified without prior notice or opportunity for public comment. NMFS will publish a notice in the **Federal Register** within 30 days subsequent to the action.

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