



January 2009

Environmental Assessment MCB Camp Lejeune Range Operations

MCB Camp Lejeune, North Carolina

Action Proponent:
MCB Camp Lejeune

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ENVIRONMENTAL ASSESSMENT

MCB CAMP LEJEUNE RANGE OPERATIONS

ONSLOW AND JONES COUNTIES, NORTH CAROLINA

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January 2009

FINDING OF NO SIGNIFICANT IMPACT

UNITED STATE MARINE CORPS RANGE OPERATIONS

AT MCB CAMP LEJEUNE, NORTH CAROLINA

INTRODUCTION

Pursuant to the Council on Environmental Quality regulations (40 Code of Federal Regulations Parts 1500-1508) implementing the procedural provisions of the National Environmental Policy Act (NEPA) (42 US Code Section 4321 et seq.), United States (US) Marine Corps Base (MCB), Camp Lejeune gives notice that an Environmental Assessment (EA) has been prepared to address training and range activities conducted at MCB Camp Lejeune, North Carolina. Based on the analysis of the EA, MCB Camp Lejeune finds that the proposed action will not have a significant impact on the natural or human environment.

PURPOSE AND NEED

The purpose for the proposed action is for the Marine Corps to meet its statutory responsibility to organize, train, equip, and maintain combat-ready Marine Forces at MCB Camp Lejeune. The need for the proposed action is to increase the operational training tempo at the MCB Camp Lejeune Range Complex in order to meet pre-deployment training schedules associated with emerging missions.

DESCRIPTION OF THE PROPOSED ACTION AND ALTERNATIVES

The EA addresses the proposed action, which is the preferred alternative, and the No Action Alternative. The No Action Alternative consists of continuing current training and range operations within the MCB Camp Lejeune Complex, at the current tempo and intensity.

Under the proposed action, the types of training operations at the MCB Camp Lejeune Range Complex will remain the same as those conducted today. However certain components of training will increase. These include the following:

- A 20 percent increase in small arms training, except .50 caliber arms
- An increase in rotary-winged (helicopter) operations including a 33 percent increase in CH-53 sorties and a 100 percent increase in AH-1 and UH-1 sorties
- A 10 percent increase in training with MK-19 40-mm grenade rounds
- A 5 percent increase in training with artillery, mortar, and other large arms
- A 39 percent increase in training with tank rounds and
- A 33 percent increase in tactical vehicle operations

EXISTING ENVIRONMENTAL CONDITIONS

The MCB Camp Lejeune complex consists of the Base and Marine Corps Outlying Landing Fields Oak Grove and Camp Davis and Marine Corps Air Station New River. The EA assesses effects of firing, movement and support activities associated with military training and range use on several components relative to the natural and human environment. The findings are summarized below.

ENVIRONMENTAL IMPACTS

Land Use: The proposed action will require no land use changes. Both current training activities and the increased activities of the proposed action will occur on existing ranges and training areas. Therefore no planning or zoning ordinances will be affected.

Environmental Justice: The EA examined the potential for off-base impacts including those that might affect minority or low-income populations, or children. Noise, air quality, water quality and safety are all issues that are potentially relevant to this topic. Neither existing training nor the proposed action will result in significant impacts in these resource areas.

Air Quality: The proposed action will result in minor increased impact on local air quality from increased detonation of munitions and increased tactical vehicle and aircraft activity. The air quality within the Jacksonville, North Carolina Metropolitan Statistical Area is well within regulatory limits and air pollution concentrations for all criteria pollutants. Neither continuance of current training activities, nor implementation of the proposed increases, will interfere with or delay continued attainment.

Noise: For large arms, the proposed action C-weighted day-night average sound level (CDNL) noise contours are comparable to the No Action Alternative levels with the following differences:

- CDNL Noise Zone II area is predicted to occur mostly within the Base. Exceptions where the 62-dBC contour extends off-Base include:

- The southern end that extends into Dixon
- The southern end that extends into Sneads Ferry
- The northwestern section that extends into Verona
- The eastern end that extends into Willis Landing

- CDNL Noise Zone II area will expand slightly beyond the Base along the northern Base boundary in the Piney Green area and along the western Base boundary near Greater Sandy Run area and around other off-Base areas.

- CDNL Noise Zone II area will increase slightly around the Base. However, the area with CDNL noise increase will experience a net increase of less than 1 dB, a barely perceptible difference. Therefore the proposed action will not result in a substantial impact to CDNL conditions around the Base.

- CDNL Noise Zone II is predicted to occur at on-Base housing and community facilities within the following areas:

- Partial areas in Paradise Point
- Partial Watkins Village
- Hospital Point, Hadnot Point, French Creek, Courthouse Bay, and Onslow Beach

Vibration conditions associated with the proposed action will remain the same as they are today.

Under both the no action and the proposed action, the overall small arms A-weighted day-night level (ADNL) contours around the MCB Camp Lejeune remain within the Base.

Increased helicopter sorties under the proposed action will increase aircraft noise in the airspace over MCB Camp Lejeune and surrounding areas. Despite this increase modeling shows that overall noise levels around the Base will remain below levels where land use constraints or the proximity of noise sensitive land uses are of concern.

Cultural Resources: Training operations have the potential to directly or indirectly affect archaeological and architectural resources eligible for listing on the National Register of Historic Places. Within the land ranges and maneuver areas both current training activities and the increased activities of the proposed action involve ground disturbing activities. MCB Camp Lejeune manages the risk to cultural resources from these activities through range standard operating procedures and user education, training area inspections, and marking of resources known to be eligible for inclusion on the National Register of Historic Places. Water range activities have a low potential to affect underwater archaeological resources; submerged artifacts are unlikely to be affected by munitions firing since the vast majority of rounds impacting the water are non-explosive small arms rounds whose momentum will likely be insufficient to disturb buried items on the river or sea floor. Current and proposed training activities will involve minimal high explosive firing with the potential to impact the waters of the BT-3 impact area, and there are no known shipwrecks in the BT-3 impact area.

Soils: Both current training activities and the increased activities of the proposed action involve soil disturbing activities. Minor impacts to soils will occur but will be offset and corrected by land management efforts, best management practices, and erosion and sedimentation control techniques already in place at MCB Camp Lejeune.

Water Resources: Current and proposed military use of the waterways around MCB Camp Lejeune is expected to cause only short-term and extremely localized disturbances of sediments and water column. These actions are unlikely to affect aquatic life or water quality. Munitions constituent concentrations in waters around MCB Camp Lejeune are currently below the Draft Department of Defense Range and Munitions Use Subcommittee Screening Values, and are expected to remain so under the proposed increases. Current procedures are successful in preventing most fuel spills during waterborne refueling, and the effects of any spills will be minimized by quick response and established procedures. Tactical vehicles will continue to use existing well defined roads and trails, thus minimizing new water crossing points.

Current and proposed uses of the New River and Onslow Bay include small boat use and transiting by light armored vehicles, amphibious assault vehicles, and expeditionary fighting vehicles. All of these have the potential to impact surface water quality from exhaust, oils, fuels and the introduction of soils from on-land training carried by amphibious vehicles entering the water at several splash points.

Other military activities on the water include spanning of waterways by bridging units and use of temporary causeways onto Onslow Beach for transport of vehicles and goods off vessels and onto shore. These structures are temporary and have only minor potential to disturb the water or bottom sediments.

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Wetlands and Floodplains: Under the proposed action, increased training and munitions expenditures will have minor impacts on wetlands. Current training activities in maneuver areas typically have minor impacts on wetland and floodplain areas since these areas are more difficult to traverse and are therefore less likely to be entered by troops on foot or in vehicles. Wetland and floodplain areas on the Base downrange of firing points receive some portion of fired rounds. This impact may alter the vegetative community but is not sufficient to cause long-term changes to the soils, or hydrology or extent of wetlands or floodplains.

Terrestrial Biology: Impacts to vegetation can result from training activities, such as when vehicles traverse through vegetated areas. Most training operations remain on designated roads or trails or within previously cleared areas that have been designated for training purposes. MCB Camp Lejeune actively inspects and restores impacted areas where needed.

Training related fires will likely increase from the proposed increase in munitions use. The ecosystems of MCB Camp Lejeune are fire dependent, and so this is at least a partially positive environmental consequence.

Munitions firing may cause the death of trees downrange from firing activities, or even the formation of bare soil areas, or a "beaten zone". The proposed action will not create any new beaten zones since all activities will occur within existing ranges and maneuver areas.

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Training related impacts on wildlife, including migratory birds, include disturbance from personnel and vehicles and training related noise. Wildlife populations on MCB Camp Lejeune are healthy, and will continue to be so under the proposed increases. Wildlife mortality associated with vehicle collisions during vehicle training exercises is rare and will remain so even with increased tactical vehicle usage. Due to the increase in sorties the proposed action will have a concurrent increase in bird/animal aircraft strike hazard potential. However, the relatively low number of actual and predicted bird/animal aircraft strikes within the MCB Camp Lejeune airspace indicates that current aircraft strike avoidance procedures are successful. These will continue to be utilized.

Marine Biology: The proposed action will have negligible impacts on marine birds, marine invertebrates, and fish, under both the No Action Alternative and the Preferred Action. Impacts will be direct, including disturbance of individual animals during firing and movement on surface waters but these disturbances will be short-term and infrequent, and therefore will have no population level or long-term effects.

Protected Species: Current training and range activities have the potential to incur incidental effects on species that are federally protected under the Endangered Species Act including sea turtles, the piping plover and Red-cockaded Woodpecker. MCB Camp Lejeune has previously consulted with the US Fish and Wildlife Service and National Marine Fisheries Service regarding these impacts and continues to adhere to the monitoring and conservation measures developed during these consultations. Increased firing and tactical vehicle usage associated with the proposed action has the potential to increase these effects, but these effects are not expected to jeopardize the continued existence of these species or their habitat. MCB Camp Lejeune is underway with consultation on these additional effects.

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Current training activities and the increased activities of the proposed action may affect, but are not likely to adversely affect, other federally recognized threatened and endangered species in

the vicinity of the MCB Camp Lejeune complex and surrounding waters. These species include seabeach amaranth, rough leaved loosestrife, golden sedge, cooley's meadowrue, the west Indian manatee, and the northern right whale.

Current training and range activities have the potential to impact species that are federally protected under the Marine Mammal Protection Act. Debris associated with training exercises, such as parachutes and chaff, could potentially be ingested; however, strands of chaff are not likely to harm a dolphin; filaments are fine and will pass through the digestive system. Impacts of accidental debris ingestion are considered negligible. Direct and indirect impacts from firing activities were modeled in the EA. Modeling parameters included the number of rounds fired that could potentially impact the water under both current training and the proposed action, and density of marine mammal species in the area. The calculated results indicate that the probability of harassment or injury of marine mammals is very low, that at most the proposed action will cause the mortality of 0.15 dolphins per year and harassment of 0.42 dolphins per year. This probability is further reduced by range standard operating procedures such as those requiring aerial clearance of the N-1/BT-3 range prior to firing.

Water range operating procedures including use of observers and minimization of lighting on the beach are in place to ensure that other water based activities, such as the temporary installation of floating causeways and piers during water borne logistics events, will not adversely affect protected species.

Hazardous Materials and Hazardous Waste Management: The increases of hazardous materials and wastes from the implementation of the proposed action are minimal and within the existing capacities of transporters and, treatment and disposal facilities at MCB Camp Lejeune. Therefore, no adverse impacts are expected to hazardous materials and waste management under the proposed action.

Public Health and Safety: The public is notified of hazardous activities through the use of Notice to Mariners and Notices to Airmen. Prior public notification of Marine Corps training activities, use of known training areas, avoidance of non-military aircraft and civilians, and the remoteness of the training areas from coastal population centers reduces the potential for the interaction between the public and the military. To date, these strategies have been successful in maintaining public safety and are anticipated to continue to do so. Use of lasers will increase under the proposed action; however, Standard Operating Procedures and advanced communications systems are in place to ensure public safety. Therefore, increases in training under the proposed action will not result in adverse impacts to the public health and safety.

Commercial and Recreational Fishing and Other Waterborne Recreational Activities: The proposed action will increase operations on land ranges and therefore may require more frequent temporary closures of surface water restricted areas associated with ranges. Recreational boating and other activities such as sports fishing, water skiing, crabbing, shellfishing, sport diving, and whale watching, will be impacted by the proposed action. However, the restricted use of these areas will be brief (usually lasting approximately one hour) and infrequent therefore, impacts on waterborne commercial and recreational activities is expected to be minor.

Civil (Non-Military) Aircraft Operations: There will be an increase in helicopter sorties under the proposed action but only negligible impacts to civil aircraft operations for either commercial or general aviation. The proposed action does not require changes to the designated purpose,

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dimensions (shape or altitude), or hours of operation of the existing special use airspace for MCB Camp Lejeune and the additional sortie operations do not conflict with any airspace plans, policies, or controls.

CUMULATIVE IMPACTS

The EA presented a discussion of cumulative impacts for past, present and reasonably foreseeable future events, by resource area. Minor cumulative impacts were identified in several resource areas.


AVOIDANCE AND MINIMIZATION MEASURES

MCB Camp Lejeune has previously implemented extensive environmental protection measures for current range and training operations. These include policies and procedures that conserve and protect environmental resources. These include avoidance and minimization measures outlined in current Standard Operating Procedures, Best Management Practices, or actions already implemented as part of the *Integrated Natural Resources Management Plan, Range and Training Regulations, Standing Operating Procedures for Range Control* (Base Order P3570.1B), and the *Environmental Handbook for Trainers*. The proposed action will have no effects left unaddressed by these procedures and practices; thus, no new mitigation measures are required.

FINDING OF NO SIGNIFICANT IMPACT

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Based on information gathered during preparation of this EA, the United States Marine Corps finds that implementing the proposed action will not significantly impact the human or natural environment or generate significant controversy. The EA addressing this action is on file and may be reviewed by interested parties at: Commanding Officer, Base Public Affairs Office, MCB Camp Lejeune, North Carolina 28542-0004, telephone (910) 451-7440.

13 Feb 09
Date



R. P. FLATAU, JR.
Colonel, US Marine Corps
Commanding Officer
Marine Corps Base, Camp Lejeune

ENVIRONMENTAL ASSESSMENT
MCB CAMP LEJEUNE RANGE OPERATIONS
ONSLOW AND JONES COUNTIES, NORTH CAROLINA

Responsible Officer: Commanding Officer
Marine Corps Base
Camp Lejeune, North Carolina 28542-0004

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EXECUTIVE SUMMARY

The US Marine Corps requires the best military training in the world to sustain its critical role in national defense and forward deployment in worldwide combat situations. Training provides the physical skills, ability, and knowledge to prevail in combat. It includes basic military, skill-specific, and weapons-specific training, as well as formal education. It builds proficiency, cohesion, and teamwork and is fundamental to achieving unity of effort. Training is the primary means for maintaining, improving, and displaying the US Marine Corps Forces' readiness to fight and win in times of crisis or conflict.

The Navy and Marine Corps extensively use each other's training areas and conduct many highly integrated training activities in the three adjoining range complexes of the Navy Cherry Point Range Complex, Marine Corps Base (MCB) Camp Lejeune Range Complex, and Marine Corps Air Station (MCAS) Cherry Point Range Complex. Despite the interaction in this region, the functions, structure, management and use of the three range complexes are sufficiently distinct. Therefore, the Navy and Marine Corps analyzed potential environmental effects of their combined training activities in separate environmental documents for the range complex(es) over which each has cognizance:

- Navy Cherry Point Range Complex Environmental Impact Statement/Overseas Environmental Impact Statement considers training activities in the sea space and undersea space of the Cherry Point Operating Area; overlying special use airspace and coastal areas from the mean high tide line, up to and extending seaward to the western Cherry Point Operating Area boundary.
- MCB Camp Lejeune Range Operations Environmental Assessment (EA) considers training activities on the installation's many ranges and impact areas, some of which extend into the Cherry Point Operating Area (e.g. BT-3 Impact Area and N-1 Surface Water Maneuver Area), and overlying special use airspace.
- MCAS Cherry Point Range Operations EA considers training activities on the air station; its outlying and auxiliary landing fields; its two impact areas of Bombing Target 11 and Bombing Target 9 in Pamlico Sound; and overlying special use airspace.

The Marine Corps EAs analyzed the potential environmental impact of training activities in the same resource areas as the Navy Environmental Impact Statement/Overseas Environmental Impact Statement. Each document addresses Navy and Marine Corps training activities that occur on that particular range complex and both services will comply with the mitigation and protective measures therein. The Navy will incorporate, by reference, relevant analyses from both Marine Corps EAs into the Environmental Impact Statement/Overseas Environmental Impact Statement discussion of Direct, Indirect, and Cumulative Impacts. The Navy and Marine Corps coordinated their public outreach efforts to provide the public with access to clear, accurate information regarding the three environmental planning efforts.

This EA considers the environmental impact of training operations in the MCB Camp Lejeune Range Complex. The MCB Camp Lejeune Range Complex provides a unique training environment comprised of land, water, and airspace training areas. This particular range complex

is of vital importance to the readiness of Marine Forces. Due to the pre-deployment training schedules associated with emerging missions, there is a need to increase the operational training tempo at the MCB Camp Lejeune Range Complex. Moreover, increased training is needed to address foreseeable increases in the number of military personnel training at MCB Camp Lejeune. Given these aspects, MCB Camp Lejeune proposes to take action that would provide a training environment within the MCB Camp Lejeune Range Complex with the capacity and capability to fully support required training tasks for operational units, military schools, and other users. The environmental impacts of the total influx of personnel that is expected at MCB Camp Lejeune in the coming years in relation to achieving a balanced growth in capability throughout the Marine Corps are being analyzed in a separate document (US Marine Corps Grow the Force at MCB Camp Lejeune, MCAS New River, and MCAS Cherry Point, North Carolina Environmental Impact Statement).

This EA has been prepared by the United States (US) Marine Corps in accordance with the National Environmental Policy Act of 1969; 42 US Code 4321-4370d, as implemented by the Council on Environmental Quality regulations, 40 Code of Federal Regulations Parts 1500-1508 and the National Environmental Policy Act procedures contained in the Marine Corps Order P5090.2A, Change 1, Chapter 12, dated 22 January 2008, *Environmental Compliance and Protection Manual*, which establishes procedures for implementing the National Environmental Policy Act.

ES.1 DESCRIPTION OF THE PROPOSED ACTION

The proposed action is to support and conduct current and emerging training operations at existing land ranges, water ranges, and special use airspace within the MCB Camp Lejeune Range Complex. The proposed action includes the following: a 20 percent increase in small arms training, except .50 caliber arms; an increase in rotary-wing (helicopter) operations, including a 33 percent increase in CH-53 sorties and a 100 percent increase in AH-1 and UH-1 sorties; a 10 percent increase in training with MK-19 40-mm grenade rounds; a 5 percent increase in training with artillery, mortar, and other large arms; a 39 percent increase in training with tank rounds; and a 33 percent increase in tactical vehicle operations.

The proposed action would fully support and enhance the MCB Camp Lejeune mission to maintain combat-ready units for expeditionary deployment, and provide the Marine Corps the capability to sustain a state of military readiness commensurate with its national defense mission. Training operations under the proposed action will be reviewed every five years to determine if supplementary NEPA analysis is necessary.

ES.2 ALTERNATIVES CONSIDERED

Military use of land ranges, water ranges, and airspace is coordinated in conjunction with a regulatory framework. All East Coast range complexes and the operations and training that occur within them adhere to specific regulations. All range complexes are necessary and critical to ensure that Marine Corps and Navy operational forces are prepared and certified ready for overseas deployment and combat operations. The MCB Camp Lejeune Range Complex is a vital

component of the Atlantic Fleet system of range complexes. A review of alternative sites (e.g., Parris Island, South Carolina and Townsend Bombing Range, Georgia) determined they do not provide reasonable alternatives for the required training purposes/activities described above. No other range complex on the East Coast has the land areas, airspace, sea space, undersea space, impact areas, training and maneuver areas, drop zones, landing zones, targets, and instrumented facilities in one geographic area. Moreover, the Marine Corps controls the scheduling for all operations conducted within the MCB Camp Lejeune Range Complex and the MCAS Cherry Point Range Complex. The Marine Corps does not control any other ranges on the East Coast, so it cannot schedule its units with user priority at any other range complex. Consequently, alternative training locations were eliminated from further consideration.

One action alternative and the No Action Alternative were carried forward for detailed analysis in this EA. **Table ES-1** summarizes the key elements of the No Action Alternative and the proposed action. Both alternatives include common elements with regard to continuation of existing operations at MCB Camp Lejeune.

Table ES-1
Summary of Alternatives

| Action to be Taken | Alternatives | |
|--|-----------------------|-----------------|
| | No Action Alternative | Proposed Action |
| Increase of munitions expenditures | | ✓ |
| Increase of existing tactical vehicle utilization levels | | ✓ |
| Increase of existing helicopter utilization levels | | ✓ |
| Continuation of existing Explosive Ordnance Disposal | ✓ | ✓ |
| Continuation of existing ground equipment use | ✓ | ✓ |
| Accommodate increased training levels | | ✓ |

Under the proposed action, the types of training operations at the MCB Camp Lejeune Range Complex would remain essentially the same. The levels of training to be provided under the proposed action are reflected by munitions usage, and the movement of personnel, vehicles, small boats and amphibious vehicles, and aircraft as shown in summary **Tables 2.3-1** through **2.3-6**, in Summary of Training Levels (**Subchapter 2.3** of this Environmental Assessment).

An action alternative which included training with live and inert Hellfire missiles was under evaluation in this EA, however, during the course of evaluating the impacts Hellfire missiles may have on the environment, the National Environmental Policy Act team was informed that the planning criteria used to develop safety footprints for specific weapon systems was being modified and would not be available in time for this document. Without accurate safety footprints, potential environmental and safety impacts associated with the Hellfire missile could not be evaluated appropriately. Therefore, any alternative in this document that included the Hellfire missile has been removed and will not be evaluated. It should be noted, however, that once the new safety footprints are available these actions will most likely be evaluated in their own National Environmental Policy Act document.

ES.3 ENVIRONMENTAL IMPACT OF THE PROPOSED ACTION

Implementation of the proposed action would result in some minor adverse environmental impacts. Following is a brief summary of the anticipated impacts on each resource area analyzed in the EA. The discussion of impacts is categorized by impacts resulting from proposed activities within land ranges, water ranges, and special use airspace. For a detailed description and analysis, refer to Chapter 4 of this EA, Environmental Consequences.

Land Ranges

Land Use. Under the proposed action, the nature of munitions firing activities and locations where these activities occur would remain the same as they are today. However, there would be an increase in the quantity of munitions fired as well as an increase in personnel and vehicle movement. The land use classification, operating and training facilities, would essentially remain the same.

Environmental Justice. As evaluated in accordance with Executive Orders 12898 and 13045, the direct and indirect effects of the proposed action would not cause disproportionately high adverse human health or environmental effects on minority or low income populations. In addition, no environmental health or safety risks were identified that would disproportionately affect children.

Air Quality. There would be minor increases in air emissions due to the increase in munitions usage and tactical vehicle use; thus, a small negative impact to the regional air quality is expected. However, the air quality within the Jacksonville, North Carolina Metropolitan Statistical Area is well within regulatory limits, and air pollution concentrations would not exceed the National Ambient Air Quality Standards as a result of the proposed action.

Noise. For large arms, the proposed action C-weighted day-night average sound level (CDNL) noise contours are comparable to the No Action Alternative levels with the following differences:

- CDNL Noise Zone II area is predicted to occur mostly within the Base. Exceptions where the 62-dBC contour extends off-Base include:
 - The southern end that extends into Dixon
 - The southern end that extends into Sneads Ferry
 - The northwestern section that extends into Verona
 - The eastern end that extends into Willis Landing
- CDNL Noise Zone II area would expand slightly beyond the Base along the northern Base boundary in the Piney Green area and along the western Base boundary near Greater Sandy Run area and around other off-Base areas.
- CDNL Noise Zone II area would increase slightly around the Base. However, the area with CDNL noise increase would likely experience a net increase of less than 1 dB, a barely perceptible difference. Therefore the proposed action likely would not result in a substantial impact to CDNL conditions around the Base.
- CDNL Noise Zone II is predicted to occur at on-Base housing and community facilities within the following areas:

- Partial areas in Paradise Point
- Partial Watkins Village
- Hospital Point, Hadnot Point, French Creek, Courthouse Bay, and Onslow Beach

For on-Base land uses, sensitive areas including Onslow Beach and small portion of Courthouse Bay areas are within Noise Zone III.

Under the proposed action, the overall small arms A-weighted day-night level (ADNL) contours around the MCB Camp Lejeune are anticipated to remain within the Base. Also, vibration conditions associated with the proposed action would remain the same as they are today.

Cultural Resources. The proposed action would have no impact on historic architectural properties as these are at a sufficient distance from the outer limits of the ranges and training areas. A portion of the Stone Bay Rifle Range Historic District is within the MCB Camp Lejeune Range Complex. The Stone Bay Rifle Range Historic District's historic features and setting would remain unchanged, as it would continue to perform the functions for which it was originally designed and built.

Impact to onshore archaeological resources at MCB Camp Lejeune and Marine Corps Outlying Landing Field Oak Grove could occur under the No Action Alternative and the proposed action. Existing and past training activities such as construction of fighting positions or repeated vehicle crossings over one particular area could damage or may have damaged archaeological sites. However, MCB Camp Lejeune has identified all archaeological sites located within high probability archaeologically sensitive soil. As a result, established protocols exist at the Base that include coordination and input from training, range and cultural resources staff to avoid, minimize, or reduce impacts to cultural resources. In addition, the Base's Cultural Resource staff monitors site conditions on a continual basis. In those instances where training activities have impacted or will impact previously unidentified sites, the *Integrated Cultural Resources Management Plan* includes procedures for inadvertent discovery that requires cessation of training at the site, and future avoidance or mitigation.

Soils. While minor impacts to soils could occur if the proposed action were implemented, land management efforts and employing applicable erosion and sedimentation control techniques would continue to mitigate environmental impacts to soils due to increased training. These efforts and the specific engineering training area maintenance plans would continue to help mitigate impacts to soils.

Water Resources. The impacts of the munitions constituents entering the natural environment under the proposed training levels are considered to be minimal. All concentrations are below the Draft Department of Defense Range and Munitions Use Subcommittee Screening Values. Draft Department of Defense Range and Munitions Use Subcommittee Screening Values were developed to promote consistency across the services' operational range assessment programs. This list of screening values is intended to be a general list of commonly found munitions constituents used in various range training activities. A hierarchy of sources was developed to guide the selection of screening values. The hierarchy was a prioritized list of screening value

sources in order of recognized authority and applicability. All services will compare their data to these screening values to determine if further assessment is recommended. Increases in small and large arms rounds would not adversely affect surface water or groundwater. Tactical vehicles would continue to use existing well defined roads and trails, thus minimizing impacts to surface waters. Surface water at the locations of splash points may experience an increase in local short term impacts due to sediment re-suspension during activities if the number of exercises at some of these areas increases.

Wetlands and Floodplains. Wetlands cover approximately 30 percent of the land area at MCB Camp Lejeune. Additionally, approximately 4,330 hectares (10,700 acres) of the installation lie within floodplains. Consequently, wetlands and floodplains are found throughout the range complex. Under the proposed action, adverse impacts to wetlands and floodplains are not expected because wetland protection measures would be followed.

Terrestrial Biology. Minor impacts to terrestrial wildlife and vegetation could occur under the proposed action. There would likely be an increased risk of accidental fire from the overall increase of munitions used, as well as increases in soil disturbance from landing ordnance, and higher levels of pedestrian and vehicular traffic. Overall, there will be an increase in training noise leading to increased disruption of normal species behavior on base. Regardless, all federal and state listed species that are known to occur on the installation have special conservation plans that will continue to be implemented, including avoidance and minimization measures to help protect these species during training exercises. Increased aircraft movement could put migrating birds at a greater risk of bird strike. However, this is not likely with existing procedures and protocols in place to avoid bird strikes. Under the proposed action, an increase in training activities may affect, but would not likely adversely affect all of these federally-listed species: seabeach amaranth, rough-leaved loosestrife, red-cockaded woodpecker, piping plover, American alligator, and nesting sea turtles (green and loggerhead).

Hazardous Materials and Hazardous Waste Management. No adverse impacts are expected to hazardous materials and waste management under the proposed action. MCB Camp Lejeune has established Standard Operating Procedures to make certain that federal and state agency notification requirements are met, and to arrange for agency consultation as necessary where sites with risk of pollutant migration could be affected. Hazardous waste would continue to be managed in compliance with Marine Corps Order 5090.2A, Chapter 9. The anticipated increases in hazardous materials and waste from implementation of the proposed action are well within the existing capacities of hazardous waste transporters and treatment and disposal facilities at MCB Camp Lejeune. The use and handling of expended ordnance is regulated under the Military Munitions Rule, which excludes ranges used for training, for the testing of munition constituents, as well as range clearance as part of range management activities from the application of the Resource Conservation and Recovery Act or the Comprehensive Environmental Response, Compensation, and Liability Act.

Public Health and Safety. Increases in training under the proposed action would not result in adverse impacts to public health and safety. Current Standard Operating Procedures and

advanced communications systems would dictate that all training is carried out in a way that minimizes impacts to the public. Therefore, safety impacts with respect to increased use of lasers associated with the increase in use of weapons and munitions would have negligible impacts. Bird/Animal Aircraft Strike Hazard is not expected to increase due to existing protocols and procedures in place to avoid bird and animal strikes.

Water Ranges

Coastal Zone Management. Implementation of the proposed action would result in some adverse environmental impacts from proposed activities within water ranges. Impacts to the coastal zone from the proposed action would be considered negligible. The Marine Corps, through the Coastal Consistency Determination process, has determined that implementing the proposed action would be consistent to the maximum extent possible with the enforceable policies of the North Carolina Coastal Management Program.

Commercial and Recreational Fishing. Due to safety concerns, commercial and recreational fishing activities would continue to be directed away from water ranges during training operations and fishermen would need to use alternate fishing destinations. Operations on land ranges would increase, which may require more frequent temporary closures of surface water restricted areas associated with ranges on the New River. Despite the minor economic impact to the county, the effects of the proposed action will be experienced more severely by commercial and recreational fishing businesses in the region of influence, and by local commercial and recreational fishermen in the area.

Recreational Activities. Recreational boating, sports fishing, water skiing, crabbing, shellfishing, sport diving, and whale watching, would be affected by the proposed action. However, the restricted use of these areas would be brief (usually lasting approximately one hour) and therefore, is not expected to adversely affect recreational activities. In addition, navigable waters between Brown's Island and the Atlantic Intracoastal Waterway (bounded by Brown's Inlet and Bear Inlet) are closed to navigation at all times due to the potential occurrence of unexploded ordnance, and therefore would not be affected by the proposed action. Noise produced by training activities at MCB Camp Lejeune is occasionally audible at nearby beaches. The proposed action would increase training related noise, however the difference would not be perceptible to recreational users of nearby beaches.

Noise. The potential large weapon noise impacts from water range operations under the proposed action would be minor. Moreover, the change in small arms rounds would have similar but negligible effects on noise.

Cultural Resources. The proposed action would have a low potential to affect underwater archaeological resources as there are no permanent water-based targets in the range complex. Munitions fired from ships and boats on water ranges aim at targets within impact areas on the ground. There is a small chance that munitions aimed at ground targets may accidentally land in the water. If submerged cultural resources exist, neither existing training nor the proposed action

would be likely to generate enough underwater disturbances to affect submerged archaeological resources.

Underwater Sediments. Under the proposed action, underwater sediments in the nearshore and open ocean underwater environment have the potential to be disturbed due to small boat and amphibious vehicle training operations and munitions constituents from expended materials. The proposed increase in munitions firing and additional expended materials would not measurably affect underwater sediment quality.

Surface Water. Current and proposed uses of the New River include small boat use and transiting by light armored vehicles, amphibious assault vehicles, and expeditionary fighting vehicles. All of these have the potential to impact surface water quality from exhaust, oils, fuels and the introduction of soils from on-land training carried by amphibious vehicles entering the water at splash points. These soils would produce short-term, temporary increases in turbidity and contaminants from the re-suspended materials. There would be no increase in surface-to-ground fires. However, because there is an increase in firing on land ranges, which have surface danger zones that fall over water, there is a potential for an increase in level of munitions that could accidentally land in water.

Marine Biology. The proposed action would have negligible impacts on marine birds, marine invertebrates, and fish, but would not differ from impacts under the No Action Alternative. Impacts would be direct but short-term. The proposed action would not adversely affect Essential Fish Habitat and would result in minor impacts to marine mammals. For threatened and endangered species, there are no foreseeable effects on the shortnose sturgeon, or the Hawksbill sea turtle. Under the proposed action, an increase in training activities may affect, but is not likely to adversely affect the following: West Indian manatee, North Atlantic right whale, loggerhead sea turtle, green sea turtle, Kemp's ridley sea turtle, or leatherback sea turtle.

Hazardous Materials and Hazardous Waste Management. No adverse impacts to water ranges are expected from hazardous materials and waste management under the proposed action.

Public Health and Safety. Increases in training under the proposed action would not adversely affect public health and safety.

Special Use Airspace

Civil (Non-Military) Aircraft Operations. Under the proposed action, there would be a 33 percent increase in CH-53 sorties and a 100 percent increase in AH-1 and UH-1 sorties. However, there will only be negligible impacts to civil aircraft operations for commercial or general aviation because the proposed action does not require changes to the designated purpose, dimensions (shape or altitude), or hours of operation of the existing special use airspace for MCB Camp Lejeune and the additional sortie operations do not conflict with any airspace plans, policies, and controls. Furthermore, joint use protocols establish that airspace becomes available for access by non-participating aircraft during periods when the airspace is not needed for its designated purpose.

Noise. The proposed action would increase activity in the special use airspace however, the increase is not large enough to cause a perceptible difference in noise levels to human or animal receivers on the ground.

Public Health and Safety. Increases in training under the proposed action would not adversely affect public health and safety.

ES.4 AVOIDANCE AND MINIMIZATION MEASURES

There are no identified mitigation measures in addition to those MCB Camp Lejeune has previously implemented for range and training operations. These include policies and procedures that conserve and protect environmental resources on the installation, including the range complex. Ongoing avoidance and minimization measures outlined in current Standard Operating Procedures, Best Management Practices, or actions already implemented as part of the *Integrated Natural Resources Management Plan*, *Range and Training Regulations*, *Standing Operating Procedures for Range Control* (Base Order P3570.1B), *Environmental Handbook for Trainers*, or other Base Orders and programs would be applied to this proposed action to protect the environment; thus, no new mitigation measures, other than what is outlined below, are necessary.

- In order to minimize the environmental impacts to soils due to training, MCB Camp Lejeune would close selected areas to training use for restoration and recovery of eroded sites; use Best Management Practices for training related activities; implement soil conservation restoration and maintenance projects; plant native warm season grasses where practical to restore eroded sites; and implement shoreline stabilization along the New River.
- During training operations, if sites of potential historical or archaeological significance are encountered, the unit commander would order actions in the vicinity halted and the area marked. The unit commander would immediately notify the Base archaeologist at telephone (910) 451-7230.
- Ongoing Range Environmental Vulnerability Assessments would continue in order to identify mitigation measures required to minimize impacts to surface water and groundwater.
- Best Management Practices would be used to avoid and minimize the release of sediments into stormwater. Mitigation plans would include long-term (project life) features to meet the requirements of the Base's *Stormwater Pollution Prevention Plan*.
- Activities would be designed to avoid and minimize impacts to wetlands and waters of the US.
- Prescribed burns would continue to be regularly conducted on the installation to reduce the risk of accidental wildfires, which could adversely affect vegetation, and to support vegetation that is benefited by periodic fire events.
- MCB Camp Lejeune would follow guidelines within the Base's *Integrated Natural Resources Management Plan* and *Range and Training Regulations*, *Standing Operating Procedures for Range Control* (Base Order P3570.1B) to minimize impacts to threatened and endangered species. The *Integrated Natural Resources Management Plan* includes specifics regarding the schedule for implementation, funding, and monitoring of identified management actions for natural resources, including annual reviews and five-year updates.

- MCB Camp Lejeune would continue to utilize and implement *Range and Training Regulations, Standing Operating Procedures for Range Control* (Base Order P3570.1B) to inform users of training facilities at the Range Complex regarding environmental procedures. The MCB Camp Lejeune Operations and Training Division regularly updates the Base Order with new information as needed, and provides daily oversight and control to enforce its requirements. Additionally, MCB Camp Lejeune's *Hazardous Waste Management Plan* contains detailed procedures for response actions, and responders are trained and certified to handle such environmental emergencies.
- In order to improve existing noise and vibration conditions in the surrounding community, MCB Camp Lejeune has been implementing several on-going mitigation measures such as:
 - Conducting a Joint Land Use Study with the involvement of local community and establishing a public information and outreach program
 - Installing the Blast Analysis and Monitor System (BLAM) to monitor peak noise levels around the installation during the weapon operations. The system provides warnings to the range operation managers when the weapon firing noise exceeds the warning threshold
 - Establishing Range and Training Regulations restrictions on large caliber weapon firing and explosive detonations during quiet hours
 - Moving certain range operations away from sensitive land uses

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1.0 PURPOSE AND NEED FOR PROPOSED ACTION

1.1 INTRODUCTION

Marine Corps Base (MCB) Camp Lejeune has prepared this Environmental Assessment (EA) to evaluate the potential environmental consequences from current and emerging training operations at the MCB Camp Lejeune Range Complex. The National Security Act of 1947, amended in 1952, established the mission of the United States (US) Marine Corps. That mission, in summary, is to train, organize, and equip Marines for offensive amphibious employment and provide a “force in readiness.” The Department of the Navy and the Marine Corps, as directed by 10 US Code, Chapter 507, Sections 5062 and 5063, respectively, are responsible for training all Naval and Marine Forces for combat.

The primary mission of MCB Camp Lejeune is to sustain combat ready units for expeditionary deployments. MCB Camp Lejeune has fulfilled this mission in 1941 by providing ocean, coastal, riverine, inland, and airspace training areas, which together support the combat readiness of Marine Corps and Navy operational forces. The MCB Camp Lejeune Range Complex supports ground combat, air combat, and combat service support elements at varying levels of training complexity. The tempo of training operations fluctuates during times of conflict and declared war.

The purpose and need for the proposed action is for the Marine Corps to meet its statutory responsibility to organize, train, equip, and maintain combat-ready Marine Forces at MCB Camp Lejeune. The activities analyzed in this EA include: land-based training, such as infantry ground maneuvers and weapons firing on ranges; water-based training, such as amphibious vehicle operations on the New River, Atlantic Intracoastal Waterway, and Onslow Bay, and air combat training in special use airspace. This EA provides a detailed look at the potential environmental impacts associated with the current training tempo and proposed increases in the training tempo at existing ranges. Increasing the operational training tempo would address pre-deployment training schedules for emerging missions and foreseeable increases in the number of military personnel training at MCB Camp Lejeune. The environmental impacts of the total influx of personnel that is expected at MCB Camp Lejeune in the coming years in relation to achieving a balanced growth in capability throughout the Marine Corps are being analyzed in a separate document (Environmental Impact Statement, US Marine Corps Grow the Force at MCB Camp Lejeune, Marine Corps Air Station (MCAS) New River, and MCAS Cherry Point, North Carolina [NC]).

What is this EA about?

This EA describes the purpose and need for the proposed action and evaluates the potential environmental consequences from current and emerging training operations at the MCB Camp Lejeune Range Complex.

What is the proposed action?

The proposed action is to support and conduct current and emerging training operations at the MCB Camp Lejeune Range Complex.

Why are we writing this EA now?

MCB Camp Lejeune has prepared this EA to address potential environmental consequences from current operations at the MCB Camp Lejeune Range Complex, as well as to address a proposed action that includes increased training operations at existing ranges.

The scope of this EA does not include combat operations, operations in direct support of combat, or other activities conducted primarily for purposes other than training.

MCB Camp Lejeune is located along the southern coast of eastern North Carolina adjacent to the City of Jacksonville, with 20.4 kilometers (km), (11 nautical miles [nm]) of Atlantic Ocean coastline (**Figure 1-1**). The potential environmental consequences in this EA will be evaluated for training operations conducted in land ranges, water ranges, and special use airspace in the MCB Camp Lejeune Range Complex (**Figure 1-2**).

The Navy and Marine Corps extensively use each other's training areas and conduct many highly integrated training activities in the three adjoining range complexes of the Navy Cherry Point Range Complex, MCB Camp Lejeune Range Complex, and MCAS Cherry Point Range Complex (see **Figure 1-3**). Despite the high degree of Navy and Marine Corps interaction in this region, the functions, structure, management and use of the three range complexes are sufficiently distinct that the Navy and Marine Corps will analyze potential environmental effects of their combined training activities in three separate documents. Each service will provide environmental documentation for the Range Complex (es) over which it has cognizance:

- Navy Cherry Point Range Complex Environmental Impact Statement/Overseas Environmental Impact Statement considers training activities in the sea space and undersea space of the Cherry Point Operating Area; overlying special use airspace of Warning Area 122; and the 5.6-km (3-nautical-mile [nm]) -wide coastal strip from the mean high tide line, up to and extending seaward to the western Cherry Point Operating Area boundary (see Navy Tactical Training Theater Assessment and Planning Program [**Subchapter 1.4.2**]). The Navy is the Action Proponent.
- MCB Camp Lejeune Range Operations EA (this EA) considers training activities on the installation's many ranges and impact areas, some of which extend into the Cherry Point Operating Area (e.g. BT-3 Impact Area and N-1 Surface Water Maneuver Area), and overlying special use airspace. The Marine Corps is the Action Proponent for the MCB Camp Lejeune Range Operations EA.
- MCAS Cherry Point Range Operations EA considers training activities on the air station; its outlying and auxiliary landing fields; its two impact areas of Bombing Target 11 and Bombing Target 9 in Pamlico Sound; and overlying special use airspace. The Marine Corps is the Action Proponent for the MCAS Cherry Point Range Operations EA.

The Marine Corps EAs will analyze the potential environmental impact of training activities in the same resource areas as the Navy Environmental Impact Statement/Overseas Environmental Impact Statement: land use and coastal zone management, air quality, noise, natural and cultural resources, hazardous materials and waste, public health and safety, and socioeconomics and environmental justice. Each document will address Navy and Marine Corps training activities that occur on that particular range complex and both services will comply with the mitigation and protective measures therein.

The Navy will incorporate by reference relevant analyses from both Marine Corps EAs into the Navy Cherry Point Range Complex Environmental Impact Statement/Overseas Environmental Impact Statement Chapter 6 discussion of Direct, Indirect, and Cumulative Impacts. Examples of

topics discussed in the EAs that are relevant to the Navy Environmental Impact Statement/Overseas Environmental Impact Statement include the following:

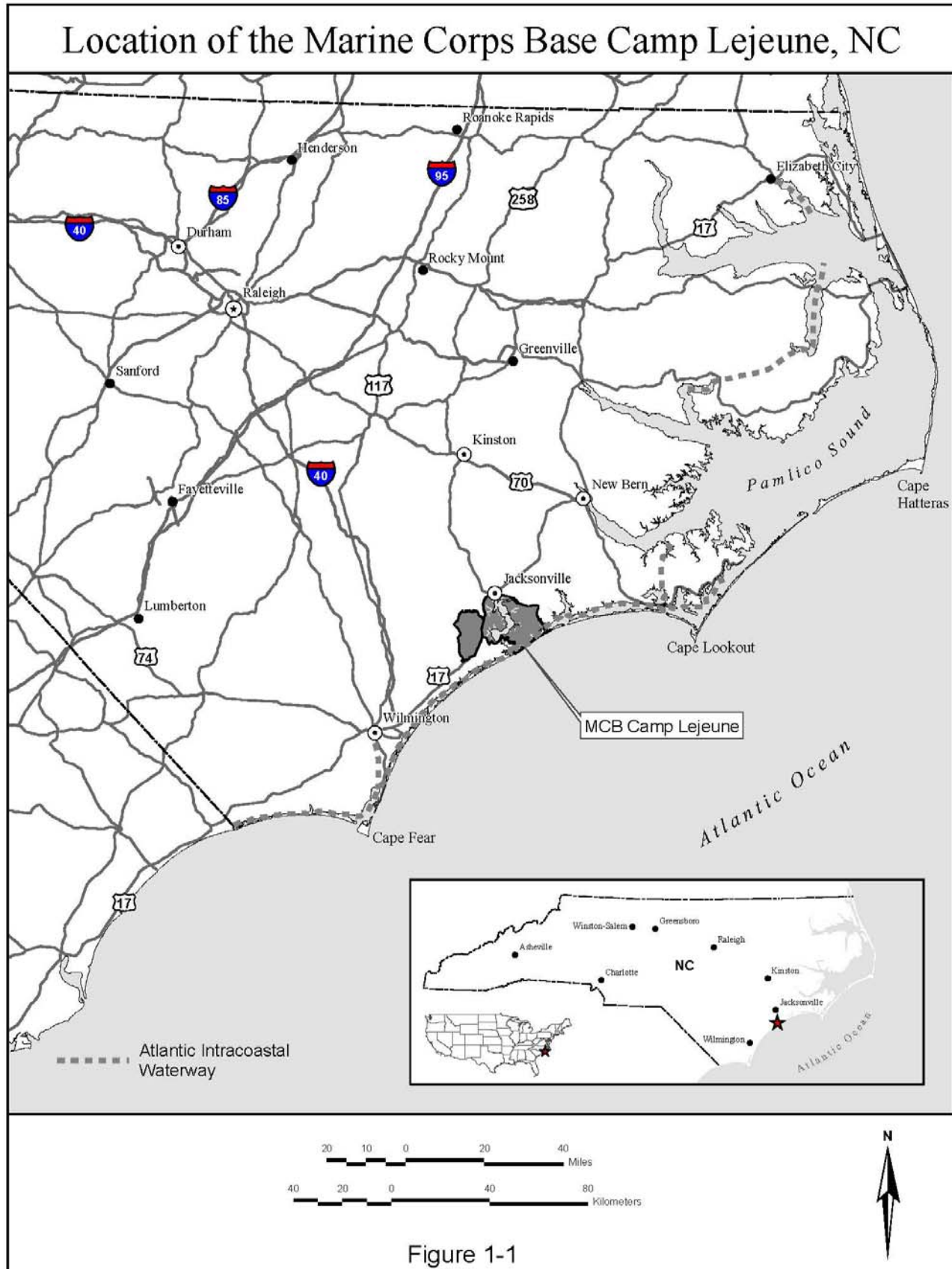
- Training activities that occur on both land and sea. An example is Navy and Marine Corps aircraft launching from ships at sea and bombing or strafing targets on shore.
- Training areas and instrumentation that overlap geographically. The Mid-Atlantic Electronic Warfare Range threat emitters are examples of instrumentation overlap in that aircraft over land and over the Cherry Point Operating Area can use the systems.
- Mobile environmental resources that occur within different portions of the range complex during different portions of their life cycle. For example, dolphins that swim both at sea and in inshore waters. Additionally, training impacts, such as noise and air emissions, have the potential to cross geographic boundaries.

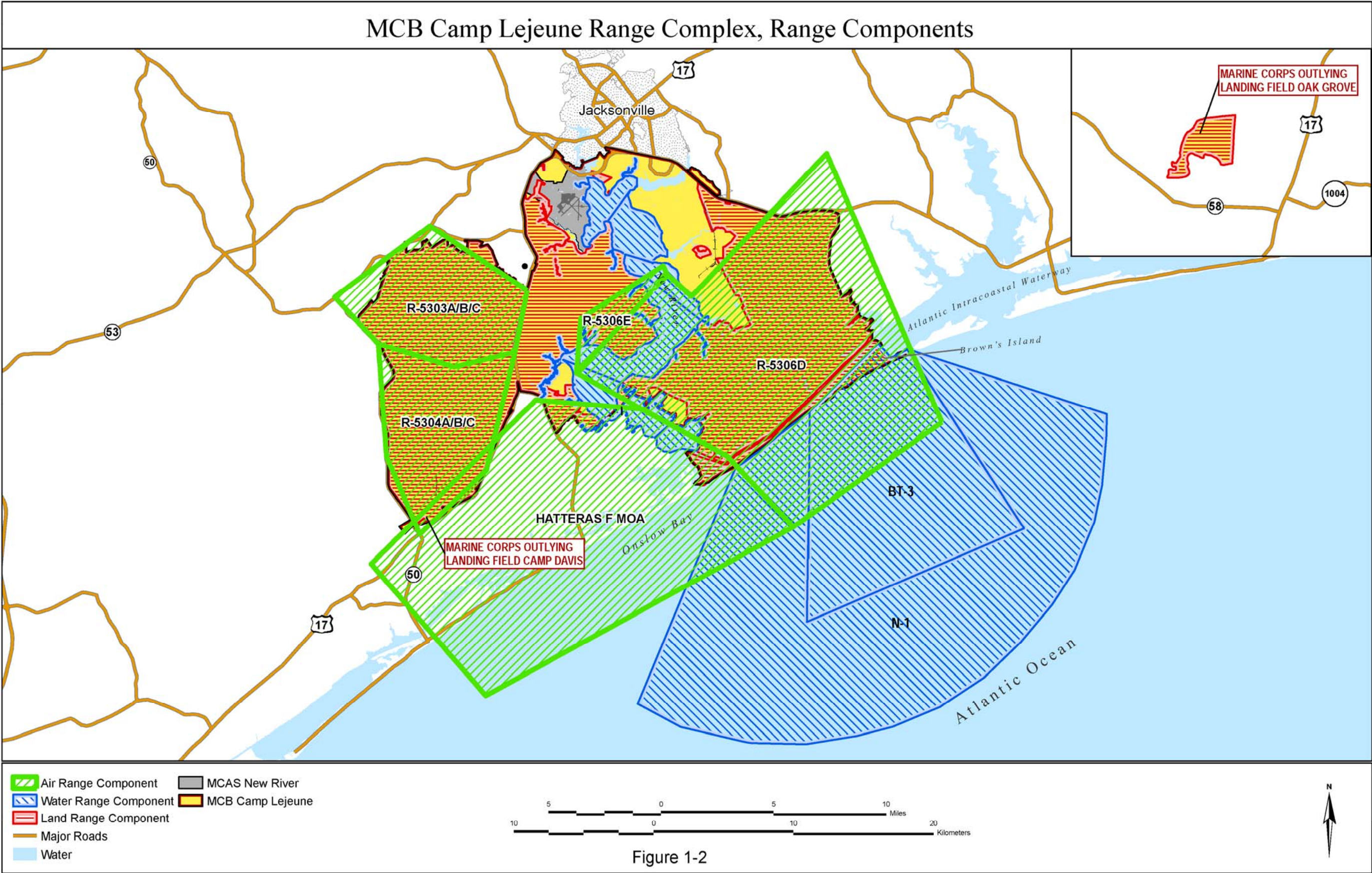
The Navy and Marine Corps coordinated their public outreach efforts to provide the public with access to clear, accurate information regarding all three environmental planning efforts. The Marine Corps, with Navy representation, hosted six public information meetings at venues near MCAS Cherry Point and MCB Camp Lejeune (see Public Involvement [**Subchapter 1.4.4**]). The Marine Corps held additional public information meetings, specific to the MCAS Cherry Point Range Operations EA, on 6 and 7 October 2008. The Navy, with Marine Corps representation, held public meetings on 14 and 15 October 2008 in Morehead City and Wilmington, North Carolina, respectively, to provide information about the Navy Cherry Point Range Complex Draft Environmental Impact Statement/Overseas Environmental Impact Statement.

1.2 BACKGROUND

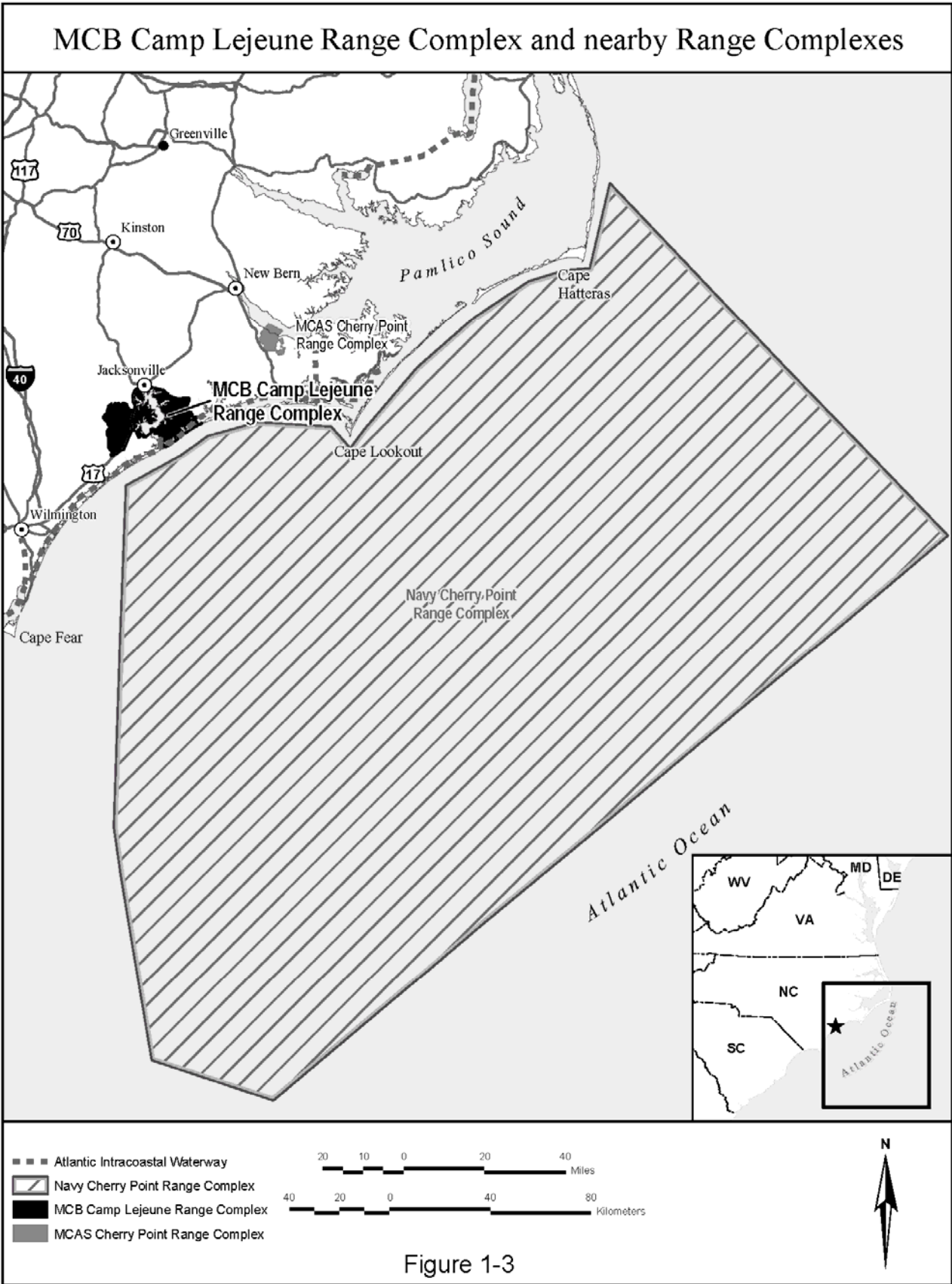
MCB Camp Lejeune is the largest Marine Corps Base on the east coast. Its ranges, training areas, and airspace provide a safe and realistic training environment to ensure military personnel are ready to defend the nation. In addition to the Marine Corps and Navy, many other services and agencies train at the MCB Camp Lejeune Range Complex: Army, Air Force, Coast Guard, foreign military services, state wildlife resource officers, and law enforcement personnel from federal, state and local agencies. This EA will address training operations conducted by all services and agencies within the MCB Camp Lejeune Range Complex.

Since the MCB Camp Lejeune Range Complex is used by the Navy, MCB Camp Lejeune is included in the Navy's Tactical Training Theater Assessment and Planning Program, which is described in **Subchapter 1.4.2**. The following subchapters provide background information on Marine Corps and Navy training, the mission of MCB Camp Lejeune, and a description of the MCB Camp Lejeune Range Complex.





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1.2.1 Marine Corps and Navy Training

The Marine Corps requires the best military training in the world to sustain its critical role in national defense and forward deployment in worldwide combat situations. Training provides the physical skills, ability, and knowledge to prevail in combat. It includes basic military, skill-specific, and weapons-specific training (both hardware and tactical), as well as formal education. It builds proficiency, cohesion, and teamwork and is fundamental to achieving unity of effort. Training is the *primary* means for maintaining, improving, and displaying the Marine Corps Forces' readiness to fight and win in times of crisis or conflict.

MCB Camp Lejeune supports Marine Corps and Navy tactical training by maintaining and operating the MCB Camp Lejeune Range Complex. This complex provides services and materials for the combat readiness of the Marine Corps Forces, Atlantic; the US Atlantic Fleet; and, other operational forces (US Fleet Forces Command et al., April 2006). The MCB Camp Lejeune Range Complex must be maintained to support national security objectives and to ensure a high state of readiness for Marine Corps and Navy Forces. The training requirements of Marines drive how the range complex is configured and the nature of the training that occurs at the range complex. Operational requirements (meaning deployment and employment of trained Marine Corps Forces), in turn determine training requirements.

Marine Corps training proceeds on a continuum, from teaching basic and specialized individual military skills, to intermediate skills or small unit training, to advanced, integrated training events, culminating in joint exercises or pre-deployment certification events. Each step on this continuum is assessed for effectiveness on an ongoing basis, as new systems, tactics, techniques, and procedures are developed and implemented.

The Joint Chiefs of Staff determine the deployment of Marine Corps Forces, including those that train at the MCB Camp Lejeune Range Complex, based on worldwide requirements and commitments. As a result, deployment schedules are not fixed, but are flexible, often changing to meet the Nation's security needs. The support necessary to conduct required pre-deployment training, particularly training range support, must therefore be available when and as needed.

1.2.2 Mission of MCB Camp Lejeune

The Marine Air-Ground Task Force is the Marine Corps' principal organization for conducting missions across the spectrum of military operations. The Marine Air-Ground Task Force provides combatant commanders or joint task force commanders with scalable, versatile expeditionary forces able to respond to a broad range of crisis and conflict situations. They are balanced, combined-arms force packages containing organic command, ground, aviation, and sustainment elements. A single commander leads and coordinates this combined-arms team from peacetime training through deployment. The Marine Air-Ground Task Force teams live and train together, further increasing their cohesion and fighting power.

The mission of MCB Camp Lejeune is to provide support to the II Marine Expeditionary Force's Marine Air-Ground Task Force elements and other tenant commands, which include the US

Marine Corps, Special Operations Command; School of Infantry; Engineer School; and elements of the Navy and US Coast Guard. Thus, this mission supports Marine Corps, Navy, and other joint force tactical training for combat readiness. This mission also provides realistic training, which is essential to preparing and protecting personnel who are deployed around the world.

MCB Camp Lejeune provides training opportunities for ground combat, air combat, and combat service support elements at many different levels. These levels of training opportunities vary from individual and unit to Marine Air-Ground Task Force Battalion/Marine Expeditionary Unit and Marine Air-Ground Task Force Marine Expeditionary Brigade.

Since the installation was established, in 1941, the tempo of training operations has fluctuated. During times of conflict and declared war, the installation experiences an increase in training prior to the conflict and a subsequent decrease toward the end of the event. Such fluctuations occurred during World War II, the Cold War, the Korean Conflict, the Vietnam Conflict, Operation Desert Shield/Desert Storm, Operation Enduring Freedom, and Operation Iraqi Freedom. Changing conditions, like those experienced in times of conflict, regularly prompt the development of new training concepts.

The Marine Corps adopted Expeditionary Maneuver Warfare as the capstone concept for developing the forces, tactics, and techniques required by the operational context of the 21st century. Expeditionary Maneuver Warfare builds upon previous concepts and doctrine on amphibious operations by preparing the Marine Corps to maneuver operationally from the sea to conduct sustained combat or other expeditionary operations ashore. MCB Camp Lejeune's unique combination of ocean, coastal, riverine, inland and airspace ranges and training areas are of critical importance to the combat readiness of our nation's most rapid response forces.

1.2.3 Description of MCB Camp Lejeune Range Complex

The MCB Camp Lejeune Range Complex includes three types of ranges: land, water, and special use airspace. Land range assets include live-fire ranges, training and maneuver areas, impact areas, and various training facilities. Land range assets cover approximately 57,870 hectares (ha) (143,000 acres [ac]). The topography lacks hilly or mountainous terrain and training areas are typically densely vegetated with pine forest and undergrowth, dotted with pocosin swamps and wetlands. The vegetation, climate, growing season, and high water table characteristics of these land range assets supply an excellent setting for maneuver, live-fire, amphibious, and tactical training.

Water ranges within the MCB Camp Lejeune Range Complex generally surround land range assets and include: New River, Atlantic Intracoastal Waterway, and Onslow Bay, and Atlantic Ocean. Water ranges are designated by the US Army Corps of Engineers as prohibited areas (existing danger zones [water]) and water restricted areas. Prohibited areas may be closed to the public on a full-time or intermittent basis because they are used for target practice, bombing, rocket-firing or other especially hazardous operations. Water restricted areas prohibit or limit public access to provide security for Government property and/or protection to the public from

the risks of damage or injury arising from the Government's use of that area. The Commanding Officer of MCB Camp Lejeune exercises the authority to control access to these navigable waters. Nautical charts show prohibited areas and restricted areas where vessels may not loiter or anchor per US Code of Federal Regulations (CFR), Part 334 Navigation. The proximity of water ranges to land range assets and their prohibited and restricted designations provide ideal conditions for fording operations, amphibious operations, and small craft training.

Special use airspace within the MCB Camp Lejeune Range Complex includes several segments of restricted airspace (R-5306D, R-5306E, R-5303 A/B/C, and R-5304 A/B/C) and a military operating area (Hatteras F Military Operating Area). The configuration of these special use airspace segments in relation to land and water ranges within the range complex provides an exceptional environment for aircraft operations, pilot training, and troop movement.

Training operations conducted within the MCB Camp Lejeune Range Complex are governed by the *Range and Training Regulations, Standing Operating Procedures for Range Control* (Base Order P3570.1B), which provides requirements, instructions, and procedures for training activities on land ranges, water ranges, and special use airspace.

1.2.4 Installations and Special Use Airspace

Segments of airspace in Eastern North Carolina are designated special use airspace for use by military aircraft. Consistent with the direction provided to the Federal Aviation Administration in the Federal Aviation Act of 1958, the concept of special use airspace was developed by the Federal Aviation Administration and the Department of Defense to identify areas where military activity or unusual flight conditions may occur, and its designation serves to alert a non-participating aircraft (civil or military) to the possible presence of these activities. Federal Aviation Administration procedural guidelines established for special use airspace use are intended to maintain the safety of all airspace users and balance the needs of the military with the needs of commercial and general aviation. As a result, the military manages its assigned special use airspace by activating the smallest airspace footprint (fewest components and fewest altitudes) necessary to accomplish the military mission on any given day (Department of the Navy, January 2007).

Eastern North Carolina is the location of important military air-to-ground training ranges. An air-to-ground training range is a military training facility that supports realistic simulation of air-to-air maneuvers, air-to-ground delivery of weapons, and electronic warfare training. These training ranges include MCB Camp Lejeune Range Complex and MCAS Cherry Point Range Complex.

Special use airspace above MCB Camp Lejeune and MCAS Cherry Point is divided into restricted and military operations areas. Restricted areas define airspace where the flight of commercial and general aircraft, while not wholly prohibited, is subject to restrictions. Restricted areas denote the existence of unusual, often invisible, hazards to commercial and general aircraft, such as artillery firing, aerial gunnery, or guided missiles. Commercial and general aircraft operations in these areas are restricted during times when a restricted area is “active.”

Military operations areas are blocks of airspace in which military training and other military maneuvers are conducted. Military operations areas have specified floors and ceilings for containing military activities. Commercial and general aircraft flying by “visual flight rules” are not restricted from flying through military operations areas while they are in operation, but are encouraged to contact MCAS Cherry Point Approach Control for radar services.

Table 1.1-1 lists the special use airspace segments above MCB Camp Lejeune and MCAS Cherry Point with their vertical extent and hours of operation. **Figure 1-4** depicts these installations and locations of special use airspace segments.

R-5303A/B/C and R-5304A/B/C lie over the Greater Sandy Run Area within the MCB Camp Lejeune Range Complex. This airspace is utilized by MCB Camp Lejeune for live firing operations, bombing, close air support (live or simulated), and/or combined air-to-ground exercises. The potential environmental impacts of training activities within R-5303A/B/C and R-5304A/B/C are being analyzed in this EA.

R-5306A is the primary restricted airspace associated with MCAS Cherry Point. It is the northernmost of these special use airspace units. It lies over the Pamlico Sound and the mouths of the Neuse and Pamlico Rivers. It is also above several small towns including Hobucken, Lowland, Merritt, Pamlico, Bayboro, Oriental, Sealevel, Stacey, and Davis. R-5306A, which is over Bombing Target 9 and Bombing Target 11, is used for unmanned aerial system flights and pilot aircraft training in air-to-air tactics, air-to-ground weapons delivery, and tactical and electronic warfare exercises. The potential environmental impacts of training activities within R-5306A are being analyzed in the MCAS Cherry Point Range Operations EA.

R-5306C is located to the south of MCAS Cherry Point and lies over Marine Corps Auxiliary Landing Field Bogue. R-5306C is above several small towns including Swansboro, Cape Carteret, Emerald Isle, Kuhns, Bogue, and Ocean, and a portion of Onslow Bay. R-5306C is primarily an aircraft approach and maneuvering area and is additionally used for unmanned aerial system flights and fighter/attack aircraft that carry and deliver ordnance on the adjacent R-5306D targets from within R-5306C. The potential environmental impacts of training activities within R-5306C are being analyzed in the MCAS Cherry Point Range Operations EA.

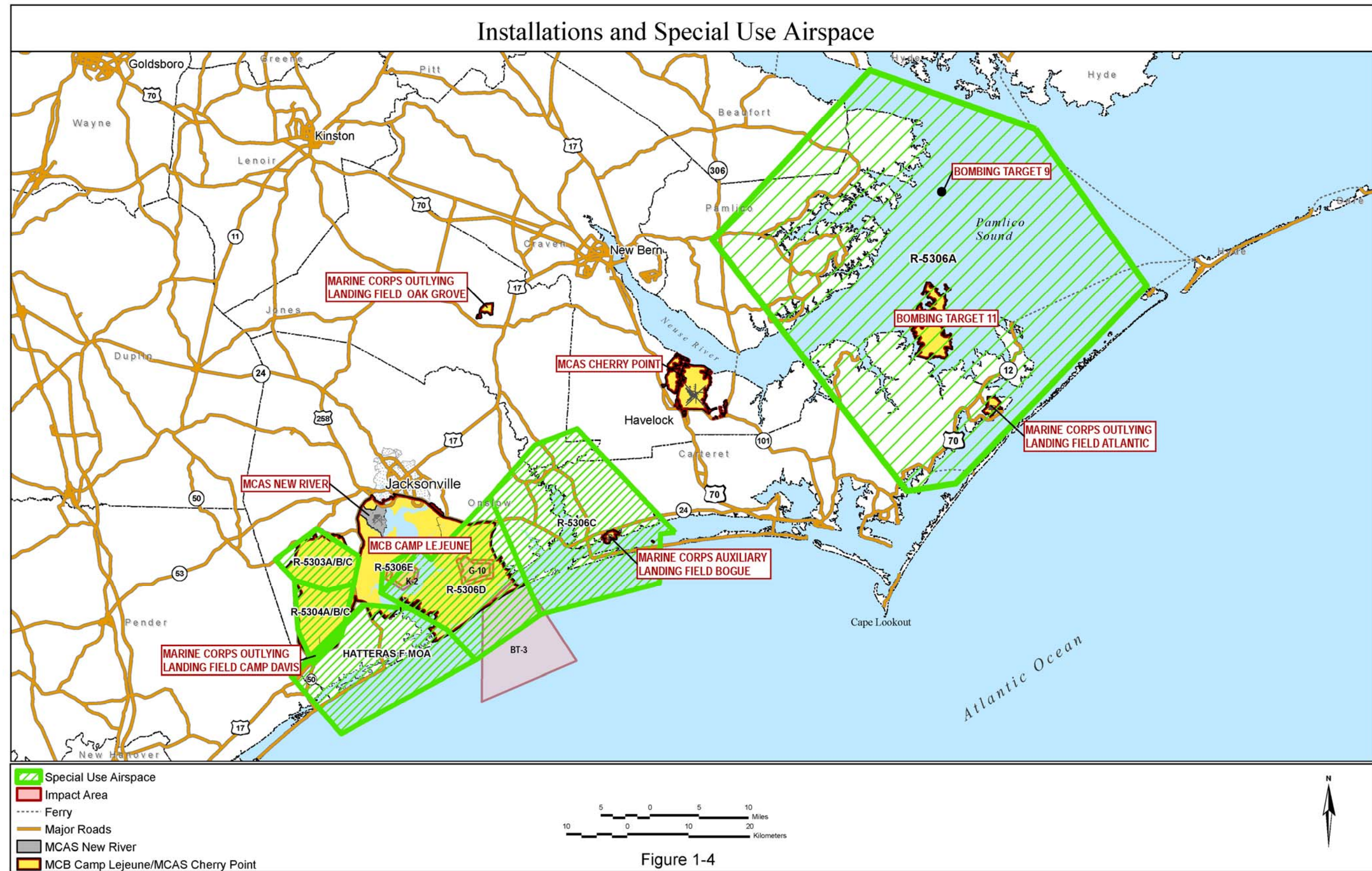
R-5306D/E lies over MCB Camp Lejeune, as well as portions of the New River and Onslow Bay. The G-10 Impact Area lies beneath R-5306D while portions of the K-2 Impact Area lies beneath R-5306E. This restricted airspace is used by MCB Camp Lejeune and frequently accommodates ground-to-ground, as well as air-to-ground munitions. The potential environmental impacts of training activities within R-5306D/E are being analyzed in this EA.

Table 1.1-1
Special Use Airspace above MCB Camp Lejeune and MCAS Cherry Point

| Airspace Segment | Floor Altitude | Ceiling Altitude | Scheduling Agency ¹ | Hours of Operation ² |
|---|---|--|--------------------------------|--|
| R-5303A | Surface | 2,133 m (6,999 ft) Mean Sea Level | MCB Camp Lejeune | 0600 – 1800 Monday-Friday; other times by Notice to Airmen 24 hours in advance |
| R-5303B | 2,134 m (7,000 ft) Mean Sea Level | 3,048 m (9,999 ft) Mean Sea Level | MCB Camp Lejeune | By Notice to Airmen 24 hours in advance |
| R-5303C | 3,048 m (10,000 ft) Mean Sea Level | 5,486.4 m (18,000 ft) Mean Sea Level | MCB Camp Lejeune | By Notice to Airmen 24 hours in advance |
| R-5304A | Surface | 2,133 m (6,999 ft) Mean Sea Level | MCB Camp Lejeune | 0600 – 1800 Monday-Friday; other times by Notice to Airmen 24 hours in advance |
| R-5304B | 2,134 m (7,000 ft) Mean Sea Level | 3,048 m (9,999 ft) Mean Sea Level | MCB Camp Lejeune | By Notice to Airmen 24 hours in advance |
| R-5304C | 3,048 m (10,000 ft) Mean Sea Level | 5,486.1 m (17,999 ft) Mean Sea Level | MCB Camp Lejeune | By Notice to Airmen 24 hours in advance |
| R-5306 A | Surface | 5,486.1 m (17,999 ft) Mean Sea Level | MCAS Cherry Point | Continuous |
| R-5306 C | 366 m (1,200 ft) Above Ground Level | 5,486.1 m (17,999 ft) Mean Sea Level | MCAS Cherry Point | Continuous |
| R-5306 D/E | Surface | 5,486.1 m (17,999 ft) Above Ground Level | MCB Camp Lejeune | Charted as active continuously |
| Hatteras F Military Operations Area | 914 m (3,000 ft) Mean Sea Level | 396 m (13,000 ft) Mean Sea Level | MCAS Cherry Point | 0700 – 2200 Monday-Friday; other times by Notice to Airmen |
| Notes: 1. Controlling agency for special use airspace is the Federal Aviation Administration, Washington Air Route Traffic Control Center; however, MCAS Cherry Point is the Controlling Agency for all special use airspace listed above with the exception of R-5303C and R-5304C. 2. Local Time | | | | |

Hatteras F Military Operations Area lies south of MCB Camp Lejeune and is above the towns of Snead's Ferry, Peru, and Surf City, as well as part of Onslow Bay. This airspace is used by MCAS Cherry Point and MCB Camp Lejeune and is frequently used in conjunction with R-5306D/E for air-to-ground ordnance training. The potential environmental impacts of training activities within the Hatteras F Military Operations Area are being analyzed in this EA.

Known as "joint use," the Marine Corps activates special use airspace only when the airspace is actually in use for its designated purpose. This airspace management practice avoids unnecessary restrictions to commercial and general aviation and permits access through these areas when they are not in use.



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1.3 PURPOSE AND NEED FOR PROPOSED ACTION

The purpose and need for the proposed action is for the Marine Corps to meet its statutory responsibility to organize, train, equip, and maintain combat-ready Marine Forces at MCB Camp Lejeune. The MCB Camp Lejeune Range Complex provides a unique training environment composed of ground, water, and airspace training areas. This particular range complex is of vital importance to the readiness of Marine Forces. Due to the pre-deployment training schedules associated with emerging missions, including Operation Enduring Freedom and Operation Iraqi Freedom, there is a need to increase the operational training tempo at the MCB Camp Lejeune Range Complex. Also, increased training is needed to address potential foreseeable changes in the number of military personnel training at MCB Camp Lejeune. Given these factors, MCB Camp Lejeune proposes to take action that would provide a training environment within the MCB Camp Lejeune Range Complex with the capacity and capability to fully support required training tasks for operational units, military schools, and other users.

Access to the ranges, training areas, and special use airspace within the MCB Camp Lejeune Range Complex allow Marines to complete training requirements, which are prerequisites before deploying on missions. The key to being effective in combat is realistic training in the air, on land, and at sea – the single greatest tool the military has in preparing and protecting Marine Forces. Realistic training supplements limited combat experience.

1.4 ENVIRONMENTAL REVIEW PROCESS

1.4.1 National Environmental Policy Act

The National Environmental Policy Act of 1969 requires that federal agencies consider potential environmental consequences of proposed actions in their decision-making process. Under the National Environmental Policy Act, federal agencies must prepare an EA or an environmental impact statement for any federal action, which may have an impact on the environment, except those actions that are determined to be “categorically excluded” from further analysis.

An EA is a concise public document that provides sufficient analysis for determining whether the potential environmental impacts of a proposed action are significant, resulting in the preparation of an environmental impact statement, or not significant, resulting in the preparation of a finding of no significant impact (FONSI). An environmental impact statement is prepared for those federal actions that may significantly affect the quality of the human environment. Thus, if the Marine Corps were to determine that the proposed action would have a significant impact on the quality of the human environment, an environmental impact statement would be prepared.

This EA will be reviewed by the lead agency, the Marine Corps, who will make a determination regarding the proposed action and whether a FONSI or environmental impact statement is appropriate. Should the Marine Corps conclude that a FONSI is appropriate, then a FONSI would be prepared that summarizes the issues presented in this EA. The Commanding Officer of MCB Camp Lejeune would sign the FONSI and publish a notice of availability in local newspapers in eastern North Carolina.

MCB Camp Lejeune has prepared this EA in accordance with all applicable federal and state regulations and instructions, as well as with other applicable laws, ordinances, rules, and policies. These include, but are not limited to the following:

- National Environmental Policy Act as amended by Public Law 94-52, July 3, 1975 (42 US Code 4321 et seq.), which requires environmental analysis for major federal actions significantly affecting the quality of the environment
- Council on Environmental Quality regulations, as contained in 40 CFR § 1500 to 1508, which direct federal agencies on how to implement the provisions of the National Environmental Policy Act
- Marine Corps Order P5090.2A, Change 1 (US Marine Corps, January 22, 2008), which provides the Marine Corps' internal operating instructions on how to implement the provisions of the National Environmental Policy Act

1.4.2 Navy Tactical Training Theater Assessment and Planning Program

Department of Defense Directive 3200.15, *Sustainment of Ranges and Operating Areas*, defines range sustainment as “managing and operating ranges to support their long-term viability and utility to meet the National defense mission.” In 2002, Navy Fleet Forces Command/Pacific Fleet developed the Tactical Training Theater Assessment and Planning Program to serve as a comprehensive approach to “sustain” or preserve ranges for continued training access.

One element of the Navy Tactical Training Theater Assessment and Planning Program is an analysis of the potential environmental impacts associated with activities and operations conducted within Naval range complexes. The Navy is currently preparing an Environmental Impact Statement/Overseas Environmental Impact Statement to assess the potential environmental impacts over a 10-year planning horizon associated with Navy Atlantic Fleet and Marine Corps training; research, development, testing, and evaluation activities; and associated range capabilities enhancements (including infrastructure improvements) in the Navy Cherry Point Range Complex. The Navy Cherry Point Range Complex encompasses air, sea, and undersea space off the central coast of North Carolina, which is separate and distinct from the MCAS Cherry Point Range Complex and the nearby MCB Camp Lejeune Complex (**Figure 1-3**). The geographic scope of the Navy's Environmental Impact Statement/Overseas Environmental Impact Statement includes the area from the mean high tide line, up to and extending seaward from the 5.6 km (3 nm) western boundary of the Navy Cherry Point operating area. It does not include any land, inland ranges, or special use airspace associated with the MCAS Cherry Point and MCB Camp Lejeune Range Complexes. (Since training operations in the Navy Cherry Point Range Complex occur outside of US territory, greater than 22 km (12 nm) offshore, an Overseas Environmental Impact Statement is combined with the Environmental Impact Statement to fulfill the requirements of Executive Order 12114, *Environmental Effects Abroad of Major Federal Actions*.) The Navy Cherry Point Range Complex Environmental Impact Statement/Overseas Environmental Impact Statement will address typical training operations such as:

- Mine warfare – mine countermeasures and mine neutralization

- Surface warfare – bombing exercise, missile exercise, gunnery exercise, gunnery exercise ship, and visit, board, search, and seizure/maritime interdiction operation-ship and helicopter
- Air warfare – air combat maneuver, gunnery exercise, missile exercise, and air intercept control
- Electronic warfare – electronic combat operation, chaff exercise, and flare exercise
- Strike warfare – high-speed anti-radiation missile exercise
- Amphibious warfare – firing exercise-land, firing exercise-integrated maritime portable acoustic scoring and simulator system, amphibious assault, and amphibious raid

To summarize, Navy and Marine Corps training in Navy-controlled operating areas, special use airspace, and undersea space is being addressed in the Navy Cherry Point Range Complex Environmental Impact Statement/Overseas Environmental Impact Statement. Marine Corps and Navy training that occurs on Marine Corps-controlled land ranges, water ranges, and special use airspace within the MCB Camp Lejeune Range Complex is addressed within this EA.

1.4.3 Scoping and Alternatives Development

A project kickoff meeting was held on October 4, 2007. At this meeting, the National Environmental Policy Act team, which consisted of representatives from the Marine Corps Installations East, MCB Camp Lejeune, Marine Corps Forces Command, US Fleet Forces Command, Naval Facilities Engineering Command Atlantic, Naval Facilities Engineering Command Mid-Atlantic, and the EA preparer, discussed the scope of environmental issues to be addressed in the EA, along with alternatives to the proposed action. Further discussions between the National Environmental Policy Act team members on the alternatives for the proposed action occurred on November 29–30, 2007. The meeting determined the following environmental resource categories would be addressed in the EA: land use and coastal zone management, air traffic, socioeconomics (commercial and recreational fishing and recreational activities) and environmental justice, air quality, noise, cultural resources, natural resources (soils, water resources, terrestrial and marine biology), hazardous materials and hazardous waste management, and public health and safety.

One of the alternatives that moved forward from the November 29–30, 2007 meeting included training with live and inert Hellfire missiles. However, during the course of evaluating the impacts that Hellfire missiles may have on the environment, the National Environmental Policy Act team was informed that the planning criteria used to develop safety footprints for specific weapon systems was being modified and would not be available in time for this document. Without accurate safety footprints, potential environmental and safety impacts associated with the Hellfire missile cannot be evaluated appropriately. Therefore, the alternative in this document that included the Hellfire missile has been removed and will not be evaluated. It should be noted, however, that once the new safety footprints are available these actions will most likely be evaluated in their own National Environmental Policy Act document.

1.4.4 Public Involvement

The public involvement process for this EA included an agency outreach meeting and two public information meetings. The agency outreach meeting was held on April 29, 2008 for federal and state agency representatives where the focus of the EA was explained as well as the baseline conditions and the purpose and need for the proposed action. Among the agencies present were the North Carolina Office of State Archaeology, North Carolina Department of Cultural Resources, National Marine Fisheries Service, US Fish and Wildlife Service, North Carolina Division of Coastal Management and others. Agency representatives participated in a question and answer session with Marine Corps representatives and were invited to provide comments on the proposed action by May 12, 2008.

Public information meetings were held from 4:00 pm to 7:00 pm on June 9 and 10, 2008 at Coastal Carolina Community College and Sneads Ferry Community Center, North Carolina, respectively. These meetings served to present information to the public about the Range Operations EA, as well as to receive public input on issues of concern. Project information was provided on posters and fact sheet handouts that addressed the proposed action and alternatives, missions, and current operations at MCB Camp Lejeune, environmental considerations, and the National Environmental Policy Act process. Attendees had the opportunity to speak one-on-one with Marine Corps representatives about the project. Comment forms were distributed to attendees with a request for feedback at the meetings or by mailing the pre-addressed comment forms by July 7, 2008.

Five people attended the June 9, 2008 meeting; no written comments were received. Nine people attended the June 10, 2008 meeting, at which two written comments were submitted regarding:

- Request for more notices/accessibility of notices regarding the closure of the Atlantic Intracoastal Waterway
- Request to open NC Route 172 for public transit when not in use by Marine Corps tactical vehicles
- Appreciation for informing the public

To the extent that the above-listed issues are within the scope of the proposed action, they are addressed in Chapters 4 and 5 of this EA.

1.4.5 Related Environmental Documents

More than 20 National Environment Policy Act documents have been prepared in the last 14 years for various infrastructure improvements and training proposals at MCB Camp Lejeune. Many of these documents and others, which contain material relevant to the proposed action, are listed in the following sections and are further described in Chapter 5. Chapter 5 addresses the potential for cumulative impacts from the proposed action in conjunction with past, present, and reasonably foreseeable future actions.

1.4.5.1 Documents Incorporated by Reference

In accordance with Council on Environmental Quality regulations for implementing the National Environmental Policy Act, the following documents with material relevant to the proposed action are being incorporated by reference:

- EA for Temporary Beddown of Proposed Increase in End Strength at MCB Camp Lejeune, North Carolina (MCB Camp Lejeune, June 2008) FONSI signed June 6, 2008
- EA for Proposed Military Operations in Areas in Eastern North Carolina (Department of the Navy, June 2003), Supplemental Study signed January 29, 2008
- EA for Marine Special Operations Command Complex, MCB Camp Lejeune, Onslow County, North Carolina (MCB Camp Lejeune, August 2007), FONSI signed August 17, 2007
- EA for Construction and Operation of Digital Airport Surveillance Radar in Eastern North Carolina (MCAS Cherry Point, February 2007). FONSI jointly signed April 25, 2007 and May 3, 2007)
- EA Chaff and Flare Training, MCB Camp Lejeune, Onslow County, North Carolina (MCB Camp Lejeune, December 2006), FONSI signed December 5, 2006
- Final EA for Construction and Operation of a Multi-Purpose Machine Gun Range in the Greater Sandy Run Area at MCB Camp Lejeune, North Carolina (MCB Camp Lejeune, January 2006), FONSI signed January 27, 2006
- Final EA for D-30 Range, MCB Camp Lejeune, North Carolina (MCB Camp Lejeune, November 2005), FONSI signed March 8, 2006
- EA for Military Operations in Urban Terrain Training Complex Enhancements, MCB Camp Lejeune, Onslow County, North Carolina (MCB Camp Lejeune, September 2005), FONSI signed September 22, 2005
- EA for Steel-Cutting Pit, MCB Camp Lejeune, Onslow County, North Carolina, (MCB Camp Lejeune, September 2005), FONSI signed September 22, 2005
- EA for K-2 Ranges, MCB Camp Lejeune, Onslow County, North Carolina (MCB Camp Lejeune, March 2005), FONSI signed March 23, 2005
- Final Environmental Impact Statement, Bogue Inlet Channel Erosion Response Project, Carteret and Onslow Counties, North Carolina (US Army Corps of Engineers, March 2004), Record of Decision signed September 15, 2004
- Final EA for Testing of the Expeditionary Fighting Vehicle Prototypes at MCB Camp Lejeune, North Carolina (MCB Camp Lejeune, June 2004), FONSI signed July 13, 2004
- EA for Stone Bay Urban Training Complex at MCB Camp Lejeune, Onslow County, North Carolina (MCB Camp Lejeune, May 2004), FONSI signed June 25, 2004
- Final EA for US Joint Maritime Complex at MCB Camp Lejeune, North Carolina (MCB Camp Lejeune, January 2004), FONSI signed March 31, 2004
- Final EA for the East Coast Introduction of the Assault Breacher Vehicle MCB Camp Lejeune, Onslow County, North Carolina (MCB Camp Lejeune, October 2003), FONSI signed November 6, 2003
- Final Environmental Impact Statement: Introduction of F/A-18 E/F Super Hornets to the East Coast of the US (Department of the Navy, July 2003), Record of Decision signed September 4, 2003
- EA for Routine Shore Fire Control Party Training EA, MCB Camp Lejeune, Onslow County, North Carolina (MCB Camp Lejeune, July 2002), FONSI signed July 31, 2002

- Endangered Species Act Section 7 Consultation on Current Use and Modification of Training Areas, Dune Stabilization, and Continued Recreational Use of Onslow Beach, (MCB Camp Lejeune, May 2002)
- Final Environmental Impact Statement, Introduction of the V-22 to the Second Marine Aircraft Wing (MCB Camp Lejeune, October 1999), Record of Decision signed December 22, 1999
- EA for Waterborne Refueling Training Operations on New River, Onslow County, North Carolina (MCB Camp Lejeune, April 1999), FONSI signed June 15, 1999
- EA for P-028 Infantry Platoon Battle Course, US MCB Camp Lejeune, North Carolina (MCB Camp Lejeune, September 1996), FONSI signed September 25, 1996
- Final EA for P-933, Multi-Purpose Range Complex US MCB Camp Lejeune, North Carolina (MCB Camp Lejeune, August 1995), FONSI signed December 1, 1995
- EA for MCON P-949, Multipurpose Training Range, MCB Camp Lejeune, North Carolina (MCB Camp Lejeune, May 1994), FONSI signed August 12, 1994
- Endangered Species Act Section 7 Consultation on the Use of the N-1 Impact Area and Browns Island Target and Bombing Area BT-3 at MCB Camp Lejeune, North Carolina, November 1982

1.4.5.2 Relevant Environmental Documents Being Prepared Concurrently with this EA

The following documents with material relevant to the proposed action are either draft or are in progress at this time.

- EA for MCAS Cherry Point Range Operations, Craven, Carteret, and Pamlico Counties, North Carolina
- EA for Engineer Training Complex and G-10 Range Realignment, MCB Camp Lejeune, North Carolina
- EA for Construction and Operation of an Infantry Platoon Battle Course, Greater Sandy Run Area, MCB Camp Lejeune, North Carolina
- Environmental Impact Statement, US Marine Corps Grow the Force Initiative at MCB Camp Lejeune, MCAS New River, and MCAS Cherry Point, North Carolina
- EA for Wallace Creek Regimental Area, MCB Camp Lejeune, North Carolina
- EA for Testing of the Expeditionary Fighting Vehicle Prototypes, MCB Camp Lejeune, North Carolina
- Environmental Impact Statement/Overseas Environmental Impact Statement, Navy Cherry Point Range Complex
- Environmental Impact Statement/ Overseas Environmental Impact Statement, Navy Undersea Warfare Training Range
- Environmental Impact Statement, US Army Corps of Engineers, North Topsail Beach Shoreline Protection Project, Onslow County
- Environmental Impact Statement, US Army Corps of Engineers, West Onslow Beach and New River Inlet (Topsail Beach) Shore Protection Project, Pender and Onslow Counties

1.4.6 Agency Coordination and Permit Requirements

In addition to the National Environmental Policy Act, other laws, regulations, permits, and licenses may be applicable to the proposed action. Specifically, supporting and conducting

current and emerging training operations and a new training mission at the MCB Camp Lejeune Range Complex may require compliance and/or coordination for the following:

- Federal Coastal Consistency Determination concurrence by the North Carolina Department of Environment and Natural Resources, Division of Coastal Management
- Compliance with the 2006 revisions of MCB Camp Lejeune's Recovery Plan for the Red-Cockaded Woodpecker
- Consultation with the US Fish and Wildlife Service on Endangered Species Act and Migratory Bird Treaty Act
- Consultation with the National Marine Fisheries Service on the Endangered Species Act, Marine Mammal Protection Act, and the Magnuson-Stevens Fishery Conservation and Management Reauthorization Act
- Concurrence from the North Carolina State Historic Preservation Officer on cultural resource effects findings

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2.0 PROPOSED ACTION AND ALTERNATIVES

This Chapter provides detailed information on the proposed action and alternatives analyzed in this EA. National Environmental Policy Act implementing regulations (40 CFR 1502.14) provide guidance on the consideration of alternatives to a federal proposed action and require rigorous exploration and objective evaluation of all reasonable alternatives. Each of the alternatives must be reasonable, practical, and feasible in accordance with Marine Corps guidance in Marine Corps Order 5090.2A Change 1, Chapter 12 and Council on Environmental Quality regulations (40 CFR 1500-1508). Reasonable alternatives must meet the stated purpose and need for the proposed action and must be practical and feasible. Alternatives that are outside the scope of what Congress has approved or funded must still be evaluated if they are reasonable because the EA may serve as the basis for modifying the congressional approval or funding in light of the National Environmental Policy Act's goals and policies.

2.1 NO ACTION ALTERNATIVE

The Marine Corps has been conducting training operations in the MCB Camp Lejeune Range Complex for more than 60 years. Training operations currently conducted in the MCB Camp Lejeune Range Complex generally fall within three categories: munitions firing; movement of personnel, vehicle, and aircraft; and support. Within these categories, training activities occur in three types of ranges: land, water, and special use airspace, as shown in **Figure 1-2**. Under the No Action Alternative, training operations would continue at current levels using existing munitions, weapons, and vehicles. The level of ongoing training operations for the No Action Alternative was determined by reviewing training data from recent years along with training that is authorized by the *Range and Training Regulations, Standing Operating Procedures for Range Control* (Base Order P3570.1B).

The No Action Alternative would provide the Marine Corps with the capability to maintain a state of military readiness commensurate with its national defense mission, but would not support emerging training requirements. The No Action Alternative is not considered a reasonable solution for satisfying the purpose and need for the proposed action. However, it does provide a baseline against which to measure the potential impacts of the proposed action. Both the Council of Environmental Quality regulations and Marine Corps Order P5090.2A, Change 1, Chapter 12 requires this comparison. Thus, it is evaluated in this EA.

The following subchapters further describe the No Action Alternative in terms of current range Standard Operating Procedures and environmental protection procedures, and the three general categories of training activities: munitions firing; movement of personnel, vehicles, and aircraft; and support.

2.1.1 Current Range Standard Operating Procedures – Environmental Procedures

The *Range and Training Regulations, Standing Operating Procedures for Range Control* (Base Order P3570.1B) prescribes the regulations and general information and precautions to be taken in the firing of weapons or other use of live ammunition, simunitions, non-lethal weapons

devices, energy producing weapons/equipment (lasers), pyrotechnics and explosives; also the use of all live fire ranges, mortar positions, gun positions, training/maneuver areas, airspace, tactical and administrative landing and drop zones, water drop zones, waterways/water sectors, beaches, and other training facilities such as the Marine Operations in Urban Terrain complex, Combat Town and others within the MCB Camp Lejeune Range Complex.

The primary purpose of Standard Operating Procedures is to maximize safe and realistic training opportunities and provide a source of general information. Nothing contained in the regulations permits live fire that endangers lives or property and equipment. The safety regulations and the current Marine Corps Order 3570.1B are applicable to firing ammunition for training and target practice.

Environmental stewardship is a priority at MCB Camp Lejeune. Unit commanders are required to attend range safety classes prior to being allowed to sign out training areas at MCB Camp Lejeune. Environmental requirements and protective measures are included in the material of these classes. When these commanders later sign out a training area for use they are required to sign a statement understanding that holds them accountable for the condition of the selected training area and requires them to indicate that they have read and understood the Range Standard Operating Procedures. The MCB Camp Lejeune *Environmental Handbook for Trainers* (**Appendix A**) summarizes the environmental protective measures mandated by the Range Standard Operating Procedures, and was developed to help unit leaders achieve their training mission while ensuring the long-term sustainable use of the MCB Camp Lejeune landscape. Deviation from the Standard Operating Procedures requires prior approval and coordination with the Operations and Training Division and Environmental Management Division at MCB Camp Lejeune.

2.1.2 Munitions Firing

The firing of munitions is described in this subchapter with an explanation of firing methods for different training scenarios. These training scenarios are then correlated with weapons and munitions fire types. The size and types of various munitions are listed and further categorized by how they are used during training activities. This subchapter is then further broken down into specific munitions firing activities that occur on the three types of ranges: land, water, and special use airspace.

The use of weapons systems to destroy or severely damage a specific target is known, in general, as “fires.” “Fires” can be broken down into two subcategories: “direct fire” where the weapon system can physically see and aim directly at the target, and “indirect fire” where the weapon system cannot physically see the target and thus aims instead at a specific target location that has been provided to the weapon system. The “aiming method” is the principal difference between these two types of fires, but that usually means the target is closer to the weapon system for direct fire than for indirect fire. Once the weapon has been fired, there is no difference between the two methods at the point of impact. Both of these firing methods are used to train units at MCB Camp Lejeune within at least five different training scenarios:

- Ground-to-Ground

- Ground-to-Air
- Air-to-Ground
- Surface-to-Ground (surface refers to water ranges)
- Surface-to-Surface (surface refers to water ranges)

Table 2.1-1 summarizes the type and size of weapons used within the MCB Camp Lejeune Range Complex and correlates their firing method with the four different training scenarios in which they are used.

Table 2.1-1
Weapons Used at MCB Camp Lejeune Range Complex by Firing Method

| Weapon Category | Size | Firing Method | Ground-to-Ground | Ground-to-Air | Air-to-Ground | Surface-to-Ground |
|-----------------|----------------------|--------------------|------------------|---------------|---------------|-------------------|
| Guns | 5.56 mm | Direct | ✓ | | ✓ | ✓ |
| | 7.62 mm | Direct | ✓ | | ✓ | ✓ |
| | 9 mm | Direct | ✓ | | | |
| | 20 mm | Direct | | | ✓ | |
| | 25 mm | Direct | ✓ | | ✓ | ✓ |
| | 40 mm | Direct | ✓ | | | ✓ |
| | 120 mm | Direct or Indirect | ✓ | | | |
| | .38 cal | Direct | ✓ | | | |
| | .45 cal | Direct | ✓ | | | |
| | .50 cal | Direct | ✓ | | ✓ | ✓ |
| | .22 cal | Direct | ✓ | | | |
| | 5-inch | Direct | | | | ✓ |
| | 12 gauge | Direct | ✓ | | | |
| | 20 gauge | Direct | ✓ | | | |
| | 28 gauge | Direct | ✓ | | | |
| | 410 gauge | Direct | ✓ | | | |
| Howitzer | 105 mm | Direct or Indirect | ✓ | | | |
| | 155 mm | Direct or Indirect | ✓ | | | |
| Mortar | 60 mm | Direct or Indirect | ✓ | | | |
| | 81 mm | Direct or Indirect | ✓ | | | |
| Naval Gunfire | 5- inch (54 Caliber) | Indirect | | | | ✓ |
| | 5-inch (63 Caliber) | Indirect | | | | ✓ |
| Bombs | MK-76 | Direct | | | ✓ | |
| | BDU-33 | Direct | | | ✓ | |
| | BDU-34 | Direct | | | ✓ | |
| | MK-80 (Series) | Direct | | | ✓ | |
| Missiles | TOW | Direct | ✓ | | ✓ | |
| | Stinger | Direct | | ✓ | | |
| Rockets | 2.75-inch | Direct | | | ✓ | |
| | 5-inch | Direct | | | ✓ | |

Weapons systems used for training within the MCB Camp Lejeune Range Complex use various munitions that are categorized by size and type. Small arms include .50 caliber munitions and smaller. A sample list of small arms is shown in **Appendix B, Table B-2**. Large arms include munitions larger than .50 caliber. A sample list of large arms is shown in **Appendix B, Table B-3**.

Munitions type categories include:

- High Explosive: This term is used to describe explosive munitions. For example, munitions typically used in combat or possessing the same or similar explosive filler as combat munitions, such as 20 mm through 2,000 lb MK-80 series High Explosive.
- Non-explosive, Practice Munitions (also known as "Training Practice" munitions): This term is used to describe most common types of practice munitions. Non-explosive, practice munitions may contain spotting charges or signal cartridges for impact locating purposes (smoke charges for daylight spotting, flash charges for night spotting, and an all purpose combination of both flash and smoke charges), such as MK-76 and BDU-45 bombs. Some non-explosive, practice munitions may also contain unburned propellant (such as rockets).
- Wholly Inert: Munitions with no explosive, propellant, or pyrotechnic component (non-reactive), such as BDU-50 and BDU-56 (both are non-reactive heavy-weights with no explosive charges).
- Blank: Munitions usually used in guns of various sizes to provide a sense of realism to a training event. A blank uses a high explosive to make a flash and an explosive sound, but does not contain a projectile.
- Simulated Munitions: Simulated munitions are typically used in standard small arm weapons to provide a sense of realism to a training event where opposing forces are in close contact. These munitions use a reduced propulsion charge and a marking projectile similar to a "paint ball," so that "hits" are observable on the opposing force.
- Explosives: Explosives are bombs and grenades that include either an explosive charge in live munitions or a spotting charge in the inert munitions. A list of explosives is shown in **Appendix B, Table B-5**.
- Pyrotechnics: Devices that use chemical reactions to produce heat, light, gas, smoke and/or sound, but are not explosive. A very common example of pyrotechnics is fireworks; in the military examples include flares and smoke devices. A list of explosives is shown in **Appendix B, Table B-6**.
- Chaff: A radar reflector material made of thin, narrow, metallic strips cut in various lengths to elicit frequency responses, which deceive enemy radars. Chaff is employed for a number of different tactical reasons, but the end goal is to create a target from the chaff that will lure enemy radar and weapons system away from the actual friendly platform. Chaff is used defensively by fixed-wing and rotary-wing aircraft to disrupt threat targeting and missile guidance radars. It is most frequently employed in reaction to being detected by an enemy targeting radar and may be employed with defensive flares. RR-129A/AL and RR-144A/AL chaff is commonly used by aircraft.
- Flares: There are two categories of flares: illumination and defensive countermeasure. Illumination flares may be dropped from aircraft or shot from guns and are used to "light up" an area so that friendly forces can see what is in the illuminated area. Both illumination flare deployment methods typically employ a parachute and a very bright magnesium flare that is fully consumed before it hits the ground. Defensive countermeasure flares are designed to create a heat signature that will decoy an infrared-guided missile to the flare rather than to an aircraft's engines. Defensive flares are disbursed by both fixed-wing and rotary-wing aircraft when a threat is detected, are much smaller than illumination flares, and six or more are typically deployed at one time. Defensive countermeasure flares are often used at the same time as chaff. Common

aircraft decoy flares include the MJU-8A/B and MJU-53B that use a magnesium extruded flare grain and the SM-875/ALE simulator flare that may be used in certain training scenarios.

In addition to the above mentioned weapons systems used for training at MCB Camp Lejeune, various fire controlled laser systems munitions are used during “fire” training. Lasers are categorized by class. Class I, II, and IIIa lasers are authorized in all training areas, ranges and training facilities aboard MCB Camp Lejeune, while Class IIIb and Class IV lasers are restricted to Observation Posts 2, 3, and 5, and Ranges K211, K301, K319, SR-7, and SR-10 due to Laser Range Safety Certification requirements.

2.1.2.1 Munitions Firing – Land Ranges

The following sections discuss training aspects of munitions firing on land ranges in terms of activities, locations, and training levels.

Munitions Firing Activities on Land Ranges

Munitions firing on land ranges and training areas includes the following four different training scenarios:

- Ground-to-Ground – For ground-to-ground fires, this section will focus on ground-based weapons such as tanks, howitzers, mortars, guns, and missiles. Tanks, guns, and missiles typically use the direct fire method against either stationary or moving targets, depending on the training scenario. Howitzers and mortars typically use the indirect fire method against stationary targets. One reason why these weapon systems use these firing methods is because of their differences in mobility. Tanks, guns, and missiles are usually mobile and may be fired while they are moving or while they are stationary. Howitzers and mortars on the other hand, are usually placed in a stationary firing position from where they will conduct their firing.

The targets used for ground-to-ground fires include both stationary and mobile targets; either, or both, may be used during a training scenario. Stationary targets include: vehicle and weapon hulks from retired, or captured equipment, and plastic mock-ups of tactical vehicles that provide some training realism, paper silhouettes, and new "Green" targets that are constructed so they may be more easily recovered after a training exercise. Stationary targets may be physically moved from one location to another to suit the training scenario, but they are not self-mobile. Mobile targets include: automated pop-up and moving reactionary targets driven by computer-programmed tactical scenarios or operated in a manual mode. Groups of targets or individual targets may be raised on command.

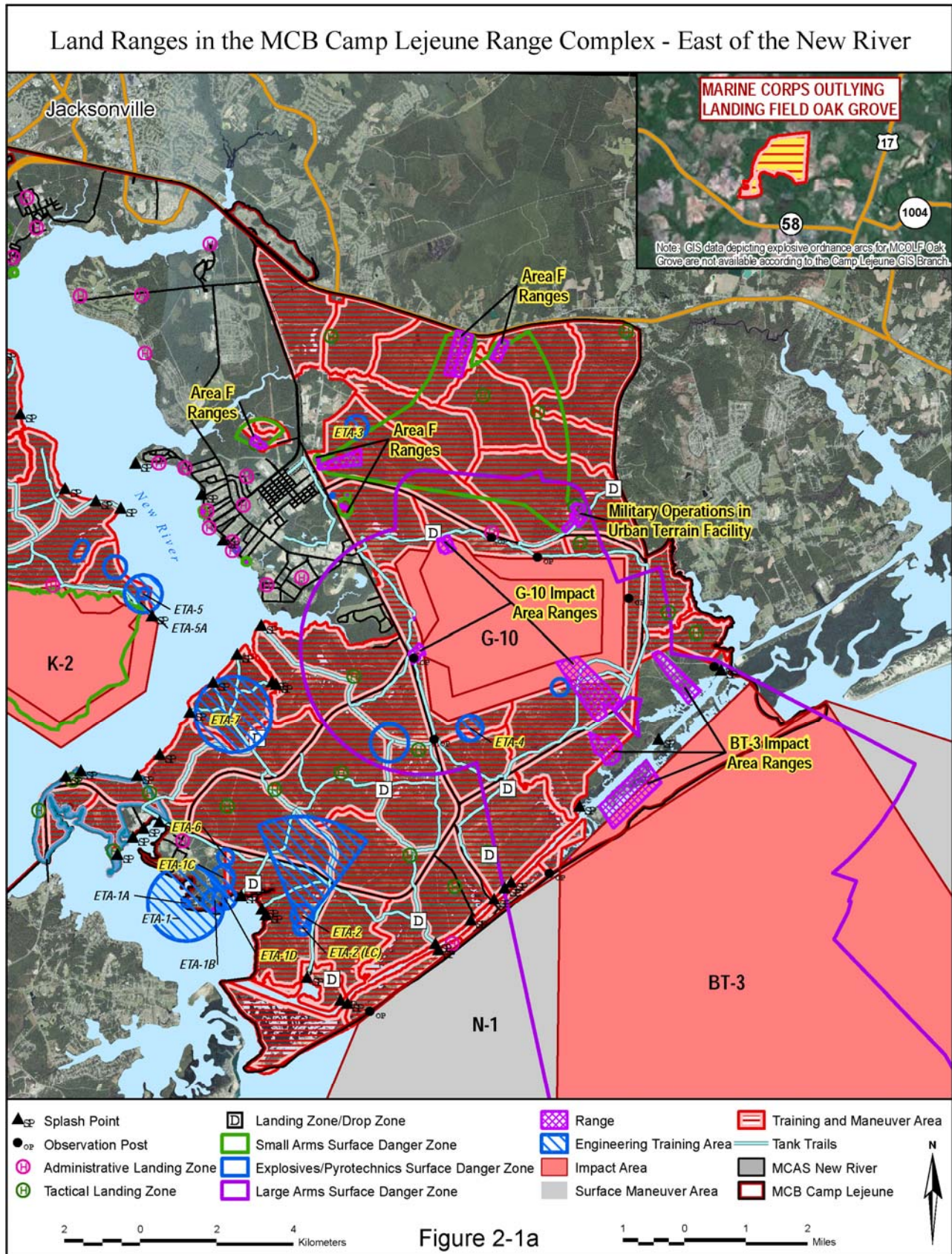
- Ground-to-Air – For ground-to-air training on land ranges, this section will focus on firing from the ground. The missile and the target are further described under Munitions Firing-Special Use Airspace (**Subchapter 2.1.2.3**). Ground-to-air fires are typically conducted with the Stinger missile system, a shoulder fired missile, against an air target which simulates a threat aircraft. The stinger is fired by a person from a fixed firing position, seaward into the BT-3 impact area where the aerial targets are flown. Both the

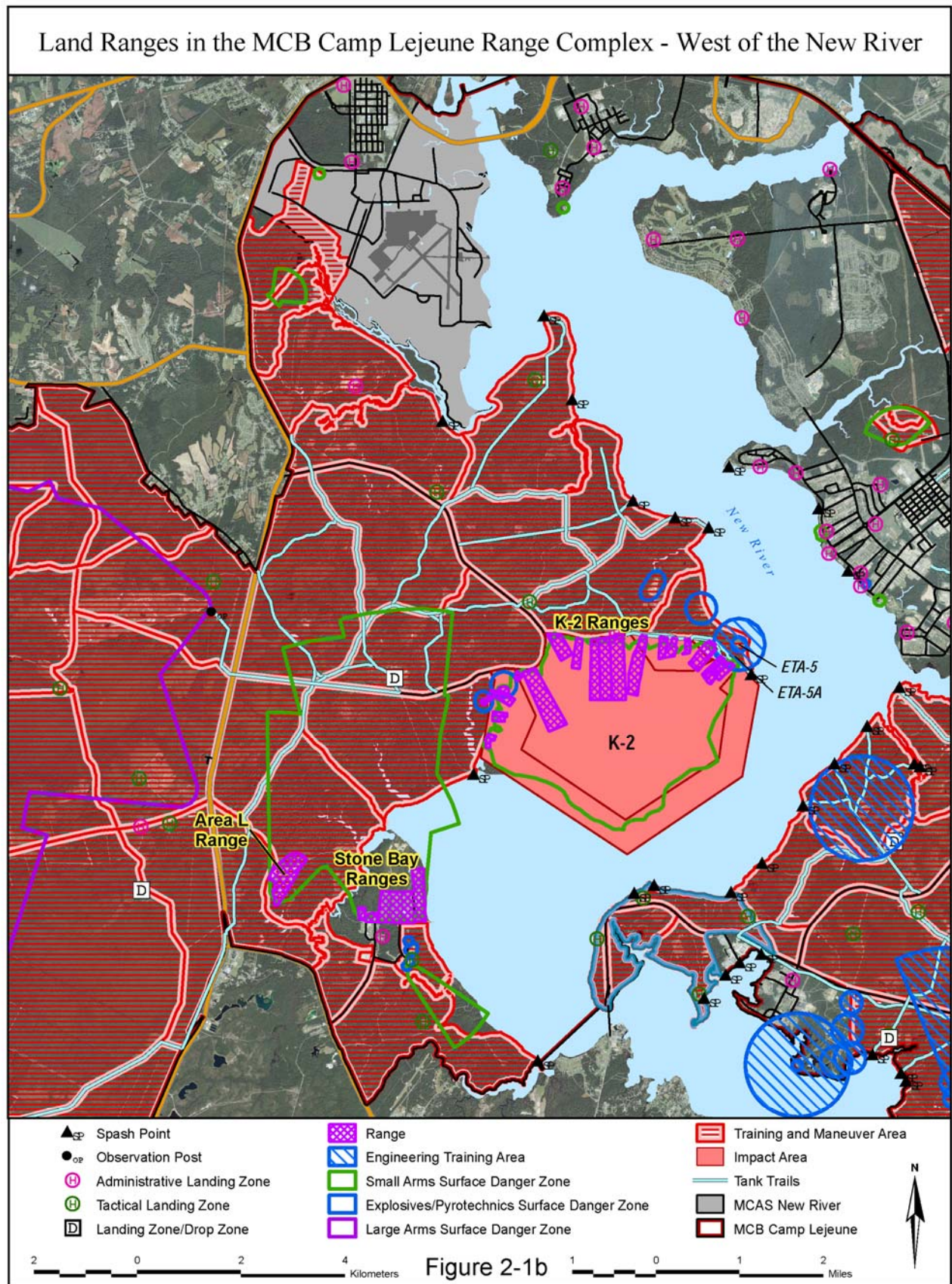
targets and the missiles fired are usually destroyed during the training and are not recovered.

- Air-to-Ground – For air-to-ground training, this section will focus on the ground mobile target. Air-to-ground fires are conducted by both fixed-wing (F/A-18; AV-8; EA-6B) and rotary-wing (AH-1; CH-46; CH-53; UH-1; MV-22) aircraft with associated guns (20 mm, .50 cal, and 7.62 mm), rockets (2.75 in), bombs (practice or inert), or missiles against stationary or mobile targets on the ground. One or two aircraft, flying together, will typically approach the target along a range authorized flight path, at a low altitude (305 meters (m) [1000 feet [ft]] for fixed-wing and 15 to 91 m [50 to 300 ft] for rotary-wing) and at speeds from 100 to 350 knots. When within the weapon's firing parameter the aircraft will fire the weapon at the target and exit the area. Air-to-ground fires are further described under Munitions Firing-Special Use Airspace (**Subchapter 2.1.2.3**).
- Surface-to-Ground – For surface-to-ground fires, this section will focus on the targets within impact areas on the ground. Cruisers and Guided Missile Destroyers use 5-inch guns with high explosive or non-explosive practice munitions, while boats will typically use .50 caliber, 7.62 mm, 5.56 mm ball ammunition or blanks, as well as 40 mm high explosive grenades. Ships will typically fire while moving very slowly, while boats may fire while stationary or at speeds from 5 knots to 10 knots. Firing from cruisers and guided missile destroyers is further described under Munitions Firing-Water Ranges (**Subchapter 2.1.2.2**).
- Surface-to-Surface – For surface-to-surface fires, this section will focus on fires from boats and amphibious vehicles at sea to temporary targets at sea. Small boats will typically use .50 caliber, 7.62 mm, 5.56 mm ball ammunition or blanks and 40 mm training practice grenades. Small boats may fire while stationary or at speeds from 5 to 10 knots. Firing from small boats is further described under Munitions Firing-Water Ranges (**Subchapter 2.1.2.2**).

Munitions Firing Locations on Land Ranges

Range assets that support munitions firing to and from land are listed in **Table 2.1-2**. Land ranges and range assets are shown on **Figures 2-1a, 2-1b, and 2-1c**.





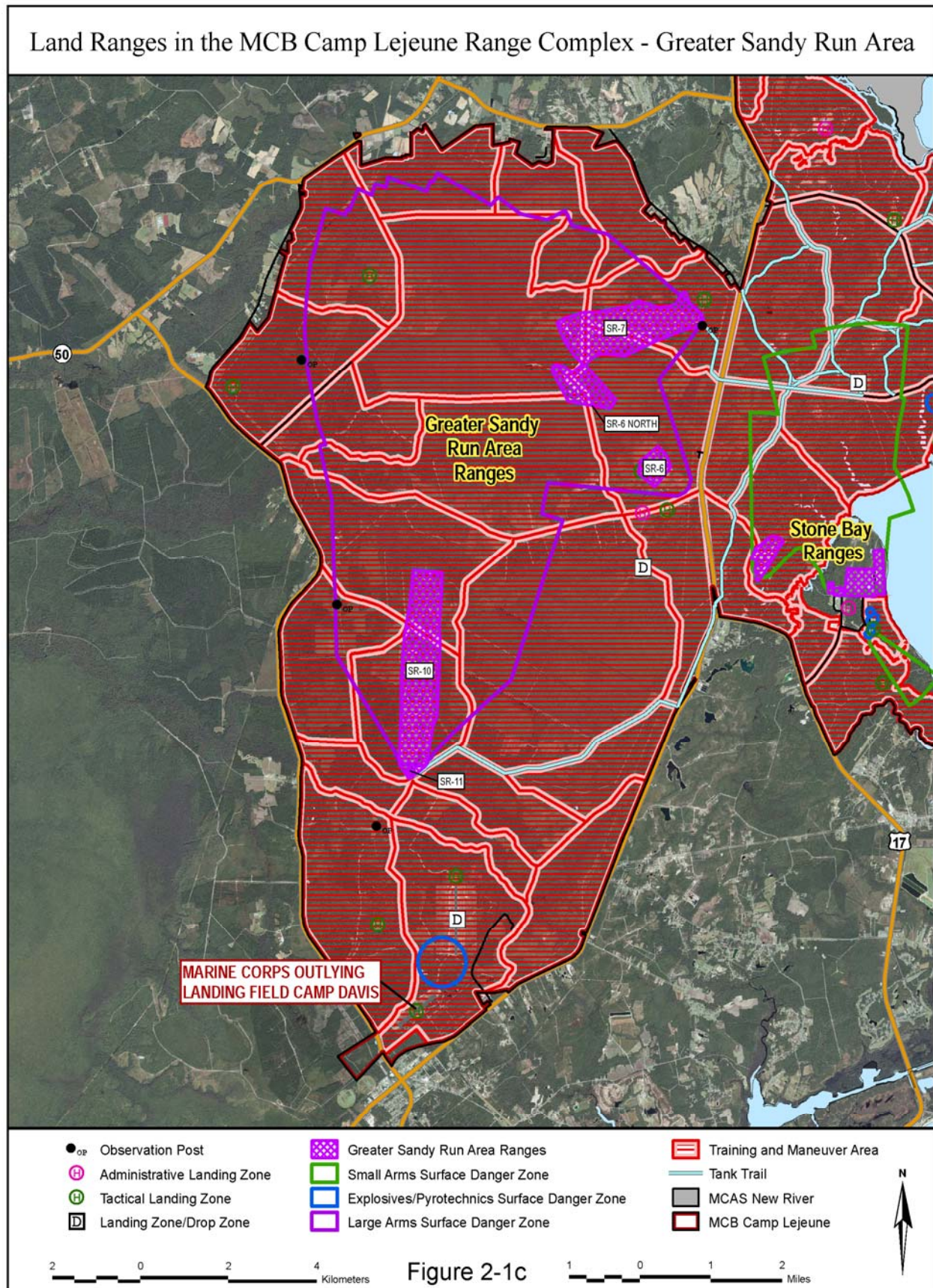


Table 2.1-2
Munitions Firing Locations within the MCB Camp Lejeune Range Complex

| Range Asset | Range Components | Type of Munitions Used ¹ |
|--|---|-------------------------------------|
| Training and Maneuver Areas | BC–SW (total of 82 training areas) | Small |
| G-10 Impact Area | G-3, G-3A, G-6/CBC, G-8, G-9 | Small/Large |
| K-2 Impact Area | K-211, K-212, K-212A, K-301, K-302, K-303, K-304, K-305, K-309, K-315, K-317, K-319, K-321, K-322, K-323, K-325, K-402, K-402A, K-406A, K-406B, K-407, K-408, K-510 | Small/Large |
| BT-3 Impact Area | E-1, H, G-5, G-7 | Small/Large |
| Engineering Training Areas | Engineering Training Areas 1, 2, 3, 4, 5, 5A, 6, 7 | Small |
| Military Operations in Urban Terrain Facility | 31 buildings and Military Operations in Urban Terrain Assault Courses -1, -2, -3, -4, -5, -6; Urban Training Facility with 69 buildings | Small |
| Greater Sandy Run Area Ranges | SR-6, SR -7, SR-8, SR-10, SR-11 | Small/Large |
| Stone Bay Ranges | Alpha, Bravo, Charlie, Dodge City Multi-purpose range, Hathcock, Mechanical, Walk Down, Dodge City Sniper Range | Small |
| Area F Ranges | F-2, -4, -5, -6, -11A, -11B, 17, -18 | Small |
| Area D Ranges | D-9, -29A, -29B, -30 | Small |
| Area I Range | I-1 | Small |
| Area L Range | L-5 | Small |
| Note: 1. See Appendix B, Table B-2 and B-3 , for sample list of small and large munitions, respectively. | | |

Munitions Firing Levels on Land Ranges

The process to determine the level of munitions firing for the No Action Alternative began with a review of munitions expenditure data from recent years along with munitions firing authorized by the *Range and Training Regulations, Standing Operating Procedures for Range Control* (Base Order P3570.1B). The data on the number and type of munitions expended on each of the ranges utilized by MCB Camp Lejeune were collected from the Range Facility Management Support System database. This database tracks the number of rounds of ammunition expended on each range by ammunition type and Department of Defense Identification Code, as well as the number of manned training days. The training data was available electronically for three two-year time periods: calendar years January 2000 to December 2001, January 2002 to December 2003, and January 2004 to December 2005.

The results of this training data review indicated that the 12-month average of munitions usage data from 2004-2005 was a fair representation of current levels of munitions firing. However, these results also indicated that refinements were needed to provide a more accurate level of munitions firing for the No Action Alternative. As a result, the average annual dataset for the 2004-2005 munitions expenditures was expanded to include certain munitions that are authorized and have been previously fired but not reflected in the 2004-2005 dataset. In these cases, specific munitions expenditures from usage data in the 2000-2001 and 2002-2003 datasets were added to the average annual 2004-2005 dataset.

The 12-month average of munitions usage data from 2004-2005 was further expanded to include munitions firing from several new training facilities that are under construction and not included in the 2004-2005 dataset. (The environmental impacts from these training facilities were

analyzed in EAs, in Documents Incorporated by Reference [**Subchapter 1.4.5.1**]). These new training facilities include:

- Marine Special Operations Command Complex
- Military Operations in Urban Terrain Training Complex Enhancements
- Steel-Cutting Pit Relocation
- K-2 Ranges Consolidation and Realignment

The Marine Special Operations Command Complex breaching facility will add 1,300 annual breaching events using 0.11 kilograms (0.25 pounds) or less of explosives per event. Small arms live-firing will be conducted at indoor facilities with approximately 1,350,000 rounds expended annually (US Marine Corps, August 2007).

Enhancements to the existing Military Operations in Urban Terrain Training Complex include a new breacher facility that will add 26 annual breaching events using 0.11 kilograms (0.25 pounds) or less of explosives per event (US Marine Corps, September 2005a).

The relocation of an existing steel-cutting pit will result in a location change for ongoing demolition training. This training will occur at the new location (HA Area) up to 80 times annually, using explosive charges no more than 22.7 kg (50 lbs) in weight (US Marine Corps, September 2005b).

The K-2 Ranges are being consolidated and realigned, which results in changes to firing point and target locations. The current K-2 Ranges are being systematically deactivated as the realigned ranges are constructed (US Marine Corps, March 2005).

Table 2.1-3 presents the munitions firing levels on land ranges under the No Action Alternative. These levels are compared with the proposed action levels and are presented as **Table 2.3-1** in Summary of Training Levels (**Subchapter 2.3**). This grouping of training level data tables serves to provide an overall sense of training within the MCB Camp Lejeune Range Complex.

Table 2.1-3
Annual Munitions Firing Levels on Land Ranges-No Action Alternative

| Munitions Type | 2004-2005 12-month Average | No Action Alternative |
|--|-------------------------------|--------------------------|
| Small Arms¹ Rounds | | |
| Small Arms excluding .50 caliber | 41,095,069 | 41,095,069 |
| .50 caliber | 1,807,562 | 1,807,562 |
| Total Small Arms Rounds | 42,902,631 | 42,902,631 |
| Large Arms² Rounds | | |
| Large Arms –MK19 | 454,910 | 454,910 |
| Large Arms - Tank Rounds | 7,403 | 7,403 |
| Artillery, Mortars, and Other Large Arms | 579,312 | 579,312 |
| Total Large Arms Rounds | 1,041,625 | 1,041,625 |
| Explosives and Pyrotechnics | | |
| Explosives ³ | 304,898 | 306,279 |
| Pyrotechnics ⁴ | 169,572 | 169,517 |
| Total Explosives and Pyrotechnics | 474,470 | 475,796 |
| Notes: 1. Refer to Appendix B, Table B-2 Small Munitions. 2. Refer to Appendix B, Table B-3 Large Munitions. 3. Refer to Appendix B, Table B-5 Explosives. 4. Refer to Appendix B, Table B-6 Pyrotechnics | | |

2.1.2.2 Munitions Firing – Water Ranges

The following sections discuss training aspects of munitions firing from water ranges in terms of activities, locations, and training levels.

Munitions Firing Activities on Water Ranges

Munitions firing on water ranges and training areas includes the following two different training scenarios:

- Surface-to-Ground - Fires are fires from ships (indirect fire) at sea and boats (direct fire) in the river and near shore areas against targets within impact areas on the ground. Cruisers and Guided Missile Destroyers use 5-inch guns with high explosive or non-explosive practice munitions. Ships will typically fire while moving very slowly.
- Surface-to-Surface - Fires are fires from boats and amphibious vehicles at sea to targets at sea. Small boats will typically use .50 caliber, 7.62 mm, 5.56 mm ball ammunition or blanks, and 40 mm training practice grenades. Small boats may fire while stationary or at speeds from 5 to 10 knots.

Munitions Firing Locations from Water Ranges

The firing of munitions takes place primarily from the prohibited area, located in the Atlantic Ocean's Onslow Bay, which surrounds the BT-3 Impact Area. Blanks are fired from water restricted areas, which are present in: New River, Atlantic Intracoastal Waterway, and Atlantic Coast. The New River prohibited area is further separated into sectors (**Figure 2-2**). Further detail on MCB Camp Lejeune prohibited areas and water restricted areas can be found in **Appendix B**.

There are currently about 50 training operations per year requiring closure of the Atlantic Intracoastal Waterway water restricted area for about 110 one-hour periods and US Coast Guard and Navy operations that involve 40 one-hour period Atlantic Intracoastal Waterway closures (US Marine Corps, March 2004).

Munitions Firing Levels from Water Ranges

Although there are no permanently-fixed, water-based targets used on MCB Camp Lejeune water ranges, temporary target systems are sometimes used in the water at the E-1 Range for training with .50 caliber munitions. These temporary target systems consist of an empty 208 liter (55 gallon) drum that has an attached floating buoy with a rope to pull it up out of the water if the drum sinks. Units schedule training with temporary water-based targets through MCB Camp Lejeune Range Control. In addition to surface-to-surface fires, several land ranges have portions of their surface danger zones positioned over water ranges, which means that there is a chance that munitions aimed at ground targets (surface-to-ground fires) may accidentally land in the water. **Table 2.1-4** presents the estimates of munitions that may land in the water under the No Action Alternative. These levels are compared with the proposed action levels and are presented as **Table 2.3-2** in Summary of Training Levels (**Subchapter 2.3**). This grouping of training level data tables serves to provide an overall sense of training within the MCB Camp Lejeune Range Complex.

Table 2.1-4
Estimates for Annual Level of Munitions that May Land in Water Ranges-No Action Alternative

| Munitions Type | New River | Atlantic Intracoastal Waterway and Onslow Bay |
|---------------------------------|-----------|---|
| 5.56 mm | 93,569 | 6,098 |
| 7.62 mm | 2,508 | 35,600 |
| .22 caliber | 9 | 0 |
| .50 caliber | 0 | 13,002 |
| 155 mm HE | 0 | 1 |
| 40 mm inert (MK-19) | 0 | 1,596 |
| 40 mm inert, excluding MK-19 | 0 | 2,008 |
| Stinger missile, Inert | 0 | 19 |
| Stinger missile, High Explosive | 0 | 40 |
| Total | 96,086 | 58,364 |

2.1.2.3 Munitions Firing – Special Use Airspace

The following sections discuss training aspects of munitions firing in special use airspace in terms of activities, locations, and training levels.

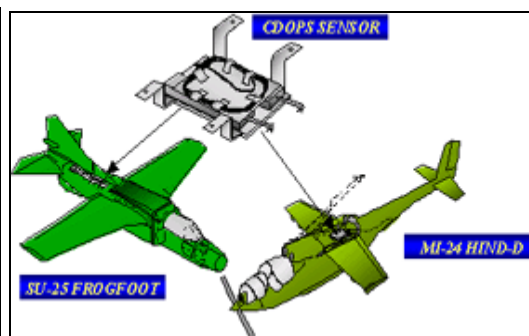
Munitions Firing Activities in Special Use Airspace

Munitions firing in special use airspace includes two different training scenarios:

- Ground-to-Air – For ground-to-air training in special use airspace, this section will focus on the air target used for Stinger missile firing. The target is typically a ballistic aerial target system or radio controlled miniature aerial targets. Often, these radio controlled targets have a wingspan of roughly 1.52 m (5 ft) and are composed of Styrofoam with a small engine and fuel tank. Both the targets and the missiles fired are usually destroyed during the training and are not recovered.



Ballistic Aerial Target System



Radio Controlled Miniature Aerial Target

- Air-to-Ground – For air-to-ground training, fires are conducted by both fixed-wing (F/A-18; AV-8; EA-6B) and rotary-wing (AH-1; CH-46; CH-53; UH-1; MV-22) aircraft with associated guns (20 mm, .50 caliber, and 7.62 mm), rockets (2.75 in), bombs (practice or inert), or missiles against stationary or mobile targets on the ground. One or two aircraft, flying together, will typically approach the target along a range authorized flight path, at a low altitude (305 m [1,000 ft] for fixed-wing and 15 to 91 m [50 to 300 ft] for rotary-wing) and at speeds from 100 to 350 knots. When within the weapon's firing parameter the aircraft will fire the weapon at the target and exit the area.

Munitions Firing Locations in Special Use Airspace

Ground-to-air fires with Stinger missile systems occur in several special use airspace segments: R-5306D, R-5306C, and the adjacent Warning Area (W-122) (see **Figure 1-4**). However, training activities over R-5306C are considered in the MCAS Cherry Point Range Operations EA and training activities over the W-122 are considered in the Navy Cherry Point Overseas Environmental Impact Statement/Environmental Impact Statement.

The Stinger missile system, a shoulder fired missile, is fired from a fixed firing position in the E-1 Range, seaward into the BT-3 Impact Area where the aerial targets are flown. Air-to-ground fires are conducted by aircraft flying through R-5306D and R-5306E firing at land-based targets within the three impact areas: G-10, K-2, and BT-3.

Restricted areas are described in Installations and Special Use Airspace (**Subchapter 1.2.4**; see **Figures 1-4 and 2-3**). Warning areas are another type of special use airspace that are designed to contain activities that may be hazardous to nonparticipating aircraft. W-122 is controlled by the Fleet Area Control and Surveillance Facility Virginia Capes, Naval Air Station, Oceana, Virginia Beach, VA and is a part of the Cherry Point Operating Area within the Navy Cherry Point Range Complex.

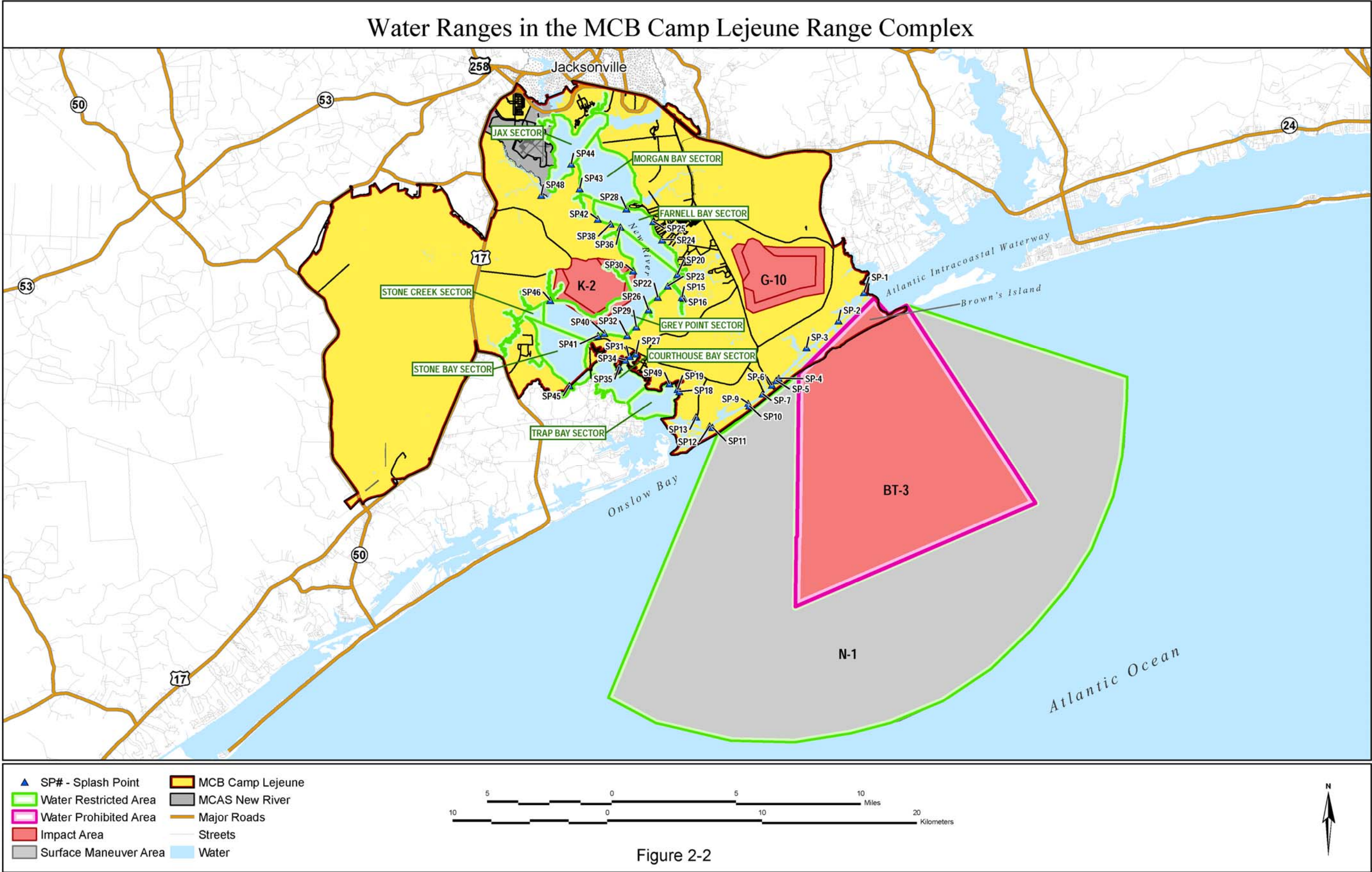
Munitions Firing Levels in Special Use Airspace

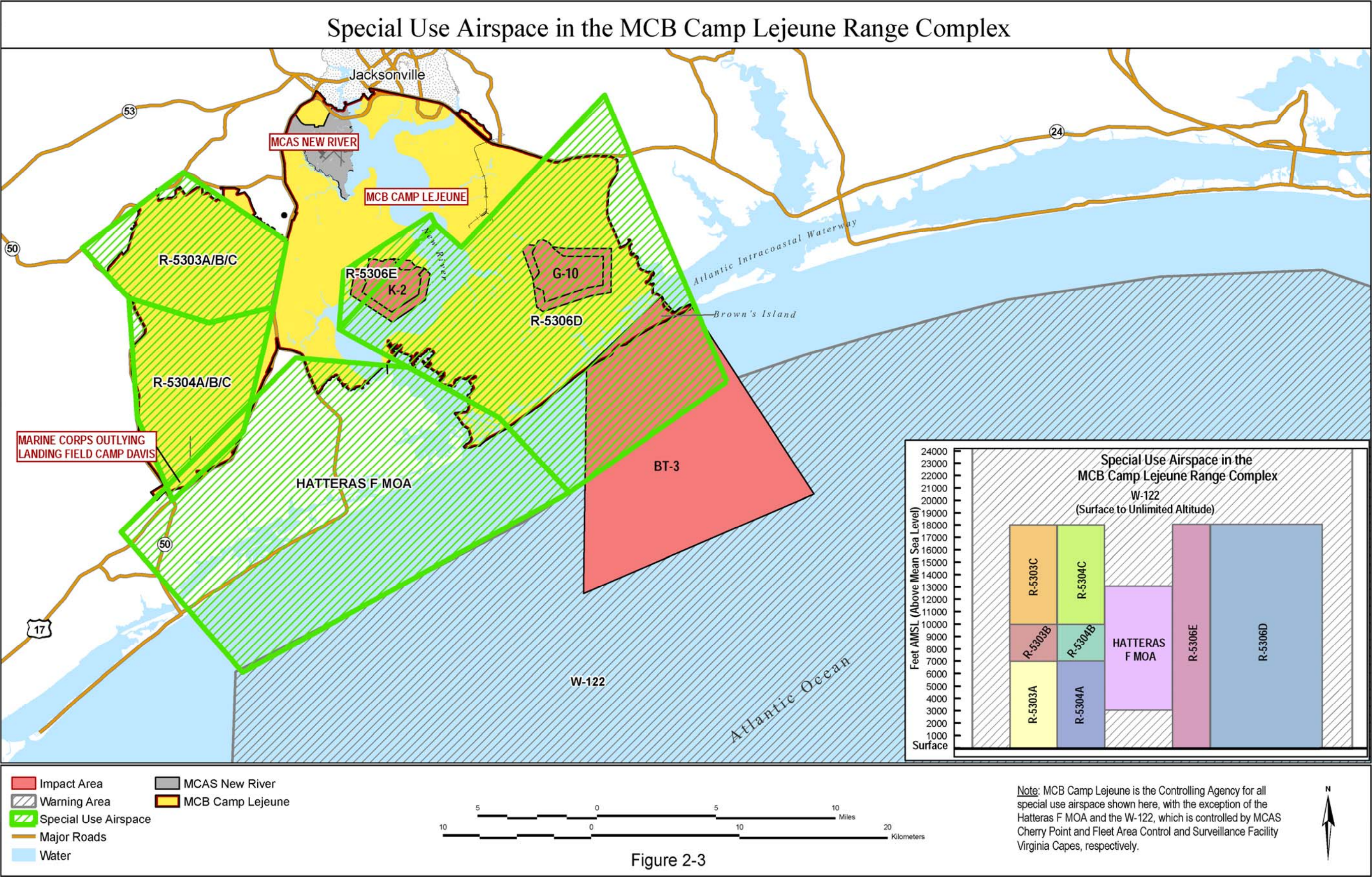
Training levels for munitions fired from aircraft onto land-based targets are recorded on the basis of the land range into which the munitions are fired. Similarly, the firing of missiles into special use airspace is recorded by its land range firing point. Therefore, munitions fired from and into special use airspace, under the No Action Alternative, are included in the munitions firing levels presented in **Table 2.1-3** and are compared with the proposed action levels in **Table 2.3-1**, Summary of Training Levels (**Subchapter 2.3**). In this way, the environmental impacts from all munitions firing on land can be assessed.

The impact of the Stinger missiles hitting aerial targets occurs in special use airspace over water ranges. This impact results in missile debris and target debris falling into the water, particularly Onslow Bay. **Table 2.1-4** presents the munitions firing levels into special use airspace over the water for the No Action Alternative. These levels are compared with the proposed action levels and are presented in **Table 2.3-2**, in Summary of Training Levels (**Subchapter 2.3**). This grouping of training level data tables serves to provide an overall sense of training within the MCB Camp Lejeune Range Complex.

2.1.3 Movement of Personnel, Vehicles, and Aircraft

The movement of personnel, vehicles, and aircraft is described in this subchapter. Movement describes methods used to get from one location to another and from one type of activity to another type of activity. For example, troops may walk in a patrol formation from one range area to another, conduct direct fire training, and then go to another range area. Vehicles may travel as a single unit, in groups of two to four similar vehicles or, at times, in a combination of several different types of vehicles, such as wheeled vehicles and foot traffic, or wheeled vehicles and tracked vehicles. Aircraft fly through special use airspace within the range complex. This subchapter is further broken down into movement activities that occur on the three types of ranges: land, water, and special use airspace.





2.1.3.1 Movement – Land Ranges, Training and Maneuver Areas

Movement Activities on Land Ranges, Training and Maneuver Areas

Personnel Movement

Infantry company training is the most frequent training event occurring at MCB Camp Lejeune, with an average of 3,078 events annually. The standardized template for this type of training includes a company of approximately 150 personnel deploying to the training location. Infantry units commonly move from one range location to another by foot. Movement by foot is unrestricted throughout the MCB Camp Lejeune maneuver areas, although trails and roads are more commonly used than random movement through the areas.

Vehicle Movement

Wheeled vehicles principally operate on established roads, but are authorized to drive throughout the maneuver areas, except where expressly restricted (such as the Red Cockaded Woodpecker area). Tracked vehicles operate on designated trails and in designated areas unless special authorization is provided to operate in another area. They typically operate at speeds from 6 to 64 km per hour (4 to 40 miles per hour). The vehicles that commonly operate within MCB Camp Lejeune are outlined in **Table 2.1-5**.

The Combat Vehicle Operator Training course is a special area at MCB Camp Lejeune where vehicle operators are challenged by a man made driving course through terrain that might be met during deployment. The course provides steep grades, rocky and muddy conditions, water crossings and other challenges that drivers must learn to navigate.

The pictures below represent vehicles that commonly operate on land ranges and training areas within the MCB Camp Lejeune Range Complex.



High Mobility Multipurpose Wheeled Vehicles



155 mm Howitzer



7-ton Truck

Table 2.1-5
Vehicles that Commonly Operate within the MCB Camp Lejeune Range Complex

| Vehicle Type | Vehicle Names | Models |
|----------------------------|---|--|
| Light Wheeled Vehicles | 105 mm Light Howitzer (towed) | N/A |
| | MK 155 Mine Clearance Launcher (towed) | N/A |
| | High Mobility Multipurpose Wheeled Vehicle | N/A |
| Medium Wheeled Vehicles | 120 mm mortar Expeditionary Fire Support System (towed) | N/A |
| | 155 mm Medium Howitzer (towed) | N/A |
| | Mine Resistant Ambush Protected Systems | Category I and II – armored personnel movers |
| | | Category III – for neutralization of anti-tank, anti-personnel mines |
| | Medium Tactical Vehicle Replacement (7-ton Truck) | Cargo Truck |
| | | 5 th Wheel Tractor for Pulling Trailers |
| | | Dump Truck |
| | | Wrecker |
| Heavy Wheeled Vehicles | MK 48 Logistics Vehicle System | The -14 Container Transporter |
| | | The -15 Recover/Wrecker |
| | | The -16 5 th Wheel Semi-trailer Adapter |
| | | The -17 Dropside Cargo |
| | | The -18 Ribbon Bridge/Container Transporter |
| Armored Wheeled Vehicles | Light Armored Vehicles | Light Armored Vehicle-25 |
| | | Light Armored Vehicle-Anti Tank |
| | | Light Armored Vehicle-Command and Control |
| | | Light Armored Vehicle-Logistics |
| | | Light Armored Vehicle-Mortar |
| | | Light Armored Vehicle-Recovery |
| Tracked Vehicles | Amphibious Assault Vehicle | Command Model |
| | | Personnel Model |
| | | Recovery Model |
| | Expeditionary Fighting Vehicle | N/A |
| | M1A1 Main Battle Tank | N/A |
| | M88A1E1 Hercules Recovery Vehicle | N/A |
| | M-9 Armored Combat Earthmover | N/A |
| Note: N/A = not applicable | | |

Movement Locations on Land Ranges, Training and Maneuver Areas

Table 2.1-6 lists land range assets, the components of each range, and the types of training operations that occur on that range. **Figures 2-1a, 2-1b, and 2-1c** depict the land ranges in the MCB Camp Lejeune Range Complex.

Table 2.1-6
Movement Locations for Typical Training Activities on Land Ranges, Training and Maneuver Areas

| Range Asset | Range Components | Typical Training Activities |
|--|---|--|
| Training and Maneuver Areas | BC–SW (total of 82 training areas) | Tactical maneuver training, amphibious exercise support, and Onslow beach training |
| Engineering Training Areas | Engineering Training Areas 1, 2, 3, 4, 5, 5A, 6, 7 | Training facilities to conduct engineer demolition training, an infiltration course, a mechanized assault course and breaching operations training range; execution of live-fire breaching exercises, a close quarters battle area and a Military Operations in Urban Terrain breaching house |
| Military Operations in Urban Terrain Facility | 31 buildings and Military Operations in Urban Terrain Assault Courses -1, -2, -3, -4, -5, -6; Urban Training Facility with 69 buildings | Supports individual, fire team, and squad level urban training and includes pistol, M-16, M4, and shotgun training, basic room entry and clearing, search and clearance operations, live-fire room clearing, and is primarily a fire team military operations in urban terrain/urban battle drill facility |
| Greater Sandy Run Area Ranges | SR-6, SR -7, SR-8, SR-9, SR-10, SR-11 | Supports tank, light armored vehicle, amphibious assault vehicle, and Infantry platoon training, includes an automated Infantry Platoon Battle Course range, includes ranges for Light Armored Reconnaissance Crew qualification and Light Armored Vehicle/Amphibious Assault Vehicle multi-purpose mechanized assault tank crew qualification, supports individual and tank platoon crew qualifications, supports individual pistol qualification |
| Stone Bay Ranges | Alpha, Bravo, Charlie, Dodge City Multi-purpose range, Hathcock, Mechanical, Walk Down, Dodge City Sniper Range | Pistol and rifle qualification/re-qualification operations for annual marksmanship qualification training and familiarization; shoot houses, breacher facilities, climbing walls/towers and a multipurpose range, supports Marine Expeditionary Unit and Marine Expeditionary Force training requirements |
| Area F Ranges | F-2, -4, -5, -6, -11A, -11B, 17, -18 | Provides training for small arms live-fire and maneuver training, hand grenade training, “Zero” range and pistol qualification and machinegun field firing; also provides a fast roping, climbing and rappelling training |
| Area D Ranges | D-9, -29A, -29B, -30 | Provides pistol qualification and re-qualification ranges, also trap and skeet range |
| Area I Range | I-1 | Pistol qualification and re-qualification range |
| Area L Range | L-5 | Provides infantry small arms live-fire and maneuver training |
| Observation Posts | OP 2-6, 8-11, Bear Tower, North Onslow, South Onslow, Hathcock | Allows observation of live-fire and laser operations at each of the impact areas, amphibious operations on the beach area, live-fire and maneuver events |
| Splash Points | SP-1-7,-9-13, 15-16, 18-20, 22-32, 34-36, 38, 40-46, 48-49 | Military operations training involving assault amphibious vehicles, light armored vehicles, small boats, swimmers, Landing Craft Utility, Landing Craft Air Cushions, etc traveling from water to land |
| Note: Please refer to Appendix B for more detail on range assets. | | |

Movement Levels on Land Ranges, Training and Maneuver Areas

The level of personnel and vehicle movement on land ranges and in training and maneuver areas is characterized for three geographic sectors: Greater Sandy Run Area, West of the New River, and East of the New River (**Figure 2-4**). The “Greater Sandy Run Area” sector includes the area

to the west of US Highway 17. The “West of the New River” sector includes areas west of the New River that contain the K-2 Impact Area. Last, the “East of the New River” sector is the area containing the G-10 Impact Area and Brown’s Island within the BT-3 Impact Area.

Table 2.1-7 presents the personnel movement levels on land ranges, training and maneuver areas, and landing and drop zones under the No Action Alternative. These levels are compared with the proposed action levels and are presented as **Table 2.3-3** in Summary of Training Levels (**Subchapter 2.3**).

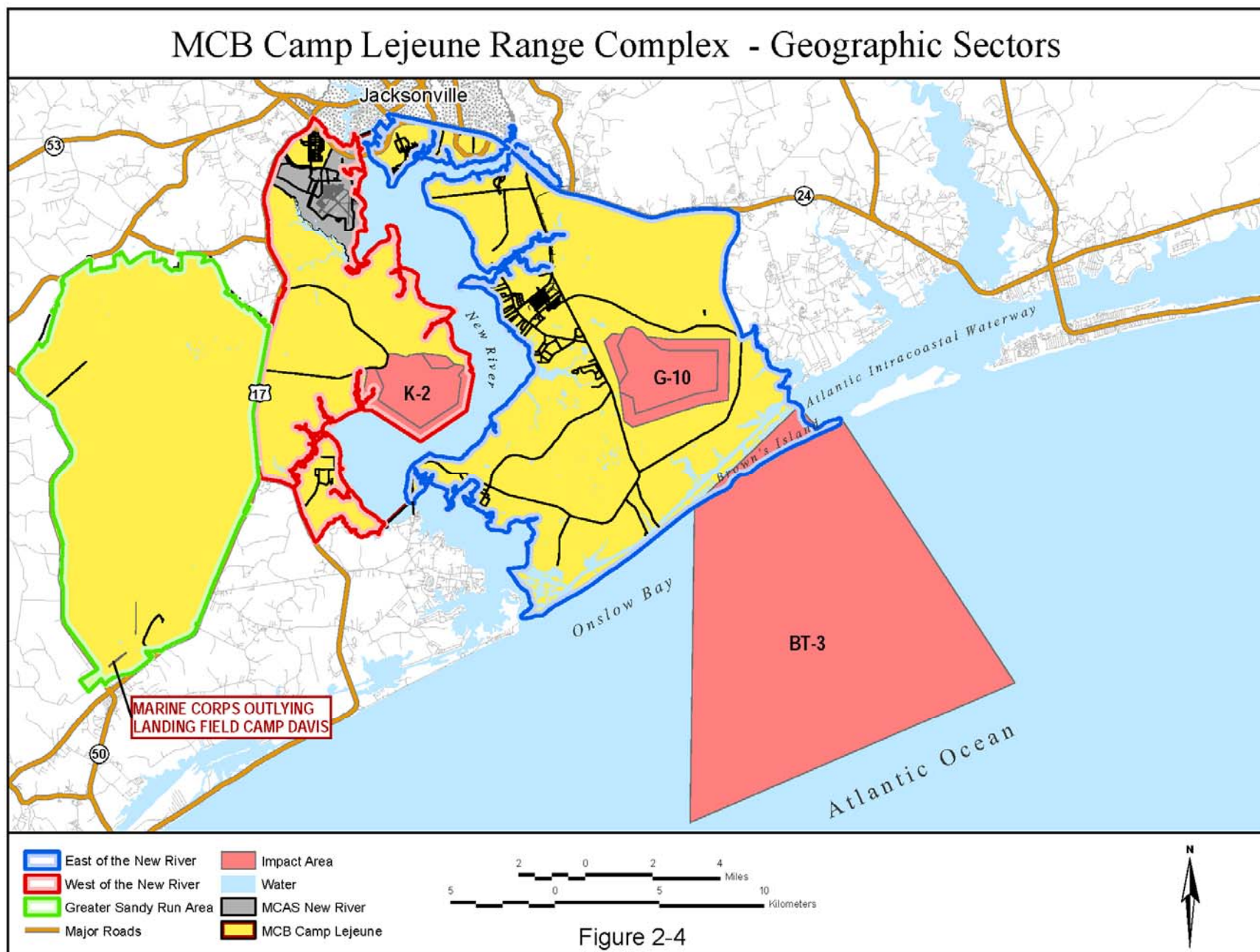
Table 2.1-7
Estimates for Annual Level of Personnel Movement on Land Ranges-No Action Alternative

| Range Asset | Greater Sandy Run Area | East of New River | West of New River |
|--|------------------------|-------------------|-------------------|
| Training and Maneuver Areas | 124,442 | 677,592 | 798,961 |
| Landing Zones and Drop Zones | 12,081 | 76,048 | 18,710 |
| Ranges/Training Courses/Gun Positions/Mortar Positions | 15,180 | 138,058 | 58,848 |
| Total | 151,703 | 891,698 | 876,519 |

Table 2.1-8 presents the vehicle movement levels on land ranges, training and maneuver areas, and landing and drop zones for the No Action Alternative. These levels are compared with the proposed action levels and are presented in **Table 2.3-4** in Summary of Training Levels (**Subchapter 2.3**). Information included in these tables represents average annual ground maneuver training operations and is characterized by data recorded in the Range Facility Management Support System database from 2005-2006.

Table 2.1-8
Estimates for Annual Level of Vehicle Usage on Land Ranges-No Action Alternative

| Type Of Vehicle | Greater Sandy Run Area | | | East Of the New River | | | West Of the New River | | |
|--|-----------------------------|------------------------------|--|-----------------------------|------------------------------|--|-----------------------------|------------------------------|--|
| | Training And Maneuver Areas | Landing Zones And Drop Zones | Ranges Training Courses/ Gun Positions/ Mortar Positions | Training And Maneuver Areas | Landing Zones And Drop Zones | Ranges Training Courses/ Gun Positions/ Mortar Positions | Training And Maneuver Areas | Landing Zones And Drop Zones | Ranges Training Courses/ Gun Positions/ Mortar Positions |
| Amphibious Assault Vehicle-7 | 43 | 4 | 325 | 4,829 | 264 | 252 | 1,163 | 21 | 321 |
| High Mobility Multipurpose Wheeled Vehicle | 1,908 | 184 | 190 | 14,945 | 1,723 | 3,709 | 9,213 | 304 | 827 |
| Light Armored Vehicle-25 | 9 | 1 | 3 | 70 | 7 | 11 | 48 | 1 | 3 |
| Light Armored Vehicle-Logistics | 1 | 0 | 0 | 5 | 1 | 1 | 4 | - | - |
| Logistics Vehicle Systems | 93 | 10 | 10 | 622 | 163 | 69 | 165 | 15 | 23 |
| 7-ton Truck | 499 | 45 | 62 | 6,834 | 723 | 3,715 | 1,988 | 138 | 155 |
| Dump Truck | 13 | 0 | 0 | 276 | 10 | 79 | 74 | 5 | 12 |
| Bulldozer | 0 | 0 | 0 | 0 | 0 | 26 | - | - | - |
| 155 mm Howitzer | 63 | 3 | 15 | 1,860 | 51 | 2,052 | 180 | 18 | 48 |
| M1A1 Main Battle Tank | 48 | 2 | 16 | 2,038 | 701 | 269 | 480 | 59 | 80 |
| Tank Retriever | 2 | 0 | 1 | 135 | 49 | 18 | 27 | 4 | 6 |
| Expeditionary Fighting Vehicle | 5 | 0 | 0 | 37 | 4 | 6 | 26 | 1 | 1 |



2.1.3.2 Movement – Water Ranges

Surface movement addresses movement of amphibious vehicles, small craft, and personnel on or through water.

Movement Activities on Water Ranges

Fording Operations

Fording is the process of crossing a stream or river by a wheeled or tracked vehicle at a low water location where the aid of a bridge or ferry is not required. Fording streams and rivers at MCB Camp Lejeune is restricted to specific fording locations that have concrete roadways through the water so the stream/river beds are not environmentally disturbed. Both wheeled and tracked vehicles practice fording operations so the vehicle operators are familiar with pre- and post-fording procedures that must be undertaken with their vehicles.

Amphibious Operations

Amphibious operations deal with the movement of personnel and equipment from ships at sea to the shore/beach area before further inland movement by ground or air methods. Amphibious movement is typically done with the amphibious ships' landing craft, including Landing Craft Air Cushioned, and Marine Corps amphibious vehicles, such as the Light Armored Vehicle, the Amphibious Assault Vehicle and the Expeditionary Fighting Vehicle. The operation can involve numerous landing craft and amphibious vehicles over three to four hours, or longer than 12 hours for more extensive exercises.

The Light Armored Vehicles, Amphibious Assault Vehicles, and Expeditionary Fighting Vehicles are designed to operate on land or in the water. Amphibious Assault Vehicle training is on land approximately 75 percent of the time and in the water approximately 25 percent of the time. The Expeditionary Fighting Vehicle training route is expected to be the same as it is scheduled to replace the Amphibious Assault Vehicles. A typical amphibious (water) training exercise involves one to three platoons (each platoon has 14 Amphibious Assault Vehicles). These platoons normally depart Courthouse Bay and transit to Onslow Beach via established tank trails or to the New River and the Atlantic Intracoastal Waterway. **Figure 2-2** depicts the water ranges and splash points in the MCB Camp Lejeune Range Complex. Splash points are designated areas that have been established for amphibious vehicles to enter or leave the water in order to minimize the potential erosion of stream banks and contamination of water. The Amphibious Assault Vehicles can cross over the New River without a bridge or ferry boat or, like a boat, these vehicles can use the river as their highway. Once the vehicles reach the beach, a platoon typically conduct three amphibious landings from shore to shore per day. When the training involves land operations, the unit lands on Onslow Beach and transits inland to the range or training area using existing tank trails. While in the water, the Light Armored Vehicle has an average speed of approximately 5 knots; the Amphibious Assault Vehicle averages approximately 7 knots; the Expeditionary Fighting Vehicle averages approximately 25 knots in

the ocean environment. **Table 2.1-9** lists the Expeditionary Fighting Vehicles' three water speed modes, the knots associated with those modes, and when the speeds are utilized.

Table 2.1-9
Expeditionary Fighting Vehicle Speeds

| Transition Speed | Knots | When Utilized |
|------------------------------------|----------|--|
| Low | 6 to 10 | General maneuver |
| Transition | 10 to 18 | Acceleration to its transit mode |
| High | 18 to 25 | Once the vehicle has come up out of the water onto hydroplane to quickly move from ship-to-shore |
| Source: US Marine Corps, May 2008. | | |

Low water speed operations are used in the Atlantic Ocean off the coast of MCB Camp Lejeune, within the Atlantic Intracoastal Waterway, and the New River, while transitional and high speed modes are normally only used in the Atlantic Ocean. These vehicles may operate on all waterways within the MCB Camp Lejeune Range Complex. The pictures below represent amphibious vehicles that commonly operate on water ranges within the range complex.



Light Armored Vehicle-25



Light Armored Vehicle-Logistics



Landing Craft, Air Cushioned



Amphibious Assault Vehicle

The Environmental Assessment for Testing of the Expeditionary Fighting Vehicle Prototype at MCB Camp Lejeune, North Carolina (US Marine Corps, May 2008) provides data in further detail on Amphibious Assault Vehicle and Expeditionary Fighting Vehicle operations.

Small Boats

Numerous types of small boats operate on the waters of MCB Camp Lejeune without restrictions. Small boats include Riverine Assault Craft and Combat Rubber Reconnaissance Craft. Ferry operations include pontoon sections (typically 1.5 x 1.5 x 2.1 [5 x 5 x 7 ft]) that are

hooked together into a size that will support the objective to be accomplished with small boats or work boats that may be used to move the pontoons from bank to bank. The pictures below represent small boats that commonly operate on water ranges within the MCB Camp Lejeune Range Complex.



Special Operations Craft Riverine



Mark Five Special Operations Craft

Movement Locations on Water Ranges

Training on water occurs within several defined sectors of the New River, the Atlantic Intracoastal Waterway, and Onslow Bay. Riverine training is conducted in the New River and Atlantic Intracoastal Waterway. **Figure 2-2** shows the 41 splash points that have been established for amphibious vehicles to enter or leave the water. This allows military operations training involving Assault Amphibious Vehicles, Light Armored Vehicles, small boats, swimmers, Landing Craft Utility, Landing Craft Air Cushioned, etc, to be conducted.

MCB Camp Lejeune has 2.6 km (1.4 nm) of amphibious landing beach and 7.4 km (4 nm) of buffer/impact area beach. Shallow ocean areas, less than 182 m (600 ft) deep, in Onslow Bay are used for amphibious training.

The water ranges within the MCB Camp Lejeune Range Complex are either designated as a prohibited area (existing danger zone [water]) or water restricted area. A prohibited area is defined as a water area (or areas) used for target practice, bombing, rocket-firing or other especially hazardous operations, normally for the armed forces. The prohibited area may be closed to the public on a full-time or intermittent basis, and the Commanding Officer of MCB Camp Lejeune exercises the authority to control access to these navigable waters. There is a prohibited area in Onslow Bay that surrounds the BT-3 Impact Area (see **Figure 2-2**). Surface movement addresses movement of boats, amphibious vehicles, and equipment on or through water ranges.

A water restricted area is a defined water area for the purpose of prohibiting or limiting public access to the area. Restricted areas generally provide security for Government property and/or protection to the public from the risks of damage or injury arising from the Government's use of that area. The water restricted areas at MCB Camp Lejeune are broken down into three areas: Atlantic Coast, New River, and the Atlantic Intracoastal Waterway. The New River water restricted area is further separated into sectors (**Figure 2-2**). Further detail on MCB Camp Lejeune prohibited areas and water restricted areas can be found in **Appendix B**. There are

currently about 50 training operations per year requiring closure of the Atlantic Intracoastal Waterway water restricted area for about 110 one-hour periods, as well as US Coast Guard and Navy operations that involve 40 one-hour period Atlantic Intracoastal Waterway closures (US Marine Corps, March 2004).

Table 2.1-10 lists typical training activities on water ranges within the MCB Camp Lejeune Range Complex.

Table 2.1-10
Movement Locations for Typical Training Activities on Water Ranges

| Location | Typical Training Activity |
|--------------------------------|---|
| Atlantic Intracoastal Waterway | Transiting to live-fire or maneuver training location (small boats); Manning Atlantic Intracoastal Waterway access control points (small boats); transit by assorted types of watercraft |
| BROWNS ISLAND | Explosive Ordnance Disposal of the live ordnance that is found on the beach. |
| BT-3 OCEAN-SIDE | Brown's Island firing of the 5.56/7.62 mm and the 40 mm training practice rounds |
| BT-3A | Naval gunfire only |
| COURTHOUSE BAY | Small boat maneuvers |
| EB / ONSLOW BAY | Deployments and return of troops, equipment, and munitions as well as amphibious training (Amphibious Assault Vehicle, Landing Craft Utility, Landing Craft Air Cushion, etc); beach assault or other landing practice (Amphibious Assault Vehicle, Landing Craft Utility, Landing Craft Air Cushion, or small boats) |
| FARNELL BAY | Small boat maneuvers |
| FRENCH CREEK | Bridging training (bridging unit) |
| GREY POINT SECTOR | Small boat maneuvers |
| JAX SECTOR | Small boat maneuvers |
| MORGAN BAY SECTOR | Small boat maneuvers |
| NEW RIVER | Small boat maneuvers |
| New River Inlet | Small boat maneuvers |
| STONE BAY RR SECTOR | Small boat maneuvers |
| TRAPS BAY | Small boat maneuvers |
| Water Drop Zone MB SECTOR | Recovery of personnel after parachute drop (small boats) |
| Water Drop Zone SB SECTOR | Recovery of personnel after parachute drop (small boats) |
| Water Drop Zone SHARK | Recovery of personnel after parachute drop (small boats) |

Movement Levels on Water Ranges

Average annual splash point usage was estimated using Range Facility Management Support System data from Calendar Year 2005 and 2006 and a training exercise template provided by the MCB Camp Lejeune Range Operations Officer. Per the input of the Range Operations Officer, splash point usage may be under-reported in the Range Facility Management Support System database. Therefore, whenever any of several training areas were used by Amphibious Assault Vehicle units, additional splash point usage was assumed to have occurred even though it was not specifically recorded. **Table 2.1-11** sums these assumed splash point uses with individually recorded splash point usage to provide the annual level of small boat and amphibious vehicle movement on water ranges.

Table 2.1-11
Average Annual Splash Point Usage-No Action Alternative

| Splash Point | Total Estimated Average Annual Usage |
|--------------|--------------------------------------|
| SP 1 | 3 |
| SP 3 | 34 |
| SP 4 | 7 |
| SP 5 | 8 |
| SP 6 | 6 |
| SP 7 | 4 |
| SP 9 | 85 |
| SP 10 | 11 |
| SP 11 | 86 |
| SP 12 | 83 |
| SP 13 | 39 |
| SP 18 | 38 |
| SP 19 | 38 |
| SP 20 | 37 |
| SP 22 | 529 |
| SP 23 | 10 |
| SP 26 | 4 |
| SP 27 | 4 |
| SP 29 | 5 |
| SP 30 | 538 |
| SP 32 | 2 |
| SP 36 | 10 |
| SP 38 | 5 |
| SP 42 | 1 |
| SP 43 | 1 |
| SP 44 | 41 |
| SP 48 | 34 |

2.1.3.3 Movement – Special Use Airspace

Movement Activities in Special Use Airspace

The movement of aircraft in special use airspace within the MCB Camp Lejeune Range Complex is conducted for three primary purposes: pilot training for weapons delivery, movement of troops and equipment, and Close Air Support. Close Air Support is the employment of air-to-ground weapons in close proximity to friendly forces that must be integrated with the fire and maneuver of ground forces. This type of training requires the highest level of coordination of any military operation involving air delivered weapons. Any weapons-carrying aircraft or system, including fixed-wing aircraft, rotary-wing aircraft, or unmanned aerial vehicle/unmanned combat aerial vehicle can conduct Close Air Support.

Movement Locations in Special Use Airspace

As described in Installations and Special Use Airspace (**Subchapter 1.2.4**), a major portion of the MCB Camp Lejeune Range Complex lies within airspace designated by the Federal Aviation Administration as Restricted Airspace (R-5306D, R-5306E, R-5303A/B/C, and R-5304A/B/C) and Hatteras F Military Operating Area in order to support military activity. **Table 1.1-1** of **Subchapter 1.2.4** lists these airspace names and authorized flight altitudes.

Aircraft participate in live firing operations, bombing, close air support (live or simulated), and/or combined air-to-ground exercises. In support of training requirements for MCB Camp Lejeune primary range users, the MCB Camp Lejeune Range Complex also has two Outlying Landing Fields, Oak Grove and Camp Davis. These outlying landing fields are used for flying and other units and equipment. Oak Grove is located 3.2 km (2 mi) northwest of Pollocksville, North Carolina and approximately 40 km (25 mi) north of MCB Camp Lejeune. Camp Davis is an unmanned, uncontrolled airstrip situated in the southern end of the Greater Sandy Run Area. The airfield is 42.53 km (26.4 mi) northeast of the town of Holly Ridge and 24 km (14.9 mi) south of MCAS New River.

Movement Levels in Special Use Airspace

Training levels in special use airspace within the MCB Camp Lejeune Range Complex are characterized by the number of sorties flown in airspace segments. A sortie operation is defined as a single aircraft entering and leaving a single airspace unit. **Table 2.1-12** presents a summary of the annual level of aircraft movement in special use airspace, as characterized by sorties flown in specific airspace segments under the No Action Alternative. These levels are compared to the proposed action levels and are presented as **Table 2.3-6** in Summary of Training Levels (**Subchapter 2.3**). This grouping of training level data tables serves to provide an overall sense of training within the MCB Camp Lejeune Range Complex.

2.1.4 Support

Any field exercise or training event includes facets of the support activity category. The specific activities listed below list common representatives of this category. These activities, such as maintenance, may be performed because they are actually needed or may be simulated simply to practice the skills involved in the activity. For example, a unit may go out into a maneuver area for an extended period of time and have an actual need for the production of drinking water in the expeditionary environment of the training area. Alternatively, a unit may go to a maneuver area and set up and operate an expeditionary water purification unit for a few hours simply to practice the skills involved.

The support category is comprised of the following activities: maintenance; supply; engineer, and distribution operations.

2.1.4.1 Support – Land Ranges

Support Activities on Land Ranges

Maintenance

Maintenance is typically a repair that is required as a result of an equipment failure and that the equipment user can repair. For example, if a wheeled vehicle has a flat tire, the tire would be changed or the flat itself would be fixed and the equipment could continue its training. If a major casualty occurs, such as an engine failure, then the equipment is recovered by a wrecker and returned to an equipment repair facility within the Base area of MCB Camp Lejeune Range Complex.

Table 2.1-12
Annual Sorties-No Action Alternative

| Aircraft Type | R-5303A | R-5306E | R-5304A | R-5306D | Hatteras F MOA |
|----------------------|---------|---------|---------|---------|----------------|
| Fixed-Wing Aircraft | | | | | |
| A-10 | 0 | 0 | 0 | 2 | 16 |
| AV-8 | 0 | 38 | 0 | 224 | 214 |
| C-12 | 0 | 0 | 0 | 5 | 0 |
| C-130 ¹ | 0 | 1 | 0 | 7 | 0 |
| C-17 ¹ | 0 | 1 | 0 | 14 | 0 |
| CESSNA ¹ | 0 | 6 | 0 | 106 | 0 |
| EA-6B | 0 | 0 | 0 | 2 | 4 |
| F-15 | 0 | 4 | 0 | 17 | 24 |
| F-16 | 0 | 0 | 0 | 4 | 1 |
| F-18 | 0 | 55 | 0 | 349 | 649 |
| F-22 | 0 | 0 | 0 | 0 | 6 |
| P-3 | 0 | 0 | 0 | 0 | 4 |
| R-44 | 0 | 0 | 0 | 0 | 0 |
| Total Fixed-wing | 0 | 105 | 0 | 730 | 918 |
| Rotary-Wing Aircraft | | | | | |
| AH-1 ² | 40 | 408 | 55 | 554 | 0 |
| CH-46 | 79 | 1014 | 162 | 1588 | 0 |
| CH-47 | 0 | 0 | 0 | 0 | 0 |
| CH-53 ² | 254 | 909 | 421 | 1507 | 0 |
| H-64 | 0 | 0 | 0 | 0 | 0 |
| OH-58 | 0 | 0 | 0 | 0 | 0 |
| UH-1 ² | 29 | 272 | 52 | 384 | 0 |
| UH-60 | 0 | 58 | 3 | 94 | 0 |
| MV-22 ³ | 192 | 1338 | 384 | 2708 | 24 |
| Total Rotary-wing | 594 | 3999 | 1077 | 6835 | 24 |
| Total Sorties | 594 | 4104 | 1077 | 7565 | 942 |

Supply

There are three types of supply operations: storage, sustainment and munitions. Storage applies to the temporary storage of consumables, such as food, water, and other supplies that may be needed while units are in the field for training, and will also typically consist of temporary security fencing and minimal temporary shelters, such as tents, to protect the stored goods for a short period of time.

Sustainment operations apply to the overall administration of units while they are in the field for training, including: billeting (sleeping facilities), showers, toilets, kitchens and mess halls, administration (office) areas, hospitals, and command posts. It also covers disposal requirements for waste water and sewage.

Ammunition supply falls under two categories: arm/de-arm and storage (which can be permanent or temporary). Four arm/de-arm supply points are established at MCB Camp Lejeune to support training exercises that use munitions. These points are specified locations where weapons may be

loaded or unloaded with the munitions that will be used for the specified training to be accomplished. These areas are chosen for security and safety reasons, so that the munitions may be accessed by only specified personnel and so that, in the event of an accident, any mishap will cause minimal damage outside of the supply point area.

The ammunition supply point also serves as a collection point for "spent casings." Many types of munitions rounds used during training will have casings that contained the propellant for the munitions that are expended during training. Where feasible, these casings (especially for medium and large munitions) are collected after the training and returned to the ammunition supply point so that the casings may be recycled or disposed. Small munitions casings are not usually collected, except in areas such as firing ranges, where their use is concentrated.

There are two types of ammunition supply points that are defined by their storage capability including permanent and temporary storage facilities. Permanent storage facilities are permanent magazines that have been constructed to meet all required safety and security measures for larger quantities and types of munitions to be stored. This document does not further address permanent storage. Temporary storage facilities, also known as Field Ammunition Supply Points are established to support a specific training exercise. The location for these facilities will normally be close to the area where the training is being conducted and will meet the safety and security requirements of the typically limited quantity and type of munitions that will be used during the training.

Engineer

Engineer companies are responsible for power generation, construction activities, explosive operations, mobility/counter-mobility operations, and force protection operations, as well as the handling of all the bulk liquids necessary for the sustainment of training operations.

Power Generation

Weapon systems, storage areas, and sustainment areas require electrical power. Where the power is not part of the system, then it must be supplied by a tactical quiet generator. There are several different size generators that can supply different amounts of electrical power, but the most commonly used generator is the 60 kilowatt trailer mounted generator. This generator runs on diesel fuel, is quiet, and has a low infrared signature.

Horizontal/Vertical Construction

All construction, whether horizontal or vertical, undertaken for, or during a training exercise, is dismantled after the training, and the training area is restored to the pre-exercise condition. Horizontal construction includes runway repair, runway construction with metal matting, road construction or repair, and construction of tactical obstacles. Vertical construction includes the construction of all temporary buildings (not tents) built for training.

Battlefield Damage Repair is a component of Horizontal/Vertical construction that trains personnel to make immediate repairs to roads, runways, bridges, and other "civil engineering"

style projects, so that they may be used again as quickly as feasible. This training involves the use of heavy construction equipment such as bulldozers, road graders, and cranes.

Explosive Operation- Unexploded Ordnance/Explosive Breaching

Unexploded ordnance can be a daily routine at MCB Camp Lejeune that may be approached in three ways:

- Range Safety - Ordnance is used almost daily at MCB Camp Lejeune. Explosive ordnance personnel are routinely called upon to recover unexploded ordnance on ranges to allow range operations to proceed.
- Range Maintenance – In accordance with Marine Corps Order 3550.12 Operational Range Clearance Program, ranges where ordnance is used are routinely cleared of military expended material and debris down to a depth of about 0.3 m (1 ft). The actual depth of clearing and the frequency for how often this maintenance is required depends on the specific range and ordnance type.
- Range Construction - Whenever construction is scheduled in a range area, the area is routinely checked for unexploded ordnance and the area cleared to make sure construction can safely proceed.

Explosive breaching is a technique commonly used to gain access to buildings where enemy personnel or material could be located, to investigate the contents of the building itself, or to secure a passage through an enemy defense, obstacle, minefield, or fortification. This process enables a unit to maintain its mobility by removing or reducing natural and man-made obstacles.

The most common training is to place explosive charges around door frames or other specified areas where the explosion will breach the door, wall, or other area and allow access into the building. In simple settings, a door and door frame is erected in a demolition pit or in a Military Operations in Urban Terrain facility where personnel practice knocking down the door using explosives that are normally less than 0.45 kg (1 lb) Net Explosive Weight.

Mobility/Counter Mobility Operations

Mobility and counter mobility involves moving friendly forces toward an objective and preventing opposing forces from reaching friendly forces through the installation or removal, in these cases, of various obstacles. Training areas where obstacles are installed or removed are always restored to their original pre-training condition.

Trenches, berms, barriers, minefields, and tactical and protective wire obstacles are typical obstacles used to keep opposing forces out of friendly areas. Engineer forces plan and install these typical physical obstacles based on the training scenario including placement of friendly weapons to support the installed friendly obstacles. One example, from 2003, is from Kuwait/Iraq where reinforced obstacles included two 4 x 4 m berms (13 x 13 ft), two 4 x 4 m (13 x 13 ft) tank ditches, two chain link fences that were 2 m (6.6 ft) high, and a six strand electrified (7,000 volt [7 amp]) concertina wire fence that spanned a 90 km (56 mi) frontage.

Mechanical breaching can be as simple as using a "battering ram" against a door, but may also include larger equipment, specifically bulldozers used against opposing force obstacles similar to those listed in the above paragraph.

Explosive breaching may be used against most of the obstacles listed above as well. If it is determined that explosive breaching will be effective against the obstacles installed for the training tactical scenario, the advantage is the element of surprise to the opposing forces, as well as the possibility of increased speed through a cleared course.

Explosive breaching methods include:

- Antipersonnel Obstacle Breaching System, which replaced Bangalore Torpedoes, is an explosive line charge system used to breach land mine fields and/or wire obstacles. It is light enough to be carried by two Marines with backpacks.
- MK-58 Mine Clearing Line Charge is a trailer mounted, rocket projected, explosive line charge which provides a breaching capability against a land mine field.

Force Protection Operations

Force protection operations are designed principally to secure storage and administrative areas, maintain security within a specific area, and control traffic. Traffic control barriers and protective wire barriers are two principal physical methods used.

Bulk Liquids

A tactical water purification unit is used to produce potable water from either a saltwater (ocean or brackish pond) or fresh water (river or pond) source. The unit is trailer mounted, is about 2.4 m tall, 2.4 m wide, 5.5 m long (8 ft tall, 8 ft wide, 18 ft long), and is powered by a 30 kilowatt generator. Typically 2,271 liters (600 gallons) per hour may be produced from saltwater or 6,814 liters (1,800 gallons) per hour from fresh water. The potable water is stored in bladders arranged on the ground or in tanks mounted on trailers and is treated as required to ensure it is potable. Bladders are made of various fabrics and are typically 4.45 x 5.73m (14.6 x 18.8 ft) for an 18,927 liter (5000 gallon) capacity. The typical trailer mounted tank (water buffalo) has a capacity of 1514 liters (400 gallons).

Ready access to fuel for all vehicles, boats, and aircraft is required for all field training. Fuel may be provided to some training units directly by fuel trucks or in an administrative area at a planned fueling site.

Fabric fuel bladders of various sizes and similar to water bladders, are used to store fuel. Fuel bladders are placed in secondary containment areas, such as berms lined with fabric sheeting to contain any spills. Two permanent secondary containment facilities are present at SR-10 and SR-7. Bladders typically store about 37,854 liters (10,000 gallons) of diesel fuel, although they are usually only partially filled during training exercises, and are supported by piping systems and transfer pumps to move the fuel to fuel trucks or tactical vehicles that require fuel. Fuel can also be stored in tactical bulk fuel tanks which may be transported by the CH-53 helicopter.

There are typically two methods of fueling or defueling (removing fuel from vehicles) vehicles on land ranges at MCB Camp Lejeune. Each method has procedures to reduce the probability of a fuel spill, and procedures to be followed to recover fuel in case a spill should occur. The two methods include:

- Ground-to-ground moves fuel either from a storage facility or a fuel truck into a tactical vehicle or an aircraft
- Ground-to-surface moves fuel either from a storage facility or a fuel truck into a small craft

Distribution Operations

The paragraph below regarding distribution operations provide information on what happens before or after the movement activity at various locations.

Land Transportation

Wheeled and tracked vehicles carry internal and external cargo loads, including pulling trailers that carry cargo. After the cargo has been moved from one location to another, such as a local storage area, the cargo can be further distributed to its intended users.

Support Locations on Land Ranges

Support activities on land ranges occur throughout the installation depending upon the type of training operation.

2.1.4.2 Support – Water Ranges

Support Activities for Water Ranges

Maintenance

Maintenance is typically a repair that is required as a result of an equipment failure and that the equipment user can repair. For example, if a water craft needs minor repairs it would be fixed and the equipment could continue its training. If a major casualty occurs, such as an engine failure, then the equipment is recovered by a wrecker and returned to an equipment repair facility within the MCB Camp Lejeune Range Complex.

Supply

Ready access to fuel for all boats is required for all field training. Fuel may be provided to some training units directly by fuel trucks or in an administrative area at planned fueling site.

Two methods of fueling or defueling (removing fuel from vehicles) boats and amphibious vehicles include:

- Ground-to-surface moves fuel either from a storage facility or a fuel truck into a small craft
- Surface-to-surface moves fuel from one small craft to another

Engineer

Engineer companies practice methods for crossing rivers, ravines, or other obstacles by constructing bridges or using ferry or rafting methods. A static bridge site with permanently installed abutments has been constructed at Landing Zone Dove. This site allows a mobile bridge to be brought to the site and put into place as many times as is required to train the personnel. Special bridging sites may be established at other waterways or areas that might require a bridge span within MCB Camp Lejeune after a special request has been submitted to Range Control to use a selected area. By using various areas, different bridging techniques may be practiced to ensure a wide range of experience. Ferrying and rafting training moves vehicles or troops over a waterway by using floating bridge sections or pontoons that are moved from one bank to another by various types of pusher boats. This training requires entry and exit points on the river banks, so frequent training is done at prepared entry and exit locations.

Distribution Operations

Beach Operations

During amphibious assaults and with Maritime Preposition Force units, Marine units must be able to load and unload ships without the benefit of deep draft-capable, fixed port facilities. They must be able to do this in friendly or undefended territory, in time of war, during phases of theater development in which there is no opposition by the enemy, or as a means of moving forces closer to tactical assembly areas, depending on threat force capabilities.

Essentially, these Marine units create and operate facilities ashore where no facilities exist and bring equipment and supplies from ships at sea to ashore staging points for use by forces ashore. This type of distribution operation is called Logistics Over-the-Shore and is composed of several types of operations depending on what has to be done to unload the ships. When Marine units and other Service Logistics Over-the-Shore forces conduct a Logistics Over-the-Shore operation together under a Joint Force Commander, the operation is called Joint Logistics Over-the-Shore.

There are five basic types of Cargo Offloading and Transfer System operations used within the Strategic Sealift Program:

- Roll-on Roll-off Discharge Facility
- Floating Causeway Insertion/Retraction
- Barge Ferry Insertion/Retraction
- Elevated Causeway System
- Maritime Prepositioning Ship Offload

These systems may be configured as lighterage (a small craft designed to transport cargo or personnel from ship to shore, including amphibians, landing craft, discharge lighters, causeways, and barges) or modular causeway systems. One or more of the systems may be used at any one time depending on the physical requirements of the cargo to be offloaded and the beach or area to be used by the forces ashore.

A mix of pontoons, water jet propulsion assemblies, and ancillary hardware is used to create facilities that may be used to offload amphibious ships and Maritime Prepositioning Ships. The Side Loadable Warping Tug is a principal craft used in this operation to move sections of the facility to be constructed. The pontoons and modular causeways, referred to as causeway sections, include both powered and non-powered versions that are connected together to create a facility to move cargo ashore. It may take a few hours, or several days to get a causeway fully in place.

The methods of constructing the various Cargo Offloading and Transfer System systems are somewhat similar, but result in different facilities that overcome different situations caused by the beach conditions or other locally available facilities.

- The Roll-on Roll-off Discharge Facility is a floating platform moored to a ship, anchored in place, or tied to a pier. It is made by connecting about seven causeway sections together and is designed to provide a roadway between the ship's ramp and a pier or to lighterage that will move the equipment from the ship to shore. It takes about six to eight hours to assemble a Roll-on Roll-off Discharge Facility, but it is one of the most important items used in a Logistics Over-the-Shore operation.
- The floating causeway is constructed by connecting standard causeway sections end to end to form a bridge/ramp from the shore, seaward. It is normally used to overcome a shallow gradient or reef barrier so that ships can quickly offload their rolling stock and containers. The causeway is essentially a floating pier that stretches outward from the beach. At the causeway's seaward end is a wide area onto which vehicles and equipment can be unloaded and then driven directly to shore. The basic causeway pieces are a 12m long by 2.4 m wide by 1.2 m deep (40 ft long by 8 wide ft by 4 ft deep) rectangular center section and two 24 m long by 2.4 m wide by 1.2 m deep (20 ft long by 8 ft wide by 4 ft deep) end sections. When joined, the three sections form a 24 m (80 ft) long unit. Three completed units, joined along their long sides, form a 24 by 7 m (80 by 24 ft) segment called a "section." Multiple sections are then joined together and anchored in place to form the causeway, which can extend up to 457 m (1,500 ft) from shore.
- The side-loadable warping tug is a key element in the causeway assembly process. This craft is used to move the causeway sections used in building most of the Cargo Offloading and Transfer System structures at sea, and to tend the structures after they have been completed. The side-loadable warping tug looks like a barge. It is 26 m (85 ft) long, rectangular, low to the water and has a small pilothouse set off to one side. It uses two water-jet propulsion units, which makes it very maneuverable in favorable seas. Coxswain training is essential for this barge ferry craft.
- The Elevated Causeway System is another Cargo Offloading and Transfer System that provides an interface between ships and shore by bridging the surf zone and creating a semi-permanent pier for the off-loading of Joint Logistics Over-the-Shore cargo to an otherwise unimproved beach. It is assembled by joining standard causeway sections together and can be elevated on piles driven into the seabed. Depending on the size of the Elevated Causeway System to be constructed, this assembly could take from 70 hours to 7 days. The completed Elevated Causeway System is typically 914m long and 7m wide (3,000 ft long and 24 ft wide). Vehicles can be driven on the causeway or offloaded by cranes to the causeway then driven ashore. These activities have been approved by the Environmental Management Division and Range Control for the areas they occur in.

Surface Transportation

Boats and barges are used to carry cargo, weapon systems, and personnel. Loading and unloading areas along the river banks are required to support surface transportation, depending on the specific cargo being transported. Pontoons anchored alongside a bank can serve as a temporary pier to help with the loading or unloading of larger cargo.

Support Locations on Water Ranges

Support activities on water ranges generally occur throughout the installation, depending on the type of training operation.

2.1.4.3 Support – Special Use Airspace

Support Activities for Special Use Airspace

Maintenance

Maintenance is typically a repair that is required as a result of an equipment failure and that the equipment user can repair. For example, if an aircraft has a flat tire, the tire would be changed or the flat itself would be fixed and the training would continue with the repaired equipment. If a major breakdown occurs, such as an engine failure, then the equipment is recovered and returned to an equipment repair facility within the Base area of the MCB Camp Lejeune Range Complex.

Supply and Storage

Ready access to aircraft fuel is required for all flight and flight support training. Fuel may be provided to some training units directly by fuel trucks or in an administrative area at planned fueling sites.

Fuel can also be stored in tactical bulk fuel tanks which may be transported by the CH-53 helicopter. There is one method of fueling or defueling (removing fuel) aircraft at MCB Camp Lejeune. It is a ground-to-ground move of fuel either from a storage facility or a fuel truck into an aircraft. This method has procedures to reduce the probability of a fuel spill, and procedures to be followed to recover fuel in case a spill should occur.

Airfield Terminal Operations

Rotary wing aircraft are the most common airfield users. Equipment they carry is loaded or unloaded after they land and distributed by other methods. Fixed wing aircraft, most commonly the C-130, do not land at an airfield, but rather use the low altitude parachute extraction method to discharge cargo. This procedure has the C-130 fly over the runway at an altitude between 1.5 and 3 m (5 and 10 ft) and the cargo is pulled from the aircraft by large, inflated cargo parachutes. The cargo slides to a stop within a very short distance and is recovered by ground based personnel and taken to storage areas or further distributed by wheeled or tracked vehicles.

Tactical Landing Zones

Tactical landing zones may be used as helicopter support areas by helicopters carrying cargo. Cargo may be loaded into or offloaded from the helicopter, but then the cargo is moved to an assigned storage area by ground personnel and ground vehicles. Much of the cargo transported may be moved by hand to storage areas. However, large heavy items may have to be moved by cargo handling equipment, such as forklifts, which are required to handle the cargo efficiently.

Air Transportation

Rotary wing aircraft have a large responsibility for moving cargo, weapon systems, and personnel, and have a capability to carry them internally or externally using slings.

Support Locations for Special Use Airspace

Support activities for training operations in special use airspace generally occur throughout the installation.

2.2 PROPOSED ACTION

This EA evaluates supporting and conducting current and emerging training operations at the MCB Camp Lejeune Range Complex. Current range operations include all those operations described in the No Action Alternative (**Subchapter 2.1**). Emerging training requirements include increases in current training operations. These training operations would be conducted within land ranges, water ranges, and special use airspace within the range complex. The proposed action includes the following increases in training operations over current levels:

- A 20 percent increase in small arms training, except .50 caliber arms
- An increase in rotary-wing (helicopter) operations including a 33 percent increase in CH-53 sorties and a 100 percent increase in AH-1 and UH-1 sorties
- A 10 percent increase in training with MK-19 40-mm grenade rounds
- A 5 percent increase in training with artillery, mortar, and other large arms
- A 39 percent increase in training with tank rounds
- A 33 percent increase in tactical vehicle operations

Under the proposed action, the types of training operations at the MCB Camp Lejeune Range Complex would remain essentially the same. However, the US Marine Corps has determined that increased training and munitions use is needed to fully support and enhance MCB Camp Lejeune's national defense mission, which is to train and maintain combat-ready units at a high state of military readiness for expeditionary deployment. The level of training to be provided under the proposed action is reflected in **Tables 2.3-1** through **2.3-6** in Summary of Training Levels (**Subchapter 2.3**). Training operations under the proposed action will be reviewed every five years to determine if supplementary NEPA analysis is necessary.

2.2.1 Munitions Firing

The firing of munitions involves training with weapons systems to destroy or severely damage specific targets. As described in **Subchapter 2.1.2**, units train with many different types and

sizes of weapon systems and munitions at the MCB Camp Lejeune Range Complex in four different training scenarios: ground-to-ground, ground-to-air, air-to-ground, and surface-to-ground.

2.2.1.1 Munitions Firing – Land Ranges

Under the proposed action, the nature of munitions firing activities and locations where these activities occur would remain the same as those described for the No Action Alternative. However, there would be an increase in the level of munitions fired as well as an increase in laser usage associated with the firing of munitions.

Table 2.2-1 presents the munitions firing levels on land ranges for the proposed action. These levels are compared with the No Action Alternative levels and are presented as **Table 2.3-1** in Summary of Training Levels (**Subchapter 2.3**). This grouping of training level data tables serves to provide an overall sense of training within the MCB Camp Lejeune Range Complex.

Table 2.2-1
Annual Munitions Firing Levels on Land Ranges-Proposed Action

| Munitions Type | Proposed Action |
|--|-----------------|
| Small Arms ¹ Rounds | |
| Small Arms excluding .50 caliber | 49,314,083 |
| .50 caliber | 1,807,562 |
| Total Small Arms Rounds | 51,121,645 |
| Large Arms ² Rounds | |
| Large Arms –MK19 | 500,401 |
| Large Arms - Tank Rounds | 10,290 |
| Artillery, Mortars, and Other Large Arms | 608,277 |
| Total Large Arms Rounds | 1,118,968 |
| Explosives and Pyrotechnics | |
| Explosives ³ | 306,279 |
| Pyrotechnics ⁴ | 169,517 |
| Total Explosives and Pyrotechnics | 475,796 |
| Notes: 1. Refer to Appendix B, Table B-2 Small Munitions. 2. Refer to Appendix B, Table B-3 Large Munitions. 3. Refer to Appendix B, Table B-5 Explosives. 4. Refer to Appendix B, Table B-6 Pyrotechnics | |

2.2.1.2 Munitions Firing – Water Ranges

Munitions firing activities and locations on water ranges would remain the same for the proposed action as described for the No Action Alternative. Boat operations on water ranges are not expected to increase under the proposed action. There would be no increases in surface-to-ground fires. However, because there is an increase in firing on land ranges, which have surface danger zones that fall over water, there is a potential for an increased level of munitions that could land in the water.

Table 2.2-2 presents the estimates of munitions that may land in water under the proposed action. These levels are compared with the No Action Alternative levels and are presented as **Table 2.3-2** in Summary of Training Levels (**Subchapter 2.3**). This grouping of training level data tables serves to provide an overall sense of training within the MCB Camp Lejeune Range Complex.

Table 2.2-2
Estimates for Annual Level of Munitions that May Land in Water Ranges-Proposed Action

| Munitions Type | New River | Atlantic Intracoastal Waterway and Onslow Bay |
|---------------------------------|-----------|---|
| 5.56 mm | 112,285 | 7,317 |
| 7.62 mm | 3,010 | 42,720 |
| .22 caliber | 11 | 0 |
| .50 caliber | 0 | 13,002 |
| 155 mm HE | 0 | 1 |
| 40 mm inert (MK-19) | 0 | 1,756 |
| 40 mm inert, excluding MK-19 | 0 | 2,109 |
| Stinger missile, Inert | 0 | 19 |
| Stinger missile, High Explosive | 0 | 40 |
| Total | 115,306 | 66,964 |

2.2.1.3 Munitions Firing – Special Use Airspace

Under the proposed action, munitions firing activities and locations in special use airspace would remain the same as that described for the No Action Alternative. However, there would be an increase in the level of several types of munitions fired from aircraft onto land-based targets, which is reflected in **Table 2.2-1**. The level of ground-to-air training with Stinger missiles, under the proposed action, would remain the same as the No Action Alternative level as shown in **Table 2.3-2** in Summary of Training Levels (**Subchapter 2.3**).

2.2.2 Movement of Personnel, Vehicle, and Aircraft

Movement describes methods used to get from one location to another and from one type of activity to another type of activity.

2.2.2.1 Movement – Land Ranges and Training Areas

The types of activities and locations for the movement of personnel and vehicles on land ranges would remain the same for the proposed action as described for the No Action Alternative. There would be an increase in the levels of personnel and vehicle movement on land ranges under the proposed action. For example, the increased levels of small arms munitions firing would result in slight increases in personnel movement East of New River because of the numerous small arms ranges in this area. Under the proposed action, tactical vehicle usage at MCB Camp Lejeune is expected to increase by 33 percent due to the basing of three additional infantry battalions, a truck company, and a new artillery battery. The increase would apply to all training operations in land training areas. Estimates for annual movement levels of personnel and vehicles on land ranges are described in **Table 2.2-3** and **Table 2.2-4** for the proposed action.

These levels are compared with the No Action Alternative and are presented as **Tables 2.3-3** and **2.3-4** in Summary of Training Levels (**Subchapter 2.3**). This grouping of training level data tables serves to provide an overall sense of training within the MCB Camp Lejeune Range Complex.

Table 2.2-3
Estimates for Annual Level of Personnel Movement on Land Ranges-Proposed Action

| Range Asset | Greater Sandy Run Area | East of New River | West of New River |
|---|------------------------|-------------------|-------------------|
| Training and Maneuver Areas | 124,442 | 677,592 | 798,961 |
| Landing Zones and Drop Zones | 12,081 | 76,048 | 18,710 |
| Ranges/Training Courses/Gun Positions/Mortar Positions | 15,180 | 138,058 | 58,848 |
| Total | 151,703 | 891,698 | 876,519 |
| Note: Under the proposed action, movement levels of personnel on land ranges would be similar to the estimate of movement levels for the No Action Alternative. | | | |

Table 2.2-4
Estimates for Annual Level of Vehicle Usage on Land Ranges-Proposed Action

| Type of Vehicle | Greater Sandy Run Area | | | East Of the New River | | | West Of the New River | | |
|---|-----------------------------|------------------------------|--|-----------------------------|------------------------------|--|-----------------------------|------------------------------|--|
| | Training And Maneuver Areas | Landing Zones And Drop Zones | Ranges Training Courses/ Gun Positions/ Mortar Positions | Training And Maneuver Areas | Landing Zones And Drop Zones | Ranges Training Courses/ Gun Positions/ Mortar Positions | Training And Maneuver Areas | Landing Zones And Drop Zones | Ranges Training Courses/ Gun Positions/ Mortar Positions |
| Amphibious Assault Vehicle-7 | 57 | 5 | 432 | 6,423 | 351 | 335 | 1,547 | 28 | 427 |
| High Mobility Multipurpose Wheeled Vehicle | 2,538 | 245 | 253 | 19,877 | 2,292 | 4,933 | 12,253 | 404 | 1,100 |
| Light Armored Vehicle-25 | 12 | 1 | 4 | 93 | 9 | 15 | 64 | 1 | 4 |
| Light Armored Vehicle-Logistics | 1 | 0 | 0 | 7 | 1 | 1 | 5 | - | - |
| Logistics Vehicle Systems | 124 | 13 | 13 | 827 | 217 | 92 | 219 | 20 | 31 |
| 7-ton Truck | 664 | 60 | 82 | 9,089 | 962 | 4,941 | 2,644 | 184 | 206 |
| Dump Truck | 17 | 0 | 0 | 367 | 13 | 105 | 98 | 7 | 16 |
| Bulldozer | 0 | 0 | 0 | 0 | 0 | 35 | - | - | - |
| 155 mm Howitzer | 84 | 4 | 20 | 2,474 | 68 | 2,729 | 239 | 24 | 64 |
| M1A1 Main Battle Tank | 64 | 3 | 21 | 2,711 | 932 | 358 | 638 | 78 | 106 |
| Tank Retriever | 3 | 0 | 1 | 180 | 65 | 24 | 36 | 5 | 8 |
| Expeditionary Fighting Vehicle | 7 | 0 | 0 | 49 | 5 | 8 | 35 | 1 | 1 |
| Note: Tactical vehicle usage is expected to increase by 33 percent due to basing of three additional infantry battalions, a truck company, and a new artillery battery. As a conservative estimate, a 33 percent increase was applied to all tactical vehicles used on land ranges. | | | | | | | | | |

2.2.2.2 Movement – Water Ranges

Movement activities and locations on water ranges would remain the same for the proposed action as described for the No Action Alternative. The level of small boat operations and amphibious vehicle operations on water ranges are not expected to increase under the proposed action. Although **Table 2.2-4** shows an increase in amphibious vehicle usages on land ranges, this was based on applying a 33 percent increase on all tactical vehicles across the board for land ranges. This is a conservative estimate for all tactical vehicles on land ranges and does not apply to amphibious vehicle usage on water ranges. Amphibious vehicle usage on water ranges is not expected to increase.

2.2.2.3 Movement – Special Use Airspace

Movement activities in special use airspace would remain the same for the proposed action as described for the No Action Alternative. However, the levels of movement would increase due to several aircraft basing actions. According to the 2009 Marine Aviation Plan, 1 Marine Heavy Lift (HMH) and 1 Marine Light Attack Helicopter (HMLA) squadron would be based at to MCAS Cherry Point followed by a permanent basing of these squadrons plus 1 additional HMLA squadron at MCAS New River (US Marine Corps, June 2009). Both HMH-366 and HMLA-467 became active at MCAS Cherry Point in FY 2008 and will move to MCAS New River in FY 2012. HMLA-567 would stand up at MCAS New River in FY 2011. These squadrons would include 16 CH-53 aircraft, 36 AH-1 aircraft, and 18 UH-1 aircraft. Additional sorties would be flown in the MCB Camp Lejeune special use airspace once additional helicopters are based.

Table 2.2-5, presents the level of movement in special use airspace, as characterized by sorties flown in specific airspace segments for the proposed action. In Summary of Training Levels (**Subchapter 2.3**), **Table 2.3-6**, presents a summary of the No Action Alternative and the proposed action level of movement in special use airspace, as characterized by sorties flown in specific airspace segments. This grouping of training level data tables serves to provide an overall sense of training within the MCB Camp Lejeune Range Complex.

2.2.3 Support

Support activities provide the essential sustainment needed for carrying out training events such as maintenance, supply, construction, storage of food and fuels and other activities. Any field exercise or training event includes facets of the support activity category. These activities may be performed because they are actually needed or may be simulated simply to practice the skills involved.

2.2.3.1 Support – Land Ranges and Training Areas

Support activities and locations on land ranges and training areas would remain the same for the proposed action as described for the No Action Alternative. However, the level of support activities carried out would increase in direct proportion to the training increases in the proposed action in order to provide the necessary support for the training activities.

2.2.3.2 Support – Water Ranges

Support activities and locations on water ranges would remain the same for the proposed action as described for the No Action Alternative. However, the level of support activities carried out would increase in direct proportion to the training increases in the proposed action in order to provide the necessary support for the training activities.

Table 2.2-5
Annual Sorties-Proposed Action

| Aircraft Type | R-5303A | | R-5306E | | R-5304A | | R-5306D | | Hatteras F MOA | |
|----------------------|------------------|-----------------|------------------|-----------------|------------------|-----------------|------------------|-----------------|------------------|-----------------|
| | Percent Increase | Proposed Action | Percent Increase | Proposed Action | Percent Increase | Proposed Action | Percent Increase | Proposed Action | Percent Increase | Proposed Action |
| Fixed-Wing Aircraft | | | | | | | | | | |
| A-10 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 2 | 0 | 16 |
| AV-8 | 0 | 0 | 0 | 38 | 0 | 0 | 0 | 224 | 0 | 214 |
| C-12 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 5 | 0 | 0 |
| C-130 ¹ | 0 | 0 | 0 | 1 | 0 | 0 | 0 | 7 | 0 | 0 |
| C-17 ¹ | 0 | 0 | 0 | 1 | 0 | 0 | 0 | 14 | 0 | 0 |
| CESSNA ¹ | 0 | 0 | 0 | 6 | 0 | 0 | 0 | 106 | 0 | 0 |
| EA-6B | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 2 | 0 | 4 |
| F-15 | 0 | 0 | 0 | 4 | 0 | 0 | 0 | 17 | 0 | 24 |
| F-16 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 4 | 0 | 1 |
| F-18 | 0 | 0 | 0 | 55 | 0 | 0 | 0 | 349 | 0 | 649 |
| F-22 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 6 |
| P-3 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 4 |
| R-44 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| Total Fixed-wing | 0 | 0 | 0 | 105 | 0 | 0 | 0 | 730 | 0 | 918 |
| Rotary-Wing Aircraft | | | | | | | | | | |
| AH-1 ² | 100 | 80 | 100 | 816 | 100 | 110 | 100 | 1108 | 0 | 0 |
| CH-46 | 0 | 79 | 0 | 1014 | 0 | 162 | 0 | 1588 | 0 | 0 |
| CH-47 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| CH-53 ² | 33 | 338 | 33 | 1209 | 33 | 560 | 33 | 2004 | 0 | 0 |
| H-64 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| OH-58 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| UH-1 ² | 100 | 58 | 100 | 544 | 100 | 104 | 100 | 768 | 0 | 0 |
| UH-60 | 0 | 0 | 0 | 58 | 0 | 3 | 0 | 94 | 0 | 0 |
| MV-22 ³ | 0 | 192 | 0 | 1338 | 0 | 384 | 0 | 2708 | 0 | 24 |
| Total Rotary-wing | 26 | 747 | 25 | 4979 | 23 | 1323 | 21 | 8270 | 0 | 24 |
| Total Sorties | 26 | 747 | 24 | 5084 | 23 | 1323 | 19 | 9000 | 0 | 942 |

Note: 1. R-5303B/C and R-5304B/C were not scheduled or utilized during Fiscal Year 206 and therefore are not reflected in this table. Fixed wing aircraft are not authorized in R-5303A or R-5304A per MCB Camp Lejeune Environmental Management Division, September 12, 2008. Fixed-wing aircraft recorded in these airspace units were assumed to be anomalous operations (e.g. mosquito spraying, aerial survey, etc.) and were not representative of typical flying operations. Five aircraft operations were deleted from R-5303A and 16 aircraft operations were deleted from R-5304A.

2. AH-1, CH-53, and UH-1 percentage increase in sorties under the proposed action was calculated based on proportional increase in squadrons of each aircraft type as indicated in the Fiscal Year 2009 Marine Aviation Plan (2 additional HMLA squadrons and 1 additional HMM squadron).

3. MV-22 sorties were taken from the *Introduction of the V-22 to the Second Marine Air Wing Environmental Impact Statement*, and Distributed among MCB Camp Lejeune airspace units according to current MV-22 usage distribution (based on Fiscal Year 2006 sortie distribution).

2.2.3.3 Support – Special Use Airspace

Support activities and locations in special use airspace would remain the same for the proposed action as described for the No Action Alternative. However, the level of support activities carried out would increase in direct proportion to the training increases in the proposed action in order to provide the necessary support for the training activities.

2.3 SUMMARY OF TRAINING LEVELS

All data tables that describe training levels for munitions firing and movement have been grouped together in this section. This grouping serves to provide an overall sense of training within the MCB Camp Lejeune Range Complex.

2.3.1 Munitions Firing Levels

Table 2.3-1 presents a summary of munitions firing levels for the No Action Alternative and proposed action. This data includes munitions firing from ground-to-ground, surface-to ground (from water ranges to land-based targets) and air-to-ground (from special use airspace to land-based targets). The 12-month average of munitions usage data from 2004-2005 is included in the table to indicate how this representative dataset was expanded to provide a more accurate level of munitions firing for the No Action Alternative.

Under the proposed action, there would be a 20 percent increase in all small arms ammunition expenditures, with the exception of .50 caliber rounds. The .50 caliber rounds would not increase. Currently, the .50 caliber weapons systems are being heavily used, and as a result, a large amount of rounds are being expended in training (over 1.8 million rounds). It is expected that the .50 caliber weapons systems will continue to be utilized at this rate with little or no increase in the current rate. The remainder of the small arms ammunition would increase due to surges in troop strength and resultant training.

The use of large arms (above .50 caliber) is not expected to increase, with three exceptions. The use of the MK-19 40 mm grenade launcher has shown a steady increase in deployment during the Global War on Terror. It has become heavily utilized in all combat theaters. Therefore, it is expected that the expenditure of 40 mm high explosive and training practice rounds at MCB Camp Lejeune would increase by approximately 10 percent in proportion to current expenditures.

MCB Camp Lejeune is scheduled to receive two new tank companies, one active and one reserve. Therefore, a 39 percent increase in the expenditure of 105 mm and 120 mm tank ammunition is projected. Training requirements and new weapons systems are also expected to occur that would require a 5 percent increase in the expenditure of artillery, mortars, and all other large arms.

The basing of the MV-22 at MCAS New River, which is currently underway, would continue with the arrival of the final two squadrons. As indicated in the *Introduction of the V-22 to the Second Marine Air Wing Environmental Impact Statement*, these squadrons are scheduled to arrive by FY 2009. The types of weapons that will be included on the MV-22 have not yet been decided. However, based on best data currently available, it would appear that a 7.62 mm gun may be mounted either on the belly of the aircraft or in the rear door of the aircraft. It is not known how many rounds would be fired annually, but the number can be expected to be small in comparison to the total number of rounds fired currently into MCB Camp Lejeune weapons training areas.

Table 2.3-1
Annual Munitions Firing Levels on Land Ranges

| Munitions Type | 2004-2005 12-month Average | No Action Alternative | Proposed Increase (percent) | Proposed Action |
|---|-------------------------------|--------------------------|--------------------------------|--------------------|
| Small Arms¹ Rounds | | | | |
| Small Arms excluding .50 caliber | 41,095,069 | 41,095,069 | 20 | 49,314,083 |
| .50 caliber | 1,807,562 | 1,807,562 | 0 | 1,807,562 |
| Total Small Arms Rounds | 42,902,631 | 42,902,631 | 19 | 51,121,645 |
| Large Arms² Rounds | | | | |
| Large Arms –MK19 | 454,910 | 454,910 | 10 | 500,401 |
| Large Arms - Tank Rounds | 7,403 | 7,403 | 39 | 10,290 |
| Artillery, Mortars, and Other Large Arms | 579,312 | 579,312 | 5 | 608,277 |
| Total Large Arms Rounds | 1,041,625 | 1,041,625 | 7 | 1,118,968 |
| Explosives and Pyrotechnics | | | | |
| Explosives ³ | 304,898 | 306,279 | 0 | 306,279 |
| Pyrotechnics ⁴ | 169,572 | 169,517 | 0 | 169,517 |
| Total Explosives and Pyrotechnics | 474,470 | 475,796 | 0 | 475,796 |
| Notes: 1. Refer to Appendix B, Table B-2 Small Munitions . 2. Refer to Appendix B, Table B-3 Large Munitions . 3. Refer to Appendix B, Table B-5 Explosives . 4. Refer to Appendix B, Table B-6 Pyrotechnics . | | | | |

Table 2.3-2 presents a summary of estimates for the annual level of munitions that may land in water ranges for the No Action Alternative and proposed action. This data includes surface-to-surface munitions firing at temporary water-based targets, as well as ground-to-ground munitions firing for those land ranges that have portions of their surface danger zones positioned over water ranges, which means that there is a chance that munitions aimed at ground targets may land in the water. In addition, Stinger missiles are fired into special use airspace over the water. The impact of the Stinger missiles hitting aerial targets over water ranges results in missile debris and target debris falling into the water, particularly Onslow Bay.

Table 2.3-2
Estimates for Annual Level of Munitions that May Land in Water Ranges

| Munitions Type | No Action Alternative | | Proposed Action | |
|---------------------------------|-----------------------|---|-----------------|---|
| | New River | Atlantic Intracoastal Waterway and Onslow Bay | New River | Atlantic Intracoastal Waterway and Onslow Bay |
| 5.56 mm | 93,569 | 6,098 | 112,285 | 7,317 |
| 7.62 mm | 2,508 | 35,600 | 3,010 | 42,720 |
| .22 caliber | 9 | 0 | 11 | 0 |
| .50 caliber | 0 | 13,002 | 0 | 13,002 |
| 155 mm HE | 0 | 1 | 0 | 1 |
| 40 mm inert (MK-19) | 0 | 1,596 | 0 | 1,756 |
| 40 mm inert, excluding MK-19 | 0 | 2,008 | 0 | 2,109 |
| Stinger missile, Inert | 0 | 19 | 0 | 19 |
| Stinger missile, High Explosive | 0 | 40 | 0 | 40 |
| Total | 96,086 | 58,364 | 115,306 | 66,964 |

2.3.2 Movement Levels

Table 2.3-3 presents a summary of estimates for the annual level of personnel movement on land ranges, training and maneuver areas, and landing and drop zones for three geographic sectors: Greater Sandy Run Area, West of the New River, and East of the New River (**Figure 2-4**). As described in Movement – Land Ranges, Training and Maneuver Areas (**Subchapter 2.1.3.1**), information included in this table represents average annual ground maneuver training operations and is characterized by data recorded in the Range Facility Management Support System database from calendar year 2005-2006.

Table 2.3-3
Estimates for Annual Level of Personnel Movement on Land Ranges for the No Action Alternative and the Proposed Action

| Range Asset | Greater Sandy Run Area | East of New River | West of New River |
|---|------------------------|-------------------|-------------------|
| Training and Maneuver Areas | 124,442 | 677,592 | 798,961 |
| Landing Zones and Drop Zones | 12,081 | 76,048 | 18,710 |
| Ranges/Training Courses/Gun Positions/Mortar Positions | 15,180 | 138,058 | 58,848 |
| Total | 151,703 | 891,698 | 876,519 |
| Note: Under the proposed action, movement levels of personnel on land ranges would be similar to the estimate of movement levels for the No Action Alternative. | | | |

Table 2.3-4 presents a summary of estimates for the annual level of vehicle movement on land ranges, training and maneuver areas, and landing and drop zones for three geographic sectors: Greater Sandy Run Area, West of the New River, and East of the New River (**Figure 2-4**). Under the proposed action, tactical vehicle usage at MCB Camp Lejeune is expected to increase by 33 percent due to the basing of three additional infantry battalions, a truck company, and a new artillery battery. The increase would apply to all training operations in land training areas.

Table 2.3-5 presents a summary of the annual average splash point usage including small boat and amphibious vehicle movement on water ranges, as characterized by event. The data in **Table 2.3-5** is based on Range Facility Management Support System data from Calendar Year 2005 and 2006.

Table 2.3-4
Estimates for Annual Level of Vehicle Usage on Land Ranges for the No Action Alternative and Proposed Action

| Type Of Vehicle | Greater Sandy Run Area – No Action Alternative | | | Greater Sandy Run Area – Proposed Action | | | East Of the New River – No Action Alternative | | | East Of the New River – Proposed Action | | | West Of the New River – No Action Alternative | | | West Of the New River – Proposed Action | | |
|---|--|------------------------------|--|--|------------------------------|--|---|------------------------------|--|---|------------------------------|--|---|------------------------------|--|---|------------------------------|--|
| | Training And Maneuver Areas | Landing Zones And Drop Zones | Ranges Training Courses/Gun Positions/Mortar Positions | Training And Maneuver Areas | Landing Zones And Drop Zones | Ranges Training Courses/Gun Positions/Mortar Positions | Training And Maneuver Areas | Landing Zones And Drop Zones | Ranges Training Courses/Gun Positions/Mortar Positions | Training And Maneuver Areas | Landing Zones And Drop Zones | Ranges Training Courses/Gun Positions/Mortar Positions | Training And Maneuver Areas | Landing Zones And Drop Zones | Ranges Training Courses/Gun Positions/Mortar Positions | Training And Maneuver Areas | Landing Zones And Drop Zones | Ranges Training Courses/Gun Positions/Mortar Positions |
| Amphibious Assault Vehicle-7 | 43 | 4 | 325 | 57 | 5 | 432 | 4,829 | 264 | 252 | 6,423 | 351 | 335 | 1,163 | 21 | 321 | 1,547 | 28 | 427 |
| High Mobility Multipurpose Wheeled Vehicle | 1,908 | 184 | 190 | 2,538 | 245 | 253 | 14,945 | 1,723 | 3,709 | 19,877 | 2,292 | 4,933 | 9,213 | 304 | 827 | 12,253 | 404 | 1,100 |
| Light Armored Vehicle-25 | 9 | 1 | 3 | 12 | 1 | 4 | 70 | 7 | 11 | 93 | 9 | 15 | 48 | 1 | 3 | 64 | 1 | 4 |
| Light Armored Vehicle-Logistics | 1 | 0 | 0 | 1 | 0 | 0 | 5 | 1 | 1 | 7 | 1 | 1 | 4 | - | - | 5 | - | - |
| Logistics Vehicle Systems | 93 | 10 | 10 | 124 | 13 | 13 | 622 | 163 | 69 | 827 | 217 | 92 | 165 | 15 | 23 | 219 | 20 | 31 |
| 7-ton Truck | 499 | 45 | 62 | 664 | 60 | 82 | 6,834 | 723 | 3,715 | 9,089 | 962 | 4,941 | 1,988 | 138 | 155 | 2,644 | 184 | 206 |
| Dump Truck | 13 | 0 | 0 | 17 | 0 | 0 | 276 | 10 | 79 | 367 | 13 | 105 | 74 | 5 | 12 | 98 | 7 | 16 |
| Bulldozer | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 26 | 0 | 0 | 35 | - | - | - | - | - | - |
| 155 mm Howitzer | 63 | 3 | 15 | 84 | 4 | 20 | 1,860 | 51 | 2,052 | 2,474 | 68 | 2,729 | 180 | 18 | 48 | 239 | 24 | 64 |
| M1A1 Main Battle Tank | 48 | 2 | 16 | 64 | 3 | 21 | 2,038 | 701 | 269 | 2,711 | 932 | 358 | 480 | 59 | 80 | 638 | 78 | 106 |
| Tank Retriever | 2 | 0 | 1 | 3 | 0 | 1 | 135 | 49 | 18 | 180 | 65 | 24 | 27 | 4 | 6 | 36 | 5 | 8 |
| Expeditionary Fighting Vehicle | 5 | 0 | 0 | 7 | 0 | 0 | 37 | 4 | 6 | 49 | 5 | 8 | 26 | 1 | 1 | 35 | 1 | 1 |
| Note: Tactical vehicle usage is expected to increase by 33 percent due to basing of three additional infantry battalions, a truck company, and a new artillery battery. As a conservative estimate, a 33 percent increase was applied to all tactical vehicles used on land ranges. | | | | | | | | | | | | | | | | | | |

Table 2.3-5
Average Annual Splash Point Usage for the No Action Alternative and Proposed Action

| Splash Point | Total Estimated Average Annual Usage |
|--|--------------------------------------|
| SP 1 | 3 |
| SP 3 | 34 |
| SP 4 | 7 |
| SP 5 | 8 |
| SP 6 | 6 |
| SP 7 | 4 |
| SP 9 | 85 |
| SP 10 | 11 |
| SP 11 | 86 |
| SP 12 | 83 |
| SP 13 | 39 |
| SP 18 | 38 |
| SP 19 | 38 |
| SP 20 | 37 |
| SP 22 | 529 |
| SP 23 | 10 |
| SP 26 | 4 |
| SP 27 | 4 |
| SP 29 | 5 |
| SP 30 | 538 |
| SP 32 | 2 |
| SP 36 | 10 |
| SP 38 | 5 |
| SP 42 | 1 |
| SP 43 | 1 |
| SP 44 | 41 |
| SP 48 | 34 |
| Note: The level of small boat and amphibious vehicle movement on water ranges is not expected to increase under the proposed action. | |

The No Action Alternative includes baseline numbers from Fiscal Year 2006. R-5303B/C and R-5304B/C were not scheduled or utilized during Fiscal Year 2006 and are not reflected in the No Action Alternative. Under the No Action Alternative, the total numbers of expected MV-22 sorties, as described in the *Introduction of the V-22 to the Second Marine Air Wing Environmental Impact Statement*, were distributed among airspace units scheduled by MCB Camp Lejeune according to current distribution patterns. The completion of the MV-22 basing would result in a total of six operational MV-22 squadrons at MCAS New River. Under the proposed action, F-14 hours were reassigned as F/A-18 hours since the F-14 has been retired and, therefore, is not a valid component of the No Action Alternative. Eight hours were recorded in R-5306D for the F-14. The percentage by which AH-1, UH-1, and CH-53 Fiscal Year 2006 hours of airspace utilization were increased was the ratio between the number of primary assigned aircraft that would be on station at end-state to the numbers of primary assigned aircraft on station currently.

Table 2.3-6 presents the annual level of aircraft movement in special use airspace, as characterized by sorties for specific airspace segments, and the increase in sorties flown under the proposed action as they relate to specific aircraft type.

Table 2.3-6
Annual Sorties under the No Action Alternative and Proposed Action

| Aircraft Type | R-5303A | | | R-5306E | | | R-5304A | | | R-5306D | | | Hatteras F MOA | | |
|----------------------|-----------------------|------------------|-----------------|-----------------------|------------------|-----------------|-----------------------|------------------|-----------------|-----------------------|------------------|-----------------|-----------------------|------------------|-----------------|
| | No Action Alternative | Percent Increase | Proposed Action | No Action Alternative | Percent Increase | Proposed Action | No Action Alternative | Percent Increase | Proposed Action | No Action Alternative | Percent Increase | Proposed Action | No Action Alternative | Percent Increase | Proposed Action |
| Fixed-Wing Aircraft | | | | | | | | | | | | | | | |
| A-10 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 2 | 0 | 2 | 16 | 0 | 16 |
| AV-8 | 0 | 0 | 0 | 38 | 0 | 38 | 0 | 0 | 0 | 224 | 0 | 224 | 214 | 0 | 214 |
| C-12 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 5 | 0 | 5 | 0 | 0 | 0 |
| C-130 ¹ | 0 | 0 | 0 | 1 | 0 | 1 | 0 | 0 | 0 | 7 | 0 | 7 | 0 | 0 | 0 |
| C-17 ¹ | 0 | 0 | 0 | 1 | 0 | 1 | 0 | 0 | 0 | 14 | 0 | 14 | 0 | 0 | 0 |
| CESSNA ¹ | 0 | 0 | 0 | 6 | 0 | 6 | 0 | 0 | 0 | 106 | 0 | 106 | 0 | 0 | 0 |
| EA-6B | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 2 | 0 | 2 | 4 | 0 | 4 |
| F-15 | 0 | 0 | 0 | 4 | 0 | 4 | 0 | 0 | 0 | 17 | 0 | 17 | 24 | 0 | 24 |
| F-16 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 4 | 0 | 4 | 1 | 0 | 1 |
| F-18 | 0 | 0 | 0 | 55 | 0 | 55 | 0 | 0 | 0 | 349 | 0 | 349 | 649 | 0 | 649 |
| F-22 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 6 | 0 | 6 |
| P-3 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 4 | 0 | 4 |
| R-44 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| Total Fixed-wing | 0 | 0 | 0 | 105 | 0 | 105 | 0 | 0 | 0 | 730 | 0 | 730 | 918 | 0 | 918 |
| Rotary-Wing Aircraft | | | | | | | | | | | | | | | |
| AH-1 ² | 40 | 100 | 80 | 408 | 100 | 816 | 55 | 100 | 110 | 554 | 100 | 1108 | 0 | 0 | 0 |
| CH-46 | 79 | 0 | 79 | 1014 | 0 | 1014 | 162 | 0 | 162 | 1588 | 0 | 1588 | 0 | 0 | 0 |
| CH-47 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| CH-53 ² | 254 | 33 | 338 | 909 | 33 | 1209 | 421 | 33 | 560 | 1507 | 33 | 2004 | 0 | 0 | 0 |
| H-64 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| OH-58 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| UH-1 ² | 29 | 100 | 58 | 272 | 100 | 544 | 52 | 100 | 104 | 384 | 100 | 768 | 0 | 0 | 0 |
| UH-60 | 0 | 0 | 0 | 58 | 0 | 58 | 3 | 0 | 3 | 94 | 0 | 94 | 0 | 0 | 0 |
| MV-22 ³ | 192 | 0 | 192 | 1338 | 0 | 1338 | 384 | 0 | 384 | 2708 | 0 | 2708 | 24 | 0 | 24 |
| Total Rotary-wing | 594 | 26 | 747 | 3999 | 25 | 4979 | 1077 | 23 | 1323 | 6835 | 21 | 8270 | 24 | 0 | 24 |
| Total Sorties | 594 | 26 | 747 | 4104 | 24 | 5084 | 1077 | 23 | 1323 | 7565 | 19 | 9000 | 942 | 0 | 942 |

Note: 1. R-5303B/C and R-5304B/C were not scheduled or utilized during Fiscal Year 2006 and therefore are not reflected in this table. Fixed wing aircraft are not authorized in R-5303A or R-5304A per MCB Camp Lejeune Environmental Management Division, September 12, 2008. Fixed-wing aircraft recorded in these airspace units were assumed to be anomalous operations (e.g. mosquito spraying, aerial surveys, etc) and were not representative of typical flying operations. Five aircraft operations were deleted from R-5303A and 16 aircraft operations were deleted from R-5304A.

2. AH-1, CH-53, and UH-1 percentage increase in sorties under the proposed action was calculated based on proportional increase in squadrons of each aircraft type as indicated in the Fiscal Year 2009 Marine Aviation Plan (2 additional HMLA squadrons and 1 additional HMM squadron).

3. MV-22 sorties were taken from the *Introduction of the V-22 to the Second Marine Air Wing Environmental Impact Statement*, and distributed among MCB Camp Lejeune airspace units according to current MV-22 usage distribution (based on Fiscal Year 2006 sortie distribution).

2.4 ALTERNATIVES CONSIDERED BUT DISMISSED

2.4.1 Alternative Range Training Locations

Unique air, land, and water training areas are necessary to fulfill the Marine Corps' training requirements. Infantry ground maneuvers require training areas, and annual marksmanship qualification requires live-fire ranges. Amphibious training requires a military beach that opens directly to maneuver areas and live-fire ranges. Small boat riverine operations need a stretch of inland water adjacent to land targets suitable for live fire. Aircraft forward firing operations, bombing, close air support (live or simulated), and/or combined air-to-ground exercises require special use airspace that separates military aircraft and munitions from civil aircraft. No single range complex on the East Coast has all the geographic attributes required to support the entire spectrum of Marine Corps and Navy training.

To maintain a high level of combat readiness for Marine Corps and Naval Forces at the best value to the US taxpayer, the Marine Corps and Navy concentrated their forces in areas that could support the training needs of these forces. Instead of concentrating capabilities in a single area, a system of range complexes was developed to support the limited set of warfare areas that predominate in that locale. Taken as a whole, this system of ranges provides robust training and testing capability for all types of combat. In support of these range complexes, important agreements have been developed, safety procedures have been established, and Standard Operating Procedures have been written.

The mid-coastal region of North Carolina has been a Marine Corps Forces concentration area since World War II, and today has the largest assemblage of equipment and personnel on the East Coast. The local infrastructure has been built up over the years, providing a wide variety of very different ranges that meet the wide variety of Marine Corps mission areas. For example, aircraft strike training requires an array of air-to-ground bombing ranges overlaid with special use airspace to separate military aircraft and ordnance from civil aircraft. Small boat riverine operations need a stretch of inland water adjacent to land targets suitable for live fire. Amphibious training requires a military beach that opens directly to maneuver areas and live fire ranges. The range complexes in the Mid-Atlantic region support a high volume of wide-ranging training operations relatively easily, an advantage that disappears if most training is done remotely.

As a consequence of the historical and natural features that made this region a Marine Corps concentration area, the Department of the Navy has invested much money and effort in building the range infrastructure that supports training activities of homeported units. For example, all Marine Corps aircraft based at MCAS New River and MCAS Cherry Point can easily and quickly access the air-to-ground bombing ranges that accommodate live and inert ordnance delivery. Air-to-ground, armor, artillery, mortar and small arms fire are authorized at the MCB Camp Lejeune G-10 and K-2 Impact Areas. The G-10 Impact Area is also the only land range on the East Coast authorized for naval surface fire support. Onslow Beach at MCB Camp Lejeune, adjoining Navy Cherry Point Range Complex, is the only Department of the Navy military beach on the Atlantic Coast capable of supporting amphibious warfare training with the full

Expeditionary Strike Group and its embarked Marine Expeditionary Unit. The shallow-water offshore bathymetry, and beach that opens directly into maneuver areas and live fire ranges, mimic the operating environment that the Marine Corps and Navy expeditionary forces may experience in overseas theaters. No suitable substitute for Onslow Beach exists on the East Coast.

The MCB Camp Lejeune Range Complex is a vital component of the Atlantic Fleet system of range complexes. Alternative sites (e.g., Townsend Bombing Range, Georgia, which is owned by MCAS Beaufort, South Carolina) do not provide reasonable alternatives for required training purposes/activities described above because no other range complex on the East Coast has the land areas, airspace, sea space, undersea space, impact areas, training and maneuver areas, drop zones, landing zones, targets, and instrumented facilities in one geographic area. Moreover, the Marine Corps controls the scheduling for all operations conducted within the MCB Camp Lejeune Range Complex and the MCAS Cherry Point Range Complex. The Marine Corps does not control any other ranges on the East Coast, so they cannot schedule their units with user priority at any other range complex. Consequently, alternative training locations were eliminated from further consideration.

2.4.2 Computer Simulated Training

An alternative that would rely entirely on computer simulated training at MCB Camp Lejeune would not achieve the necessary levels of proficiency in communicating, maneuvering, operating, repairing equipment, and firing weapons in a high stress and realistic environment. Computer technologies provide excellent tools for implementing a successful, integrated training program while reducing the risk and expense typically associated with military training. As a result, computer simulation is already utilized extensively to enhance combat performance in the Marine Corps' training program. However, while it is an essential component of training, computer simulation cannot be used exclusively for training. Consequently, this alternative fails to meet the purpose and need for the proposed action and this alternative was not carried forward for analysis.

2.5 EVALUATION OF ALTERNATIVES

Table 2.5-1 summarizes the impacts of the two alternatives considered, the No Action Alternative and the proposed action. The No Action Alternative would provide the Marine Corps with the capability to maintain a state of military readiness commensurate with its national defense mission, but would not support emerging training requirements. The proposed action is to support and conduct current and emerging training operations and a new training mission at the MCB Camp Lejeune Range Complex. The proposed action would provide a training environment within the MCB Camp Lejeune Range Complex with the capacity and capability to fully support required training tasks for operational units, military schools, and other users. Thus, the proposed action is the preferred alternative.

Table 2.5-1
Evaluation of Alternatives

| Range | Impact | No Action Alternative | Proposed Action |
|-------------|--|---|--|
| Land Ranges | Land Use | Land use would remain the same: operational and training facilities. | Land use would remain the same: operational and training facilities. |
| | Environmental Justice | No disproportionately adverse impacts to minorities, low-income populations, or children. | Proposed action would not cause disproportionately adverse environmental, economic, or health impacts specific to any groups or individuals at MCB Camp Lejeune or nearby communities, including minorities, low-income populations, or children. |
| | Air Quality | Levels of air emissions currently generated and existing air quality would remain the same; the region is expected to remain in attainment for all criteria pollutants. | Slight increase in air emissions due to the increase in munitions usage; the region is expected to remain in attainment for all criteria pollutants. |
| | Noise | Existing noise conditions on Base would remain unchanged. | Under the proposed action, the size of weapons would not increase; therefore, the vibration conditions around the Base are anticipated to remain unchanged from the No Action Alternative. |
| | Cultural Resources | No historic architectural resources would be impacted under the No Action Alternative; no archaeological resources would be further impacted. | No historic architectural resources would be impacted under the proposed action; a minor (low) impact to onshore cultural resources is anticipated. MCB Camp Lejeune would consult with the North Carolina State Historic Preservation Office in accordance with 36 CFR § 800 to avoid, minimize, or mitigate any adverse effects resulting from the proposed action. |
| | Natural Resources | Under the No Action Alternative, existing conditions in natural resources would not change. | No adverse impacts to soils; sediment and erosion control techniques at training sites will be employed. The impacts of munitions constituents entering waters under the proposed action are considered to be minimal; increases would not adversely affect surface water or groundwater. No adverse impacts to wetlands and floodplains are expected because of wetland protection measures that would be implemented. Minor impacts to terrestrial wildlife and vegetation could occur under the proposed action. However, Standard Operating Procedures are in place to reduce and continue to mitigate adverse impacts. All listed species that are known to occur on the Base have special conservation plans in place. Under the proposed action increases in training activities "may affect, but would not likely adversely affect" all of these federally-listed species: seabeach amaranth, rough-leaved loosestrife, red-cockaded woodpecker, piping plover, American alligator, and nesting sea turtles (green and loggerhead). Increase in aircraft movement could put migrating birds at greater risk of bird strikes; however, it is unlikely given the Standard Operating Procedures in place to avoid these instances. |
| | Hazardous Materials and Hazardous Waste Management | Under the No Action Alternative, existing conditions in hazardous materials and waste management would not change. | The impacts of the munitions constituents entering the natural environment under the proposed training levels are considered to be minimal. All concentrations are expected to be below Draft Department of Defense Range and Munitions Use Subcommittee Screening Values as well. |

| Range | Impact | No Action Alternative | Proposed Action |
|--------------|--|---|--|
| | Public Health and Safety | Current Standard Operating Procedures and advanced communications systems make certain that all training is carried out in a way that minimizes impacts to the public. There would be no impacts to the public. | Increases in training under the proposed action will have negligible impacts to public health and safety; Bird/Animal Aircraft Strike Hazard is not expected to increase. |
| Water Ranges | Coastal Zone Management | The No Action Alternative was reviewed to determine its consistency with the applicable requirements of the North Carolina Coastal Area Management Act. The No Action Alternative is consistent to the greatest extent practicable with these policies. | Implementing the proposed action would be fully consistent to the greatest extent possible with the applicable policies of the North Carolina Coastal Management Program. |
| | Socioeconomics | Under the No Action Alternative, existing conditions in commercial and recreational fishing would not change. | The effect of additional temporary disruptions in fishing activities would be minor. However, the added inconvenience may be experienced more severely by local, frequent users of these waters. |
| | Cultural Resources | Under the No Action Alternative, existing conditions in natural resources would not change. | Under the proposed action, no impacts to underwater resources are anticipated. |
| | Natural Resources | Under the No Action Alternative, existing conditions in natural resources would not change. | The proposed action would not adversely affect Essential Fish Habitat and would result in minor impacts to marine mammals. For threatened and endangered species, there are no foreseeable effects on the shortnose sturgeon, or the Hawksbill sea turtle. Under the proposed action, an increase in training activities "may affect, but is not likely to adversely affect" the following: West Indian manatee, North Atlantic right whale, loggerhead sea turtle, green sea turtle, Kemp's ridley sea turtle, or leatherback sea turtle. |
| | Hazardous Materials and Hazardous Waste Management | Under the No Action Alternative, existing conditions in hazardous materials and waste management would not change. | The impacts of the munitions constituents entering the natural environment under the proposed training levels are considered to be minimal. All concentrations are expected to be below Draft Department of Defense Range and Munitions Use Subcommittee Screening Values. |
| | Public Health and Safety | Implementation of the No Action Alternative would maintain the status quo, and the existing conditions of laser and munitions use on the ranges at MCB Camp Lejeune would remain the same. No further precautions for public safety would have to be addressed under the No Action Alternative. | Laser and munitions use at the MCB Camp Lejeune ranges would increase proportionally with the increase in training exercises. MCB Camp Lejeune already complies with regulations on laser use and laser safety measures. Under the proposed action, there is no adverse impact on the public's safety and private property. |

| Range | Impact | No Action Alternative | Proposed Action |
|----------------------|--|---|--|
| Special Use Airspace | Civil (Non-Military) Aircraft Operations | Under the No Action Alternative, activities in special use airspace would remain the same as they are today. Commercial and general aviation would continue to successfully conduct operations to and from the public and private use airports, along airway route structures, and along the coastal areas. | Under the proposed action, an increase in helicopter sorties would occur. However, there would only be negligible impacts to commercial and general aviation because the proposed action does not require any changes to the current restrictions, dimensions (shape or altitude), or hours of use of the existing special use airspace for MCB Camp Lejeune Range Complex. Commercial and general aviation would continue to successfully conduct operations to and from the public and private use airports, along airway route structures, and along the coastal areas. |
| | Noise | Existing noise conditions on Base would remain unchanged. | Under the proposed action, the size of weapons would not increase; therefore, the vibration conditions around the Base are anticipated to remain unchanged from the No Action Alternative. The potential aircraft noise impacts resulting from the proposed action would be negligible. |
| | Hazardous Materials and Hazardous Waste Management | Under the No Action Alternative, existing conditions in hazardous materials and waste management would not change. | The impacts of the munitions constituents entering the natural environment under the proposed training levels are considered to be minimal. All concentrations are expected to be below Department of Defense Range and Munitions Use Subcommittee screening values as well. |
| | Public Health and Safety | Implementation of the No Action Alternative would maintain the status quo, and the existing conditions of laser and munitions use on the ranges at MCB Camp Lejeune would remain the same. No further precautions for public safety would have to be addressed under the No Action Alternative. | Laser and munitions use at the MCB Camp Lejeune ranges would increase proportionally with the increase in training exercises. MCB Camp Lejeune already complies with regulations on laser use and laser safety measures. Under the proposed action, there is no adverse impact on the public's safety and private property. |

3.0 AFFECTED ENVIRONMENT

This chapter provides a description of the environment that would be affected by the proposed action, as required by the Council on Environmental Quality regulations for implementing the National Environmental Policy Act (40 CFR § 1500-1508). The description focuses on those features of the environment that would potentially be affected by the proposed increase in training and operations at MCB Camp Lejeune, North Carolina. The discussion in Chapter 3 is divided into three major sections by the type of range or training area: land ranges, water ranges, and special use airspace. Each of these three sections includes subsections on the resource areas relevant to that type of range. Some resources (noise, cultural resources, water resources, hazardous materials and waste management, and public health and safety) are discussed in more than one section. Coastal Zone Management applies to both land and water ranges, but this discussion was grouped together and included under the Water Ranges section to eliminate redundancy.

3.1 LAND RANGES

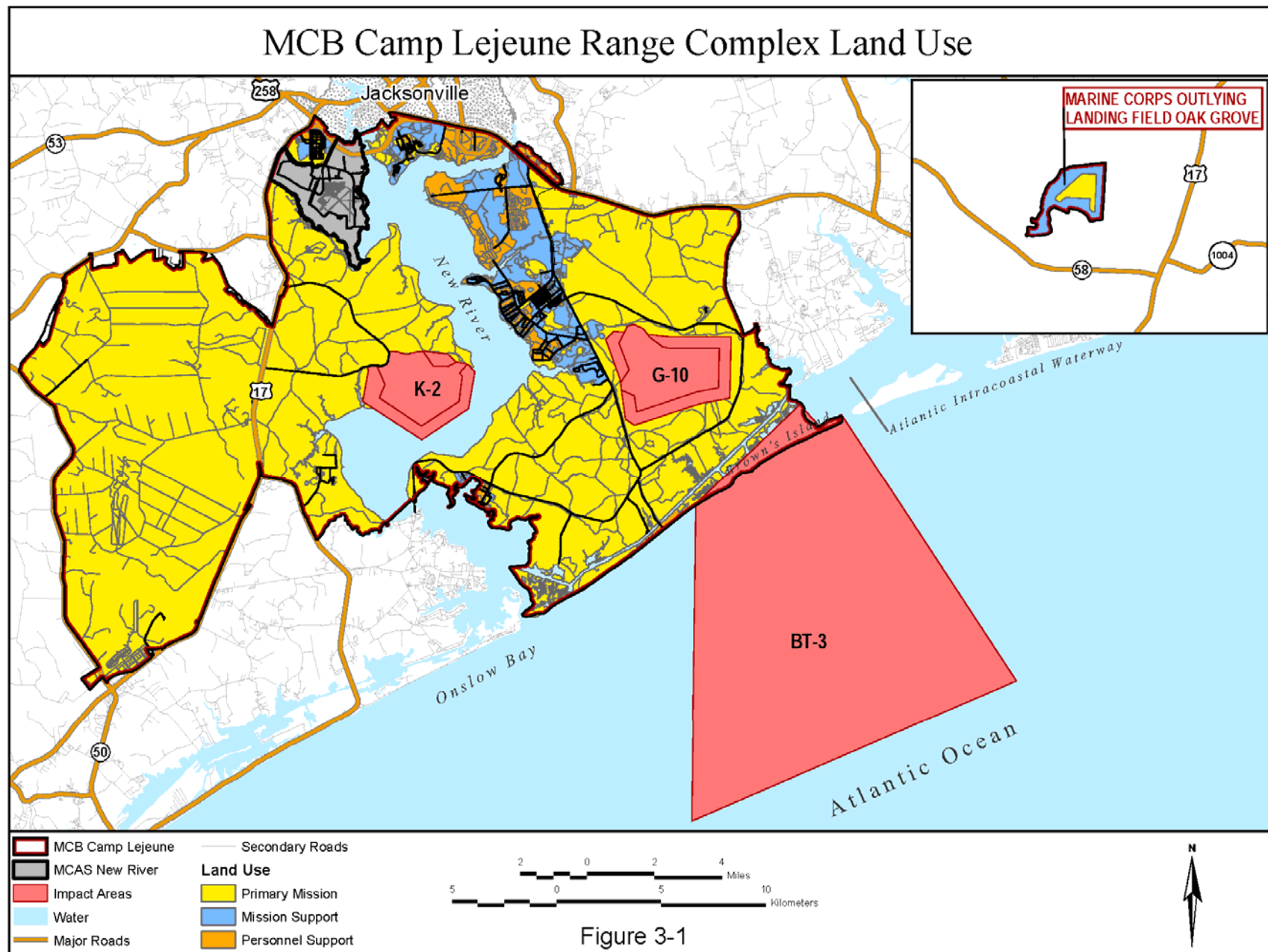
3.1.1 Land Use – Land Ranges

Land use often refers to human modification of land for residential or economic purposes. The attributes of land use include general land use and ownership, special use land areas, and land management plans. Land uses are frequently regulated by management plans, policies, ordinances, and regulations that determine the types of uses that are allowable or to protect specially designated or environmentally sensitive uses.

The land use study area is comprised of Onslow County and Jones County, the primary region of influence.

3.1.1.1 MCB Camp Lejeune Range Complex

MCB Camp Lejeune comprises the Base and Marine Corps Outlying Landing Fields Oak Grove and Camp Davis and MCAS New River. Land use at MCB Camp Lejeune is shown in **Figure 3-1** and organized by Primary Mission, Mission Support and Personnel Support. MCB Camp Lejeune uses 87.7 percent or 44,245 ha (109,331 ac) of its land toward operations and training, labeled “Primary Mission”. This is consistent with the Base’s mission to train and maintain combat ready units for expeditionary deployment. Also included in Primary Mission are research, development and testing facilities. Land use for Mission Support is land for support facilities and administration and is approximately 7.7 percent or 3,880 ha (9,587 ac), concentrated mainly around developed areas on the northern portion of the Base along the New River. The remaining 4.5 percent or 2,283 ha (5,642 ac) is “Personnel Support,” which includes hospitals and housing and community facilities.



3.1.1.2 Regional Land Use

Onslow County

Onslow County encompasses 1,986 square kilometers (sq km) (767 square miles [sq mi]), 42 percent of which belongs to three government-owned facilities: MCB Camp Lejeune, Hofmann Forest, and Hammock Beach State Park. The remaining 58 percent or 1,160 sq km (448 sq mi) of the total area is under Onslow County's regulatory jurisdiction. Government-owned facilities are not considered as regional land use as these areas are outside of Onslow County jurisdiction. Onslow is primarily rural as only a small portion of the county is developed. Land uses in the undeveloped portions of the county include forested lands, much of which are designated as wetlands and agricultural lands (Onslow County Planning Department, March 2000). Of the developed area in Onslow County, the primary land use is residential and the remaining minority is a mix of commercial and industrial.

Jones County

Jones County has no formal zoning and no designated land uses (Perez, March 2008).

3.1.2 Environmental Justice – Land Ranges

An assessment of environmental justice is included in this EA to determine if the proposed action would disproportionately affect low-income populations and/or minorities in the vicinity of MCB Camp Lejeune.

Executive Order 12898, "Federal Actions to Address Environmental Justice in Minority Populations and Low-Income Populations," states that each federal agency shall make achieving environmental justice part of its mission by identifying and addressing, as appropriate, disproportionately high and adverse human health or environmental effects of its programs, policies, and activities on minority populations and low-income populations.

Executive Order 13045, "Protection of Children from Environmental Health Risks and Safety Risks," requires each federal agency to identify and assess environmental health and safety risks to children. "Environmental health and safety risks" are defined as "risks to health or to safety that are attributable to products or substances that the child is likely to come in contact with or ingest."

Demographic data for the areas with the potential to be affected by the proposed action are presented in **Table 3.1-1**. Data for City of Jacksonville and North Carolina are also included in **Table 3.1-1** for comparison.

Minority populations are defined by the US Census Bureau as Black or African American, American Indian and Alaska Native, Asian, and Native Hawaiian and other Pacific Islander. Hispanic origin may be of any race and is included in the appropriate race category. Low-income populations include individuals with income below their appropriate thresholds (based on family size and composition) (US Census Bureau, April 2008).

As shown in **Table 3.1-1**, the percentage of minority populations in Onslow County is lower than the City of Jacksonville and North Carolina. The two census tracts surrounding Marine Corps Outlying Landing Field Oak Grove (Jones County) have the highest percentage minority populations as compared to Onslow County, the City of Jacksonville, and North Carolina. These two census tracts and Onslow County have higher percentages of low-income populations compared to Jacksonville and North Carolina. The percentage Hispanic population is higher in Jacksonville and North Carolina than in Onslow County and in the census tracts surrounding Marine Corps Outlying Landing Field Oak Grove. The percentage of population younger than 18 years is higher in Onslow County, the areas surrounding Marine Corps Outlying Landing Field Oak Grove, and Jacksonville than North Carolina.

In order to protect the public, access to the MCB Camp Lejeune Range Complex is restricted to military personnel and others as authorized by military authority. In addition, the US Army Corps of Engineers has designated a danger zone (water) also known as prohibited area, surrounding the BT-3 Impact Area, which extends 11,000 m (36,089 ft) into Onslow Bay and the Atlantic Ocean, to protect the public from exposure to unexploded ordnance within the boundaries of this impact area.

Table 3.1-1
Environmental Justice Populations (2006 estimates)

| Range Area | County | Total Pop. | Minority Pop. | Percent Minority | Hispanic | Percent Hispanic | Low-Income Pop. | Percent Low-Income | Under 18 Pop. | Percent Under 18 |
|---|---------------------------|---------------|---------------|------------------|----------|------------------|-----------------|--------------------|---------------|------------------|
| MCB Camp Lejeune | Onslow County | 150,673 | 36,011 | 23.9 | 8,739 | 5.8 | 26,518 | 17.6 | 42,942 | 28.5 |
| Marine Corps Outlying Landing Field Oak Grove | Jones County ¹ | 2,855 | 1,288 | 45.1 | 81 | 2.8 | 520 | 18.2 | 793 | 27.8 |
| Marine Corps Outlying Landing Field Oak Grove | Jones County ² | 4,089 | 1,885 | 46.1 | 82 | 2.0 | 752 | 18.4 | 1,058 | 25.9 |
| City of Jacksonville | | 67,280 | 31,508 | 36.1 | 4,710 | 7.0 | 11,303 | 16.8 | 17,964 | 26.7 |
| North Carolina | | 8.857 million | 2.303 million | 26.0 | 593,386 | 6.7 | 1.320 million | 14.9 | 2.2 million | 29.3 |

Source: US Census Bureau, April 2008

Notes: 1. Census Tract 980.2 2000 data;

2. Census Tract 980.1 2000 data.

3.1.3 Air Quality – Land Ranges

Air quality is of concern relative to the proposed action because its implementation has the potential to increase air emissions.

3.1.3.1 National Ambient Air Quality Standards and Attainment Status

Seven pollutants (also known as "criteria pollutants") are commonly found in air, particularly in developed countries such as the US. They are:

- particulate matter 10 microns in size, or PM₁₀
- particulate matter 2.5 microns in size, or PM_{2.5}

- ground-level ozone
- carbon monoxide
- sulfur oxides
- nitrogen oxides
- lead

These pollutants can harm human health and the environment, and cause property damage. PM₁₀, PM_{2.5} and ground-level ozone are the most widespread health threats. Particle pollution, which includes both PM₁₀ and PM_{2.5}, consists of very fine dust, soot, smoke, and droplets that are formed from chemical reactions. It is also produced when fuels such as coal, wood, or oil are burned. For example, sulfur dioxide and nitrogen oxide gases from motor vehicles, electric power generation, and industrial facilities may react with sunlight and water vapor to form particulates. Particulates may also come from bare soil, unpaved roads, crushing and grinding operations, and may be blown into the air by the wind.

Ground-level ozone is a primary component of smog. Ground-level ozone can cause human health problems and damage forests and agricultural crops. The two types of chemicals that are the main ingredients in forming ground-level ozone are called volatile organic compounds and nitrogen oxides. Volatile organic compounds are released by cars burning gasoline, petroleum refineries, chemical manufacturing plants, and other industrial facilities. The solvents used in paints and other consumer and business products contain volatile organic compounds. Nitrogen oxides are produced when cars and other sources like power plants and industrial boilers burn fuels such as gasoline, coal, or oil. The reddish-brown color sometimes seen when it is smoggy comes from the nitrogen oxides.

The US Environmental Protection Agency calls these pollutants "criteria" air pollutants because it regulates them by developing human health-based and/or environmentally-based criteria (science-based guidelines) for setting permissible levels. These guidelines are collectively called the National Ambient Air Quality Standards. The National Ambient Air Quality Standards include primary and secondary standards. The primary standards are limits set based on human health. The secondary standards are another set of limits intended to prevent environmental and property damage. A geographic area with air quality that is cleaner than the primary standard is called an "attainment" area; areas that do not meet the primary standard are called "nonattainment" areas. The primary and secondary standards are listed in **Table 3.1-2**. On March 12, 2008 US Environmental Protection Agency promulgated a revision to the 8-hour ozone standard for ground-level ozone, reducing it from 0.08 parts per million to 0.075 parts per million. It became effective on May 27, 2008. The North Carolina Department of Environment and Natural Resources has an additional standard for total suspended particulates, which is also included in **Table 3.1-2**.

Table 3.1-2
National Ambient and North Carolina Air Quality Standards

| Pollutant ^a | Averaging Time | National Ambient Air Quality Standards | |
|-------------------------------------|---------------------------|--|-----------------|
| | | Primary | Secondary |
| Ozone (O ₃) | 8 Hours | 0.075 ppm ^b | Same as Primary |
| Carbon Monoxide (CO) | 8 Hours | 9.0 ppm | None |
| | 1 Hour | 35 ppm | |
| Nitrogen Dioxide (NO ₂) | Annual Arithmetic Mean | 0.053 ppm | Same as Primary |
| Sulfur Dioxide (SO ₂) | Annual Arithmetic Mean | 0.03 ppm | None |
| | 24 Hours | 0.14 ppm | |
| | 3 Hours | --- | 0.5 ppm |
| PM ₁₀ | 24 Hours | 150 µg/m ³ ^b | Same as Primary |
| PM _{2.5} | Annual | 15 µg/m ³ | Same as Primary |
| | 24 Hours | 35 µg/m ³ | --- |
| Lead (Pb) | Quarterly Arithmetic Mean | 1.5 µg/m ³ | Same as Primary |
| North Carolina TSP Standard | Annual Geometric Mean | 75 µg/m ³ | |
| | 24 Hours | 150 µg/m ³ | -- |

Notes: a: These standards, other than for ozone and those based on annual averages, must not be exceeded more than once per year. The ozone standard is attained when the expected number of days per calendar year with a maximum hourly average concentration above the standard is equal to or less than one.
b: ppm = parts per million by volume, µg/m³ = micrograms per cubic meter.
Source: US Environmental Protection Agency, May 2008.

Air quality is of concern relative to the proposed action because its implementation has the potential to introduce air pollutants to the atmosphere. MCB Camp Lejeune and 13 surrounding counties are located in an attainment area for these criteria pollutants that is identified as the Southern Coastal Plain Intrastate Air Quality Control Region (defined in 40 CFR Part 81.152 and classification can be found in 40 CFR Part 81.334). Under Title V of the Clean Air Act, MCB Camp Lejeune is required to obtain a construction and operation permit from the North Carolina Division of Air Quality for certain stationary emission sources and associated air pollution control equipment. This permit requires MCB Camp Lejeune to perform intensive monitoring, record keeping, and reporting for over one hundred different stationary emission sources, such as boilers, generators, surface coating operations, and engine testing operations. Tactical vehicles are exempt from the Title V reporting requirements. With regard to range activities, the only sources of air emissions that might be included in an air quality permit would come from such stationary sources as generators or boilers of a certain size that are constructed and operated as part of a building.

3.1.3.2 Hazardous Air Pollutants

In addition to the ambient air quality standards for criteria pollutants, national standards exist for hazardous air pollutants. The National Emission Standards for Hazardous Air Pollutants regulates 188 hazardous air pollutants based on available control technologies. Examples of hazardous air pollutants include benzene, which is found in gasoline; perchlorethylene, which is emitted from some dry cleaning facilities; and methylene chloride, which is used as a solvent and paint stripper. Examples of other listed air toxics include dioxin, asbestos, toluene, and metals such as cadmium, mercury, chromium, and lead compounds. The majority of hazardous air pollutants are volatile organic compounds.

3.1.3.3 Toxic Air Pollutants

North Carolina regulates 105 toxic air pollutants under its toxic air pollutant control program. Toxic air pollutants are compounds that carry the potential for adverse health effects at certain ambient levels established by a Scientific Advisory Board created by the North Carolina Department of Environment and Natural Resources. The list of toxic air pollutants differs from the list of 188 hazardous air pollutants regulated under Section 112(b) of the 1990 Clean Air Act Amendments. Eighteen toxic air pollutants are not included on US Environmental Protection Agency's list of hazardous air pollutants, and 129 hazardous air pollutants are not considered as toxic air pollutants in North Carolina.

3.1.4 Noise – Land Ranges

MCB Camp Lejeune generates noise from various activities associated with training operations at land ranges within the MCB Camp Lejeune Range Complex, including:

- Small arms and large-caliber weapons firing, and explosives detonation
- Tactical vehicles movement

Noise from tactical vehicles typically is noticeable only within each land range and would not result in any concerns to off-Base land uses. Therefore, vehicle related noise is not considered further in this EA.

3.1.4.1 Measuring Noise

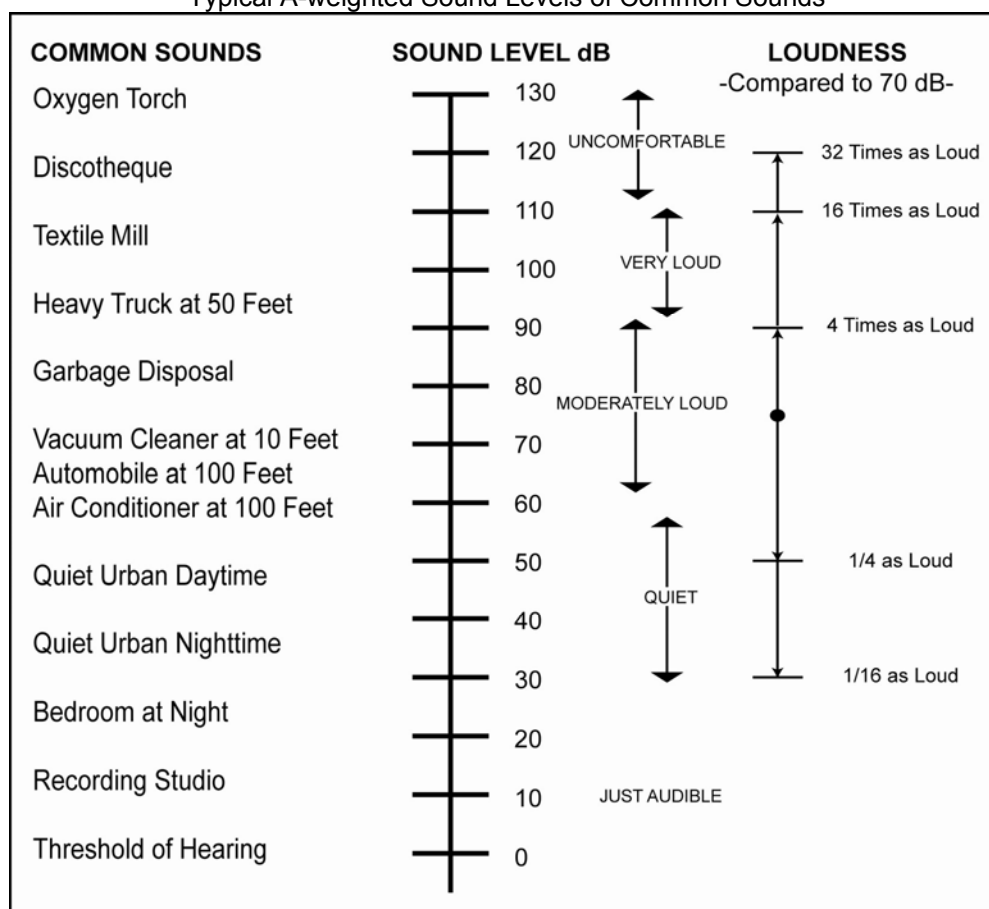
Noise is unwanted sound that reaches a level of annoyance and interferes with normal activities or otherwise diminishes the quality of the environment. There is wide diversity in responses to noise that vary not only according to the type of noise and the characteristics of the sound source, but also according to the sensitivity and expectations of the receptor, the time of day, and the distance between the noise source and the receptor. The noise levels at a receptor location can be either measured using a sound level meter or predicted using a mathematical model based on given source noise strength data.

Normal conversational speech has a sound pressure level of approximately 60 decibels (dB). Sound pressure levels above 120 dB begin to be felt inside the human ear as discomfort and eventually pain at still higher levels. The minimum change in sound pressure level that an average human ear can detect is about 3 dB. A change in sound pressure level of 10 dB is usually perceived by the average person as a doubling (or halving) of the sound's loudness, and this relationship holds true for loud sounds and for quieter sounds (**Table 3.1-3**). Typical sound pressure levels are illustrated in **Graph 3-1**.

Table 3.1-3
Decibel Changes and Loudness

| Change (Decibels) | Relative Loudness |
|---|----------------------------|
| 0 | Reference |
| 3 | Barely perceptible change |
| 5 | Readily perceptible change |
| 10 | Half or twice as loud |
| 20 | 1/4 or four times as loud |
| 30 | 1/8 or eight times as loud |
| Source: Based on Federal Highway Administration, June 1995. | |

Graph 3-1
Typical A-weighted Sound Levels of Common Sounds



Source: Harris, 1979

Noise Metrics

Ambient noise conditions around MCB Camp Lejeune are dominated both by impulsive noise (generated by small arms and large-caliber weapons firing, and the detonation of explosives) and by continuous noise (generated by the operation of civilian and military aircraft and civilian traffic and tactical vehicles). Continuous noise is fundamentally different from impulsive noise. As such, noise threshold criteria differ. For example, permanent damage to unprotected ears due to continuous noise occurs at approximately 85 dB, based on an eight-hour-per-day exposure, while the threshold for permanent damage to unprotected ears due to impulsive noise is approximately 140 dB peak noise based on 100 exposures per day (Pater, September 1976).

Military operations are often the source of sounds (e.g., small arms and large-caliber weapons firing, explosive detonations, aircraft flyovers, transport of heavy vehicles, etc.) that are experienced by the military community and civilians who live and work around military installations. Given the continuous versus impulsive types of noise, the variations in frequency and period of noise exposure, and the fact that the human ear cannot perceive all pitches and frequencies equally well, noise from military operations is measured using different noise metrics that reflect the different noise characteristics. Two common metrics are the following:

- Day-night Sound Level (DNL) – This metric cannot be measured directly; rather, it is calculated as the average sound level in decibels with a 10 dB penalty added to the nighttime levels (2200 to 0700 hours). This penalty accounts for the fact that noises at night sound louder because there are usually fewer noises occurring at night and generally are more noticed. The DNL noise metric may be further defined, as appropriate, by the installation with a specific, designated time period (for example, annual average DNL, average busy month DNL).
- Peak Sound Level – The peak sound level (dBP) can be measured. It is the peak sound level that occurs in any given period. This metric is used to quantify short-duration impulses; e.g., the noise related to large-caliber weapons firing and the detonation of explosives. Typical A-weighted sound levels are illustrated in **Graph 3-1**.

Frequency Weighting

A number of factors affect sound, as the human ear perceives it. These include the actual level of noise, the frequencies involved, the period of exposure to the noise, and changes or fluctuations in noise levels during exposure. In order to correlate the frequency characteristics from typical noise sources to the perception of human ears, several noise frequency weighting measures have been developed. The most common frequency measures include the following:

- A-weighted Scale – Since the human ear cannot perceive all pitches or frequencies equally well, these measures are adjusted or weighted to compensate for the human lack of sensitivity to low-pitched and high-pitched sounds. This adjusted unit is known as the A-weighted decibel, or dBA. The dBA is used to evaluate noise sources related to transportation (e.g., traffic and aircraft) and to small arms (smaller than 20 mm) firing.
- C-weighted Scale – The C-weighted scale measures more of the low-frequency components of noise than does the A-weighted scale. It is used for evaluating impulsive noise and vibrations generated by large-caliber weapons, such as artillery, mortars, and explosive charges. C-weighted noise levels are indicated by dBC.

Noise levels from one scale cannot be added or converted mathematically to levels in another weighting scale.

3.1.4.2 Noise Standards and Guidelines

The DNL metric has been recognized by the Department of Housing and Urban Development, the US Environmental Protection Agency, the Federal Aviation Administration, and the Department of Defense as an appropriate metric for estimating the degree of nuisance or annoyance that increased noise levels would cause, and therefore land use compatibility. Thus, the DNL metric is used here for evaluating effects from both continuous and impulsive noise sources, as follows:

- A-weighted DNL or ADNL for aircraft operations and small arms firing
- C-weighted DNL or CDNL for large-caliber weapon firing and detonation of explosives

Noise models are used to calculate existing and predicted DNLs and to portray the modeled values as contours (i.e., lines on a map that join points of equal noise level). The analyses are conducted in accordance with the following Department of Defense guidance.

US Marine Corps

Although there is no formal Marine Corps order or Navy instruction on ground training noise, Headquarters Marine Corps issued a memorandum (Ground Training Noise Guidance for Marine Corps Installations, US Marine Corps, June 2005) stating that CDNL is the appropriate noise metric to represent the effects of noise from Marine Corps ground training ranges. In addition, Marine Corps installations are required to evaluate their noise and other range impacts on land use and present the findings to the public. This is done through the completion of Range Compatible Use Zone studies.

US Army

Army Regulation 200-1 (Environmental Protection and Enhancement) Chapter 14 (Operational Noise) provides the guidance for evaluation of ground training noise at Marine Corps installations (US Army, December 2007). The Army Operational Noise Manual (USACHPPM, November 2005) establishes noise zones and associated land use compatibility recommendations for ADNL and CDNL noise values. **Table 3.1-4** presents that information. Noise-sensitive land uses typically include residential areas, schools, hospitals, and churches.

Table 3.1-4
Army Land Use Planning Guides

| Noise Zone | Aviation ADNL (dBA) | Impulsive CDNL (dBC) | Land Use Recommendation |
|------------|---------------------|----------------------|--|
| I | < 65 | < 62 | Generally acceptable with any residential or noise-sensitive uses. |
| II | 65 – 75 | 62 – 70 | Normally not recommended with residential or noise-sensitive uses. |
| III | >75 | >70 | Not recommended with any residential or noise-sensitive uses. |

Source: US Army Center for Health Promotion and Preventative Medicine, November 2005.

The Army's impulsive CDNL noise criteria are used in this EA to evaluate the effects of noise from large-caliber weapon firing and detonation of explosives.

US Navy

The Navy has established the Range Air Installations Compatible Use Zones program procedures (OPNAVINST 3550.1, August 7, 1998) to protect public health, safety, and welfare, and to prevent encroachment from degrading the operational capability of air-to-ground ranges. The Range Air Installations Compatible Use Zones program includes range safety and noise analyses, and provides land use recommendations that would be compatible with range safety zones (i.e., areas of varying levels of safety hazard concerns due to potential weapons impact). It also provides noise levels associated with the military range operations. The Navy defines three noise zones based on the ADNL metric and provides general action to be considered with respect to land use compatibility within these noise zones (**Table 3.1-5**).

Table 3.1-5
Navy Land Use Compatible Guidelines

| Noise Zone | ADNL (dBA) | Land Use Compatibility |
|------------|-------------|---|
| I | < 65 | An area of minimal impact where sound attenuation is not needed. |
| II | 65 – 75 | An area of moderate impact where some land use noise controls are needed. |
| III | 75 or above | The most severely impacted area where the greatest degree of land use noise controls is needed. |

Source: OPNAVINST 3550.1, August 7, 1998.

The Navy's noise criteria are used in this EA to evaluate the effects of noise from aircraft operations. The Navy guidance does not specifically address small arms firing. However, as the noise from small arms firing is best evaluated using the ADNL metric, the Navy's noise criteria also are used to evaluate the effects of small arms firing noise.

The Navy guidance also directs the use of the Department of Defense's Blast Noise Prediction (BNOISE) program to establish ordnance blast noise contours. As discussed below, BNOISE is used here to predict the CDNLs for large-caliber weapon firing and explosive detonation noise.

3.1.4.3 Existing Noise Conditions

Ambient background noise levels in the vicinity of MCB Camp Lejeune are typical of a rural environment. The communities around MCB Camp Lejeune are relatively quiet, but aircraft flying overhead, boats on the river, on-Base range training activities, and traffic along main transportation routes add noise intermittently.

Previous MCB Camp Lejeune Noise Studies

In May 2002, the Marine Corps completed a Range Compatible Use Zone study. This study included noise contours developed for small arms and large-caliber weapons firing data from calendar year 2000 for the most frequently used training areas at MCB Camp Lejeune, the Greater Sandy Run Area and the G-10 Impact Area (US Marine Corps, May 2002). The small arms contours were produced using the Small Arms Range Noise Assessment Model (SARNAM Version 2.0) and the large-caliber weapons contours were produced using BNOISE (Version 3.2). The results of this study showed minimal off-Base impact, but gave the Base information that the large-caliber weapons contours should be the emphasis of future noise studies and that additional training areas and activities need to be evaluated.

In May 2005, a noise study for base-wide large-caliber weapons and explosive detonations was completed using calendar year 2002 operational data and the updated BNOISE model (BNOISE2, Version 1.3.2003-07-03). The 2002 ordnance expenditures were increased by 15 percent to produce contours that would be representative of both current and known reasonable future growth in accordance with US Marine Corps guidance (US Army Center for Health Promotion and Preventative Medicine, May 2005).

In June 2007, the US Army Center for Health Promotion and Preventative Medicine updated the existing condition noise contours, using the 2002 range operational data as the basis of the analysis and considered several changes that occurred on the Base since the 2005 study as follows:

- Certain operations such as 40-lb cratering charges were moved from ETA-1 to ETC
- Correction was made on G-10 target positions
- Military Operations in Urban Terrain operations were added
- Special Operations Training Group operations were added
- Shoulder-Launched Multipurpose Assault Weapon Rocket rounds were added at the K305 range

Current Noise Study

As described in Chapter 2, the Base-wide ranges operational activities have changed since 2002. Therefore, further noise analysis was conducted and is described herein to present more representative existing noise conditions around the Base. The existing condition Base-wide noise contours were updated using the annual average rounds fired between 2004 and 2006, based on the data presented in the report entitled *MCB Camp Lejeune Operations Data Collection* (US Marine Corps, October 2008).

Impulsive noise at MCB Camp Lejeune is generated by large-caliber weapon firing and small arms firing within air-to-ground and ground-to-ground ranges and explosive detonations on various Engineering Training Areas and Explosive Ordnance Disposal ranges. These noise generating activities occur approximately 244 days per year. Typically, range operations are not conducted during weekends and holidays when the surrounding community is more sensitive to noise. Although range operations are conducted both during the day and at night, large caliber weapon firing and explosive detonations are restricted during quiet hours as per Range and Training Regulations.

For large-caliber weapon firing and explosive detonations, modeling was used to develop Base-wide noise contours. For small arms firing, on the ranges with potential to have the greatest noise effects on the surrounding communities were modeled. Specific ranges considered include those supporting the firing of the greatest number of rounds and located in closest proximity to the Base boundary. Therefore, based on a review of the small arms firing at each range, the noise from small arms firing at the Stone Bay ranges and the L-5 range was analyzed in the noise modeling. The K-2 ranges also support great amounts of small arms live firing, but are located relatively far from the Base boundary. **Table 3.1-6** provides a comparison of small arms live firing expenditure data around the base. **Appendix C** describes the BNOISE2 and SARNAM modeling methodologies used in this EA.

Large-Caliber Weapons and Explosive Detonations

Bow Shock

A large-amplitude compression wave that occurs in front of an object with supersonic motion.

Large-caliber weapon fire includes both explosive and non-explosive projectile fire. When a large-caliber, live projectile is fired, there is impulsive noise both when the gun is fired and when the projectile hits the target area and explodes, as well as bow shock noise from the projectile. The firing of an inert projectile does not create an explosion when the projectile hits a target area; therefore, only the firing of the gun creates an impulsive noise plus bow shock noise from the projectile. Existing noise conditions were

modeled as discussed below, based on the average annual number of rounds fired over the 2004 to 2006 timeframe.

Given the dominant low frequency component of large-caliber weapon firing and explosive detonation noise, the CDNLs (244-day average) were predicted using the Department of Defense's large-caliber weapon noise model – BNOISE2, Version 1.3.2003-07-03. BNOISE2 is a Department of Defense's developed computer program that calculates and displays blast noise exposure contours resulting from specified operations involving large-caliber weapons and explosive charges. BNOISE2 considers the type of weapon and ammunition, the number of rounds fired and firing time (day or night), range attributes, weather, and which direction the weapon is pointing. The underlying data for the model are based on actual measurements and experimental data.

The model used for this document accounted for weather and the varying behavior of sound intensity propagating over land versus over water. Water surface reflects greater intensity of sound as compared to land surface during sound propagation. **Figure 3-2** displays the estimated CDNL contours for both large-caliber weapon firing and explosive detonation noise from average range operational condition between 2004 and 2006. **Figure 3-3** shows the modeled firing and target locations. Detailed modeling input data are presented in **Appendix C**.

The contours of **Figure 3-2** indicate that:

- CDNLs at or greater than 70 dBC (Noise Zone III) are predicted to occur mostly within the Base. However, portions of the New River are included within these contours. No off-Base land areas are within Noise Zone III. For on-Base land uses, sensitive areas including Onslow Beach and small portion of Courthouse Bay areas are also within Noise Zone III.
- CDNLs at or greater than 62 dBC but less than 70 dBC (Noise Zone II) are predicted to occur mainly within the Base. Exceptions where the 62-dBC contour extends off-Base include:
 - A small portion of southern end that extends into Dixon
 - The southern end that extends into Sneads Ferry
 - A northwestern part that extends into Verona
 - An eastern end that extends into Willis Landing
- CDNL Noise Zone II is predicted to occur at on-Base housing and community facilities within the following areas:
 - Partial areas in Paradise Point
 - Hospital Point, Hadnot Point, French Creek, Courthouse Bay, and Onslow Beach

Small Arms Firing Noise

Small arms fire consists of live fire and the firing of blank shots. When a live shot is fired, impulsive noise occurs at the gun firing position. Bow shock noise from the projectile occurs as well. The firing of blanks only creates negligible noise at the gun position and generates no noise at the target area. Therefore, only live firing is of main concern with respect to noise and was considered in the analysis. Together, the Stone Bay and L-5 ranges supported the firing of approximately 12.8 million annual live firing rounds (roughly 32 percent of the Base-wide live rounds) between 2004 and 2006 (**Table 3.1-6**).

Table 3.1-6
Small Arms Live Fire Comparisons at MCB Camp Lejeune

| Range | Weapon Type | 2004-2006 Annual Average Rounds |
|-----------------------|------------------|------------------------------------|
| Stone Bay Ranges | .22 Caliber | 2,366 |
| | .38 Caliber | 25 |
| | .45 Caliber | 413,609 |
| | 12 Gauge | 13,921 |
| | 5.56 mm | 9,646,682 |
| | 7.62 mm | 282,409 |
| | 9 mm | 473,308 |
| | All Weapon Types | 10,832,320 |
| L-5 Ranges | 12 Gauge | 290 |
| | 5.56 mm | 1,609,268 |
| | 7.62 mm | 318,585 |
| | 9 mm | 19,690 |
| | All Weapon Types | 1,947,833 |
| K-2 Ranges | .22 Caliber | 2,250 |
| | .45 Caliber | 55,287 |
| | 12 Gauge | 43,348 |
| | 5.56 mm | 11,843,334 |
| | 7.62 mm | 4,228,609 |
| | 9 mm | 521,905 |
| | All Weapon Types | 16,694,733 |
| Base-wide Grand Total | All Weapon Types | 40,467,100 |

Figure 3-4 (2004-2006 Average ADNL Contours from Small Arms Training at Stone Bay Ranges and L-5 Ranges) displays the estimated ADNL contours resulting from the Stone Bay and L-5 ranges. Detailed modeling input data and discussion are presented in **Appendix C**.

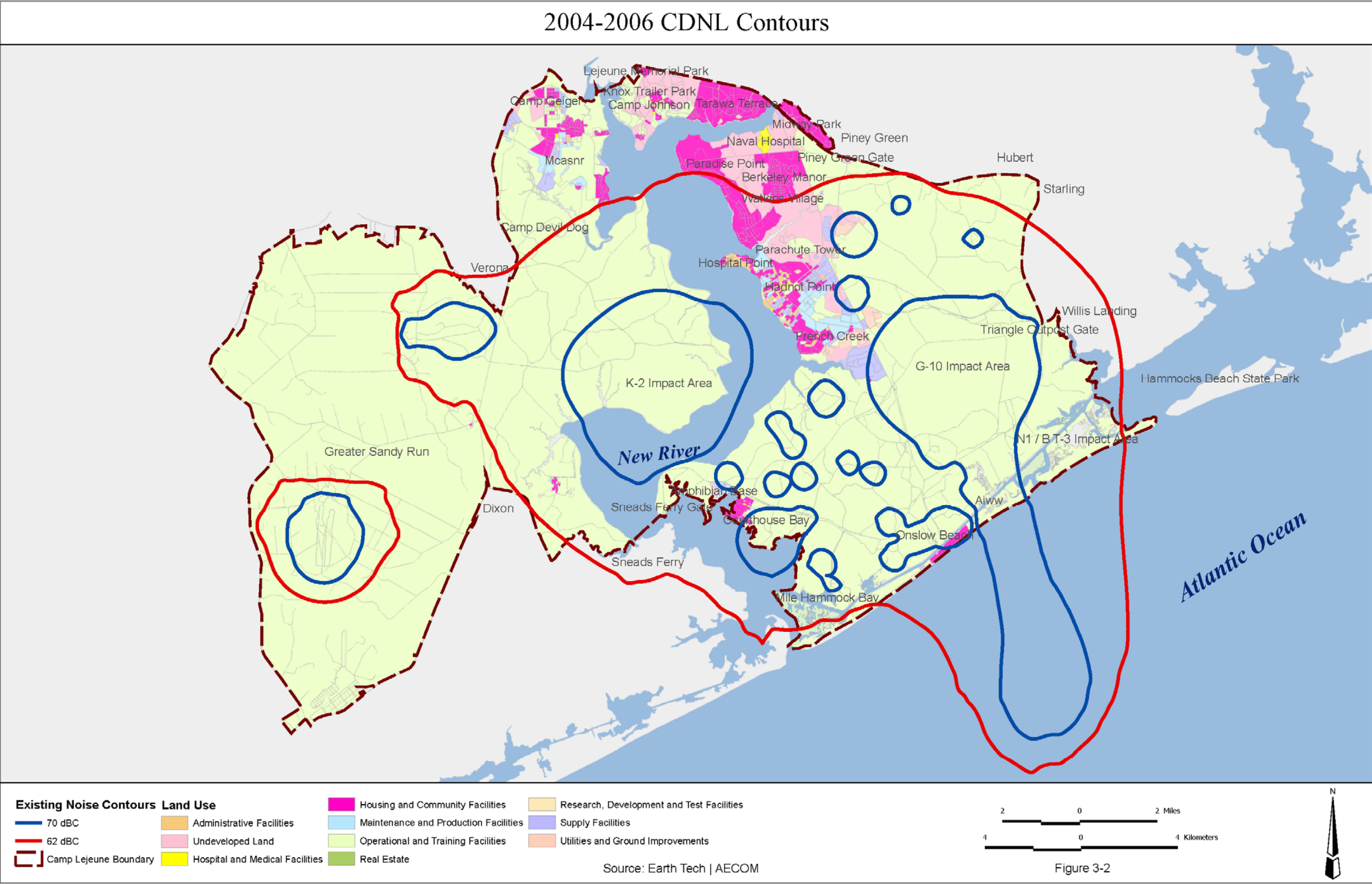
The contours of **Figure 3-4** indicate that around the Stone Bay and L-5 ranges:

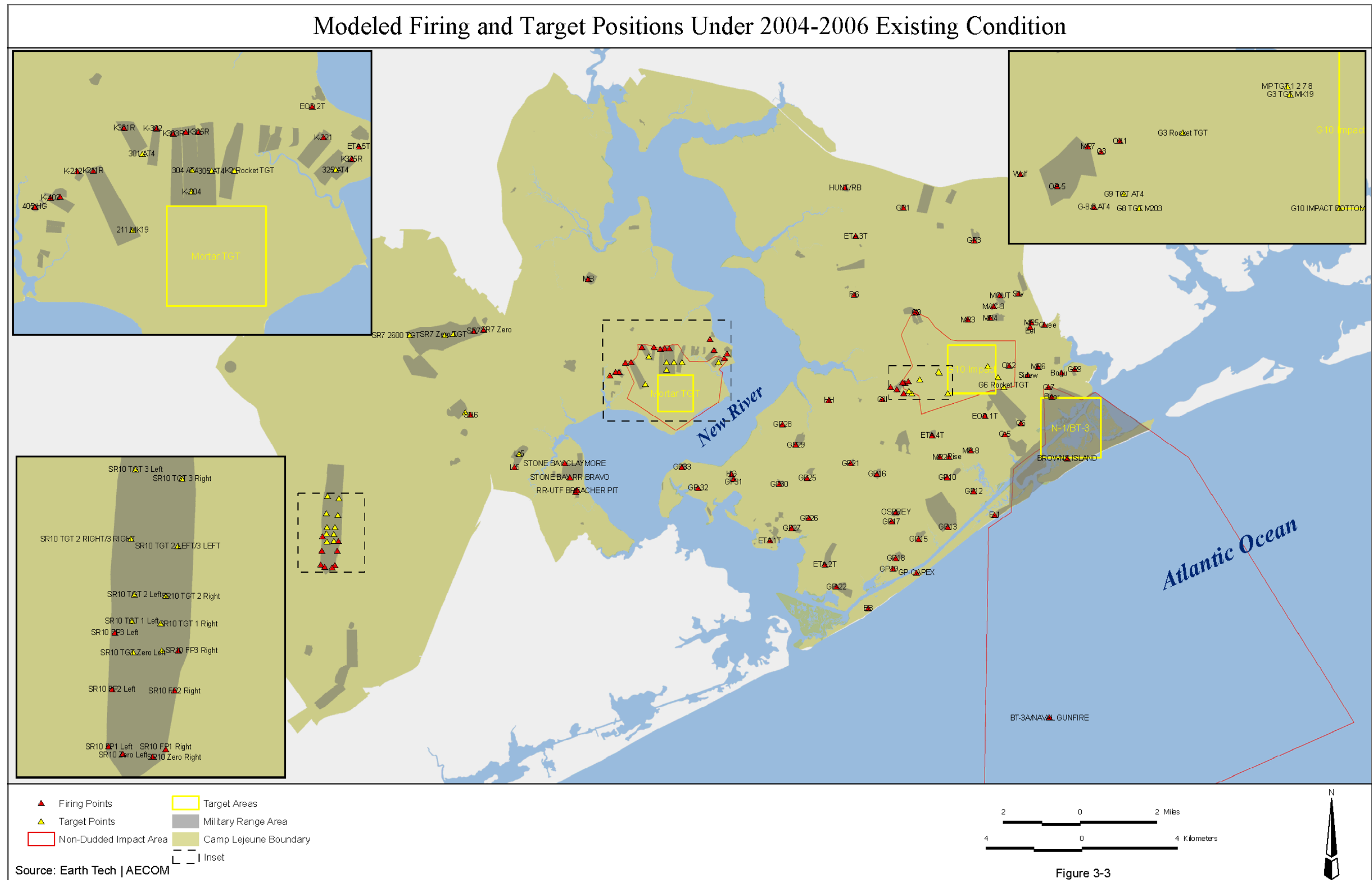
- ADNLs at or greater than 75 dBA (Noise Zone III) and ADNLs between 65 dBA and 75 dBA (Noise Zone II) from small arms live firing remain entirely on Base

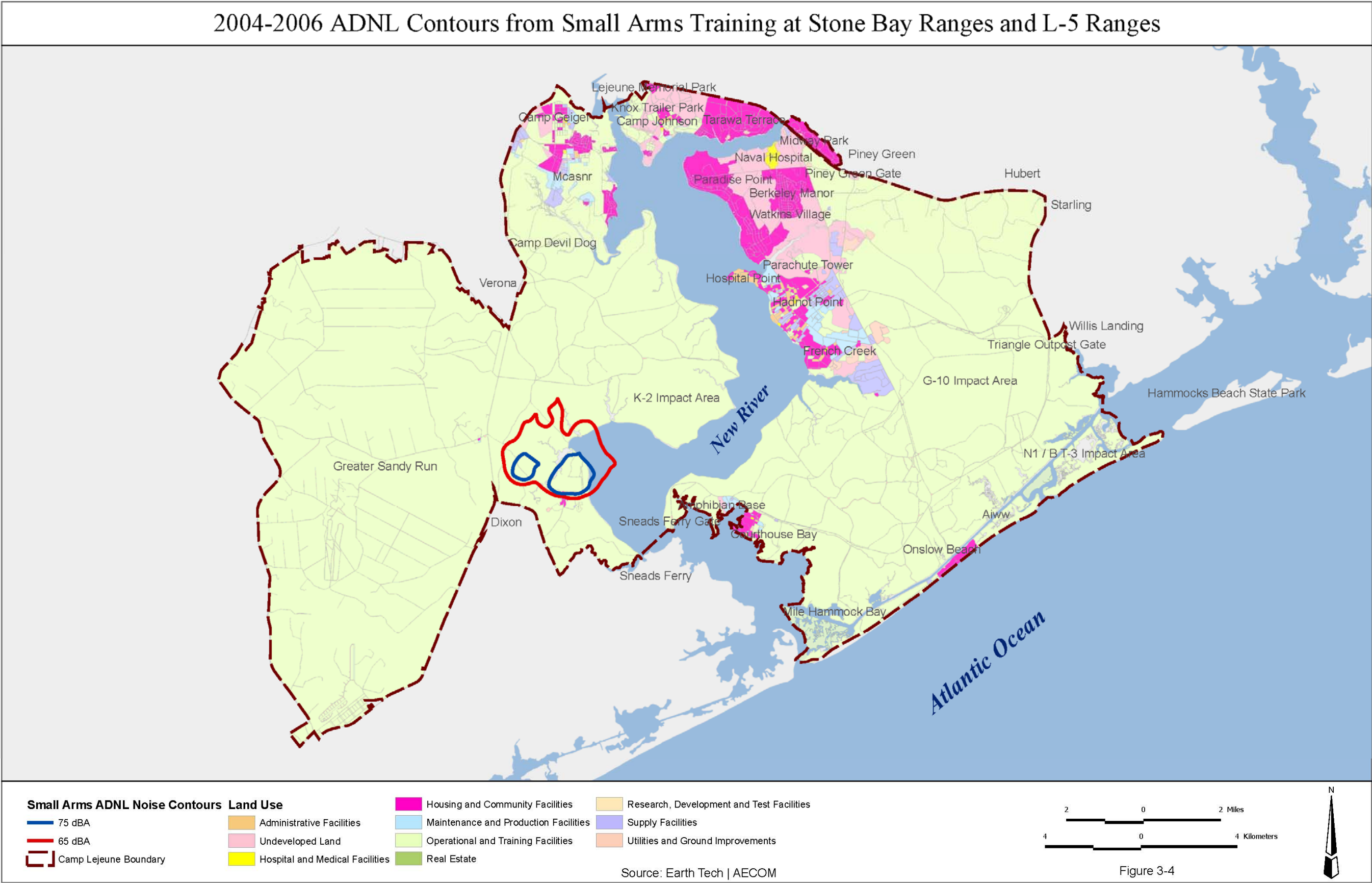
Based on the results predicted for the ranges with potential to have the greatest noise effects on the surrounding communities, it is unlikely that Base-wide small arms firing noise results in Noise Zones II and III extending off the Base.

3.1.4.4 Vibration

In general, low frequency, impulsive sound pressure generated by the detonation of explosive charges or large-caliber weapon firing can cause structures to vibrate. Occupants often perceive this vibration as the rattling of loose windows and objects on shelves, and sometimes the building itself. There are two types of vibration: vibration that is transmitted through the ground (i.e., ground-borne vibration); and vibration that is transmitted through the air (i.e., airborne vibration).







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Ground-Borne Vibration

Ground-borne vibration originates from an explosive detonation that radiates vibration energy into the soil. The face of the nearest foundation or underground building wall responds to the incident ground-borne vibration and propagates the waves throughout the building. The resulting ground-borne vibration is a function of the magnitude of the energy source, distance from the source, blasting response specific characteristics of the transmitting media (rock/soil), and response characteristics of the structural element (building). Vibration studies of coal mine detonations indicate that ground-borne vibration dominates structure vibration in the near field, while airborne vibration dominates at greater distances. For example, for a 100-lb charge, the ground-borne vibration is the dominant cause of building vibration if the building is located less than 152.4 m (500 ft) from the detonation point. At distances greater than 152.4 m (500 ft), the airborne sound wave is the dominant cause of the vibration (USACHPPM, November 2005).

The US Bureau of Mines conducted an 18-month study at McAlester Army Ammunition Plant in 1988 (Siskind, 1989) and found that:

- 0.5 in/sec is the maximum ground-borne vibration level to prevent threshold damage
- 2.0 in/sec is the threshold level at which minor structural damage may begin to occur in 0.01 percent of structures

Since the explosive detonation positions around the Base are relatively far from the Base boundary (e.g., greater than 152.4 m [500 ft] away), it is anticipated that the ground-borne vibrations from the range operations are negligible at off-Base building structures. This is consistent with the fact that no off-Base property damage has been claimed historically.

Airborne Vibration

Most of the studies of airborne vibration and the damage guidelines derived from these studies used sonic booms as the source. The vibration from open area explosive detonations and large-caliber weapon firing is similar to the vibration from sonic booms.

Structural shaking or window rattling by airborne vibration can annoy the occupants and cause possible structural damage (e.g., broken glass and plaster cracks). The previously cited study conducted by the US Bureau of Mines (Siskind, 1989) correlated the airborne vibration levels with the peak sound pressure levels that potentially could cause structural damage (**Table 3.1-7**). As shown in **Table 3.1-7**, homeowners became concerned about structural damage at levels far below those actually capable of causing structural damage.

Table 3.1-7
Potential Building Damage and Airborne Vibration Levels

| Response | Vibration Level (in/sec) | Peak Sound Level (dBP) |
|---|--------------------------|------------------------|
| Concern by Homeowner about Structural Rattling and Possible Damage | 0.1 | 120 |
| Glass and Plaster Cracks Worst Case* | 0.5 | 134 |
| Gypsum Wallboard Worst Case* | 0.75 | 141 |
| Structural Damage to Lightweight Superstructure | >2.0 | 175 |
| Note: 1. Worst case = Poorly fitted loose window glass and stressed walls. Source: Siskind, 1989. | | |

A vibration study was undertaken for the Routine Shore-Fire Control Party Training EA at MCB Camp Lejeune on 16 January 2002 to evaluate potential vibration impacts from typical large-caliber weapon firing and explosive detonations. Vibration levels were measured at three locations in the surrounding community that are close to some large-caliber weapon operations.

The firing events included 26 shots of 155 mm artillery near the G-10 Impact Area and demolition charges at ETA-1 (**Table 3.1-8**). No ground-borne vibration levels were measurable during this study. The peak noise levels and airborne vibration measurements are summarized in **Tables 3.1-9** and **3.1-10**. Based on these measurements, besides the potential window rattling during the worst-case measurement in the Snead's Ferry location, the overall airborne vibration levels recorded were not high enough to be likely to cause building structure damage but had potential to cause walls and windows rattling.

In order to improve existing noise and vibration conditions in the surrounding community, MCB Camp Lejeune has been implementing several on-going measures such as:

- Conducting Joint Land Use Study with the involvement of local community and establishing a public information and outreach program. The Community Plans and Liaison Office at MCB Camp Lejeune continues to work and develop partnerships with local community to control encroachment
- Installing the Blast Analysis and Monitor System (BLAM) to monitor peak noise levels around the installation during the weapon operations. The system provides warnings to the range operation managers when the weapon firing noise exceeds the warning threshold
- Range and Training Regulations establish restrictions on large caliber weapon firing and explosive detonations during quiet hours
- Moving certain range operations away from the sensitive land uses (e.g., partial ETA-1 operations were moved to HA range areas)

Table 3.1-8
Number of Firing Events

| Source | Total Number of Events |
|--|------------------------|
| 155 mm Howitzer – High Explosive | 20 |
| Demolition Charges (ranging from 5 to 27.4 pounds) | 6 |

Table 3.1-9
Summary of Unweighted Peak Levels

| Site | Mean Level (dBP) | Max Level (dBP) | Number Events with Unweighted Peak Levels | | |
|---------------|------------------|-----------------|---|---------------|---------------|
| | | | < 115 dBP | 115 - 130 dBP | 130 - 140 dBP |
| Snead's Ferry | 105.8 | 131.4 | 16 | 3 | 1 |
| Bear Hollow | 101.9 | 110.9 | 12 | 0 | 0 |
| High Hill | 105.7 | 110.8 | 21 | 0 | 0 |

Table 3.1-10
Summary of Vibration Measurements

| Site | Measurements (in/sec) | | Number of Events | | | |
|---------------|-----------------------|-------|------------------|----------------|----------------|----------------|
| | Mean | Max. | <0.5 in/sec | 0.5-1.0 in/sec | 1.0-2.0 in/sec | 2.0-4.0 in/sec |
| Window | | | | | | |
| Snead's Ferry | 0.54 | 3.98 | 14 | 6 | 1 | 1 |
| Bear Hollow | 0.12 | 0.28 | 21 | 0 | 0 | 0 |
| High Hill | 0.10 | 0.16 | 11 | 0 | 0 | 0 |
| Wall | | | | | | |
| Snead's Ferry | 0.14 | 0.56 | 20 | 1 | 0 | 0 |
| Bear Hollow | 0.02 | 0.05 | 21 | 0 | 0 | 0 |
| High Hill | 0.009 | 0.02 | 10 | 0 | 0 | 0 |
| Corner | | | | | | |
| Snead's Ferry | 0.02 | 0.1 | 21 | 0 | 0 | 0 |
| Bear Hollow | 0.003 | 0.006 | 20 | 0 | 0 | 0 |
| High Hill | 0.001 | 0.001 | 3 | 0 | 0 | 0 |

3.1.5 Cultural Resources – Land Ranges

Cultural resources are defined as any prehistoric or historic sites, buildings, structures, objects, districts, or other physical evidence of human activity that are considered important to a culture or community for scientific, traditional, religious, or other reasons. Cultural resources include prehistoric and historic archaeological resources, architectural resources, and traditional cultural properties. Under cultural resource legislation, historic properties are subject to protection or consideration by a federal agency. A historic property is defined as a cultural resource that is listed on, or is eligible for listing on, the National Register of Historic Places.

Under Sections 106 and 110 of the National Historic Preservation Act, MCB Camp Lejeune has conducted numerous cultural resource surveys to identify cultural resources and determine their significance. The Base's *Integrated Cultural Resources Management Plan* (MCB Camp Lejeune, April 2002) provides guidance on managing the Installation's historic properties in compliance with federal laws and Department of Defense and Marine Corps directives and orders on the management of cultural resources. It includes a summary of the Installation's history, mission, and known prehistoric and historic resources. *The Integrated Cultural Resources Management Plan* also contains compliance procedures including Native American concerns, consultation procedures, and Section 106 review guidelines.

Currently, there is one federally recognized Native American Tribe in North Carolina, the Eastern Band of Cherokee Indians of North Carolina. However, the Tribe has no land area claims in the counties where MCB Camp Lejeune or the Marine Corps Outlying Landing Field Oak Grove is located (Richardson, February 2008). A written historical account exists for the presence of the Tuscarora Indians of New York, along the Trent River in Oak Grove. However, no evidence of a Tuscarora site has been discovered at the Marine Corps Outlying Landing Field Oak Grove (Richardson, February 2008).

The following subchapters describe the known cultural resources on MCB Camp Lejeune (including Marine Corps Outlying Landing Field Oak Grove)

3.1.5.1 Architectural Resources

Eight historic districts on the MCB Camp Lejeune installation have been determined eligible for inclusion in the National Register of Historic Places by MCB Camp Lejeune and the North Carolina State Historic Preservation Office (see **Table 3.1-11**). Combined, the districts include 187 buildings and structures. Most of these historic properties were identified in a three-phase architectural investigation of World War II construction at MCB Camp Lejeune. The districts are eligible for their role in Marine mobilization for World War II (MCB Camp Lejeune, April 2002).

Table 3.1-11
Historic Architectural Properties

| Property Name | Contributing Resources |
|---|------------------------|
| Assault Amphibian Base Historic District | 2 |
| Camp Geiger Historic District | 1 |
| Command Services/Regimental Area Number 3 Historic District | 45 |
| Montford Point Camp Number 1 Historic District | 53 |
| Montford Point Camps Number 2 and 2A Historic District | 39 |
| Naval Hospital/Surgeon's Row Historic District | 7 |
| Parachute Training Historic District | 3 |
| Stone Bay Rifle Range Historic District | 37 |

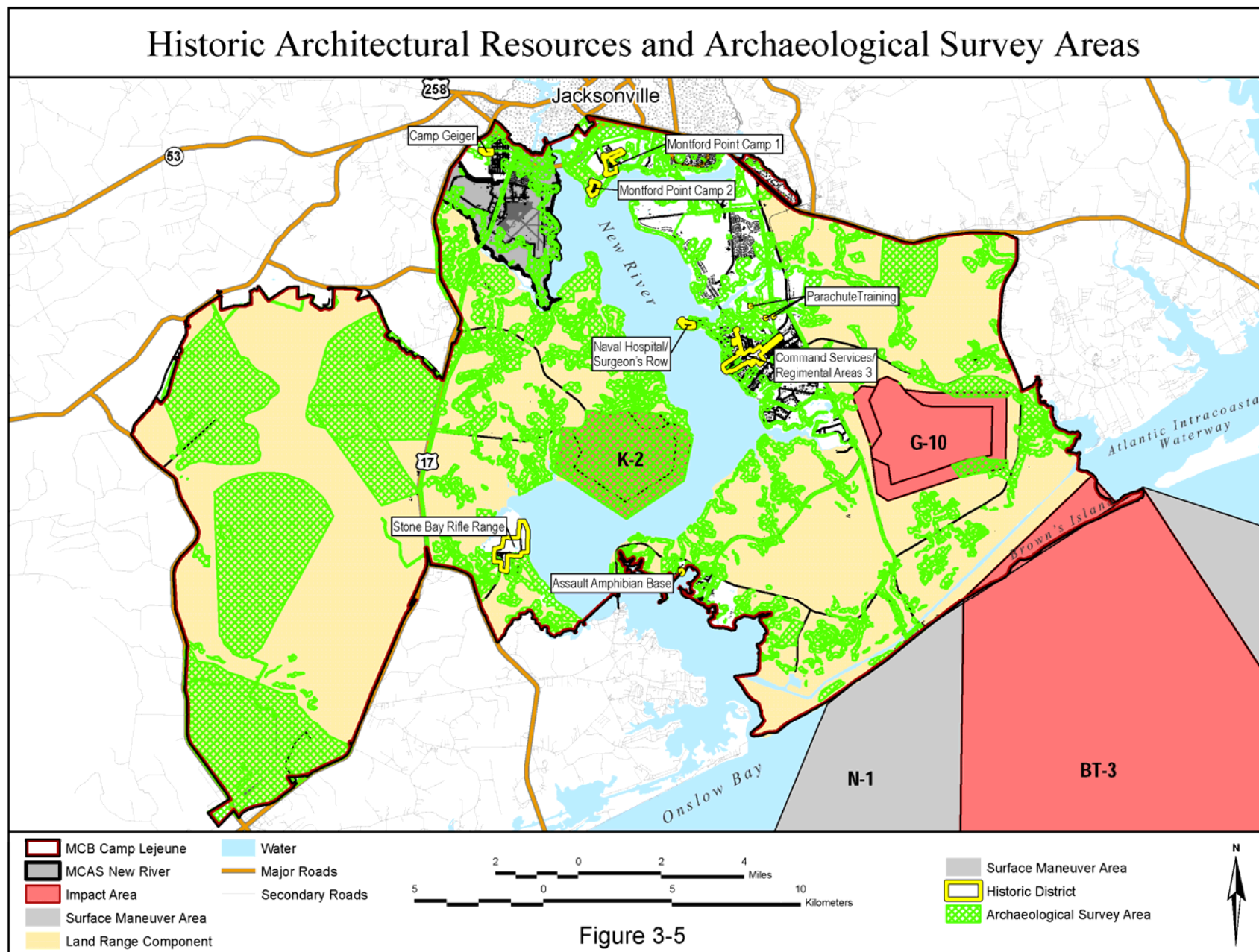
The majority of these historic properties are located away from the primary ranges and training areas of the Base (**Figure 3-5**), and situated in administrative, community, and support areas. However, a portion of the Stone Bay Rifle Range Historic District is within the surface danger zone of a Stone Bay small arms range, and the remainder is adjacent to it. Architectural resources in two other historic districts are, or were, components of training and range facilities, and thus, they are within, or adjacent to, present training areas or small arms ranges. The historic districts include the Assault Amphibian Base and Parachute Training.

There are no National Register-listed or -eligible architectural resources at Marine Corps Outlying Land Field Oak Grove. An architectural survey of the buildings and structures at Oak Grove was completed in 1998 when the landing field was under the jurisdiction of MCAS Cherry Point. No buildings or structures at Marine Corps Outlying Land Field Oak Grove were determined eligible as a result of the survey (Naval Facilities Engineering Command, Atlantic Division, 2007).

3.1.5.2 Archaeological Resources

Through the use of predictive models and previous field surveys (**Figure 3-5**), MCB Camp Lejeune, in consultation with the North Carolina State Historic Preservation Office, has identified and surveyed all the areas within the boundaries of MCB Camp Lejeune installation and Marine Corps Outlying Landing Field Oak Grove that contain high probability archaeologically sensitive soils.

A total of 1,269 archaeological sites have been identified at MCB Camp Lejeune (Richardson, March 2008). They include prehistoric and historic archaeological sites ranging from the early Archaic period (8000 BC) to early European colonization and later settlement (MCB Camp Lejeune, Environmental Management Division, March 2008). Of these sites, 21 have been determined eligible for listing on the National Register of Historic Places while 221 require further evaluation to determine their eligibility for listing (Richardson, February 2008). Approximately 81 percent of all recorded archaeological sites (1,027 sites) at the Installation have been determined ineligible for listing on the National Register of Historic Places (Richardson, February 2008).



A total of 15 archaeological sites have been identified at Marine Corps Outlying Land Field Oak Grove (Richardson, March 2008). Of these sites, one is eligible for listing on the National Register of Historic Places and two require further evaluation to determine their eligibility for listing. The remaining 12 sites are ineligible for listing on the National Register of Historic Places.

3.1.6 Natural Resources – Land Ranges

3.1.6.1 Soils

The geologic resources of an area consist of all soil and bedrock materials. This includes sediments and rock outcroppings in the nearshore and open ocean underwater environment. For the purpose of this EA, the terms soil and rock refer to unconsolidated and consolidated material, respectively. Geological resources can also include mineral deposits, significant landforms, tectonic features, and paleontological remains (i.e., fossils).

MCB Camp Lejeune lies in the Atlantic Coastal Flatlands as described by US Department of Agriculture in 1994 (US Marine Corps, January 2007). The predominant landform in this area is a flat, weakly dissected alluvial plain. The movement of the earth's crust, along with glacial events, has resulted in the areas near the coast being alternately exposed and submerged. Thus, marine deposits have been laid down and have contributed to the formation of this alluvial plain. Three primary geomorphic surfaces are identified at MCB Camp Lejeune (US Marine Corps, January 2007). These are the Pamlico terrace, the Wicomico terrace, and the Talbot terrace. The Pamlico terrace has elevations from 0 to 7.6 m (0 to 25 ft) in narrow strips along the Intracoastal Waterway, New River and its tributaries. The Wicomico terrace is found in a few areas south of Jacksonville and has elevations between 13.7 and 22.9 m (45 and 75 ft). The Talbot terrace, which lies underneath much of mainside MCB Camp Lejeune, has elevations ranging between 7.6 and 13.7 m (25 and 45 ft).

The topography of the area is relatively flat with some areas of gently rolling terrain. Elevations are at their greatest between New River and US 17 reaching 21.9 m (72 ft). Areas east of the New River are characterized by flatlands that range in elevation between 7.6 and 13.7 m (25 and 45 ft) (US Marine Corps, January 2007).

There are 38 different soils found within the boundaries of MCB Camp Lejeune. Many of these individual soils cover less than 1 percent of the land area. **Table 3.1-12** provides specific information on each of the different soil types and the acreage present on the Base. Also included for each soil type is whether or not the soil is considered Prime or Unique Farmland. Prime Farmland is land that has the best combination of physical and chemical characteristics for producing agricultural crops with minimum inputs such as fertilizer, pesticides, and labor. Unique Farmland is land other than Prime Farmland that could be used for the production of specific high value crops.

Table 3.1-12
Soils at MCB Camp Lejeune

| Soil Name | Prime/ Unique Farmland | Drainage Class | Erosion Potential | Flooding Potential | Acres |
|---|------------------------------|--|----------------------|-----------------------|--------|
| Alpin Fine Sand 1-6% slope | No | excessively well drained | slight | slight | 969 |
| Baymeade-Urban land complex 0-6% slope | No | well drained | slight | slight | 3,562 |
| Baymeade fine sand 0-6% slope | No ¹ | well drained | slight | slight | 18,615 |
| Bohicket silty clay loam | No | very poorly drained | slight | Very severe | 2,544 |
| Carteret fine sand | No | very poorly drained | slight | Very severe | 15 |
| Corolla fine sand | No | somewhat poorly drained | slight | moderate | 224 |
| Craven fine sandy loam 1-4% slope | Yes | moderately well drained | slight | moderate | 288 |
| Craven fine sandy loam 4-8% slope | No ¹ | moderately well drained | slight | moderate | 153 |
| Croatan muck | No | very poorly drained | slight | severe | 8662 |
| Dorovan muck | No | very poorly drained | Very severe | Very severe | 1,081 |
| Duckston fine sand | No | poorly drained | slight | severe | 235 |
| Foreston loamy fine sand 0-2% slope | No ¹ | moderately well drained | slight | moderate | 5,144 |
| Goldsboro fine sandy loam 0-2% slope | Yes | moderately well drained | slight | moderate | 518 |
| Goldsboro urban land complex 0-5% slope | No | moderately well drained | slight | moderate | 1,377 |
| Kureb fine sand 1-6% slope | No | excessively well drained | slight | slight | 5,125 |
| Longshoal muck | No | very poorly drained | Very severe | Very severe | 11 |
| Lenoir loam | No ¹ | somewhat poorly drained | slight | moderate | 101 |
| Leon fine sand | No ¹ | poorly to very poorly drained | slight | severe | 13,803 |
| Lynchburg fine sandy loam | Yes | somewhat poorly drained | slight | moderate | 158 |
| Marvyn loamy fine sand 6-15% slope | No ¹ | well drained | slight | slight | 9,618 |
| Muckalee loam | No | poorly drained | slight | severe | 8,685 |
| Murville fine sand | No ¹ | very poorly drained | slight | moderate | 8,161 |
| Newhan fine sand, dredged, 0-30 % slope | No | excessively drained | slight | slight | 437 |
| Newhan Corolla Urban land complex | No | excessively drained | slight | moderate | 607 |
| Norfolk loamy fine sand 0-2% slope | Yes | well drained | slight | slight | 121 |
| Norfolk loamy fine sand 2-6% slope | Yes | well drained | slight | slight | 1,160 |
| Onslow loamy fine sand | Yes | moderately well drained | slight | moderate | 6,686 |
| Pactolus fine sand | No | moderately well to somewhat poorly drained | slight | moderate | 1,882 |
| Pantego mucky loam | Yes | very poorly drained | slight | severe | 186 |
| Pits | No | moderately well to very poorly drained | slight to moderate | moderate | 175 |
| Rains fine sandy loam | Yes | poorly drained | slight | severe | 760 |
| Stallings loamy fine sand | No ¹ | somewhat poorly drained | slight | moderate | 3,864 |
| Torhunta fine sandy loam | Yes | very poorly drained | slight | moderate | 7,540 |
| Udorthents loam | No | moderately well to somewhat poorly drained | slight | slight | 46 |
| Urban land | No | well drained | slight to moderate | slight | 977 |
| Wando fine sand 1-6% slope | No | well drained | slight | slight | 4,342 |
| Woodington loamy fine sand | No ¹ | poorly drained | slight | moderate | 7,372 |
| Yaupon fine sandy loam 0-3% slope | No | moderately well to somewhat poorly drained | slight | moderate | 120 |

Notes: 1. These soils do not meet the criteria for Prime or Unique Farmland but are designated as Farmland of statewide importance. Generally, this land includes soils that nearly meet the requirements for prime farmland and that could economically produce high yields of crops when treated and managed according to acceptable farm practices.

Source: US Department of Agriculture, Natural Resources Conservation Service. August 2008.

Soils found at Marine Corps Outlying Landing Field Oak Grove include sands, loamy sands and loams. Slopes generally range from zero to fifteen percent. **Table 3.1-13** provides specific information for each of the soil types at the Marine Corps Outlying Landing Field Oak Grove.

Table 3.1-13
Soils at the Marine Corps Outlying Landing Field Oak Grove

| Soil Name | Prime/ Unique Farmland | Drainage Class | Erosion Potential | Flooding Potential | Acres |
|--|------------------------------|---------------------------------------|----------------------|-----------------------|-------|
| Alpin fine sand, 0-6% slopes | No | Excessively drained | slight | slight | 338 |
| Autryville loamy fine sand, 0-4% | No ¹ | Well drained | slight | slight | 267 |
| Goldsboro loamy sand, 0-2% | Yes | Moderately well drained | slight | moderate | 63.5 |
| Marvyn loamy sand, 6-15% | No ¹ | Well drained | slight | slight | 4 |
| Muckalee loam | No | Poorly drained | slight | moderate | 70 |
| Norfolk loam sand, 1-4% | Yes | Well drained | slight | slight | 124.5 |
| Pactolus loamy fine sand | No | Moderately well to somewhat poorly | slight | slight to moderate | 61 |
| Stallings loamy fine sand | No ¹ | Somewhat poorly drained | slight | moderate | 18 |
| Notes: 1. These soils do not meet the criteria for Prime or Unique Farmland but are designated as Farmland of statewide importance. Generally, this land includes soils that nearly meet the requirements for prime farmland and that could economically produce high yields of crops when treated and managed according to acceptable farm practices. Source: US Department of Agriculture, Natural Resources Conservation Service. August 2008. | | | | | |

3.1.6.2 Water Resources – Land Ranges

Water resources are essential components of the natural setting. These resources can have scientific, historic, economic, and recreational value within a specific area. For land ranges, the following water resource topics are addressed: surface water (e.g., streams, waters of the US, and primary nursery areas); groundwater; wetlands; and floodplains. Surface waters described within the land ranges section include the smaller, more inland streams and creeks. The New River, Atlantic Intracoastal Waterway, and Onslow Bay are described in Water Resources – Water Ranges (**Subchapter 3.2.5.2**)

Surface Water

The state of North Carolina has assigned water quality classifications for surface waters based on the existing and contemplated “best usage” for which the waters must be protected. Class SA waters receive the highest rating for tidal salt waters and are suitable for shell fishing and any of the uses specified for SB and SC classifications. The intermediate rating for tidal salt waters is Class SB, waters suitable for primary recreation and other uses as specified by the SC classification. Class C (freshwater) and SC tidal salt waters are suitable for aquatic life propagation and survival, fishing, wildlife, and secondary recreation (15A NCAC 02B).

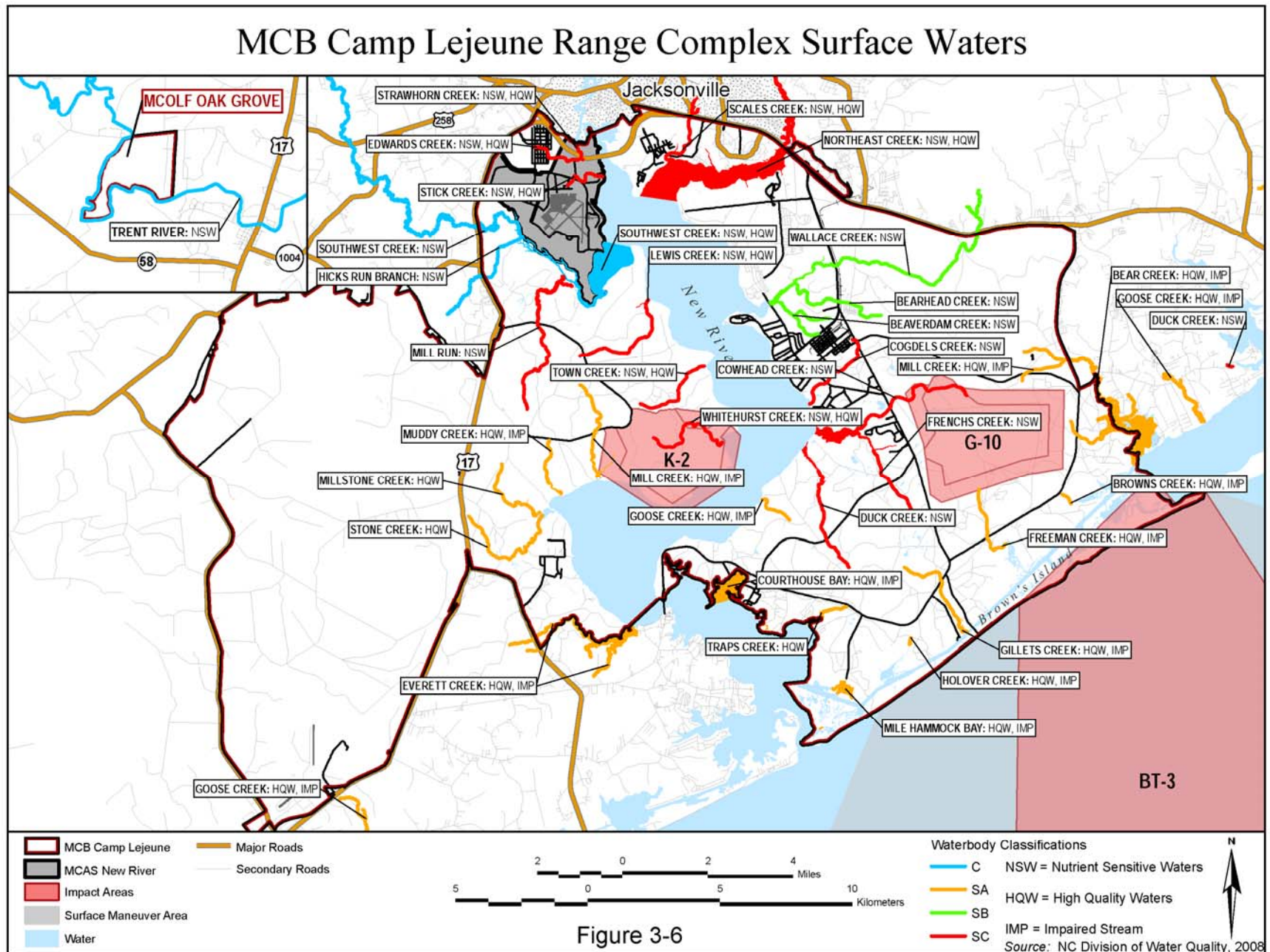
In addition to these principal water quality classifications, the North Carolina Department of Environment and Natural Resources has applied supplemental classifications to describe other attributes of the water bodies. The term “nutrient sensitive waters” identifies streams, creeks, and rivers that show decreased fish populations, decreased ambient dissolved oxygen, increased frequency of fish kills, and increased algae concentrations. “Outstanding resource waters” are unique and special waters of exceptional state or national recreational or ecological significance

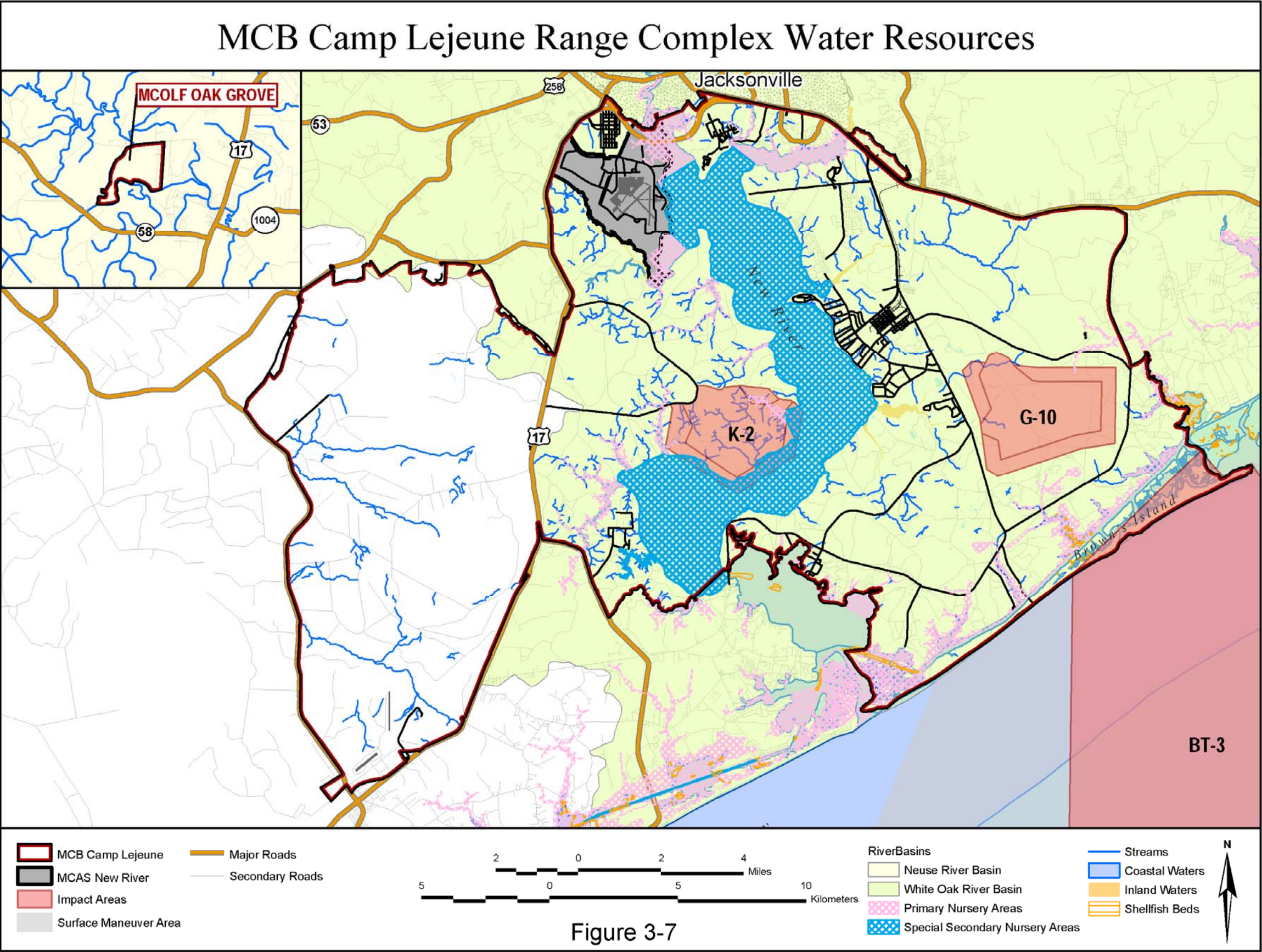
which require special protection to maintain existing uses. “High quality waters” are waters rated as excellent based on biological or physical/chemical characteristics (15A NCAC 02B).

MCB Camp Lejeune is located within the White Oak River Basin. **Figure 3-6** depicts surface waters within the range complex. **Table 3.1-14** identifies land range surface waters located at MCB Camp Lejeune and their corresponding classifications. Section 303 (d) of the Clean Water Act requires states to outline those waters that do not meet the water quality standards of having impaired uses. These listed waters must undergo prioritization and formulate a management strategy, normally consisting of total maximum daily load. As the corresponding table includes information taken from various test points within a particular water body, some streams will contain both high quality and impaired status.

The North Carolina Marine Fisheries Commission has further designated certain estuarine areas as “nursery areas” to protect the habitat for juvenile populations of economically important commercial fish species. Nursery areas provide food, cover, suitable substrate, and appropriate salinity and temperature for young finfish and crustaceans over a major portion of their initial growing season (15A NCAC 3N). Primary nursery areas are located in the upper portions of creeks and bays. These areas are usually shallow with soft muddy bottoms and surrounded by marshes and wetlands. Low salinity and the abundance of food in these areas are ideal for young fish and shellfish. “Special secondary nursery areas” are located adjacent to “secondary nursery areas” but closer to the open waters of sounds and the oceans. The majority of the year, when juvenile species are abundant, these waters are closed to trawling. **Figure 3-7** identifies nursery areas within MCB Camp Lejeune.

In addition to surface water resources within the Base boundaries, there are surface water resources located at the Marine Corps Outlying Landing Field Oak Grove, which is part of the overall MCB Camp Lejeune Range Complex. Marine Corps Outlying Landing Field Oak Grove is located in Jones County and is part of the Neuse River Basin (**Figure 3-7**). The Neuse River Basin is the third largest river basin in North Carolina and is one of only four major river basins completely contained within the state. The basin includes Jones County, one of 24 counties with area in the basin. On December 9, 1999, the North Carolina Environmental Management Commission adopted rules to protect the 15 m (50 ft) wide riparian buffer along waterways in the Neuse River Basin. The buffers remove nitrogen, phosphorus, and other pollutants from rainwater that flows into the basins’ waterways, protecting waterways from surrounding land uses.





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Table 3.1-14
Surface Waters within the MCB Camp Lejeune Range Complex

| Name of Stream | Class | Nutrient Sensitive Waters | High Quality Waters | Outstanding Resource Waters | Impaired |
|-------------------------|-------|---------------------------|---------------------|-----------------------------|----------|
| Bear Creek | SA | | √ | | √ |
| Bearhead Creek | SB | √ | | | |
| Beaverdam Creek | SB | √ | | | |
| Brown's Creek | | | | | √ |
| Cogdels Creek | SC | √ | | | |
| Courthouse Bay | SA | | √ | | √ |
| Cowhead Creek | SC | √ | | | |
| Duck Creek | SC | √ | | | |
| Edwards Creek | SC | √ | √ | | |
| Everett Creek | | | | | √ |
| Freeman Creek | SA | | √ | | √ |
| Frenchs Creek | SC | √ | | | |
| Gillets Creek | SA | | √ | | √ |
| Goose Creek | SA | | √ | | √ |
| Hicks Run (Hickory Run) | C | √ | | | |
| Hogpen Bay | SA | | | √ | |
| Holover Creek | SA | | √ | | √ |
| Lewis Creek | SC | √ | √ | | |
| Mile Hammock Bay | SA | | √ | | √ |
| Mill Creek | | | | | √ |
| Mill Run | SC | √ | | | |
| Millstone Creek | SA | | √ | | |
| Muddy Creek | SA | | √ | | √ |
| Northeast Creek | SC | √ | √ | | |
| Scales Creek | SC | √ | √ | | |
| Stick Creek | SC | √ | √ | | |
| Strawhorn Creek | SC | √ | √ | | |
| Town Creek | SC | √ | √ | | |
| Traps Creek | SA | | √ | | |
| Wallace Creek | SB | √ | | | |
| Ward Creek | SC | | | | |
| Whitehurst Creek | SC | √ | √ | | |

Source: North Carolina Division of Water Quality, March 2008.

Groundwater

All of Onslow County, including MCB Camp Lejeune, falls within the freshwater portion of the Castle Hayne aquifer. This aquifer is surficial or unconfined in that it overlies deeper aquifers confined by clay sediments. The Castle Hayne aquifer ranges in depth from 20 to 265 m (65 to 870 ft) with an average depth of 27 m (90 ft). The thickness of this aquifer ranges from 6 to 290 m (15 to 954 ft) with an average thickness of 53 m (175 ft). Composed of limestone, sandy limestone, and sand, it is the most productive aquifer in North Carolina with wells typically producing 0.8 to 1.9 kiloliters per minute (200-500 gallons per minute) (North Carolina Department of Environment and Natural Resources, Division of Water Resources, May 2007).

The topography of all sectors is essentially flat with elevations ranging from sea level to 13.7 m (45 ft) above mean sea level. Soils (**Subchapter 3.1.6.1**) consist mainly of fine sands, and sandy loams throughout the Base (see soil classifications in **Table 3.1-13**). Approximately 30 percent of the Base is covered by hydric soils.

Precipitation in the form of rain is approximately 1400 liters/m² (34.33 gallons/ft²) per year (Heath, 1994). Approximately 75 percent of precipitation is lost through run-off and transpiration resulting in about 350 liters/m² (8.58 gallons/ft²) of infiltration.

A recent hydraulic assessment was conducted to determine the possible connection between the Castle Hayne and the surficial aquifer. Selected water supply wells established in the Castle Hayne were shut down and turned back on while water levels were measured over time in nearby monitoring wells which are screened in the surficial aquifer. No changes in water levels were noted in the monitoring wells while raises in water levels in the production wells ranged from 2.4 to 34 m (8 to 110 ft). This indicates that there is very little hydraulic connection between the two aquifers. Also, sampling to test major inorganic ion parameters was conducted in both the surficial and Castle Hayne aquifers. The results showed marked chemical differences between the groundwater of the two aquifers further indicating that they are not directly hydraulically connected.

Wetlands

Wetlands are considered transitional zones between the terrestrial and aquatic environments. These areas are characterized by physical, chemical, and biological features indicative of their hydrology. Wetlands serve as a valuable resource for groundwater recharge within the region and are currently regulated by the US Army Corps of Engineers under Section 404 of the Clean Water Act of 1972. Wetlands generally include swamps, marshes, bogs, and similar areas.

There are approximately 16,973 ha (41,853 ac) of palustrine wetlands at MCB Camp Lejeune. Palustrine wetlands include all non-tidal wetlands dominated by trees, shrubs, persistent emergent plants, or emergent mosses or lichens, as well as small, shallow open water ponds or potholes. While palustrine wetlands can be found throughout the range complex at MCB Camp Lejeune, the majority of the palustrine wetlands at MCB Camp Lejeune are located in the Greater Sandy Run Area. Estuarine wetlands cover approximately 1,531 ha (3,784 ac) of land at MCB Camp Lejeune. Estuarine wetlands are tidal wetlands that are usually semi-enclosed by land but have open, partly obstructed or sporadic access to the open ocean, and in which ocean water is at least occasionally diluted by freshwater runoff from land. (US Department of Agriculture, August 2008). Estuarine wetlands at MCB Camp Lejeune are found along the Atlantic Intracoastal Waterway and near the mouth of the New River. Wetlands present within the MCB Camp Lejeune Range Complex are shown in **Figure 3-8**.

Executive Order 11990, *Protection of Wetlands*, directs federal agencies to take action to minimize the destruction, loss, or degradation of wetlands on their property and mandates review of proposed actions on wetlands through procedures established by the National Environmental Policy Act. It requires that federal agencies establish and implement procedures to minimize development in wetlands. In support of the Navy's goal of "no net loss of wetlands," all Navy/Marine Corps construction and operational actions must avoid adverse impacts to, or destruction of, wetlands. If this is impossible, then designs shall be made to minimize wetland degradation and shall include mitigation to replace impacted wetlands in another location.

Floodplains

Executive Order 11988, *Floodplain Management*, sets forth the responsibilities of federal agencies for reducing the risk of flood loss or damage to personal property, minimizing the impacts of flood loss, and restoring the natural and beneficial functions of floodplains. This order was issued in furtherance of the National Flood Insurance Act of 1968 and the Flood Disaster Protection Act of 1973. Floodplains and flood hazard zones are generally present throughout MCB Camp Lejeune near the New River and its creeks and estuaries. Floodplains present within the MCB Camp Lejeune Range Complex are shown in **Figure 3-8**.

3.1.6.3 Terrestrial Biology

Terrestrial biological resources on MCB Camp Lejeune include plants and animals and the habitats in which they occur, on land and in adjacent freshwater environments. In keeping with the *Integrated Natural Resources Management Plan* (US Marine Corps, January 2007), the ecological classification system developed for MCB Camp Lejeune is used to describe the occurrence of vegetation and habitats. Key resources which are discussed in separate sections include fish and wildlife (both game and non-game species) and threatened, endangered, and other sensitive species.

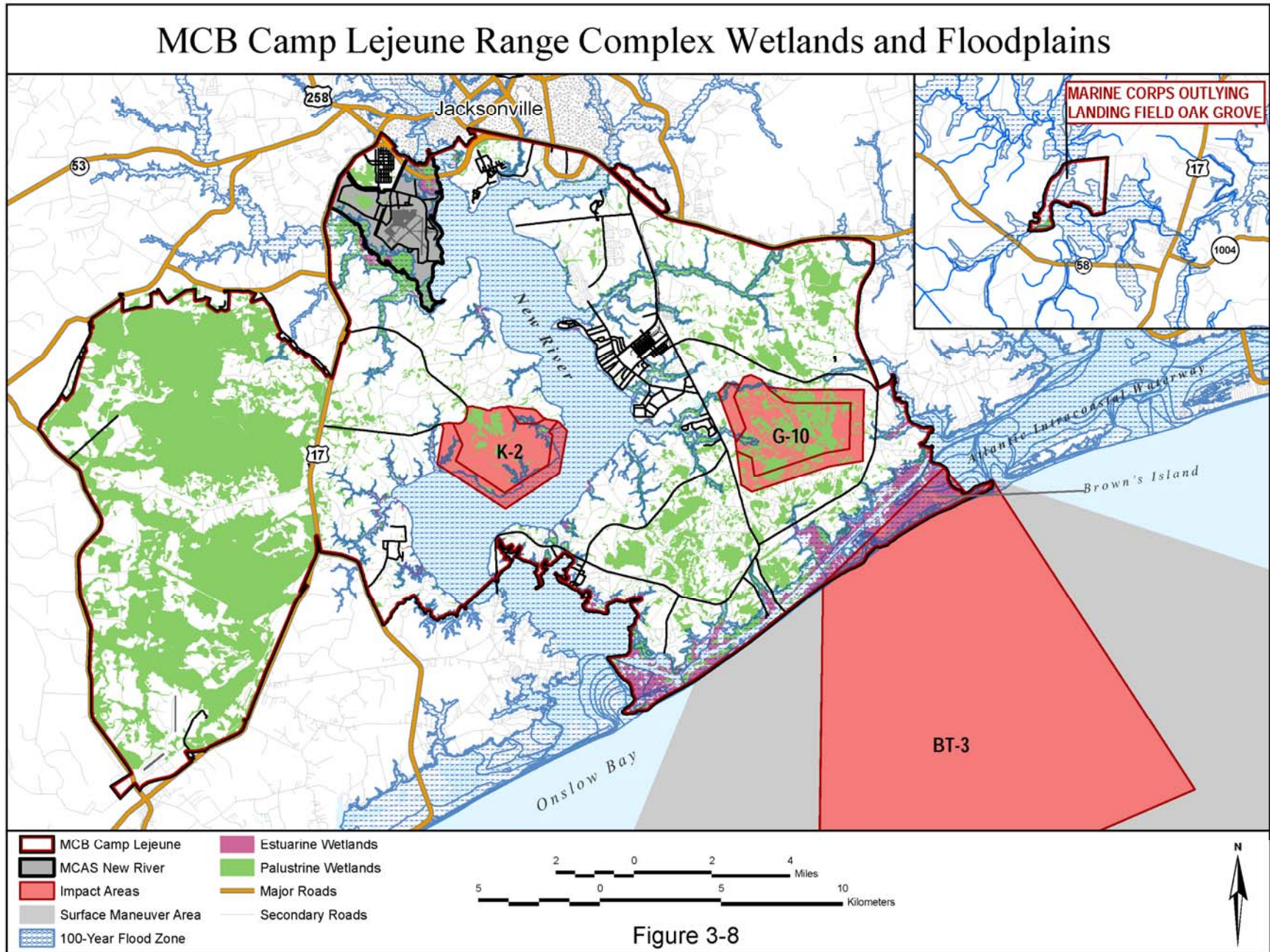
Vegetation

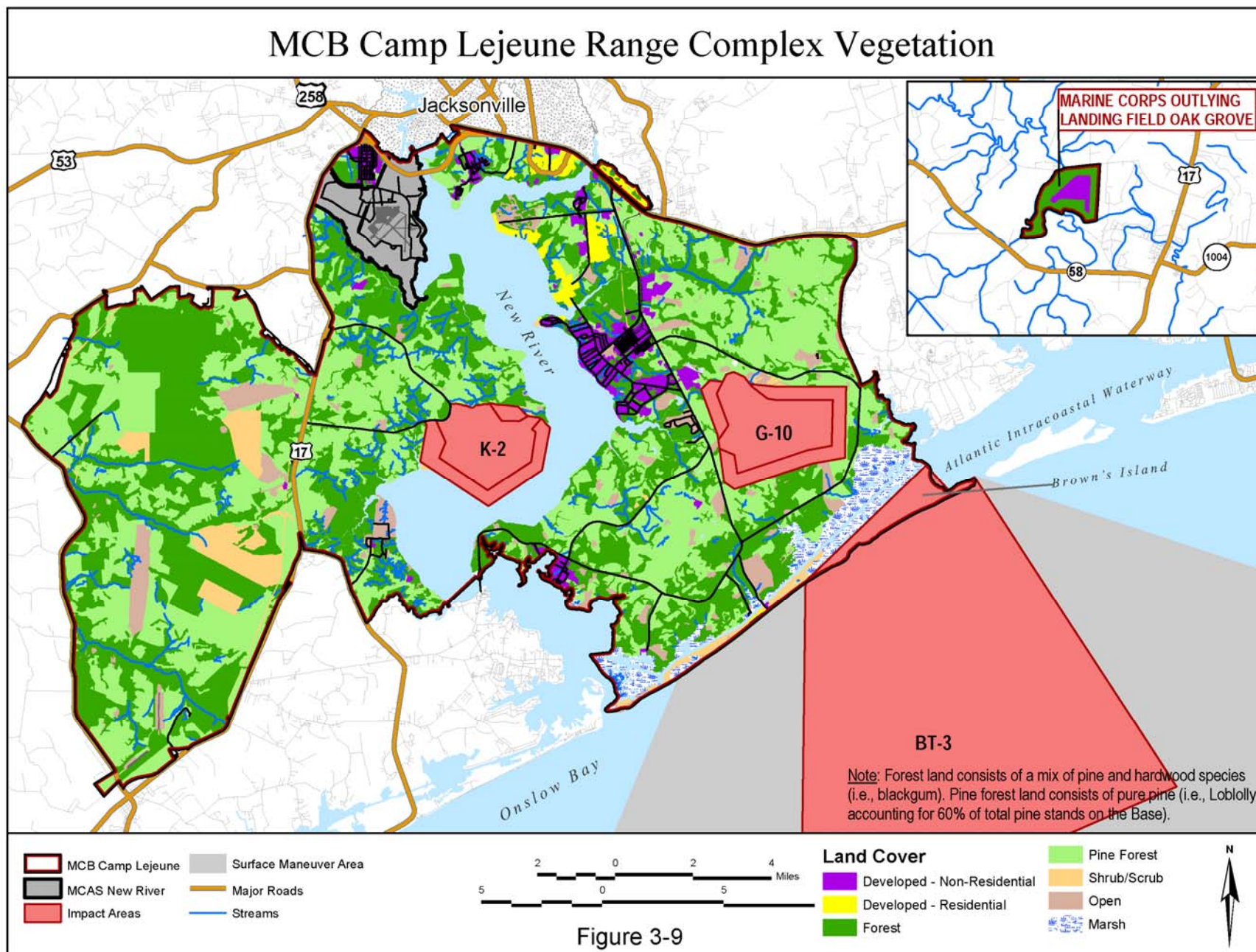
MCB Camp Lejeune consists of 57,870 ha (143,000 ac) of property of which over half is managed commercial forestland (exclusive military training areas G-10, K-2, and BT-3 are not managed). Pure pine, pure hardwood, and mixed pine/hardwood stands make up the bulk of the forested vegetation on MCB Camp Lejeune (see **Figure 3-9**). Loblolly pine is the dominant species in approximately 60 percent of the pine stands on MCB Camp Lejeune. Blackgum is the dominant hardwood species in the bottomland hardwood stands.

Ecological Classification of MCB Camp Lejeune

Consistent with the National Hierarchical Framework of Ecological Units (Cleland et al. 1997), an ecological classification system has been developed for MCB Camp Lejeune (US Marine Corps, January 2007). This system integrates information on climate, geomorphic, and vegetation features from regional to local scales. At the local landscape level, ecological units termed “landtypes” are differentiated on the basis of landforms and topography, soil and geologic features, and vegetation communities. Landtypes are the basic units of ecological classification used on MCB Camp Lejeune and can be grouped into four associations that cover most of the Base. These include the Onslow Maritime Zone, Bogue-Topsail Coastal Sandridge, New River Dissected Terraces, and Greater Sandy Run Pocosin (US Marine Corps, January 2007).

Landtypes can be further subdivided into landtype phases, which represent distinct soil and/or vegetation features within landtypes. On MCB Camp Lejeune, the distribution of landtypes is correlated with patterns of disturbance and the occurrence of rare species and communities. Landtype classification is used to identify management considerations that apply to natural resources as well as continuing use of the land for Marine Corps activities (US Marine Corps, January 2007).





Following are general descriptions of the landtypes based on the *Integrated Natural Resources Management Plan* and the approximate acreage that occurs on MCB Camp Lejeune. Additional detail is provided in the *Integrated Natural Resources Management Plan* (US Marine Corps, January 2007).

- **Inland Tidal Marshes and Tidal Swamps (567 ha [1,400 ac]).** This landtype occurs on sites influenced by tidal waters adjacent to the New River. Fire suppression in these areas has allowed hardwoods, especially tupelo (*Nyssa* spp.), to expand, reducing the area of marsh that was historically present.
- **Small Stream Swamps and Streamhead Pocosins (3,521 ha [8,700 ac]).** This landtype comprises seasonally to semi-permanently flooded wetlands associated with small to moderately large streams, dominated by trees (swamps) or shrubs (pocosins). They occur in tributaries to the New River and the Atlantic Intracoastal Waterway, and in the swamps of the Greater Sandy Run Area.
- **Drainage Slopes (3,521 ha [8,700 ac]).** This landtype occurs on side slopes along streams and rivers and drainage headlands, on uplands above floodplains. On the Base, it extends along all of the small tributaries of the New River. This landtype typically supports a mixed hardwood-pine forest, dominated by loblolly pine (*Pinus taeda*), oaks (*Quercus* spp.), and hickories (*Carya* spp.).
- **Interstream Flats (3,440 ha [8,500 ac]).** This landtype forms small to very large, irregularly shaped patches on poorly drained soils between streams, mostly in the Greater Sandy Run Area. Most sites are dominated by loblolly pine and pond pine (*Pinus serotina*), with a dense tall shrub and hardwood layer in the understory.
- **Pocosin Fringes (3,116 ha [7,700 ac]).** This landtype occurs on very poorly drained soils in peat-mantled uplands and broad interstream flats in association with pocosins, most extensively on the Greater Sandy Run Area and east of MCB Camp Lejeune at Horse Swamp. Historically, these sites supported pond pine woodlands with diverse associated trees, shrubs, forbs, and grasses. Presently, they support dense pond pine or pine-hardwood forest, with dense tall pocosin shrubs such as loblolly bay (*Gordonia lasianthus*).
- **Broad Pocosins (6,700 ha [16,800 ac]).** This landtype occurs in broad, shallow basins, in drainage basin heads, and on broad, flat uplands. It is most extensive in the Greater Sandy Run Area. Historically, these sites supported low pocosin vegetation (i.e. shrubs and stunted trees less than 1 m [3 ft] tall), that was maintained by frequent fire and nutrient-poor soils. Fire suppression has allowed the vegetation to expand in stature.
- **Wet-Mesic and Wet Pine Savannas (7,204 ha [17,800 ac]).** This landtype occurs in upland flats and interstream areas, on poorly drained sites with a seasonal high water table, periodic to frequent burning, and mostly sandy soils. Its occurrence is primarily in the Greater Sandy Run Area and on the coastal sandridge. As a result of fire suppression, the vegetation tends to be dominated by loblolly pine, hardwoods, and dense shrubs. Historically, the vegetation was a more open savanna of longleaf pine and pond pine.
- **Mesic Wet Pine Savannas (5,666 ha [14, 000 ac]).** This landtype occurs on upland terraces and flats in generally well-drained soils. It occurs widely throughout MCB Camp Lejeune. Historically, the vegetation was a savanna characterized by longleaf pine, with an understory of wiregrass (*Aristida stricta*) and other grasses and forbs maintained by frequent fire. Fire suppression has resulted in most sites becoming more thickly wooded by loblolly pine and hardwoods, with a dense shrub understory.

Fish and Wildlife

A discussion of fish and wildlife is included in this EA because various wildlife species would be expected to occur within the region of influence and could therefore be displaced and/or disturbed by training and range activities. As summarized in the *Integrated Natural Resources Management Plan* (US Marine Corps, January 2007), both game and non-game species are abundant on MCB Camp Lejeune. Managed game species include white-tailed deer (*Odocoileus virginianus*), black bear (*Ursus americanus*), wild turkey (*Melagris gallopavo*), bobwhite quail (*Colinus virginianus*), mourning dove (*Zenaida macroura*), fox squirrel (*Sciurus niger*), gray squirrel (*Sciurus carolinensis*), eastern cottontail rabbit (*Sylvilagus floridanus*), and a variety of waterfowl species. Non-game species found on MCB Camp Lejeune include raccoon (*Procyon lotor*), opossum (*Didelphis marsupialis*), and a variety of birds, reptiles and amphibians. Non-game species are not directly managed for, but derive secondary benefits from the various land management activities that take place aboard the Base, such as managing forest openings and prescribed fire. Much of the non-game species habitat is protected through association with other protected areas or species, such as wetlands or longleaf pine savannas. The *Integrated Natural Resources Management Plan* provides additional discussion of the status and management of these species on MCB Camp Lejeune (US Marine Corps, January 2007).

MCB Camp Lejeune conducts annual wildlife surveys of upland areas of the Base and creeks throughout the New River estuary. Songbirds, birds of prey, and small mammals frequent wildlife openings that primarily have been cleared, within forests, for game species. Observed bird species common to the New River estuary and barrier island marshes include waterfowl such as Canada goose (*Branta canadensis*), mallard (*Anas platyrhynchos*), gadwall (*A. strepera*), green-winged teal (*A. crecca*), American widgeon (*A. americana*), northern shoveler (*A. clypeata*), ruddy duck (*Oxyura jamaicensis*), wood duck (*Aix sponsa*), canvasback (*Aythya valisneria*), lesser scaup (*Aythya affinis*), bufflehead (*Bucephala albeola*), and common merganser (*Mergus merganser*). Wading birds associated with tidal marshes and mudflats include clapper rail (*Rallus longirostris*), Virginia rail (*Rallus limicola*), whimbrel (*Numenius phaeopus*), greater yellowlegs (*Tringa melanoleuca*), short-billed dowitcher (*Limnodromus griseus*), little blue heron (*Egretta caerulea*), snowy egret (*E. thula*), American egret (*Casmerodius albus*), great blue heron (*Ardea herodias*), and glossy ibis (*Plegadis fulcinellus*) (MCB Camp Lejeune, July 2002). Shorebirds foraging and nesting along beaches include Wilson's plover (*Charadrius wilsonia*), least tern (*Sterna antillarum*), and American oystercatcher (*Haematopus palliatus*) (MCB Camp Lejeune, January 2007). Presence/absence surveys are currently conducted along the beach and have been done for several years. In addition, nests are tracked mostly on the southern portion of Onslow Beach, documenting hatching and fledging success.

Many species of amphibians are common on MCB Camp Lejeune and serve an important role as sensitive indicators of environmental change. Fifteen species of frogs and six species of salamanders inhabit the Base (**Table 3.1-15**). American bullfrog and southern leopard frog are the most abundant on MCB Camp Lejeune. Frogs, for example, typically move extensive distances through the base, occupying a variety of landtypes. Moist environments such as ponds and areas along streams are used for breeding (January-July). Natural pools in mature

pine/hardwood stands and downed logs are used for egg cover during postbreeding (August-December) (North Carolina Department of Environment and Natural Resources Division of Forest Resources, 2006).

Table 3.1-15
Amphibian Species Occurring on MCB Camp Lejeune

| Frogs and Toads | |
|--|---|
| Southern toad (<i>Bufo terrestris</i>) | Northern Spring peeper (<i>Pseudacris crucifer crucifer</i>) |
| Coastal Plain Cricket frog (<i>Acris gryllus gryllus</i>) | Little grass frog (<i>Pseudacris ocularis</i>) |
| Cope's gray treefrog (<i>Hyla chrysoscelis</i>) | Eastern narrow-mouthed toad (<i>Gastrophryne carolinensis</i>) |
| Green treefrog (<i>Hyla cinerea</i>) | Eastern spadefoot (<i>Scaphiopus holbrookii</i>) |
| Pine Woods treefrog (<i>Hyla femoralis</i>) | American bullfrog (<i>Rana catesbeiana</i>) |
| Barking treefrog (<i>Hyla gratiosa</i>) | Northern Green frog (<i>Rana clamitans melanota</i>) |
| Southern leopard frog (<i>Rana sphenocephala utricularia</i>) | Ornate chorus frog (<i>Pseudacris ornate</i>) |
| Squirrel treefrog (<i>Hyla squirella</i>) | |
| Salamanders | |
| Marbled salamander (<i>Ambystoma opacum</i>) | Two-toad amphiuma (<i>Amphiuma means</i>) |
| Atlantic Coast slimy salamander (<i>Plethodon chlorobryonis</i>) | Broken-striped newt (<i>Notophthalmus viridescens dorsalis</i>) |
| Mabee's salamander (<i>Ambystoma mabeei</i>) | Eastern lesser siren (<i>Siren intermedia intermedia</i>) |
| Source: Department of Defense, 2001. | |

Migratory Birds

Migratory and most native-resident bird species are protected under the Migratory Bird Treaty Act, and their conservation by federal agencies is mandated by Executive Order 13186. The Migratory Bird Treaty Act prohibits the taking, killing, or possessing of migratory birds unless permitted by regulation. Eastern North Carolina sees a wide array of migratory birds because it is part of the Atlantic Flyway. Additionally, in eastern North Carolina there are 10 National Wildlife Refuges aimed to preserve and protect the natural environment.

MCB Camp Lejeune biologists have compiled several regional reports and used them to prepare a list of the species of concern that could potentially occupy the habitat in the MCB Camp Lejeune Range Complex. This list is provided in **Appendix D**. Chapter 4 of this EA provides an assessment of the likelihood of population level effects on these species.

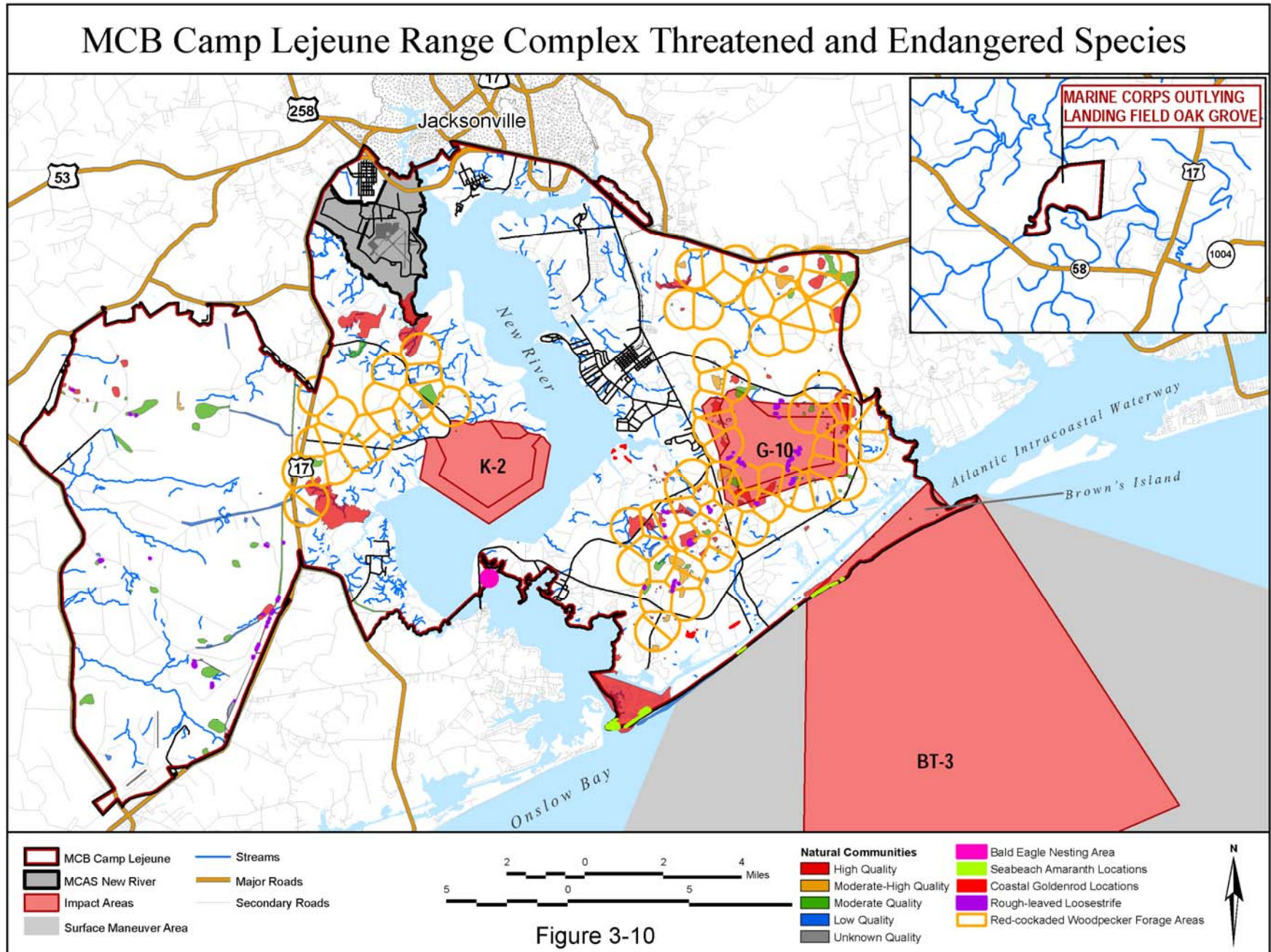
Threatened and Endangered Species

Threatened and endangered species are discussed in this EA because several are known to occur or potentially occur at MCB Camp Lejeune. The Endangered Species Act of 1973 and subsequent amendments provide for the conservation of threatened and endangered species of animals and plants, and the habitats in which they are found. The Endangered Species Act prohibits jeopardizing endangered and threatened species or adversely modifying critical habitats essential to their survival. Section 7 of the act requires consultation with the National Marine Fisheries Service and US Fish and Wildlife Service to determine whether any endangered or threatened species under their jurisdiction may be affected by the proposed action (MCB Camp Lejeune, August 2005). The Marine Corps conducts consultations as required with US Fish and Wildlife Service and National Marine Fisheries Service under Section 7 for any action which "may affect" a threatened or endangered species according to guidance provided in the Environmental Resources Program Manual, Marine Corps Order P5090.2A.

The Marine Corps coordinated with US Fish and Wildlife Service and the National Marine Fisheries Service to obtain their concurrence on the list of Threatened and Endangered Species with the potential to occur within the range complex (**Appendix E**). Federally listed threatened and endangered terrestrial species that occur in Onslow and Jones Counties (US Fish and Wildlife Service, January 2008), and their known or potential occurrence on MCB Camp Lejeune, are listed in **Table 3.1-16**. The occurrence of the two federally listed plant species known to occur on MCB Camp Lejeune is shown in **Figure 3-10**, along with the occurrence of coastal goldenrod, a species of concern. Additional discussion of listed species that are known to occur on MCB Camp Lejeune is provided in the following section.

Table 3.1-16
Federally Listed Terrestrial Plants and Animals in Onslow and Jones Counties, North Carolina and Their Occurrence on MCB Camp Lejeune

| Species/Federal Status | County of Occurrence | Habitat | Occurrence on Installation |
|--|----------------------|---|---|
| Seabeach amaranth (<i>Amaranthus pumilus</i>)/Threatened | Onslow | Occurs along Onslow Beach, likely on Brown's Island (Figure 3-10). | MCB Camp Lejeune. |
| Golden sedge (<i>Carex lutea</i>)/Endangered | Onslow | Pine savanna mixed with wet hardwood/conifer forests | Habitat present but not known to exist on installation. |
| Rough-leaved loosestrife (<i>Lysimachia asperulaefolia</i>)/Endangered | Onslow | Fire-maintained open-understory areas between upland longleaf pine and wet pond pine woodlands | Numerous populations on MCB Camp Lejeune (Figure 3-10). |
| Cooley's meadowrue (<i>Thalictrum cooleyi</i>)/Endangered | Onslow | Wet pine savanna; grass-sedge bogs | Not known to exist on MCB Camp Lejeune. |
| Red-cockaded woodpecker (<i>Picoides borealis</i>)/Endangered | Onslow, Jones | Longleaf pines are preferred and secondarily use shortleaf, loblolly, and slash pine habitat for nesting. Mature pines with open canopy for foraging. | 88 nest clusters on MCB Camp Lejeune (Figure 3-10); no occurrence on Marine Corps Outlying Landing Field Oak Grove, however, habitat is present. |
| Piping plover (<i>Charadrius melodus</i>)/Threatened | Onslow | Sandflats adjacent to inlets or passes for foraging; gently sloping foredunes or washout areas between foredunes for nesting. | No nesting recorded on MCB Camp Lejeune; migratory and wintering individuals occur on beaches. |
| American alligator (<i>Alligator mississippiensis</i>)/Threatened* | Onslow, Jones | Estuarine wetlands of the Atlantic Intracoastal Waterway and New River. | MCB Camp Lejeune. |
| Green sea turtle (<i>Chelonia mydas</i>)/Threatened | Onslow, Jones | Beaches | MCB Camp Lejeune, nesting annually. |
| Loggerhead sea turtle (<i>Caretta caretta</i>)/Threatened | Onslow, Jones | Beaches | MCB Camp Lejeune, nesting annually. |
| Leatherback sea turtle (<i>Dermochelys coriacea</i>)/Endangered | Onslow, Jones | Beaches | Habitat present at MCB Camp Lejeune and nearest nesting location is North of Base at Pine Knoll Shores. |
| Sources: US Marine Corps, January 2007; US Fish and Wildlife Service, January 2008. Note: 1. American alligator is listed as threatened due to similarity of appearance with the endangered American crocodile. This species is not biologically endangered or threatened and is not subject to section 7 consultation. | | | |



Seabeach amaranth is an herbaceous annual plant which colonizes and stabilizes the seaward areas, growing closer to the high tide line than any other coastal plant. This species is native to the barrier island beaches of the Atlantic Coast, occupying suitable habitat as it becomes available. It often grows in the same areas selected for nesting by shorebirds such as plovers, terns, and skimmers. It emerges on sand dunes, inlets, and over-wash flats in summer and early fall. Its distribution varies from year to year, influenced by seed dispersal and locally favorable conditions for germination, growth, and flowering (US Marine Corps, January 2007; US Fish and Wildlife Service, February 2008).

Seabeach amaranth has been eliminated from two-thirds of its historic range. Although some of the surviving populations are on public lands (National Seashores and State Parks), they are not completely protected from the threats that face almost all populations. Rangewide, the most significant threats to seabeach amaranth are beach stabilization structures, beach erosion, tidal inundation, beach grooming, herbivory, and off-road recreational vehicles (US Fish and Wildlife Service, February 2008).

The most persistent locations for seabeach amaranth have been in the vicinity of the New River Inlet and in the vicinity of Onslow North Tower (**Figure 3-10**). Management of this species on MCB Camp Lejeune consists of annual surveys and the marking of occupied sites to prevent damage by people and vehicles. Although Brown's Island is not regularly surveyed due to the fact that it is a duded impact area, it is expected that populations of seabeach amaranth exist on the island (US Marine Corps, January 2007).

Rough-leaved loosestrife is a perennial herb that spreads from underground rhizomes. It is endemic to the coastal plain and sandhills of North and South Carolina, and generally occurs in fire-maintained, open-understory areas in the ecotone between upland longleaf pine woodlands and wet pond pine woodland (US Fish and Wildlife Service, February 2008). It occurs on about 11 ha (27 ac) in locations scattered throughout MCB Camp Lejeune (US Marine Corps, January 2007) (see **Figure 3-10**).

Most of the populations are small, both in area covered and in number of stems. Fire suppression, wetland drainage, and residential and commercial development have altered and eliminated habitat for this species and continue to be the most significant threats to its continued existence. A protective 30 m (100 ft) buffer is marked around the perimeter of known populations, and within these areas, no vehicular traffic other than emergency vehicles is allowed. Rough-leaved loosestrife populations on MCB Camp Lejeune are given high priority for prescribed burning with burn activity occurring every 2-3 years (US Marine Corps, January 2007).

The red-cockaded woodpecker inhabits stands of large, old pines, especially longleaf pine, in which it excavates nesting and roosting cavities. These cavity tree clusters host family groups that consist of a breeding pair and a variable number of helpers that are typically male offspring of the breeding pair. Logging and fire suppression have resulted in the widespread replacement

of longleaf pine by loblolly pine and hardwoods, to the detriment of the red-cockaded woodpecker populations. MCB Camp Lejeune has an active forest management program that is geared toward reestablishing stands of longleaf pine and protecting established stands that are known to, or could in the future, support red-cockaded woodpecker nesting (US Marine Corps, January 2007).

Foraging habitat for red-cockaded woodpecker includes areas of very little hardwood encroachment that contains mature pines with an open canopy. Because red-cockaded woodpecker require that potential cavity trees and foraging habitat be within open stands with little to no hardwood over or understory, fire suppression has been a main cause for cluster abandonment (US Fish and Wildlife Service, February 2008).

MCB Camp Lejeune currently contains 88 active red-cockaded woodpecker nesting tree clusters (see **Figure 3-10**). The Base has worked closely with US Fish and Wildlife Service to create and implement their own red-cockaded woodpecker Recovery Plan. The plan consists of restoring and enhancing red-cockaded woodpecker habitat through forest management practices such as, prescribed burning of hardwood encroachment areas, and processes in place to restore populations of longleaf pine, the preferred habitat for red-cockaded woodpecker. In addition, the Base has implemented a monitoring plan to aid in continued growth of red-cockaded woodpecker clusters on MCB Camp Lejeune, as well as management practices (i.e., 61 m [200-ft] buffer zones and signage posted) to reduce effects from military activities. Since monitoring and management for red-cockaded woodpecker populations on MCB Camp Lejeune began in 1986, there has been a consistent annual growth average in active clusters of over 9 percent (US Marine Corps, January 2007).

The piping plover breeds on coastal beaches from Newfoundland and southeastern Quebec to North Carolina. These birds winter primarily on the Atlantic Coast, from North Carolina to Florida, although some migrate to the Bahamas and West Indies. Piping plover nests are situated above the high tide line on coastal beaches, sandflats at the ends of sandpits and barrier islands, gently sloping foredunes, blowout areas behind primary dunes, and washover areas cut into or between dunes. They may also nest on areas where suitable dredge material has been deposited. Nests are usually found in areas with little or no vegetation although, on occasion, piping plovers will nest under stands of American beachgrass (*Ammophila breviligulata*) or other vegetation (US Fish and Wildlife Service, February 2008).

Atlantic Coast piping plover migration patterns are not well documented. Most piping plover surveys have focused on breeding or wintering sites, and it is sometimes difficult to distinguish local nesting birds and fledged young feeding on neutral feeding areas, from non-local breeders on stopover during southward migration. Northward migration to the breeding grounds occurs during late February, March and early April, and southward migration to the wintering grounds is during late July, August, and September. Both spring and fall migration routes are believed to follow a narrow strip along the Atlantic Coast (US Fish and Wildlife Service, February 2008).

In general, wintering plovers on the Atlantic Coast are found at accreting ends of barrier islands, along sandy peninsulas, and near coastal inlets. Plovers appear to prefer sandflats adjacent to inlets or passes, sandy mudflats along prograding spits, and overwash areas as foraging habitats. Roosting plovers are generally found along inlets and adjacent ocean and estuarine shorelines and their associated berms (with wrack and other debris often used as wind-shields), and on nearby exposed tidal flats (US Fish and Wildlife Service, February 2008).

Although Onslow Beach is utilized for foraging and resting at any time of the year, no nesting has been documented on MCB Camp Lejeune. MCB Camp Lejeune conducts breeding season surveys and is committed to the protection of any piping plover nests that are discovered on the installation (US Marine Corps, January 2007). Recently, researchers from Virginia Polytechnic Institute and State University (Ray et. al. 2008, unpublished data) completed a season-long survey of shorebird use on Onslow Beach at MCB Camp Lejeune. The early breeding survey period was from March 15 through May 31, 2008; this covers to the timeframe of spring migration, pair establishment, nesting, and egg-laying for most breeding species. Surveys were also completed from June 1 through August 15, 2008 which would cover the hatching, rearing, and fledging life-cycle stages. In order to assess the potential effects of human disturbance on shorebird activity, data was analyzed for approximately 11.5 km (7.1 miles) of Onslow Beach as follows: 5.0 km (3.1 mi) of “developed recreational beach” to the north, a central “amphibious training beach” of 2.9 km (1.8 mi), and 3.5 km (2.2 mi) of a generally undisturbed “south beach/overwash area” (near New River Inlet). Piping plovers were observed in various portions of Onslow Beach throughout the spring and summer months. Of the 20 instances that piping plovers were observed:

- Nearly all observations were seaward of the dunes, with only 2 (10%) individuals observed in the back marshes along the Atlantic Intracoastal Waterway.
- Many sightings were of an individual (40%) or pair of birds (45%), but on three (15%) occasions a trio of piping plovers were observed.
- Only one (5%) time were they found in the amphibious/training portion of Onslow Beach (at 7:30 pm on April 20, 2008), where three individuals were observed foraging with Wilson’s plovers.
- On only 2 (10%) occasions were they documented using the developed/recreational beach areas (early in the season, on March 26, 2008, foraging in the intertidal zone).
- The majority (17, or 85%) of the sightings were in the more undisturbed areas of south beach, the washover area, and the adjoining impact buffer.

A total of 24 species were documented within the study area, with the greatest diversity and highest abundance appearing in the south beach and washover complex (Ray et. al. 2008). Fewer species (35% less) were documented using the portions of the beach where training and recreational activities are routine. While piping plovers can forage almost anywhere along Onslow Beach, only the large overwash area and wider areas of accreting sand along the inlets are considered suitable for plover breeding (Ray et.al. study (2008)).

Piping plovers are known to nest on Bear Island within Hammocks Beach State Park, and have been observed on the Park's beaches as recently as November 2008 (North Carolina Division of Parks and Recreation, November 2008). Breeding success data were not immediately available from Hammocks Beach State Park. However, Atlantic Coast population nesting success estimates show a steady increase in breeding pairs over the past 5 years for North Carolina's populations (US Fish and Wildlife Service, April 2008); 61 breeding pairs in 2007, 46 in 2006, 37 in 2005, 24 in 2004, and 20 in 2003. An eastern portion of Bear Island is designated as critical habitat for the species, part of NC Unit -10, Bogue Inlet (US Fish and Wildlife Service July 2001). This critical habitat is adjacent to MCB Camp Lejeune's water ranges (BT-3 Impact Area, see **Figure 2-2**) and special use airspace (R-5306D, see **Figure 2-3**), and is underneath special use airspace R-5306C, which is controlled by MCAS Cherry Point. MCB Camp Lejeune aircraft activity over Bear Island includes rotary wing operations below 500 ft above ground level, below the R-5306C airspace.

The American alligator is listed as threatened due to similarity of appearance to the American crocodile. The threatened American alligator is found in the waters surrounding MCB Camp Lejeune and nests in brackish waters of the major tributaries. It has been sighted in the New River watershed and Atlantic Intracoastal Waterway (MCB Camp Lejeune, July 2002).

Green and loggerhead sea turtles, both listed as threatened, are known to nest regularly along Onslow Beach, mostly from mid-May through August. However, nest monitoring has been conducted on the beach from May 1 through October 31 since 1979 (MCB Camp Lejeune, January 2007). And, even though the endangered leatherback sea turtle has not been documented as nesting on Onslow Beach, they do nest on nearby beaches and inhabit nearshore areas. Leatherback nesting activities in North Carolina have been confirmed during the years 1998, 2000 and 2002 and suspected on occasion in years past. Because leatherbacks nest as early as late February, it is possible that nesting attempts on Onslow Beach have been missed over the years by MCB Camp Lejeune staff, as they do not begin monitoring until May 1. For additional information on sea turtles occurring in the nearshore areas of the Base, please refer to Marine Biology (**Subchapter 3.2.5.3**).

In addition to the federally listed threatened and endangered species mentioned above, federal species of concern are designated in Onslow and Jones Counties. Federal species of concern are defined as species that previously were or could potentially be considered for listing under the Endangered Species Act (US Fish and Wildlife Service, January 2008). There are 26 federal species of concern designated for Onslow County, of which 13 are known to occur on MCB Camp Lejeune and are listed below (US Marine Corps, January 2007). Six federal species of concern are designated for Jones County; however there are no documented occurrences of these species at Marine Corps Outlying Landing Field Oak Grove (MCAS Cherry Point, September 2001). The thirteen Onslow county species known to occur on MCB Camp Lejeune include the following:

- Hirst's panic grass (*Dichanthelium* sp.) – candidate for listing

- Venus flytrap (*Dionea muscipula*)
- Pondspice (*Litsea aestivalis*)
- Boykin's lobelia (*Lobelia boykinii*)
- Loose watermillfoil (*Myriophyllum laxum*)
- Awned meadowbeauty (*Rhexia aristosa*)
- Thorne's beaksedge (*Rhynchospora thornei*)
- Coastal goldenrod (*Solidago villosicarpa*)
- Carolina asphodel (*Tofieldia glabra*)
- Bachman's sparrow (*Aimophila aestivalis*)
- Henslow's sparrow (*Ammodramus henslowii*)
- Southern hognose snake (*Heterodon simus*)
- Carolina gopher frog (*Rana capito*)
- Red knot (*Calidris canutus*)

Of the above, coastal goldenrod is especially noteworthy as MCB Camp Lejeune contains three of the five known populations. The foregoing sensitive species are associated with rare natural communities, and their occurrence on MCB Camp Lejeune is described in the *Integrated Natural Resources Management Plan*. As noted in the *Integrated Natural Resources Management Plan*, these communities tend to occur in wetlands, have limited accessibility, or are protected by virtue of their occurrence in the red-cockaded woodpecker cluster sites (US Marine Corps, January 2007). These communities are mapped as sensitive natural communities in **Figure 3-10**.

Other Sensitive Species

Several bird species are of general conservation interest on MCB Camp Lejeune. Bluebird (*Sialia sialis*) nesting boxes are maintained by the Base in partnership with local groups. Since 2000, there has been a bald eagle (*Haliaeetus leucocephalus*) nest at the junction of Snead's Creek and New River (see **Figure 3-10**). Protective buffers have been established around the nest to limit air and ground activities that could disrupt nesting. Other nesting species of interest include osprey (*Pandion haliaetus*) and wood duck (*Aix sponsa*) (US Marine Corps, January 2007).

3.1.7 Hazardous Materials and Hazardous Waste Management – Land Ranges

This EA analyzes impacts related to hazardous materials and hazardous waste based on the potential for hazardous materials to be introduced to the installation during the course of ground range training exercises. This subchapter addresses hazardous materials and waste management in compliance with the Resource Conservation and Recovery Act, and potential hazardous waste contamination areas. The various departments and divisions within MCB Camp Lejeune generally order hazardous materials through the supply system. Most materials are purchased through outside vendors. Implementation of the Hazardous Material Management System has helped reduce the amount of hazardous materials purchased, resulting in a decrease in hazardous waste, particularly waste generated by product expiration.

3.1.7.1 Hazardous Materials

Hazardous materials are broadly defined as those materials with clearly hazardous properties that are in general use in commercial, military, or industrial applications. Hazardous materials are chemical substances that pose a substantial threat to human health or the environment. In general, these materials pose hazards because of their quantity, concentration, physical, or chemical characteristics. Hazardous materials used in training include some common things such as petroleum products, coolants, paints, adhesives, solvents, corrosion inhibitors, cleaning compounds, photographic materials, and chemicals. Hazardous materials are also used in high technology missiles, munitions, and targets because they are strong, lightweight, reliable, or long-lasting. Both live and inert munitions contain hazardous materials, as do other training materials, such as glowsticks and weapon lubricants.

Hazardous materials are present at MCB Camp Lejeune as fuel, lubricants, munitions, and cleaning and maintenance materials. Larger volumes of these materials are stored within the cantonment area. However, many of these compounds are also used and temporarily stored in smaller quantities in training areas for the duration of training events. On the ground ranges hazardous materials are present mostly in the form of munitions and explosives.

MCB Camp Lejeune personnel follow procedures established by Base Order 5090.9 and 5090.91 for handling of hazardous material and petroleum, oils, and lubricants. Base Order 5090.9 is the Base's *Hazardous Waste and Hazardous Material Management Program*. Base Order 5090.91 is the Base's *Oil and Hazardous Substance Pollution Prevention and Pollution Abatement Facility Management Plan*. Infrequently, leaks, and spills of hazardous materials— especially petroleum products— do occur. If a spill occurs, Unit Level Contingency Plans are implemented.

3.1.7.2 Hazardous Constituents

Hazardous constituents generally can be defined as hazardous materials present at low concentrations in a generally non-hazardous matrix, such that their hazardous properties do not produce acute effects. Component hazardous materials are considered hazardous constituents. Components that contain hazardous constituents include propellants, batteries, flares, igniters, jet fuel, diesel fuel, hydraulic fluid, and explosive warheads. Each of these constituents has the potential to affect human health and the environment through direct contact with water, soil, or air.

Equipment used in training does not intentionally release hazardous constituents into the environment. However, tactical equipment may produce waste streams that contain hazardous constituents. Training-related material components that could potentially contain hazardous constituents include bilgewater and/or oil water separator discharges, gray water, and cooling water. Waste streams are handled according to Standard Operating Procedures and are not released into the environment.

Expendable training material such as bombs, missiles, targets, flares, and detonation residues can release contaminants to the environment upon use, or leach small amounts of toxic substances as

they explode and decompose. The hazardous constituents that may be released upon use are generally referred to as energetic chemicals. Most are commonly found in the explosive, propellant, and pyrotechnic elements of munitions, as summarized in **Table 3.1-17**. These constituents may also leak from munitions that do not detonate on impact as intended.

Table 3.1-17
Munitions Elements and Respective Hazardous Constituents

| Munitions Element | Energetic Chemicals |
|---|---|
| Explosives | trinitrotoluene (TNT), cyclotrimethylenetrinitramine (RDX), hexahydro-trinitro-triazine (HMX) |
| Propellants | Nitrocellulose (NC), Nitroglycerin (NG), Nitroguanidine (NQ), 2,4-Dinitrotoluene (2,4-DNT), perchlorate |
| Source: US Army Engineer Research and Development Center Cold Regions Research and Engineering Laboratory, 2007 | |

The chemicals listed in **Table 3.1-17** were studied by the US Army Engineer Development Center and based on the study were considered to be the primary indicator munitions constituents due to their chemical stability within the environment. They are common high explosives used in a wide variety of military munitions and have the potential to occur in historical and current operational ranges and training areas within the MCB Camp Lejeune Range Complex. The volume of expended material that decomposes within the training areas and the amounts of toxic substances being released to the environment gradually increases over the period of military use. Concentrations of some substances in sediments surrounding the expended material may also increase over time. Transport of these substances via winds and erosion may eventually disperse these contaminants outside training areas.

In addition to the hazardous constituents from energetic chemicals, hazardous constituents may also leach from solid components of munitions such as bomb hulls, targets, and small arms ammunition. For bomb construction, the American Society for Testing and Materials Standards specify each of the iron bomb bodies or steel fins may contain small percentages (typically less than 1 percent) of any of the following: carbon, manganese, phosphorus, sulfur, copper, nickel, chromium, molybdenum, vanadium, columbium, or titanium. The aluminum fins, in addition to the aluminum, may also contain: zinc, magnesium, copper, chromium, manganese, silicon, or titanium (Department of the Navy, March 2005).

The munitions constituents associated with small arms ammunition commonly used at operational ranges include lead, antimony, copper, and zinc. The primary munitions constituent of concern at small arms ranges is lead because it is the most prevalent (by weight) potentially hazardous constituent associated with small arms ammunition. Lead is geochemically specific regarding its mobility in the environment. Site-specific conditions (i.e., geochemical properties) must be known to quantitatively assess lead migration. The scientific community has established that metallic lead (such as recently fired, unweathered bullets and shot) generally has low chemical reactivity and is relatively inactive in the environment under most ambient or everyday conditions. However, a portion of lead deposited on an operational range may become environmentally active if the right combination of conditions exists.

MCB Camp Lejeune has conducted a baseline assessment to determine if there is a potential for munitions constituents from an operational range to migrate off-range and cause an unacceptable risk to human and/or ecological receptors. This baseline assessment was conducted under the Range Environmental Vulnerability Assessment program. The Range Environmental Vulnerability Assessment process will be completed, at a minimum, every five years on all operational ranges at MCB Camp Lejeune. The main pathways that were identified under the Range Environmental Vulnerability Assessment to evaluate off-range migration include both surface water and groundwater. During the baseline assessment two separate groundwater aquifers were identified at the installation. These include the surficial aquifer (shallow) and the Castle Hayne aquifer (deep), which are separated by the Castle Hayne Confining Unit. The Castle Hayne aquifer is used as a drinking water supply for the installation and surrounding communities. Based on the baseline assessment, 33 munitions constituent loading areas (areas on the operational range where munitions constituents are predicted to be deposited) were identified and assessed. Of these 33 areas, two areas were assessed further to determine if munitions constituents were indeed migrating off-range, and if so, at what levels. These two areas include the G-10 and K-2 Impact Areas (US Marine Corps, February 2006).

3.1.7.3 Hazardous Waste Management

A hazardous waste may be a solid, liquid, semi-solid, or contain gaseous material that alone or in combination may: 1) cause, or significantly contribute to, an increase in mortality or an increase in serious irreversible or incapacitating reversible illness; or 2) pose a substantial present or potential hazard to human health or the environment when improperly treated, stored, transported, disposed, or otherwise managed.

The Resource Conservation and Recovery Act, 42 US Code § 6901 *et seq.*, regulates management of solid waste and hazardous waste. The Military Munitions Rule clarifies when conventional and chemical military munitions become a hazardous waste under Resource Conservation and Recovery Act. Military munitions are not considered hazardous waste under two conditions stated in the US Environmental Protection Agency Military Munitions Rule and the Department of Defense Interim Policy on Military Munitions (1997). These conditions cover virtually all the uses of missiles, munitions, and targets at the MCB Camp Lejeune. Specifically, munitions are not considered hazardous waste when:

- Used for their intended purpose, including training of military personnel and explosive emergency response specialists, research and development activities, and when recovered, collected, and destroyed during range clearance events
- Unused and being repaired, reused, recycled, reclaimed, disassembled, reconfigured, or subjected to other material recovery activities

Base Order P3570.1B, Chapter 6, Base Order 5090.9, and the MCB Camp Lejeune *Hazardous Waste Management Plan* provide information on management of hazardous waste. These documents provide a comprehensive compilation of procedures and requirements mandated by law, directive, or regulation. They have a compliance orientation to verify the safe and efficient control, use, transport, and disposal of hazardous waste. Hazardous waste and materials used or

generated at MCB Camp Lejeune Range Complex are handled, stored and disposed of in accordance with the procedures mandated in these documents.

Hazardous waste is present within the MCB Camp Lejeune Range Complex. Most of the accumulated hazardous waste is brought to the Environmental Management Division's consolidation center, and then transferred off-base through the Defense Reutilization and Marketing Office (MCB Camp Lejeune, August 2003). These materials typically are accumulated in designated areas and then transported to licensed disposal facilities in accordance with Resource Conservation and Recovery Act guidelines.

As a result of historic incidences of improper disposal of hazardous waste, isolated deposits of various types of hazardous waste may be found at identified Installation Restoration sites. Known Installation Restoration sites are documented at locations across the Range Complex through the MCB Camp Lejeune Installation Restoration program which manages the cleanup of these sites. This program was initiated by the Department of the Navy to satisfy the requirements of the Comprehensive Environmental Response, Compensation, and Liability Act for former and current hazardous waste sites.

3.1.8 Public Health and Safety – Land Ranges

Public health and safety issues include potential hazards inherent in range training operations. It is the policy of the Marine Corps and the Navy to observe every possible precaution in the planning and execution of all activities that occur onshore or offshore to prevent injury to people or damage to property.

All range safety precautions and regulations contained in Base Order P3570.1B, *Range and Training Regulations, Standing Operating Procedures for Range Control* (US Marine Corps, October 2006) apply in the MCB Camp Lejeune Range Complex. The Commanding Officer of MCB Camp Lejeune is the controlling authority for all ranges and training areas within the MCB Camp Lejeune Range Complex. The Standard Operating Procedures establish procedures for the safe use of weapons. It also sets restrictions on the use of various types of ordnance and certain types of operations. The procedures provide specific safety guidelines for each individual range and training facility.

3.1.8.1 Laser Safety

A comprehensive safety program exists for the use of lasers. Lasers are categorized by "class." Class I, Class II, and Class III lasers are authorized in all training areas, ranges and training facilities aboard MCB Camp Lejeune. The Base restricts use of Class IIIb and Class IV lasers to certain areas (Observation Posts 2, 3, and 5, and Ranges K211, K301, K319, S-7 and S-10) to prevent off-base impacts. Lasers are used occasionally on the nearshore and offshore ranges or both precision distance range finding and target designation for guided munitions.

Lasers are used for precision range finding and by target designation systems for guided munitions. Units conducting laser operations are required to complete a laser safety course, and

to observe strict safety precautions (Department of Defense, December 1996). Strict precautions and written instructions are in place and observed by laser users to protect personnel from eye or skin injury due to the light energy. Some Class IIIb and Class IV lasers may also pose a burn hazard to the skin. The hazard of exposure to the skin is small when compared to the eye; however, personnel should avoid direct laser beam exposure to high power lasers (Department of Defense, December 1996). Use of Class I through Class IIIa lasers is associated with the firing of weapons and/or munitions (except tank activities). For tank related activities, Class IIIb and Class IV lasers are used. These activities only take place in areas that are currently certified for laser usage.

To maintain public safety during laser training at ground ranges certain specific precautions are taken. Laser users must determine that ground-based lasers are at the approved operating position or firing points and always pointed down range toward the target. Targets are not positioned outside the controlled area. Every diffuse reflecting object that the laser beam strikes has the potential to reflect some energy in all directions and toward the laser. To avoid hazardous specular reflections, the area around the target is cleared of specular (mirror-like) reflectors. To protect the public and control access to potential laser hazard areas fences and warning signs are used. Roads or other access points to the range area are evaluated to determine the probabilities of non-controlled personnel entering the target area or controlled range areas. Roadblocks are established and posted at the area where access could occur (Department of Defense, December 1996).

3.1.8.2 Bird/Animal-Aircraft Strike Hazard

Bird/Animal-Aircraft Strikes can represent a hazard to aircraft during landing and take-off and in extreme cases can result in accidents. Migration corridors and other areas where birds congregate (e.g., water bodies) represent the locations with the greatest hazard when birds are present. Based on these potential effects, the Marine Corps devotes considerable attention to avoid the possibility of bird-aircraft strikes. Special purpose permits may be requested and issued that allow for the relocation or transport of migratory birds as necessary to maintain safe operating procedures. MCB Camp Lejeune requests a depredation control permit for various gull species and Canada geese on an annual basis. This permit allows the Base to take management actions regarding bird animal strike hazards around airfields (US Marine Corps, January 2007). Current Navy and Marine Corps instructions implementing aspects of the Bird/Animal-Aircraft Strikes program include Marine Corps Order 3750.6R, Marine Corps Order 5090.1B, and Naval Facilities Engineering Command Procedural Manual P-73. Marine Corps Order 3750.6R (Chapter 4) outlines the procedures for submitting hazard reports for bird and animal strikes. The draft Department of the Navy Marine Corps Order (Office of the Chief of Naval Operations Instruction [Chapter 6]) concerning the Bird/Animal-Aircraft Strikes Prevention Manual discusses the role of Air Traffic Control Tower personnel to communicate the current airfield Bird/Animal-Aircraft Strikes condition via the Automatic Terminal Information System per Federal Aviation Administration Order 7110.65.

3.1.8.3 Communications

Exercise Control and Coordination circuits provide two-way communications among Range Operations personnel through radios and telephones. Two-way communication must be maintained between the laser system operators and all affected range personnel (Department of Defense, December 1996). Before any training can commence, personnel must conduct a visual clearance of the area to assure that it is clear of both civilian and military personnel and report to Range Control and communicate any potential hazard, or if there is a need to abort the scheduled training exercise using the operational communication circuits (US Marine Corps, October 2006).

3.2 WATER RANGES

3.2.1 Coastal Zone Management – Water Ranges

The coastal zone is rich in natural, commercial, recreational, ecological, industrial, and aesthetic resources. As such, it is protected by legislation for the effective management of its resources. The Coastal Zone Management Act of 1972 (16 US Code§ 1451, et seq., as amended) provides assistance to states, in cooperation with federal and local agencies, for developing land and water use programs in the coastal zone.

Coastal Zone Management Act policy is implemented through state coastal zone management programs. Federal lands are excluded from the jurisdiction of these state programs. However, activities on federal lands are subject to the Coastal Zone Management Act federal consistency requirements if the federal activity will affect any land or water or natural resource in the state's coastal zone, including reasonably foreseeable effects.

The North Carolina Coastal Area Management Act of 1974 was passed in accordance with the federal Coastal Zone Management Act. It established a cooperative program of coastal area management between local and state governments. The Coastal Area Management Act established the North Carolina Coastal Resources Commission, required local land use planning in the coastal counties and provided for a program for regulating development. The North Carolina Coastal Management Program was federally approved in 1978. North Carolina's coastal zone includes the 20 counties that are adjacent to, adjoining, intersected by, or bounded by the Atlantic Ocean or any coastal sound, including Onslow County. The coastal zone extends seaward to the 6 km (3 nm) territorial sea limit.

There are two tiers of regulatory review for projects within the coastal zone. The first tier includes projects that are located in Areas of Environmental Concern, which are designated by the state. The second tier includes land uses with the potential to affect coastal waters, even though they are not defined as Areas of Environmental Concern. These projects are reviewed under the Coastal Area Management Act General Policy Guidelines. Both of these are explained in more detail below.

Areas of Environmental Concern

The North Carolina Coastal Resources Commission designated Areas of Environmental Concern within the 20 coastal counties and set rules for managing development within these areas. An Area of Environmental Concern is an area of natural importance. These areas may be easily destroyed by erosion or flooding, or it may have environmental, social, economic, or aesthetic values that make it valuable. Its classification protects the area from uncontrolled development. Projects located within an Area of Environmental Concern undergo a more thorough level of regulatory review.

Areas of Environmental Concern include almost all coastal waters and about three percent of the land in the 20 coastal counties. The four categories of Areas of Environmental Concern are:

- The Estuarine and Ocean System, which includes public trust areas, estuarine coastal waters, coastal shorelines, and coastal wetlands
- The Ocean Hazard System, which includes components of barrier island systems
- Public Water Supplies, which include certain small surface water supply watersheds and public water supply well fields
- Natural and Cultural Resource Areas, which include coastal complex natural areas; areas providing habitat for federal or state designated rare, threatened or endangered species; unique coastal geologic formations; or significant coastal archaeological or historic resources.

General Policy Guidelines

Projects that are located outside of an Area of Environmental Concern are reviewed under the General Policy Guidelines. The North Carolina Coastal Area Management Act sets forth 11 General Policy Guidelines (two policies on use of coastal airspace and on water- and wetland-based target areas for military training areas are not enforceable), addressing:

- Shoreline erosion policies
- Shorefront access policies
- Coastal energy policies
- Post-disaster policies
- Floating structure policies
- Mitigation policy
- Coastal water quality policies
- Policies on use of coastal airspace
- Policies on water- and wetland-based target areas for military training areas
- Policies on beneficial use and availability of materials resulting from the excavation or maintenance of navigational channels
- Policies on ocean mining

The purpose of these rules is to establish generally applicable objectives and policies to be followed in the public and private use of land and water areas within the coastal area of North Carolina.

Onslow County Coastal Management Policies

The Coastal Area Management Act requires local governments in each of the 20 coastal counties in the state to prepare, implement, and enforce a land use plan and ordinances consistent with established state and federal policies. Specifically, local policy statements are required on resource protection; resource production and management; economic and community development; continuing public participation; and storm hazard mitigation, post-disaster recovery, and evacuation plans. Upon approval by the North Carolina Coastal Resources Commission, each plan becomes part of the North Carolina Coastal Management Plan.

Onslow County adopted its Land Use plan in conformity with the Coastal Area Management Act in 2000, and is currently updating the plan. The county has zoning controls applicable to only one special area, Golden Acres in Stump Sound Township. The county does, however, require

review of subdivisions, providing for minimum standards, enforced by the county Planning Department. Incorporated areas within the county implement their own zoning regulations. Onslow County's *Citizen's Comprehensive Plan for Onslow County*, adopted in 2003, also addresses land use planning in relation to the Coastal Area Management Act (Onslow County Planning and Development Department, April 2003).

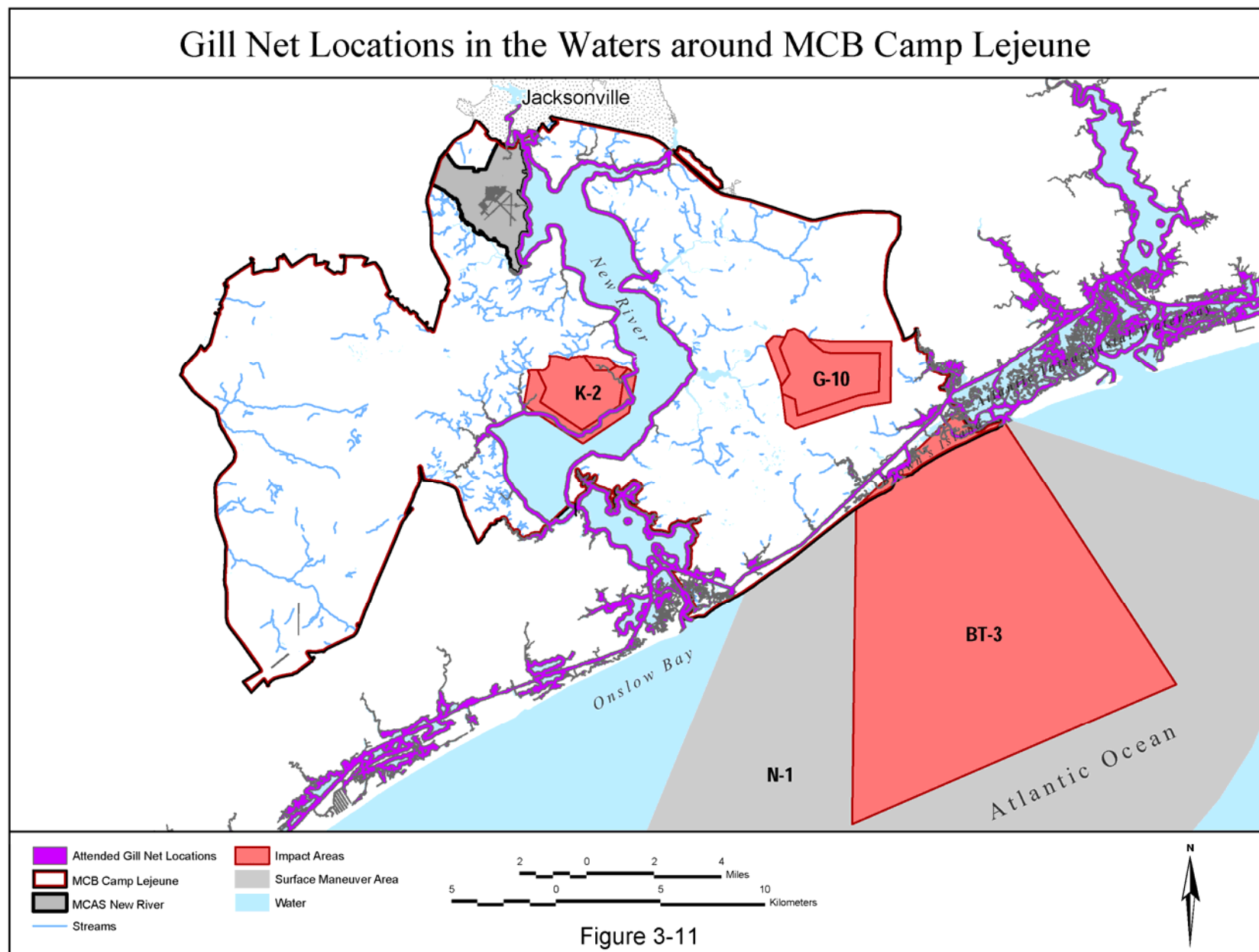
Specific information on the Area of Environmental Concern, general policy guidelines, and local coastal management policies as related to the No Action Alternative and proposed action is included in Coastal Zone Management (**Subchapters 4.2.1**).

3.2.2 Socioeconomics – Water Ranges

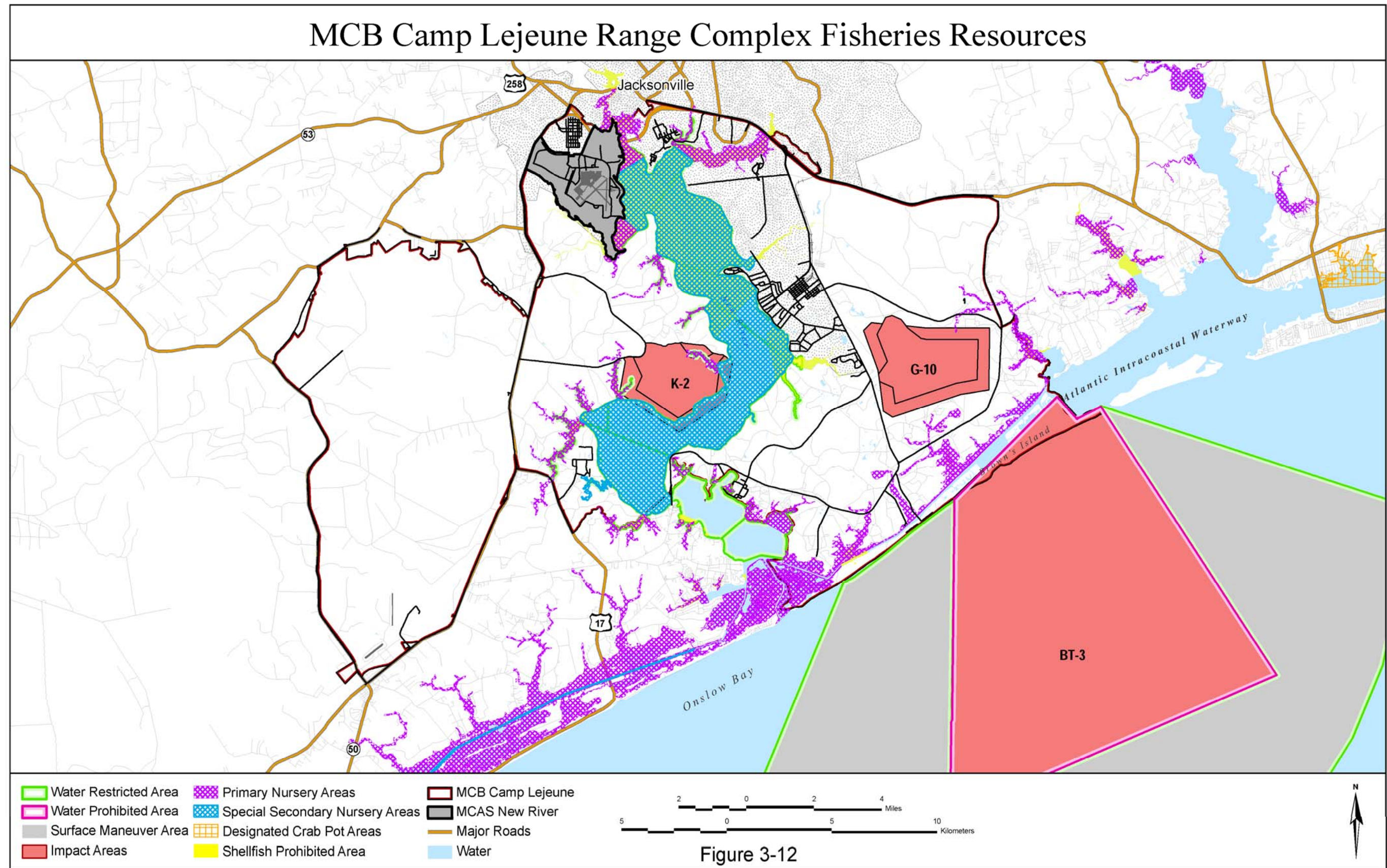
The region of influence of the proposed action for potential socioeconomic impacts is Onslow County.

3.2.2.1 Commercial and Recreational Fishing

The New River and its bays, the Atlantic Intracoastal Waterway, Brown's Inlet, Bear Inlet and Onslow Bay are estuarine, inshore and offshore waters within the region of influence, that support commercial and recreational fisheries. The North Carolina Division of Marine Fisheries designates waters for crab pots and gill net fishing; these areas are shown in **Figures 3-11 and 3-12**. The navigation channel of the Atlantic Intracoastal Waterway is closed to crab pots and other fixed gear that could create a navigation hazard (North Carolina Division of Marine Fisheries, 2005). There is also an active commercial and recreational hook and line fishery in the New River, Atlantic Intracoastal Waterway, and Onslow Bay.



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Commercial Fishing – Landings

The National Marine Fisheries Service collects landings data from several sources, including state-mandated fishery or mollusk trip-tickets; landing weigh-out reports provided by seafood dealers; federal logbooks of fishery catch and effort; shipboard and portside interviews; and biological sampling of catches (National Oceanic and Atmospheric Administration, National Marine Fisheries Service, August 2008). These data are incorporated into the National Marine Fisheries Service Fisheries Statistics and Economics Division commercial landings databases. Three caveats are relevant to the interpretation of this data:

- Landing data do not indicate the location of capture; fish landed in North Carolina by North Carolina fisherman could have been taken offshore of another state, but landed in North Carolina
- Data report only non-confidential landing statistics; whenever confidential landings occur, they have been combined with other landings and usually reported as unclassified. Total landings by state include confidential data and are accurate, but landings reported by individual species may be misleading
- All of the estimates of value presented in the section are based on ex-vessel value, or the price the fishermen are paid for their catch at the point of landing; this value increases by several orders of magnitude as the fish are sold up the chain from the dealers to restaurants, grocery stores, etc. and later to the public

North Carolina

In 2005, North Carolina was ranked ninth in US domestic commercial fisheries landings with an annual recorded catch of 35,913,629 kilograms (kg) (79,176,000 pounds [lbs]) valued at \$59,824,000. In 2006 the state was ranked fourteenth in US domestic commercial fisheries landings with an annual recorded catch of 31,135,000 kg (68,641,000 lbs) valued at \$71,886,000. Both years the state was ranked first out of the south Atlantic states (North Carolina, South Carolina, Georgia and Florida – east coast) in commercial fisheries landings (National Oceanic and Atmospheric Administration, National Marine Fisheries Service, February 2008).

Approximately 76 percent of the commercial value for the North Carolina inshore fishery is shellfish, primarily blue crabs (*Callinectes sapidus*), shrimp (*Penaeus spp.*), and clams (*Mercenaria mercenaria*) (Naval Facilities Engineering Command, Atlantic Division, March 1998). Crabs are harvested by trawler and by crab pots, shrimp are harvested primarily with trawlers, and clams are harvested by hand or mechanically (Naval Facilities Engineering Command, Atlantic Division, 1998).

Onslow County

The North Carolina Division of Marine Fisheries License and Statistics Section provides annual data on North Carolina fisheries. Between 2003 and 2007, commercial seafood landings in Onslow County were 5,401,892 kg (11,884,163 lbs) having an estimated value of \$24,187,224 (North Carolina Division of Marine Fisheries, October 2008), an annual average value of \$4.84 million. Shrimp, crabs, clams and oysters composed more than 26 percent of the species composition by weight during this period. In 2007, commercial landings for Onslow County

were reported to be 1,159,185 kg (2,550,206 lbs) and had an estimated value of \$5,542,501. Between 2003 and 2007, Onslow County ranked between third and second in commercial fishing effort and accounted for between 12.34 and 14.61 percent of the total number of trips landed in the coastal counties of North Carolina (**Table 3.2-1**).

Table 3.2-1
Onslow County Commercial Landings and Effort Data 2003-2007

| Year | # of Trips | % of Total NC Trips | Trip Rank | Pounds Landed (in thousands) | % of Total NC Pounds | Pound Rank |
|------|------------|---------------------|-----------|------------------------------|----------------------|------------|
| 2003 | 24,678 | 12.51 | 3 | 2,934 | 2.10 | 9 |
| 2004 | 22,922 | 12.34 | 3 | 2,333 | 1.74 | 8 |
| 2005 | 19,391 | 12.48 | 3 | 1,518 | 1.91 | 9 |
| 2006 | 21,223 | 14.14 | 2 | 2,549 | 3.71 | 7 |
| 2007 | 23,267 | 14.61 | 2 | 2,550 | 4.05 | 8 |

Source: North Carolina Division of Marine Fisheries, October 2008

The main ports in Onslow County are Sneads Ferry and Swansboro. Annual commercial landings in pounds and landings values compiled by the National Marine Fisheries Service are listed in **Table 3.2-2** for most years between 2000 and 2007. The last few years show a slight decline over the annual landings in 2000, which were 3.1 million pounds. In 2006, Sneads Ferry-Swansboro ranked eighty-sixth of ninety-three major ports in the US, and fifth of the five major ports of North Carolina (National Marine Fisheries Service, August 2008).

Table 3.2-2
Sneads Ferry-Swansboro, North Carolina Landings by Year

| Year | Millions of Pounds | Millions of Dollars |
|------|--------------------|---------------------|
| 2007 | 2.4 | 5.4 |
| 2006 | 2.6 | 5.5 |
| 2003 | 3.0 | 5.0 |
| 2002 | 2.9 | 6.4 |
| 2001 | 2.8 | 5.6 |
| 2000 | 3.1 | 6.3 |

Source: National Marine Fisheries Service, August 2008.

According to statistics on commercial landings by waterbody provided in the North Carolina Division of Marine Fisheries annual report for 2007, the New River and Atlantic Intracoastal Waterway contribute approximately 29 percent and 6.5 percent, respectively, to the total landings at Sneads Ferry-Swansboro (North Carolina Division of Marine Fisheries, 2007).

Commercial Fishing - Economy

Between 1994 and 2001, fishermen in Onslow County earned incomes from fishing that were 50 percent or less of the average income of the Onslow County workforce. Employment in the fishing industry represents less than 1 percent of total employment in Onslow County where military is, by far, the largest employer (Onslow County, April 2003).

Similarly, a social and economic study of fishermen of the Core Sound area in Carteret County, to the north of Onslow County, extending from Shackleford Banks north along the Core Banks, demonstrates that commercial fishing has declined in volume and value over the last ten years

(Crosson, 2007). The value of landings in that area has declined by 50 percent since 1997, and the participation rates have dropped by 43 percent. According to the 2007 study, income from fishing has comprised a smaller portion of the total income for most fishermen, who were 96 percent male and 99 percent white. Fishermen interviewed for the study attributed the decline to (listed in order of ranked importance): high fuel prices; low seafood prices; imported seafood; coastal development; loss of working waterfronts; inability to predict future business; Federal and state regulations; too many areas off limits to fishing; and gear and seasonal restrictions.

Commercial fishing has very little effect on the Onslow County economy (Jacksonville Onslow Economic Development, December 2007). The major drivers of the economy are the military, other government entities, retail trade and travel/tourism. Nevertheless, Onslow County maintains its historical connection to fishing, most notably in the village of Sneads Ferry where the annual Shrimp Festival has been held for the last thirty-eight years. Several major fishing tournaments also occur annually in Onslow Bay offshore of Onslow County.

Recreational Fishing – Landings

The Marine Recreational Fishery Statistics Survey, conducted by the National Marine Fisheries Service, provides estimates of fishing effort, catch, and participation by recreational anglers in the marine waters of the US by state. There are no data available by port for recreational fisheries. The following discussion of recreational fishing is based on the findings of the Marine Recreational Fishery Statistics Survey (National Oceanic and Atmospheric Administration, National Marine Fisheries Service, February 2008).

In 2005, 7.8 million residents participated in marine recreational fishing in the Atlantic coastal states. Thirteen percent of this recreational fishing effort and catch occurred in North Carolina. The most commonly caught non-bait species (in numbers of fish) in the Atlantic coast states were summer flounder, Atlantic croaker, bluefish, striped bass and spot. The largest harvests by weight were striped bass, bluefish, summer flounder, Atlantic croaker and dolphinfish. Almost 30 percent of the total Atlantic catch came on saltwater trips that fished primarily in the state territorial seas, and 60 percent came on trips that fished primarily on inland waters (National Oceanic and Atmospheric Administration, National Marine Fisheries Service, February 2008).

In 2005, North Carolina was ranked third out of the US coastal states (including Puerto Rico) for pounds of finfish harvested recreationally via hook and line 10,953,349 kg (24,148,000 lbs) and number of shellfish harvested recreationally (13,381,000 fish) (National Oceanic and Atmospheric Administration, National Marine Fisheries Service, February 2007).

In addition to annual fishing tournaments held in Onslow Bay, other recreational fishing in the region of influence is generated by several recreational fishing hotspots located with or adjacent to the MCB Camp Lejeune water ranges (Department of the Navy, 2003). Hook and line recreational fisheries are active in the New River, Atlantic Intracoastal Waterway, and Onslow Bay. Species most targeted by fishing guides and charter operations are king and Spanish mackerel, speckled trout, red drum and southern flounder (Carpenter, December 2008).

In addition to the reported recreational catch, North Carolina also reports recreational fishing conducted with commercial gear. In 2005, 234,749 kg (517,533 lbs) of fish and shellfish were landed in North Carolina using recreational commercial gear. The top five species caught were spot 87,892 kg (193,769 lbs), blue crab 47,708 kg (105,179 lbs), flounder 26,353 kg (58,099 lbs), striped mullet 16,472 kg (36,314 lbs), and shrimp 14,761 kg (32,542 lbs) (North Carolina Division of Marine Fisheries, April 2006).

Recreational Fishing - Effort

In North Carolina, 6.6 million and 7.2 million saltwater and inshore angler trips were taken during 2005 and 2006, respectively (North Carolina Division of Marine Fisheries, 2007). These angler trips contribute to the local economy through purchases of boats, bait and tackle and from fees for fishing piers, jetties, charter boats, and boat rentals. As is the case with commercial fishing, recreational fishing has little effect on the Onslow County economy. Recreational fishing does play a small part in the tourism industry of Onslow County, but the area's beaches are its major draw.

3.2.2.2 Recreational Activities

Recreational boating has grown in popularity in recent years. In 2005, over 362,000 recreational boat permits were issued in the state of North Carolina (National Marine Manufacturers Association, 2007). These permits were issued to powerboats, sailboats, and personal watercraft.

New River

Personnel stationed at MCB Camp Lejeune, as well as residents upstream of the Base, frequently utilize the New River for various types of recreational boating. A number of marinas are located along the river. Navigable creeks and tributaries allow residents to moor boats at their homes. However, the New River has 11 water restricted area sectors (see **Figure 2-2**) and those areas may be closed to the public on a full-time or intermittent basis for military training (see Munitions Firing-Water Ranges [Subchapter 2.1.2.2]).

Recreational boating activities in Courthouse Bay primarily comprise sport fishing, water skiing, crabbing, and other activities. Shellfishing is also permitted within most of the Bay. Recreational fishing and other recreational boating range throughout the North Carolina coastal waters, depending on season and weather conditions. However, most recreational fishing and boating occurs within a few miles off shore. Sport diving generally is geographically restricted to shoreline ocean sites. The peak diving season for all of North Carolina is from May to October (Divespots.com, February 2008).

Onslow Bay

Recreational activities in Onslow Bay primarily comprise game and sport fishing, charter boat fishing, sport diving, whale watching, sailing, power cruising, and other recreational boating activities. Most recreational boating occurs within a few miles off shore. Sport diving generally is geographically restricted to more shallow waters, close to shore (MCB Camp Lejeune, January 2004). There is a prohibited area (existing danger zone [water]) in Onslow Bay that surrounds

the BT-3 Impact Area (see **Figure 2-2**). An existing danger zone (water), also known as a prohibited area, is defined as a water area (or areas) used for target practice, bombing, rocket-firing, or other especially hazardous operations, normally for the armed forces. The existing danger zones (water) may be closed to the public on a full-time or intermittent basis.

Approximately 20 artificial reefs have been established in Onslow Bay primarily to support offshore sport fishing and recreational diving. Although the artificial reefs are utilized throughout the year by recreational vessels and commercial charter boats, use is highest during the summer (MCB Camp Lejeune, January 2004).

Shipwrecks provide habitat suitable for development of artificial reefs, and are popular destinations for divers. Within the general vicinity of Onslow Beach, Brown's Inlet, Brown's Island, Bear Inlet, and Bear Island, there are 11 reported shipwrecks, most occurring in the vicinity of Bear Inlet (Lawrence, March 2008). No recorded shipwrecks have been identified within the BT-3 offshore impact area or within the New River (Lawrence, March 2008 and National Oceanic and Atmospheric Administration, March 2008).

Atlantic Intracoastal Waterway

The Atlantic Intracoastal Waterway is a toll-free boating channel—part canal, part natural waterway that extends for almost the entire length of the East Coast, passing through MCB Camp Lejeune between the beaches and the mainland. A number of boats are launched on the New River and other waters within Onslow County. Many boats pass through the Atlantic Intracoastal Waterway to enter or exit the New River estuary and Onslow Bay (MCB Camp Lejeune, January 2004). The Marine Corps uses the Atlantic Intracoastal Waterway for boat and amphibious training, and readiness operations; however, the waterway is primarily used for transport between the Pamlico Sound, New River, or Onslow Bay to conduct such operations. At times, portions of the Atlantic Intracoastal Waterway are closed for as long as is deemed necessary, consistent with 33 CFR Part 334.440, in order to prevent civilians and other non-participating craft from entering the operations area at the existing danger zones (water), also known as prohibited areas, and water restricted areas (see **Figure 2-2**). In addition, navigable waters between Brown's Island and the Atlantic Intracoastal Waterway (bounded by Brown's Inlet and Bear Inlet) are closed to navigation at times. There are highly sensitive unexploded projectiles within the limits of this area (US Marine Corps, October 2006).

Hazardous operations are communicated to vessels and operators by use of Notices to Mariners, issued by the US Coast Guard. Notices to Mariners advise the public, fishermen, and divers in advance of ongoing military activities that may temporarily relocate civilian/recreational activities. There are currently about 50 Base operations per year requiring closure of the Atlantic Intracoastal Waterway water restricted area for about 110 one-hour periods as well as US Coast Guard and Navy operations that involve 40 one-hour period Atlantic Intracoastal Waterway closures (MCB Camp Lejeune, January 2004).

There are no data available for the number of recreational, non-military annual boat trips on the Atlantic Intracoastal Waterway.

Tourism

Tourism has grown into one of North Carolina's largest industries, generating more than \$16.5 billion to the state economy per year (North Carolina Department of Commerce, March 2008). Annually, over 45 million people visit North Carolina. Tourism directly employs 190,000 North Carolinians with a payroll of \$4 billion. According to the *2006 North Carolina Visitor and Trip Profile*, 13 percent of visitors cited beach/waterfront activities as the reason for their visit (North Carolina Department of Commerce, 2006). Among the many beaches along North Carolina's coast is Onslow Beach, which is owned by the Marine Corps. Onslow Beach is limited to military patrons and their families.

3.2.3 Noise – Water Ranges

MCB Camp Lejeune generates noise from various activities associated with training operations at the MCB Camp Lejeune Range Complex, including:

- Weapon and explosive firing noise from the firing of ship- and boat-based small arms, large-caliber weapons, and high explosive grenades related to water range operations.
- Existing noise in terms of CDNL contributed from the firing from large-caliber weapons within the water ranges has been considered as part of the Base overall large-caliber weapon noise described previously in Noise (**Subchapter 3.1.4**)
- Existing noise in terms of ADNL contributed from the firing from boat-based small arms is considered negligible since both firing and target positions are relatively far from noise sensitive land uses

3.2.4 Cultural Resources – Water Ranges

3.2.4.1 Underwater Archaeological Sites

No underwater surveys have been conducted to establish the presence or absence of archaeological sites or shipwrecks within the vicinity of the BT-3 Impact Area (Lawrence, March 2008). Therefore, there is potential for prehistoric and historic cultural resources to occur. With respect to prehistoric resources in depths of less than approximately 91 m (300 ft), archaeological sites with Paleo-Indian or Early Archaic components may be present. As a result, these sites, in all probability, would be buried deeply under sediments that have accumulated over time and therefore are less likely to be impacted than later historic sites (i.e., shipwrecks). If shipwrecks are present within the project area, it should be noted that due to mechanical, chemical, and biological erosion and decay, it is likely that older shipwrecks are represented by non-organic material (e.g., metal, ballast stones, etc.) which would also be covered by sediments that have accumulated over time.

Both the Underwater Archaeology Branch of the North Carolina Office of State Archaeology and the Automated Wreck and Obstruction Information System established by the National Ocean and Atmospheric Administration were consulted to identify recorded underwater archaeological sites and shipwrecks occurring within the project area. The Underwater Archaeology Branch of the North Carolina Office of State Archaeology maintains historic shipwreck files on over 5,000 vessel losses along the North Carolina coast (Lawrence, March 2008). These are shipwrecks for which a historical reference (e.g. newspaper account, life saving

station records, etc.) exists; however, in most cases the physical remains of the vessels have not been located. The Automated Wreck and Obstruction Information System is a catalogue of reported submerged shipwrecks and obstructions in US coastal waters. It should be noted that the North Carolina Office of State Archaeology reports and the Automated Wreck and Obstruction Information System database are not comprehensive records of wrecks in any particular area.

Within the general vicinity of Onslow Beach, Brown's Inlet, Brown's Island, Bear Inlet, and Bear Island, there are 11 reported shipwrecks, most occurring in the vicinity of Bear Inlet (Lawrence, March 2008). No underwater archaeological sites or recorded shipwrecks have been identified within the BT-3 Impact Area or within the New River (Lawrence, March 2008 and National Oceanic and Atmospheric Administration, March 2008).

3.2.5 Natural Resources – Water Ranges

3.2.5.1 Underwater Sediments

Underwater sediments are included in this EA because the proposed action would result in some disturbance of the sediments in the nearshore and open ocean underwater environment.

Longshore currents are nearshore currents that move parallel to the shoreline and transport sediments (sand) along the coast. Along the US East Coast longshore currents transport sediments from the north, where they are usually generated by storms in the North Atlantic.

In Onslow Bay the continental shelf is narrow in comparison to other areas of the coast. Its topography is uneven with peaks and valleys. These formations are a result of sedimentation and erosion that occurred during the ice age when this area was not submerged and subject to weathering. Most of the sedimentary material on the shelf comes from land being transported by winds and rivers. The underwater sediments along Onslow Beach/Bay consist primarily of sand and silt, while further out (approximately 30 km [19 mi]), off the coast, sediments consist of medium to coarse grained sand (Department of the Navy, June 2003).

The New River estuary drains a relatively small coastal plain basin with a significant tidal influence. It varies in depth from 1 to 4 m (3.28 to 13.12 ft) and has muddy and sandy bottoms (Cahoon et al, 1999). Near the New River, sediments consist of fine sands with less than 25 percent shell material with some patches of mud or muddy sand. Deposition rates are not very high due to a lack of sediment inputs. Limestone and sandstone are the predominant rock types (Paquette et al. 1995). Near the outer shelf and upper slope sedimentary lenses have been created by the repeated erosion and deposition caused by the Gulf Stream (DeAlteris, 1996). A survey of the area from Cape Hatteras to Cape Fear showed that 14 percent of the area had hard bottom or reef structures (DeAlteris, 1996).

3.2.5.2 Water Resources – Water Ranges

Water resources are essential components of the natural setting. These resources can have scientific, historic, economic, and recreational value within a specific area. For water ranges,

surface water descriptions include the New River, Atlantic Intracoastal Waterway, and Onslow Bay.

The North Carolina Division of Water Quality has listed the Atlantic Intracoastal Waterway as an impaired water system at certain points. Onslow Bay's continental shelf waters have been identified as part of the South Atlantic Bight. The New River contains waters with C, SA, SB, and SC classifications (as defined in Water Resources [Subchapter 3.1.6.2]), as well as waters considered impaired.

The 81 km (50 mile) New River provides freshwater to Onslow Bay and is considered an estuary in its lower reaches. Waters draining to the New River north of Grey Point are considered nutrient sensitive waters. The New River and most tributary streams of the New River south of the city of Jacksonville have the additional designation of high quality water (15A NCAC 3N.0002) and primary nursery areas (15A NCAC 3N.0002). Additional sections of the New River areas are considered special secondary nursery areas.

There are 27 individual National Pollutant Discharge Elimination System wastewater discharge permits owned by various facilities in the subbasin numbered 03 05 02, with a total permitted flow of 66 million liters per day (17.45 million gallons) (North Carolina Division of Water quality, May 2007). The largest of these permitted outfalls is held by the US Marine Corps – MCB Camp Lejeune Advanced Wastewater Treatment Plant facility with a total permitted discharge of 56.78 million liters per day (15 million gallons). In 2005, 21 of the various permitted facilities were out of compliance with their permit limits resulting in a total of 437 violations and the issuance of 73 Notices of Violation and the remaining proceeded to enforcement. MCB Camp Lejeune was not one of the facilities with compliance issues. According to the MCB Camp Lejeune Advanced Wastewater Treatment Plant Annual Performance Report for the period of July 2005 to June 2006, there were no violations at the MCB Camp Lejeune plant (US Marine Corps, June 2006).

There are several segments of the Atlantic Intracoastal Waterway (166 ha [409 ac]), considered impaired for shellfish harvesting or aquatic life. There are additional segments of the Intracoastal Waterway that are classified as conditionally approved open and prohibited in growing areas due to potential fecal coliform bacteria levels. One segment is also impaired in the aquatic life category due to low dissolved oxygen in 13 percent of samples. An additional 39 ha (96 ac) of the Atlantic Intracoastal Waterway in the growing areas are classified as approved, and are considered supporting shellfish harvesting (North Carolina Division of Water Quality, May 2007).

Onslow Bay has a southward moving long shore current and is influenced by the Gulf Stream. Nearshore waters are shallow with an average water depth of approximately 7 m (23 ft). Nearshore salinity is influenced by the fresh water inputs and ranges from 28 to 32 practical salinity units. Open ocean salinity averages roughly 35 practical salinity units (Department of the Navy, June 2002). The bay can experience a 20 degree Celsius (°C) (68 degree Fahrenheit [°F]) temperature flux through the year. Chlorophyll A is often used as an indicator of productivity. In

Onslow Bay there is little season variability in its concentration and presence (Department of the Navy, June 2002). This seems to indicate that nutrient concentrations and water temperatures remain high enough to sustain phytoplankton growth year round. However, the bay's proximity to the Gulf Stream makes it susceptible to eddies that can impact water temperatures, oxygen levels, nutrient levels and currents (Woods et al, 2006).

3.2.5.3 Marine Biology

The marine environment in and around the MCB Camp Lejeune Range Complex is comprised of temperate coastal waters bordered by a narrow strip of beach on the landward side. Barrier islands exist directly offshore, and to the east of the islands is open-ocean. The environment is home to a diverse array of marine habitats and species important to fisheries and local recreational activities. The *Marine Resource Assessment for the Cherry Point and Southern Virginia Capes Inshore and Estuarine Areas* (Department of the Navy, June 2003) provides an inventory of marine biological resources found in the coastal estuarine waters of North Carolina. This Marine Resource Assessment includes the MCB Camp Lejeune and Cherry Point operating areas, out to 6 km (4 mi). This document, along with the *Integrated Natural Resources Management Plan for MCB Camp Lejeune* (US Marine Corps, January 2007) are the primary sources for information on marine biological resources potentially occurring in the action area, although other sources were cross-referenced for updated information and are included throughout the following subchapters. A more recent *Marine Resource Assessment for the Cherry Point Operating Area* (Department of the Navy, 2007) was also referenced for updated information and to identify species that occur inshore and offshore. Throughout this subchapter, the use of the term "inshore" is used to distinguish the coastal waters within 3 nm (6 km [4 mi]) of shore.

Physical Environment and Marine Habitats

Marine biological resources as considered here include the organisms and habitats of the estuarine-riverine environment inside of the Atlantic Intracoastal Waterway and New River Inlet, and those of the oceanic waters. Regional oceanographic conditions are dominated by the Gulf Stream, which flows toward the northeast along the outer edge of the continental shelf in the South Atlantic Bight Region (Mann and Lazier, 1991 as cited in Department of the Navy, 2002). Circulation in the shallow waters of the continental shelf is driven by winds and water mass densities, resulting in currents that flow toward the northeast, parallel to shore, although seasonal and storm-related reversals occur frequently. South of Cape Hatteras, there tends to be a net shoreward transport of warm water and associated subtropical organisms across the shelf (Menzies, 1966).

Sea surface temperatures tend to be warm (averaging about 25°Celsius [77°Fahrenheit]) and salinities high (28-36 parts per thousand) in the offshore area. Surface temperature and salinity are slightly lower and more variable in the inshore and in the estuarine-riverine environments due to mixing of marine and fresh water masses (Department of the Navy, June 2002).

Bottom topography in Onslow Bay slopes very gently seaward, with no major canyons or seamounts within the region of influence (National Ocean Service, 2001). Bottom sediments in Onslow Bay are generally fine-grained sand and silt, with areas of medium- to coarse-grained sand and carbonate sediments becoming more abundant offshore. Owing to low sedimentation rates and scouring by currents, the sediments are thin, and low outcrops of sedimentary rock are prevalent in Onslow Bay (Newton et al., 1971; Pilkey et al., 1977).

Inshore and Estuarine Areas

Inshore waters are shallow, generally less than 10 m (33 ft) deep within 6 km (3 nm) of the shore. Inshore currents and sediment transport are mostly southward, unless subject to storm events. The North Carolina coast has a tidal range of 1 to 1.5 m (3 to 5 ft) with two highs and two lows on most days of the year (Department of the Navy, June 2003).

The New River Inlet is a brackish, transitional environment. The waters become more salty at the mouth of the inlet. Salinities in the Atlantic Intracoastal Waterway tend to be slightly lower than in the open ocean because of freshwater input (National Ocean Service, 2001). Bottom sediments in the inlet consist of sand to silt weathered from older carbonate rocks and terrigenous sediments eroded from surrounding land. Warm-temperate conditions prevail along the North Carolina coast, with temperatures ranging from about 15 °C (59 °F) in winter to 27 °C (80 °F) in summer. Temperature extremes are more pronounced in the sheltered, shallow waters of the Intracoastal Waterway and New River Inlet (Copeland et al., 1984).

Nearshore productivity is high most of the year due to warm-temperate conditions and the input of nutrients in runoff from the land. However, in sheltered, shallow bodies of water, such as the New River Inlet, phytoplankton blooms are associated with nutrient input. These blooms have led to oxygen depletion and localized fish kills in the recent past (North Carolina Department of Environment and Natural Resources, 2003).

Onslow Beach consists of a long, narrow beach that fronts the Atlantic Intracoastal Waterway. The beach is subject to seasonal and episodic (storm-driven) erosion and deposition. Erosion is most prevalent in the southern part. The primary source of sediment input to Onslow Beach is the weathering of carbonate rocks offshore. As the sand is blown inland by prevailing easterly winds, dunes are formed and, to varying degrees, are stabilized by vegetation (US Marine Corps, January 2007).

Habitats that occur in the inshore and estuarine area in the vicinity of MCB Camp Lejeune include salt marsh, un-vegetated tidal flats, submerged aquatic vegetation, live/hard bottom communities, reef/reef-like habitats, and coral patches. These habitats are described in detail in the *Marine Resource Assessment for the Cherry Point and Southern Virginia Capes Inshore and Estuarine Areas* (Department of the Navy, June 2003), which is the main source, in addition to primary literature, for the following summaries.

Salt marshes occur in the mid- to upper- intertidal zone of sheltered shorelines and tend to be dominated by cordgrass (*Spartina* spp.) and other plants tolerant of intermediate flooding and

saline conditions (Schafale and Weakley, 1990). Salt marshes develop only in calm-water conditions; beaches exposed to waves and strong currents are un-vegetated. Salt marshes and adjacent channel and mudflat habitats provide ecologically vital habitats for fishes and invertebrates and are considered essential fish habitat in North Carolina (South Atlantic Fishery Management Council, February 2008). Salt marshes also stabilize shorelines, filter and trap sediments, and absorb nutrients that could otherwise cause phytoplankton blooms in estuarine waters.

Un-vegetated tidal flats are alternately flooded and exposed by the tides on a daily basis. They support large populations of invertebrates that in turn attract fishes and shorebirds. Some primary production by microalgae occurs on the flats, but the biological community is largely based on detritus produced by adjacent terrestrial, marsh and submerged aquatic vegetation habitats (Peterson and Peterson, 1979). Tidal flats are especially extensive at the mouth of the New River Inlet (US Fish and Wildlife Service, 1980; National Ocean Service, 2001). Commercially and ecologically important species such as the American oyster (*Crassostrea virginica*), red drum, blue crab, and brown shrimp are prevalent on tidal flats (South Atlantic Fishery Management Council, February 2008).

Submerged aquatic vegetation consists primarily of seagrasses - which are rooted, vascular flowering plants. Submerged aquatic vegetation is considered an essential fish habitat along the North Carolina coast (South Atlantic Fishery Management Council, February 2008). It is a key source of primary production in the shallow marine estuarine environment, stabilizes the substrate, and provides habitat for many species of fishes and invertebrates at some stage of their life cycle. It occurs in patches in the shallow subtidal areas of the Atlantic Intracoastal Waterway (US Fish and Wildlife Service, 1980; National Ocean Service, 2001).

Live and hard bottom communities include assemblages of sessile organisms (e.g., sea fans, sea whips, ascidians, bryozoans, corals, hydroids, anemones, and sponges) that are often established on low outcrops which provide a firm substrate for attachment. These communities attract fishes and sea turtles (Thompson et al., 1999). Within the southeast US, live and hard bottom occurs anywhere from 3 to over 500 m (9.84 to over 1640.42 ft) depth (Street et al., 2005). In North Carolina, these habitats occur mostly in deeper water beyond 6 km (3 nm) offshore, but are also prevalent in shallow water on hard bottom associated with the submerged headland off the New River Inlet (Reed, 1980; Southeast Area Monitoring and Assessment Program, 2001; Florida Fish and Wildlife Conservation Commission; 2005; George, 2002).

Reef and reef-like habitats include rocks and other hard materials, both natural and manmade, which project vertically above the surrounding seafloor. Reefs provide heterogeneous hard-bottom habitats that support diverse epibiota and associated mobile species. These habitats occur in patches throughout the region (Reed, 1980; Southeast Area Monitoring and Assessment Program, 2001).

Marine Birds

The nearshore and offshore habitats in the region of influence support numerous bird species. The open waters and shorelines of Onslow Bay, the Atlantic Intracoastal Waterway and the New River provide important foraging and roosting habitats for migratory, wintering, and resident-breeding marine birds, including shorebirds, waterfowl, wading and diving birds, and generalist waterbirds (e.g., gulls). The nearshore habitats also serve as a migratory corridor for various marine birds (e.g., terns). The shallow water estuarine habitat is heavily used by waterbirds for foraging and on-water resting habitat (Hunter et al., 2006).

Seabirds (and virtually all other birds) in the project area are protected by the Migratory Bird Treaty Act of 1918, which prohibits the taking, killing, or possessing of migratory birds or the parts, nests, or eggs of such birds, unless permitted by regulation. In 2003, the National Defense Authorization Act was signed, which gives the Secretary of the Interior authority to prescribe regulations to exempt the armed forces from the incidental taking of migratory birds during authorized military readiness activities. The final rule authorizing the Department of Defense to take migratory birds in such cases includes a requirement that the armed forces must cooperate with the US Fish and Wildlife Service to develop and implement conservation measures to minimize or mitigate adverse effects of activities (US Fish and Wildlife Service, October 2000). To aid in gaining more information about bird populations, MCB Camp Lejeune is involved in several bird survey programs, including an annual Christmas Bird Count and Summer Bird Count. The use of restricted airspace is granted to survey wintering water fowl in the New River in coordination with the Atlantic Migratory Bird Initiative (US Marine Corps, January 2007).

A list of bird species protected by the Migratory Bird Treaty Act that are known to occur at MCB Camp Lejeune is included in **Appendix D**. Species occurrences throughout the project area vary greatly spatially due to strong association with the substrate type present.

Federally listed threatened and endangered birds that occur in the project area are discussed in Terrestrial Biology, Threatened and Endangered Species (**Subchapter 3.1.6.3, Table 3.1-16**).

Marine Invertebrates

The New River and Atlantic Intracoastal Waterway provide habitat for many shellfish. Common species associated with the estuary and nearby waters include blue crab, shrimp, hard clams, and American oyster (Peterson and Peterson, 1979). The New River estuary provides habitat for a wide variety of benthic invertebrates that serve as a food source for many of the fish that frequent its waters. Some flats are intermittently exposed at low tide, and these areas, along with adjacent tidal marshes, provide foraging habitat for a variety of terrestrial invertebrates. Additional high quality habitat is provided by beds of submerged aquatic vegetation (South Atlantic Fishery Management Council, 1998).

Fish

Over 685 species of fishes have been recorded in the offshore waters surrounding the region of influence (Schwartz, 1989). The great diversity of fishes includes the subtropical fish fauna of

the South Atlantic Bight, and many temperate and migratory species that follow isotherms (zones of equal temperature) that vary by season and depth. The diversity of species reflects the northward dispersal of subtropical species by the Gulf Stream, and the diversity of water conditions such as temperature that provide favorable conditions for a wide variety of species (Ross, 2004).

Common species found in the New River, the Atlantic Intracoastal Waterway, and the associated tidal creeks include anadromous, catadromous, and migratory species such as herrings (*Alosa* spp.), flounder (*Paralichthys* spp.), spot (*Leiostomus xanthurus*), croaker (*Micropogonius undulatus*), weakfish (*Cynoscion regalis*), bluefish (*Pomatomus saltatrix*), American eel (*Anguilla rostrata*), and black sea bass (*Centropristes striata*) (Hester and Copeland 1975; Copeland et al. 1983, 1984; Nelson et al. 1991; Schwartz, 1989).

The federally endangered shortnose sturgeon is discussed in the Threatened and Endangered Species subchapter.

Essential Fish Habitat

Essential fish habitat is defined as “those waters and substrate necessary to fish for spawning, breeding, feeding, or growth to maturity” (National Marine Fisheries Service, February 2002). Essential fish habitat for managed fishery resources is designated in the fishery management plans prepared by regional fishery management council under the Magnuson-Stevens Fishery Conservation and Management Act (16 US Code 1801). The fishery management council may also designate habitat areas of particular concern, which are “subsets of essential fish habitat which are rare, particularly susceptible to human-induced degradation, especially ecologically important, or located in an environmentally stressed area.” The fishery management council under the Magnuson-Stevens Fishery Conservation and Management Act requires federal agencies to consult with National Marine Fisheries Service when any activity proposed to be funded, permitted, or carried out may have an adverse effect on essential fish habitat or habitat areas of particular concern (National Marine Fisheries Service, February 2002). Habitat areas of particular concern do not require additional protection or impose additional restrictions to an area; these areas are simply identified as particularly important to fisheries species and vulnerable to degradation (National Marine Fisheries Service, 2008a).

Fishery resources within the nearshore and estuarine region of influence for which fishery management plans have been prepared by the South Atlantic fishery management council and Mid-Atlantic fishery management council include the following (South Atlantic Fishery Management Council, February 2008):

- Shrimp (brown, pink, and white)
- Red drum
- Snapper/grouper
- Coastal Migratory Pelagics
- Coral and coral reef
- Calico scallop

- Summer flounder, scup, black sea bass
- Bluefish
- Spiny dogfish
- Dolphin and Wahoo
- Golden crab
- Spiny lobster

The National Marine Fisheries Service has also designated essential fish habitat for the highly migratory species within Onslow Bay and include the following:

- Atlantic sharpnose shark
- Blacktip shark
- Dusky shark
- Finetooth shark
- Sailfish
- Sand tiger shark
- Sandbar shark
- Scalloped hammerhead
- Spinner shark
- Swordfish
- Tiger shark

Essential fish habitat that occurs in waters within and adjacent to the MCB Camp Lejeune complex include the following:

- Estuarine Emergent Wetlands - These include salt marsh habitats along the shores of the Atlantic Intracoastal Waterway and New River Inlet.
- Submerged Aquatic Vegetation - Submerged Aquatic Vegetation occurs in patches within the Atlantic Intracoastal Waterway and New River Inlet.
- Intertidal Flats - These include mudflats along the shores of the Atlantic Intracoastal Waterway and New River Inlet.
- Palustrine Emergent and Forested Wetlands - These are freshwater habitats that occur adjacent to the creeks that flow into the Atlantic Intracoastal Waterway and New River Inlet.
- Estuarine Water Column - This includes the open water areas of the Atlantic Intracoastal Waterway and New River Inlet.
- Live/Hard Bottom Habitat - As previously discussed, considerable areas of live/hard bottom are scattered in Onslow Bay.
- Coral and Coral Reefs - As previously discussed, patches of coral occur in Onslow Bay.
- Artificial and Manmade Reefs - Several artificial reefs occur in Onslow Bay.
- Marine Water Column - Many managed species occur within specific portions of the oceanic water column (between the surface and the bottom) and are dependent on this habitat for development, dispersal, or feeding.
- Tidal Creeks – These are areas where freshwater creeks meet estuarine waters that occur along the New River.
- Unconsolidated Bottom – This includes seafloor substrates such as sand, gravel, clay and silt. Large areas occur on the continental shelf and slope in the vicinity of Onslow Bay.

- Oyster Reefs and Shell Banks – This is defined as natural structures located in the intertidal or subtidal zones, including the New River and nearshore Onslow Bay
- Salinity-based habitats – Includes estuarine waters with specific salinity levels, found in the New River
- Macroalgae – Located within the salt marsh tidal creeks of the New River (South Atlantic Fishery Management Council, February 2008).

Essential fish habitat or habitat areas of particular concern occur in each of the major operating areas at MCB Camp Lejeune. The geographical areas of the habitat types vary, but are generally a small portion of each training area.

Marine Mammals

Marine mammals are discussed in this EA because several are known to occur or potentially occur in the waters around MCB Camp Lejeune. The Marine Mammal Protection Act of 1972 makes it illegal to “take” any species of marine mammal. The definition of take refers to the harassing, injuring or killing of any marine mammal, or the possessing of any marine mammal or part of a marine mammal, without authorization. Some marine mammals are listed under the Marine Mammal Protection Act as strategic. The definition of strategic refers to a stock of marine mammals that is being negatively impacted by human activities and may not be sustainable. When a population or stock has fallen below optimum sustainable levels, it is considered depleted. A stock may be considered depleted when the mortality in multiple units exceeds the Potential Biological Removal identified for the species. All marine mammal species listed under the Endangered Species Act of 1973 are considered depleted.

The National Defense Authorization Act of Fiscal Year 2004 (Public Law 108-136) amended the definition of harassment as applied to military readiness activities or scientific research activities conducted by or on behalf of the federal government, consistent with Section 104(c)(3) [16 US Code 1374 (c)(3)]. The Fiscal Year 2004 National Defense Authorization Act adopted the definition of “military activity” as set forth in the Fiscal Year 2003 National Defense Authorization Act (Public Law 107-314). Military training activities within MCB Camp Lejeune and vicinity constitute military readiness activities as that term is defined in Public Law 107-314 because training activities constitute “training and operations of the armed forces that relate to combat” and constitute “adequate and realistic testing of military equipment, vehicles, weapons, and sensors for proper operation and suitability for combat use.” For military readiness activities, the relevant definition of harassment is any act that:

- Injures or has the significant potential to injure a marine mammal or marine mammal stock in the wild (“Level A harassment”).
- 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”) [16 US Code 1362 (18)(B)(i)(ii)].

Section 101(a)(5) of the Marine Mammal Protection Act directs the Secretary of the Department of Commerce to allow, upon request, the incidental (but not intentional) taking of marine mammals by US citizens who engage in a specified activity (exclusive of commercial fishing), if

certain findings are made and regulations are issued. Permission will be granted by the Secretary for the incidental take of marine mammals if the taking will have a negligible impact on the species or stock and will not have an unmitigable adverse impact on the availability of such species or stock for taking for subsistence uses.

Cape Hatteras, North Carolina, is generally considered to be a range boundary between many tropical and temperate marine species in the western Atlantic (Ekman, 1953; Briggs, 1974; Garrison et al., 2003). Thus, it is not surprising that the greatest diversity of marine mammals off the East Coast of the US is found in this region (Webster et al., 1995). Favorable water depths produce habitats for various types of prey as well as migratory corridors for marine mammals. High numbers of marine mammal sightings off North Carolina have occurred along the continental shelf break near Cape Hatteras, which is likely due to the proximity of deep waters and the Gulf Stream to shore and the convergence of warm and cold water species in this area (Department of the Navy, 2007). The shelf break off MCB Camp Lejeune is some 111 km (60 nm) to the southwest, which takes it well beyond the nearshore operations area under the proposed action.

Four orders and thirty-eight species of marine mammals have been reported or may occur within the nearshore and deeper offshore waters of the region of influence (Department of the Navy, 2007). Most are members of the order Cetacea, comprising whales, dolphins and porpoises. Of these, 26 species belong to the suborder Odontoceti, or toothed whales, which include dolphins and porpoises. Another seven species belong to the suborder Mysticeti, baleen whales. The order Carnivora is represented by four species of seals and sea lions. One species, the West Indian manatee (*Trichechus manatus latirostris*), is in the order Sirenia.

As the project area is located in nearshore, shallow waters, the two marine mammal species that are expected to be the most prevalent include the bottlenose dolphin (*Tursiops truncatus*) and Atlantic spotted dolphin (*Stenella frontalis*) (Department of the Navy, 2007). Based on the Marine Resource Assessment reviews and more recent data (Waring et al., April 2007), the following subchapter discusses the species not listed in the Endangered Species Act that can occur in the inshore/estuarine waters within 6 km (3 nm) off shore within the vicinity of activities that are part of the proposed action. Several threatened or endangered marine mammals may occur in the project area and are discussed in detail in the Threatened and Endangered Species subchapter, below.

The western Atlantic population of bottlenose dolphin (coastal morphotype) consists of offshore and coastal morphotype stocks; only the latter is likely to occur in the region of influence. The population structure of the coastal morphotype of bottlenose dolphin is extremely complex, consisting of residents, seasonal residents, and migratory or transient animals. To differentiate between the various substocks, the coastal stock has been broken into seven management units. Collectively, these units are considered depleted and strategic under the Marine Mammal Protection Act. Of particular interest to this project are the southern North Carolina, northern North Carolina and northern migratory management units, all of which may overlap at one time

or another near or at the project site (National Marine Fisheries Service, 2001, Waring et al., April 2007).

The North Carolina units include animals that occur in sounds and inlets and along shallow coastal waters. Both the southern and northern North Carolina management units are broken further into estuary and oceanic stocks for survey purposes. The winter population of the southern and northern North Carolina and the northern migratory stock units is 16,913 (Waring et al., April 2007). The occurrence of coastal bottlenose dolphins is common within the region of influence.

The Atlantic spotted dolphin (*Stenella frontalis*) appears to be the only species of *Stenella* that regularly ventures into coastal waters (Waring et al., April 2007); other species of oceanic dolphins occur from the shelf edge and slope out to deep offshore waters. The pantropical spotted dolphin (*Stenella attenuata*) is thought to be sympatric with the Atlantic spotted dolphin, but is known to occur in offshore waters (Perrin and Hohn, 1994). Recent research suggests that a population subdivision exists between the Gulf of Mexico and the western North Atlantic stocks, and a further division exists between Atlantic spotted dolphins north of Cape Hatteras and those south of it. The total estimated population size of the spotted dolphin is 50,978. Of these, 47,400 animals are estimated to occur in the waters between Maryland and Florida. From 1999 through 2003, there were 17 strandings of Atlantic spotted dolphins along the Atlantic Coast, 8 of which occurred in North Carolina (Waring et al., April 2007).

Threatened and Endangered Species

Threatened and endangered species are discussed in this EA because several are known to occur or potentially occur at MCB Camp Lejeune. Threatened and endangered marine species that may occur include birds, fish, marine mammals and sea turtles. The US Marine Corps is consulting under Section 7 of the Endangered Species Act regarding the potential effects of the proposed action on these species. The occurrences of threatened and endangered marine species in the region of influence is summarized in **Table 3.2-3** and discussed in more detail below.

Birds

The only federally listed marine bird species that may occur in the project area are the piping plover and roseate tern. As these species are found mainly on beaches, they are discussed in detail in Terrestrial Biology (**Subchapter 3.1.6.3**).

Fish

Historical distribution for shortnose sturgeon (*Acipenser brevirostrum*) has been in major rivers along the Atlantic seaboard, with the northern limit near the St. John River in Canada, and the southern limit near the Indian River in central Florida. This species is known to spawn in freshwater rivers, and feed and overwinter in both freshwater and marine habitats, although occurrence in the marine environment is less common. Adults are generally thought to be estuarine anadromous in southern rivers. Shortnose sturgeon were listed as an endangered species in 1967, and remained listed with the passing of the Endangered Species Act of 1972. A

recovery plan was completed for shortnose sturgeon in hopes to delist and recover populations depleted by habitat loss, fishing, and incidental fisheries bycatch. Currently, 19 populations of shortnose sturgeon have been identified throughout their distribution. Most viable populations occur north of Cape Hatteras, and the only viable population south of Cape Hatteras resides in the Altamaha River in Georgia. Population dynamics information is virtually non-existent for most southern populations due to the small number of individuals recorded in surveys (National Marine Fisheries Service, December 1998). Due to the habitat present it is possible that the Shortnose sturgeon would occur in the region of influence, specifically the New River, but there is no recent evidence of their occurrence (Department of the Navy, June 2003).

Table 3.2-3
Federally Threatened and Endangered Marine Species Known or Reasonably Likely to Occur in the Vicinity of MCB Camp Lejeune

| Common name (Scientific name) | Status | Seasonality | Habitat |
|---|------------|--------------------------|--|
| Piping plover (<i>Charadrius melodus</i>) | Threatened | Year-round | Coastal beaches, and migrating along coastlines |
| Roseate tern (<i>Sterna dougallii</i>) | Threatened | Year-round | Offshore islands, coastal beaches |
| Seabeach amaranth (<i>Amaranthus pumilis</i>) | Threatened | Summer and early Fall | Seward areas of primary dunes, inlets and over-wash flats, growing closer to the high tide line than any other coastal plant |
| Shortnose sturgeon (<i>Acipenser brevirostrum</i>) | Endangered | Year-round | Freshwater rivers, estuarine areas, & nearshore coastal waters |
| West Indian manatee (<i>Trichechus manatus latirostris</i>) | Endangered | Late spring through fall | Warm freshwater, estuarine & nearshore coastal waters |
| North Atlantic right whale (<i>Eubalaena glacialis</i>) | Endangered | Late fall through spring | Coastal and continental shelf |
| Humpback whale (<i>Megaptera novaeangliae</i>) | Endangered | Spring, fall and winter | Coastal and continental shelf |
| Loggerhead sea turtle (<i>Caretta caretta</i>) | Threatened | Year-round | Nearshore, continental shelf; nest on beaches in summer |
| Green sea turtle (<i>Chelonia mydas</i>) | Threatened | Year-round | Shallow nearshore waters (adults); oceanic waters (juveniles). Nest on beaches in summer |
| Kemp's ridley sea turtle (<i>Lepidochelys kempi</i>) | Endangered | Year-round | Shallow nearshore waters (large juveniles & adults); oceanic waters (post-hatchlings & small juveniles). Nest on beaches in summer |
| Leatherback sea turtle (<i>Dermochelys coriacea</i>) | Endangered | Year-round | Nearshore to mid-ocean. Nest on beaches in summer |
| Hawksbill sea turtle (<i>Eretmochelys imbricata</i>) | Threatened | Year-round | Rocky outcrops and coral reefs |
| Sources: Department of the Navy, June 2003 ; NMFS 2008b ; US Fish and Wildlife Service, 2008. | | | |

Marine Mammals

West Indian Manatee

The West Indian manatee is listed as endangered under the Endangered Species Act. It is considered depleted and strategic under the Marine Mammal Protection Act (Waring et al., April 2007). Critical habitat was established in 1976 for the West Indian manatee and included approximately one-third of Florida's known manatee habitat, including freshwater springs and areas of the Gulf of Florida (US Fish and Wildlife Service, 2007).

Due to an analysis of the current population status and risk of extinction of the West Indian manatee, the US Fish and Wildlife Service recommended a reduction in status to threatened (US Fish and Wildlife Service, 2007). Conservation measures recommended thus far have resulted in a decrease of manatee mortality due to watercraft collisions.

In general, manatees favor shallow grass beds immediately adjacent to deep channels. Such areas comprise warm freshwater areas, estuarine areas, rivers and streams, canals, bays, and lagoons. Preferred water depth ranges from 1.5 to 6 m (5 to 20 ft). Many manatees are year-round residents of certain areas and simply congregate in warm water springs when the water gets colder in winter. The rest of the year, they are generally solitary, except for mothers with calves. Subadults in particular sometimes wander considerable distances during summer and early fall, when the water is warmest. Manatees do not regularly venture beyond extremely nearshore waters. They have been reported occasionally along the Atlantic Intracoastal Waterway, inside the barrier islands of the North Carolina coast, and on a few occasions off the beaches and nearshore banks. Manatees are occasionally sighted near the New River inlet, with one sighting occurring within the New River (Department of the Navy, June 2003).

North Atlantic Right Whale

The historic range of the North Atlantic right whale was from temperate areas to subarctic locations in the North Atlantic Ocean. Some individuals have been sighted migrating over extremely deep waters, but most sightings occur in coastal and continental shelf waters. Individuals have been reported as far south as the Gulf of Mexico, although these occurrences are rare. Currently, their distribution is highly influenced by season and specific activities. Calving occurs between November and April in the southeast US. Feeding primarily occurs from spring until fall in coastal waters of the northeast US and Canada where their prey (zooplankton) is abundant. When North Atlantic right whales are not occupied with reproductive or paternal duties, their distribution is strongly linked to the distribution of their prey, comprised of various zooplankton species, particularly those with high lipid content. Migration for feeding is a critical activity, as both the quality and quantity of their food source are both of importance. Although general distributional patterns do exist, information for many individuals throughout the winter is not well documented (National Marine Fisheries Service, August 2004, December 2006).

Ship collisions and entanglement in fishing gear are the primary causes of injury and death in North Atlantic right whale populations. According to the National Marine Fisheries Service Large Whale Ship Strike Database, as of 2004, North Atlantic right whales were the fourth most commonly struck whale species in the world. The region comprised of the southeast US and Caribbean had the fifth highest number of vessel strikes on all whale species in the world, and was the leader in vessel strikes for all of North America. When speed was recorded for individual vessel strike events, the most common vessel speed was 13-15 knots. Substantially fewer strikes occurred for vessels traveling at speeds less than 10 knots (Jensen and Silber, January 2004). Additional factors such as habitat degradation, contaminants, predators, and past whaling activities have all contributed to the endangered status of the North Atlantic right whale (National Marine Fisheries Service, December 2006).

Occurrences of North Atlantic right whales in the waters off North Carolina are thought to take place during migrations, while whales are on their way to or from calving in Georgia and Florida (Department of the Navy, June 2003). The occurrence of this species in the project area is expected occasionally during fall, winter and spring. The most current population size estimate is from November 2005 to October 2006, with an estimate of 396 individuals (North Atlantic Right Whale Consortium 2006). Even though population estimates are extremely low, there is hope that the population may rebound if actions taken to reduce the number of collisions with ships and incidents of fishing gear entanglements are effective (National Marine Fisheries Service, August 2004). Part of the solution includes minimizing these activities in areas where North Atlantic right whales frequent, hence the designation of critical habitat offshore of Georgia and Florida, areas of the North Atlantic (Massachusetts and Cape Cod Bays), and portions of the Gulf of Alaska and Bering Sea which are critical habitat for the North Pacific right whale.

Humpback Whale

The humpback whale is listed as endangered under the Endangered Species Act, and considered depleted under the Marine Mammal Protection Act. The entire North Atlantic stock has been estimated at 10,600 whales, while the Gulf of Maine stock is 902 (Waring et al., 2008).

From spring through fall, humpbacks frequent feeding grounds from south of New England to northern Norway. These areas are generally relatively shallow banks and shoals often associated with areas of high relief. In US waters, important feeding grounds extend from Jeffreys Ledge, in the southwestern part of the Gulf of Maine, to the Great South Channel. In late fall, North Atlantic humpbacks journey south to calving and mating grounds in the West Indies, returning in the early spring. Not all humpbacks undertake this journey; occasional sightings are made throughout the year in the mid-North Atlantic. The migratory route is unknown, although researchers presume it must be well offshore since relatively few animals are seen close to shore (National Marine Fisheries Service, 1991). Humpbacks are occasionally observed along the Atlantic coast from Virginia to Florida in winter, and the majority of these are often juveniles. Sightings off North Carolina peak from April through May during the northbound migration, and from September through December during the southbound migration. Many sightings and strandings are juveniles, suggesting that this region may become an important habitat for such animals (Clapham et al., 1993; Swingle et al., 1993; Wiley et al., 1995; Laerm et al., 1997). Nonetheless, most sightings are made from 20 to 73 m (66 to 240 ft) of water depth. The occurrence of humpback whales in the region of the project site is expected during the winter, spring and fall months in these offshore regions.

Sei, Sperm, and Fin Whales

The sei, sperm, fin and blue whale are all listed as threatened or endangered and occur in the waters off North Carolina. These species are found in deep water, and have not been sighted in or near waters surrounding MCB Camp Lejeune, thus are excluded from further discussion and impacts analysis.

Sea Turtles

All sea turtles that occur in the US are listed under the Endangered Species Act as either threatened or endangered. No critical habitat has been established for sea turtles in the continental US (US Fish and Wildlife Service, February 2008).

MCB Camp Lejeune's monitoring, protection, and management program for sea turtles is described in the *Integrated Natural Resources Management Plan* (US Marine Corps, January 2007). From mid-May through mid-August, an 11 km (7 mi) stretch of Onslow Beach is monitored nightly for sea turtle nesting activity. Nests in locations where training activities put them at risk are relocated. Nest locations are marked and protected with cages. Due to risks from unexploded ordnance, turtle nesting activity on Northern Onslow Beach and Brown's Island is monitored by aerial surveys. In 1980, a turtle sanctuary was established that includes Onslow Beach, MCB Camp Lejeune (from New River to Bogue Inlet), and Brown's Island and Bear Island, also in North Carolina. The sanctuary extends up to 3 km (1.6 nm) offshore, and is an area of recognized importance for sea turtles (US Marine Corps, January 2007). A Biological Opinion was issued by the US Fish and Wildlife Service for training activities occurring at MCB Camp Lejeune which detailed distinct conservation measures for nesting sea turtles. Included were guidelines for handling nests, the requirements for signage and caging, restrictions for traffic to and from the training site, and the requirement for the Environmental Conservation Branch to provide a handout detailing action to be taken if a sea turtle is encountered (US Fish and Wildlife Service, 2002).

Sea turtles nest from April through October in the southeastern US, and have been recorded nesting at MCB Camp Lejeune during the summer (Schwartz, 1989). Females lay several clutches of eggs each season at night. The number of eggs varies from 50 to 200, depending on the species. The large number of nests and eggs are necessary because only approximately 1 in 1,000 will survive. Females generally nest every 2 or 3 years, except possibly the Kemp's ridley, which may nest every year (Witzell, 1983; Dodd, 1988; Hirth, 1997). Four species have been reported nesting on North Carolina beaches: loggerhead, green, Kemp's ridley, and leatherback. Only the loggerhead and green are known to nest at MCB Camp Lejeune (Department of the Navy, June 2003). An additional sea turtle species, the Hawksbill, does not nest in the region of influence, but may transit North Carolina waters seasonally. This species is considered extremely rare in the region of influence (Parker, 1995).

Sea turtle hatchlings emerge at night, and then head for the sea, where they swim rapidly offshore. Relatively little is known about the period between hatching and their reoccurrence in nearshore waters as juveniles. This period of their lives is often referred to as the "lost years." Most species apparently drift for up to a decade in oceanic waters, sometimes living in rafts of *Sargassum* which float at the sea surface and provide both shelter and food (i.e. small fish and crustaceans) (Carr, 1987). The west wall of the Gulf Stream and continental shelf attract turtles of all ages to North Carolina waters. The juveniles eventually make their way toward shore, to shift to the benthic feeding habits of the adults. Each species has its niche, which may range from sea grasses to invertebrates (Musick and Limpus, 1997).

The nearshore waters are generally most attractive to sea turtles because food, cover and rest areas are provided there. In fall, many turtles either head south, toward warmer water, or seaward toward the Gulf Stream, migrating back in the spring. In some cases, availability of food during the colder water months is also a factor (Musick and Limpus, 1997).

Sea turtles have been sighted year-round off North Carolina, particularly juveniles. Abundance estimates from sightings are difficult to obtain due to bias from the source of data, level of effort, or sighting conditions. Sea turtles remain submerged approximately 90 percent of the time when they are in the water. Some species can stay underwater for up to nearly 3 hours, although this is extreme in regards to submergence times. Dive times for sea turtles vary by species, and within species depend on the depth of the dive and various other factors. For example, the duration of deeper dives for the green sea turtle typically ranges from 30-40 minutes (Hays et al., 2000). Cheloniid turtles are relatively small and do not reveal much of themselves above the surface. Submergence times and small sizes make sighting sea turtles difficult, particularly in adverse observation conditions (Henwood and Epperly, 1999).

The coast off Cape Hatteras appears to be an important migration corridor for Kemp's ridleys, loggerheads and leatherbacks. This corridor is about 19 km (12 mi) wide. Off North Carolina, peak sea turtle sightings generally occur in spring, when adults and juveniles are present. Sounds and estuaries in the project area are ideal habitats for sea turtle foraging, although these habitats are not used when water temperatures decrease during the winter (Mansfield and Musick, 2004). Fisheries bycatch data collected in the early 1990's for the Bogue Inlet area, indicated that, loggerheads comprised 71 percent of the bycatch, greens 17 percent, and Kemp's ridleys 12 percent; leatherbacks were not mentioned (Epperly et al, 1995). More recent data on sea turtle strandings in the entire state of North Carolina in 2007 included a total of 342 individuals, which included 157 loggerheads, 141 greens, 4 leatherbacks, 29 Kemp's ridleys, and 11 unidentified species. Sea turtle strandings in Onslow County in 2008 comprised 13 loggerheads, 9 greens, 0 leatherbacks, and 1 Kemp's ridley, (North Carolina Sea Turtle Stranding and Salvage Network, 2008). Information specific to each species known to reside in the project area is included below.

Loggerhead Sea Turtle

Although the loggerhead sea turtle is the most abundant sea turtle in US waters, it is listed as threatened under the Endangered Species Act. Hatchlings drift in convergence zones in floating patches of *Sargassum* (National Marine Fisheries Service and US Fish and Wildlife Service, 1993). As juveniles, they begin occupying the waters of the continental shelf, edge and slope from 200 m (656 ft) deep all the way into coastal waters and estuaries (Hopkins-Murphy et al., 2003). These waters comprise an important developmental habitat for this species. Juveniles and adults feed mostly on benthic invertebrates. Loggerheads do not venture into the Gulf Stream in the fall, probably to avoid being swept into the colder northern waters (Epperly et al., 1995). Based on sighting data, they are found year-round south of Cape Hatteras. In spring and fall, they are concentrated off Raleigh and Onslow bays (Shoop and Kenney, 1992). Although most loggerheads travel north of Cape Hatteras in summer, some females remain in North Carolina to nest from April through September (Schwartz, 1989). Most loggerheads leave during the winter,

either heading south or to the warm edges of the Gulf Stream along the west wall. Nonetheless, loggerhead sightings are reported year-round and are the most commonly sighted sea turtles in North Carolina (Department of the Navy, May 2007).

Loggerhead nests are by far the most abundant in North Carolina, comprising some 90 percent of the nests (US Army Corps of Engineers, March 2004). At MCB Camp Lejeune, the average density of nests on Onslow Beach is 5.6 per mile. Surveys indicate that loggerheads nest on MCB Camp Lejeune beaches May through September. The earliest nesting recorded annually in this area was on May 18, and the latest was on September 2 (US Fish and Wildlife Service, May 2002). Most nesting occurs at the northeast end of Onslow Beach (Hopkins and Richardson, 1984; Schwartz, 1989; US Marine Corps, 2000). Nearshore estuarine waters are important for the juvenile phase of loggerhead sea turtles and adults who are foraging between nesting sessions (Morreale and Standora, 2005). The occurrence of this species in the region of influence is expected.

Green Sea Turtle

The green sea turtle is considered threatened under the Endangered Species Act; the Florida and Mexico nesting populations are considered endangered.

Green sea turtles are highly mobile, making a series of long-distance movements throughout their lifetimes. The majority of adults migrate between foraging and nesting sites, often returning to the same foraging and resting grounds (Seminoff and Jones, 2006). Some adult individuals have been observed remaining in open ocean habitats for long periods with no evidence of inshore movement to foraging areas. Those adults that do favor nearshore waters typically reside in waters from 3 to 5 m (10 to 16 ft) deep to take advantage of an abundance of their vegetated food source, and rocks, reefs, and coral formations as rest sites (National Marine Fisheries Service and US Fish and Wildlife Service, August 2007a). Juvenile green sea turtles reside in a variety of marine habitats for up to 40 years before returning to the same beach from which they originated (Limpus and Chaloupka, 1997). Much speculation exists concerning the activities that commence during the juvenile phase, but there is evidence that post-hatchlings and juveniles live in convergence zones, while feeding on pelagic prey items such as floating mats of algae (primarily *Sargassum*) and other planktonic prey items such as ctenophores (Salmon et al., 2004). The nearshore waters form an important developmental habitat for the juveniles as they move in to shallower waters, as dietary preferences eventually shifts to benthic vegetation (National Marine Fisheries Service and US Fish and Wildlife Service, August 2007a).

Although green sea turtles can be found year-round in North Carolina, they are most abundant from spring through fall. They have been reported in nearshore, shelf, and edge waters, generally in less than 50 m (164 ft) depth. Although green sea turtles occasionally nest on Onslow Beach, these nests are relatively few compared to the number of nests made by loggerheads (Schwartz, 1989). Nearshore estuarine waters are important for the juvenile phase of green sea turtles and adults who are foraging between nesting sessions. The occurrence of this species in the region of influence is expected (DoN, May 2007).

Kemp's Ridley Sea Turtle

The Kemp's ridley sea turtle is listed as endangered under the Endangered Species Act. It is considered the most endangered of all sea turtles globally. Virtually all nesting activity takes place in Mexico (National Marine Fisheries Service, and US Fish and Wildlife Service, 2007).

Adults migrate between nesting and foraging areas, following shallow migratory corridors. This species is the most restricted geographically, with distribution limited to the Gulf of Mexico and the east coast of the US (Morreale et al., 2007). On the East Coast, blue crabs (*Callinectes sapidus*) form an important part of the adult diet, which is why many Kemp's ridleys appear in Chesapeake Bay during the summer (Seney and Musick, 2005). They are usually reported in less than 50 m (164 ft) of water depth. The nearshore waters of North Carolina are considered an important developmental habitat for this species. Post-hatchlings are carried from waters near nesting beaches north along the coast in neritic habitats until they are approximately two years in age. At this point juveniles are known to recruit to nearshore benthic habitats to begin feeding on benthic prey, which may vary depending on resource availability (National Marine Fisheries Service and US Fish and Wildlife Service, August 2007b).

Off North Carolina, Kemp's ridleys are most likely to be seen in spring and fall (Lazell, 1980; Lutcavage and Musick, 1985; Weber, 1995). Kemp's ridleys have been known to nest in North Carolina, but such an activity is very rare and they are not known to nest at MCB Camp Lejeune. Past bycatch records for the Bogue Inlet area indicate that only 12 percent of the turtles caught are Kemp's ridleys (Epperly et al, 1995). Of sea turtle strandings in Onslow County in 2007, only 29 out of 342 sea turtles were Kemp's ridleys, although 11 were unidentified species (North Carolina Sea Turtle Stranding and Salvage Network, 2008). This species may occur, but with relatively low frequency, in the nearshore and beach areas of the region of influence (Department of the Navy, May 2007).

Leatherback Sea Turtle

Leatherbacks are listed as endangered under the Endangered Species Act. Unlike other sea turtles, leatherbacks are more dependent upon prey and reproductive requirements than upon temperature in regards to their distribution. Leatherbacks are able to regulate their internal temperature to a remarkable degree; for example, a leatherback found off Nova Scotia had a temperature of 25.5 °C (80.0 °F) when the water temperature was 7.5 °C (45.5 °F) (Frair et al., 1972). Leatherbacks are capable of maintaining such relatively high internal temperatures due to several physiological features including countercurrent heat exchangers in their flippers and a subepidermal adipose layer that acts as an insulating layer (Goff and Stenson, 1988). As a consequence, leatherbacks range from the tropics into cool, temperate waters (Frair et al., 1972).

Leatherbacks are found from nearshore to mid-oceanic waters, including the waters of the continental shelf, edge and slope. Off North Carolina, leatherbacks are observed from April to June in relatively shallow waters, although they have been reported year-round in the Cherry Point Operating Area (Schwartz, 1989). They generally appear close to shore in Onslow Bay during their northward migration in spring. Leatherbacks occur in North Carolina in the highest

numbers from mid April to mid October (Keinath et al., 1996). Leatherbacks are the second most common turtle reported in surveys made in the region, probably because their immense size (up to 2.5 m [8 ft]) makes them much easier to spot (Department of the Navy, June 2003).

Leatherback nesting activities in North Carolina have been confirmed during the years 1998, 2000 and 2002 and suspected on occasion in years past. One nest was confirmed at Cape Lookout, while six others were confirmed at Cape Hatteras (Rabon et al., 2003). These nests could possibly be from only one female. As recently as 2007, one nest was sighted at Ocracoke Island (Field Trip Earth, 2008). Since leatherbacks nest as early as late February, it is possible that other nests were missed by monitors throughout the years, as monitoring does not begin, until May each year. This species may occur, but with relatively low frequency, in the nearshore and beach areas in the region of influence.

3.2.6 Hazardous Materials and Hazardous Waste Management – Water Ranges

This EA analyzes impacts related to hazardous materials and hazardous waste based on the potential for hazardous materials to be introduced to the installations during the course of water range training exercises. Refer to Hazardous Materials and Hazardous Waste Management – Land Ranges (**Subchapter 3.1.7**) for additional information.

3.2.6.1 Hazardous Materials

Hazardous materials are chemical substances that pose a substantial threat to human health or the environment. Refer to Hazardous Materials (**Subchapter 3.1.7.1**) for a detailed explanation of hazardous materials present on MCB Camp Lejeune.

On the water ranges, hazardous materials are present in the form of munitions, explosives, and petroleum products.

MCB Camp Lejeune personnel follow procedures established by Base Order 5090.9 and 5090.91 for handling of hazardous material and petroleum, oils, and lubricants. Base Order 5090.9 is the Base's *Hazardous Waste and Hazardous Material Management Program*. Base Order 5090.91 is the Base's *Oil and Hazardous Substance Pollution Prevention and Pollution Abatement Facility Management Plan*. Infrequently, leaks, and spills of hazardous materials– especially of petroleum products– do occur. If a spill occurs, Unit Level Contingency Plans are implemented.

Fuel jettison by aircraft rarely occurs. Aircrews are prohibited to perform fuel jettison below 1,829 m (6,000 ft), except in an emergency situation. Above 1,829 m (6,000 ft), the fuel has enough time to completely vaporize and dissipate and would therefore have a negligible effect on the surface below.

3.2.6.2 Hazardous Constituents

Hazardous constituents generally can be defined as hazardous materials present at low concentrations in a generally non-hazardous matrix; refer to Hazardous Constituents (**Subchapter 3.1.7.2**).

Equipment used in training does not intentionally release hazardous constituents into the environment. However, tactical equipment used on water ranges, such as small boats discharging petroleum products in their wet exhaust. Waste streams are handled according to Standard Operating Procedures and are not released into the environment.

Some targets may be remotely operated surface, or, in the case of at-sea targets, subsurface traveling units, most of which are designed to be recovered for reuse. A typical target drone may contain oils, hydraulic fluid, batteries, and explosive cartridges as part of their operating systems.

3.2.6.3 Hazardous Waste Management

A hazardous waste may be a solid, liquid, semi-solid, or contain gaseous material that alone or in combination may: 1) cause, or significantly contribute to, an increase in mortality or an increase in serious irreversible or incapacitating reversible illness; or 2) pose a substantial present or potential hazard to human health or the environment when improperly treated, stored, transported, disposed, or otherwise managed. Refer to Hazardous Waste Management (Subchapter 3.1.7.3).

As a result of historic incidences of improper disposal of hazardous waste, isolated deposits of various types of hazardous waste may be found on the ocean floor and at identified Installation Restoration sites. Known Installation Restoration sites are documented at locations across the MCB Camp Lejeune and the cleanup of these sites is managed through the Navy Installation Restoration program. This program was instituted to satisfy the requirements of the Comprehensive Environmental Response, Compensation, and Liability Act for former and current hazardous waste sites. Although no such sites have been identified within the Marine Corps water ranges, the potential for one or more hazardous waste deposits to be present cannot be discounted.

3.2.7 Public Health and Safety – Water Ranges

Public health and safety issues include potential hazards inherent in range training operations. It is the policy of the Marine Corps and the Navy to observe every possible precaution in the planning and execution of all activities that occur onshore or offshore to prevent injury to people or damage to property.

All range safety precautions and regulations contained in Base Order P3570.1B, *Range and Training Regulations, Standing Operating Procedures for Range Control* (US Marine Corps, October 2006) apply in the MCB Camp Lejeune Range Complex. The Commanding Officer, MCB Camp Lejeune is the controlling authority for all ranges and training areas within the MCB Camp Lejeune Range Complex. The Standard Operating Procedures establishes procedure for the safe use of weapons. It also sets restrictions on the use of various types of ordnance and certain types of operations. The procedures provide specific safety guidelines for each individual range and training facility.

Military, commercial, institutional, and recreational activities take place within the MCB Camp Lejeune Range Complex. The public typically accesses the offshore ocean areas for recreational

purposes such as sport fishing, sailing, boating, sight-seeing, eco-tourism, diving, and swimming, as discussed in Recreational Activities (**Subchapter 3.2.2.2**). However, designated existing danger zones (water), also known as prohibited areas, and water restricted areas for military operations have been designated in New River, the Atlantic Intracoastal Waterway (bounded by Brown's Inlet and Bear Inlet), and Onslow Bay (**Figure 2-2**). There is unexploded ordnance within the limits of the existing danger zone (water).

Vessels may proceed along other established waterways if there are no scheduled live fire training periods. Nevertheless, military operations often require the exclusive use of an area, and those periods are scheduled and broadcast by the Marine Corps and Navy through Notices to Mariners and by displaying, one hour before firing, a red danger streamer during daylight hours or a red light at night from range towers/poles (US Marine Corps, October 2006). The Atlantic Coast and Atlantic Intracoastal Waterway areas are searched by aircraft prior to bombing and firing operations. Watercraft in the area are warned of the impending live fire by aircraft buzzing, by the sounding of a siren located atop the observation towers, or by safety/guard boats. When warned, vessels must leave the area as quickly as possible by the most direct route. Prior to firing over New River, the area is visually inspected to verify that it is clear of personnel or vessels.

3.2.7.1 Laser Safety

A comprehensive safety program exists for the use of lasers. Refer to Laser Safety (**Subchapter 3.1.8.1**).

To ensure public safety during laser training at water ranges certain specific precautions are taken. Targets are not positioned outside the controlled area. Calm, smooth water and clean ice can reflect laser beams, especially at low angles of incidence. These potential reflections are considered when establishing target areas. Also, lasing ceases if unprotected or unauthorized surface craft enter the operations area or buffer zone. To protect the public near water ranges, water surface danger zones have been established (Department of Defense, December 1996). The US Coast Guard issues Notices to Mariners to watercraft to avoid established danger zones when active.

3.2.7.2 Communications

Refer to Communications (**Subchapter 3.1.8.3**).

3.3 SPECIAL USE AIRSPACE

3.3.1 Civil (Non-Military) Aircraft Operations – Special Use Airspace

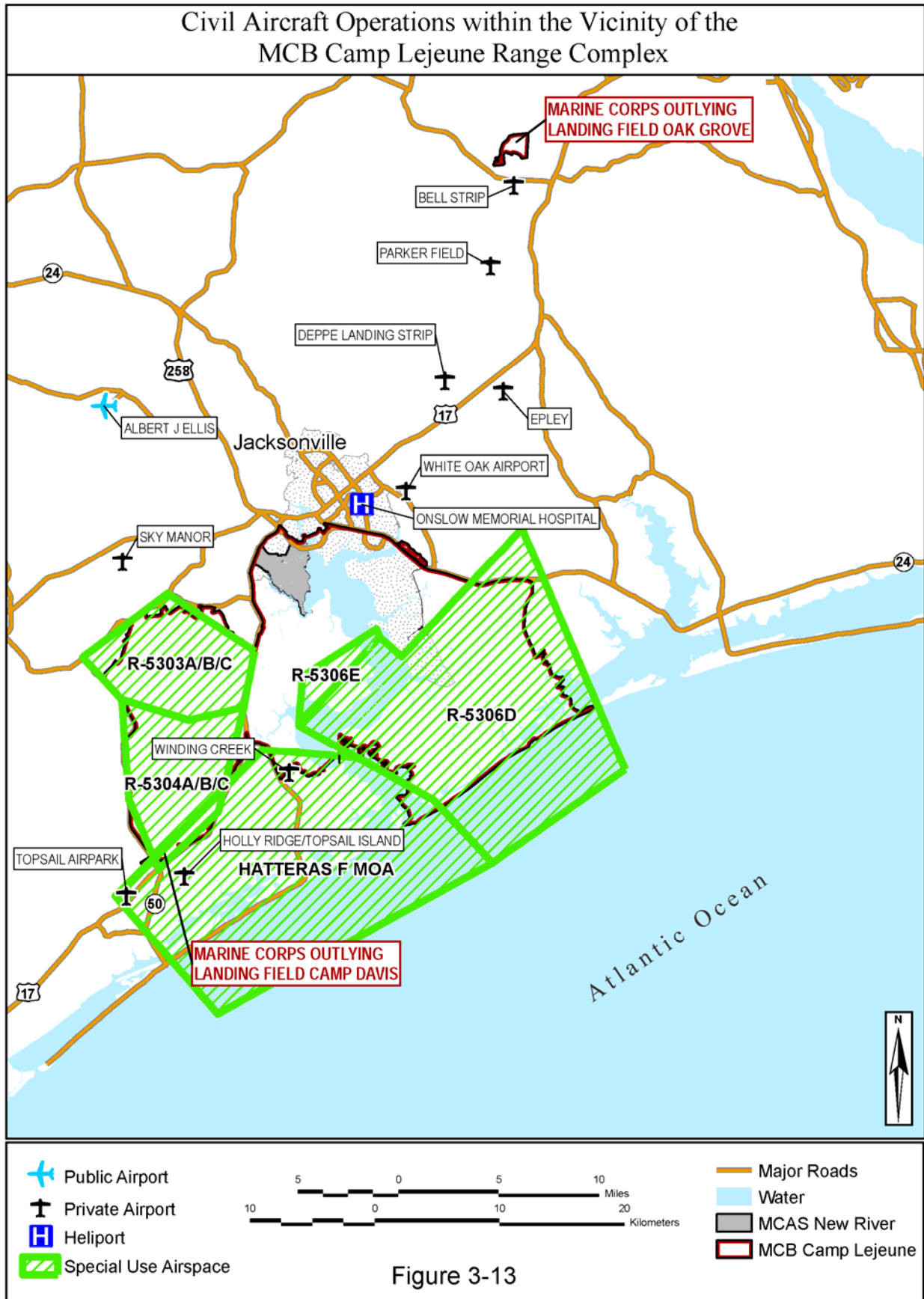
Civil airspace users operate a wide range of aircraft types, both commercial and general aviation (private). The flow of civil air traffic in Eastern North Carolina is routed above, around, and sometimes through active special use airspace (Department of the Navy, January 2007). As shown in **Table 3.3-1** and **Figure 3-13**, there are 11 public and private-use airports and 1 private-use heliport serving civil aviation located within the vicinity of MCB Camp Lejeune Range Complex (Department of the Navy, January 2007).

Table 3.3-1
Public and Private Airports and Heliports in the Vicinity of the MCB Camp Lejeune Range Complex

| Airport | County | City |
|---|--------|---------------|
| Albert J. Ellis | Onslow | Jacksonville |
| Bell Strip | Jones | Pollocksville |
| Deppe Landing Strip | Onslow | Deppe |
| Epley | Onslow | Jacksonville |
| Holly Ridge/Topsail Island | Onslow | Holly Ridge |
| Topsail Airpark | Pender | Holly Ridge |
| Hood Field | Jones | Dover |
| Parker Field | Jones | Maysville |
| Sky Manor | Onslow | Jacksonville |
| White Oak Airport | Onslow | Jacksonville |
| Winding Creek | Onslow | Sneads Ferry |
| Heliport | County | City |
| Onslow Memorial Hospital | Onslow | Jacksonville |
| Source: Department of the Navy, January 2007. | | |

3.3.1.1 Commercial Aviation

Commercial aviation uses airspace to move people and cargo from one location to another in accordance with 14 CFR § 119, 121, 125, 127, 129, 135, 137, 139, and 212. The flow of commercial air traffic is predominately north/south and along the coastline over the Outer Banks, as determined by east coast air corridors and the airline hubs of Washington, DC; Raleigh-Durham and Charlotte, North Carolina; and Atlanta, Georgia. Commercial air carriers operate above 5,486.4 m (18,000 ft) mean sea level on jet routes, at all altitudes below 5,486.4 m (18,000 ft) on Victor Airways, as appropriate to the terrain and air navigation aids, or under Visual Flight Rules. Visual Flight Rules generally allow pilots to deviate from published air routes using visual references. Visual Flight Rules means flight is restricted to altitudes below 5,486.4 m (18,000 ft) mean sea level, when the weather meets or exceeds minimum requirements (depending on the airspace classification), and does not require flight clearances from air traffic control). Aircraft operating under Instrument Flight Rules must maintain a 3 nm lateral separation from restricted airspace boundaries. Instrument Flight Rules require pilots to be trained and certified in navigational methodologies and to adhere to air traffic control clearances regarding specific flight route and altitude directions (Department of the Navy, January 2007). The civil airport in the vicinity of the MCB Camp Lejeune Range Complex that serves commercial air carriers is Albert J. Ellis Airport (Jacksonville, North Carolina).



In accordance with Federal Aviation Administration ruling, the federal airway Victor 139 (V139) crosses through R-5303A/B/C and R-5304A/B/C restricted airspace. Commercial aviation aircraft using V139 normally transit R-5303A and R-5304A at or above 2,133.6 m (7,000 ft) mean sea level or are vectored around it by air traffic control. When non-military aircraft on V139 are unable to transit above the Restricted Airspace altitudes in use, range activity is either capped or a cease-fire is imposed to accommodate the aircraft on the airway. On occasion, Air Traffic Control may vector non-participating aircraft off the airway to the east of the range through the Restricted Airspace, which would then be deactivated for that purpose.

3.3.1.2 General Aviation

Some of the general aviation in Eastern North Carolina includes the following types of activities: menhaden fish spotters, crop dusters (aerial applicators), airships/forestry (industrial operations), tourist and business charters, pilot training, recreational flying, and emergency medical aircraft (Medivac). In addition, local and state governmental agencies, such as North Carolina Forest Service, North Carolina Highway Patrol, and North Carolina Division of Marine Fisheries, use their own aircraft and contract pilots and aircraft to perform many tasks, including aerial monitoring of state forests and wildlife and game areas, and for law enforcement. MCB Camp Lejeune has a Letter of Agreement with the State of North Carolina providing coordination and control procedures for use of R-5306D, R-5306E, and R-5303 and R-5304 by aircraft owned and operated by the state. The US Fish and Wildlife Service and National Park Service use aircraft to perform a number of operations over the National Wildlife Refuges and the national seashores, including wildlife-tracking flights, aerial survey flights, and fire spotting (for fire suppression as well as controlled burns).

General aviation usually occurs at altitudes below 3,048 m (10,000 ft) and can range in duration from short distance flights in single-engine light aircraft to long-distance business-chartered flights (Department of the Navy, January 2007). General aviation in the vicinity of the MCB Camp Lejeune Range Complex Restricted Airspace under Visual Flight Rules must avoid the Restricted Airspace per Federal Aviation Administration rules. General aviation aircraft using V139 normally transit R-5303A and R-5304A at or above 2,133.6 m (7,000 ft) mean sea level or are vectored around it by air traffic control. As stated above under commercial aviation, when non-military aircraft on V139 are unable to transit above the Restricted Airspace altitudes in use, range activity is either capped or a cease-fire is imposed to accommodate the aircraft on the airway. On occasion, Air Traffic Control may vector non-participating aircraft off the airway to the east of the range through the Restricted Airspace, which would then be deactivated for that purpose.

Known as “joint use,” the Marine Corps activates special use airspace only when the airspace is actually in use for its designated purpose. This airspace management practice avoids unnecessary restrictions to commercial and general aviation and permits access through these areas when they are not in use.

3.3.2 Noise – Special Use Airspace

This subchapter addresses noise levels within the MCB Camp Lejeune Range Complex from aircraft operations within special use airspace. Noise is analyzed for training operations in special use airspace because the proposed action would produce temporary and intermittent increases in noise in the vicinity of the MCB Camp Lejeune Range Complex. Noise - Land Ranges (**Subchapter 3.1.4**) presents a discussion on measuring noise, and outlines the Navy Range Air Installations Compatible Use Zones program that defines noise zones associated with range aircraft operations. Ambient background noise levels in the vicinity of MCB Camp Lejeune are typical of a rural environment. However, the neighborhood noise conditions are affected by two main types of noise sources from MCB Camp Lejeune, specifically 1) ordnance firing related to ground range training activities, discussed in Noise (**Subchapter 3.1.4**), and 2) aircraft flights within restricted airspace in the MCB Camp Lejeune Range Complex, which is discussed in this subchapter.

3.3.2.1 Past Camp Lejeune Noise Studies

As part of the Final Environmental Impact Statement for the introduction of the MV-22 to the Second Marine Air Wing (Department of the Navy, October 1999), an aircraft noise study was conducted to predict aircraft noise conditions around MCB Camp Lejeune. The Department of Defense's aircraft noise model applicable for range operations, MR_NMAP, was used to predict then existing noise conditions, as well as the proposed condition. The sorties modeled under various studied alternatives are summarized in **Appendix C**; however, these sorties were not specified for each individual training area. The aircraft noise modeling results indicate that the ADNL are approximately 57 dBA under the then existing condition and 58 dBA under the proposed MV-22 condition (Navy Noise Zone I). According to the *Introduction of the V-22 to the Second Marine Air Wing Environmental Impact Statement*, replacing the CH-46 with the MV-22 plus increasing air operations by 1,272 annual sorties (19.6 percent) would only result in an approximately 1-dBA net increase in the A- weighted Day Night Level.

3.3.2.2 Current Noise Condition

A total of approximately 14,282 sorties occur in MCB Camp Lejeune special use airspace segments under the No Action Alternative. No Action Alternative sortie operations were those reported for Fiscal Year 2006, with exception of the MV-22. MV-22 sorties under the No Action Alternative are as described in the October 1999 *Final Environmental Impact Statement for the Introduction of the V-22 to the Second Marine Air Wing*. In the Environmental Impact Statement, the number of MV-22 sorties was stated only as a combined total number for all MCB Camp Lejeune special use airspace units. For the purposes of this analysis, the total number of MV-22 sorties stated in the Environmental Impact Statement was distributed across individual special use airspace units according to Fiscal Year 2006 distribution of MV-22 sorties (US Marine Corps, October 2008). The number of sorties under the No Action Alternative is summarized in **Table 3.3-2** and was approximately 72 percent more than the number of sorties analyzed for the proposed action in the October 1999 Final Environmental Impact Statement.

Table 3.3-2
Annual Sorties under the No Action Alternative

| R-5303A | R-5306E | R-5304A | R-5306D | Hatteras F MOA |
|---|---------|---------|---------|----------------|
| 594 | 4,104 | 1,077 | 7,565 | 942 |
| Note: Numbers in this table include all sorties from Table 2.3-6 . Source: US Marine Corps, October 2008. | | | | |

According to a fundamental acoustical principle, doubling or halving the operations from the same aircraft types under the same flight conditions would result in only a 3 dBA change in the noise condition. Although the overall aircraft operations within the restricted areas have increased since 1999, given the relatively low ADNL predicted in the aircraft noise study for the introduction of the MV-22 (i.e., 58 dBA for the proposed condition), the 72 percent increase in sorties likely would not result in a more than 3 dBA change in the noise condition. Therefore, the overall ADNLs around the Base under existing conditions would still be well below 65 dBA, above which noise sensitive land uses would normally be of concern.

Sorties in the Hatteras F MOA were of a similar nature to those occurring in MCB Camp Lejeune special use airspace. Only 942 sorties occurred in Hatteras F MOA under the No Action Alternative. Therefore, noise levels in Hatteras F MOA are assumed to be similar to those in the MCB Camp Lejeune special use airspace.

3.3.3 Public Health and Safety – Special Use Airspace

Public health and safety issues include potential hazards inherent in range training operations. It is the policy of the Marine Corps and the Navy to observe every possible precaution in the planning and execution of all activities that occur onshore or offshore to prevent injury to people or damage to property.

All range safety precautions and regulations contained in Base Order P3570.1B, *Range and Training Regulations, Standing Operating Procedures for Range Control* (US Marine Corps, October 2006) apply in the MCB Camp Lejeune Range Complex. The Commanding Officer of MCB Camp Lejeune is the controlling authority for all ranges and training areas within the MCB Camp Lejeune Range Complex. The Standard Operating Procedures establish procedures for the safe use of weapons. It also sets restrictions on the use of various types of ordnance and certain types of operations. The procedures provide specific safety guidelines for each individual range and training facility.

Despite restrictions, most of the airspace is available for co-use most of the time. Only hazardous activities require exclusive use of an area, and those periods are scheduled and broadcast by the Navy through Notices to Airmen issued by the Federal Aviation Administration. The notices advise the public in advance of ongoing military activities that may temporarily relocate aircraft use of these areas. The public typically accesses the special use airspace for recreational purposes such as private craft and commercially in a commercial airliner. Refer to Civil (Non-Military) Aircraft Operations (**Subchapter 3.3.1**) for further discussion.

3.3.3.1 Laser Safety

To maintain public safety during laser training in special use airspace certain specific precautions are taken. Targets are never positioned outside the controlled area (including airspace). Appropriate precautions are taken if expecting exposure to laser radiation levels that may cause dazzle or momentary flash blindness, especially for personnel performing critical tasks, such as flying aircraft. Lasing ceases if unprotected or unauthorized aircraft enter the operations area or buffer zone from 0 m to 549 m (0 ft to 1800 ft) above mean sea level, or between the lasing aircraft and the target. To protect the public, airspace is restricted during training exercises. The aircraft exclusion zone is a cone around the laser line-of-sight that is 20 times the buffer angle. The Federal Aviation Administration relays restricted airspace information to non-military aircraft in the area through the issues of Notices to Airmen. Class III and IV lasers are not directed above the horizon unless coordinated with US Space Command (Laser Clearing House) and with the regional Federal Aviation Administration office for laser radiation above the maximum permissible exposure for outside restricted airspace (Department of Defense, December 1996). Refer to Laser Safety (**Subchapter 3.1.8.1**).

3.3.3.2 Bird/Animal-Aircraft Strike Hazard

Migration corridors and other areas where birds congregate represent the locations with the greatest hazard when birds are present. Based on these potential effects, the Marine Corps devotes considerable attention to avoid the possibility of bird-aircraft strikes. The Navy, in conjunction with the US Department of Agriculture, has conducted several studies in Eastern North Carolina to study bird migrations, bird flight patterns, and past strikes to develop predictions of where and when bird-aircraft strikes might occur and how to avoid them (US Department of Agriculture/Animal and Plant Health Inspection Service/Wildlife Services, February 2007). Under normal conditions when a low-level flight is planned, aircrews make adjustments to planned routes during mission planning and briefings to avoid known areas know to support high densities of bird populations such as lakes, rivers, and wetlands. When the bird/animal aircraft strike hazard potential is moderate or higher, all aircrews are directed to raise overflight altitudes, avoid particular low-level segments, or not fly specific low-level routes entirely to minimize the risk of bird collision.

Current Navy and Marine Corps instructions implementing aspects of the Bird/Animal-Aircraft Strikes program include Marine Corps Order 3750.6R, Marine Corps Order 5090.1B, and Naval Facilities Engineering Command Procedural Manual P-73. Marine Corps Order 3750.6R outlines the procedures for submitting hazard reports for bird and animal strikes. The draft Department of the Navy Marine Corps Order (Office of the Chief of Naval Operations Instruction) concerning the Bird/Animal-Aircraft Strikes Prevention Manual discusses the role of Air Traffic Control Tower personnel to communicate the current airfield hazard condition via the Automatic Terminal Information System per Federal Aviation Administration Order 7110.65.

3.3.3.3 Communications

Refer to Communications (**Subchapter 3.1.8.3**).

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4.0 ENVIRONMENTAL CONSEQUENCES

This chapter presents an analysis of the potential impacts upon various components of the environment that could result from the No Action Alternative and the proposed action. The No Action Alternative is to support and conduct current training operations at the MCB Camp Lejeune Range Complex, North Carolina. The proposed action includes all current training under the No Action Alternative plus the increases in training described in Proposed Action (**Subchapter 2.2**). Following a format similar to Chapter 3, the discussion in Chapter 4 is divided into three major sections by the type of range or training area: land ranges, water ranges, and special use airspace. Subsections on the environmental features relevant to each of these range types discuss the impacts of the No Action Alternative and the proposed action, the preferred alternative. As in Chapter 3, some resources are discussed in more than one section. Coastal Zone Management applies to both land and water ranges, but this discussion was grouped together and included under the water ranges section to eliminate redundancy.

4.1 LAND RANGES

4.1.1 Land Use – Land Ranges

4.1.1.1 No Action Alternative

MCB Camp Lejeune Range Complex

No impacts to land use would occur under the No Action Alternative because land use patterns would not change. There would be no construction of new facilities; therefore, no planning or zoning ordinances would be changed. Under the No Action Alternative, munitions firing, movement of personnel and tactical vehicles, and support activities on land ranges would continue as they are today. Land use within the MCB Camp Lejeune Range Complex would remain the same.

Regional Land Use

Onslow County

The 2003 Joint Land Use Study between MCB Camp Lejeune, MCAS New River, and Onslow County was performed to address conflicts between military and civilian communities through cooperative land use planning. One aspect of this study suggests continued community educational programs and availability of resources to provide information on military training and noise. In one effort of ongoing implementation, the Joint Land Use Study Committee reviews and reports annual progress of its recommendations, Base training operations, and noise concerns to the County Commissioners and the Base Commander.

While the No Action Alternative would not interfere with current standards or recommended actions, the purpose of the committee is to ensure that all standards are enforced. Additionally, the Joint Land Use Study suggests that the US Marine Corps “examine the feasibility of refining certain flight tracks to the least populated area(s) along these tracks and/or increase flying

altitude approach profiles” within the G-10 Flight Tracks/Safety Zones (Onslow County, February 2003).

Jones County

Currently, the Marine Corps Outlying Landing Field Oak Grove area consists of agricultural, forested, and scattered residential land uses (Department of the Navy, October 1999). As Jones County has no official zoning and Marine Corps Outlying Landing Field Oak Grove is situated away from any high-density populations, there would be no impacts on land use in Jones County.

4.1.1.2 Proposed Action

MCB Camp Lejeune Range Complex

Under the proposed action, the nature of munitions firing activities and locations where these activities occur would remain the same as described for the No Action Alternative. However, there would be an increase in the level of munitions fired as well as an increase in movement of personnel and vehicles. The land use classification, operation and training facilities, would remain the same.

Regional Land Use

Onslow County

Similar to the No Action Alternative, the proposed action would not interfere with current standards or the recommended actions of the Joint Land Use Study Committee.

Jones County

Similar to the No Action Alternative, the proposed action would not affect the current land use at Marine Corps Outlying Landing Field Oak Grove.

4.1.2 Environmental Justice – Land Ranges

4.1.2.1 No Action Alternative

Implementation of the No Action Alternative would maintain the existing training activities at MCB Camp Lejeune. Munitions firing, movement of personnel and tactical vehicles, and support activities on land ranges would continue as they are today. No changes would occur that would result in impacts to minority populations, low-income population, or children.

4.1.2.2 Proposed Action

As evaluated in accordance with Executive Orders 12898 and 13045, the direct and indirect effects of the proposed action would not cause disproportionately high adverse human health or environmental effects on minority or low-income populations. In addition, no environmental health or safety risks were identified that would disproportionately affect children.

Demographic data for Onslow and Jones Counties, the City of Jacksonville, and the state of North Carolina are provided in **Table 3.1-1**. The data indicate the two census tracts surrounding

Marine Corps Outlying Landing Field Oak Grove (Jones County) have the highest percentage of minority and low-income populations compared to Onslow County, Jacksonville, and North Carolina. An increase in existing range operations could potentially affect minority and low-income populations if the increase resulted in a change to the noise contour levels in these areas. However, as described in Noise (**Subchapter 4.1.4**), the proposed action would not result in adverse noise impacts in these areas.

Children of military families reside and attend schools within the installation however, military family housing areas are separated and apart from range and training areas. Therefore, children do not spend time in the vicinity of the MCB Camp Lejeune Range Complex. Training operations are conducted within federal property and access to the MCB Camp Lejeune Range Complex is restricted to military personnel and others as authorized by military authority. It follows that civilian children from nearby communities would not spend any time in or near the MCB Camp Lejeune Range Complex. Therefore, it is not expected that the proposed action would have impacts on children.

As mentioned in Environmental Justice (**Subchapter 3.1.2**), access to the MCB Camp Lejeune Range Complex is restricted to military personnel and others as authorized by military authority. In addition, the US Army Corps of Engineers has designated a danger zone (water), also known as a prohibited area, surrounding the BT-3 Impact Area, which extends 11,000 m (36,089 ft) into Onslow Bay and the Atlantic Ocean, to protect the public from exposure to unexploded ordnance within the boundaries of this impact area. Thus, recreational vessels are prohibited from accessing existing danger zones (water). Vessels may proceed along other established waterways if there are no scheduled live fire training periods. In the event of a scheduled live fire training period, the Marine Corps and Navy communicates the event through Notices to Mariners and by displaying, one hour before firing, a red danger streamer during daylight hours or a red light at night from range towers/poles (US Marine Corps, October 2006). The Atlantic Coast and Atlantic Intracoastal Waterway areas are searched by aircraft prior to bombing and firing operations. Watercraft in the area are warned of the impending live fire by aircraft "buzzing," by the sounding of a siren located atop the observation towers, or by safety/guard boats. When warned, vessels must leave the area as quickly as possible by the most direct route. Prior to firing over New River, the area is visually inspected to verify that it is clear of personnel or vessels. Therefore, the proposed action would not reasonably be expected to adversely impact minority populations, low-income populations, or children.

4.1.3 Air Quality – Land Ranges

4.1.3.1 No Action Alternative

Under the No Action Alternative, the MCB Camp Lejeune ranges that use large caliber weapons and explosive detonations would continue to operate at levels consistent with the 2004-2005 12-month average operations which are presented in **Table 2.3-1**. However, MCB Camp Lejeune currently is implementing several authorized actions that, in terms of weapon firing and explosive detonation, would result in deviations from the 2004-2005 conditions. The

environmental impacts of these actions have been analyzed and the FONSI's have been signed. The following briefly describes these actions:

- Marine Special Operations Command Complex Breaching Facility is expected to conduct 1,300 operations per year using the equivalent of a quarter pound of C-4 explosive for each operation
- The Enhanced Military Operations in Urban Terrain Training Complex would involve 26 new operations per year using the equivalent of a quarter pound of C-4 explosive for each operation
- The relocation of activities conducted at engineering training area (ETA-1) to the ETC is currently underway.
- The realignment of the K-2 Ranges involves consolidating the current 23 K-2 ranges into 12 ranges

For purposes of the air quality analysis, the No Action Alternative is considered a future operational condition without the proposed action. This future operational condition comprises the 2004-2005 conditions plus the additional authorized actions described above.

4.1.3.2 Proposed Action

The proposed action, which includes the support and conduct of current and emerging training operations at MCB Camp Lejeune, is being evaluated for air quality impacts to determine whether or not there are any adverse impacts that could either cause the region to decline to nonattainment status or pose a health threat to the local population. Specifically, the air quality analysis evaluates proposed increases in munitions use and increased use of mobile sources

Criteria pollutant emissions resulting from the proposed increase in training activities have been evaluated for the proposed action. Air quality impacts would be substantial if emissions associated with the proposed action would: 1) increase ambient air pollution concentrations above the National Ambient Air Quality Standards, 2) contribute to an existing violation of the National Ambient Air Quality Standards, 3) interfere with, or delay timely attainment of the National Ambient Air Quality Standards, or 4) impair visibility within federally-mandated Prevention of Significant Deterioration Class I areas.

Pollutants considered in this EA analysis include the criteria pollutants and hazardous air pollutants measured by federal standards and toxic air pollutants that are regulated by the State of North Carolina. These pollutants are generated by the types of activities (e.g., munitions expenditures and mobile source emissions) associated with the proposed action. Under the proposed action, it is not anticipated that Marine Corps training would result in an increase in the use of surface ships. Use of surface ships is projected to be at levels similar to the baseline, and expected to remain relatively constant.

The air quality analysis involved evaluating air emissions generated from the proposed action and assessing the potential impacts to the local air quality, including an evaluation of potential exposures to toxic air pollutant emissions. Trace amounts of air toxics emissions would be generated from combustion sources (internal combustion engines in mobile sources) and the use of ordnance. These pollutant emissions would include hazardous air pollutants not covered under

the National Ambient Air Quality Standards. Primarily, these emissions would be produced by unspent missile fuel vapors. These emissions would be minor and would not result in substantial impacts because of the distance from human receptor populations that could be affected by air toxics and the low levels of emissions that would be produced as a result of the proposed activities.

Determining the effects of the proposed action on local air quality and visibility involved evaluating emissions associated with the proposed action. This included a comparison of current munitions and mobile source usage relative to baseline conditions to determine air emissions increases or decreases. From this, a qualitative assessment of the potential for air quality effects was determined.

Munitions

As depicted in **Table 4.1-1**, training activities associated with the proposed action would result in minor increases in air pollutant emissions from the detonation of munitions.

Table 4.1-1
Air Pollutant Emissions from the Detonation of Munitions under the Proposed Action

| Ordnance Type | No Action Alternative | Proposed Increase | % Increase |
|---|-----------------------|-------------------|------------|
| Small Arms Rounds Excluding .50 Caliber | 41,095,089 | 8,219,019 | 20 |
| Large Arms – MK19 | 454,910 | 45,491 | 10 |
| Large Arms – artillery, mortars, other | 579,312 | 28,965 | 5 |
| Tank Rounds | 7,403 | 2,887 | 39 |

Oxides of carbon, nitrogen and water are formed during munitions detonation, which reduces the likelihood of parent chemicals such as trinitrotoluene and cyclonite from entering the surrounding environment. Similar reactions are produced in the detonation of other nitroaromatic compounds such as octogen, tetryl, and picric acid (used in fuses and primers). Inert ordnance does not carry an explosive charge.

Air emissions from the detonation of munitions (both through training exercises and through ordnance disposal practices) are required to be reported under the Emergency Planning and Community Right to Know Act, Subchapter 313, Toxic Release Inventory. Annual Toxic Release Inventory reporting for MCB Camp Lejeune ranges includes the following compounds: aluminum, copper, dibutyl phosphate, lead compounds, nitroglycerin, phosphorus and toluene. The increase in munitions usage is expected to have a small but additive impact to the reporting totals.

The increase in ordnance-related emissions would have a small impact on local air quality. The primary emissions from the ordnance detonation are carbon dioxide, carbon monoxide and particulate matter. Other criteria pollutants, hazardous air pollutants as defined by the Clean Air Act, and toxic chemicals (i.e., those chemicals regulated under Section 313 of the Emergency Planning and Community Right-to-Know Act), as well as North Carolina-regulated toxic air pollutants are emitted at low levels. As ordnance is typically used in the field, there are no controls associated with its use.

Mobile Sources

Mobile source usage would increase both in terms of rotary-wing aircraft in the airspace and wheeled and tracked vehicles on the ground. MCB Camp Lejeune is located in an area classified by the US Environmental Protection Agency as attainment for all criteria pollutants. Therefore, the Base is not required to keep records on, or otherwise track air emissions generated by the mobile sources operating on, and around the ranges. The installation does, nonetheless, have a representation of mobile source use based on the operation data reports. Thus, the installation can use this information to provide a reasonable estimate of the baseline and projected increase in mobile source use. This estimate is based on the projected increase in munitions use (**Table 2.3-1**).

Ground maneuver training operations were quantified using data recorded in the Range Facility Management Support System database during Calendar Years 2005 and 2006. For all ground maneuver training exercises not directed by the Marine Air-Ground Task Force, standardized training exercise “templates” were developed by the MCB Camp Lejeune Operations and Training Department. These templates present the wide range of activity and equipment that are involved in individual training events at MCB Camp Lejeune and represent the best way to capture a high percentage of the overall training events.

No Action Alternative conditions and proposed action changes in mobile source usage associated with the proposed action are presented in **Table 4.1-2**

Table 4.1-2
Annual Rotary-Wing Aircraft Utilization and Tactical Vehicle Usage
No Action Alternative and Proposed Action

| Aircraft Type | No Action Alternative Hours Utilized ¹ | Proposed Action Hours Utilized ² | % Increase |
|---|---|---|------------|
| AH-1 | 1,586 | 3,171 | 100 |
| CH-53 | 4,637 | 6,167 | 33 |
| UH-1 | 1,106 | 2,211 | 100 |
| Tactical Vehicles | No Action Alternative # Deployments | Proposed # Deployments | % Increase |
| Tactical Vehicles on Land Ranges | 43,271 | 57,550 | 33 |
| Note: 1. Hours utilized were calculated using the average sortie duration - 1.5 hours. 2. AH-1, CH-53, and UH-1 percentage increase in sorties under the proposed action was calculated based on proportional increase in squadrons of each aircraft type as indicated in Fiscal Year 2009 AVPLAN (2 additional HMLA squadrons and 1 additional HMH squadron). | | | |

It should be noted that not all training events include the use of tactical vehicles. Additionally, the numbers presented in **Table 4.1-2** do not include tactical vehicles operating within the cantonment area, as would occur as a result of vehicles being driven to maintenance locations or in the use of personnel movement within the cantonment area.

The largest number of tactical vehicle deployments in the ranges use High Mobility Multipurpose Wheeled Vehicles, also known as “Humvees,” and Medium Tactical Vehicle Replacement 7-ton trucks. As shown in **Table 4.1-3**, a comparison of total annual tactical vehicle deployments to average daily traffic counts on highways adjacent to, and near MCB Camp Lejeune, demonstrate that the number of tactical vehicles used over the course of a year is less

than one percent compared to the number of vehicles driving annually on the highways in the City of Jacksonville.

Table 4.1-3
Annual Tactical Vehicle Deployments at MCB Lejeune Ranges and Average Daily Traffic Counts for Jacksonville and Onslow County, North Carolina

| | |
|---|------------------------|
| No Action Alternative # Deployed Vehicles | 43,271 |
| Proposed Action # Deployed Vehicles | 57,550 |
| Annual Daily Traffic Count on NC Highway 24 | 27,000 |
| Annual Daily Traffic Count on NC Highway 17 | 30,000 |
| Annual Daily Traffic Count on NC Highway 53 | 17,000 |
| Range of Annual Traffic Count for Jacksonville Highways Based on Annual Daily Traffic | 6,205,000 – 10,950,000 |
| Percent of Annual County Traffic that Proposed Action Represents | 0.5 - 0.9 |

Because of the small increase in air emissions due to the increase in munitions and mobile source use on the ranges, a small negative impact to the regional air quality is expected. However, the air quality in the Jacksonville, North Carolina Metropolitan Statistical Area is well within regulatory limits and air pollution concentrations would not exceed the National Ambient Air Quality Standards as a result of the proposed action. The action could not interfere with or delay timely attainment of the National Ambient Air Quality Standards because the Jacksonville Metropolitan Statistical Area is in attainment for all criteria pollutants.

4.1.4 Noise – Land Ranges

The ground range noise impact analyses for the No Action Alternative and the proposed action include:

- A BNOISE2 modeling analysis of CDNL for large-caliber weapons, including explosive detonations
- A SARNAM modeling analysis of ADNL for small arms firing operations around the Stone Bay ranges and the L-5 range

4.1.4.1 No Action Alternative

The No Action Alternative includes the 2004-2006 baseline conditions as described in Noise – Land Ranges (**Subchapter 3.1.4**), as well as actions that have been evaluated and approved through the NEPA process. These actions are listed below with corresponding FONSI dates.

- Marine Special Operations Command Complex Breaching Facility is expected to conduct 1,300 operations per year using the equivalent of a quarter pound of C-4 explosive for each operation; FONSI signed 17 August 2007
- Military Operations in Urban Terrain Enhancement project would involve 26 new operations per year using the equivalent of a quarter pound of C-4 explosive for each operation; FONSI signed 22 September 2005
- The relocation of activities conducted at engineering training area (ETA-1) to the ETC is currently underway; FONSI signed 22 September 2005
- The realignment of the K-2 Ranges involves consolidating the current 23 K-2 ranges into 12 ranges; FONSI signed 23 March 2005

Large-Caliber Weapons and Explosive Detonations

The same methodology used to establish the 2004-2006 baseline conditions CDNL contours around the Base, as described in Noise – Land Ranges (**Subchapter 3.1.4**), was used to develop the No Action Alternative CDNL contours (see **Figure 4-1**). The detailed modeling inputs are presented in **Appendix C**.

The CDNL contours on **Figure 4-1** indicate that:

- CDNL at or greater than 70 dBC (Army Noise Zone III) are predicted to occur mostly within the Base. However, portions of the New River are included within these contours. No off-Base land areas are within Noise Zone III. For on-Base land uses, sensitive areas including Onslow Beach are within Noise Zone III.
- CDNL at or greater than 62 dBC but less than 70 dBC (Noise Zone II) are predicted to occur mainly within the Base. Exceptions where the 62-dBC contour extends off-Base include:
 - The southern end that extends into Dixon
 - The southern end that extends into Sneads Ferry
 - The northwestern section that extends into Verona
 - The eastern end that extends into Willis Landing
- CDNL Noise Zone II is predicted to occur at on-Base housing and community facilities within the following areas:
 - Partial areas in Paradise Point
 - Partial Watkins Village
 - Hospital Point, Hadnot Point, French Creek, Courthouse Bay, and Onslow Beach

Compared to the 2004-2006 baseline conditions, the contours of the No Action Alternative show the following differences:

- CDNL Noise Zone III around on-Base Courthouse Bay would be eliminated from the realignment of ETA-1 activities to ETC
- CDNL Noise Zone II area would shift around Snead's Ferry, with overall less affected areas primarily resulting from the realignment of ETA-1 activities to ETC
- CDNL Noise Zone II area would expand more into the Dixon area primarily due to the implementation of Marine Special Operations Command Complex Breaching Facility
- CDNL Noise Zone II area would shift slightly north, primarily resulting from the realignment of K-2 ranges, and includes slightly greater on-Base family housing areas within Paradise Point and Watkins Village

Small Arms

Small arms firing-related ADNL noise conditions around the Base would be the same as discussed in Noise (**Subchapter 3.1.4**) for the existing conditions. The ADNL contours established for the area around the Stone Bay and L-5 ranges are shown in **Figure 4-2**. Both Noise Zone II and Noise Zone III would remain within the Base.

Vibration

As the No Action Alternative would not result in increased levels of explosive detonation and large-caliber weapon firing near the Base boundary, the change in vibration effects in the

communities around the Base would likely be minimal. However, it is anticipated that vibration conditions in certain areas around Sneads Ferry would be improved, primarily due to the relocation of activities from ETA-1 to the ETC.

4.1.4.2 Proposed Action

The proposed action is to support and conduct current and emerging training operations at existing ranges within the MCB Camp Lejeune Range Complex. The proposed action includes the following increases in munitions usage:

- A 20 percent increase in small arms training, except .50 caliber arms
- A 10 percent increase in training with MK-19 40-mm grenade rounds
- A 5 percent increase in training with artillery, mortar, and other large arms
- A 39 percent increase in training with tank rounds

Large-Caliber Weapons and Explosive Detonations

The above increases in overall large-caliber weapon firing activities as compared to the No Action Alternative condition was considered in establishing the CDNL contours under the proposed action (**Figure 4-3**). The detailed modeling inputs are summarized in **Appendix C**.

The CDNL contours on Figure 4-3 indicate that:

- CDNL at or greater than 70 dBC (Noise Zone III) are predicted to occur mostly within the Base. However, portions of the New River are included within these contours. No off-Base land areas are within Noise Zone III. For on-Base land uses, sensitive areas including Onslow Beach are within Noise Zone III.
- CDNL at or greater than 62 dBC but less than 70 dBC (Noise Zone II) are predicted to occur mainly within the Base. Exceptions occur where the 62-dBC contour extends off-Base as follows:
 - A portion of the southern end that extends into Dixon
 - The southern end that extends into Sneads Ferry
 - A northwestern part that extends into Verona
 - An eastern end that extends into Willis Landing
- CDNL Noise Zone II is predicted to occur at on-Base housing and community facilities within the following areas:
 - Partial areas in Paradise Point
 - Partial Watkins Village
 - Hospital Point, Hadnot Point, French Creek, Courthouse Bay, and Onslow Beach

Proposed action CDNL noise contours are comparable to the No Action Alternative levels with the following differences:

- CDNL Noise Zone III area would expand slightly along Onslow Beach sensitive area
- CDNL Noise Zone II area would expand slightly beyond the Base along the northern Base boundary in the Piney Green area, and along the western Base boundary near Greater Sandy Run area and around other off-Base areas
- CDNL Noise Zone II area would increase slightly around the Base. However, the area with CDNL noise increase would likely experience a net increase of less than 1 dB, a

barely perceptible difference; therefore, the proposed action likely would not result in a substantial impact to CDNL conditions around the Base

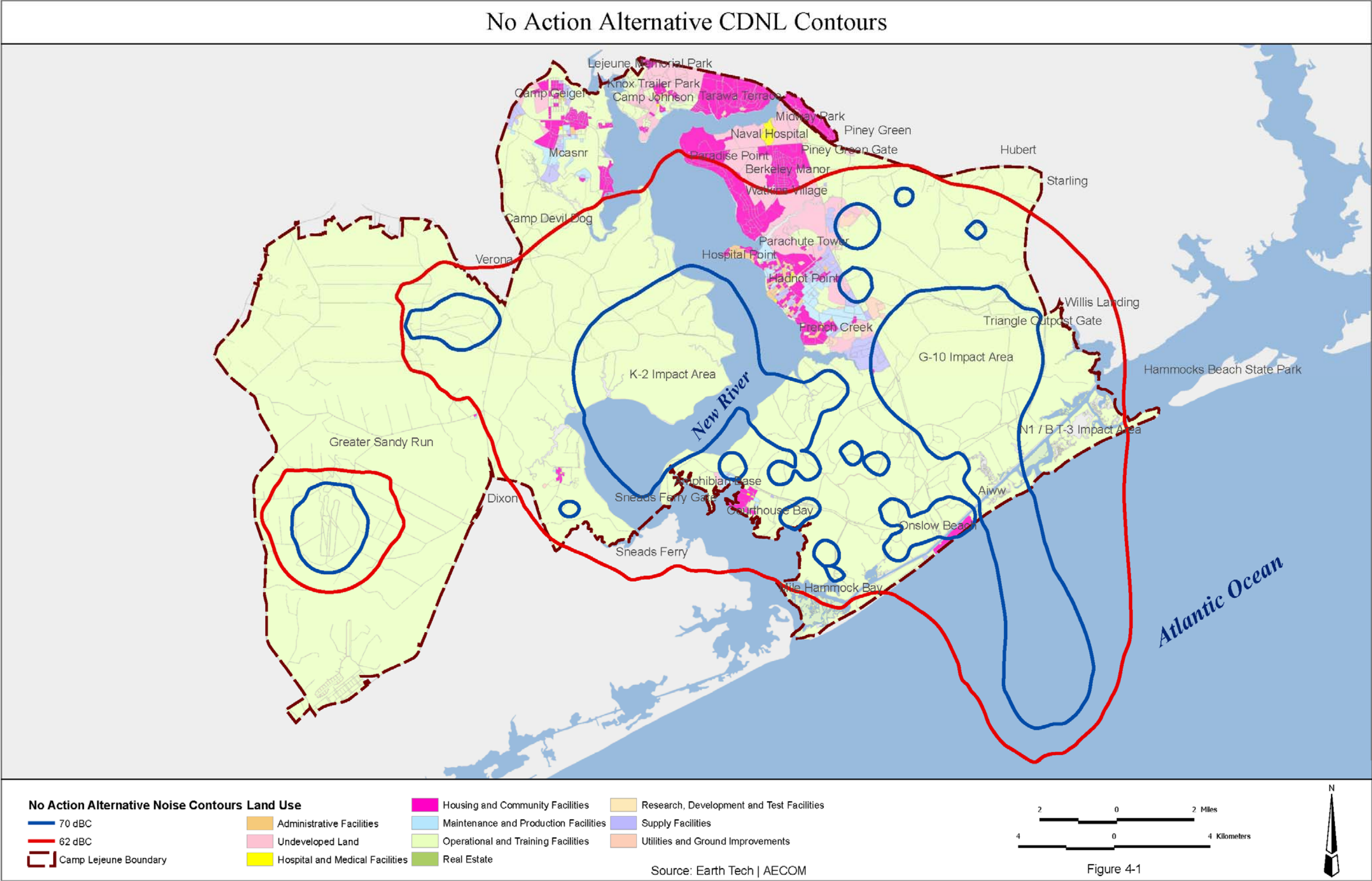
- Greater portion of on-Base housing area (e.g., Watkins Village and Paradise Point) would be exposed to Noise Zone II contours

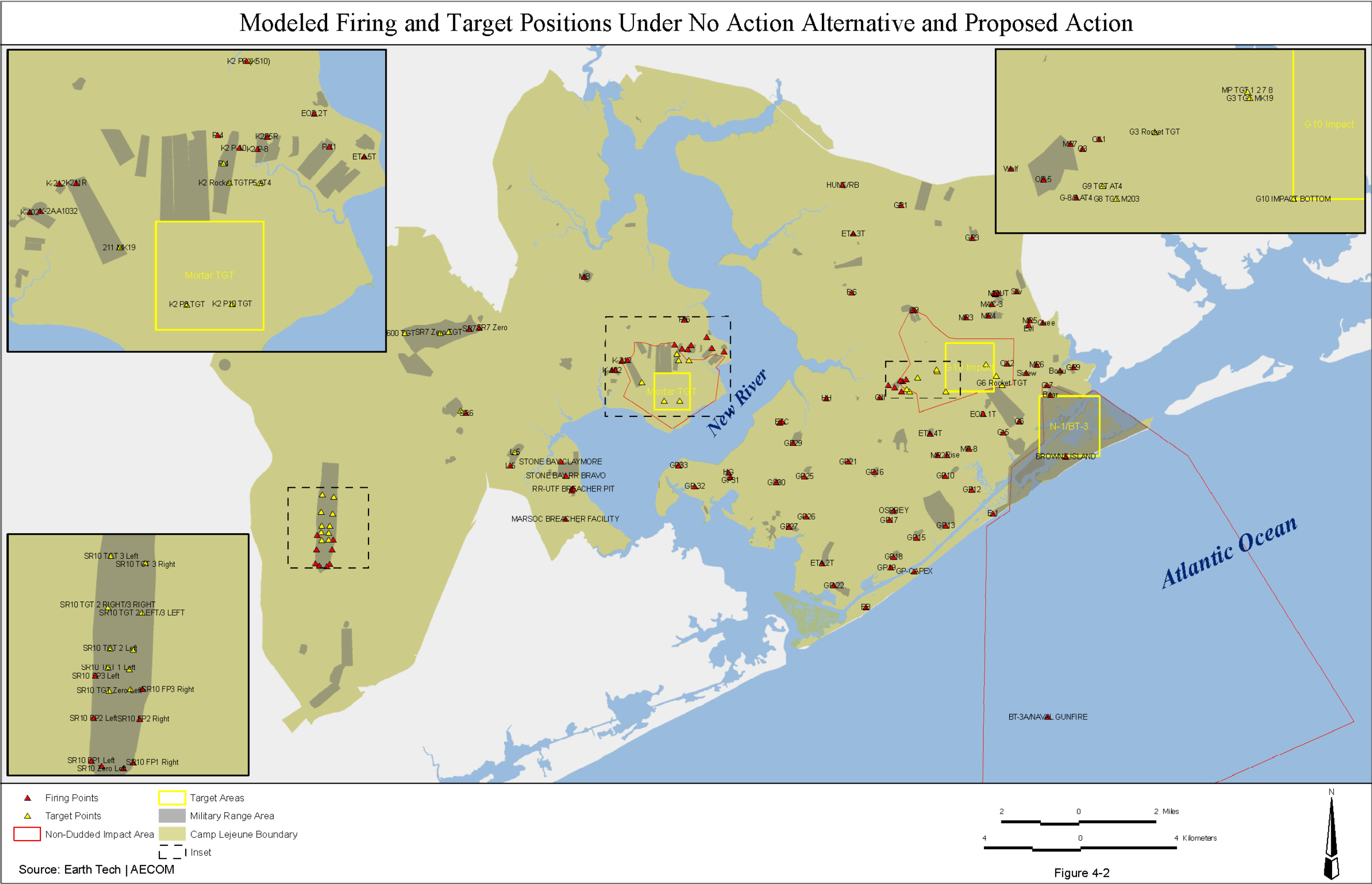
Small Arms

Small arms fire-related ADNL noise levels would increase slightly due to the proposed overall increase in the number of small arm rounds fired. However, the predicted ADNL contours around the Stone Bay and L-5 ranges (**Figure 4-4**) show that both ADNL Noise Zone II and Noise Zone III would still remain within the firing range area. Consequently, under the proposed action, the overall small arms ADNL contours around the Base are anticipated to remain within the Base.

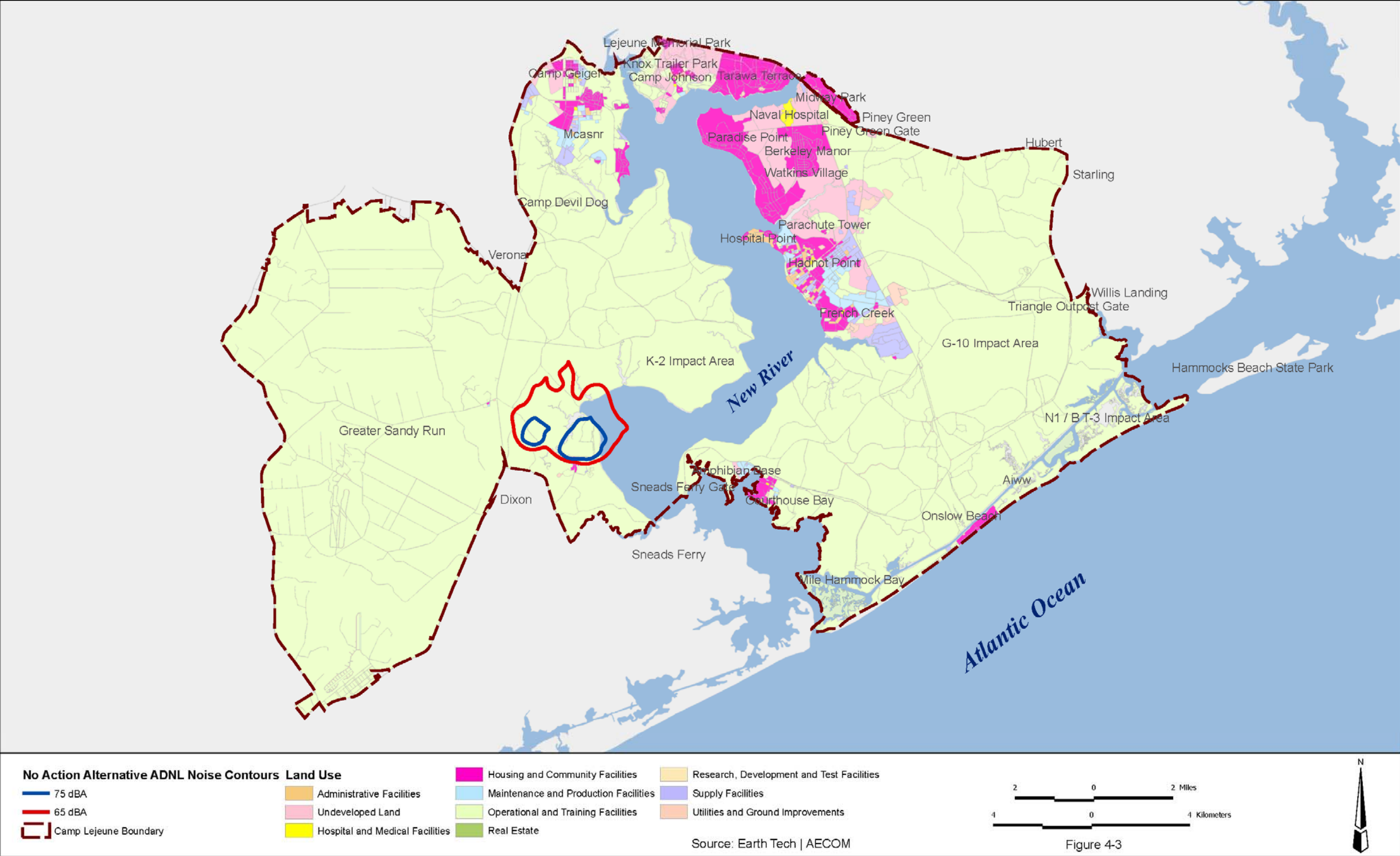
Vibration

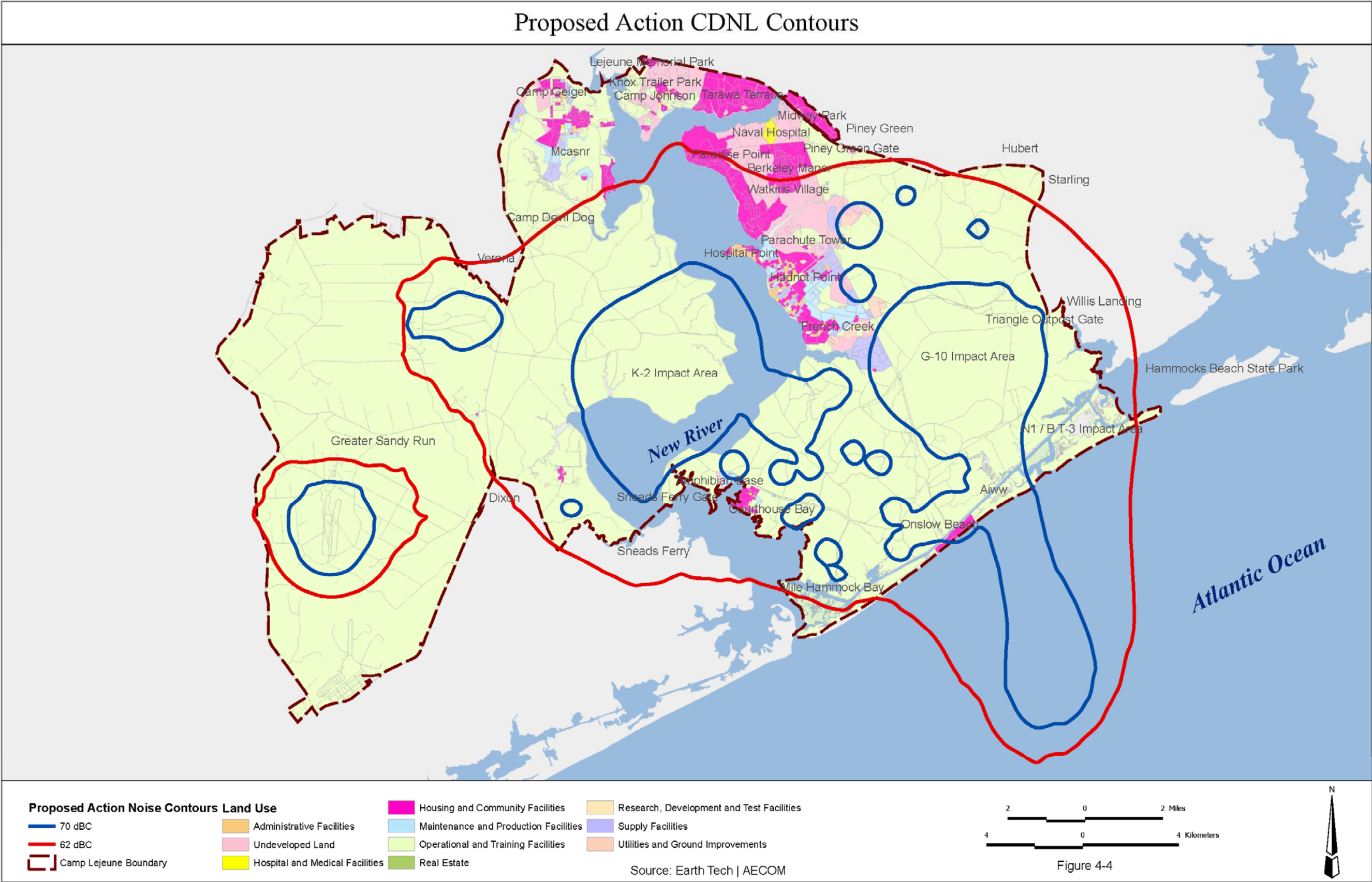
The proposed action would essentially increase the number of rounds of the types of large-caliber weapon fire that currently occurs, but would not increase the size of weapons fired. Therefore, in general, the vibration conditions around the Base would remain unchanged from the No Action Alternative.

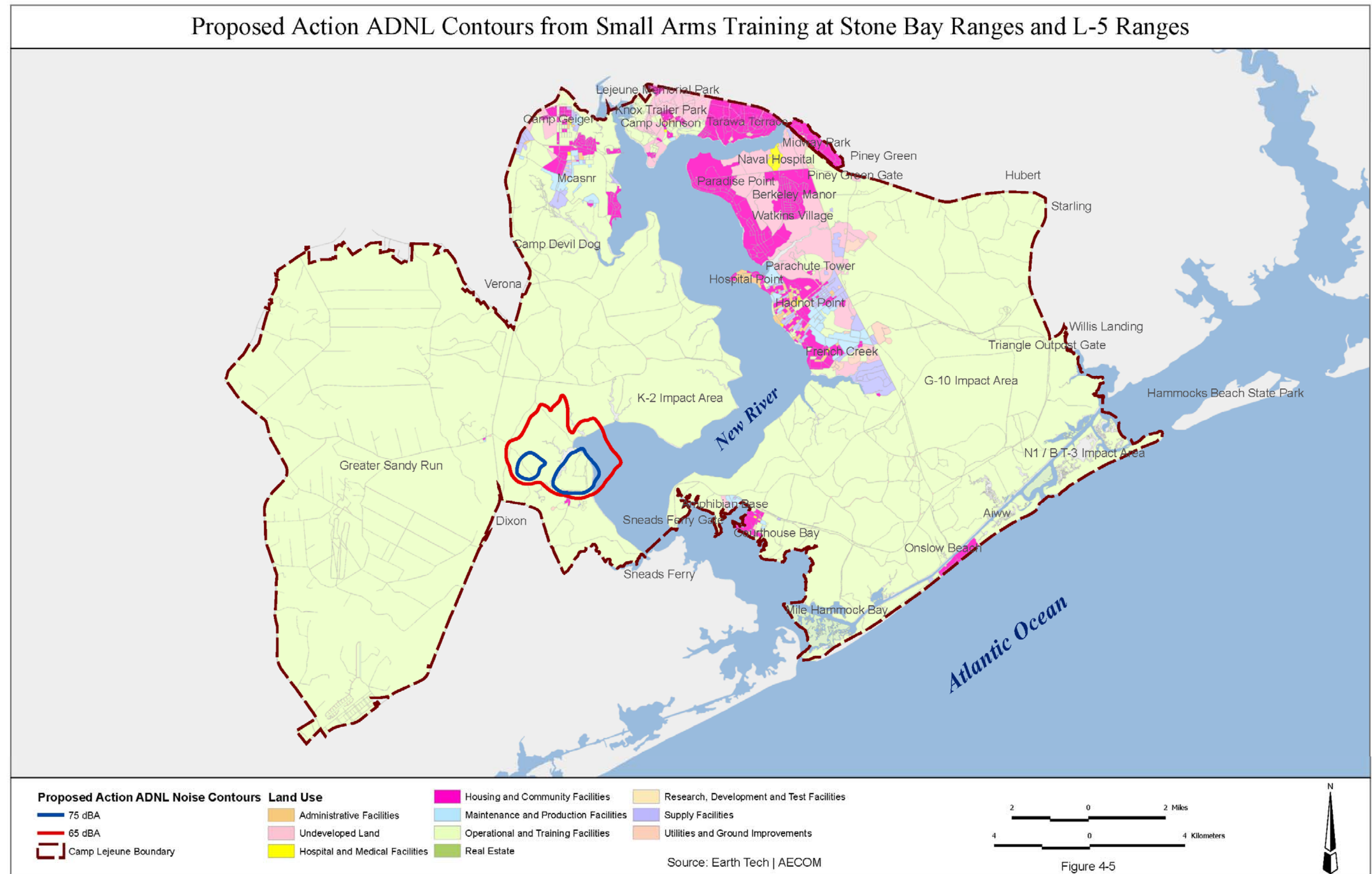




No Action Alternative ADNL Contours from Small Arms Training at Stone Bay Ranges and L-5 Ranges







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4.1.5 Cultural Resources – Land Ranges

Training operations in the MCB Camp Lejeune Range Complex have the potential to directly or indirectly affect important archaeological and architectural resources determined eligible for listing on the National Register of Historic Places. Under the National Historic Preservation Act, potential impacts of the proposed action may include physical destruction, or damage to all or part of a resource; alteration of a resource in a way that is inconsistent with the Secretary of the Interior's Standards for the Treatment of Historic Properties (36 CFR Part 68); introduction of visual, atmospheric, or audible elements that diminish the integrity of the property's major historic features; neglect of a resource resulting in its deterioration or destruction; and, any change that could adversely affect the qualities that make the resource significant (36 CFR 800.5(a)(2)).

The impacts analysis for the No Action Alternative and the proposed action involved identifying training activities that could directly or indirectly affect eligible cultural resources and determining the level of impacts on the resources. Elements of the proposed action that may affect archaeological resources involve ground-disturbing activities by ground training exercises (e.g., Marine foot traffic, off-trail use of tactical vehicles, excavation of defensive positions, and bivouacking); amphibious maneuver training; and exploding ordnance from ground-to-ground, surface-to-ground, air-to-surface, and air-to-ground weapons delivery. Indirect impacts on eligible archaeological and architectural resources may involve alterations in their setting or changes in land status, without adequate protection of the resources.

Potential impacts to archaeological sites located within the land ranges would vary based on the intensity of training occurring within the different training areas. For example, impacts to landing zone areas are generally considered more intense than impacts to wooded maneuver areas. However, landing zones are, by the nature of ongoing disturbances, less likely to have intact resources with sufficient integrity to be eligible for listing on the National Register of Historic Places. Therefore, while impacts to landing zones are intense, the likelihood of impacts to resources eligible for listing on the National Register of Historic Places is low. Wooded maneuver areas may receive lower intensity impact because trees limit the type and extent of training related disturbances that can occur. As a result, the potential for the presence of resources eligible under the National Register of Historic Places is higher.

4.1.5.1 Architectural Resources

No Action Alternative

The historic districts of Camp Geiger, Montford Point Camp 1, Naval Hospital/Surgeon's Row, and Command Services/Regimental Area 3 would not be affected by training activities under the No Action Alternative. None of these National Register-eligible properties are located in or near the MCB Camp Lejeune Range Complex (see **Figure 3-5**). The Parachute Training Historic District is near a skeet range, but this facility is operating as a recreational use complex and is not directly tied to military training; therefore, the No Action Alternative would have no effect on this district.

Two of the historic districts at MCB Camp Lejeune are associated with mission support, and are situated in the vicinity of a range or training area. Montford Point Camp 2 is near a baffled pistol range and tactical landing zone. The Assault Amphibian Base Historic District is in the vicinity of amphibious training areas. Training in these areas occurs in well-defined, well-used areas, and remain within the confines of the defined training range. The Montford Point Camp 2 and Assault Amphibian Base historic districts are surrounded by forest and other buildings, respectively, so that the range or training areas are not visible. These historic districts are at a sufficient distance from the outer limits of the ranges and training areas so that training activities would not affect the historic properties.

A portion of the Stone Bay Rifle Range Historic District is within the MCB Camp Lejeune Range Complex. Buildings and features of the historic district are within or adjacent to the surface danger zone of the Stone Bay rifle range. This historic district is important for its direct association with MCB Camp Lejeune's World War II mobilization and training mission, which included training its Marines in the proficient use of pistols and rifles. Under the No Action Alternative, the resources in the historic district would continue to support the training mission of the Stone Bay rifle range. The district's buildings and structures would not be demolished, damaged, or altered by training exercises at the range. The Stone Bay Rifle Range Historic District's historic features and setting would remain unchanged, as it would continue to perform the functions for which it was originally designed and built. Therefore, no architectural resources in the Stone Bay Rifle Range Historic District would be impacted under the No Action Alternative. The North Carolina State Historic Preservation Officer had no comment on this EA, thus indicating concurrence on the cultural resources effect findings for the No Action Alternative (**Appendix E**).

Proposed Action

Under the proposed action, the tempo of some training activities on land ranges would increase, including small arms training, which would increase by 20 percent, except for .50 caliber. The Stone Bay Rifle Range Historic District would not be affected by the proposed action. The increase in small arms training would not damage, alter, or otherwise change the contributing resources or significant features in the district. The district's buildings and structures would continue to perform the functions for which they were originally designed and would be unaffected by the increase in small arms training under the proposed action.

The proposed action would have no impact on the other historic architectural properties for the same reasons as those described for the No Action Alternative. The North Carolina State Historic Preservation Officer had no comment on this EA, thus indicating concurrence on the cultural resources effect findings for the proposed action (**Appendix E**).

4.1.5.2 Archaeological Resources

No Action Alternative

Impact to onshore archaeological resources at MCB Camp Lejeune and Marine Corps Outlying Landing Field Oak Grove could occur under the No Action Alternative. Existing and past

training activities such as construction of fighting positions or repeated vehicle crossings over one particular area could damage, or may have damaged archaeological sites. However, MCB Camp Lejeune has identified all archaeological sites located within high probability archaeologically sensitive soil. As a result, established protocols exist at the Base that include coordination and input from training, range, and cultural resources staff to avoid, minimize, or reduce impacts to cultural resources. In addition, the Base's Cultural Resources staff monitors site conditions on a continual basis. For all potential impacts to archaeological sites, MCB Camp Lejeune would consult with the North Carolina State Historic Preservation Office in accordance with 36 CFR 800 to avoid, minimize, or mitigate adverse effects. Mitigation measures may include the following: avoidance (by implementing guidance in Range Standard Operating Procedures); data recovery at the potentially impacted site prior to the impact occurring (results in complete disturbance of the resource, rendering it unavailable for further study); and mitigation of adverse effects to some sites by the preservation of others (marking and protecting certain sites for future study). If previously unidentified sites are discovered or damaged during training activities, Integrated Cultural Resources Management Plan includes procedures that requires curtailing training activities at the site, in addition to future avoidance and/or mitigation measures. The North Carolina State Historic Preservation Officer, having no comment on this EA, concurs with the cultural resources effect findings for the No Action Alternative (**Appendix E**).

Proposed Action

Under the proposed action, the tempo of some training activities on land ranges would increase. However, the general nature of these training activities would not change. Potential impacts to onshore archaeological resources by the proposed action would be the same as those described for the No Action Alternative. All procedures and guidelines prescribed in the *Integrated Cultural Resources Management Plan* and described above would be followed in order to protect archaeological resources.

The North Carolina State Historic Preservation Officer, having no comment on this EA, concurs with the cultural resources effect findings for the proposed action (**Appendix E**).

4.1.6 Natural Resources – Land Ranges

4.1.6.1 Soils

No Action Alternative

Impacts to soils from the No Action Alternative are addressed below. Generally, training can affect soils by surface disturbance and munitions firing, which could lead to subsequent erosion of soils. Thus, range operations were analyzed for their effects on soils, particularly soil erosion and deposition of expended training materials. Potential impacts to soils from contamination by hazardous constituents are addressed in Hazardous Constituents (**Subchapter 4.2.6.2**).

MCB Camp Lejeune has expended substantial time, effort, and funds in an attempt to adequately address land management/erosion problems Basewide. Some current actions used to help reduce soil erosion and degradation of maneuver areas on Base include:

- Closing selected areas to training use for restoration and recovery of eroded sites
- Using Best Management Practices for all training-related activities
- Implementing soil conservation restoration and maintenance projects
- Planting native warm season grasses where practical when restoring eroded sites
- Stabilizing the shoreline where needed along the New River

In addition to these efforts, several engineering training areas have maintenance plans that require units, in coordination with range inspectors, to conduct inspection of ranges and training areas prior to conducting training. The maintenance plan for engineering training area (ETA-2) requires that routine evaluations be conducted by Range Maintenance personnel from the Environmental Conservation and Environmental Compliance Branches to identify erosion and land disturbance deficiencies on the ranges and/or training areas (MCB Camp Lejeune, No Date). Maintenance and repair activities are coordinated through Range Control. Range Control typically restricts access into deficient areas and notifies trainers of any training areas temporarily closed for soil conservation and erosion repair.

As part of routine range maintenance activities, range debris (e.g., target debris, military munitions packaging and crating material, and unexploded ordnance) would continue to be periodically removed and disposed of in accordance with proper disposal procedures. Many training events include cleanup after the exercise. Discarded training materials (i.e., expended munitions debris) that accumulate on ranges would also be periodically removed. In accordance with Marine Corps Order 3550.12 *Operational Range Clearance Program*, ranges where ordnance is used are routinely cleared of military expended material and debris down to a depth of about 0.3 m (1 ft). The actual depth clearing and the frequency for how often this maintenance is required depend on the specific range and ordnance type. Soils would be impacted during the cleanup of discarded training materials but would be regraded and reseeded using best management practices to restore range conditions.

For the purposes of this analysis, MCB Camp Lejeune is divided into four geographic sectors (see **Figure 2-4**). To the west of US Highway 17 is the “Greater Sandy Run Area” sector. The “West of the New River” sector includes areas west of the New River that contain the K-2 Impact Area. The “East of the New River” sector contains the G-10 Impact Area and Brown’s Island within the BT-3 Impact Area. The Marine Outlying Landing Field Oak Grove is also addressed separately. The potential impacts of range activities on soils in each sector will be discussed separately in this section. Base-wide land management/erosion control and range debris cleanup as described above would apply to each of these areas.

Greater Sandy Run Area

Under the No Action Alternative there would be no change to current training operations in the Greater Sandy Run Area of the MCB Camp Lejeune Range Complex. Ranges and training areas currently support various munitions firing, personnel and vehicle movement, and support activities. When these activities are combined with the sometimes significant weather-related events, can result in erosion problems that impact the quality of training and reduce the land’s ability to recover naturally may result. Soil disturbance can be caused by debris created by

munitions firing, digging defensive positions, operating vehicles off-road, and bivouacking. Off-road vehicle traffic, bivouacking, and digging can reduce vegetative cover and cause soil compaction, both of which can increase runoff and the potential for soil erosion. Soil erosion and deep rutting due to vehicle traffic, especially during wet weather, could cause roads and tank trails to become impassable, and ultimately force military trainers to abandon degraded areas. Any loss of available training land due to soil degradation puts an increased demand on other maneuver areas. This can lead to increased pressure on training areas elsewhere on Base.

The predominant soil type found in the Greater Sandy Run Area is Croatan Muck. This soil type is typically saturated for 8 to 10 months of the year. The erosion risk is slight.

West of the New River

Under the No Action Alternative there would be no changes to current training operations West of the New River at MCB Camp Lejeune. As previously stated, ranges and training areas at MCB Camp Lejeune currently support various munitions firing, personnel and vehicle movement, and support activities. When these activities are combined with significant weather-related events, erosion problems that impact the quality of training and reduce the land's ability to recover naturally may result. Any loss of available training land due to soil degradation puts an increased demand on other maneuver areas. This can lead to further erosion of training areas elsewhere on Base.

The majority of the soils found in the West of the New River sector are the Baymeade fine sand soil series. The erosion hazard for this soil type is slight.

East of the New River

Under the No Action Alternative there would be no changes to current training operations East of the New River at MCB Camp Lejeune. However, these ranges and training areas currently support various munitions firing, personnel and vehicle movement, and support activities. When these activities are combined with significant weather-related events, erosion problems that impact the quality of training and reduce the land's ability to recover naturally may result. Soil disturbance can be caused by debris created by munitions firing, digging defensive positions, operating vehicles off-road, and bivouacking. These activities can reduce vegetative cover and cause soil compaction both of which can increase runoff and the potential for soil erosion. Soil erosion and deep rutting due to vehicle traffic especially during wet weather could cause roads and tank trails to become impassable. Ultimately, this may force military trainers to abandon degraded areas. Loss of available training land due to soil degradation puts an increased demand on other maneuver areas which can lead to further erosion of training areas elsewhere on Base.

There are several soil types found in the East of the New River sector, which contains the G-10 Impact Area and Brown's Island within the BT-3 Impact Area. The soils found in the G-10 Impact Area are primarily Kureb fine sand and Leon fine sand. Both of these soil types have a slight erosion risk. The area of Brown's Island within the BT-3 Impact Area contains Bohicket

silty clay loam, which is flooded twice daily by sea water, and Wando fine sand, which is formed in sandy marine sediments. Both of these soils have a slight erosion risk.

Marine Corps Outlying Landing Field Oak Grove

Under the No Action Alternative there would be no changes to current training operations at Marine Corps Outlying Landing Field Oak Grove. As stated above, MCB Camp Lejeune currently supports various munitions firing, personnel and vehicle movement, and support activities. When these activities are combined with significant weather-related events, erosion problems that impact the quality of training and reduce the land's ability to recover naturally may result.

The Marine Corps Outlying Landing Field Oak Grove consists primarily of Alpine fine sand and Autryville loamy fine sand soil types. Both of these soil types have a slight erosion risk.

Proposed Action

Greater Sandy Run Area

Under the proposed action, the nature of munitions firing activities and locations where these activities occur would remain the same as those described for the No Action Alternative. However, soils would be disturbed by increases in munitions firing at the ranges on the Greater Sandy Run Area. Similar to the No Action Alternative, the use of land at the Greater Sandy Run Area for military training combined with destructive weather-related events may result in erosion problems that impact the quality of training and reduce the land's ability to recover naturally.

While minor impacts to soils could occur if the proposed action were implemented, land management efforts and employing applicable erosion and sedimentation control techniques, as described for the No Action Alternative, would continue to minimize environmental impacts to soils due to increased training.

West of the New River

Under the proposed action, soils would be disturbed by increases in munitions firing at the ranges West of the New River. Similar to the No Action Alternative, the use of land West of the New River for military training combined with destructive weather-related events may result in erosion problems that impact the quality of training and reduce the land's ability to recover naturally.

While minor impacts to soils could occur if the proposed action were implemented, land management efforts and employing applicable erosion and sedimentation control techniques, as described for the No Action Alternative, would continue to minimize environmental impacts to soils due to increased training.

East of the New River

Under the proposed action, soils would be disturbed by increases in munitions firing at the ranges East of the New River. Similar to the No Action Alternative, the use of land East of the New River for military training combined with destructive weather-related events may result in erosion problems that impact the quality of training and reduce the land's ability to recover naturally. The ordnance impacts can reduce vegetative cover and cause soil compaction both of which can increase runoff and the potential for soil erosion.

While minor impacts to soils could occur if the proposed action were implemented, land management efforts and employing applicable erosion and sedimentation control techniques, as described for the No Action Alternative, would continue to minimize environmental impacts to soils due to increased training. These efforts and the specific engineering training area maintenance plans would continue to help minimize environmental impacts to soils.

Marine Corps Outlying Landing Field Oak Grove

Under the proposed action, soils would be disturbed by increases in rotary wing aircraft traffic. Similar to the No Action Alternative, the use of land at the Marine Corps Outlying Landing Field Oak Grove for military training combined with destructive weather-related events may result in erosion problems that impact the quality of training and reduce the land's ability to recover naturally.

While minor impacts to soils could occur if the proposed action were implemented, land management efforts and employing applicable erosion and sedimentation control techniques, as described for the No Action Alternative, would continue to minimize environmental impacts to soils due to increased training.

4.1.6.2 Water Resources

For the purposes of this analysis, MCB Camp Lejeune is divided into three geographic sectors (see **Figure 2-4**). To the west of US Highway 17 is the "Greater Sandy Run Area" sector. The "West of the New River" sector includes areas west of the New River that contain the K-2 Impact Area. The "East of the New River" sector contains the G-10 Impact Area and Brown's Island within the BT-3 Impact Area. The potential impacts of range activities on surface water and groundwater in each sector will be discussed separately in this section.

Surface Water

No Action Alternative

Greater Sandy Run Area

Under the No Action Alternative, munitions usage and training activities on land ranges in the Greater Sandy Run Area would remain the same. Ongoing munitions firing could result in the potential for munitions constituents to enter surface water. One of the major constituents of small arms rounds is lead. Low levels of copper, antimony, and zinc would also be expected. The scientific community has established that metallic lead (such as recently fired, un-weathered

bullets and shot) generally has low chemical reactivity and low solubility in water and is relatively inactive in the environment under most ambient or everyday conditions. All concentrations are below the Draft Department of Defense Range and Munitions Use Subcommittee Screening Values.

Impacts from movement of tactical vehicles crossing streams and other surface water bodies (fording) would be expected in the form of erosion and turbidity resulting in sedimentation. However, fording is restricted to specific locations that have concrete roadways through the water to prevent some of these impacts.

Impacts from support activities may be caused by accidental spills and release of oil, fuel, coolant or other liquids needed to operate the machinery used in training. However, these would not be expected to be substantial due to the existing response plans. For example, bulk fuel bladders are enclosed in secondary containment features, such as berms lined with fabric sheeting to contain spills.

West of the New River

Site-specific environmental conditions and munitions constituents loading rates are used in screening level fate and transport models to assess whether there exists potential for, or a substantial threat of a release of munitions constituents from an operational range or range complex areas to an off-range area. The munitions constituents evaluated in the Range Environmental Vulnerability Assessment program include trinitrotoluene (TNT), cyclotrimethylenetrinitramine (RDX), hexahydro-trinitro-triazine (HMX), and perchlorate.

Trinitrotoluene (TNT), cyclotrimethylenetrinitramine (RDX), hexahydro-trinitro-triazine (HMX) and perchlorate are considered to be indicator munitions constituents. Studies have shown that they are detected in a high percentage of samples containing munitions constituents due to their chemical stability within the environment. They are common, high explosives used in a wide variety of military munitions. In November of 2007, seven water samples were collected around the K-2 Impact Area and the G-10 Impact Area. Four surface water samples were collected from the area surrounding the G-10 Impact Area and three surface water samples were collected from the area surrounding the K-2 Impact Area. These surface water samples were analyzed for a full explosives suite, perchlorate, and lead. A background surface water sample was also collected from the New River, up gradient of the K-2 Impact Area. The samples were analyzed for a full explosives suite, perchlorate, and lead. None of the samples had detectable amounts of explosives. One sample from K-2 and one sample around G-10 had perchlorate detected at concentrations of 0.014 and 0.016 micrograms per liter ($\mu\text{g/L}$), respectively, which are well below the surface water screening values for ecological receptors of 9,300 $\mu\text{g/L}$ and the Draft Department of Defense Range and Munitions Use Subcommittee drinking water screening value of 24 $\mu\text{g/L}$. Total lead was detected in samples at concentrations ranging between 0.16 and 0.95 $\mu\text{g/L}$ near both the K-2 and G-10 Impact Areas. The dissolved lead concentrations were all non-detectable. The surface water screening value for ecological receptors for dissolved lead is 1.5 $\mu\text{g/L}$.

Water quality can be affected by the training activities that take place in this sector. Tactical vehicles crossing streams and water bodies can cause increased erosion and turbidity. Fording only takes place in those areas where concrete roads cross the stream or river. The West of the New River sector also has eight splash points where training activities have potential impacts to the shoreline. These activities can result in re-suspension of sediments into the water column, resulting in the release of contaminants in the sediments. This results in short-term local impacts on water quality in the New River. Potential impacts could also result from possible spills and releases of fuel, oil and other liquids from tactical vehicles, although these impacts are expected to be negligible due to existing spill contingency plans.

East of the New River

Under the No Action Alternative, munitions use would not be expected to increase and based on the baseline assessment described above, munitions are not a source of concern in this sector.

Impacts to water quality would be similar to those in the Greater Sandy Run Area and the West of the New River sectors. Impacts from fording would be the same as those mentioned above. This area has splash points that are used in the same manner as those in the West of the New River area. These areas would remain in use and would not be expanded.

Marine Corps Outlying Landing Field Oak Grove

As discussed in Water Resources (**Subchapter 3.1.6.2**), on December 9, 1999, the North Carolina Environmental Management Commission adopted rules to protect the 15 m (50 ft) wide riparian buffer along waterways in the Neuse River Basin. Variances from these rules are available for certain activities, including airfield facilities such as taxiways. However, even under authorization of a variance removing vegetation within the buffer requires compensatory mitigation to offset impacts. Airfield safety zones at Marine Corps Outlying Landing Field Oak Grove fall within the buffer of the Trent River. As such, trees that are tall enough to pose an obstruction to safe aircraft operations are periodically removed after coordination with the North Carolina Department of Water Quality regarding the buffer rules. Regardless of this exemption, the effects on the Neuse River would remain the same under the No Action Alternative.

Proposed Action

Greater Sandy Run Area

The proposed action includes an overall increase in small arms fire by 20 percent over existing levels for the Greater Sandy Run Area sector. The number of tank rounds being fired into the SR-10 is expected to increase by 39 percent (all tank rounds fired would be inert as these are the only ones authorized in the Greater Sandy Run Area). Overall, the number of rounds expended at the Greater Sandy Run Area ranges would increase from 3,001,186 to 3,362,217 rounds annually. Approximately 97 percent of the total proposed rounds at the Greater Sandy Run Area are small arms rounds, and 5 percent of the small arms rounds are blanks. All large arms rounds are inert.

Similar to that described for the No Action Alternative, one of the major constituents of small arms rounds is lead with low levels of copper, antimony, and zinc. The scientific community has established that metallic lead (such as recently fired, un-weathered bullets and shot) generally has low chemical reactivity and low solubility in water and is relatively inactive in the environment under most ambient or everyday conditions. Due to these factors and due to the large arms rounds being inert, the proposed increase in munitions expenditures at the Greater Sandy Run Area is not expected to cause a substantial impact on the surface water quality.

There are no planned additional vehicular stream/river crossings anticipated under the proposed action. Therefore, there should be no additional impact to these surface waters in the Greater Sandy Run area. There would be a 33 percent increase in tactical vehicles. However, tactical vehicles would continue to use existing well-defined roads and trails.

West of the New River

The proposed action would lead to an overall increase of 10 percent in the 40 mm grenade rounds and a 20 percent increase in small arms firing on the main ranges. These increases in small and large arms rounds would not considerably affect surface water. As previous tests have indicated, present levels of explosives, metals, and perchlorate are very small and the limited increases in munitions use would not be expected to have adverse impacts.

There are no planned additional vehicular stream/river crossings anticipated under this alternative. Therefore, there should be no additional impact to the surface waters in the West of the New River Sector. Tactical vehicles would continue to use existing well-defined roads and trails.

East of the New River

The proposed action includes an overall increase of 10 percent in the 40 mm grenade rounds, and a 5 percent increase of artillery and mortar rounds. This small increase is not expected to have adverse impacts to surface water quality. Existing levels of munitions constituents remain low and future levels are expected to be below Range Environmental Vulnerability Assessment trigger values. The slight increase in large arms rounds would not considerably affect surface waters.

Surface water at the locations of splash points may see an increase in local short-term impacts due to sediment re-suspension during activities if the number of exercises at some of these areas increases. Additional increases in the fording of streams would have minor additional impacts. The presence of the concrete crossings and limited number of crossings would prevent large scale erosion and turbidity. Tactical vehicles would remain on existing well-defined roads and trails.

Marine Corps Outlying Landing Field Oak Grove

As discussed in Water Resources (**Subchapter 3.1.6.2**), on December 9 1999, the North Carolina Environmental Management Commission adopted rules to protect the 15 m (50 ft) wide riparian buffer along waterways in the Neuse River Basin. Variances from these rules are available for

certain activities, including airfield facilities such as taxiways. However, even under authorization of a variance removing vegetation within the buffer requires compensatory mitigation to offset impacts. Airfield safety zones at Marine Corps Outlying Landing Field Oak Grove fall within the buffer of the Trent River. As such, trees that are tall enough to pose an obstruction to safe aircraft operations are periodically removed after coordination with the North Carolina Department of Water Quality regarding the buffer rules. Under the proposed action, the effects of increased training operations would not have substantial impacts on the Neuse River Basin.

Groundwater

No Action Alternative

Throughout the Base, surficial aquifers are situated very close to the surface with the water table ranging in depth from 0 to 3.1 m (0 [in the channel of the New River] to 10 ft). The surficial aquifer is composed of sand and silts that form the Pleistocene sediment cap and the upper most portion of the Miocene Belgrade Formation. No water supply wells are found in the surficial aquifer; therefore, it is not a source of potable water for the Base.

At depth, the Base is underlain by the limestone and sand hosted Castle Hayne aquifer, the major public water supply source for the Base and surrounding communities. It is separated from the surficial aquifers by the Castle Hayne Confining Unit composed of discontinuous lenses of clay, silty clays, and silts with an average thickness of 3.1 m (10 ft).

MCB Camp Lejeune's ranges are being studied through ongoing Range Environmental Vulnerability Assessments. The initial Range Environmental Vulnerability Assessment screening methodology consisted of development of a conceptual site model and screening-level modeling, as necessary. Munitions constituent loading data deposited through both historical and current activities at operational ranges were estimated. These mass loading data were then used in screening-level modeling to determine whether potential concentrations of munitions constituents may reach the surficial aquifer and/or entering surface water run-off. The screening-level modeling indicated the potential existed in some areas for munitions constituents to reach the surficial aquifer and surface water run-off at detectable concentrations.

Thirty-three munitions loading areas were identified and studied in the Range Environmental Vulnerability Assessment screening-level study, and from this study, two areas (G-10 and K-2 Impact Areas) were selected for further analyses including sampling and hydraulic test analyses. The sampling results indicated only minimal concentrations of munitions constituents (lead and perchlorate) were detected; however all of the results were well below applicable regulatory limits and/or Draft Department of Defense Range and Munitions Use Subcommittee Screening Values. Additionally, all potable water supply wells surrounding the G-10 Impact Area have been sampled (in 2004) resulting in no detections of munitions constituents being obtained.

Greater Sandy Run Area

The Greater Sandy Run Area sector ranges are restricted to training maneuver operations, inert tank rounds, and small arms fire. Thus the munitions constituents of concern in this sector are the heavy metals (lead, copper, antimony, and zinc). For small arms ranges, Range Environmental Vulnerability Assessment focuses on lead as the indicator munition constituent because lead is the most prevalent (by weight) potentially hazardous constituent associated with small arms ammunition. Lead is geochemically-specific regarding its mobility in the environment, and modeling of lead requires site-specific geochemical data that are generally unavailable during a baseline assessment. Therefore, instead of modeling lead transport, operational small arms ranges at the installations are qualitatively reviewed and assessed through the Small Arms Range Assessment Protocol to identify factors that influence the potential for lead migration. The Small Arms Range Assessment Protocol was developed as a qualitative approach to identify and assess factors that influence the potential for lead to migrate from an operational range. These factors include the following:

- Range design and layout
- Physical and chemical characteristics of the area
- Past and present operation and maintenance practices

In addition, potential receptors and pathways are identified relative to the small arms range being assessed. The potential for an identified receptor to be impacted by munitions constituent migration through an identified pathway is evaluated. The qualitative assessment process for a small arms range involves describing and documenting its physical and environmental conditions, as well as how the range is utilized and maintained (including the dates of use and types and amounts of small arms ammunition expended). During the qualitative assessment at Greater Sandy Run Area observations of fresh un-weathered bullets on ranges indicated that lead has a low solubility in water and is relatively inactive under normal conditions. Thus, leaching of lead to the groundwater is very restricted unless conditions are modified by the introduction of acids or salt water to the environment.

The impacts of the munitions constituents entering the natural environment under the No Action Alternative in the Greater Sandy Run Area sector are considered to be minimal and restricted to very low levels of lead, copper, antimony, and zinc in surface waters and possibly the surface aquifer where this aquifer intersects surface water. All concentrations are below the Draft Department of Defense Range and Munitions Use Subcommittee Screening Values.

Training maneuver operations involve simulated combat tactical vehicle refueling and thus the potential for releases of petroleum hydrocarbons during refueling exists. This potential is minimized through the application of fueling Standard Operating Procedures incorporating Best Management Practices for fuel transfers.

West of the New River

The West of the New River sector is better drained than the Greater Sandy Run Area sector with moderately well defined drainages. The same shallow groundwater conditions can be expected, in which groundwater drains both to the internal drainage channels and to the New River. This

sector contains the Base's main rifle ranges and the K-2 Impact Area. For the rifle ranges the munitions constituents of concern are the heavy metals associated with small arms projectiles, copper, lead, antimony, and zinc. Within the K-2 Impact Area additional munitions constituents are trinitrotoluene (TNT), cyclotrimethylenetrinitramine (RDX), hexahydro-trinitro-triazine (HMX), and perchlorate residues from high order and low order detonations and from any unexploded ordnance that is undergoing corrosion. These constituents are from high explosive munitions detonations.

Possible impacts to the groundwater from small arms firing (pistol and rifle) are minimal as the solubility of the heavy metals munitions constituents is very low. Some acceleration can be expected along reaches of the New River as storm spray of brackish water on to the deflation zones would increase leaching rates of the metals. However, it is expected the possible concentrations of heavy metals in the surface waters and shallow surficial aquifer would be below Draft Department of Defense Range and Munitions Use Subcommittee Screening Values.

Under the No Action Alternative, impacts to groundwater in the K-2 Impact area would mainly be from the munitions constituent residues remaining after detonation of high explosive munitions. The areas adjacent to the boundary of the K-2 Impact area were selected during the Range Environmental Vulnerability Assessment for testing of ground and surface waters. The chemical analyses obtained from surface drainage water samples, and samples collected from monitoring and potable water supply wells were well below applicable regulatory limits and Draft Department of Defense Range and Munitions Use Subcommittee Screening Values. Thus, no adverse impacts are present in the current activities of the No Action Alternative.

East of the New River

Physiographically, the East of the New River sector is very similar to the West of the New River sector. Again, the water table is very shallow and groundwater would drain mainly towards the New River and the Atlantic Ocean. The East of the New River sector contains approximately 20 artillery firing positions, the G-10 Impact Area, and the BT-3 Impact Area. The munitions constituents of concern in this sector are residues of trinitrotoluene (TNT), cyclotrimethylenetrinitramine (RDX), hexahydro-trinitro-triazine (HMX), and perchlorate resulting from detonation of live high explosive munitions.

As part of the Range Environmental Vulnerability Assessment program, screening-level surface and groundwater modeling was conducted to determine whether munitions constituent migration was possible and additional analyses were warranted. Current and historical munitions expenditures were used to estimate the munitions constituents loading for the screening-level modeling efforts. Based on the conservative screening-level modeling, it was determined that munitions constituent migration to surface water and groundwater off range was possible. Therefore, additional assessments were conducted to determine if munitions constituents were indeed migrating off-range, and if so, at what level. Subsequently, surface water and groundwater samples were collected adjacent to the boundary of G-10 Impact Area and determined that no munitions constituents percolated to the water table or were present in surface water run-off at concentrations above Draft Department of Defense Range and Munitions Use

Subcommittee Screening Values. Thus, no adverse impacts are present in the current activities under the No Action Alternative

Proposed Action

Greater Sandy Run Area

The proposed action includes an overall increase in small arms fire by 20 percent over existing levels for the Greater Sandy Run Area sector. Small arms rounds for all training would increase from 41,095,089 to 49,314,108 rounds annually. In addition, the number of tank rounds being fired into the SR-10 is expected to increase by 39 percent (all tank rounds fired would be inert as these are the only ones authorized in the Greater Sandy Run Area). The number of .50 caliber rounds fired would not change. These increases would not expend sufficient munitions constituents above the current levels to cause adverse impacts on the groundwater quality.

West of the New River

The proposed action would lead to an overall increase of 10 percent in the 40 mm grenade rounds, a 5 percent of artillery and mortar rounds and a 20 percent increase in small arms firing on the main ranges. These modest increases in small and large arms rounds would not considerably affect groundwater quality. Potential impacts would be the same as those described for the No Action Alternative.

East of the New River

The proposed action would lead to an increase of 10 percent in the 40 mm grenade rounds and 5 percent of artillery and mortar rounds. The slight increase in large arms rounds would not considerably affect groundwater. Potential impacts would be the same as those described for the No Action Alternative.

Wetlands and Floodplains

No Action Alternative

As described in Water Resources (**Subchapter 3.1.6.2**), there are approximately 16,973 ha (41,853 ac) of palustrine wetlands and 1,531 ha (3,784 ac) of estuarine wetlands at MCB Camp Lejeune. Additionally, approximately 4,330 ha (10,700 ac) of the installation lies within floodplains. Training within wetlands is primarily associated with stream fording and amphibious operations. The potential impacts of these are minimized by the requirements for units to use existing bridges or designated crossings and to only cross as often as absolutely necessary. Vehicles are prohibited from driving in the stream, other than for the crossing. Digging of fighting positions within wetlands is also prohibited, and units are instructed to avoid wet areas while operating vehicles. Even still, secondary impacts could occur from erosion in areas where training activities have reduced vegetative cover and thereby increased the potential for soil erosion and subsequent sedimentation into wetlands. However, as previously discussed, processes are in place to address and remedy these issues. Occasional off-road vehicle traffic associated with training maneuvers is not expected to have a substantial impact on vegetation and subsequently, wetlands. The majority of vehicle traffic is conducted on established roads and

tank trails. The thick understory of the training maneuver areas does not allow for much off-road driving through vegetated areas, and the fast rate of vegetation growth in eastern North Carolina lends itself to quick reestablishment of disturbed vegetation. Therefore, any impacts would be short-term and over limited areas. In order to reduce the impacts from current training, the Base would continue to implement wetland protection measures as outlined in the *Integrated Natural Resources Management Plan* for MCB Camp Lejeune. Wetland protection measures include the following:

- Using Best Management Practices for all training-related activities
- Recovering training areas not suited for training due to erosion
- Reducing soil erosion and subsequent sedimentation in sensitive riparian habitats, streams and estuaries
- Enhanced vegetative recovery onsite by planting native warm season grasses where feasible

Proposed Action

Under the proposed action the type of training operations and support activities at the MCB Camp Lejeune Range Complex would remain essentially the same. However, the potential for impacts to wetlands and floodplains exists primarily due to increased munitions firing and increased personnel and tactical vehicle movement.

Under the proposed action, potential impacts would be minimized by using applicable erosion and sedimentation control techniques described for the No Action Alternative.

The proposed action is consistent with current ongoing training operations at MCB Camp Lejeune and would not result in additional adverse impacts to wetlands and floodplains because of wetland protection measures that would be implemented. Wetland protection measures as outlined in the *Memorandum of Agreement Between the Department of the Army and the US Environmental Protection Agency, The Determination of Mitigation under the Clean Water Act Section 404(b)(1) Guidelines* (US Army Corps of Engineers and US Environmental Protection Agency, February 1990), would be followed as described below:

- Avoidance - avoid potential impacts to the maximum extent practicable
- Minimization - take appropriate and practicable steps to minimize the adverse impacts (e.g., limit the anticipated impact to an area of the wetland with lesser value than other areas, or reduce the actual size of the impacted area)
- Compensatory mitigation - take appropriate and practicable compensatory mitigation action for unavoidable adverse impacts that remain after all appropriate and practicable minimization has been made (e.g., create a new wetland area, restore existing degraded wetland, or enhance low value wetland)

4.1.6.3 Terrestrial Biology

The following subchapter describes potential impacts to terrestrial biological resources from the Marine Corps training activities currently conducted on MCB Camp Lejeune land ranges. Training activities occurring on land ranges are described in the No Action Alternative (**Subchapter 2.1**). Potential impacts to vegetation, wildlife and migratory birds, and federally listed and sensitive species are evaluated below for munitions firing, movement of personnel,

vehicle, and aircraft, and support services for training activities under the No Action Alternative and the proposed action.

To adequately train for combat, military training must occur in all weather conditions, over various types of terrain, and at all times of the year. Training must include digging defensive positions and obstacles, breaching adversaries' positions, movement of vehicles over terrain and distances similar to what is expected in combat and munitions firing to train soldiers in the use of weapons in a realistic environment. Natural resource managers at military installations must provide for areas and opportunities for this kind of realistic training to take place, while at the same time fulfilling Department of Defense mandates to conserve and manage military base natural resource values (Fehmi et al, 2001). MCB Camp Lejeune has a revised *Integrated Natural Resources Management Plan* and a set of Standard Operating Procedures that range personnel and soldiers are required to follow. Collectively, these two documents contain the vast majority of the avoidance and minimization measures the base has developed to protect and manage its valuable natural resources while striking a balance with training directives. Both the *Integrated Natural Resources Management Plan* and Standard Operating Procedures will be referred to frequently throughout this chapter.

No Action Alternative

Vegetation

Vegetative communities are vulnerable to disturbance from fire, crushing, and clearing activities associated with military training. However, MCB Camp Lejeune currently enforces a set of guidelines that help to minimize impacts to vegetation and natural ecosystems. These can be found in Chapter 6 of the *Range and Training Regulations, Standing Operating Procedures for Range Control* (Base Order P3570.1B). The following is a summary of these ecosystem stewardship measures:

- Special **Conservation Areas** are designed to protect species at risk or especially sensitive habitats (e.g., Hirst's panic grass, coastal goldenrod, and nesting shorebirds) and are posted with signs marked "Conservation Area". The following actions are prohibited in conservation areas:
 - The use of any vehicle off designated roads/trails
 - Any earth disturbing activity such as excavating or digging foxholes
 - Bivouacking and the establishment of command posts
 - MCB Camp Lejeune promotes **soil conservation** and makes efforts to restore and repair training areas degraded by erosion. This may include culvert replacement, repair of tactical trails, use of silt fences and the grading and reseeded of tactical landing zones and artillery gun positions. These activities are coordinated through Range Control. Range Control notifies trainers of any training areas temporarily closed for soil conservation and erosion repair. These areas are also be posted with signs and fences or barricades. MCB Camp Lejeune also protects wetlands (swamps, creeks, streams, marshes, open water areas). Maintained, tactical vehicles trails are used whenever possible to avoid damage to wetlands. Wet and low-lying areas during off-road tactical vehicle movement are avoided.

- MCB Camp Lejeune also supports a variety of **recreational activities** in areas not scheduled for training use. These activities include fishing, hunting and scouting, trapping, woodcutting, shell gathering and bird watching. Unscheduled training areas are turned over to the Conservation Law Enforcement Office (Game Warden) for recreational use. This makes it extremely important that trainers schedule the areas they want to train in via Range Facility Management Support System. When conducting training, units must ensure they stay within the areas they have scheduled to ensure that their training does not conflict with other activities. Training units must avoid wildlife food plots (they are small, tilled/planted clearings marked with signs). Units do not train in them, drive through them, or establish bivouac sites/command posts within them. Units must also avoid the mowed, maintained shorelines around managed fishing ponds.
- Units must use common sense when operating off-road vehicles. Units must not drive around gates, drive through chain-link fences or enter areas that are posted as “Hazardous Waste Site,” or “Authorized Personnel Only.” When grasses and shrubs are damaged or removed as a result of vehicle movement, the bare soil is subject to erosion. Over time, erosion results in a barren area of deep ruts, large holes and flooding, greatly restricting foot and vehicle movement. Excessive damage to road, trails and vegetation to Range Control are reported so necessary corrective measures may be taken.
- Tracked vehicles must stay on tank trails transiting to/from designated training areas, i.e. tactical landing zones accessible by tank trails, free play tracked vehicle training areas designated by Range Control (Mobile Assault Course), Military Operations in Urban Terrain and Combat Town.
- Tracked vehicles must cross railroad tracks and paved roads at tank pad crossing sites. Tracked vehicles are to avoid road shoulders of paved roads. Road guards are used when crossing paved roads and all debris is removed from the tank pad crossing generated by the tracked vehicles. At night, safety gear, vests, flashlights, etc., are worn by road guards.
- Tracked vehicles must avoid wetlands (which includes much of MCB Camp Lejeune). If a vehicle operator is not sure whether an area is a wetland, they move to higher ground.
- Trench systems and tank traps are authorized in designated free play tracked vehicle areas after approval by Range Control and the Environmental Management Division.
- Trees are not knocked down by any military vehicle.
- Off road movement by any vehicle is prohibited on Jarrett’s Point south of a line from grid coordinates 81552970 to 81752970. Signs on that line identify a federally protected archaeological site.
- Off road movement is prohibited on marked archeological sites, which have signs that state:

| |
|---|
| <p style="text-align: center;">RESTRICTED AREA EXCAVATION, DIGGING, VEHICLES PROHIBITED BY ORDER COMMANDING OFFICER, MCB CAMP LEJEUNE</p> |
|---|

- Measures are taken to reduce the silting of streams caused by vehicles at fords and approaches. Areas showing signs of erosion are avoided, especially by heavy equipment and tracked vehicles. No digging is allowed in these areas.
- **Cutting of brush and trees** is minimized. Forested areas are an extremely important resource on MCB Camp Lejeune for both training and the environment. When cutting brush and hardwoods for camouflage, do not cut or knock down any standing hardwood trees. Do not cut any tree limbs larger than the diameter of your arm.

- Units are prohibited from cutting trees by explosive methods or chainsaws without proper authorization. Units are prohibited from knocking over trees with vehicles/equipment. Tree cutting requests must be submitted through the National Environmental Policy Act section (via a request for environmental impact review), and must indicate the number, size, and physical location of the trees.
- Cutting or damaging of pine trees of any size is prohibited anywhere on Base, except by permission of Environmental Management Division, or in cases of hazard to human safety. At no time will any pine trees or pine foliage be cut for camouflage aboard MCB Camp Lejeune.

Munitions usage in a vegetated area could inadvertently start a fire. Current training activities typically occur within previously disturbed areas or locations away from forested vegetation where fire hazards are more controlled (MCB Camp Lejeune January, 2007). For activities where firing positions are fixed versus moving firing positions (i.e., obstacle courses), vegetation located down-range is directly impacted from firing activities. Thus, these areas tend to develop a lack of vegetative communities over time. Impacts from munitions firing are expected, but mitigated, with existing forest management protocols. As described in No Action Alternative (**Subchapter 2.1**), approximately 150 personnel travel by foot from one range location to another an average of just over 3,000 events per year. Although foot traffic typically occurs on designated trails and roads, movement by foot is unrestricted throughout MCB Camp Lejeune. Off-road foot travel has the potential to cause damage to vegetation in general. However, damage from foot travel is expected to be minimal. Occasional off-road vehicle traffic associated with training maneuvers is not expected to have a substantial impact on vegetation. The majority of vehicle traffic is conducted on established roads and tank trails. The thick understory of the training maneuver areas does not allow for off-road driving through vegetated areas, and the fast rate of vegetation growth in eastern North Carolina lends itself to quick reestablishment of disturbed vegetation. Therefore, impacts would be short-term, covering limited areas.

Support operations (**Subchapter 2.1.4**) include activities, such as erection of tents and equipment set-up which tend to be concentrated in areas that have been used before for support purposes. Use of new areas (and clearing of vegetation to support this use) is infrequent. Effects to vegetation existing in the area would primarily be from foot traffic during set-up, use, and dismantling operations. However, no adverse effects to vegetation are anticipated from Support operations. Implementation of Standard Operating Procedures (i.e., prescribed burns in areas of munitions training to reduce risk of accidental fires), requiring vehicle and foot traffic to primarily use designated roads and trails and continued re-use of areas for support activities all help to reduce effects on vegetation from training activities. Overall, proper management of vegetated areas can sustain intense military activities (Trame and Harpor, 1997).

Wildlife and Migratory Birds

The diverse array of wildlife occurring on MCB Camp Lejeune has been exposed to activities associated with military training operations for over 60 years. Potential negative effects from munitions training, foot and vehicle traffic, and support operations are possible, but these are controlled and/or limited through existing management practices and Standard Operating Procedures. Although munitions use could cause injury or mortality to wildlife and migratory birds in the training areas, this would be very unlikely due to the expectation that individuals

would avoid the area or move away from it during training exercises. Wildlife game populations on MCB Camp Lejeune are extremely healthy and support an active hunting program. There have been no recorded incidences of game species lost due to incidental hits during munitions training exercises. Because of the thriving game species populations on base, it can be surmised that most wildlife are adapted to training activities, and that they simply take cover and remain concealed during the event, or they avoid the area and then subsequently return. Non-game species and migratory birds would likely react similarly during munitions exercises. Therefore, munitions training under the No Action Alternative will result in only short term, minimal impacts to wildlife and migratory bird populations.

Nesting, resting, and foraging birds and species such as deer or rabbit will likely be encountered on trails, beaches, and designated roads during foot and vehicle training activities. There is some potential for nest trampling, and mortality from crushing of smaller, secretive animals (e.g., reptiles and amphibians). The majority of nesting species are unlikely to experience long-term disruption of nesting activities given that these are routine training activities in the maneuver areas, and in order to use this habitat these species would have to become acclimated to this level of disturbance. At a maximum vehicle speed of 64 km (40 mi) per hour on designated roads, avoiding a collision with wildlife in the vehicle path could be problematic. Extreme caution would be taken during vehicle movement to avoid injury or mortality to wildlife. The noise from the approaching vehicle would likely deter wildlife from coming in close proximity of a training activity, or species would remain stationary as the activity passes through the area. Therefore, disturbance from foot and vehicle training exercises under the No Action Alternative would be short-term and temporary.

Effects to migratory bird populations would primarily center on noise from training activities, including munitions firing and aircraft overflights. Behavioral responses to noise vary from species to species (Goudie 2006). While some birds will likely avoid or flee the area during training activities, others will become inactive and remain in the area. However, a variety of migratory bird species coexist with, and have acclimated to, daily training operations at MCB Camp Lejeune rangewide (**Appendix D**).

Aircraft noise effects on bird species has long been a concern for active civilian airfields and military air stations. Birds that tend to flock, such as waterfowl and blackbirds, can react to disturbances by suddenly taking flight “en masse”. If the birds are foraging in agricultural fields or wetland areas near the runways, the potential for bird-aircraft impacts can be substantial, resulting in wildlife mortality, and becoming a safety issue for pilots and passengers. As a result, active airfields and air stations are required by the Federal Aviation Administration to develop and implement a Bird-Air Strike Hazard management and monitoring program, and to develop and use a Bird Avoidance Model based on known bird use and movement patterns in the area (see Bird/Animal-Aircraft Strike Hazard [**Subchapter 3.1.8.2**]). Certainly, individual birds die each year from in-flight air impacts, but the level of mortality is not expected to result in significant impacts to species populations. For example, the number of reported wildlife (birds and mammals) strikes for North Carolina during the period October 2006 through September 2007 was 77 animals. During this same period, there were 6,543 reported strikes for the entire

US, and MCAS Cherry Point reported 25 strikes (1 deer and 24 birds). In terms of migratory bird species populations, these airstrike mortality figures are low when compared to the US average. The No Action Alternative is not likely to have adverse effects on the species.

Potential impacts to wildlife from support operations would primarily be noise disturbance associated with the erection, assembly, and disassembly of temporary structures and equipment, which requires short bursts of intensive activity and some noise. During these timeframes, wildlife in the immediate vicinity may be disrupted from their normal activities, but there would be no lasting effects. Wildlife habitat impacts from support activities are also unlikely. While foot traffic occurs throughout the maneuver areas, support activities conversely are concentrated in areas that have been used before to minimize the amount of work required to accomplish the task. Therefore, disturbance to wildlife under the No Action Alternative would be short-term and temporary.

Threatened and Endangered Species

Seabeach Amaranth

The following avoidance and minimization measures are currently being implemented at MCB Camp Lejeune to prevent or reduce impacts to seabeach amaranth. These are described, collectively, in the revised *Integrated Natural Resources Management Plan, Range and Training Regulations, Standing Operating Procedures for Range Control* (Base Order P3570.1B), and the *Environmental Handbook for Trainers* (**Appendix A**):

- Seabeach amaranth is an annual plant, and its location cannot be reliably predicted from year to year; all possible habitat locations must be surveyed each summer to ensure that populations receive adequate protection
- Once identified, seabeach amaranth sites are marked with signs to prevent military off-road recreational vehicles and pedestrian traffic from harming the plants; the plants are also monitored for webworm herbivory and other causes of mortality
- Potential habitat in overwash areas is protected from vehicle traffic year-round with a system of poles and signs designed to keep drivers to the seaward side of certain areas; MCB Camp Lejeune significantly reduced the threat that off-road recreational vehicles present to seabeach amaranth by restricting driving to the amphibious landing beach (Riseley Pier to the South Tower) between April 1 and August 31 (Base Order 11017.1F)
- For operations near/on the beach: it is prohibited to remove or disturb grass or plants from/on the beach; the beach is only accessed at designated areas marked with yellow-black poles; heavy equipment and vehicles is kept off sand dunes and vegetation; bivouac is carried out on the north side of the beach road, not on the beach itself

Additional avoidance and minimization measures for seabeach amaranth can be found in the US Fish and Wildlife Service Biological Opinion on the effects of dune stabilization and continued recreational use of Onslow Beach (US Fish and Wildlife Service 2002):

- No sand fencing is erected and no dune stabilization is established where seabeach amaranth has most frequently occurred: in the southern end of Onslow Beach and in the vicinity of the North Tower

- Prior to initiation of sand-pushing or bulldozing, the area is surveyed for seabeach amaranth germinations and adult plants; if seabeach amaranth is found in an area to be disturbed by dune building activities, the project is delayed until natural plant senescence
- Occurrences of seabeach amaranth in the area of a special beach entertainment event are clearly marked and protected to prevent disturbance

Known seabeach amaranth populations on MCB Camp Lejeune are well-documented and protected by the above avoidance and minimization measures. However, it remains possible that unauthorized surface disturbances or fires started from exploding live munitions could still affect seabeach amaranth plants, including in both known/demarcated and undiscovered populations. Therefore, activities associated with the No Action Alternative may affect, but are not likely to adversely affect, seabeach amaranth.

Rough-leaved Loosestrife

The following avoidance and minimization measures are currently being implemented at MCB Camp Lejeune to prevent or reduce impacts to rough-leaved loosestrife. These are described, collectively, in the revised *Integrated Natural Resources Management Plan, Range and Training Regulations, Standing Operating Procedures for Range Control* (Base Order P3570.1B), and the *Environmental Handbook for Trainers* (**Appendix A**):

- Sites containing rough-leaved loosestrife are clearly marked as restricted areas, with a single band of white non-toxic latex paint on the lower portion of tree trunks and signs reading “Restricted Area Endangered Species Site” or “No Vehicles Allowed”. This restricted area will extend 30.5 m (100 ft) from the outermost plant. Within the marked area the following activities are prohibited: vehicle traffic (with the exception of those responding to a fire emergency or associated with an authorized silvicultural treatment); excavation of any kind; alteration of site hydrology by excavations outside the buffer zone; cutting or girdling of pine trees; and bivouacking or extended occupation of the site is prohibited.
- Management activity within rough-leaved loosestrife sites are done with minimal soil disturbance. Skid trails, mechanical site preparation and mechanical treatments to control competition are prohibited within rough-leaved loosestrife sites and buffer zones. Also, except in cases where a wildfire endangers life or property, fire containment lines are not placed in buffer areas, or in a way that would alter hydrology.
- Activities that may impact rough-leaved loosestrife sites proposed in or near high probability habitat require a site survey by the Threatened and Endangered Species Section prior to implementation of the activity. If a survey results in the discovery of a new rough-leaved loosestrife site, the above restrictions apply.
- Mechanical hardwood/mid-story control conducted within the buffers of known rough-leaved loosestrife sites are only done during the dormant season, and only when conditions ensure that no rutting or extensive ground disturbance will take place.
- MCB Camp Lejeune continues to conduct growing season burning in rough-leaved loosestrife habitat. The use of plowed fire lines in the ecotone habitats favored by rough-leaved loosestrife has been dramatically reduced in recent years. This reduction is expected to continue as growing season burning increases, and the danger posed by catastrophic fires in pocosin wetlands is reduced. When plow lines are necessary to conduct a fire, they are not placed within the buffer of a known rough-leaved loosestrife site, and it is not done in a way that might alter the hydrology of the site. Additionally,

before a new fire line is placed in high-probability habitat, the area is surveyed for rough-leaved loosestrife. New rough-leaved loosestrife populations will be protected in the same manner as existing sites.

- Known rough-leaved loosestrife sites are visited annually to visually inspect for changes in extent and apparent health. Since 2002, MCB Camp Lejeune has been utilizing the monitoring protocol developed by the North Carolina Plant Conservation Program.

The majority of rough-leaved loosestrife populations on MCB Camp Lejeune are well-documented, and many of these are in the G-10 Impact Area boundaries, with others located in Combat Town and in the southeast portion of the Greater Sandy Run ranges. While the above avoidance, minimization, and monitoring measures will help to ensure the long-term viability of rough-leaved loosestrife, some effects under the No Action Alternative cannot be ruled out. In light of its occurrence within the G-10 Impact Area, direct disturbance from inert rounds and exploding live ordnance is possible, which can leave small to large impact craters (depending on the size of the ordnance). Also, with live munitions, habitat alteration from resulting fires is possible. Further, unauthorized surface disturbances from off-trail tracked vehicle intrusions could lead to habitat degradation and loss of some rough-leaved loosestrife populations. Therefore, activities associated with the No Action Alternative may affect, but are not likely to adversely affect, rough-leaved loosestrife.

Red-cockaded Woodpecker

The following avoidance and minimization measures are currently being implemented at MCB Camp Lejeune to prevent or reduce impacts to red-cockaded woodpecker. These are described, collectively, in the: *MCB Camp Lejeune Recovery Plan for Red-cockaded Woodpeckers* (US Marine Corps, May 1999), the revised *Integrated Natural Resources Management Plan, Range and Training Regulations, Standing Operating Procedures for Range Control* (Base Order P3570.1B), and the *Environmental Handbook for Trainers*:

- Because red-cockaded woodpeckers make nests in cavities of live pine trees, the nest sites are protected and designated as protected clusters. Cluster protection involves marking clusters with painted buffers, and imposing training restrictions within those buffers. Currently, most red-cockaded woodpecker clusters have marked 61 m (200 ft) buffers that extend outward from the polygon formed by the aggregate of cavity trees. Within these buffer areas, only transient foot traffic, transient vehicular traffic on existing maintained roads and trails, and blank small arms fire is permitted. Clusters are marked with a single band of white paint with signs posted around the cluster perimeter. This marking serves as the visual cue that the area has certain restrictions. Buffer zones are reconfigured as needed as existing cavity trees die or new ones are established.
- The following activities are prohibited within red-cockaded woodpecker buffer zones: use of vehicles, wheeled or tracked, off designated trails; cutting or damage to pine trees; bivouacking or establishing command posts; “tree topping” of antennas, girdling of pine trees with communication wire, burying of cable and climbing of pine trees with tree gaffs; firing of artillery; removal or destruction of signs marking a restricted area; cutting down or damaging trees in training areas unless authorized by the Base Environmental Management Department; heavy (mechanical) digging or establishing vehicle fighting positions, tank ditches, trench lines or deliberate defensive positions; and erecting camouflage netting.

- Riot Control Agent (lethal or incapacitating chemical agent) is not used within a minimum safe distance of 500 m (1,640 ft) from red-cockaded woodpecker sites.
- Acts which result in the shooting, wounding, killing, capturing or collection of any red-cockaded woodpecker, destruction of its eggs, nesting sites or attempt to engage in any such act, is prohibited.
- In unmarked red-cockaded woodpecker nesting sites, areas are monitored and the following training activities are prohibited: no tracked vehicles are allowed off of designated trails; no cutting or damaging pine trees; and no girdling pine trees with communication or barbed wire.
- With implementation of its 2006 *Red-cockaded Woodpecker Management Plan*, MCB Camp Lejeune adopted the 1996 US Army guidelines for red-cockaded woodpecker cluster protection. With the adoption of the Army guidelines, MCB Camp Lejeune maintains a 61 m (200 ft) buffer on all marked clusters. However, revised buffers encompass the area within 61 m (200 ft) of each cavity, as opposed to a 61 m (200 ft) buffer around the aggregate of cavity trees. With the adoption of the Army guidelines, many more training activities are allowed within the 61 m (200 ft) buffer. The Army guidelines include a secondary 15 m (50 ft) buffer around cavity trees. The 15 m (50 ft) cavity tree buffer is not marked, but is estimated by Marines in the field. Training activities which are now allowed within 61 m (200 ft) buffers include: hasty defense, light infantry hand digging only, 2 hours max; foot transit through the colony; wheeled vehicle and armored vehicle transit (but not within 15 m (50 ft) of a cavity tree, unless on existing roads, trails, or fire breaks); cutting of natural camouflage, hardwood only; vehicle maintenance for no more than 2 hours; blank firing (7.62 mm and below); noise from artillery and hand grenade simulators, and Hoffman device firing; smoke drift from haze operations, smoke grenades, and star clusters/parachute flares.
- In addition to adopting the Army guidelines, MCB Camp Lejeune implemented a strategy to increase red-cockaded woodpecker population growth, decrease restrictions to training, and continue to monitor impacts to red-cockaded woodpecker due to military training. First, MCB Camp Lejeune is attempting to speed up the rate of red-cockaded woodpecker population growth by promoting growth in areas that previously has been low priority for red-cockaded woodpecker growth. With the implementation of this plan, MCB Camp Lejeune is promoting red-cockaded woodpecker population growth in designated High-Use Training Areas by allowing unmarked recruitment clusters to be placed there. By designating high use areas where new clusters will not be marked, MCB Camp Lejeune has removed what has been a disincentive to red-cockaded woodpecker growth in certain areas. It is the intention of MCB Camp Lejeune to have unmarked clusters in these areas subject to incidental take from military training activities, until the goal of 173 active clusters is reached. This plan allows MCB Camp Lejeune to promote population growth in the best possible habitat, regardless of the training area. MCB Camp Lejeune training areas that are free from additional training restrictions are as follows: HA, HB, HC, HE, HF, HG, HH, FA, FB, FC, FE, FF, MC, MD, ME, MF. This approach is similar to the approach taken by the US Army with Supplemental Recruitment Cluster areas (US Army Engineer Research and Development Center, January 1997). Unmarked clusters on MCB Camp Lejeune will not be considered supplemental, and may not be subject to incidental take at the time of recovery.
- Consistent with the 1999 Biological Assessment (US Marine Corps, May 1999) and subsequent Biological Opinion, upon reaching the mission compatible goal of 173 active

clusters, in consultation with the US Fish and Wildlife Service, MCB Camp Lejeune has the option of removing all red-cockaded woodpecker military training restrictions. Milestones are in increments of 25 active clusters, and the percentage of unmarked clusters are increased as each milestone is met. As the population approaches the recovery goal of 173 active clusters, the percentage of unmarked clusters increases. The number of marked clusters varies depending on the percentage of total clusters, but it is not expected to exceed 64 clusters. As MCB Camp Lejeune's red-cockaded woodpecker population increases, the percentage of marked clusters decreases. For example, between 75 and 100 active clusters, the percent of unmarked clusters is 35 percent. Between 100 and 125, it is 45 percent. This will increase until MCB Camp Lejeune gets closer to the recovery goal of 173 active clusters, at which time, the intervals will get smaller. This removal of training restrictions would apply as long as the red-cockaded woodpecker population remains at or above the mission compatible goal of 173 active clusters. However, once restrictions are lifted, the incidental take will not be authorized for 173 "recovery clusters", but will apply only to the number of clusters in excess of 173. As MCB Camp Lejeune approaches its recovery goal, the Base may decide to exceed its recovery goal before removing all training restrictions in order to ensure a buffer against falling below the goal again.

- MCB Camp Lejeune continues to monitor the impacts of military training to the Base's red-cockaded woodpecker population. As with the previous plan, control clusters are marked (i.e. subject to training restrictions) and experimental clusters are unmarked. Unlike the previous plan, monitoring will not continue the paired design followed by the Military Impacts Study. Instead, locations of unmarked clusters are determined based on benefits to training.
- Monitoring, management, and research on MCB Camp Lejeune's red-cockaded woodpecker population, continues as stated in the 1999 Plan. MCB Camp Lejeune continues to designate control and research clusters for monitoring military impacts. MCB Camp Lejeune also continues to utilize tools and techniques available for red-cockaded woodpecker management, including artificial cavities, cavity restrictors, translocation, and prescribed burning.
- As a result of the 2003 *MCB Camp Lejeune Recovery Plan for Red-cockaded Woodpeckers*, US Fish and Wildlife Service authorized take of future red-cockaded woodpecker clusters as follows: 6 future clusters in the cantonment areas, as well as 5 clusters in the mission essential military construction area around the G-10 Impact Area. These 11 total clusters may or may not ever form, but this take was authorized to accommodate proposed future range and facilities development.
- In response to the Biological Assessment for the revised 2007 *Integrated Natural Resources Management Plan*, US Fish and Wildlife Service re-authorized the original incidental take (11 total clusters) requested in 2003 but never used. They also added 7 additional clusters as follows: 2 newly-formed clusters, and up to 5 "de-marked" clusters after population milestones on base have been met. It is important to recognize that by US Fish and Wildlife Service authorizing a total take of 18 clusters, they and MCB Camp Lejeune are merely being precautionary. Take is defined in the Biological Opinion as resulting from harassment, change in cluster status, damage to a cavity tree, etc., all of which can occur related to training activities. In its Biological Opinion, US Fish and Wildlife Service also required that the following additional conservation measures be implemented by MCB Camp Lejeune:

- Avoid damaging, destroying, or felling pine trees in size and age classes that serve as foraging or potential nesting substrates within unmarked clusters, and minimize tree loss in unmarked clusters, except as prescribed silviculturally to enhance red-cockaded woodpecker habitat
- Inspect and monitor unmarked (including de-marked) clusters and collect demographic information relative to red-cockaded woodpeckers and military training activities, pursuant to the proposed monitoring program
- Whenever prescribed burning takes place in the vicinity of active red-cockaded woodpecker clusters or recruitment clusters, MCB Camp Lejeune personnel may take appropriate measures to protect cavity trees prior to general ignition of the burn unit, and motorized and heavy equipment use in red-cockaded woodpecker clusters is minimized to the greatest extent possible during burning operations
- Following prescribed burning activities, MCB Camp Lejeune inspects active red-cockaded woodpecker clusters. If red-cockaded woodpecker cavity trees are found to be damaged to the point that they can no longer be used, MCB Camp Lejeune replaces that tree by creating an artificial cavity in close proximity as soon as qualified personnel can be mobilized and on the site
- Prior to construction within the cantonment areas and Greater Sandy Run Area, surveys of suitable habitat are conducted for the presence of red-cockaded woodpeckers

In its 2006 Biological Opinion (US Fish and Wildlife, October 2006) regarding red-cockaded woodpecker management at MCB Camp Lejeune (as found in the revised *Integrated Natural Resources Management Plan*), the US Fish and Wildlife Service concluded that potential taking of red-cockaded woodpeckers in unmarked clusters will not reduce the number of currently active existing clusters on base. Further, US Fish and Wildlife Service found that management, research, and monitoring activities for the red-cockaded woodpecker on MCB Camp Lejeune are necessary for the maintenance and expansion of the red-cockaded woodpecker population. US Fish and Wildlife Service concluded that the authorized level of take being allowed would not likely jeopardize the on-base population of red-cockaded woodpeckers. It should be noted that the one caveat related to training activities on base was the above referenced requirement to monitor all unmarked and de-marked clusters relative to training exercises. However, it remains plausible that ongoing training activities on base could result in unexpected impacts to red-cockaded woodpeckers, most likely from unauthorized surface disturbance, and fire from exploding, live ordnance. The probability of a red-cockaded woodpecker being killed by a direct hit from ordnance is considered extremely remote, and these types of impacts are believed to be discountable. Given all of the above-described avoidance and minimization measures being implemented, and that US Fish and Wildlife Service's authorization to take of some future clusters, it can be concluded that although the No Action Alternative may adversely affect the species, these effects are covered by previous consultations.

Piping Plovers

In recent years, piping plovers have not been documented as nesting on Onslow Beach or the mouth of the New River, even though habitat is suitable to support breeding. The nearest known nesting activity for the species is at the eastern end of Bear Island, within Hammock Beach State Park, which is also part of a critical habitat unit (NC-10, Bogue Inlet) designated by US Fish and

Wildlife Service. Even though nesting activity has not been documented on base, MCB Camp Lejeune has implemented protective measures for migrating, breeding, and foraging piping plovers. The following avoidance and minimization measures are currently being implemented on base to prevent or reduce impacts to piping plovers. These are described, collectively, in the: *Integrated Natural Resources Management Plan, Range and Training Regulations, Standing Operating Procedures for Range Control* (Base Order P3570.1B), and the *Environmental Handbook for Trainers*, and a 2002 Biological Assessment and subsequent Biological Opinion from US Fish and Wildlife Service for proposed activities on Onslow Beach (US Fish and Wildlife, May 2002):

- From April-August, portions of the New River Inlet beach (Area EA) are closed to vehicle traffic with signs reading:

| |
|---|
| SHORE BIRD NESTING AREA VEHICLES PROHIBITED |
|---|

- Though no piping plover nesting has been documented on Onslow Beach, suitable habitat is available for nesting, over-winter foraging, migrating, and roosting. Birds have been documented foraging on Onslow Beach during the winter, spring and fall migration periods, and during the nesting season, although to date no nests have been found. Beginning in 2000, bi-weekly shorebird surveys along the accessible portion of Onslow Beach have been conducted.
- Starting in April, high quality potential nesting habitat is posted as protected, and the surveys become more intensive as the beach is monitored for evidence of piping plover nesting behavior.
- MCB Camp Lejeune intends to allow the portion of Onslow Beach outside the recreational and training beaches to remain in a natural state. Natural beach dynamics have historically created good potential habitat for piping plovers at the inlets and in a large overwash flat on the south east end of Onslow Beach. Additionally, the inlets and smaller overwash areas on Browns Island provide relatively undisturbed habitat for piping plovers and other shorebirds.
- MCB Camp Lejeune also participates in international piping plover census counts, both over winter and in the breeding season.
- If piping plovers are sighted during the nesting season, they are observed for signs of breeding behavior. If breeding behavior is detected or a nest is located outside of the military training portion of the beach, appropriate protective measures are implemented. For instance, the areas are posted to prohibit disturbance, including pedestrians and pets.
- New off-road recreational vehicle rules restrict recreational vehicle access south of the south tower between April 1 and August 31. April 1 was chosen specifically to protect nesting shorebirds, including piping plovers. Only base personnel or volunteers conducting surveys, base range inspectors and Conservation Law Enforcement personnel are allowed on this portion of the beach during that timeframe.
- MCB Camp Lejeune posts shorebird sites to discourage pedestrian impacts, and enforce Base Order 10570.1c requiring pets to be leashed on Onslow Beach.
- MCB Camp Lejeune has actively removed predators from Onslow Beach, and will do so again as appropriate.

- In order to help conserve piping plovers and other species, no sand fencing or dune planting takes place south of South Tower or north of North Tower.
- The annual Christmas Bird Count is held each year from mid-December through January. MCB Camp Lejeune has taken the necessary steps to convert this count to an official Audubon count. The results of the survey will be compiled into the longest running database in ornithology, which represents over a century of data on trends of early-winter bird populations across the Americas. MCB Camp Lejeune also supports a summer bird count conducted on International Migratory Bird Day, the second Saturday in May each year. Also, MCB Camp Lejeune coordinates the use of restricted airspace for aerial surveys of wintering waterfowl on New River, and performs coordinated waterfowl and shorebird surveys as part of the South Atlantic Migratory Bird Initiative.
- The military training section of Onslow beach is not only a vital military asset, but it has generally low quality habitat for piping plovers, and it is unlikely to see nesting or breeding behavior there. But, recognizing the remote possibility of plovers one day nesting here, MCB Camp Lejeune applied for, and was granted, incidental take for this species by US Fish and Wildlife Service in 2002 (US Fish and Wildlife, May 2002). Special conservation measures required by US Fish and Wildlife Service are still being implemented by the base, and these include:
 - Surveying bi-monthly for piping plover to document plover use of Onslow Beach; if nesting behavior or nests are identified, the area or nests is immediately posted with signs prohibiting vehicular or human access
 - Prior to dune construction activities, project areas and the surrounding area are surveyed for adult, young, or nests of piping plover
 - If a nest is located or adults are exhibiting breeding behavior within 91 m (300 ft) of a proposed dune building project site, the project is delayed until the breeding season is complete

In its 2002 Biological Opinion (US Fish and Wildlife, May 2002) regarding the various uses proposed for Onslow Beach, including training activities, US Fish and Wildlife Service estimated that training activities could impact approximately 20.2 ha (50 ac) of good quality piping plover habitat. However, US Fish and Wildlife Service did not anticipate, nor did they authorize, take of individual piping plovers or their nests. An unspecified level of indirect take from military training activities, off-road recreational vehicles, pedestrian traffic, and pets harassing, disturbing, or interfering with piping plovers attempting to roost, forage, or nest were authorized within the project area or on adjacent beaches.

In addition to habitat degradation and the physical disturbances from pedestrians and vehicles, piping plovers and other threatened and endangered species on military installations have the potential to be affected by noise. At MCB Camp Lejeune, this would include loud sounds emanating from people on foot and in vehicles, the impulsive noise from munitions firing and detonation, and aircraft overflights. Most of the early work related to avian response to human-created noise has been with waterfowl species and their reaction to aircraft overflights. Waterfowl reacting to fixed-wing propeller, fixed-wing jet, and rotary-wing aircraft at both civilian and military airbases have been documented as a leading source of bird-aircraft strikes.

Population estimates based on survey data collected by federal and state agencies within North Carolina show that waterfowl populations in the areas of Piney island, Cedar Island National

Wildlife Refuge, and Swanquarter National Wildlife Refuge have remained stable during the past 30 years (Department of the Navy, 2006). Waterfowl in these areas are frequently exposed to aircraft overflights that generate sound exposure levels in excess of 75 decibels (dB) due to the proximity of these areas to Navy, Air Force and Marine Corps bombing ranges and associated restricted airspace.

Also in support of the Super Hornet introduction effort, the Navy commissioned a literature review study whereby a large number of published reports related to avian reaction to aircraft noise were evaluated and synthesized (Department of the Navy, 2006). The following are excerpts from the conclusions of those reports deemed most relevant to this EA:

- In a two-year study on the effect of low-altitude military aircraft training flights on wading bird nesting colonies in Florida, Black et al. (1984) compared behavioral responses and reproductive success of selected species in a non-habituated “treatment colony” (i.e., newly exposed to F-16 overflights) and a control colony (no overflights). Breeding wading birds were exposed to F-16 overflights at 420 knots indicated airspeed, 82% to 84% rotations per minute, at 152 m (500 ft) above ground level, producing noise levels ranging from 55 to 100 dB. The responses of the treatment colony were not severe; no walking or flushing from nests was observed, as were no productivity-limiting responses. There were no differences in adult attendance, aggression, or chick feeding rates resulting from F-16 overflights. But, a noticeably greater response (flushing) was observed in relation to human foot traffic and disturbances from airboats.
- Conomy et.al. (1998) conducted similar work on waterfowl reaction to military overflights within R5306-A the airspace over BT-11, otherwise known as Piney Island, which is the air to ground bombing range controlled by MCAS Cherry Point. They studied black ducks, American widgeon, green-winged teal, and gadwall. By their definition, an overflight occurred when aircraft passed overhead near or above 152 m (500 ft) above ground level, which is the minimum allowed on the range. A noise exceedance occurrence was set at the 80 dB or higher threshold, and the number of exceedances per hour was recorded, with the range being 1 to 44 per hour. Resting was the only activity inversely related to sound variables, with no other behaviors changing in frequency of occurrence or duration. The results showed only a small portion of the waterfowl population responded by not resting (13/672, or 2%), their responses were brief (10 to 40 seconds), and they were highly likely to resume their pre-disturbance behavior (64%). In other work by Conomy et.al. at Piney island (1996), the results indicated that waterfowl spend <1.4% of their time responding to aircraft overflights, and the study conclusions indicated that aircraft disturbance was not adversely impacting the energy budgets of waterfowl, or diminishing the quality of habitat.
- Conomy et.al. (1996) conducted experiments to test captive, wild-strain black ducks and wood ducks to actual or simulated jet aircraft sounds. The results indicated that the birds habituated to the noise; the proportion of the black ducks exhibiting reaction to visual and auditory aircraft activity decreased from 38% to 7.5% in the first 15 days of confinement, and the duration of the response per bird also decreased with time. Response rates remained stable after 15 days.
- In further work at Piney Island, North Carolina, Fleming et.al. (1996) found that, despite the long term use of BT-11 by the USMC, the population of wintering waterfowl (in both diversity and abundance) did not decline in proportion to the declines documented

elsewhere within the North Carolina or Atlantic Flyways. They also conclude that, despite low altitude overflights (152 m [500 ft] above ground level) at speeds of 250 knots or higher (but not supersonic), and with most aircraft noise events exceeding 80 dB for 2 to 12 minutes, waterfowl were unlikely to exhibit a behavioral response.

- Kushlan's (1979) study was initiated over concerns that noise from fixed-wing aircraft could be causing biases in censuses of wading bird colonies in the Florida Everglades. The study assumed that by this point in time, birds had habituated to aircraft sounds, so a Lake single-engine amphibious plane was used as the control disturbance, with a Bell 47G-2 helicopter being the rotary-wing test aircraft. A "drastic" disturbance was defined as one causing an incubating or brooding adult to flush from the nest and not return for more than 5 minutes. Data were collected mostly on great egrets, snowy egrets, and Louisiana herons. The field trials showed that no bird ever exhibited a drastic disturbance response, even when the airplane and helicopter were flown within 60 m (197 ft). There were "no reaction" responses in nearly 75% of the 200 observations, and in 90% of the observations the birds either exhibited "no response" or merely "looked up." Finally, in 11 of 12 comparisons made, birds either responded less to the helicopter or there was no significant difference.
- Lamp's (1989) work at Fallon Naval Air Station in Nevada was intended to study the effects of low-altitude subsonic and supersonic aircraft disturbances on wildlife, including waterfowl and shorebirds. Aircraft disturbances were categorized as: (1) sonic boom; (2) low-level (914 m above ground level [3,000 ft]); and (3) high-level (above 914 m above ground level [3,000 ft]). Reactions by wildlife were classified as: (1) no reaction [no observable change]; (2) minor reactions [slight change in body position, indication of awareness, or slight change in behavior]; and (3) major reactions [gross change in behavior or body location, posture, adoption of defensive position, or exhibition of panic or stress, such as flushing or running]. Snow geese showed no response to 33 (41%) of the events, minor reaction to 22 (27%), and major flushing reactions to 26 (32%). These reactions were in response to helicopters, propeller-driven planes, and jets. The average time required for disturbed snow geese to return to normal behavior was 235 seconds following a low-level aircraft disturbance, and 150 seconds following a high-level event. The sound ranges of these events averaged 78 dB for low-altitude and 84 dB for high-altitude overflights. There was one sonic boom event, and feeding Canada geese showed no response. Migratory ducks showed a similar response pattern: no reaction to 233 (71%) events, minor reaction to 53 (16%), and major reactions to 41 (13%) events.
- In work completed by Fleming et al. (2000) for Piney Island in support of a Marine Corps proposal to increase military aircraft activity by 15%, the focus was on field documentation of waterfowl behavioral response to overflight noise. This study found that waterfowl at Piney Island were more likely not to respond than to respond to the presence of aircraft. Waterfowl spent only <1% of their time reacting to aircraft activities. Also, the highest numbers of waterfowl were observed in approach and exit vectors for training aircraft, suggesting that these activities, at these low altitudes, did not discourage waterfowl from using their preferred roosting and feeding areas. According to Fleming et al., the low response rate to the presence of aircraft suggested that waterfowl either did not perceive the aircraft as stressors, or that they quickly acclimated to the presence of aircraft due to repeated exposures.

In summarizing much of the recent literature on avian response to aircraft overflight noise, most researchers believe helicopter noise to be a greater source of disturbance than fixed-wing aircraft,

and that birds perceive slower aircraft to be a bigger threat (Department of the Navy, 2006). Also, horizontal distance, and not altitude, is probably a greater source of concern, with birds flushing more quickly when the source of noise is nearer. Other studies have even shown that the presence of a natural predator, or even dogs off-leash, will produce a greater response than those exhibited to human intrusion (either on foot or in vehicle).

The literature that was reviewed in support of this EA does, however, repeatedly suggest or conclude that birds and other wildlife can become habituated, or acclimated, if exposed to noise disturbance repeatedly over time. It may be a matter of perception (*what is a threat?*) or energetics (*when is it worth responding?*), but the work done locally in North Carolina by the Department of the Navy (2007), Conomy et.al. (1996, 1998), Fleming et.al. (2000), as well as the studies done by Kushlan (1979) and Lamp (1989) in Florida and Nevada, respectively, all indicate that shorebird, waterfowl, and wading bird responses to aircraft noise diminishes over time. Fleming et.al. (1996) even found that waterfowl diversity and abundance within the nearby Piney Island portion of BT-11 remained stable, while populations elsewhere declined. Portions of Onslow Beach are exposed frequently to human disturbance from off-road recreational vehicle use and amphibious training activities, yet Ray et.al. (2008) documented a diverse shorebird population on MCB Camp Lejeune, including piping plovers. While not currently nesting on Onslow Beach, they were most frequently observed in the spring and summer months in more optimal breeding habitat on South Beach and the over-wash areas, possibly to avoid disturbing activities elsewhere.

Given the results of studies and survey efforts summarized above, it is reasonable to conclude that some species at least can acclimate to the daily and routine disturbances that come from military training activities, including aircraft noise. Under current training levels, there are about 730 fixed-wing aircraft sorties per year in Range 5306D and another 918 in Hatteras F MOA (see Figure 2-3 and Table 2.1-12); together, these two air ranges comprise the special use airspace that overlies Onslow Beach, which is where piping plovers have been observed. Under current rotary-wing training levels, there would be an estimated 6,835 sorties in R-5306D and 24 in Hatteras F MOA. All sorties, combined, for both air ranges and both types of aircraft total approximately 8,500 per year. Rotary wing overflights of other areas, such as Bear Island, would continue under the No Action Alternative. Training activities under the No Action Alternative are not expected to affect piping plovers, or other shorebird species; as evidenced by their continued presence, most piping plovers and/or shorebird species have already habituated to overflight disturbances.

American Alligator

Base Order P3570.1B, Section 6002 requires that precautions be taken to avoid disturbance in wetland areas known to be inhabited by alligators. The Base *Environmental Handbook for Trainers* also stipulates that precautions must be taken during the months of May and June, which is when the female alligator usually lays its eggs onshore. Areas known to host alligators are also posted with signs that say:

DANGER
THREATENED SPECIES HABITAT
AMERICAN ALLIGATOR
STATE PROTECTED
DO NOT DISTURB OR FEED ALLIGATORS
SWIMMING BY PERSONNEL OR PETS
STRICTLY PROHIBITED

American alligators are technically recovered from their once endangered status, but they remain protected under the federal Endangered Species Act because of their similarity to the still endangered American crocodile (that is, most people cannot tell the two species apart, so both are protected). MCB Camp Lejeune conducts annual surveys for the American alligator which, unlike crocodiles, is known to occur locally. Nighttime spotlight surveys are conducted on three tidally influenced tributaries of the New River (Southwest Creek, Wallace Creek, and French's Creek) during the summer of each year. GPS locations and approximate size are recorded for each sighting. Since monitoring began in 1980, the population appears to be stable or slightly increasing.

Munitions' training that occurs within American alligator habitat would mostly consist of inert small arms. Alligators may be disturbed by munitions firing noise on a temporary basis. Precautions would be taken to avoid disturbance to American alligators in the area during training activities involving movement on foot or vehicle within or adjacent to their known habitat. Therefore, the No Action Alternative will have no effect on American alligators.

Nesting Sea Turtles

Sea turtles are known to nest annually on Onslow Beach and Brown's Island at MCB Camp Lejeune. The two most frequently encountered nesting species are green and loggerhead sea turtles. The Base has a specific monitoring protocol for sea turtles during the nesting and hatching season (May through October), and protective measures are in place to avoid disturbance or harm to them. The requirements for the monitoring protocol, protective measures, and other conservation requirements can be found in the *Range and Training Regulations*, *Standing Operating Procedures for Range Control* (Base Order P3570.1B), and the *Environmental Handbook for Trainers*. MCB Camp Lejeune also consulted with US Fish and Wildlife Service in 2002 to obtain incidental take authorization for the 6.4 miles of nesting habitat at Onslow Beach that have been designated for training activities, dune construction, and recreational uses (US Fish and Wildlife Service, 2002). The following are the avoidance, minimization, and conservation measures excerpted from those documents that are currently being implemented at MCB Camp Lejeune:

- Sea turtle nests are monitored at MCB Camp Lejeune, and annual nest reports are sent to US Fish and Wildlife Service. Reporting this data to the appropriate state and federal agencies is an important component of sea turtle management at MCB Camp Lejeune. Onslow Beach is an index nesting site for the State of North Carolina, which makes the data collected here important to regional sea turtle management and recovery. It is also necessary to report tagging activities to the National Marine Fisheries Service who maintains this type of data.

- Aerial monitoring of sea turtle nests is done on the northern end of Onslow Beach and Brown's Island twice weekly during the nesting season; vehicular and foot traffic is prohibited in these areas due to the potential of encountering unexploded ordnance. Observers record the location of false crawls, nests and evidence of predation. Because access is prohibited, no nest management occurs in this area.
- Turtle nests are protected by wire cages and signs that say:

| |
|---|
| <p style="text-align: center;">ENDANGERED SPECIES NEST DO NOT DISTURB</p> |
|---|

- Nest sites shall be inspected daily to ensure nest markers remain in place and the nest has not been disturbed by security beach access or training operations.
- Morning surveys shall be conducted daily between sunrise and 9:00 AM. Only those nests that may be affected by training activities and that cannot be sufficiently protected with a mark and avoidance program shall be relocated. Nests requiring relocation shall be moved no later than 9:00 AM the morning following deposition to a nearby self-release site in a secure setting where artificial lighting will not interfere with hatchling orientation. In addition to morning surveys, nightly surveys are conducted when nighttime training activities are scheduled to occur on Onslow Beach.
- Nests laid below the mean high tide line are also eligible for nest relocation. As the nests near the end of incubation, they are checked each morning for signs of hatching, hatchling emergence or predation. Hatchling tracks are counted to estimate a measure of success before the completion of nest inventory after 80 days of incubation.
- Nesting surveys, nest marking, and egg relocations shall only be conducted by personnel with prior experience and training in nesting survey, nest marking, and egg relocation procedures. Surveyors shall have a valid North Carolina Wildlife Resources Commission permit.
- Any sea turtle nest that has not been marked and protected must be reported to the Environmental Management Division, Installation & Environment Department, at extension (910) 451-5063.
- During the nesting season, night landing exercises are minimized, and vehicles and equipment are restricted from remaining on the beach overnight.
- During sea turtle nesting and hatching season, all vehicles (except emergency related) shall be driven at speeds less than 10 miles per hour.
- Egress from the beach to the road behind the sand dunes should be via the designated egress routes and sites only. Vehicular traffic is prohibited on the dunes.
- Shooting, wounding, capturing, or collection of any sea turtle, destruction or collection of their eggs, destruction of their nests or any attempt to do so is strictly prohibited.
- Digging, excavating or building tank traps on the beach is prohibited. Bunkers constructed in support of capability exercises must be covered with plywood and sandbags if left overnight.
- MCB Camp Lejeune is trying to meet the need for nighttime safety in the recreational portion of Onslow Beach with conservation standards for nesting sea turtles and emerging hatchlings. MCB Camp Lejeune uses the nighttime lighting standards contained in the Florida Marine Research Institute Technical Report TR-2 (Witherspoon and Martin, 2000) to assess structural lighting within the recreational portion of Onslow Beach (Riseley Pier to the Officer's Pavilion) for potential impacts to sea turtles for structures, including housing units. This guidance is used to modify lights that are

determined to have a potential to affect sea turtles. Presently, street lamps behind the recreational beach have switches so that they may be turned off during the nesting season. Residents of beach housing are asked to turn off porch lights when not required for safety.

- All traffic to and from the anti-aircraft training site north of the Onslow North Tower is restricted to below the high tide line. During the sea turtle nesting season (May 15 through October 31), vehicular traffic accessing the anti-aircraft training site between sunset and 10:00 PM is guided using night vision equipment and is preceded by a sentry to prevent collision with nesting sea turtles or hatchlings. Base personnel monitor the exercise in the hours between sunset and 10:00 PM to ensure minimal lighting requirements are enforced. Once the exercise in the modified training area has concluded, the training unit is responsible for smoothing and removing debris from the beach to minimize any potential obstacles to sea turtle hatchlings moving to the surf.
- The Environmental Management Division is notified of exercises scheduled in the modified training areas during the sea turtle nesting season (May 15 through October 31). Environmental Management Division staff monitors training on Onslow Beach to ensure activities are performed in accordance with *Range and Training Regulations, Standing Operating Procedures for Range Control* (Base Order P3570.1B).
- If equipment is to remain on the beach overnight in the North Tower area, or the area north of Riseley Pier, no object is placed parallel to the surf that exceeds 2.4 m (8 ft) in length, and sandbags surround the object to prevent entanglement of nesting female turtles. Once bunkers are excavated for the aerial bombing simulators, the holes are covered with plywood and sandbags are placed around the perimeter to prevent sea turtles from falling into the holes. The nightly monitoring program ensures that if a turtle becomes entangled in the structure, base personnel will be on scene to assist in freeing the turtle.
- Sand stabilization fencing is erected in accordance with guidelines provided by the North Carolina Wildlife Resources Commission, which are intended to achieve dune accretion while minimizing the potential for fencing to impede sea turtle nesting.
- Measures to minimize obstacles to emerging sea turtle hatchlings are implemented. This primarily consists of tire rut removal, and include the following procedures as presented in the Volusia County Beach Habitat Conservation Plan, 1996:
 - 14 days prior to estimated hatch dates, nests are surveyed for extent and depth of ruts between the nest and the surf line
 - No later than 10 days prior to estimated hatch dates, ruts are removed and the sand is smoothed at those nests where multiple ruts are deeper than 0.03 m (1 in) and longer than 1 m (3 ft)
 - If ruts are located seaward of the vegetation line, a section of chain-link fence or similar apparatus, at least 15 m wide (49 ft wide), is towed across the approximate path of emerging hatchlings
 - If ruts are located on or near the vegetation line, the ruts are hand-raked to avoid damage to beach vegetation
 - Holes are filled, and debris is removed at those nests that are due to hatch within a 10 day time period
 - Nests are reevaluated daily to ascertain that no obstacles exist for emerging hatchlings; and

- Although off-road recreational vehicles are prohibited from Riseley Pier north, the procedures outlined above are also applied from Riseley Pier north to the Officer's Pavilion
- Dune construction (sand pushing) is done in accordance with guidelines provided by Coastal Area Management Authority and the US Army Corps of Engineers. If practical, dune construction is initiated after sea turtles have finished their egg-laying activities. Dune building does not occur within 30.5 m (100 ft) of an incubating turtle nest. After completion of sand pushing activities and prior to the next three nesting seasons, monitoring shall be conducted to determine if escarpments are present, and escarpments shall be leveled as required to reduce the likelihood of impacting sea turtle nesting and hatching activities.
- Special entertainment events are staged landward of the foredunes so that disturbance to nesting sea turtles by pedestrian or vehicular traffic is minimized. Lighting or laser shows are directed away from the beach with sufficient screening to minimize ambient lighting. Audience members are not permitted to access the beach at night.
- Military vehicles without night vision goggle support, operating in hours of darkness between Riseley Pier and the South Tower shall use headlights when accessing and driving on the beach. Tactical/administrative vehicles with engines running but at rest for more than one minute shall switch to parking lights. If tactical/administrative vehicle(s) encounter a sea turtle in the process of nesting or a hatchling sea turtle(s) emerging from a nest and/or crawling to the sea, all vehicles (except emergency-related) shall stop, shut off the vehicle engine, switch from headlights to parking lights (nighttime only), and all persons shall remain in the vehicle until the sea turtle(s) returns or crawls to the sea. Encounters with sea turtles shall be reported immediately to MCB Camp Lejeune's Environmental Conservation Branch.
- During the sea turtle nesting and hatching season, Beachmaster Camps set up in association with amphibious landings shall be located off the beach. Lighting associated with the Beachmaster Camps shall be limited to the immediate area of the Camp only, and shall be the minimal amount of lighting necessary to comply with safety requirements and training needs. Lighting shall be minimized through reduction, shielding, lowering, and appropriate placement of lights to prevent the glowing portion of any luminaries (including the lamp, globe, or reflector) from being directly visible from anywhere on the beach.

In its 2002 Biological Opinion (US Fish and Wildlife, May 2002), the US Fish and Wildlife Service authorized an unspecified level of incidental take of sea turtles at MCB Camp Lejeune within the 6.4 linear miles of nesting beach habitat on Onslow Beach that have been identified for training activities, dune construction, and recreational activities. They anticipated that the level of incidental take would be difficult to detect because:

- Turtles nest primarily at night and all nests are not found because (a) natural factors, such as rainfall, wind, and tides may obscure crawls, and (b) human-caused factors, such as pedestrian traffic, may obscure crawls, and result in nests being destroyed because they were missed during a nesting survey and egg relocation program
- The total number of hatchlings per undiscovered nest is unknown
- The reduction in percent hatching and emerging success per relocated nest over the natural nest site is unknown

- An unknown number of females may avoid the project beaches and be forced to nest in a less than optimal area
- Lights may disorient an unknown number of hatchlings and cause death
- Escarpments may form and cause an unknown number of females from accessing a suitable nesting site

The US Fish and Wildlife Service further stated that the unspecified level of take would occur from a variety of factors, including:

- Destruction of all sea turtle nests that may be constructed and eggs that may be deposited and missed by a nest survey and egg relocation program within the four beach segments identified to accommodate military training requirements 3,515 m (11,533 linear ft), where off-road recreational vehicles are authorized 3,729 m (12,233 linear ft) and where sand might be pushed to protect structures 3,664 m (12,022 linear ft)
- Reduced hatching success due to egg mortality during relocation and adverse conditions at the relocation site
- Harassment in the form of disturbing or interfering with female turtles attempting to nest within the training areas or on adjacent beaches as a result of military training activities;
- Disorientation of hatchling turtles on beaches adjacent to the recreational beach area as they emerge from the nest and crawl to the water as a result of project lighting
- Behavior modification of nesting females due to escarpment formation within the dune construction area during a nesting season, resulting in false crawls or situations where they choose marginal or unsuitable nesting areas to deposit eggs
- Sand fencing obstructing nesting female sea turtles moving to and from the surf as well as creating a barrier to hatchling sea turtles returning to the surf

The US Fish and Wildlife Service continued to express reservations about the impacts of training activities on nesting sea turtles at MCB Camp Lejeune, but they also found that, with implementation of the entire sea turtle conservation program, impacts from training, dune stabilization, and recreation at Onslow Beach would not likely jeopardize the continued existence of green or loggerhead sea turtles (US Fish and Wildlife, May 2002). Concerns of impacts from continued training included the following:

- Nighttime training on Onslow Beach may have adverse effects on sea turtles. Leaving training equipment on the beach during the night can create barriers to nesting females emerging from the surf and crawling up the beach, causing a higher incidence of false crawls and unnecessary energy expenditures. Moving vehicles could collide with nesting females and hatchlings.
- Ruts from Amphibious Assault Vehicles, Landing Craft Air Cushions, and Light Armored Vehicles, as well as recreational vehicles can create obstacles to turtles moving between the nesting site and the surf. The use of the aerial bombing simulators between Riseley Pier and the Onslow South Tower has the potential to impact sea turtles. The excavated bunkers for the explosives could entrap nesting females causing injury or unnecessary energy expenditure.
- The bulldozing of sand within the project area, in and of itself, may not provide suitable habitat for sea turtles. Sand pushing conducted during the nesting and hatching season may result in the burial or crushing of nests or hatchlings or loss of sea turtles through the disruption of nesting activity. While a nest monitoring and/or egg relocation program would likely reduce these impacts, nests may be inadvertently missed or misidentified as false crawls during daily patrols. In addition, nests may be destroyed by operations at

night prior to beach patrols being performed. Under the best of conditions, approximately 7 percent of nests are misidentified as false crawls by experienced sea turtle nest surveyors (Schroeder, 1994), thus these nests would be destroyed by the project.

- Besides the potential for missing nests during a nest relocation program, there is the potential for eggs to be destroyed by their excavation and movement during relocation or for unknown biological mechanisms to be affected. Furthermore, some studies have found that re-located nests have a significantly lower hatching success rate than *in situ* nests. Nest relocation can have adverse impacts on incubation temperature (and hence sex ratios), gas exchange parameters, hydric environment of nests, hatching success, and hatchling emergence. Relocating nests into sands deficient in oxygen or moisture can result in mortality, morbidity, and reduced behavioral competence of hatchlings. Water availability is known to influence the incubation environment of the embryos and hatchlings of turtles with flexible-shelled eggs, which has been shown to affect nitrogen excretion, mobilization of calcium, mobilization of yolk nutrients, hatchling size, energy reserves in the yolk at hatching, and locomotory ability of hatchlings. A final concern about nest relocation is that the program may concentrate eggs in an area resulting in a greater susceptibility to catastrophic events (e.g., a low area subject to flooding). Hatchlings released from concentrated, relocated nests also may be subject to greater predation rates from both land and marine predators as a result of predators learning where to concentrate their efforts.
- Another impact to sea turtles is disorientation (loss of bearings) and misorientation (incorrect orientation) of hatchlings from artificial lighting. Visual cues are the primary sea-finding mechanism for hatchlings. Artificial beachfront lighting is a well-documented cause of hatchling disorientation and misorientation on nesting beaches. In addition, research has also documented significant reduction in sea turtle nesting activity on beaches illuminated with artificial lights. Therefore, light emanating from structures on the recreational beach and from operational lighting for training exercises may deter females from coming ashore to nest, disorient females trying to return to the surf after a nesting event, and disorient and misorient emergent hatchlings from adjacent non-project beaches. Any source of bright lighting can profoundly affect the orientation of hatchlings, both during the crawl from the beach to the ocean and once they begin swimming offshore. Hatchlings attracted to light sources on dredging barges may not only suffer from interference in migration, but may also experience higher probabilities of predation to predatory fishes that are also attracted to the barge lights. Using the minimum amount of light necessary (may require shielding) or low-pressure sodium lighting may reduce these impacts.

The above concerns of US Fish and Wildlife Service, coupled with the activities proposed for continuation at Onslow Beach (including training, dune stabilization, and recreational uses), leads to a conclusion that the No Action Alternative is likely affecting nesting sea turtles here, but these effects are covered by previous consultations and take is not expected to exceed levels previously authorized by the US Fish and Wildlife Service. This is particularly true, given that MCB Camp Lejeune continues to address concerns raised by US Fish and Wildlife Service, and work with them during the ongoing consultation and reporting. The probability of a sea turtle nest or a female attempting to lay eggs, especially on Brown's Island, being killed by a direct hit from ordnance is considered extremely remote, and these types of impacts are believed to be discountable. However, even though sea turtles nesting on Brown's Island will continue to be

monitored, they may potentially be affected from ongoing firing impacts (live and inert rounds). Because ordnance landing on Brown's Island was not addressed by the previous consultation, it is likely that additional take could occur, and this is being addressed with US Fish and Wildlife Service in a new Section 7 consultation. Regardless, it is highly unlikely that take will exceed the levels already authorized, or that the sea turtles nesting on Brown's Island would be adversely affected over the long-term.

Other Sensitive Species

The Department of Defense works in conjunction with US Fish and Wildlife Service and North Carolina state agencies to actively manage and conserve regionally-significant species, such as Coastal goldenrod (a federal Species of Concern) and Hirst's panic grass (a Candidate for federal listing), and support conservation of these and other special status species. With both species occurring in or adjacent to coastal wetland areas that have limited accessibility (**Figure 3-10**), they are not likely to experience much by way of direct impacts from ground disturbance. Effects to sensitive plant communities from munitions, foot and vehicle traffic, and from support operations are expected to be negligible. Impacts from munitions firing into these communities is also not likely, as they are not within any live fire range fans, and limited access into wetland areas would protect sensitive plant species from trampling or crushing. Support operations, as stated above for vegetation, would occur in previously used areas and would not require clearing.

With respect to sensitive wildlife (i.e., Bachman's sparrow, Henslow's sparrow, Southern hognose snake, and Carolina gopher frog), the primary disturbance to these species would likely be from noise, and habitat disturbance. Noise is a primary stressor affecting wildlife, and responses to noise vary among species (Goudie, 2006). However, most species breeding on base will have adapted to training activities already, and those visiting during winter and migration would likely either flee the area or remain immobile until training in the area subsides. Many of the non-listed special status species tend to occur in the same protected/managed habitats on base as those species which are listed. For example, Bachman's sparrow would occur on base in long-leaf pine woodlands, as would southern hognose snake, and this habitat is already being managed for perpetuation of red-cockaded woodpeckers. Therefore, most training activities would not result in long-term impacts to special-status (non-listed) wildlife species.

Proposed Action

As described in Movement-Land Ranges and Training Areas (**Subchapter 2.2.2.1**), the type of personnel and vehicle movement activities would remain the same as the No Action Alternative, but with a 33 percent increase in tempo of training under the proposed action. An increase in small arms, grenade, and artillery, mortar, and tank rounds are proposed under this action as well. Support activities would increase in direct proportion to the other training mentioned above. Impacts associated with the proposed action are discussed below.

Vegetation

There is an increased risk of accidental fire from the overall increase of munitions used; however, Standard Operating Procedures in place for reduction of fire risk would still be adhered

to under the proposed action. Trampling or crushing of vegetation with increased vehicle and foot activity would increase incrementally. But, support operations, albeit increasing, would still utilize areas formerly used; although additional temporary structures may be required. However, with adherence to the Base Standard Operating Procedures and with continued implementation of the *Integrated Natural Resources Management Plan*, it is reasonable to conclude that the proposed action may result in minimal, short-term impacts to vegetation at MCB Camp Lejeune.

Wildlife and Migratory Birds

As discussed under the No Action Alternative, munitions usage puts wildlife and migratory birds at risk; however, injury or death from munitions training is unlikely due to noise deterring wildlife and migratory birds from inhabiting the area during the training exercise. Although there is no recorded incidence of a direct hit, as described under the No Action Alternative, increased use of munitions under the proposed action also increases risk of a direct hit. Therefore, the proposed action may result in minor impacts to wildlife and migratory bird populations from occasional, individual mortality occurrences, but the likelihood of this is considered extremely low.

Nesting, resting, and foraging wildlife have likely acclimated to the current level of foot and vehicle training activities taking place under the No Action Alternative. Increased activity may cause a longer-term avoidance of an area by a species; however, permanent avoidance is unlikely. Therefore, disturbance from foot and vehicle traffic under the proposed action may result in minor, but not permanent, impacts to wildlife and migratory birds.

Support operations under the proposed action will likely entail erecting additional structures and increases in noise. Because equipment and structures would be set-up in previously used areas, no additional disturbance to wildlife or habitat is expected. Wildlife in training areas may temporarily avoid them during training exercises, but will likely return after training has ceased. Therefore, disturbance to wildlife from increased support operations under the proposed action is expected to be short-term and temporary, and will not permanently impact wildlife populations on Base.

Threatened and Endangered Species

There would likely be increased noise disturbance to federally listed species inhabiting the areas in or adjacent to munitions training exercises, and this may cause prolonged avoidance of necessary resting or foraging habitat for listed species. However, protective measures for all listed species, as described under the No Action Alternative, will remain in place and be enforced under the proposed action this includes adhering to Standard Operating Procedures and all environmental management considerations. Nonetheless, some additional impacts, albeit slight, can be expected from the increased training levels under the proposed action. Therefore the proposed action may affect, but is not likely to adversely affect, federally listed plant and animal species.

Seabeach Amaranth

As described above under the No Action Alternative, seabeach amaranth populations that may occur within munitions use areas are not likely to be damaged under the increased levels of training for the proposed action. However, as with the No Action Alternative, it remains possible that unauthorized surface disturbances, accidental spills of petroleum products, or fires started from exploding live munitions could still affect seabeach amaranth plants, including in both known/demarcated and undiscovered populations. Therefore, activities associated with the proposed action may affect, but are not likely to adversely affect, seabeach amaranth.

Rough-leaved Loosestrife

As described under the No Action Alternative, the majority of rough-leaved loosestrife populations on MCB Camp Lejeune are well-documented, and most of these are in the G-10 Impact Area boundaries, with a few others located in the southeast portion of the Greater Sandy Run ranges. While the avoidance, minimization, and monitoring measures currently being implemented at MCB Camp Lejeune provide extensive protection of known rough-leaved loosestrife populations, some impacts may still occur. In light of its occurrence within the G-10 Impact Area, direct disturbance from inert rounds and exploding live ordnance under the proposed action remains possible, and elevated training levels increases this potential. Also, the proposed increases in training, support, and munitions firing raises the potential for impacts from inadvertent fires, surface disturbances, and accidental spills. Therefore, even with protective measures in place, the proposed action may affect, but is not likely to adversely affect, rough-leaved loosestrife populations at MCB Camp Lejeune.

Red-cockaded Woodpecker

The proposed action may lead to additional habitat impacts from unauthorized surface disturbance, unexpected spills of petroleum products, and fire from exploding, live ordnance. However, as described for the No Action Alternative, numerous active management techniques, habitat enhancement measures, and population monitoring protocols will continue to be implemented at MCB Camp Lejeune for species-specific benefits to red-cockaded woodpeckers. The US Fish and Wildlife Service has already authorized take of some future clusters, including finding that this take would not jeopardize the continued existence of the species. However, given that the proposed action will lead to incremental increases in training activities above and beyond those described for the No Action Alternative, then it is reasonable to conclude that additional take could occur, but it is highly unlikely that the total take will exceed the levels already authorized. Base personnel will continue to monitor all unmarked and de-marked clusters relative to training exercises, and will reinitiate formal consultation should unforeseeable training-related impacts occur.

Piping Plover

The No Action Alternative includes adverse effects on piping plovers from training activities. The proposed action has additional potential to affect the species through the increases in training and support activities, as well as higher levels of munitions firing. In particular, higher levels of human disturbance at Onslow Beach may make it less favorable for piping plovers to

use this area, or the mud flats at the mouth of the New River, for foraging or roosting during migration, and for breeding. This is also true for piping plovers that may inhabit Brown's Island; even though the species cannot be documented there, they would likely to be affected by increased levels of training. The US Fish and Wildlife Service has previously authorized an unspecified level of indirect take, contingent on the Base continuing to manage and monitor this species, and implement protection and avoidance measures when it is present. Proposed increases in sorties under the proposed action (33 percent increase in CH-53 sorties and a 100 percent increase in AH-1 and UH-1 sorties), represent only an additional 1,435 total aircraft sorties per year in airspace that is above Onslow Beach (R-5306D and Hatteras F MOA), or an increase of 16.9%. Piping plovers and other shorebird species inhabiting Onslow Beach are probably already acclimated to aircraft disturbances, and an increase of 16.9% is unlikely to result in additional adverse effects. Similarly, continuance of rotary wing operations underneath the R-5306C airspace is unlikely to result in additional effects above which species have already acclimated to. Consultation with the US Fish and Wildlife Service regarding additional affects of the proposed action is currently underway.

American Alligator

Disturbance to American alligators under the proposed action is expected to be similar to the No Action Alternative. Therefore, the proposed action will cause only minimal additional short-term impacts to American alligators.

Nesting Sea Turtles

The No Action Alternative offers a lengthy description of actions currently being undertaken by MCB Camp Lejeune specifically for the conservation of nesting sea turtles at Onslow Beach and the protection of their nests. In its 2002 Biological Opinion on proposed uses for Onslow Beach, US Fish and Wildlife Service authorized an unspecified level of take for nesting green and loggerhead sea turtles in the area used for training exercises. US Fish and Wildlife Service also concluded that the take authorized would not have long-term effects and would not jeopardize their continued existence. It is reasonable to conclude that the increases in proposed training levels at Onslow Beach under the proposed action may still results in effects to nesting sea turtles but, with continued monitoring and implementation of conservation measures, the increased training is not likely to result in long-term, adverse effects on breeding sea turtle populations in this area. Also, while the proposed action could lead to some additional take of nesting sea turtles, it is highly unlikely that the total take will exceed the levels already authorized.

Other Sensitive Species

Sensitive plant species are not expected to be at increased risk under the proposed action, as they would likely be protected inadvertently by conservation and protection measures in place for federally listed plant species and rare natural communities. Disturbance to sensitive wildlife species may increase from noise, and possible trampling or crushing, should their behavioral response be to flee the area. However, with continued implementation of the Base *Integrated Natural Resources Management Plan* and the *Range and Training Regulations, Standing Operating Procedures for Range Control* (Base Order P3570.1B), increased training levels under

the proposed action may affect, but is not likely to adversely affect, sensitive plant or wildlife species.

4.1.7 Hazardous Materials and Hazardous Waste Management – Land Ranges

The significance of potential impacts associated with hazardous materials and hazardous wastes is based on the toxicity of the substances as well as their management (i.e., transportation, storage, disposal, etc.). Hazardous materials and waste impacts are considered adverse if the use, storage, transportation, or disposal of these substances substantially increases the human exposure risk or environmental contamination.

4.1.7.1 Hazardous Materials

No Action Alternative

Implementation of the No Action Alternative would maintain existing conditions, and munitions firing, movement and support activities, and locations of activities on land ranges would remain the same. Tactical vehicles, aircraft, and other military assets employed in training operations on the land ranges would carry and use hazardous materials for routine operation and maintenance. Training operations involving the use of a variety of solid and liquid hazardous materials (fuel and paint) and training materials (live and practice munitions) would continue to be managed as outlined in *Base Order 5090.9 Hazardous Waste and Hazardous Material Management Program* (MCB Camp Lejeune, April 1999). In addition, MCB Camp Lejeune would continue with currently scheduled remedial actions and environmental pollution abatement as outlined in *Base Order 5090.91 Oil and Hazardous Substance Pollution Prevention and Pollution Abatement Facility Management* (MCB Camp Lejeune, May 1999).

Under the No Action Alternative, the amount of hazardous materials purchased would continue to be managed under the Hazardous Materials Management Program and the amount of hazardous waste, particularly waste generated by product expiration, would continue to decrease. Hazardous materials are handled, stored and disposed of in accordance with the procedures of the Consolidated Hazardous Materials Reutilization and Inventory Management Program Manual and the 2005 Hazardous Materials Minimization, Hazardous Waste Reutilization and Disposal Guide.

Environmental restrictions and procedures for use of the ranges would continue as established by the *Range and Training Regulations, Standing Operating Procedures for Range Control* (Base Order P3570.1B) for ranges at MCB Camp Lejeune. For ground training operations at MCB Camp Lejeune, there are procedures governing a number of environmental concerns, including the handling of hazardous materials and petroleum, oils, and lubricants. These procedures include, but are not limited to, spill control and response, disposal of battery waste, and fuel storage restrictions. By following procedures outlined in the Base Order, personnel would avoid a release of contaminants during training and operations at MCB Camp Lejeune, thus mitigating any appreciable impact to the surrounding environment as a result of the No Action Alternative.

Proposed Action

As described in Proposed Action (**Subchapter 2.2**), MCB Camp Lejeune training operations involving hazardous materials would increase in support of the proposed action. Amounts of expended training materials would increase in rough proportion to the overall increases in these training operations.

Tactical vehicles, aircraft, and other military assets employed in training operations on land ranges would continue to carry and use hazardous materials for routine operation and maintenance. Increase in hazardous materials transport, storage, and use to support increased training operations under the proposed action would be managed using the same procedures as the No Action Alternative. No new types of hazardous materials would be required, and existing hazardous materials storage and handling facilities, equipment, supplies, and procedures would continue to provide for adequate management of these materials. No releases of hazardous materials to the environment and no unplanned exposures of personnel to hazardous materials are anticipated.

The overall increase in training operations at MCB Camp Lejeune would lead to an increase in chemicals listed under the Emergency Planning and Community Right-to-Know Act. The presence of lead on Base would increase due to the increase in training exercises; furthermore, there would also be more petroleum, oils and lubricants along with other reportable chemicals used for vehicle operation and maintenance. Environmental restrictions and procedures for use of the ranges would continue as described for the No Action Alternative.

4.1.7.2 Hazardous Constituents

No Action Alternative

Under the US Environmental Protection Agency's Military Munitions Rule (40 CFR § 260 -266, 270), hazardous materials are not deemed hazardous constituents when used properly on a range. Munitions constituents found in MCB Camp Lejeune have been closely monitored under the Range Environmental Vulnerability Assessment. Baseline assessments have and are currently being performed for range activities to monitor that munitions constituents from on-Base range operations do not migrate off-range causing an unacceptable risk to human health and the environment (US Marine Corps, February 2006).

Under the No Action Alternative, munitions firing levels would remain at current levels as shown in **Table 2.3-1**; therefore, no change in the baseline assessments of hazardous constituents is expected.

Proposed Action

MCB Camp Lejeune training operations involving hazardous constituents would increase by varying degrees from current levels in support of the proposed action. Amounts of expended training materials would increase in rough proportion to the overall increases in these training operations. No new types of hazardous constituents would be used at MCB Camp Lejeune under the proposed action.

The increases in training on ranges at MCB Camp Lejeune would increase the amount of lead bullets and other munitions expended in the range areas. Live-fire small arms ranges would retain their berms to stop projectiles fired at the ranges. Although more lead from live-fire activities would be fired into the impact berms, the installation has mitigation measures in place to monitor that berms are well maintained and re-graded as needed.

4.1.7.3 Hazardous Waste Management

No Action Alternative

Under the No Action Alternative, tactical vehicles, aircraft, and other military assets would continue to be employed in training operations on the land ranges and would continue to carry and use hazardous materials for routine operation and maintenance. The current amount of hazardous waste generated by these activities would continue, and is within the existing capacities of hazardous waste transporters and treatment and disposal facilities in MCB Camp Lejeune.

The use and handling of ordnance is regulated under the Military Munitions Rule, which excludes ranges used for training, for the testing of munitions, as well as range clearance as part of range management activities from the application of the Resource Conservation and Recovery Act or the Comprehensive Environmental Response, Compensation and Liability Act. However, Department of Defense organizations must pursue aggressive range management policies that comply with existing regulations and promote environmental stewardship (*Department of Defense Policy to Implement the EPA Military Munitions Rule*, 1998). MCB Camp Lejeune would establish an appropriate course of action so that federal and state agency notification requirements are met and to arrange for agency consultation, as necessary, where sites with risk of pollutant migration could be affected.

Under the No Action Alternative, Installation Restoration sites containing hazardous waste from past disposal practices would not be impacted. The Installation Restoration sites would continue to be managed through the MCB Camp Lejeune Installation Restoration Program, and efforts to clean up these sites would continue.

Proposed Action

MCB Camp Lejeune would continue range management policies as required by the Military Munitions Rule. As appropriate, courses of action for the proposed action would be established so that federal and state agency notification requirements are met and agency consultations are arranged, as necessary, when sites with risk of pollutant migration could be affected.

The amount of hazardous waste generated by training operations under the proposed action would be incrementally greater than those under the No Action Alternative. Hazardous waste would continue to be managed as described under the No Action Alternative. The anticipated increases are well within the existing capacities of hazardous waste transporters and treatment and disposal facilities in MCB Camp Lejeune.

4.1.8 Public Health and Safety – Land Ranges

Public health and safety issues include potential hazards inherent in range training operations. It is the policy of the Marine Corps and the Navy to observe every possible precaution in the planning and execution of activities that occur onshore or offshore to prevent injury to people or damage to property.

4.1.8.1 No Action Alternative

Implementation of the No Action Alternative would maintain existing conditions, and the current level of laser and munitions usage and movement activities of personnel and vehicles on land ranges would remain the same.

With respect to bird/animal-aircraft strike potential during takeoffs and landings on runways, current operations would continue to be conducted to avoid wildlife thereby maintaining safety to the public, pilots and range personnel. For the safety of the public, the pilots and the wildlife, MCB Camp Lejeune personnel closely follow the preventative measures outlined in Marine Corps Order 3750.6R and the draft Department of the Navy Marine Corps Order (Office of the Chief of Naval Operations Instruction [Chapter 6]) Bird/Animal-Aircraft Strikes Prevention Manual. The number of actual and predicted bird/animal aircraft strikes is relatively low, which indicates no need to change safety procedures currently being implemented. Under the No Action Alternative, existing procedures and precautions would continue to be followed.

Under the No Action Alternative, current communication procedures would remain in place to make certain that all on-range and off-range participants maintain situational awareness needed to maintain the safety of military personnel and civilians. Current communication procedures outlined in the *Range and Training Regulations, Standing Operating Procedures for Range Control* (Base Order P3570.1B), charge the Range Office in Charge with the responsibility to verify that required communications are established with the Range Control Duty Officer and maintained at all times.

4.1.8.2 Proposed Action

Under the proposed action, laser and munitions usage at MCB Camp Lejeune land ranges would increase proportionally with the increase in usage of weapons and munitions. Use of Class I through Class IIIa lasers will increase proportionally with the firing of weapons and/or munitions (except tank activities). For tank related increases, Class IIIb and Class IV lasers will increase in association at the same percentage. However, these activities will only take place in areas that are currently certified for laser usage. With the increase in laser and munitions use, there is a chance to increase the potential for public mishaps. However, due to the stringent precautions already taken, this is unlikely. MCB Camp Lejeune already complies with regulations on laser use and laser safety measures and is fully certified for the safe use of laser systems. Under the proposed action, there would be no additional adverse impact on the public's safety and private property.

As stated in the No Action Alternative, the relatively low number of actual and predicted bird/animal aircraft strikes within the MCB Camp Lejeune Range Complex indicates no need to change safety procedures currently being implemented. The proposed increase in flying time would result in an increase in bird/animal aircraft strike hazard potential; however, the potential for impacts to birds or other wildlife such as deer that may be prevalent near the runways would remain low based on historical data. The Marine Corps would continue to employ bird/animal aircraft strike hazard avoidance procedures that have proved successful in the past; therefore, no additional impacts would be expected.

Under the proposed action, communications would continue to follow standard protocol outlined in the *Range and Training Regulations, Standing Operating Procedures for Range Control* (Base Order P3570.1B) as described in the No Action Alternative, to maintain personnel and civilian safety during training operations. As a result, there would be no adverse impacts to public health and safety.

4.2 WATER RANGES

4.2.1 Coastal Zone Management – Water Ranges

Demands placed on lands and waters of the coastal zone from proposed development and population growth require that new projects or actions be carefully planned in order to avoid stress on the coastal zone. This planning involves a review of state and local enforceable policies, which are designed to provide effective protection and use of land and water resources of the coastal zone.

The project alternatives were assessed for their applicability and consistency with the North Carolina Coastal Area Management Act and the Onslow County Land Use Plan. MCB Camp Lejeune is federal property and is considered to be outside of the coastal zone. Federal activities on federal land are excluded from North Carolina Coastal Commission permit authority. However, in accordance with the Coastal Zone Management Act of 1972, federal agency activities within or outside the coastal zone that may affect any land or water use or natural resource of the coastal zone shall consider the effect of such actions on coastal zone resources, and comply with coastal zone policies to the maximum extent practicable. Please see Appendix F for the detailed Coastal Consistency Determination.

4.2.1.1 No Action Alternative

North Carolina Coastal Area Management Act

The No Action Alternative was reviewed to determine its consistency with the applicable requirements of the North Carolina Coastal Area Management Act. Under the No Action Alternative, existing training would continue on the various components of the MCB Camp Lejeune Range Complex; there would be no changes.

Areas of Environmental Concern

The North Carolina Coastal Resources Commission designated Areas of Environmental Concern within the 20 coastal counties and set rules for managing development within these areas. An Area of Environmental Concern is an area of natural importance; it may be easily destroyed by erosion or flooding, or it may have environmental, social, economic, or aesthetic values that make it valuable. Its classification protects the area from uncontrolled development.

Various aspects of the No Action Alternative take place in areas designated as Areas of Environmental Concern under the North Carolina Coastal Management Program. Activities occur in estuarine and ocean systems areas, ocean hazard areas, and natural and cultural resource areas. All ongoing activities occur on existing water and land ranges and in existing special use airspace within the MCB Camp Lejeune Range Complex. The following is an analysis of the applicability of the Coastal Area Management Act Area of Environmental Concern policies to the No Action Alternative and the alternative's consistency with those policies, when applicable.

15A NCAC 07H.0200 (Estuarine and Ocean Systems)

Estuarine and ocean systems include estuarine waters, coastal wetlands, public trust areas, and estuarine and public trust shorelines. The management objective of this policy is to conserve and manage these resources as an interrelated group so as to safeguard and perpetuate their biological, social, economic, and aesthetic values and to make certain that development occurring within Areas of Environmental Concern is compatible with natural characteristics so as to minimize the likelihood of substantial loss of private property and public resources. An additional objective is to protect present common-law and statutory public rights of access to the lands and waters of the coastal area.

Some aspects of the No Action Alternative occur in the estuarine and ocean system. However, no construction of permanent facilities, draining, or new dredging would occur under this alternative. Approximately every 5 to 10 years, Weils Point and Roads Point are dredged to support engineer ribbon bridging movement of tanks from the main side of MCB Camp Lejeune to the Greater Sandy Run Area. Further, all training and range operations are governed by the MCB Camp Lejeune *Range and Training Regulations*, *Standing Operating Procedures for Range Control* (Base Order P3570.1B), *Integrated Natural Resources Management Plan*, and the *Environmental Handbook for Trainers* which contain specific measures and procedures to protect the natural environment to the greatest extent practicable.

To protect public safety, MCB Camp Lejeune has restricted access to its beaches and water areas. The No Action Alternative would not change existing public access to, or use of, the shorefront or water. There would be no change to public trust areas under the No Action Alternative.

The general use standards outlined in 15A NCAC 07H.0200 state that uses that are not water dependent shall not be permitted in coastal wetlands, estuarine waters, and public trust areas. The US Marine Corps has been conducting amphibious training at MCB Camp Lejeune since 1941. With extensive beachfront, MCB Camp Lejeune has been a unique and irreplaceable home training Base for Marines. Numerous aspects of this alternative are water dependent, in that Marines must have water-based training opportunities in order to effectively meet their mission requirements. There are no reasonable alternative sites. In addition, the national defense nature of the current ongoing use of the range complex supports the determination that the No Action Alternative is consistent to the maximum extent practicable with this policy.

15A NCAC 07H.0300 (Ocean Hazard Areas)

Ocean hazard areas are those areas along the Atlantic Ocean shoreline where, because of their special vulnerability to erosion or other adverse effects of sand, wind, and water, uncontrolled or incompatible development could unreasonably endanger life or property. Ocean hazard areas include beaches, frontal dunes, inlet lands, and other areas in which geologic, vegetative, and soil conditions indicate a substantial possibility of excessive erosion or flood damage.

The management objectives for these policies are to reduce the loss of life and property through the proper location and design of structures and by care taken in prevention of damage to natural protective features, particularly primary and frontal dunes.

Various aspects of the No Action Alternative occur in ocean hazard areas. However, under this alternative, no construction of permanent facilities would occur in the ocean hazard areas. Further, MCB Camp Lejeune has implemented numerous mitigation measures to prevent long-term erosion and preserve the natural ecological conditions of the barrier dune and beach systems (as found in the *Range and Training Regulations*, *Standing Operating Procedures for Range Control* (Base Order P3570.1B), *Integrated Natural Resources Management Plan*, and *Environmental Handbook for Trainers*). Specific mitigation measures are identified below in Section 15A NCAC 07M.0200 (Shoreline Erosion Policies) and 15A NCAC 07M.0700 (Mitigation Policy). The No Action Alternative is consistent to the greatest extent practicable with this policy.

15A NCAC 07H.0400 (Public Water Supplies)

This policy addresses valuable small surface water supply watersheds and public water supply well fields. These vulnerable, critical water supplies, if degraded, could adversely affect public health or require substantial monetary outlays by affected communities for alternative water source development. The management objective for this policy is to regulate development within critical water supply areas to protect and preserve public water supply well fields and surface water sources.

The No Action Alternative does not affect areas where there are small surface water supply watersheds or public water supply well fields. Therefore, policies protecting public water supplies are not applicable.

15A NCAC 07H.0500 (Natural and Cultural Resource Areas)

Fragile coastal natural and cultural resource areas are defined as areas that contain environmental, natural, or cultural resources of more than local significance in which uncontrolled or incompatible development could result in major or irreversible damage to natural systems or cultural resources, scientific, educational, or associative values, or aesthetic qualities.

15A NCAC 07H.0505 (Coastal Areas That Sustain Remnant Species)

Coastal areas that sustain remnant species are those areas that support native plants or animals determined to be rare or endangered within the coastal area. The management objective for this policy is to protect unique habitat conditions that are necessary for the continued survival of threatened and endangered native plants and animals and to minimize land use impacts that might jeopardize these conditions.

MCB Camp Lejeune is home to various threatened and endangered species of animals and plants, as well as species considered at risk and diverse natural communities (please refer to Natural Resources, **Subchapters 3.1.6 and 3.2.5**). The *Integrated Natural Resource Management*

Plan (US Marine Corps, January 2007) details the management practices that MCB Camp Lejeune employs to protect and conserve these species and their habitats. MCB Camp Lejeune regularly consults with the US Fish and Wildlife Service and the National Oceanic and Atmospheric Administration to minimize Marine Corps actions that may jeopardize the continued existence of endangered or threatened species, and are in compliance with the Endangered Species Act. The Marine Corps conducts consultations as required with the US Fish and Wildlife Service and National Oceanic and Atmospheric Administration for any action which “may affect” a threatened or endangered species.

As detailed in the *Integrated Natural Resources Management Plan* (US Marine Corps, January 2007), the Base Order P3570.1B *Range and Training Regulations, Standing Operating Procedures for Range Control* (US Marine Corps, October 2006), and the *Environmental Handbook for Trainers*, MCB Camp Lejeune implements numerous mitigation measures to protect the unique habitat conditions that are necessary to the continued survival of threatened and endangered native plants and animals. Therefore, the No Action Alternative is consistent to the greatest extent practicable with this policy.

15A NCAC 07H.0506 (Coastal Complex Natural Areas)

Coastal complex natural areas are defined as lands that support native plant and animal communities and provide habitat qualities which have remained essentially unchanged by human activity. Such areas may be either significant components of coastal systems or especially notable habitat areas of scientific, educational, or aesthetic value. The management objective of this policy is to protect the features of a designated coastal complex natural area to safeguard its biological relationships, educational and scientific values, and aesthetic qualities.

MCB Camp Lejeune has two designated natural areas: the CF Russell Longleaf Pine Natural Area and the Wallace Creek Natural Area. Both have been designated and registered as natural areas by the North Carolina Natural Heritage Program. Since 1985, MCB Camp Lejeune has had a Memorandum of Agreement with the North Carolina Natural Heritage Program to protect and manage these two areas. The No Action Alternative is consistent to the greatest extent practicable with this policy.

15A NCAC 07H.0507 (Unique Coastal Geologic Formations)

Unique coastal geologic formations are defined as sites that contain geologic formations that are unique or otherwise significant components of coastal systems or that are especially notable examples of geologic formations or processes in the coastal area. The management objective for this policy is to preserve unique resources of more than local significance that function as key physical components of natural systems, as important scientific and educational sites, or as valuable scenic resources. No unique geological formations are located within the MCB Camp Lejeune Range Complex. This policy is not applicable.

15A NCAC 07H.0509 (Significant Coastal Archaeological Resources)

Significant coastal archaeological resources are defined as areas that contain archaeological remains (objects, features, and/or sites) that have more than local significance to history or prehistory. The management objective for this policy is to conserve coastal archaeological resources of more than local significance to history or prehistory that constitute important scientific sites, or are valuable educational, associative, or aesthetic resources.

MCB Camp Lejeune manages a variety of historic and prehistoric archaeological resources in accordance with its *Integrated Cultural Resources Management Plan* (US Marine Corps, April 2002). The plan provides guidance and establishes Standard Operating Procedures for the management of culturally meaningful resources on Base. A total of 1,284 archaeological sites have been identified within the MCB Camp Lejeune Complex (includes Oak Grove Landing Field). They include prehistoric and historic archaeological sites ranging from the early Archaic period (8000 BC) to early European colonization and later settlement. Of these sites, 22 have been determined eligible for listing on the National Register of Historic Places while 223 require further evaluation to determine their eligibility for listing. Approximately 81 percent of recorded archaeological sites (1,039 sites) at the Installation have been determined ineligible. In addition, high probability archaeologically sensitive soils located within the base have been surveyed.

Potential effects to National Register of Historic Places-eligible or potentially eligible resources are mitigated as follows:

- Mitigation through avoidance (by marking and implementing guidance in the *Range and Training Regulations, Standing Operating Procedures for Range Control* [Base Order P3570.1B])
- Mitigation of adverse impacts through data recovery at the impacted site prior to the impact occurring (results in complete disturbance of the resource, rendering it unavailable for further study)
- Mitigation of adverse effects to some sites by the preservation of others (marking and protecting certain sites for future study)

In addition, MCB Camp Lejeune is in the process of revising the Base's *Integrated Cultural Resources Management Plan* which includes the development of a Programmatic Agreement, in consultation with the North Carolina State Historic Preservation Office, for routine or repetitive actions that are likely to affect National Register of Historic Places- eligible or potentially eligible sites. The development of a Programmatic Agreement would allow for consideration of the effects of repetitive actions to cultural resources thorough a planned approach to the completion of these tasks. The implementation of such a plan agreement has the added benefit of reducing the volume of consultation necessary with the State Historic Preservation Office.

No underwater surveys have been conducted to establish the presence or absence of archaeological sites or shipwrecks within the vicinity of the BT-3 Impact Area. With respect to prehistoric resources in depths of less than approximately 91 m (300 ft), archaeological sites with Paleo-Indian components may be present. However, it is likely these sites would be buried under sediments that have accumulated over time. As a result, although there could be submerged

cultural resources, they would likely be buried deeply under sediments and thus are less likely to be impacted than later historic shipwrecks.

Within the general vicinity of Onslow Beach, Brown's Inlet, Brown's Island, Bear Inlet, and Bear Island, there are 11 reported shipwrecks, most occurring in the vicinity of Bear Inlet. No underwater archaeological sites or recorded shipwrecks have been identified within the BT-3 Impact Area or within the New River. If shipwrecks are present within the project area, it should be noted that due to mechanical, chemical, and biological erosion and decay, it is likely that older shipwrecks are represented by non-organic material (e.g., metal, ballast stones, etc.) and are likely covered by sediments that have accumulated over time. Therefore, the No Action Alternative is consistent to the greatest extent practicable with this policy.

15A NCAC 07H.0510 (Significant Coastal Historic Architectural Resources)

Significant coastal historic architectural resources are defined as districts, structures, buildings, sites or objects that have more than local significance to history or architecture. The management objective for this policy is to conserve coastal historic architectural resources of more than local significance which are valuable educational, scientific, associative or aesthetic resources.

Eight historic districts on MCB Camp Lejeune have been determined eligible for inclusion in the National Register of Historic Places. The majority of the historic architectural properties are located away from the primary ranges and training areas of the Base.

A portion of the Stone Bay Rifle Range Historic District is within the MCB Camp Lejeune Range Complex. Buildings and features of the historic district are within or immediately adjacent to the surface danger zone of the Stone Bay rifle range. This historic district is important for its direct association with MCB Camp Lejeune's World War II mobilization and training mission, which included training its Marines in the proficient use of pistols and rifles. Under the No Action Alternative, the resources in the historic district would continue to support the training mission of the Stone Bay rifle range. The district's buildings and structures would not be demolished, damaged, or altered by training exercises at the range. The Stone Bay Rifle Range Historic District's historic features and setting would remain unchanged, as it would continue to perform the functions for which it was originally designed and built. Therefore, no historic architectural resources would be affected. The No Action Alternative would be consistent to the greatest extent practicable with this policy.

General Policy Guidelines

The No Action Alternative was analyzed to determine the applicability of the Coastal Area Management Act's General Policy Guidelines and the alternative's consistency, when applicable and where enforceable. As detailed in the Coastal Consistency Determination in **Appendix F**, 7 of the 11 policies are applicable. Consistency with these applicable policies is addressed as follows.

15A NCAC 07M.0200 (Shoreline Erosion Policies)

This policy states that the general welfare and public interest require that development along the ocean and estuarine shorelines be conducted in a manner that avoids loss of life, property, and amenities. All proposals for shoreline erosion response projects shall avoid losses to North Carolina's natural heritage. All means should be taken to identify and develop response measures that would not adversely affect estuarine and marine productivity.

Various aspects of the No Action Alternative occur along the shoreline. No construction activities or facilities to prevent shoreline erosion would occur under this alternative. The use of land for military training combined with sometimes destructive weather-related events can result in erosion problems that impact the quality of training and reduce the land's ability to recover naturally. Ranges and training areas at MCB Camp Lejeune support various combat training activities. Off-road vehicle traffic, bivouacking, and digging can reduce vegetative cover and cause soil compaction, both of which can increase runoff and the potential for soil erosion.

Shoreline erosion would be minimized to the greatest extent feasible by following the relevant sections of the MCB Camp Lejeune *Integrated Natural Resources Management Plan* (Chapter 10), *Range and Training Regulations*, *Standing Operating Procedures for Range Control* (Base Order P3570.1B), and the *Environmental Handbook for Trainers*. In addition, potential impacts to soils would be addressed by maintenance and hardening of roads and trails, and employing applicable erosion and sedimentation control techniques at training sites. Actions that would be used to help reduce soil erosion and degradation of maneuver areas include:

- Closing selected areas to training use for restoration and recovery of eroded sites
- Using Best Management Practices for training-related activities
- Implementing soil conservation restoration and maintenance projects
- Planting native warm season grasses where practical in restoring eroded sites
- Implementing shoreline stabilization projects

In addition to these measures, several engineering training areas have maintenance plans that require units to conduct inspection of ranges and training areas of facilities for erosion and land disturbance deficiencies prior to conducting training (see Soils [**Subchapter 4.1.6.1**]). These efforts would minimize environmental impacts to soils due to training by rehabilitating degraded areas; reducing soil erosion and subsequent sedimentation in sensitive riparian habitats streams, and estuaries; and enhancing vegetative recovery onsite by establishing native warm season grasses where feasible to help prevent erosion. The No Action Alternative is consistent to the greatest extent practicable with this policy.

15A NCAC 07M.0300 (Shorefront Access Policies)

This policy fosters, improves, enhances, and ensures optimum access to the public beaches and waters of the 20 coastal counties. Access shall be consistent with rights of private property owners and the concurrent need to protect important coastal natural resources.

Due to extensive daily military training and to protect public safety, MCB Camp Lejeune is a closed military installation. Access to Onslow Beach is limited to military personnel and their

families; civilians may use the beach only when sponsored by a military member who must be present. Prior to April 2007, the public could use boat launches located on MCB Camp Lejeune. However, due to increased security concerns, the public can no longer launch or recover boats on MCB Camp Lejeune property. Under the No Action Alternative there would be no change to existing public access to or use of the shorefront or water. Therefore, the No Action Alternative is consistent to the greatest extent practicable with this policy.

15A NCAC 07M.0500 (Post-Disaster Policies)

These policies require that all state agencies prepare for disasters and coordinate their activities in the event of a coastal disaster. MCB Camp Lejeune, Base Order P3440.6E, *Destructive Weather*, addresses how MCB Camp Lejeune would prepare for potential disasters and would respond in the event of a disaster, including coordination with North Carolina emergency services. The No Action Alternative is consistent with this policy.

15A NCAC 07M.0700 (Mitigation Policy)

This policy states that coastal ecosystems shall be protected and maintained as complete and functional systems by mitigating the adverse impacts of development as much as feasible, by enhancing, creating, or restoring areas with the goal of improving or maintaining ecosystem function and areal proportion. Mitigation shall be used to enhance coastal resources and offset any potential losses occurring from approved and unauthorized development.

Specific procedures and measures that protect natural resources are detailed in the MCB Camp Lejeune *Integrated Natural Resources Management Plan*, *Integrated Cultural Resources Management Plan*, *Range and Training Regulations*, *Standing Operating Procedures for Range Control* (Base Order P3570.1B), the Environmental Handbook for Trainers, permits, and Biological Opinions, among others. MCB Camp Lejeune uses every means practicable to avoid and minimize damage to the natural environment (please refer to Avoidance and Minimization Measures [Subchapter 4.7]). The No Action Alternative is consistent to the greatest extent practicable with this policy.

15A NCAC 07M.0800 (Coastal Water Quality Policies)

These policies state that all the waters of the state within the coastal area have a potential for uses that require optimal water quality. Therefore, at every opportunity, existing development adjacent to these waters shall be upgraded to reduce discharge of pollutants. Basinwide management within and outside of the coastal area is necessary to preserve the quality of coastal waters. Methods to control development so as to eliminate harmful runoff which may impact water quality and the adoption of best management practices to control runoff from undeveloped lands are necessary to prevent the deterioration of coastal waters.

Stormwater runoff is managed and controlled in accordance with MCB Camp Lejeune's 2002 state-approved Stormwater Pollution Prevention Plan, a state-approved erosion and sediment control plan, and National Pollutant Discharge Elimination Systems (NPDES) Phase I permit

requirements. The NPDES Phase II permit is expected to be issued in 2008. Stormwater runoff would be managed under those permit requirements when the permit becomes effective.

In the continuing effort to protect water quality, MCB Camp Lejeune ranges are being studied through ongoing Range Environmental Vulnerability Assessments. The initial Range Environmental Vulnerability Assessment screening methodology consisted of conceptual site modeling to develop loading data of munitions constituents deposited through operational periods of both historical and currently operating ranges. These mass loading data were then processed to determine the potential concentrations of munitions constituents reaching the surficial aquifer and/or entering site run-off to surface drainages (see Natural Resources [Subchapter 4.1.6]).

Wetland protection measures as outlined in the *Memorandum of Agreement Between the Department of the Army and the US Environmental Protection Agency, The Determination of Mitigation under the Clean Water Act Section 404(b)(1) Guidelines* include:

- Avoidance - avoid potential impacts to the maximum extent practicable
- Minimization - take appropriate and practicable steps to minimize the adverse impacts (e.g., limit the anticipated impact to an area of the wetland with lesser value than other areas, or reduce the actual size of the impacted area)
- Compensatory mitigation - take appropriate and practicable compensatory mitigation action for unavoidable adverse impacts that remain after all appropriate and practicable minimization has been made (e.g., create a new wetland area, restore existing degraded wetland, or enhance low value wetland)

Activities such as, operating wheeled and tracked vehicles off-road, fording streams, amphibious operations, digging defensive positions, bivouacking, and landing of rotary wing aircraft can reduce vegetative cover, which increases the potential for soil erosion and subsequent sedimentation of wetlands. These potential impacts would be minimized by avoiding wetlands and floodplains where possible when conducting military training activities, and employing applicable erosion and sedimentation control techniques at training sites to prevent sedimentation of wetlands. Some actions outlined in the *Integrated Natural Resources Management Plan* for MCB Camp Lejeune that would help protect wetlands include:

- Using Best Management Practices for all training-related activities
- Recovering training areas previously not suited for training due to erosion
- Reducing soil erosion and subsequent sedimentation in sensitive riparian habitats, streams and estuaries
- Enhanced vegetative recovery onsite by planting native warm season grasses where feasible

Therefore, the No Action Alternative would not adversely impact coastal water quality (see Natural Resources [Subchapter 4.1.6]). Implementation of the No Action Alternative is consistent to the greatest extent practicable with this policy.

15A NCAC 07M.0900 (Policies on Use of Coastal Airspace)

These policies state that access corridors free of special use airspace designations shall be preserved along the length of the barrier islands and laterally at intervals not to exceed 40 km (25 mi) to provide unobstructed access both along the coastline and from inland areas to the coast. Development of aviation related projects and associated airspace management practices shall, to the maximum extent practicable, facilitate the use of aircraft by local, state, and federal government agencies for purposes of resource management, law enforcement, and other activities related to public health, safety, and welfare. Access to restricted areas shall be provided on a periodic basis for routine enforcement flights and access shall be provided on an emergency basis when required to respond to an immediate threat to public health and safety.

All aircraft training activities are governed by the *Standing Operating Procedures for Range Control*. All helicopter and fixed-wing aircraft operations occur in special use airspace and are conducted in a manner that is consistent with policies on use of coastal airspace. The No Action Alternative is consistent with these policies.

15A NCAC 07M.1000 (Policies on Water- and Wetland-Based Target Areas for Military Training Areas)

These policies state that all public trust waters subject to surface water restrictions for use in military training shall be opened to commercial fishing at established times appropriate for harvest of the fisheries resources within those areas. In addition, where laser weaponry is used, the area of restricted surface waters shall be at least as large as the recommended laser safety zone. Further, water quality shall be tested periodically in the surface water restricted areas surrounding such targets and results of such testing shall be reported to the North Carolina Department of Environment and Natural Resources.

As discussed above in 15A NCAC 07H.0200 (Estuarine and Ocean Systems), MCB Camp Lejeune has long restricted access to its facilities and water areas to protect the public and to provide security to Government property. For MCB Camp Lejeune to fulfill its mission, Marines must be able to train at water- and wetland-based targets; there are no available alternatives. All training and range activities, including laser use, are governed by MCB Camp Lejeune *Standing Operating Procedures for Range Control*.

In the continuing effort to protect water quality, MCB Camp Lejeune ranges are being studied through ongoing Range Environmental Vulnerability Assessments. The initial Range Environmental Vulnerability Assessment screening methodology consisted of conceptual site modeling to develop loading data of munitions constituents deposited through operational periods of both historical and currently operating ranges. These mass loading data were then processed to determine the potential concentrations of munitions constituents reaching the surficial aquifer and/or entering site run-off to surface drainages (see Natural Resources, [Subchapter 4.1.6]).

Wetland protection measures as outlined in the *Memorandum of Agreement Between the Department of the Army and the Environmental Protection Agency, The Determination of Mitigation under the Clean Water Act Section 404(b)(1) Guidelines* include:

- Avoidance - avoid potential impacts to the maximum extent practicable
- Minimization - take appropriate and practicable steps to minimize the adverse impacts (e.g., limit the anticipated impact to an area of the wetland with lesser value than other areas, or reduce the actual size of the impacted area)
- Compensatory mitigation - take appropriate and practicable compensatory mitigation action for unavoidable adverse impacts that remain after all appropriate and practicable minimization has been made (e.g., create a new wetland area, restore existing degraded wetland, or enhance low value wetland)

Activities such as, operating wheeled and tracked vehicles off-road, fording streams, amphibious operations, digging defensive positions, bivouacking, and landing of rotary wing aircraft can reduce vegetative cover which increases the potential for soil erosion and subsequent sedimentation of wetlands. These potential impacts would be minimized by avoiding wetlands and floodplains where possible when conducting military training activities, and employing applicable erosion and sedimentation control techniques at training sites to prevent sedimentation of wetlands. Some actions outlined in the *Integrated Natural Resources Management Plan* for MCB Camp Lejeune that would help protect wetlands include:

- Using Best Management Practices for all training-related activities
- Recovering training areas previously not suited for training due to erosion
- Reducing soil erosion and subsequent sedimentation in sensitive riparian habitats, streams and estuaries
- Enhanced vegetative recovery onsite by planting native warm season grasses where feasible

The No Action Alternative is consistent to the greatest extent practicable with these policies.

Local Coastal Management Policies

The No Action Alternative was assessed for its consistency with the applicable land use, development, and coastal zone management policies of the Onslow County Land Use Plan. The ongoing training activities conducted at the MCB Camp Lejeune are consistent to the greatest extent practicable with the applicable local coastal management policies (**Table 4.2-1**).

Table 4.2-1
Onslow County Comprehensive Plan Policies

| Land Use and Development Policies | Applicability |
|--|----------------|
| Preferred Development Pattern | Not Applicable |
| Housing and Neighborhood Development | Not Applicable |
| Commercial and Office Development | Not Applicable |
| Industrial Development | Not Applicable |
| Agricultural and Rural Area Preservation | Not Applicable |
| Waterfront and Waterborne Development | Not Applicable |
| Infrastructure and Service Policies | Applicability |
| Transportation | Consistent |
| Water and Sewer Services | Consistent |
| Stormwater Management, Drainage and Flooding | Consistent |
| Solid Waste Management | Consistent |
| Natural Resources Management and Use Policies | Applicability |
| Areas of Environmental Concern | Consistent |
| Estuarine and Ocean Resources | Consistent |
| Ocean Hazard System of Areas of Environmental Concern | Consistent |
| Public Water Supply Areas of Environmental Concern | Not Applicable |
| Natural and Cultural Resource Areas | Consistent |
| Other Important Natural Resource Areas | Consistent |
| Water Resources, Surface and Ground | Consistent |
| Wetlands and Hydric Soils | Consistent |
| Economy and Culture Policies | Applicability |
| Economic Development | Not Applicable |
| The Military and the Community | Consistent |
| Educational Facilities | Consistent |
| Parks and Recreation Facilities | Not Applicable |
| Cultural History, Historic Preservation/Revitalization | Not Applicable |
| Community Appearance | Not Applicable |

The No Action Alternative is consistent to the greatest extent practicable with the relevant enforceable policies of North Carolina's Coastal Management Program.

4.2.1.2 Proposed Action

The proposed action would support and conduct current and emerging training operations at the MCB Camp Lejeune Range Complex. Emerging training requirements include increases in current training operations at existing ranges. Training operations would be conducted within existing land ranges, water ranges, and special use airspace within the range complex. The proposed action includes the following:

- A 20 percent increase in small arms training, except .50 caliber arms
- A 33 percent increase in CH-53 sorties and a 100 percent increase in AH-1 and UH-1 sorties
- A 10 percent increase in training with MK-19 40-mm grenade rounds
- A 5 percent increase in training with artillery, mortar, and other large arms
- A 39 percent increase in tank rounds
- A 33 percent increase in tactical vehicle operations

Under the proposed action, the types of training operations at the MCB Camp Lejeune Range Complex would remain the same.

The Coastal Consistency Determination would be the same as for the No Action Alternative with the following exception.

15A NCAC 07M.0700 (Mitigation Policy)

In addition to the mitigation measures identified under the No Action Alternative, MCB Camp Lejeune would require the following and approvals and consultations for the proposed action:

- Federal Coastal Consistency Determination concurrence by the North Carolina Department of Environment and Natural Resources, Division of Coastal Management
- Compliance with the 2006 revisions of MCB Camp Lejeune's *Recovery Plan for the Red-Cockaded Woodpecker*
- Consultation with the US Fish and Wildlife Service on the Endangered Species Act and Migratory Bird Treaty Act
- Consultation with the National Marine Fisheries Services on the Endangered Species Act, Marine Mammal Protection Act, and the Magnuson-Stevens Fishery Conservation and Management Reauthorization Act and
- Concurrence from the North Carolina State Historic Preservation Officer on cultural resource effects findings

MCB Camp Lejeune would implement actions required by these approvals and consultations. Therefore, the proposed action would be consistent to the greatest extent practicable with this policy.

4.2.2 Socioeconomics – Water Ranges

4.2.2.1 No Action Alternative

Commercial and Recreational Fishing

MCB Camp Lejeune currently conducts water training exercises in the waters surrounding the range complex, in which live fire or maneuver training occurs. Live-fire exercises in Onslow Bay take place in the BT-3 Impact Area inside a prohibited area, which excludes fishing under the existing conditions. Water training exercises take place in the N-1 water space. The New River is a water restricted area in which various sectors may be closed to fishing during training operations. The Marine Corps provides advance notice of closures, except at Stones Bay, which is subject to closure without notice (33 CFR 334.440). The Atlantic Intracoastal Waterway is a water restricted area that is also used for exercises. Munitions firing may take place from or over the waterway into targets on Brown's Island or the Horney Range (barrier island targets), which necessitates periodic temporary closures that stop watercraft traffic using the waterway. There are currently 50 operations per year requiring closure of the Atlantic Intracoastal Waterway for about 110 one-hour periods. In addition, the US Coast Guard and Navy conduct operations involving 40 one-hour closures. The training exercises and associated waterway closures would continue under the No Action Alternative.

Due to safety concerns, commercial and recreational fishing activities may be directed away from water ranges during training operations and fishermen would need to use alternate fishing destinations. Also, they could be delayed or re-routed while the Atlantic Intracoastal Waterway

is temporarily closed for training operations resulting in temporary impacts to commercial and recreational fishing.

The prohibited area in Onslow Bay consists of 18,494 ha (45,700 ac) that contain offshore waters and inshore areas, including Brown's and Bear Inlets, which are designated for crab pots and other fishing. The shrimp fishery, both inshore and offshore, and the inshore fisheries for blue crabs, southern flounder, striped mullet and red drum have been interrupted by closures due to training exercises (Carpenter, December 2008). The prohibited area removes inshore waters between Brown's and Bear Inlets and offshore waters in Onslow Bay from public access, which impacts commercial and recreational fishing under the No Action Alternative.

The economic impact of the commercial and recreational fishing impacts to Onslow County is minor because the fishing industry is such a small part of the Onslow County economy. However, despite the minor economic impact to the county, the effects of the No Action Alternative are experienced more severely by commercial and recreational fishing businesses in the region of influence and by local fishermen that fish commercially and recreationally in the area. Nonetheless, these impacts would continue to be temporary and limited in duration as described above.

Recreational Activities

Under the No Action Alternative, demands on the Atlantic Intracoastal Waterway and area beaches are expected to remain the same. Recreational boating in Onslow Bay, the Atlantic Intracoastal Waterway, and New River would continue to experience restrictions, delays, or re-routing from ongoing military training activities. These impacts would not substantially affect the recreational industry.

4.2.2.2 Proposed Action

Commercial and Recreational Fishing

The proposed action would include all operations currently affecting commercial and recreational fishing under the No Action Alternative. Operations on water ranges under the proposed action would remain the same as the No Action Alternative; therefore, the impacts of the proposed action on fishing would be the same. Operations on land ranges would increase, which may require more frequent temporary closures of surface water restricted areas associated with ranges on the New River.

The economic impact of the commercial and recreational fishing impacts to Onslow County is minor because the fishing industry is such a small part of the Onslow County economy. However, the added inconvenience and disruptions may be experienced more severely by local commercial and recreational fishing businesses and individuals that would be affected by any additional closures of these waters. Nonetheless, these impacts would be temporary and limited in duration as described for the No Action Alternative.

Recreational Activities

Recreational boating and other activities such as sports fishing, water skiing, crabbing, shellfishing, sport diving, and whale watching, will be impacted by the proposed action. As discussed in Recreational Activities (**Subchapter 3.2.2.2**), at times, portions of the New River, Onslow Bay, and the Atlantic Intracoastal Waterway are closed for as long as deemed necessary, consistent with 33 CFR Part 334.440, in order to prevent civilians and other non-participating craft from entering the operations area at the existing danger zone (water), also known as prohibited area, and water restricted areas during scheduled live fire training periods. Currently, there are no data available for the number of recreational, non-military annual boat trips on the Atlantic Intracoastal Waterway that could potentially be affected by the proposed action. However, the restricted use of these areas would be brief (usually lasting approximately one hour) and therefore, is not expected to adversely impact recreational activities. Under the proposed action, navigable waters between Brown's Island and the Atlantic Intracoastal Waterway (bounded by Brown's Inlet and Bear Inlet) will continue to be closed to navigation at all times due to the potential occurrence of unexploded ordnance. The impact of the proposed action, therefore, is the same as that discussed for the No Action Alternative.

As discussed in Recreational Activities (**Subchapter 3.2.2.2**), 13 percent of North Carolina visitors cited beach/waterfront activities as the reason for their visit (North Carolina Department of Commerce, 2006). In addition, Onslow Beach, which is owned by the Marine Corps, is the only beach that could potentially be affected by the proposed action. Access to Onslow Beach is limited to military patrons and their families. Noise produced by training activities at MCB Camp Lejeune is occasionally audible at nearby beaches. The proposed action would increase training related noise, but not enough that the difference would be perceptible to recreational users of nearby beaches.

4.2.3 Noise – Water Ranges

4.2.3.1 No Action Alternative

Weapon operations within water ranges under the No Action Alternative would remain unchanged compared to the existing conditions described in Noise – Water Ranges (**Subchapter 3.2.3**). Therefore, no weapon firing noise impact would occur under the No Action Alternative.

4.2.3.2 Proposed Action

Impacts resulting from the increased use of both small arms and large weapons rounds have been discussed previously (see Noise - Land Ranges, Proposed Action [**Subchapter 4.1.4.2**]), and were found to be minor.

4.2.4 Cultural Resources – Water Ranges

4.2.4.1 No Action Alternative

Archaeological Resources

As described in Underwater Archaeological Resources [Subchapter 3.2.4.1], there is the potential that prehistoric or historic archaeological sites may be present on the seafloor of the water ranges, although none have been formally recorded. It is unlikely that underwater archaeological sites within the water ranges would be impacted under the No Action Alternative, as there are no permanent water-based targets in the range complex. Munitions fired from ships and boats on water ranges aim at targets within impact areas on the ground. There is a chance that munitions aimed at ground targets may accidentally land in the water. **Table 2.3-2** indicates that approximately 154,450 munitions fall into the New River, Atlantic Intracoastal Waterway and Onslow Bay from training every year. If submerged cultural resources exist, due to the likely depth of site deposition, it is not anticipated that errant munitions falling short or wide of the intended target would impact any sites. Within the region of influence, 11 unconfirmed shipwrecks have been identified. Most of the shipwrecks occur in the vicinity of Bear Inlet, which is adjacent to the northeast corner of the BT-3 Impact Area. However, it should be noted that no shipwrecks have been identified with the BT-3 Impact Area. If historic shipwrecks are present, they have most likely eroded and decayed to such an extent that only non-organic materials would be present. The North Carolina State Historic Preservation Officer, having no comment on this EA, concurs with the cultural resources effect findings for the No Action Alternative and proposed action (**Appendix E**).

4.2.4.2 Proposed Action

Archaeological Resources

The proposed action would have a low potential to affect underwater archaeological resources for the same reasons as those described for the No Action Alternative. Neither existing training nor the proposed action would be likely to generate enough underwater disturbance to affect submerged archaeological resources.

4.2.5 Natural Resources – Water Ranges

4.2.5.1 Underwater Sediments

No Action Alternative

Under the No Action Alternative, underwater sediments in the nearshore and open ocean underwater environment have the potential to be disturbed by munitions firing, small boat and amphibious vehicle training operations, and munitions constituents from expended materials. While munitions firing and small boat and amphibious vehicle training operations would affect underwater sediments, these activities would not result in long-term adverse impacts for the following reasons.

Munitions are fired from the New River to targets on land. **Table 2.3-2** indicates that approximately 96,086 munitions may fall into the New River from training every year. All these

are small arms rounds: .22 caliber, 5.56 mm and 7.62 mm. Munitions that are used in and around the BT-3 Impact Area include a variety of small arms and three types of large arms munitions. A total of 58,364 rounds are assumed to fall into the waters of the Atlantic Intracoastal Waterway and Onslow Bay. The majority of these rounds are from small arms ammunitions.

Small arms rounds are not recovered and would be deposited on the river and ocean bottom. Small arms rounds generally remain intact upon contact with the surface of the water and quickly sink through the water column to the bottom, where they would be eventually buried in sand or sediment. In Onslow Bay, ocean currents would disperse small arms rounds once they enter the water column. Corrosion of the metallic materials may affect bottom sediment quality but not to a substantial degree due to the relatively slow rate of release into the environment.

Approximately 19 inert and 40 high explosive Stinger Missiles would be fired over Onslow Bay under the No Action Alternative. Roughly 5,604 inert 40 mm rounds could land in Onslow Bay. It is estimated that one 155 mm high explosive round could miss its land-based target and fall into Onslow Bay. As a result, debris from Stinger Missiles, inert 40 mm rounds, one 155 mm round, aerial targets, and surface targets would be deposited on the ocean bottom. This debris would sink to the bottom and eventually be buried in sand or sediment.

In 2005, an extensive study was conducted at the Canadian Forces Maritime Experimental and Test Ranges near Nanoose, British Columbia to analyze the chemical effects of expendable components from activities involving sonobuoys, torpedoes, expendable mobile training targets, and auxiliary dry cargo carriers. These expended materials contain many of the same constituents as training materials used at the MCB Camp Lejeune water ranges. In the study, the analysis focused on lead, copper, and lithium. The study found that metal constituents were most likely to concentrate in fine-grained particulate matter, especially when the particulate matter was smaller than 63 micrometers. The findings demonstrated that operations did not cause a measurable effect on sediment quality (Environmental Sciences Group, July 2005).

Small boat and amphibious vehicle training operations have the potential to disturb bottom sediments, similar to commercial and recreational boating. Sediments would be temporarily suspended from boat motors. Military boats and amphibious vehicles would use established piers and splash points while entering or leaving the water, which would minimize impacts to underwater sediments.

Proposed Action

Under the proposed action, underwater sediments in the nearshore and open ocean underwater environment have the potential to be disturbed by munitions firing and small boat and amphibious vehicle training operations in a manner similar to that described for the No Action Alternative. While munitions firing and small boat and amphibious vehicle training operations would affect underwater sediments, these activities would not result in long-term adverse impacts for the following reasons.

The proposed increase in munitions firing would potentially result in 115,306 munitions falling into New River annually. All these are small arms rounds: .22 caliber, 5.56 mm and 7.62 mm. The proposed increase in munitions firing could result in 66,964 rounds falling into the Atlantic Intracoastal Waterway and Onslow Bay, most of which are small arms rounds (see **Table 2.3-2**). This increase in munitions rounds and debris deposited on the river and ocean bottom is not expected to result in substantial impacts to underwater sediments. Similar to the munitions currently fired, the increased number of rounds would eventually be buried in sand or sediment. In Onslow Bay, ocean currents would disperse munitions rounds and debris once they enter the water column. There would continue to be a relatively slow rate of release into underwater sediments from the corrosion of metallic materials.

Under the proposed action, small boat and amphibious vehicle movement on water ranges and splash point usage would remain the same. Therefore, the impact to underwater sediment from small boat and amphibious vehicle movement and distribution operations would be similar to that described for the No Action Alternative.

4.2.5.2 Surface Water

No Action Alternative

Water ranges in the range complex include three surface water bodies: New River, Atlantic Intracoastal Waterway, and Onslow Bay. These surface waters have the potential to be impacted by munitions firing, small boat and amphibious vehicle training operations, and support activities. However, these training operations would not result in long-term adverse impacts to surface waters. (Surface waters on land ranges are addressed in Water Resources [**Subchapter 4.1.6.2**]).

Other military activities on the water, such as distribution operations, include spanning of waterways by bridging units and use of temporary causeways onto Onslow Beach for transport of vehicles and goods off vessels and onto shore. These structures are temporary and have only minor potential to disturb the water or bottom sediments.

Munitions are fired from the New River to targets on land. **Table 2.3-2** indicates that approximately 96,086 munitions may fall into the New River from training every year. All are from .22 caliber, 5.56 mm and 7.62 mm rounds. Munitions fired at the BT-3 Impact Area include a variety of small arms and three types of large arms munitions. A total of 58,364 rounds are estimated to fall into the waters of the Atlantic Intracoastal Waterway and Onslow Bay. The majority of these rounds are from small arms ammunition.

Small arms rounds are not recovered and would be deposited on the river and ocean bottom, where they would be eventually buried in sand or sediment. In Onslow Bay, ocean currents would disperse small arms rounds once they enter the water column. Corrosion of the mostly non-toxic metals from small arms rounds may affect water quality but not to a substantial degree due to the relatively slow rate of release into the environment. Debris from Stinger Missiles, inert 40 mm rounds, one 155 mm round, aerial targets, and surface targets would be deposited on the

ocean bottom. Explosives and propellants in the high explosive rounds are mostly consumed during the firing of the round, leaving only residues. Munitions firing introduces several types of pollutants into the water column. These substances include propellant, explosive residues, and battery constituents from missiles and aerial targets, and metals from rusting and corroding casings. It is not anticipated that these pollutants would be released in quantities and at rates that would violate water quality standards.

Current uses of the New River include small boat use and transiting by light armored vehicles, amphibious assault vehicles, and expeditionary fighting vehicles. These vehicles have the potential to impact surface water quality from exhaust, oils, fuels and the introduction of soils from on-land training carried by amphibious vehicles entering the water at several splash points. These soils would produce short-term, temporary increases in turbidity and contaminants from the re-suspended materials.

Current uses of the BT-3 Impact Area include small boat use and transiting by light armored vehicles, amphibious assault vehicles, Landing Craft Air Cushion, amphibious landing craft expeditionary fighting vehicles and barrier island targets within the BT-3 Impact Area. These vehicles have the potential to impact surface water quality from exhaust, oils, fuels and the introduction of soils from on-land training carried by amphibious vehicles entering the water, as well as the introduction of metals and explosive material. There are several splash points that are used for amphibious landing along the shoreline of Onslow Bay and the Atlantic Intracoastal Waterway. Short-term, temporary impacts would be expected due to increased turbidity caused by the introduction of soils and the release of any contaminants from the re-suspended material during the use of these splash points.

Training operations on water ranges would be conducted in accordance with all procedures on the handling of hazardous materials and petroleum, oils, and lubricants to avoid a release of contaminants.

Proposed Action

The New River, Atlantic Intracoastal Waterway, and Onslow Bay would be impacted by munitions firing, small boat and amphibious vehicle training operations, and support activities. However, these training operations would not result in long-term adverse impacts to surface waters as discussed below.

Munitions firing activities and locations on water ranges would remain the same for the proposed action as described for the No Action Alternative. The proposed increase in munitions firing would potentially result in 115,306 munitions falling into New River annually. All these are small arms rounds: .22 caliber, 5.56 mm and 7.62 mm. The proposed increase in munitions firing could result in 66,964 rounds falling into the Atlantic Intracoastal Waterway and Onslow Bay, most of which are small arms rounds (see **Table 2.3-2**). This increase in munitions rounds and debris deposited on the river and ocean bottom is not expected to result in substantial impacts to water quality. Similar to the munitions currently fired, the increased number of rounds would eventually be buried in sand or sediment. In Onslow Bay, ocean currents would disperse

munitions rounds and debris once they enter the water column. There would continue to be a relatively slow rate of release into underwater sediments from the corrosion of mostly non-toxic metals. An increase in pollutants would be introduced into the water column from additional propellant, explosive residues, and battery constituents from missiles and aerial targets, and metals from rusting and corroding casings. However, it is not anticipated that the increase in these pollutants would be released in quantities and at rates that would violate water quality standards.

The type and frequency of training operations and support activities conducted on water ranges would not increase under the proposed action. Therefore, the impacts to surface water from these training activities under the proposed action would be the same as described for the No Action Alternative. Training operations on water ranges would be conducted in accordance with all procedures on the handling of hazardous materials and petroleum, oils, and lubricants to avoid a release of contaminants.

4.2.5.3 Marine Biology

No Action Alternative

Project activities occurring in water ranges may negatively impact marine or estuarine organisms or habitats. Training activities conducted in Onslow Bay (including the BT-3 Impact Area and the N-1 Surface Water Maneuver Area), New River, Atlantic Intracoastal Waterway, and the Atlantic Coast near MCB Camp Lejeune were addressed to assess potential disturbances to marine resources including invertebrates, fish and essential fish habitat, marine mammals, marine birds, and threatened and endangered species (marine birds, fish, marine mammals and sea turtles). The main activities addressed include the use of small boats throughout seaside training areas, ordnance delivery to targets located near to or surrounded by water, and the transit of amphibious vehicles on marine and estuarine substrates. Documents from a variety of sources including the Marine Corps, National Marine Fisheries Service, and individual scientific investigators are referenced for analysis of potential impacts to marine resources from the No Action Alternative and the proposed action.

The maximum number of munitions that may fall into the water for the No Action Alternative and the proposed action was estimated for the New River and the combined Onslow Bay and Atlantic Intracoastal Waterway (see **Table 2.3-2**). These estimates along with the munitions type were considered for analysis of impacts to habitats and organisms residing in the action area.

For the No Action Alternative, training activities currently being conducted at the MCB Camp Lejeune Range Complex (described in detail in the No Action Alternative [**Subchapter 2.1**]) would continue and these activities were assessed for their potential to impact marine biological resources.

Marine Birds

Marine birds residing in the project area may be temporarily disturbed by current training activities under the No Action Alternative. The presence and associated noise of aircraft and

boats likely deter birds from training areas during training activities and shortly thereafter, although some birds may actually habituate to the unnatural conditions created by training activities. Although birds are highly mobile, the high speeds at which aircraft move does not always allow for avoidance by birds, especially if they are habituated they are not as likely to leave the area during training operations. Bird/Animal-Aircraft Strike Hazard (**Subchapter 3.1.8.2**) includes information on efforts to predict where and when bird strikes may occur and how to avoid them. MCB Camp Lejeune personnel practice caution during training activities to minimize negative impacts to birds. Large flocks of birds are highly visible, and thus easily avoided by aircraft and boats. The likelihood of ordnance striking a bird is low, as the surface area of these organisms is relatively small. With conservation measures in place and the low likelihood of striking a bird by ordnance or vessels, the No Action Alternative has short-term, negligible impacts on marine birds. Although some takes are allowed for training operations including military readiness, MCB Camp Lejeune is involved in bird surveys to aid in monitoring populations, and precautions are taken to avoid and minimize negative impacts to birds. No “takes” as defined by the Migratory Bird Treaty Act as amended by the National Defense Authorization Act are anticipated, as the small number of birds which may be impacted would not negatively impact bird populations.

Marine Invertebrates

Marine invertebrates residing in the project area may be temporarily disturbed by the current training activities. Transit of amphibious vehicles over soft-bottom substrates at splash points within the New River and Atlantic Intracoastal Waterway may disturb organisms living in or on the sediments (**Figure 2-2**). The use of ordnance for training operations would result in little if any disturbance to marine invertebrates, as the actual area of the seafloor potentially impacted by ordnance is small, and there is no evidence that underwater noise negatively affects marine invertebrates. Impacts are direct but short-term, and therefore negligible. Recruitment of new individuals transported by the Gulf Stream occurs continuously to replace organisms lost as a result of training activities (Department of the Navy, June 2003).

Essential fish habitat areas for various invertebrates including shrimp, coral, scallop, crab, and lobster species are located within the training areas, and will be discussed in the essential fish habitat section below.

Fish

Fish residing in the region of influence may be disturbed by training activities that include frequent boat traffic and other activities leading to increased underwater noise or physical disturbance. Fish are highly mobile organisms, so if disturbed likely leave the area and return once activities cease. The potential for harm to fish from ordnance does exist, but the likelihood of such an occurrence is extremely low. Once training activities commence, fish likely leave the area, and are not present in the immediate area of impact. Although unlikely, fish could be directly impacted by high explosive ordnance strike. The area of the water column in the project area that is potentially impacted by ordnance is relatively small in comparison to the water

column in the entire project area. Debris from ordnance is known to rapidly sink to the bottom and eventually become encrusted with biota, therefore having no effect on fish communities. Water quality would not be significantly changed from debris. The transit of amphibious vehicles on the bottom would not impact fish, as fish are highly mobile, and benthic fishes would swim away from the area of impact. Activities associated with the No Action Alternative have indirect and short-term impacts on fish species in the action area, with a very low likelihood of direct impacts from ordnance, and therefore impacts are negligible.

Essential fish habitat areas for several fish species occurs within the region of influence, and will be discussed in detail in the essential fish habitat section below. The federally endangered shortnose sturgeon is discussed in the Threatened and Endangered species section below.

Essential Fish Habitat

Essential fish habitat for a number of invertebrate and fish species with fishery management plans occurs within the project area. Effects determinations for essential fish habitat are either “no adverse effect on essential fish habitat” or “may adversely affect essential fish habitat.” Adverse effects include direct or indirect effects that reduce the quality or quantity of the habitat (National Marine Fisheries Service, February 1998). Adverse effects to essential fish habitat require further consultation if they are determined to be permanent versus temporary. **Table 4.2-2** includes information on the essential fish habitat types present in the project area and potential adverse effects of current training activities.

Table 4.2-2
Essential Fish Habitat Types in or Near the Project Area, Training Activities Occurring in the Area, and Potential Impacts of the No Action Alternative on the Essential Fish Habitat Resource

| Essential Fish Habitat Description | Area of Occurrence | Associated Training Activity | Effect |
|---|--|--|---------------------|
| Estuarine Emergent Wetlands | Atlantic Intracoastal Waterway and New River Inlet | Vessel traffic, Support Activities & Amphibious vehicles | Direct, Temporary |
| Submerged Aquatic Vegetation | Atlantic Intracoastal Waterway and New River Inlet | Amphibious vehicles & Support Activities | Direct, Temporary |
| Intertidal Flats | Atlantic Intracoastal Waterway and New River Inlet | Amphibious vehicles & Support Activities | Direct, Temporary |
| Palustrine Emergent and Forested Wetlands | Creeks that flow into the Atlantic Intracoastal Waterway and New River Inlet | Amphibious vehicles & Support Activities | Direct, Temporary |
| Estuarine Water Column | Atlantic Intracoastal Waterway and New River Inlet | Vessel traffic | Indirect, Temporary |
| Live/Hard Bottom Habitat | Onslow Bay | Surface to ground or air live-fire | No Effect |
| Coral and Coral Reefs | Onslow Bay | Surface to ground or air live-fire | No Effect |
| Artificial and Manmade Reefs | Onslow Bay | Surface to ground or air live-fire | No Effect |
| Marine Water Column | Onslow Bay | Surface to ground or air live-fire | Indirect, Temporary |
| Note: Support activities refer to the placement of temporary causeways, piers and barges at the land-sea/river interface. | | | |

Species with fishery management plans may be disturbed by training activities, but would likely resume normal activities once training activities cease. The No Action Alternative yields no long-term impacts to species with fishery management plans. The essential fish habitat-habitat

areas of particular concern altered by ordnance delivery reaching the sea or river floor, or amphibious vehicles transiting to or from land, are extremely small relative to the entire habitat present in the region of influence. There is very limited hard bottom and reef habitat in the action area. The likelihood that ordnance would detonate in the water is low, and the likelihood of it reaching the bottom and then detonating is extremely low. The hard bottom and reef habitats are mapped, so areas are known and can easily be avoided for installation of any temporary structures. In addition, the temporary installment of structures (e.g. piers, causeways) related to support activities is short term. Due to the temporary and limited nature of disturbances, the activities related to the No Action Alternative would have no adverse effect on essential fish habitat.

Marine Mammals

Preventative measures in place by the military for activities taking place at MCB Camp Lejeune are described in several documents, including the *Range and Training Regulations, Standing Operating Procedures for Range Control* (Base Order P3570.1B) and the *MCB Camp Lejeune Integrated Natural Resources Management Plan* (MCB Lejeune, January 2007). Actions described in these documents are standard operating procedures that are currently in place and will be used in the future for all activities being analyzed in this EA. Those specific to the avoidance of harm to all marine mammals include the following:

- Regular consultation (when needed) with the National Oceanographic and Atmospheric Administration, which is the agency responsible for management of marine species
- Ranges and training maneuver areas must be scheduled and approved in the Range Facility Management Support System prior to use. Ranges that are close to the Atlantic Intracoastal Waterway or use the BT-3 Impact Area and training or operations in the Atlantic Ocean Sector, to include Onslow Bay, must be scheduled at least 45 days prior to use to allow publication of a Notice to Mariners, coordination with external agencies, and scheduling of aircraft to perform an aerial sweep of the Atlantic Intracoastal Waterway and Atlantic Ocean Sector prior to live firing, per the CFR
- Training practice projectiles are not deliberately fired to impact within 200 m (656 ft) of the Atlantic Intracoastal Waterway
- An aerial sweep of the impact area using rotary-wing aircraft must include a sweep for people, small boats, and marine mammals in the Atlantic Intracoastal Waterway. It must be conducted within one-half hour prior to firing to ensure the area is safe for firing
- While conducting Shore Bombardment, if marine mammals are observed within a 30.5 m (100 ft) radius of the ship, operations are suspended until the area has been cleared of marine mammals

The Navy East Coast Biological Evaluation (US Fleet Forces, December 2007) describes general maritime measures in place by the military which include lookouts trained to site marine mammals or sea turtles. Specific duties include the following:

- All commanding officers, executive officers, lookouts, and officers of the deck complete the National Marine Fisheries Service-approved US Navy Marine Species Awareness Training, which is a DVD-based instructional course. Marine Species Awareness

Training may also be viewed on-line at <https://mmrc.tecquest.net>. All bridge watchstanders/lookouts will complete both parts one and two of the Marine Species Awareness Training; part two is optional for other personnel. This training addresses the lookout's role in environmental protection, laws governing the protection of marine species, Navy stewardship commitments and general observation information to aid in avoiding interactions with marine species

- Navy lookouts undertake extensive training in order to qualify as a watchstander in accordance with the *Lookout Training Handbook* (NAVEDTRA 12968-B)
- Lookout training includes on-the-job instruction under the supervision of a qualified, experienced watchstander. Following successful completion of this supervised training period, lookouts complete the Personal Qualification Standard Program, certifying that they have demonstrated the necessary skills (such as detection and reporting of partially submerged objects)
- Lookouts are trained in the most effective means to ensure quick and effective communication within the command structure in order to facilitate implementation of protective measures if marine species are spotted

The *Environmental Handbook for Trainers* further states the following:

- Survey the area after each exercise for any harmful objects; abandoned wire, netting and other debris that poses a danger to people and wildlife

All marine mammals are protected under the Marine Mammal Protection Act. The Marine Mammal Protection Act generally defines harassment as Level A or Level B, and these levels are different for acts of military readiness such as the current project activities (described in detail in Marine Biology [**Subchapter 3.2.4.3**]). For military readiness activities, the relevant definition of harassment is any act that:

- Injures or has the significant potential to injure a marine mammal or marine mammal stock in the wild ("Level A harassment").
- 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") [16 US Code 1362 (18)(B)(i)(ii)].

There is the potential for training activities to lead to Level A or B harassment as defined by the Marine Mammal Protection Act, and potential impacts are analyzed below.

The bottlenose dolphin (*Tursiops truncatus*) and Atlantic spotted dolphin (*Stenella frontalis*) are expected to occur regularly within the project area. Activities taking place at MCB Camp Lejeune of concern for marine mammals include those that involve amphibious vehicles and small boat traffic and the use of live-fire near the water, which could lead to Level A or B harassment. Dolphins are highly mobile, so collisions with amphibious vehicles and small boats are not likely, although collisions are possible when watercraft operate at high speeds. Noise from vessels may disturb dolphins, but if disturbed, individuals would likely leave the area temporarily and return when training activities have ceased. Training activities would not lead to higher vessel traffic than the level of current activity by recreational boaters; when areas are

closed off during training activities boating activity is confined to military vessels only, so the level of boat activity is lower than the normal conditions.

Falling debris or explosions from ordnance landing in the water have the potential to impact marine mammals. Activities taking place in the BT-3 Impact Area include live surface to ground direct fire at an island and surface to air fire at targets, all surrounded by the waters of Onslow Bay. Estimates for the annual level of munitions that may land in water ranges is provided in **Table 2.3-2**. **Figure 2-2** shows the extent of the BT-3 Impact Area where munitions may land in the water. These waters support frequent visits by bottlenose and spotted dolphins. Potential impacts include direct strike, acoustic impacts, debris ingestion or entanglement, and injury or mortality from explosives. Under the No Action Alternative, a total of 40 high explosive Stinger missiles are designed to explode in the air, while the remaining 19 inert Stinger missiles would hit a target and fall to the water intact. The likelihood of a missile or missile debris striking a marine mammal is very low, especially with preventative measures in place (described below). If a Stinger missile were to miss a target, it would be detonated in the air so as to not explode underwater. Smaller munitions (in effect, .50 caliber) pose a lower magnitude of risk to marine mammals, but the potential for injury or death is possible from a direct strike.

Munitions Strike Probability

An analysis was conducted to examine the probability of direct strike to dolphins and the resultant total number of potential strikes based on the annual number of munitions that may land in the water and the density of dolphins within the BT-3 Impact Areas (Atlantic Intracoastal Waterway and Onslow Bay) and the New River (US Marine Corps, December 2008). The probability of direct strike was determined by first calculating the area of the potential strike surface and multiplying it by the total number of rounds that may enter the water. The area of the potential strike surface is a dolphin's dorsal surface area multiplied by the dolphin density in that location. Bottlenose dolphin densities for summer and winter apply to both the New River and Onslow Bay area. Spotted dolphin density applies only to the Onslow Bay area and represents a year-round average estimate. The estimate for dolphin surface area is assumed to be 1.425 m² (15.339 ft²) (or the average length of 2.85 m [9.35 ft] times the average body width of 0.5 m [1.6 ft]) (US Marine Corps, 2007). The total annual number of rounds in the New River is 96,086 (**Table 2.3-2**). Round expenditures are assumed to be evenly divided between summer and winter seasons where seasonal density estimates are available. The total number of rounds that may land in the Atlantic Intracoastal Waterway and Onslow Bay for the No Action Alternative is 58,364. Probabilities of a direct strike were calculated for bottlenose and spotted dolphins for summer and winter for the areas in which they occur. The analysis assumes that the 19 inert Stinger missiles would land intact, and that live Stingers would break apart with the only significant debris piece by weight being the engine which is about 0.08 x 0.127 m (3 x 5 inches), and weighs about half a kilogram (1 lb). Other debris pieces, such as Styrofoam parts of targets, would not represent a strike hazard. Thus, the number of Stinger missiles fired is counted as the number of debris pieces. **Table 4.2-3** lists the probabilities of direct impact to bottlenose and spotted dolphins from munitions that may land in the water. The analysis confirms that the risk of a direct strike is minimal.

Table 4.2-3
Potential for Direct Strike of Munitions on Marine Mammals – No Action Alternative

| Area | Season | Species | Species Density | Probability of Direct Strike | Annual Estimates of Dolphins Potentially Impacted by Direct Strike |
|---|------------|--------------------|-----------------|------------------------------|--|
| New River | Winter | Bottlenose Dolphin | 0.392 | 5.6×10^{-7} | 0.03 |
| | Summer | | 0.392 | 5.6×10^{-7} | 0.03 |
| Atlantic Intracoastal Waterway and Onslow Bay | Winter | | 1.205 | 1.7×10^{-6} | 0.05 |
| | Summer | | 0.42 | 6.0×10^{-7} | 0.02 |
| | Year-Round | Spotted Dolphin | 0.152 | 2.2×10^{-7} | 0.01 |

Acoustic Impacts

Potential impacts to marine mammals from underwater noise associated with explosive munitions that may land in the water and detonate underwater were also analyzed (US Marine Corps, December 2008). For military readiness activities, Marine Mammal Protection Act Level A harassment includes any act that injures or has the significant potential to injure a marine mammal or marine mammal stock in the wild. Injury, as defined in this EA and previous rulings, is the destruction or loss of biological tissue (National Oceanic and Atmospheric Administration, May 2001, 2002). Consistent with prior actions and rulings (National Oceanic and Atmospheric Administration, May 2001), this EA assumes that all injuries (slight to severe) are considered Level A harassment under the Marine Mammal Protection Act.

For military readiness activities, Marine Mammal Protection Act Level B harassment includes all actions that disturb or are likely to disturb a marine mammal or marine mammal stock in the wild through the disruption of natural behavioral patterns. This includes, but is not limited to, migration, surfacing, nursing, breeding, feeding, or sheltering to a point where such behavioral patterns are abandoned or significantly altered.

The analysis described above assumes that some high explosive munitions could miss their land-based target and inadvertently detonate in the water. The noise from these detonations may have potential adverse effects on marine mammals, resulting in Level A or Level B harassment. The only munition containing high explosives which has the potential to land in the water is the 155 mm high explosive round. If a missile was to miss a target, it would be detonated in the air so as to not explode underwater, therefore, avoiding underwater acoustic impacts to marine animals. Detonation upon impact is conservatively assumed for all cases although, some may not detonate. The analysis of explosive underwater noise impacts to marine mammals is fairly complex and requires an explanation of the metrics, criteria and thresholds used to predict noise impacts (**Appendix C**).

The calculations for potential impacts to marine mammals from explosive munitions that may land in the water and detonate underwater are based on methodology described in **Appendix C**.

An estimate of the number of animals likely to be affected by 155mm detonations (exposures) is calculated by first multiplying the area of noise (developed from impact area listed in **Table 4.2-4**) associated with a particular effect or harassment threshold by the density (either summer or

winter) of bottlenose dolphins or the density of Atlantic spotted dolphins found in the study area. Then, this number is multiplied by the number of munitions that may fall in the water, which in the case of the 155 mm would be 1 annually.

There is no density information for right whales, humpback whales and manatees within the study area, since they occur only occasionally. Thus, noise effects on these species cannot be calculated but is assumed to be zero due to very low numbers (US Marine Corps, December 2008).

Table 4.2-4
Estimated Impact Area for Dolphins for a 155 mm Detonation

| Impact Criteria and Threshold | Estimated Impact Area for 155 mm (meters) | |
|---|---|--------|
| | Summer | Winter |
| Level A, Onset Mortality (1%) Onset extensive lung injury (30.5 psi-ms) | 20 | 20 |
| Level A Harassment: 50% TM rupture (205 dB re 1 $\mu\text{Pa}^2\text{-s}$) | 38 | 34 |
| Level A Harassment: Onset slight lung injury (indexed to 13 psi-ms) | 31 | 31 |
| Level B Harassment: TTS for toothed whales and sea turtles (182 dB re 1 $\mu\text{Pa}^2\text{-s}$) | 126 | 107 |
| Level B Harassment: TTS (23 psi) | 211 | 209 |
| Level B Harassment: (Sub-TTS) | 182 | 155 |

Table 4.2-5 provides the predicted exposures by Level A and Level B harassment, respectively. Acoustic analysis conservatively considered a scenario where a 155 mm round landed seaward of its intended target, detonating on the surface of the BT-3 Impact Area. Based on this scenario, modeling results indicated that there would be a potential for less than 1 (0.35) exposure of a bottlenose dolphin to sound levels likely to result in Level B harassment, less than 1 (0.35) leading to Level A harassment and injury (0.01), and 0 exposures leading to Level A harassment and mortality.

Table 4.2-5
Bottlenose Dolphin Noise Exposures from Munitions Noise

| Mammals \ Exposures | Level B | Level A | |
|---------------------|---------|---------|-----------|
| | TTS | Injury | Mortality |
| 155mm (1 round) | 0.35 | 0.01 | 0.00 |

Less than one (0.07) Atlantic spotted dolphins would be exposed to Level B noise as shown in **Table 4.2-6**. Acoustic analysis indicates that no Atlantic spotted dolphins would be exposed to sound levels likely to result in Level A harassment.

Table 4.2-6
Atlantic Spotted Dolphin Noise Exposures from Munitions Noise

| Mammals \ Exposures | Level B | Level A | |
|---------------------|---------|---------|-----------|
| | TTS | Injury | Mortality |
| 155mm (1 round) | 0.07 | 0.00 | 0.00 |

Modeling of 155 mm underwater detonations predicts that there would be no mortality to bottlenose or spotted dolphins. Noise exposure to dolphins is likely overestimated since these animals may be detected within the training area and avoided prior to training. It is current practice to cease training activities if a marine mammal is spotted within the impact area (see preventative measures for marine mammals described above).

Debris Ingestion

Ingestion of marine debris by marine mammals can cause digestive tract blockages or damage the digestive system (Gorzalany, 1998; Stamper et al., 2006). Ingestion of debris by dolphins is not likely, as dolphins typically eat fish and other quickly moving prey items which are not easily mistaken for debris. There is no evidence of a dolphin attempting to ingest material as large as a parachute, so parachutes are not likely to lead to harm from ingestion. If ingested, strands of chaff are not likely to harm a dolphin; filaments are fine and would pass through the digestive system. Studies suggest that the impacts of chaff ingestion are negligible, with no mortality or digestive disturbance apparent with exposure to high levels of chaff material and its major component, aluminum (Systems Consultants, 1977). Concerns about the impacts of chaff degrading in and polluting the marine environment are also negligible. The combination of the relatively small amount of chaff used in exercises and the dilution factor present in the ocean lead to an insignificant change, if any, in water quality as chaff degrades (US Air Force, 1997).

Ingestion of expended ordnance is not expected to occur in the water column where dolphins feed because ordnance quickly sinks. Specific information on potential toxic effects of ingestion of the types of ordnance used in military activities on marine mammals is not available. Although there is a lack of directed studies on this topic, it is clear that the type of ordnance would determine potential effects: relatively small objects with smooth edges such as a cannon shell or small caliber ammunition would likely pass through the digestive tract without causing harm, while a piece of metal shrapnel with sharp edges would be more likely to cause damage. As mentioned above, the fact that ordnance quickly sinks to the bottom leads to a highly unlikely scenario of a dolphin ingesting expended ordnance.

Debris Entanglement

Entanglement in debris is also not likely, but is possible; dolphins are relatively large animals, and for entanglement to occur debris would need to be large in size, and more importantly, structurally complexity. The most likely occurrence of large debris in the project area is parachute material. Parachutes are large but flimsy but structurally simple, hence unlikely to trap a dolphin. The likelihood that a dolphin encounters debris is low. Marine mammals are much more likely to become entangled in debris from fishing gear (Laist, 1997).

Airborne Noise

Aircraft flyovers from ongoing training operations would continue to produce airborne noise and some of this energy would continue to be transmitted into the waters below special use airspace. Sound pressure levels at a range of 3 to 18 m (9.8 to 59.0 ft) underwater from aircraft flyovers have been measured at 100 to 124 dB re 1 μ Pa, which are below noise levels typically generated by traveling vessels. The angle of incidence of a sound wave propagating from an aircraft must enter the water at an angle of 13° or less from the vertical for the wave to continue propagating under the water's surface. Any greater angle of incidence will lead to the water surface acting as an effective reflector of the sound wave, and very little penetration of the wave below the water occurs (Urlick, 1972). Although any noise other than ambient has the potential to disturb marine

mammals, these underwater noise levels from aircraft flyovers are substantially below levels considered as harassment to marine mammals (Refer to **Appendix C**).

Conclusions

The fact that marine mammals breathe air, and consequently must surface periodically, leads to some ability to detect these organisms above water. The chances of striking a dolphin are low as they are highly mobile, can detect vessel sound, and are able to avoid vessels in many cases. With preventative measures in place (detailed in the *Range and Training Regulations, Standing Operating Procedures for Range Control* (Base Order P3570.1B) and the *Camp Lejeune Integrated Natural Resources Management Plan* [MCB Lejeune, January 2007]) and the extremely low probability of ordnance striking a marine mammal (dolphin), the No Action Alternative is likely to have minor impacts on marine mammals. The likelihood of Level A harassment as defined by the Marine Mammal Protection Act is low for impacts from munition strikes, debris entanglement, and vessel strikes. Level B harassment as defined by the Marine Mammal Protection Act is possible, as training activities may disrupt normal behaviors of marine mammals (dolphins).

The Endangered Species Act-listed endangered West Indian manatee (*Trichechus manatus latirostris*) and North Atlantic right whale (*Eubalaena glacialis*) are discussed in the Threatened and Endangered Species subchapter, below.

Threatened and Endangered Species

Birds

Threatened and endangered bird species are discussed in Terrestrial Biology (**Subchapter 4.1.6.3**).

Fish

The only federally listed fish species that might occur in the action area is the shortnose sturgeon (*Acipenser brevirostrum*). As stated in the *MCB Camp Lejeune Integrated Natural Resources Management Plan* (MCB Camp Lejeune, January 2007), regular consultation with the National Oceanographic and Atmospheric Administration takes place to avoid and minimize potential impacts to the shortnose sturgeon. This species has not been documented to occur in the waters surrounding MCB Camp Lejeune, although the estuarine habitat present is known to be the ideal type for shortnose sturgeons. If present in the action area during training activities, this species would likely leave the area temporarily due to noise disturbances. Harm due to live-fire training operations is very unlikely. Due to the lack of evidence of occurrence of this species in the project area and the temporary disturbance that might occur if encountered, activities associated with the No Action Alternative would have no effect on the shortnose sturgeon.

Marine Mammals

Preventative measures to avoid harm to the West Indian manatee include those described for marine mammals in general (see Marine Mammal section, above) in addition to several specifically in place for the manatee. To avoid harm to the West Indian manatee, the following

procedures are implemented, as outlined in the *Range and Training Regulations, Standing Operating Procedures for Range Control* (Base Order P3570.1B).

- Unit Commanders, Officers-in-Charge, and Non-commissioned Officers-in-Charge will ensure strict compliance with applicable regulations regarding protected species (including the West Indian manatee and North Atlantic right whale), as listed in Base Order 5090
- Everyone conducting waterborne operations should be alert for possible manatee encounters
- If a manatee is sighted, personnel should immediately slow to a no-wake speed
- Allow sufficient room for the manatee, and maneuver cautiously away from the encounter area
- All sightings are to be reported to the Camp Lejeune Fish and Wildlife Branch
- Do not approach the manatee
- Report all sightings to the Camp Lejeune Fish and Wildlife Branch at (910) 451-5063

The *Environmental Handbook for Trainers* further states the following:

- Survey the area after your exercise for any harmful objects; abandoned wire, netting and other debris poses a danger to people and wildlife

The West Indian manatee is occasionally sighted near the New River Inlet and the surrounding beaches, and has the potential to occur in other nearshore areas at MCB Camp Lejeune. Sightings are not common, but appropriate habitat is abundant in the project area. Vessel strikes to manatees are common in general, as this species is slow-swimming with the exception of small bursts of speed. Precautionary measures implemented for sea turtles and marine mammals would be the same for the West Indian manatee, including halting training activities upon sighting a manatee. Ingestion of debris associated with training activities (including chaff) would not likely impact manatees, as they are primarily herbivores and feed in shallow areas along the shore. Entanglement in debris is possible for manatees, as these organisms are not as agile as other marine mammals. The typical location of manatees is very nearshore where a small percentage of debris may end up eventually, but these areas are not located where debris is likely to initially enter the water. Due to the low probability of an amphibious vehicle, small boat, or munitions strike, the low occurrence of this species in the project area, and the preventative measures in place, the activities associated with the No Action Alternative may affect, but are not likely to adversely affect the West Indian manatee.

Preventative measures to avoid harm to the North Atlantic right whale and humpback whale include those described for marine mammals in general (see Marine Mammal section, above) in addition to many specifically in place for the North Atlantic right whale. The following preventative measures created specifically for the North Atlantic right whale are included in the *Range and Training Regulations, Standing Operating Procedures for Range Control* (Base Order P3570.1B).

- Prior to commencing live fire exercises in the BT-3 Impact Area, an air sweep must be conducted to identify whales in the impact area. Flyovers will be flown at 227 m (750 ft) and consist of at least two survey lines 2 nm apart and parallel to the coast, with the first line 1.6-3.2 km (1-2 mi) off the beach, and the second 4.8-6.4 km (3-4 mi) off the beach.

If a whale is spotted in the BT-3 Impact Area, the Environmental Management Division must be notified; firing cannot commence until the whale clears the impact area

- If a whale is spotted, all live fire operations into coast waters (BT-3 Impact Area) shall be halted and Environmental Management Division notified at (910) 451-5063. Live fire will not resume until an air sweep confirms the BT-3 Impact Area is again clear
- To further protect North Atlantic right whales, Range Control issues a daily warning order to trainers from November 1 through April 30 when North Atlantic right whales are present along the North Carolina coast. The warning order states:

ENDANGERED NORTH ATLANTIC RIGHT WHALES MIGRATE ALONG THE NORTH CAROLINA COAST ENROUTE TO AND FROM NEW ENGLAND AREAS USED PRIMARILY SPRING THROUGH FALL, AND GEORGIA/FLORIDA CALVING AREAS USED DURING WINTER. RIGHT WHALES, INCLUDING MOTHER/CALF PAIRS, CAN BE FOUND 1/4 MILE OR MORE OFF ONSLOW BEACH FROM 1 NOVEMBER TO 30 April. RANGE CONTROL REQUIRES RANGE SWEEPS DURING THIS PERIOD IN CONJUNCTION WITH LIVE FIRING EXERCISE INTO THE BT-3/N1 IMPACT AREA.

- All whale sightings (live or dead) must be reported to the Environmental Management Division, 451-5063. Environmental Management Division will distribute a Critical Sightings Program guide to all training crews operating offshore of Camp Lejeune

A Biological Evaluation for the Navy East Coast Range Complexes (US Fleet Forces, December 2007) includes specific measures for the North Atlantic right whale during migration periods, and includes the following applicable to North Carolina waters:

- In North Carolina, Navy vessels are required to use extreme caution and operate at a slow, safe speed consistent with mission and safety for the months of December through April and within a 20 nm (37 km) arc of the following reference point: 34-41.54 N 076-40.20 W
- During months of expected North Atlantic right whale occurrence, Navy vessels will practice increased vigilance with respect to avoidance of vessel-whale interactions along the mid-Atlantic coast, including transits to and from any mid-Atlantic ports

The *Environmental Handbook for Trainers* further states the following:

- Survey the area after your exercise for any harmful objects; abandoned wire, netting and other debris poses a danger to people and wildlife

The North Atlantic right whale and humpback whale are known to occur in the nearshore waters of the project area with varying frequencies during fall, winter, and spring while migrating to or from calving grounds. Abundance estimates for the project area are limited, but sightings of these species in the project area are not common. Both the North Atlantic right whale and humpback whale are vulnerable to ship strikes, and the special conservation measures outlined above are implemented to avoid collisions. Average operating speeds for amphibious vehicles range from 5 to 25 knots within the BT-3 Impact Area, and personnel are visually scanning for whales, dolphins and turtles while transiting. Although small boats operate in the training areas at relatively high speeds, these vehicles are highly maneuverable and capable of quick maneuvers to avoid collisions. Although not likely, due to the presence of lookouts and the maneuverability of small boats, there is a possibility of a vessel strike to a whale.

Training activities including live fire pose a risk to the North Atlantic right whale and humpback whale. As with other marine mammals and sea turtles, if a North Atlantic right whale or

humpback whale is sighted prior to or during training activities, all activities cease until the animal leaves the area. These whales are large and must surface to breath air, so they are likely to be sighted while on the surface. The chances that one surfaces in the area and is unsighted are low, especially with precautionary measures in place. If a whale was to go unsighted or reside just below the sea surface and live fire was to miss a target, the potential for disturbance or even mortality does exist.

Ingestion of debris by North Atlantic right whales or humpback whales is very unlikely, and if it were to occur, would not likely cause harm. Both of these species are known to feed primarily on the surface or in the water column. Expended ordnance sinks to the bottom quickly, thus limiting the potential for ingestion to organisms that feed on the bottom. Debris such as chaff that floats on the surface is more likely to be ingested or degrade in the water, but studies indicate that impacts of both chaff ingestion and degradation in the water are very minimal (described for dolphins in marine mammals section, above).

Due to the low probability of an amphibious vehicle, small boat, or munitions strike, the low likelihood of ingestion of debris, the low occurrence of these species in the project area, and the implementation of preventative measures, the activities associated with the No Action Alternative may affect, but are not likely to adversely affect the North Atlantic right whale or humpback whale.

Sea Turtles

General maritime measures in place by the military, including lookouts trained to sight marine mammals or sea turtles, are in use and designed to avoid collisions with protected species. These measures are described in detail in the Marine Mammal section, above.

Preventative measures for natural resources are detailed in the Range and Training Regulations (Base Order P3570.1B), *Standing Operating Procedures for Range Control* (US Marine Corps, October 2006). Actions described in this document are Standard Operating Procedures that are currently in place and will be used in the future for activities being analyzed in this EA. Those specific to the avoidance of harm to sea turtles from surface gunnery include the following:

- The target area for surface gunnery shall not be established within 200 yards of known or observed sea turtles. The surface vessel that establishes the target area and deploys the target and unmanned remotely-controlled tow vehicle (if applicable) will use trained lookouts to survey the prospective target area for any marine resources
- If a target-towing vessel is manned, it shall maintain a trained lookout for marine mammals and sea turtles. If one is sighted within 200 yards of the impact area, the tow vessel will immediately notify the firing vessel to secure firing until the area is clear
- Firing may take place only when the trained lookouts have confirmed a 200 yard buffer zone

The *Environmental Handbook for Trainers* further states the following:

- Survey the area after your exercise for any harmful objects; abandoned wire, netting and other debris poses a danger to people and wildlife

One training activity that could adversely impact sea turtles includes the use of live-fire that may land in the water where turtles swim. Training activities at Brown's Island (BT-3 Impact Area) in particular could potentially harm sea turtles residing in the area. Sea turtles in the immediate vicinity of delivered ordnance may experience major disturbances from noise; injury from noise created by ordnance delivered in close proximity; injury and direct mortality if struck by ordnance; or entanglement in debris. Most of these disturbances are not well-studied for sea turtles. A summary of available information and analysis of impacts are included below for the No Action Alternative.

Acoustic Impacts

Noise created by ordnance delivery is sporadic and occurs in various locations within the project area, so behavioral disturbances to sea turtles in any given location would be minimal. Injury to sea turtles from extremely loud noises has not been well-studied, but it can be assumed that ordnance delivered in close proximity to a sea turtle would cause some level of injury. Ordnance that strikes the water creates a sound wave that propagates a distance that is determined by the angle of impact; most of the sound pressure wave is rapidly dissipated (Ward et al., 1998). If ordnance was to strike the water within the range of the sound wave reaching a sea turtle, a hearing-related injury is possible.

Munitions Strike Probability

The likelihood of ordnance striking a sea turtle is extremely low. Similar to marine mammals, if a sea turtle is sighted swimming in a range area, activities cease until the animal leaves the area. Unlike marine mammals, sea turtles are difficult to sight, so the small potential for sighting a sea turtle does not greatly decrease the likelihood of a strike. The probability of a direct hit to a dolphin was calculated for the BT-3 Impact Area using the surface area of a dolphin and the estimated surface density of dolphins in the area; the likelihood of a strike was determined to be extremely low, with the highest probability within the waters of the BT-3 Impact Area calculated at 1.7×10^{-6} . Similar conclusions of low potential for a strike can be made for sea turtles: with the exception of the leatherback, which is the largest sea turtle species, the surface area of an average sea turtle is smaller than a dolphin, and according to surveys conducted in the project area, sea turtle densities in the region are notably lower than dolphins (Goodman et al., 2007).

Calculations of strike probabilities using the average area of a sea turtle, the average density of sea turtles in all impact areas in the project area, and the number of rounds expended yield values several orders of magnitude lower than the probability for dolphins. For leatherbacks (the only non-hardshell turtle), the probability of strike in the New River is 7.5×10^{-10} , and in the Atlantic Intracoastal Waterway is 2.3×10^{-10} . For the hardshell turtle group, the probability of a strike in the New River is 3.8×10^{-10} , and in the Atlantic Intracoastal Waterway is 2.3×10^{-10} .

Debris Entanglement and Ingestion

Entanglement in debris is unlikely due to the ability of sea turtles to avoid entanglement, but since large debris such as parachutes may land in the water, such an occurrence is possible. Ingestion of debris is a potential source of harm to sea turtles. Even though they are visual

predators and have excellent eyesight for choosing prey, if debris closely resembled a food source, the potential exists for a sea turtle to mistake the debris item for food. Small parachutes from sonobuoys slightly resemble plastic bags, and in effect, jellyfish, so these would provide a source of potential harm to sea turtles if mistaken for food and ingested. Ingestion of foreign objects (namely plastic items) has been attributed to deaths of sea turtles (Bjorndal, 1994; Magnuson et al., 1990). Chaff may also be ingested by sea turtles or degrade in the water, as it typically floats on the surface; impacts of both chaff ingestion and degradation were found to be negligible in studies on species of various taxa (Systems Consultants, 1977; US Air Force, 1997).

Conclusion

With the low likelihood of harm from training activities taking place in water ranges and preventative measures in place, activities associated with the No Action Alternative may affect, but are not likely to adversely affect the loggerhead, green, Kemp's ridley, or leatherback sea turtles. Due to its rare occurrence in the region of influence, there would be no effect on the Hawksbill sea turtle from activities taking place in water ranges. Land-based activities associated with the No Action Alternative in Terrestrial Biology (**Subchapter 4.1.6.3**) lead to similar conclusions for nesting sea turtles: activities associated with the No Action Alternative may affect, but are not likely to adversely affect the green and loggerhead sea turtles.

Water range operating procedures including use of observers and minimization of lighting on the beach are in place to ensure that other water based activities, such as the temporary installation of floating causeways and piers during water borne logistics events, will not adversely affect protected species.

Proposed Action

The proposed action includes all of the activities associated with the No Action Alternative with an increase in the current levels of training operations. Munitions firing activities and locations on water ranges would remain the same for the proposed action as described for the No Action Alternative. Boat operations on water ranges are only expected to increase proportionally to support increased training activities under the proposed action. There would be no increases in surface-to-ground fires. However, because there is an increase in firing on land ranges, which have surface danger zones that fall over water, and an increase in firing at temporary target system on water ranges, there is a potential that a larger number of munitions may fall into the water (see **Table 2.3-2**). Resources will be analyzed according to the potential for adverse impacts associated with increased training activities.

Marine Birds

Impacts of the proposed action on marine birds would not differ from impacts under the No Action Alternative. Increased training activities at the BT-3 Impact Area would lead to more frequent disturbances from noise, but the reaction of and possible impacts to birds from the activities would be similar to those described for the No Action Alternative. The higher level of training activities increases the chances of ordnance striking a bird, but similar precautionary

measures described for the No Action Alternative would be implemented. With conservation measures in place and the low likelihood of striking a bird by ordnance or ordnance delivery vessels, the proposed action would have short-term, negligible impacts on marine birds. None to very few “takes,” as defined by the Migratory Bird Treaty Act, are anticipated.

Marine Invertebrates

Effects of the proposed action on marine invertebrates would not differ from effects under the No Action Alternative. Impacts would be direct but short-term, and therefore negligible.

Fish

Impacts of the proposed action on fish would not differ from impacts under the No Action Alternative. Increased training activities at the BT-3 Impact Area would lead to more frequent disturbances from noise, but the reaction of fish and possible impacts on fish from the activities would be similar to those described for the No Action Alternative. Activities associated with the proposed action would have indirect and short-term impacts on fish species in the action area, and therefore impacts would be negligible.

Essential Fish Habitat

Impacts of the proposed action on essential fish habitat would not differ greatly from impacts under the No Action Alternative. Increased disturbance to the water column near the BT-3 Impact Area would occur, but these impacts would be temporary. Due to the temporary and limited nature of disturbances, the activities related to the No Action Alternative would have no adverse effect on essential fish habitat.

Marine Mammals

Impacts of the proposed action on marine mammals would be similar to those for the No Action Alternative, and precautionary measures described for the No Action Alternative to avoid harm to these animals are the same for the proposed action. The potential for negative impacts would be higher due to an increase in the frequency of training activities which include firing at targets in the BT-3 Impact Area (**Figure 2-1a; Table 2.3-2**). The level of ground-to-air training would remain the same as under the No Action Alternative (**Table 2.3-1**). The same precautionary measures would be implemented to avoid harm to marine mammals as for the No Action Alternative, thus reducing potential for negative impacts to these organisms. The potential for impacts to marine mammals from explosive munitions would not differ from the No Action alternative, as the number of high explosives for both alternatives is the same. An analysis was conducted to assess the number of 155 mm high explosive rounds that may land in the water on an annual basis and the estimated impact area for dolphins (**Table 4.2-4**). The 155 mm round is the only munition used containing high explosives that have the potential to land in the water. The total number of 155 mm rounds which could potentially detonate underwater annually is 1, and the total number of dolphins (Bottlenose and Atlantic Spotted) which could be impacted is less than one for Level B and Level A harassment, as defined by the marine mammal protection

act (**Tables 4.2-5 and 4.2-6**). No mortality is expected from underwater detonations, and estimates are likely overestimates. With preventative measures in place and the extremely low probability of ordnance striking a marine mammal (dolphin), the proposed action is likely to have minor impacts on marine mammals. The likelihood of Level A harassment as defined by the Marine Mammal Protection Act is low based on calculated values for munitions strike, the low potential for debris entanglement or ingestion, and the extremely low potential for a vessel strike. Level B harassment as defined by the Marine Mammal Protection Act is possible, as training activities may disrupt normal behaviors of marine mammals (dolphins).

An analysis was conducted to examine the probability of direct strike to dolphins and the total number of dolphins potentially struck annually based on the annual number of munitions that may land in the water and the density of dolphins within the BT-3 Impact Areas (Atlantic Intracoastal Waterway and Onslow Bay) and the New River. The probability of direct strike was calculated for the proposed action using the methodology described in the No Action Alternative. **Table 4.2-7** lists the probabilities of direct impact to bottlenose and spotted dolphins from munitions that may land in the water under the proposed action. Similar to the No Action Alternative, the analysis for the potential for direct strikes of munitions on marine mammals under the proposed action confirms that the risk of a direct strike is improbable.

Table 4.2-7
Potential for Direct Strike of Munitions on Marine Mammals – Proposed Action

| Area | Season | Species | Species Density | Probability of Direct Strike | Annual Estimates of Dolphins Potentially Impacted by Direct Strike |
|---|------------|--------------------|-----------------|------------------------------|--|
| New River | Winter | Bottlenose Dolphin | 0.392 | 5.6×10^{-7} | 0.03 |
| | Summer | | 0.392 | 5.6×10^{-7} | 0.03 |
| Atlantic Intracoastal Waterway and Onslow Bay | Winter | | 1.205 | 1.7×10^{-6} | 0.06 |
| | Summer | | 0.42 | 6.0×10^{-7} | 0.02 |
| | Year-Round | Spotted Dolphin | 0.152 | 2.2×10^{-7} | 0.01 |

Threatened and Endangered Species

Birds

Threatened and endangered bird species are discussed in Terrestrial Biology (**Subchapter 4.1.6.3**).

Fish

Effects of the proposed action on the endangered shortnose sturgeon would be similar to those described for the No Action Alternative. Due to the lack of evidence of occurrence of this species in the project area and the temporary disturbance that might occur if encountered, activities associated with the proposed action would have no effect on the shortnose sturgeon.

Marine Mammals

There is no density information for right whales, humpback whales and manatees within the study area, since they occur only occasionally. Thus, effects from high explosives on these species cannot be calculated but is assumed to be zero due to very low numbers.

Effects of the proposed action on the endangered West Indian manatee would be similar to those described for the No Action Alternative. This species is not known to occur commonly in the project area, and as a result, effects from the proposed action which includes an increase in training activities in this area would lead to a slightly higher likelihood of adverse impacts than the No Action Alternative. The proposed action may affect, but is not likely to adversely affect the West Indian manatee.

Effects of the proposed action on the endangered North Atlantic right whale and humpback whale would be similar to those described for the No Action Alternative. The potential for negative impacts would be higher due to an increase in the frequency of training activities which include firing at targets in the BT-3 Impact Area. The same precautionary measures would be implemented to avoid harm to marine mammals as for the No Action Alternative, thus reducing potential for negative impacts to these organisms. Due to the low probability of a vessel or munitions strike, the low probability of debris ingestion or entanglement, and the low occurrence of this species in the project area, the activities associated with the proposed action may affect, but are not likely to adversely affect the North Atlantic right whale or humpback whale.

Sea Turtles

Impacts of the proposed action on sea turtles would be similar to those for the No Action Alternative. The potential for adverse effects would be higher due to an increase in the frequency of training activities which include firing at targets in Onslow Bay. The same precautionary measures described for the No Action Alternative would be implemented to avoid harm to sea turtles for the proposed action. With preventative measures in place, activities associated with the proposed action may affect, but are not likely to adversely affect the loggerhead, green, Kemp's ridley, or leatherback sea turtles. Due to its rare occurrence in the region of influence, there would be no effect on the Hawksbill sea turtle.

Table 4.2-8 summarizes the potential effects of the No Action Alternative and the proposed action on marine biological resources.

Table 4.2-8
Effects Determinations for Project Alternatives on Marine Biological Resources.

| Marine Biological Resource | No Action Alternative | Proposed Action |
|--|--|--|
| Marine Birds | Negligible impacts | Negligible impacts |
| Invertebrates | Negligible impacts | Negligible impacts |
| Fish | Negligible impacts | Negligible impacts |
| Essential Fish Habitat | No adverse effect | No adverse effect |
| Marine Mammals (dolphins) | Minor impacts | Minor impacts |
| Threatened or Endangered Species | | |
| Shortnose sturgeon (<i>Acipenser brevirostrum</i>) | No effect | No effect |
| West Indian manatee (<i>Trichechus manatus latirostris</i>) | May affect, not likely to adversely affect | May affect, not likely to adversely affect |
| North Atlantic right whale (<i>Balaena glacialis</i>) | May affect, not likely to adversely affect | May affect, not likely to adversely affect |
| Humpback whale (<i>Megaptera novaeangliae</i>) | May affect, not likely to adversely affect | May affect, not likely to adversely affect |
| Loggerhead sea turtle (<i>Caretta caretta</i>) | May affect, not likely to adversely affect | May affect, not likely to adversely affect |
| Green sea turtle (<i>Chelonia mydas</i>) | May affect, not likely to adversely affect | May affect, not likely to adversely affect |
| Kemp's ridley sea turtle (<i>Lepidochelys kempii</i>) | May affect, not likely to adversely affect | May affect, not likely to adversely affect |
| Hawksbill sea turtle (<i>Eretmochelys imbricata</i>) | No effect | No effect |
| Leatherback sea turtle (<i>Dermochelys coriacea</i>) | May affect, not likely to adversely affect | May affect, not likely to adversely affect |

4.2.6 Hazardous Materials and Hazardous Waste Management – Water Ranges

The significance of potential impacts associated with hazardous materials and hazardous wastes is based on the toxicity of the substances as well as their management (i.e. transportation, storage, disposal, etc.). Hazardous materials and waste impacts are considered adverse if the use, storage, transportation, or disposal of these substances substantially increases the human exposure risk or environmental contamination.

4.2.6.1 Hazardous Materials

No Action Alternative

Implementation of the No Action Alternative would maintain the status quo, and munitions firing, movement and support activities, and locations of activities on water ranges would remain the same. Training operations involving the use of a variety of solid and liquid hazardous materials (fuel and paint) and training materials (live and practice munitions) would continue to be managed as outlined in Base Order 5090.9 Hazardous Waste and Hazardous Material Management Program (MCB Camp Lejeune, April 1999). In addition, MCB Camp Lejeune would continue with currently scheduled remedial actions and environmental pollution abatement as outlined in the Base Order 5090.91 Oil and Hazardous Substance Pollution Prevention and Pollution Abatement Facility Management (MCB Camp Lejeune, May 1999).

The various departments and divisions within MCB Camp Lejeune generally order hazardous materials through the supply system, from outside vendors. Under the No Action Alternative, the amount of hazardous materials purchased would continue to be managed under the Hazardous Materials Management System and would continue to decrease the amount of hazardous waste, particularly waste generated by product expiration.

Environmental restrictions and procedures for use of the ranges are established by the *Range and Training Regulations, Standing Operating Procedures for Range Control* (Base Order P3570.1B) for ranges at MCB Camp Lejeune. For water training operations at MCB Camp Lejeune, there are procedures governing a number of environmental concerns, including the handling of hazardous materials and petroleum, oils, and lubricants. These products include but are not limited to spill control and response, disposal of battery waste, and fuel storage restrictions.

Proposed Action

MCB Camp Lejeune training operations involving hazardous materials would remain the same under the proposed action. Small boats and amphibious vehicles used for training on water ranges would continue to carry and use hazardous materials for routine operation and maintenance. Hazardous materials transport, storage, and use to support training operations under the proposed action would continue to be managed in compliance with Marine Corps Order 5090.2A. No new types of hazardous materials would be required, and existing hazardous materials storage and handling facilities, equipment, supplies, and procedures would continue to provide for adequate management of these materials. No releases of hazardous materials to the environment and no unplanned exposures of personnel to hazardous materials would be anticipated.

By following procedures outlined in the Base Order P3570.1B, personnel would avoid a release of contaminants during training and operations at MCB Camp Lejeune, thus mitigating appreciable impacts to the surrounding environment as a result of the proposed action.

Because there would be no increase in training operations under the proposed action, there would be no increase in chemicals listed under The Emergency Planning and Community Right-to-Know Act.

4.2.6.2 Hazardous Constituents

No Action Alternative

As described in Hazardous Constituents (**Subchapter 3.2.6.2**), several munitions elements can release contaminants, such as trinitrotoluene (TNT), cyclotrimethylenetrinitramine (RDX), hexahydro-trinitro-triazine (HMX), and perchlorate into the environment upon use or leach small amounts of toxic substance as they explode or decompose. These toxic substances are considered hazardous constituents. After munitions firing, there is the potential for munitions constituents to migrate off-range and cause an unacceptable risk to human health and the environment. However, MCB Camp Lejeune's operational ranges are being studied through ongoing Range

Environmental Vulnerability Assessments. Of the 33 munitions loading areas identified during the initial assessment, two areas (G-10 and K-2 Impact Areas) were selected for further analysis. Recent sampling and chemical analysis of surface waters and groundwater near those impact areas concluded that only minimal concentrations of munitions constituents (lead and perchlorate) were detected. However, the detected concentrations were well below applicable regulatory limits and Draft Department of Defense Range and Munitions Use Subcommittee screening levels. Under the No Action Alternative, munitions firing levels would remain at current levels as shown in **Table 2.3-1**; therefore, no additional impacts are expected.

Proposed Action

Munitions firing would increase under the proposed action, as described in Proposed Action (**Subchapter 2.2**) and depicted in **Table 2.3-1**. After munitions firing, there is the potential for munitions constituents to migrate off-range and cause an unacceptable risk to human and/or ecological receptors. Based on the results of the ongoing Range Environmental Vulnerability Assessment study, the proposed increase in munitions firing is unlikely to result in an increase in concentrations of munitions constituents (lead and perchlorate) above current regulatory limits.

4.2.6.3 Hazardous Waste Management

No Action Alternative

Under the No Action Alternative, the use and handling of ordnance would continue to be regulated under the US Environmental Protection Agency's Military Munitions Rule (40 CFR § 260 -266, 270). The Military Munitions Rule excludes ranges used for training, for the testing of munitions, as well as range clearance as part of range management activities from the application of Resource Conservation and Recovery Act or Comprehensive Environmental Response, Compensation and Liability Act. However, Department of Defense organizations must pursue aggressive range management policies that comply with existing regulations and promote environmental stewardship (Department of Defense, July 1998). MCB Camp Lejeune would establish an appropriate course of action for the proposed action so that federal and state agency notification requirements are met and to arrange for agency consultation as necessary where sites with risk of pollutant migration could be affected.

Under the No Action Alternative, the current amount of hazardous waste generated by normal small boat and amphibious vehicle training operations and maintenance would continue to be managed in compliance with Base Order 5090.9. The hazardous waste generated by training operations is well within the existing capacities of hazardous waste transporters and treatment and disposal facilities in MCB Camp Lejeune.

Known Installation Restoration sites are documented at locations across the MCB Camp Lejeune Range Complex and the cleanup of these sites is managed through the Base's Installation Restoration Program. Under the No Action Alternative, Installation Restoration sites would not be impacted and the efforts to clean up these sites would continue.

Proposed Action

Under the proposed action, the use and handling of ordnance would continue to be regulated under the US Environmental Protection Agency's Military Munitions Rule (40 CFR § 260 -266, 270). The Military Munitions Rule excludes ranges used for training, for the testing of munitions, as well as range clearance as part of range management activities from the application of Resource Conservation and Recovery Act or Comprehensive Environmental Response, Compensation and Liability Act. However, Department of Defense organizations must pursue aggressive range management policies that comply with existing regulations and promote environmental stewardship (Department of Defense, July 1998). MCB Camp Lejeune would establish an appropriate course of action for the proposed action so that federal and state agency notification requirements are met and to arrange for agency consultation as necessary where sites with risk of pollutant migration could be affected.

The amount of hazardous waste generated by normal small boat and amphibious vehicle training operations and maintenance under the proposed action would be the same as that generated under the No Action Alternative because training operations would not increase. All hazardous waste would continue to be managed in compliance with Marine Corps Order 5090.2A and Base Order 5090.9. The hazardous waste generated by training operations is well within the existing capacities of hazardous waste transporters and treatment and disposal facilities in MCB Camp Lejeune.

Known Installation Restoration sites are documented at locations across the MCB Camp Lejeune Range Complex and the cleanup of these sites is managed through the Base's Installation Restoration Program. Similar to the No Action Alternative, the proposed action would not impact Installation Restoration sites or continued efforts to clean up these sites.

4.2.7 Public Health and Safety – Water Ranges

Public health and safety issues include potential hazards inherent in range training operations. It is the policy of the Marine Corps and the Navy to observe every possible precaution in the planning and execution of all activities that occur onshore or offshore to prevent injury to people or damage to property.

4.2.7.1 No Action Alternative

Implementation of the No Action Alternative would maintain existing conditions, and the current levels of laser and munitions usage and movement activities of personnel and amphibious vehicles on water ranges at MCB Camp Lejeune would remain the same.

To maintain public safety during laser training at water ranges certain specific precautions are taken. Standard Operating Procedures dictate that targets should not be positioned outside the controlled area (including airspace). Calm, smooth water and clean ice can reflect laser beams, especially at low angles of incidence and these potential reflections are considered when establishing target areas (Department of Defense, December 1996). Also, lasing shall cease if unprotected or unauthorized surface craft enter the operations area or buffer zone (Department of

Defense, December 1996). The Marine Corps notifies the public of hazardous activities through the use of Notice to Mariners. Prior public notification of Marine Corps training activities, use of known training areas, avoidance of non-military vessels and personnel, and the remoteness of the offshore training areas from coastal population centers reduce the potential for the interaction between the public and military vessels. To date, these strategies have been successful.

4.2.7.2 Proposed Action

Under the proposed action, laser usage at MCB Camp Lejeune water ranges would increase proportionally with the increase in munitions firing. With the increase in laser and munitions use there is a chance to increase the potential for public mishaps; however, due to the stringent precautions already taken, this is unlikely. MCB Camp Lejeune already complies with regulations on laser use and laser safety measures. Under the proposed action, there would be no additional impact on the public's safety and private property.

4.3 SPECIAL USE AIRSPACE

4.3.1 Civil (Non-Military) Aircraft Operations – Special Use Airspace

4.3.1.1 No Action Alternative

A wide variety of aircraft types are flown by civil airspace users, both commercial and general aviation (private). The flow of civil air traffic in Eastern North Carolina is routinely routed above, around, and sometimes through active special use airspace by Air Route Traffic Control Centers. In accordance with Federal Aviation Administration ruling, the federal airway Victor 139 (V139) crosses through R-5303A/B/C and R-5304A/B/C airspace. Commercial aviation aircraft using V139 normally transit R-5303A and R-5304A at or above 2,133.6 m (7,000 ft) mean sea level or are vectored around it by air traffic control with no interference to MCB Camp Lejeune Range Complex activities.

General aviation, aircraft flying from private airports, in the vicinity of the MCB Camp Lejeune Range Complex Restricted Airspace under Visual Flight Rules must avoid the special use airspace per Federal Aviation Administration rules. General aviation aircraft using V139 normally transit R-5303A and R-5304A at or above 2,133.6 m (7,000 ft) mean sea level or are vectored around it by air traffic control with no interference to MCB Camp Lejeune Range Complex activities. When non-participating aircraft on V139 are unable to transit above the Restricted Airspace altitudes in use and unable to accept vectors around, range activity is either capped or a cease-fire is imposed to accommodate the aircraft on the airway.

Under the No Action Alternative, there would be no changes to the designated purpose, dimensions (shape or altitude), or times of use of the existing special use airspace for MCB Camp Lejeune Range Complex. Commercial and general aviation would continue to successfully conduct operations to and from the public and private use airports, along airway route structures, and along the coastal areas. There would be no impact to civil aircraft operations because the existing relationship between the regional commercial and general aviation industry and ongoing air training activities in special use airspace would remain the same.

4.3.1.2 Proposed Action

Under the proposed action, there would be an increase in helicopter sorties as shown in Tables 2.2-5 and 2.3-6. However, airspace training activities and special use airspace locations would remain the same as those described for the No Action Alternative in Subchapters 2.1.3.3. Additional sorties operations would take place within the current hours of operation listed in Table 1.1-1. Furthermore, joint use protocols establish that airspace becomes available for access by non-participating aircraft during periods when the airspace is not needed for its designated purpose.

The impact on civil aircraft operations from air training activities would be negligible for several reasons. The proposed action does not require changes to the designated purpose or dimensions (shape or altitude) of the existing special use airspace for MCB Camp Lejeune Range Complex. The small increase in additional sortie operations do not conflict with any airspace use plans, policies, and controls. Moreover, civil aircraft would continue to conduct their current flight

operations to and from the public and private use airports, along airway route structures, and along the coastal areas under the proposed action.

4.3.2 Noise – Special Use Airspace

4.3.2.1 No Action Alternative

Aircraft operations within restricted airspace under the No Action Alternative would remain unchanged compared to the existing conditions described in Noise (**Subchapter 3.3.2**). Therefore, no aircraft noise impact would occur under the No Action Alternative.

4.3.2.2 Proposed Action

The proposed action would include changes in the levels of movement within MCAS Cherry Point special use airspace that are associated with several aircraft basing actions including temporary basing of 1 Marine Heavy Lift (HMH) and 1 Marine Light Attack Helicopter (HMLA) squadron to MCAS Cherry Point followed by permanent basing of these squadrons plus 1 additional HMLA squadron at MCAS New River. These actions would increase the usage of restricted airspace above MCB Camp Lejeune. The annual special use airspace sorties would remain the same for fixed-wing aircraft operations. However, sorties for rotary-wing aircraft operations would increase compared to the No Action Alternative described in Noise (**Subchapter 3.3.2**).

Table 4.3-1 summarizes the percentage increase resulting from the proposed action as compared to the No Action Alternative.

Table 4.3-1
Annual No Action Alternative and Proposed Action Sorties

| Scenario | R-5303A | R-5306E | R-5304A | R-5306D | Hatteras F MOA |
|---|---------|---------|---------|---------|----------------|
| No Action Alternative | 594 | 4,104 | 1,077 | 7,565 | 942 |
| Proposed Action | 747 | 5,084 | 1,323 | 9,000 | 942 |
| Percentage Increase (%) | 26 | 24 | 23 | 19 | 0 |
| Note: Numbers in this table include all sorties from Table 2.3-6 . Source: US Marine Corps, October 2008. | | | | | |

As discussed in Chapter 3, the No Action Alternative would produce less than a 3 dBA increase over the 58 dBA noise levels projected in the V-22 EIS, and the overall ADNLs around the Base under existing conditions would still be well below 65 dBA, above which noise sensitive land uses would normally be of concern. The proposed action includes an increase in sorties in MCB Camp Lejeune special use airspace of 20 to 25 percent as compared to the No Action Alternative. This increase, in addition to the 72 percent increase experienced in the No Action baseline year of 2006, still does not double the number of sorties modeled for the V-22 EIS. Therefore, the net increase in the ADNL would still be less than 3 dBA and would still result in overall ADNLs of less than 65 dBA.

4.3.3 Public Health and Safety – Special Use Airspace

Public health and safety issues include potential hazards inherent in range training operations. It is the policy of the Marine Corps and the Navy to observe every possible precaution in the planning and execution of all activities to prevent injury to people or damage to property.

4.3.3.1 No Action Alternative

Implementation of the No Action Alternative would maintain current locations, activities, and levels of laser and munitions usage within special use airspace at the MCB Camp Lejeune Range Complex. There would be no adverse impact to public health and safety from laser training in special use airspace due to the comprehensive laser safety program (see Public Health and Safety [Subchapter 3.3.3]) that would continue to be followed during training operations. Also, the Marine Corps notifies the public of hazardous activities through the use of Notice to Airmen. Several factors reduce the potential for interaction between the public and military aircraft conducting laser training: prior public notification of Marine Corps training activities, use of known training areas, avoidance of non-military vessels and personnel, and the remoteness of the offshore training areas from coastal population centers. To date, these strategies have been successful in maintaining public safety. No further precautions for public safety would be required under the No Action Alternative.

In order to maintain the safety of the public, the pilots and the wildlife, MCB Camp Lejeune closely follows the preventative measure outlined in Marine Corps Order 3750.6R and the draft Department of the Navy Marine Corps Order (Office of the Chief of Naval Operations Instruction [Chapter 6]) Bird/Animal-Aircraft Strikes Prevention Manual. The relatively low number of actual and predicted bird/animal aircraft strikes within the MCB Camp Lejeune special use airspace indicates no need to change safety procedures currently being implemented.

4.3.3.2 Proposed Action

Under the proposed action, laser usage within the MCB Camp Lejeune Range Complex would increase proportionally with the proposed increase in guided munitions expenditures (typically missiles and bombs). However, this increase in laser usage would not result in adverse impacts to public health and safety because MCB Camp Lejeune would continue to comply with laser use regulations and implement the comprehensive laser safety program during laser training activities. Similar to the No Action Alternative, there are several factors that reduce the potential for interaction between the public and military aircraft conducting laser training, which are expected to maintain public safety.

As stated above under the No Action Alternative, the relatively low number of actual and predicted bird/animal aircraft strikes within the MCB Camp Lejeune special use airspace indicates no need to change safety procedures currently being implemented. The proposed increase in flying time would result in an increase in bird/animal aircraft strike hazard potential; however, the potential incidence would remain low based on historical data. The Marine Corps would continue to employ bird/animal aircraft strike hazard avoidance procedures that have proved successful in the past; therefore, no additional impacts would be expected.

4.4 UNAVOIDABLE ADVERSE IMPACTS

The environmental analysis of the alternatives includes the avoidance, minimization, or other mitigation of potential adverse effects on natural, cultural, and environmental resources. However, adverse impacts may not be completely avoided and/or mitigated.

Current and proposed noise impacts within and adjacent to the installation would continue and not be readily avoided or completely mitigated. Operations within ranges and training areas would continue to result in noise generation. Continued communication with the public would help address noise concerns but imposing rigid restrictions on large-caliber weapons, including night firing, would decrease the realism of training and therefore impede the mission of MCB Camp Lejeune.

4.5 RELATIONSHIP BETWEEN LOCAL SHORT-TERM USES OF THE ENVIRONMENT AND ENHANCEMENT OF LONG-TERM PRODUCTIVITY

The National Environmental Policy Act requires consideration of the relationship between short-term use of the environment and the impacts that such use could have on the maintenance and enhancement of long-term productivity of the impacted environment. The proposed action represents a continuing action with regard to the current uses and training within the MCB Camp Lejeune Range Complex. The proposed action would not have an impact on the maintenance and enhancement of long-term productivity.

4.6 IRREVERSIBLE AND IRRETRIEVABLE COMMITMENTS OF RESOURCES

The National Environmental Policy Act requires that environmental analysis include identification of "...any irreversible or irretrievable commitments of resources that would be involved if the proposed action is implemented." "Resources" (both renewable and nonrenewable) means the natural and cultural resources committed to, or lost by, the action, as well as labor, funds, and materials committed to the action.

Implementation of the proposed action would result in the commitment and expenditure of human labor that therefore could not be expended in the service of other projects. No construction is proposed; therefore, implementation of the proposed action would not result in an irreversible commitment of building materials, fuel for construction vehicles and equipment, and other resources. However, the proposed action would require an expenditure of federal funds, increased munitions expenditures, and fuels necessary for training equipment and vehicles, which represents irretrievable commitments of resources. These commitments of resources are neither unusual nor unexpected, given the nature of the proposed action.

The proposed action would not result in the destruction of environmental resources such that the range of potential uses of the environment would be limited, nor impact the biodiversity of the region.

4.7 AVOIDANCE AND MINIMIZATION MEASURES

There are no identified mitigation measures for the proposed action beyond the current Standard Operating Procedures, Best Management Practices, or actions already implemented as part of the *Integrated Natural Resources Management Plan*, *Standing Operating Procedures for Range Control* (Base Order P3570.1B), the *Environmental Handbook for Trainers*, or other Base Orders and programs as discussed under the No Action Alternative above. These ongoing measures include wildlife and habitat protection, erosion control, hazardous material and waste management, cultural resource inadvertent discovery procedures, and safety programs, among others. The *Integrated Natural Resources Management Plan* includes specifics regarding the schedule for implementation, funding, and monitoring of identified management actions for natural resources, including annual reviews and 5-year updates. Establishing separate monitoring or tracking through this EA is not warranted; rather, the *Integrated Natural Resources Management Plan* review and update process serves as the monitoring and tracking mechanism for the natural resources potentially impacted by the proposed action.

4.7.1 Land Use

No impacts were identified; therefore, no mitigation is required.

4.7.2 Coastal Zone Management

Coastal effects were identified in estuarine and ocean systems, ocean hazard areas, and natural and cultural resource areas. Coastal effects to shoreline erosion, shoreline access, and coastal water quality were also identified. However, continued implementation of the existing minimization measures detailed in this Subchapter would also minimize any potential coastal effects.

4.7.3 Environmental Justice

No impacts were identified; therefore, no mitigation is required.

4.7.4 Socioeconomics

No impacts were identified; therefore, no mitigation is required.

4.7.5 Air Quality

MCB Camp Lejeune operates under a current Title V permit. In addition, no air quality impacts were identified; therefore, no additional mitigation measures are required.

4.7.6 Noise

MCB Camp Lejeune generates noise from numerous activities. The proposed action involves increased munitions and an increase in helicopter sorties. The noise study prepared for this EA predicts slight increase in existing noise contours from increased munitions and slight increase in noise around the base due to increased aircraft sorties. However, the predicted noise would unlikely be perceptible and would not be significant. Therefore, no noise mitigation measures are

warranted in addition to the on-going base-wide noise mitigation measures described in Vibration (**Subchapter 3.1.4.4**).

4.7.7 Cultural Resources

Established protocols exist at the Installation that include coordination and input from training and range staff and cultural resource staff to avoid, minimize, or reduce impacts to cultural resources. MCB Camp Lejeune would consult with the North Carolina State Historic Preservation Office in accordance with 36 CFR 800 to avoid, minimize, or mitigate any adverse effects resulting from the proposed action. Mitigation Measures may include the following: mitigation through avoidance (by implementing guidance in Range Standing Operating Procedure); mitigation of adverse impacts through data recovery at the impacted site prior to the impact occurring (results in complete disturbance of the resource, rendering it unavailable for further study); and mitigation of adverse effects to some sites by the preservation of others (marking and protecting certain sites for future study).

4.7.8 Soils

While minor impacts to soils could occur as a result of the proposed action, ongoing land management efforts that include existing applicable erosion and sedimentation control techniques, as described for the No Action Alternative in Soils (**Subchapter 4.1.6.1**), would continue to mitigate environmental impacts to soils due to increased training. In order to minimize the environmental impacts to soils due to training, MCB Camp Lejeune would close selected areas to training use for restoration and recovery of eroded sites; use Best Management Practices for all training related activities; implement soil conservation restoration and maintenance projects; plant native warm season grasses where practical in restoring eroded site; and implement shoreline stabilization along the New River. No additional mitigation measures are required.

4.7.9 Underwater Sediments

As discussed under the No Action Alternative above, studies have indicated that offshore training operations would not cause a measurable effect on underwater sediment quality. Therefore, no mitigation measures are required.

4.7.10 Water Resources

MCB Camp Lejeune's operational ranges are being studied through ongoing Range Environmental Vulnerability Assessments. The Range Environmental Vulnerability Assessment process will be completed, at a minimum, every five years on all operational ranges at MCB Camp Lejeune. The main pathways that were identified under the Range Environmental Vulnerability Assessment to evaluate off-range migration include surface water and groundwater. Munitions constituents loading from current and historical use of munitions on the ranges was estimated.

Impacts to surface and groundwater quality under the proposed action are expected to be minimal. Therefore, no mitigation is required.

Wetlands may be affected by the increased munitions use and increased vehicle and foot traffic on training ranges. As is current procedure, to prevent sedimentation of wetlands and potential impacts to floodplains, where possible, when conducting military training activities, applicable erosion and sedimentation control techniques are employed, as explained under the No Action Alternative. No additional mitigation measures are required.

The potential for fuel spills is minimized through the application of fueling Standard Operating Procedures incorporating Best Management Practices for fuel transfers. MCB Camp Lejeune also has a Hazardous Waste and Hazardous Material Management Program (Base Order 5090.9) and a detailed Hazardous Waste Management Plan. No additional mitigation measures are required.

4.7.11 Terrestrial Biology

As discussed above under the No Action Alternative, MCB Camp Lejeune implements numerous measures to protect the unique habitats and wildlife and vegetative species that occur on Base. These measures are identified in the *Integrated Natural Resources Management Plan*, *Standing Operating Procedures for Range Control* (Base Order P3570.1B), and the *Environmental Handbook for Trainers*, among others. The Standard Operating Procedures already in place would apply to the proposed action and would be used to minimize impacts to vegetation, wildlife, and federally listed and sensitive species. No additional mitigation measures are required.

4.7.12 Marine Biology

As discussed above under the No Action Alternative, MCB Camp Lejeune implements numerous measures to protect marine species and habitats from the effects of training on water ranges. These measures are identified in the *Integrated Natural Resources Management Plan*, *Standing Operating Procedures for Range Control* (Base Order P3570.1B), and the *Environmental Handbook for Trainers*, among others. The Standard Operating Procedures already in place would apply to the proposed action and would be used to minimize impacts to marine biological resources. No additional mitigation measures are required.

4.7.13 Hazardous Materials and Hazardous Waste

Hazardous materials and wastes are managed and disposed of according to applicable federal and Marine Corps regulations, orders, programs, and procedures as detailed under the No Action Alternative above. Munitions would be used for their intended purpose on active ranges and would not meet the definition of solid waste under CFR §266.202. If the material is not a solid waste then it is not subject to Resource Conservation and Recovery Act, subtitle C regulation, and site cleanup would not be required until such time as the range became inactive and/or used for other purposes. No additional mitigation measures are required.

4.7.14 Public Health and Safety

As described under the No Action Alternative, Base Order P3570.1B, *Range and Training Regulations*, *Standing Operating Procedures for Range Control* provides regulations for the

MCB Camp Lejeune Range Complex. The Base Order establishes procedures for the safe use of weapons and weapons platforms. It also sets restrictions on the use of various types of ordnance and certain types of operations. In order to protect the public and military users, the procedures provide specific safety guidelines for each individual range and training facility within the MCB Camp Lejeune Range Complex. It also includes preventative measures to minimize the chance of bird/animal aircraft strikes. No additional mitigation measures are required.

4.7.15 Civil (Non-Military) Aircraft Operations

No mitigation measures are required because airspace activities, dimensions, and times of use are unchanged for any of the alternatives under consideration. Furthermore, when non-participating aircraft are unable to transit above the Restricted Airspace altitudes in use and unable to accept vectors around, range activity is either capped or a cease-fire is imposed to accommodate the aircraft on the airway. In addition, joint use protocols establish that airspace becomes available for access by non-participating aircraft during periods when the airspace is not needed for its designated purpose.

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5.0 CUMULATIVE IMPACTS

Cumulative impacts are defined by the Council on Environmental Quality in 40 CFR 1508.7 as:

Impacts on the environment which result from the incremental impact of the action when added to other past, present, and reasonably foreseeable future actions regardless of what agency (federal or non-federal) or person undertakes such other actions.

The Council on Environmental Quality regulations further require that National Environmental Protection Act environmental analyses address connected, cumulative, and similar actions in the same document (40 CFR 1508.25).

Additionally, the Council on Environmental Quality further explained in *Considering Cumulative Effects Under the National Environmental Policy Act* (Council on Environmental Quality 1997) that “each resource, ecosystem and human community must be analyzed in terms of its ability to accommodate additional effects, based on its own time and space parameters.” Therefore, cumulative effects analysis normally will encompass geographic boundaries beyond the immediate area of the proposed action, and a time frame, including past actions and foreseeable future actions, in order to capture these additional effects.

Focusing the cumulative effects analysis is a complex undertaking, appropriately limited by practical considerations. The level of detail required for cumulative effects analysis presented in this EA is appropriate and in context with the scope and magnitude of the proposed action and alternatives. The Council on Environmental Quality notes that “It is not practical to analyze how the cumulative effects of an action interact with the universe; the analysis of environmental effects must focus on the aggregate effects of past, present, and reasonably foreseeable future actions that are truly meaningful. The scope of the cumulative impact analysis is related to the magnitude of the environmental impacts of the proposed action. Proposed actions of limited scope typically do not require as comprehensive an assessment of cumulative impacts as proposed actions that have significant environmental impacts over a large area (Council on Environmental Quality 2005).” US Environmental Protection Agency guidance states that information should be presented commensurate with the impacts of the project, with a greater degree of detail for more potentially serious impacts (US Environmental Protection Agency 1999).

The geographic boundaries for analyses of cumulative impacts in this EA vary for different resources and environmental media. For example, for air quality, the potentially affected air quality region(s) is the appropriate boundary for assessment of cumulative impacts from releases of pollutants into the atmosphere. For wide-ranging or migratory wildlife, specifically marine mammals and sea turtles, any impacts from the proposed action or alternatives might combine with impacts from other sources within the range of the population. Therefore, identification and consideration of related impacts elsewhere in the range of a potentially affected population is

appropriate. For terrestrial biological resources, on the other hand, the boundary of MCB Camp Lejeune provides the appropriate geographical area for assessing cumulative impacts.

5.1 PAST AND PRESENT ACTIONS

Several past and present actions have the potential to impact the resources described in Chapter 3. An overview of past and present actions is provided in the following sections with a description of the activities that are relevant to the impact analysis in Chapter 4.

5.1.1 Past Actions

EA for Temporary Beddown of Proposed Increase in End Strength at MCB Camp Lejeune, North Carolina (MCB Camp Lejeune, June 2008): This EA evaluated the construction of certain temporary facilities needed to accommodate immediate increase in Marine Forces at MCB Camp Lejeune. The Marines would be accommodated in a combination of existing and newly constructed temporary facilities until the decision to construct permanent facilities for these Marines is made. The analysis concluded that the implementation of the proposed action would result in some minor adverse environmental impacts. The FONSI was signed June 6, 2008.

EA Proposed Military Operations Areas in Eastern North Carolina (Department of the Navy, June 2003): The proposed action created two functionally independent Military Operating Areas to enhance existing and future training opportunities for the Second Marine Aircraft Wing (2d MAW) and other aircraft operating out of MCAS Cherry Point. The analysis concluded that the impacts would not be significant. The Supplemental Study was signed January 29, 2008.

EA Marine Special Operations Command Complex, MCB Camp Lejeune, Onslow County, North Carolina (MCB Camp Lejeune, August 2007): This EA analyzed the impacts of the construction, operation, and maintenance of the Marine Special Operations Command Complex on roughly 220 ha (544 ac) in the Stone Bay Rifle Range part of the installation. Also addressed in this EA were the demolition of nine buildings and structures, the expansion of an existing tactical landing zone, and an influx of 875 active duty personnel to MCB Camp Lejeune. Lastly, the impacts from Special Operations Forces training within the complex were evaluated for breacher training, small arms live-fire training, and increased flight operations at Tactical Landing Zone Owl. Breacher training with demolitions munitions will be conducted at the breacher facility and urban trainer using 0.11 kilograms (0.25 pounds) or less of explosives per event, with roughly 1,300 annual breaching events. Small arms live-firing will be conducted indoors at the indoor small arms range, shoothouse, and urban trainer with approximately 1,350,000 rounds expended annually. The expanded tactical landing zone Owl will accommodate up to four aircraft at a time and an additional 290 flight operations per year for an annual total of 350. The analyses concluded that while some impacts were adverse, they were not significant. The FONSI was signed August 17, 2007.

EA Construction and Operation of Digital Airport Surveillance Radar in Eastern North Carolina (MCAS Cherry Point, February 2007): The objective of the radar is improved airspace management, air traffic control services, and safety in eastern North Carolina. The Digital Airport Surveillance Radar system provides continuous and complete radar surveillance

coverage in eastern North Carolina for air traffic control services. The analysis concluded that the impacts would not be significant. The FONSI was jointly signed April 25, 2007 and May 3, 2007.

EA Chaff and Flare Training, MCB Camp Lejeune, Onslow County, North Carolina (MCB Camp Lejeune, December 2006): This EA assessed the impacts of chaff and flare training from helicopters, tilt-rotary, and fixed-wing aircraft at the G-10, K-2, N-1/BT-3, and Greater Sandy Run Area SR-10 areas of MCB Camp Lejeune. Chaff and flare training is part of the training provided to aircrews on electronic warfare and defensive measures. The conclusion of this analysis indicated that the impacts from this training were not significant. The FONSI was signed December 5, 2006.

EA for Construction and Operation of a Multi-Purpose Machine Gun Range in the Greater Sandy Run Area at MCB Camp Lejeune, North Carolina (MCB Camp Lejeune, January 2006): This EA analyzed impacts from the construction and operation of a multi-purpose machine gun range on a 121 ha (300 ac) site within the Greater Sandy Run Area of the installation. The range has 10 firing lanes on a raised berm, 4 fighting holes, 2 vehicle-firing lanes, 2 defilade-firing positions, and a battle sight zero range to accommodate marksmanship training with M249, M240G, M2 50 caliber and Mk19 machine guns, and M40A3 and M82A3 sniper rifles. The range will be operational an average of 144 days per year with roughly one-third of the operations taking place during night. Helicopters will be authorized to conduct door gunnery exercises from below 152 m (500 ft) above ground with inert rounds. The range includes: maneuver and training areas, battle site zero area, bivouac area, vehicle holding area, target emplacements and various supporting facilities. The conclusion of the analyses showed that there would be some adverse impacts, which would not be significant. The FONSI was signed January 27, 2006.

EA for D-30 Range, MCB Camp Lejeune, North Carolina (MCB Camp Lejeune, November 2005): This EA assessed the impacts of the proposed relocation and upgrade of the existing small arms range in the Hadnot Point area of the installation. The new range will have 42 firing lanes to accommodate 9 mm and 45 caliber pistol qualification training and 5.56 mm rifle battle site zero calibration training. Upgrades include a semi-enclosed impact area downrange with a bullet trap to capture spent rounds and an air filter system to remove lead dust from the impact area downrange from shooters. The analyses concluded that the relocation and upgrades will not result in any significant impacts on the environment. The FONSI was signed March 8, 2006.

EA Military Operations in Urban Terrain Training Complex Enhancements, MCB Camp Lejeune, Onslow County, North Carolina (MCB Camp Lejeune, September 2005): This EA assessed the impacts of upgrading and enhancing the existing military operations in urban terrain training complex with facilities and infrastructure. Also addressed in this EA were the impacts from munitions firing such as: small arms live-fire in indoor shoothouses, sniper live-fire, grenade training, and demolition munitions training. Demolitions munitions training will use 0.11 kilograms (0.25 pounds) or less of explosives per event, with 26 additional annual breaching events for a total of approximately 80 annual breaching events per year. Lastly, the

impacts from training were assessed for the movement of high mobility multipurpose wheeled vehicles and other mechanized vehicles throughout the complex and roughly 50 annual helicopter operations. The analyses concluded that while some impacts were adverse, they were not significant. The FONSI was signed September 22, 2005.

EA for Steel-Cutting Pit, MCB Camp Lejeune, Onslow County, North Carolina, (MCB Camp Lejeune, September 2005): This EA evaluated the impacts from relocating a steel-cutting pit to the HA area of the installation to reduce noise impacts from explosive munitions training on the local community. Construction of the new steel-cutting pit consisted of building a 10,000 m² (107,584 ft²) partially enclosed pit surrounded by a 9 m (30 ft) wide and 5 m (16 ft) tall earthen berm. A 60 person bunker was built for use by training personnel during live-fire operations. Training at the pit will accommodate the use of explosives to destroy, breach, and create obstacles. Specifically, demolition training involves the use of explosive charges of various sizes and power to selectively take apart or disable large metal items such as vehicles, tanks, and steel beams. This training typically takes place over several days and will occur up to 80 times annually, using explosives charges no more than 50 pounds in weight. This project resulted in improvements in off-Base noise conditions. Other minimal adverse impacts were not considered significant. The FONSI was signed September 22, 2005.

EA K-2 Ranges, MCB Camp Lejeune, Onslow County, North Carolina (MCB Camp Lejeune, March 2005): This EA evaluated the impacts of consolidating the existing 23 K-2 ranges, developing 12 realigned ranges, and constructing support facilities and infrastructure. Existing ranges were and continue to be inactivated, cleared of unexploded ordnance, and realigned. Selected ranges are being equipped with automated targetry systems. The realigned K-2 ranges will accommodate a ten percent increase in training with small arms, anti-armor systems, grenades, and artillery. This project is resulting in the beneficial effect of a reduction in the surface danger zone that currently is positioned over the New River. The analyses concluded that the range consolidation and realignment along with new facilities and infrastructure will not result in any significant impacts on the environment. The FONSI was signed March 23, 2005.

Environmental Impact Statement, Bogue Inlet Channel Erosion Response Project, Carteret and Onslow Counties, North Carolina (US Army Corps of Engineers, March 2004): This environmental impact statement analyzed the impacts from an erosion response project, which relocated the main ebb channel in Bogue Inlet approximately 1,085 m (3,559 ft) west, to a more central location between the west end of Bogue Banks and the east end of Bear Island. The Record of Decision was signed September 15, 2004.

EA for Testing of the Expeditionary Fighting Vehicle Prototypes at MCB Camp Lejeune, North Carolina (MCB Camp Lejeune, June 2004): This EA addressed impacts from testing of 1 to 14 expeditionary fighting vehicle prototypes from July 2004 through December 2008. The expeditionary fighting vehicle is designed to replace the amphibious assault vehicle. The expeditionary fighting vehicle tests were conducted on Onslow Beach; land ranges and training areas; New River; Atlantic Intracoastal Waterway; and Onslow Bay, Atlantic Ocean. The

analyses concluded that the testing will have a negligible impact that will not constitute a significant impact on the human or natural environment. The FONSI was signed July 13, 2004.

EA for Stone Bay Urban Training Complex at MCB Camp Lejeune, Onslow County, North Carolina (MCB Camp Lejeune, May 2004): This EA analyzed the impacts of upgrading the existing facility with the construction of several new training structures and adding live-fire to the training program. The training addressed in this EA included small arms firing and breaching for certification in the Special Operations Capable training program at various existing training facilities and new facilities such as, urban assault building, breacher facility, and mobile aircraft trainers. Breacher training with demolitions munitions will be conducted at the breacher pit using up to 5 pound charges or less of explosives per event, with roughly 100 annual breaching events. The breaching training analysis concluded that while some impacts were adverse, they were not significant. The FONSI was signed June 25, 2004.

EA for US Joint Maritime Complex at MCB Camp Lejeune, North Carolina (MCB Camp Lejeune, January 2004): This EA evaluated the impacts of establishing a US Joint Maritime Complex at MCB Camp Lejeune that would provide maritime special missions training for US Marine Corps, US Coast Guard, and Navy personnel and the construction of facilities to support the training. The training addressed in the EA included small arms firing to land targets from boats on water ranges and boat operations on New River, Atlantic Intracoastal Waterway, Pamlico Sound, and Onslow Bay, Atlantic Ocean. The conclusion of this analysis indicated that the impacts from this facility construction and training were not significant. The FONSI was signed March 31, 2004.

EA for the East Coast Introduction of the Assault Breacher Vehicle MCB Camp Lejeune, Onslow County, North Carolina (MCB Camp Lejeune, October 2003): This EA analyzed impacts from the basing of the assault breacher vehicle at MCB Camp Lejeune, and influx of 30 personnel, and conducting assault breacher vehicle training exercises at MCB Camp Lejeune, expanding an existing training area, and constructing and upgrading storage and maintenance facilities to accommodate the vehicles. Training activities addressed in the EA included: munitions firing from assault breacher vehicles with 0.50 caliber machine guns at SR-7 and SR-10 (in the Greater Sandy Run Area) and G-3 infantry weapons range, assault breacher vehicles driving on existing tank trails, plowing 4.6 m (15 ft) breach lanes, obstacle breaching, and firing inert linear demolition charges at Engineer Training Area-2. No activities assessed in the EA were determined to have significant impacts on any of the resource areas. The FONSI was signed November 6, 2003.

Environmental Impact Statement: Introduction of F/A-18 E/F Super Hornets to the East Coast of the US (Department of the Navy, July 2003): This Environmental Impact Statement analyzed the impacts of homebasing ten Super Hornet Squadrons and one Super Hornet Fleet Replacement Squadron at several combinations of East Coast Navy and Marine Corps air stations along with the impact to nearby training areas (Bombing Target 9, Bombing Target 11, Dare County Range, and Townsend Bombing Range). The analysis considered the amount of ordnance typically used at each range. The Environmental Impact Statement concluded that there would not be an

increase in the amount of ordnance expended at any of the ranges and that there would not be a significant impact to resources at these ranges. The Record of Decision was signed September 4, 2003.

EA Routine Shore Fire Control Party Training EA, MCB Camp Lejeune, Onslow County, North Carolina (MCB Camp Lejeune, July 2002): This EA analyzed the impacts of conducting Routine Shore Fire Control Party training at MCB Camp Lejeune. Training activities analyzed in the EA included Navy ships firing 5-inch explosive gun rounds from MK-45 lightweight guns into the G-10 Impact area at MCB Camp Lejeune approximately 30 times per year. The analyses concluded that this training will not significantly impact the quality of the environment. The FONSI was signed July 31, 2002.

Environmental Impact Statement, Introduction of the V-22 to the Second Marine Aircraft Wing (Department of the Navy, October 1999): This environmental impact statement analyzed the impacts of introducing the MV-22, a new type of tiltrotor aircraft, to the Second Marine Aircraft Wing. The analysis also considered the impacts of aircraft training and readiness operations at existing outlying landing fields, targets, military training routes, and within special use airspace in eastern North Carolina. The environmental impact statement concluded that none of the impacts of basing the MV-22 at MCAS New River were considered to be significant. The Record of Decision was signed December 22, 1999.

EA Waterborne Refueling Training Operations on New River, Onslow County, North Carolina (MCB Camp Lejeune, April 1999): This EA addressed the impacts of conducting waterborne refueling training on New River at different positions between Ragged Point and Grey Point. Training activities include small craft refueling with unleaded gasoline or diesel from a tactical bulk refueling system loaded onto a floating platform or vessel approximately 14 times annually. The analyses concluded that waterborne refueling training operations will not significantly impact the environment. The FONSI was signed June 15, 1999.

EA P-028 Infantry Platoon Battle Course, US MCB Camp Lejeune, North Carolina (MCB Camp Lejeune, September 1996): This EA evaluated the impacts of constructing, maintaining, and operating an infantry platoon battle course range and support facilities. Training activities addressed in this EA included: small arms and heavy machine gun firing, live-fire maneuver training, and helicopter training exercises in two helicopter landing zones. The analyses concluded that while some impacts were adverse, they were not significant. The FONSI was signed September 25, 1996.

EA for P-933, Multi-Purpose Range Complex US MCB Camp Lejeune, North Carolina (MCB Camp Lejeune, August 1995): This EA evaluated the impacts of constructing and operating a series of ranges and support facilities on a 400 ha (988 ac) site (SR-10) in the Greater Sandy Run Area that would provide simultaneous, combined tank, light armored vehicle, dismounted infantry, and attack helicopter training. This range complex will include four tank maneuver trails and stationary and moving targets. Only non-explosive steel or copper-jacketed ordnance will be fired. The analyses concluded that the construction and operation of this multi-purpose

range will not significantly affect the quality of the environment. The FONSI was signed December 1, 1995.

EA for MCON P-949, Multipurpose Training Range, MCB Camp Lejeune, North Carolina (MCB Camp Lejeune, May 1994): This EA assessed the impacts of constructing and operating a multipurpose training range for tank crew maneuver and live-fire training within a 300 ha (740 ac) site in the Greater Sandy Run Area. This range will include two tank maneuver trails with stationary and automated moving targets, along with various support facilities. Only non-explosive steel or copper-jacketed ordnance will be fired. The analyses concluded that the construction and operation of a multipurpose training range will have only minor impacts and will not significantly impact the environment. The FONSI was signed August 12, 1994.

5.1.2 Present Actions

EA MCAS Cherry Point Range Operations, Craven, Carteret, and Pamlico Counties, North Carolina: The Marine Corps is preparing an EA to evaluate the potential environmental consequences from current and emerging training operations at the MCAS Cherry Point Range Complex.

EA for Engineer in Training Complex and G-10 Range Realignment, Marine Corps Base Camp Lejeune, North Carolina. The Marine Corps is preparing an EA for the proposed relocation of certain ranges and consolidation of several training functions into new training areas. The goals of this realignment are to reduce land use constraints created by existing surface danger zones, reduce off base noise impacts, and provide the base with ranges that facilitate realistic, combat-oriented training with all the facilities needed to support live fire training.

EA Construction and Operation of an Infantry Platoon Battle Course, Greater Sandy Run Area, MCB Camp Lejeune, North Carolina: The Marine Corps is preparing an EA for the proposed construction and operation of an Infantry Platoon Battle Course in the Greater Sandy Run Area of MCB Camp Lejeune. The EA will address construction and operation of a single range, with range support facilities that would accommodate training standards and objectives for all direct fire weapons used by infantry battalions. This training includes simultaneous firing and maneuver activities and rotary-wing aircraft operation.

Environmental Impact Statement US Marine Corps Grow the Force Initiative at MCB Camp Lejeune, MCAS New River, and MCAS Cherry Point, North Carolina: The Marine Corps is preparing an Environmental Impact Statement to evaluate the permanent assignment of approximately 9,900 additional Marines and support service personnel at the three installations. New facility construction, renovation and use of existing facilities, or a combination of both new and existing facilities will be looked at to allow the increase in numbers (from approximately 180,00 to 202,000 by 2011). These changes are needed to provide adequate time for troops to recover between deployments, train to meet combat readiness, and prepare for redeployment.

EA Wallace Creek Regimental Area, MCB Camp Lejeune, North Carolina: An EA is being prepared for a four battalion regimental complex in the Wallace Creek area of the Base. The

proposed facilities and infrastructure are designed to meet the operational and training requirements of two new infantry battalions, a new Regimental Headquarters element, and two existing infantry battalions already stationed at MCB Camp Lejeune.

EA Testing of the Expeditionary Fighting Vehicle Prototypes, MCB Camp Lejeune, North Carolina: An EA for the Expeditionary Fighting Vehicle is currently being prepared that will analyze the environmental consequences of performing testing and engineering assessments/evaluations on one to four prototype Expeditionary Fighting Vehicles at MCB Camp Lejeune. The testing of the Expeditionary Fighting Vehicle prototypes would be conducted during six, 8-week periods from September 2008 through December 2014.

Environmental Impact Statement/Overseas Environmental Impact Statement Navy Cherry Point Range Complex: The Navy is preparing an Environmental Impact Statement/Overseas Environmental Impact Statement to assess the potential impacts over a 10-year planning horizon associated with Navy Atlantic Fleet training, research, development, testing, and evaluation activities, and associated range capabilities enhancements (including infrastructure improvements) in the Navy Cherry Point Range Complex. The Navy Cherry Point Range Complex includes targets and instrumented areas, air, sea, and undersea space in the Navy Cherry Point Operating Area and Warning Areas.

Environmental Impact Statement/ Overseas Environmental Impact Statement Navy Undersea Warfare Training Range: The Navy is preparing an Environmental Impact Statement/Overseas Environmental Impact Statement to analyze the potential impacts of installing and operating an undersea warfare training range along the east coast. The proposed action includes training that involves the use of active sonar at the undersea warfare training range. Several sites along the east coast are under consideration for the undersea warfare training range, including a site within the Navy Cherry Point Range Complex Operating Area.

Environmental Impact Statement, US Army Corps of Engineers, North Topsail Beach Shoreline Protection Project, Onslow County, North Carolina: The Army Corps of Engineers is preparing an Environmental Impact Statement to address shoreline erosion due to storm damage. Congress directed that a review of the 1992 report to create hurricane protection and beach erosion control for approximately 3.6 miles of oceanfront at Topsail Beach be reviewed to determine the advisability of modifying its recommendation with regard to shore protection for Surf City and North Topsail Beach.

Environmental Impact Statement, US Army Corps of Engineers, West Onslow Beach and New River Inlet (Topsail Beach) Shore Protection Project, Pender and Onslow Counties, North Carolina: The Army Corps of Engineers is preparing an Environmental Impact Statement to address shoreline erosion, high vulnerability to storm overwash, due to storm damage. In 1992, a Federal Shore Protection Project was authorized, but the project did not take place. The authorized project is now being reevaluated with regard to protection of Topsail Beach.

5.2 POTENTIAL CUMULATIVE IMPACTS BY ENVIRONMENTAL RESOURCE AREA

As outlined in previous chapters, the proposed action would not make radical changes to MCB Camp Lejeune ongoing operations and training functions. Rather, the actions proposed are incremental increases that would result in relatively small-scale, but critical, enhancements necessary for the Marine Corps to maintain a requisite state of military readiness to meet its national defense mission.

The cumulative impacts discussion is presented by resource area. Within each resource area, potential cumulative impacts are discussed as they relate to land ranges, water ranges, and special use airspace, as appropriate. **Table 5.2-1** indicates the geographic area relevant to each cumulative impact analysis. **Table 5.2-2** indicates the past and present actions that have the potential to impact the resources described in Chapter 3 of this document.

Table 5.2-1
Geographic Areas for Cumulative Impacts Analysis

| Resource | Areas for Impacts Analysis |
|--|---|
| Land Use | MCB Camp Lejeune; Onslow and Jones Counties |
| Coastal Zone Management | MCB Camp Lejeune and Onslow County |
| Environmental Justice | MCB Camp Lejeune Range Complex and neighboring communities |
| Socioeconomics | Commercial & Recreational Fishing: New River, Atlantic Intracoastal Waterway, Onslow Bay, and the Atlantic Ocean Recreational Activities: New River, Atlantic Intracoastal Waterway, Onslow Bay, Atlantic Ocean, and area beaches |
| Air Quality | Southern Coastal Plain Intrastate Air Quality Control Region (13 counties) |
| Noise | MCB Camp Lejeune Range Complex and neighboring communities |
| Cultural Resources | MCB Camp Lejeune Range Complex and adjacent waters |
| Natural Resources | <u>Soils</u> : MCB Camp Lejeune Range Complex <u>Underwater Sediments</u> : Soils underlying water ranges and danger zones <u>Water</u> : MCB Camp Lejeune Range Complex surface and groundwater, and wetlands and floodplains <u>Terrestrial Biology</u> : MCB Camp Lejeune Range Complex <u>Marine Biology</u> : Waters adjacent to MCB Camp Lejeune and migratory range of a potentially affected species population |
| Hazardous Materials and Hazardous Waste Management | MCB Camp Lejeune Range Complex and adjacent waters |
| Public Health and Safety | MCB Camp Lejeune Range Complex, neighboring communities, lands lying under special use airspace associated with MCB Camp Lejeune, and adjacent waters |
| Civil (Non-Military) Aircraft Operations | Eastern North Carolina |

Table 5.2-2
Past and Present Actions with Potential to Impact Resources

| Past and Present Actions | Land Use | Coastal Zone Management | Environmental Justice | Socioeconomics | Air Quality | Noise | Cultural Resources | Natural Resources | Hazardous Materials & Waste Management | Public Health and Safety | Civil Aircraft Operations |
|--|----------|-------------------------|-----------------------|----------------|-------------|-------|--------------------|-------------------|--|--------------------------|---------------------------|
| EA for Temporary Beddown of Proposed Increase in End Strength at MCB Camp Lejeune, NC | | | | | ✓ | ✓ | | ✓ | ✓ | | |
| EA for Proposed Military Operations Areas in Eastern NC | | ✓ | | ✓ | ✓ | ✓ | ✓ | | | ✓ | ✓ |
| EA for Marine Special Operations Command Complex, MCB Camp Lejeune, NC | | ✓ | | | ✓ | ✓ | ✓ | ✓ | ✓ | | ✓ |
| EA for Construction and Operation of Digital Airport Surveillance Radar in Eastern NC | | | | | | | | | | | ✓ |
| EA for Chaff and Flare Training, MCB Camp Lejeune, NC | | ✓ | | ✓ | ✓ | ✓ | | ✓ | ✓ | ✓ | ✓ |
| EA for Construction and Operation of a Multi-Purpose Machine Gun Range, Greater Sandy Run Area, MCB Camp Lejeune, NC | | | | | ✓ | ✓ | | ✓ | ✓ | | ✓ |
| EA for D-30 Range, MCB Camp Lejeune, NC | | ✓ | | | ✓ | ✓ | | ✓ | | ✓ | |
| EA for Military Operations in Urban Terrain Training Complex Enhancements, MCB Camp Lejeune, NC | | ✓ | | | ✓ | ✓ | | ✓ | ✓ | | |
| EA for Steel-Cutting Pit, MCB Camp Lejeune, NC | | ✓ | | | ✓ | ✓ | | ✓ | ✓ | | |
| EA for K-2 Ranges, MCB Camp Lejeune, NC | | ✓ | | | ✓ | ✓ | | ✓ | ✓ | ✓ | |
| EIS, Bogue Inlet Channel Erosion Response Project, Carteret and Onslow Counties, NC | | ✓ | | ✓ | | | | ✓ | | | |
| EA for Testing of the Expeditionary Fighting Vehicle Prototypes, MCB Camp Lejeune, NC | | | | | ✓ | ✓ | | ✓ | | | |
| EA for Stone Bay Urban Training Complex at MCB Camp Lejeune, NC | | | | | ✓ | ✓ | | ✓ | ✓ | ✓ | |
| EA for US Joint Maritime Complex at MCB Camp Lejeune, NC | | ✓ | | ✓ | ✓ | ✓ | | ✓ | ✓ | | |
| EA for the East Coast Introduction of the Assault Breacher Vehicle MCB Camp Lejeune, NC | | | | | ✓ | ✓ | | ✓ | ✓ | ✓ | |
| EIS, Introduction of F/A-18 E/F Super Hornets to the East Coast of the US | | | | | ✓ | | | | | | ✓ |
| EA for Routine Shore Fire Control Party Training, MCB Camp Lejeune, NC | | ✓ | | ✓ | ✓ | ✓ | | ✓ | ✓ | ✓ | |
| EIS, Introduction of the V-22 to the Second Marine Aircraft Wing | | ✓ | | | ✓ | ✓ | | ✓ | ✓ | | ✓ |
| EA for Waterborne Refueling Training Operations on New River, NC | | ✓ | | | ✓ | | | ✓ | ✓ | | |
| EA for P-028 Infantry Platoon Battle Course, US MCB Camp Lejeune, NC | | ✓ | | | ✓ | ✓ | | ✓ | | ✓ | ✓ |

| Past and Present Actions | Land Use | Coastal Zone Management | Environmental Justice | Socioeconomics | Air Quality | Noise | Cultural Resources | Natural Resources | Hazardous Materials & Waste Management | Public Health and Safety | Civil Aircraft Operations |
|--|----------|-------------------------|-----------------------|----------------|-------------|-------|--------------------|-------------------|--|--------------------------|---------------------------|
| EA for P-933, Multi-Purpose Range Complex, MCB Camp Lejeune, NC | | ✓ | | | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ |
| EA for MCON P-949, Multipurpose Training Range, MCB Camp Lejeune, NC | | | | | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ |
| EA for MCAS Cherry Point Range Operations, Craven, Carteret, and Pamlico Counties, NC | | ✓ | | ✓ | ✓ | ✓ | | ✓ | ✓ | ✓ | ✓ |
| EA for Engineer Training Complex and G-10 Range Realignment, MCB Camp Lejeune, NC | | ✓ | | | ✓ | ✓ | | ✓ | | | |
| EA for Construction and Operation of an Infantry Platoon Battle Course, Greater Sandy Run Area, MCB Camp Lejeune, NC | | ✓ | | | ✓ | ✓ | | ✓ | ✓ | ✓ | |
| EIS, US Marine Corps Grow the Force Initiative at MCB Camp Lejeune, MCAS New River, and MCAS Cherry Point, NC | | ✓ | | | ✓ | ✓ | | ✓ | ✓ | | |
| EA for Wallace Creek Regimental Area, MCB Camp Lejeune, NC | | ✓ | | | ✓ | ✓ | | ✓ | ✓ | | |
| EA for Testing of the Expeditionary Fighting Vehicle Prototypes, MCB Camp Lejeune, NC | | ✓ | | ✓ | ✓ | ✓ | | ✓ | | | |
| EIS/OEIS, Navy Cherry Point Range Complex | | ✓ | | ✓ | ✓ | ✓ | | ✓ | ✓ | ✓ | ✓ |
| EIS/OEIS, Navy Undersea Warfare Training Range | | ✓ | | ✓ | | ✓ | | ✓ | | | |
| EIS, US Army Corps of Engineers, North Topsail Beach Shoreline Protection Project, NC | | ✓ | | ✓ | ✓ | ✓ | | ✓ | ✓ | | |
| EIS, US Army Corps of Engineers, West Onslow Beach and New River Inlet (Topsail Beach) Shore Protection Project, NC | | ✓ | | ✓ | ✓ | ✓ | | ✓ | ✓ | | |

5.2.1 Land Use

No Action Alternative. Training and bombing range use would remain within the existing range complex and at the existing levels as today. There would be no land use impacts. The No Action Alternative, in conjunction with past, present, or reasonably foreseeable projects, would not result in adverse cumulative impacts to land use.

Proposed Action. Existing land use within the area of impact analysis would not be changed by the increase in sorties and munitions use involved in the proposed action. Land use patterns and designations on MCB Camp Lejeune would remain unchanged. The proposed action would be confined to training ranges and would not affect land use outside the MCB Camp Lejeune Range Complex. There would be no land use impacts. Other projects located on MCB Camp Lejeune would also be subject to the current land use policies. In conjunction with past, present, or

reasonably foreseeable future actions, the proposed action would not be expected to result in an adverse cumulative impact to land use.

5.2.2 Coastal Zone Management

No Action Alternative. Based on an assessment of the North Carolina Coastal Area Management Act and the coastal zone management policies of the Onslow County Land Use Plan, it was determined that MCB Camp Lejeune's current training operations conducted within the military enclave, designated water restricted and danger zones, and special use airspace are consistent to the greatest extent practicable with the relevant enforceable policies of North Carolina's Coastal Management Program.

Other past and present projects that, in conjunction with the No Action Alternative, have the potential to result in cumulative coastal zone impacts include:

- EA Proposed Military Operations Areas in Eastern North Carolina
- EA Marine Special Operations Command Complex, MCB Camp Lejeune, Onslow County, North Carolina
- EA Chaff and Flare Training, MCB Camp Lejeune, Onslow County, North Carolina
- EA for D-30 Range, MCB Camp Lejeune, North Carolina
- EA Military Operations in Urban Terrain Training Complex Enhancements, MCB Camp Lejeune, Onslow County, North Carolina
- EA for Steel-Cutting Pit, MCB Camp Lejeune, Onslow County, North Carolina
- EA K-2 Ranges, MCB Camp Lejeune, Onslow County, North Carolina
- Environmental Impact Statement, Bogue Inlet Channel Erosion Response Project, Carteret and Onslow Counties, North Carolina
- EA for US Joint Maritime Complex at MCB Camp Lejeune, North Carolina
- EA Routine Shore Fire Control Party Training EA, MCB Camp Lejeune, Onslow County, North Carolina
- Environmental Impact Statement, Introduction of the V-22 to the Second Marine Aircraft Wing
- EA Waterborne Refueling Training Operations on New River, Onslow County, North Carolina
- EA P-028 Infantry Platoon Battle Course, US MCB Camp Lejeune, North Carolina
- Final EA for P-933, Multi-Purpose Range Complex US MCB Camp Lejeune, North Carolina
- EA MCAS Cherry Point Range Operations, Craven, Carteret, and Pamlico Counties, North Carolina
- EA for Engineer in Training Complex and G-10 Range Realignment, Marine Corps Base Camp Lejeune, North Carolina
- EA Construction and Operation of an Infantry Platoon Battle Course, Greater Sandy Run Area, MCB Camp Lejeune, North Carolina
- Environmental Impact Statement US Marine Corps Grow the Force Initiative at MCB Camp Lejeune, MCAS New River, and MCAS Cherry Point, North Carolina
- EA Wallace Creek Regimental Area, MCB Camp Lejeune, North Carolina

- EA Testing of the Expeditionary Fighting Vehicle Prototypes, MCB Camp Lejeune, North Carolina
- Environmental Impact Statement/Overseas Environmental Impact Statement Navy Cherry Point Range Complex
- Environmental Impact Statement/Overseas Environmental Impact Statement Navy Undersea Warfare Training Range
- Environmental Impact Statement, US Army Corps of Engineers, North Topsail Beach Shoreline Protection Project, Onslow County, North Carolina
- Environmental Impact Statement, US Army Corps of Engineers, West Onslow Beach and New River Inlet (Topsail Beach) Shore Protection Project, Pender and Onslow Counties, North Carolina
- EA MCAS Cherry Point Range Operations, Craven, Carteret, and Pamlico Counties, North Carolina
- Environmental Impact Statement US Marine Corps Grow the Force Initiative at MCB Camp Lejeune, MCAS New River, and MCAS Cherry Point, North Carolina
- EA Wallace Creek Regimental Area, MCB Camp Lejeune, North Carolina
- Environmental Impact Statement/Overseas Environmental Impact Statement Navy Undersea Warfare Training Range

Each of these projects has been found to be consistent to the maximum extent practicable with the relevant enforceable policies of North Carolina's Coastal Management Program. Therefore, the No Action Alternative, in conjunction with past, present, or reasonably foreseeable future actions, would not be expected to result in adverse cumulative effects to the coastal zone that would be inconsistent with the relevant enforceable policies of the North Carolina Coastal Management Program.

Proposed Action. This alternative involves increased use of ranges, but does not entail major construction activities on the ranges involved in the proposed increased levels of training. Only existing ranges would be used, and the ranges would be used for weapons and within the capabilities for which they were designed. MCB Camp Lejeune is in compliance with the Coastal Zone Management Act directive which states that federal agency activities within or outside the coastal zone that may affect the coastal zone shall comply to the maximum extent practicable with relevant enforceable policies of North Carolina's Coastal Management Plan.

Other past and present projects that, in conjunction with the proposed action, have the potential to result in cumulative coastal zone impacts are the same as listed above for the No Action Alternative. Each of these projects has been found to be consistent to the maximum extent practicable with the relevant enforceable policies of North Carolina's Coastal Management Program. Therefore, the proposed action, in conjunction with past, present, or reasonably foreseeable future actions, would not be expected to result in adverse cumulative effects to the coastal zone that would be inconsistent with the relevant enforceable policies of the North Carolina Coastal Management Program.

5.2.3 Environmental Justice

No Action Alternative. The training operations currently conducted impose no disproportionate adverse environmental, economic, or health impacts specific to any groups or individuals within the area of impact analysis, including minorities, low-income populations, or children. Previous projects are identified in **Table 5.2-2** and were reviewed to determine if they had environmental justice impacts. These projects did not have impacts associated with environmental justice. Future projects located on MCB Camp Lejeune would also be subject to Executive Orders 12898 and 13045, which would ensure minorities, low-income populations, and children are not disproportionately affected. Therefore, the No Action Alternative, in conjunction with past, present, or reasonably foreseeable future actions, would not contribute to adverse cumulative impacts in the area of environmental justice.

Proposed Action. The proposed action would not impact minorities, low-income populations, or children. The increase in current training operations would not disproportionately affect minorities, low-income populations, or children. As outlined in the No Action Alternative, previous projects associated with MCB Camp Lejeune had no impacts associated with environmental justice. Future projects located on MCB Camp Lejeune would also be subject to Executive Orders 12898 and 13045, which would ensure that minorities, low-income populations, and children are not disproportionately affected. Therefore, the proposed action, in conjunction with past, present, or reasonably foreseeable future actions, would not contribute to adverse cumulative impacts in the area of environmental justice.

5.2.4 Socioeconomics

No Action Alternative. There would be no changes to commercial and recreational fishing or recreational activities under the No Action Alternative. Due to safety concerns, commercial and recreational fishing and recreational activities are directed away from water ranges during training operations, resulting in temporary impacts to fishing and recreational activities. The prohibited area removes inshore waters between Brown's and Bear Inlets and offshore waters in Onslow Bay from public access, which impacts commercial and recreational fishing and recreational activities under the No Action Alternative.

Other past and present projects that, in conjunction with the No Action Alternative, have the potential to result in cumulative impacts to commercial and recreational fishing or recreational activities include the following.

- *EA Proposed Military Operations Areas in Eastern North Carolina.* In this EA, a primary issue regarding potential indirect impacts to socioeconomic resources was the noise that would be generated by use of the proposed Military Operating Areas and how it would affect tourism earnings. The EA analysis determined that the proposed noise values would be less than 50 dB, representing little change from ambient noise conditions. Given the timing and type of use of the Military Operating Areas and the sound of the ocean surf along Cape Lookout National Seashore, noise impacts on recreational activities would be minor.

- *EA Chaff and Flare Training, MCB Camp Lejeune, Onslow County, North Carolina.* The analysis completed in this EA determined that no adverse impacts to biological resources, including fisheries, would be expected from the use of chaff and flare training.
- *Environmental Impact Statement, Bogue Inlet Channel Erosion Response Project, Carteret and Onslow Counties, North Carolina.* This Environmental Impact Statement determined that the project would have long-term benefits to recreation. Any negative impacts to commercial and recreational fishing and recreational activities would be minor and short-term.
- *EA for US Joint Maritime Complex at MCB Camp Lejeune, North Carolina.* This EA determined that the proposed maritime special missions training would have minimal impact to commercial fisheries that would not be significant for several reasons: 1) Proposed training on the water, when added to existing training, would result in a total of approximately three training exercises on the water per day, a minor increase from the average of slightly less than three riverine and maritime training exercises that are currently being conducted. 2) Proposed training would take place primarily on the New River and would be spread out among the different bays and sectors of the river. The Atlantic Intracoastal Waterway, Pamlico Sound, and Onslow Bay in the Atlantic Ocean would be used to a lesser extent. 3) Four of the ten proposed training courses would involve live fire discharged from boats positioned within the BT-3 Impact Area and BT-9 Bombing Target. Subsequent closures of portions of the Atlantic Intracoastal Waterway and Onslow Bay would be a very small percentage of the time in which the Atlantic Intracoastal Waterway is open to boat traffic. 4) The New River would remain open during the proposed training operations. 5) Commercial fishing vessels are currently excluded from BT-9. 6) Shellfishing in Courthouse Bay would be unaffected by the proposed action. It is possible that the public's enjoyment of waters near MCB Camp Lejeune could be slightly diminished due to the increase in military boat traffic, but this impact lacks significance for the following reasons: 1) The New River would remain open during proposed training, and military use of waters around the BT-9 in Pamlico Sound would remain the same as it is today. 2) Recreational fishing and boating would continue to be prohibited in the BT-9 surface danger zone. 3) Recreational boats may be inconvenienced by the temporary closures of the Atlantic Intracoastal Waterway for live-fire training exercises, but the Atlantic Intracoastal Waterway would be closed only on even hours and open odd hours during training operations in accordance with existing procedures for closure. Although slightly impacted by some scheduling constraints, recreational fishing (landings and effort) and recreational boating are expected to remain at the same level of activity.
- *EA Routine Shore Fire Control Party Training EA, MCB Camp Lejeune, Onslow County, North Carolina.* This EA determined that there would be a minor disruption to boat traffic on the Atlantic Intracoastal Waterway due to intermittent closures (an additional 90 hours per years which is about one percent of all available hours on an annual basis).
- *EA MCAS Cherry Point Range Operations, Craven, Carteret, and Pamlico Counties, North Carolina.* Under Alternative 2, the preferred alternative, the intermittent use of the water restricted area at BT-11 would result in periodic fishing prohibitions. The prohibition of fishing for 6 percent of the year on 0.5 percent of the region of influence would result in a minor impact to the local and regional fisheries-based economy. Recreational fishing and activities would also be affected by the closure.

- *Environmental Impact Statement/Overseas Environmental Impact Statement Navy Cherry Point Range Complex*. The analysis indicated that implementation of the No Action Alternative, Alternative 1, or Alternative 2 would result in no unavoidable significant adverse effects to commercial and recreational fishing. The analysis also indicated that there would be no unavoidable significant adverse effects to recreation.
- *Environmental Impact Statement/Overseas Environmental Impact Statement Navy Undersea Warfare Training Range*. The analysis in this document determined that there would be little potential interaction between the trunk cable and fishing gear, including bottom equipment. While recreational fishing is popular in each of the project areas, most recreational fishing and boating occurs within a few miles of shore and is expected to be infrequent in the vicinity of any of the proposed project sites. Operational activities would be required to avoid shipping vessels transiting through the range area or recreational boaters within the range. Since the proposed range is in international waters, no disruption to commercial shipping could be imposed. Commercial ship traffic or recreational boating activities within the operations area could require that the Navy delay, interrupt, or alter training exercises.
- Environmental Impact Statement, US Army Corps of Engineers, North Topsail Beach Shoreline Protection Project, Onslow County, North Carolina. This Environmental Impact Statement determined that the proposed action would result in long-term benefits to commercial and recreational fishing and recreational activities; any negative impacts would be short-term.
- Environmental Impact Statement, US Army Corps of Engineers, West Onslow Beach and New River Inlet (Topsail Beach) Shore Protection Project, Pender and Onslow Counties, North Carolina. This Environmental Impact Statement determined that the project would have long-term benefits to recreation. Any negative impacts to commercial and recreational fishing and recreational activities would be short-term.

The No Action Alternative, in conjunction with the above actions has the potential to result in minor adverse cumulative impacts to commercial and recreational fishing and recreational activities.

Proposed Action. The proposed action would include all operations currently affecting commercial and recreational fishing and recreational activities under the No Action Alternative. Operations on water ranges under the proposed action would remain the same as the No Action Alternative; therefore, the impacts of the proposed action on fishing and recreation would be the same.

Other past and present projects that have the potential to result in cumulative impacts are the same as listed above for the No Action Alternative. As with the No Action Alternative, the proposed action, in conjunction with other past and present actions, has the potential to result in minor adverse cumulative impacts to commercial and recreational fishing and recreational activities.

5.2.5 Air Quality

No Action Alternative. Under the No Action Alternative there would be no change in the current conditions at the MCB Camp Lejeune Range Complex and therefore there would be no cumulative impacts to air quality.

The following relevant projects were reviewed and evaluated to determine cumulative effects associated with air quality under the No Action Alternative:

- *EA for Temporary Beddown of Proposed Increase in End Strength at MCB Camp Lejeune, North Carolina:* The proposed action under this EA includes several actions that would increase air emissions including operation of construction vehicles and facility construction. Construction impacts would be short-term in nature, lasting only for the duration of the temporary facility construction. Even with these increased emissions, the region is expected to remain in attainment for all criteria pollutants.
- *EA Proposed Military Operations Areas in Eastern North Carolina:* Military aircraft are mobile and normally fly at altitudes where emissions would tend to be dispersed. From earth's surface extending up to altitudes of a few thousand feet, the atmosphere is completely mixed. The vertical limit of this mixing zone is known as the mixing height. Emissions of pollutants released below the mixing height may have an affect on ground-level air quality. Emissions released above the mixing height have no measurable ground-level effects because they become too widely dispersed before reaching ground level. Generally, in the summer season the mixing zone is at a higher altitude for a given time of day than in winter. US Environmental Protection Agency (1992) recommends that a mixing height of 914 m (3,000 ft) be used in assessing the effects of aircraft emissions. This 914 m (3,000 ft) mixing height is meant to approximate summertime conditions. The likelihood for air quality impacts associated with the proposed Military Operation Areas was evaluated based on their floor altitude (914 m [3,000 ft] mean sea level). This floor is the same as the mixing height for pollutants. Thus, all flight activities would occur consistently (100 percent) above the mixing height of 914 m (3,000 ft) mean sea level for all proposed Military Operation Areas. As a result, pollutants from aircraft operations in the Military Operation Areas would be dispersed and there would be no significant impact on ground level air quality conditions.
- *EA Marine Special Operations Command Complex, MCB Camp Lejeune, North Carolina:* The proposed action includes several actions that would result in temporary and long term increases in air emissions: operation of construction vehicles, facility construction, and operation and maintenance of facilities. In addition, several permanent air emission sources would be added to Camp Lejeune's Clean Air Act Title V Permit. Even with these increased emissions, the region is expected to remain in attainment for all criteria pollutants.
- *EA Chaff and Flare Training, MCB Camp Lejeune, North Carolina:* As discussed in Chapter 3, Camp Lejeune, North Carolina is considered an attainment area for federal and state air quality standards. Chaff and flare training would not contribute any air quality concerns because chaff and flare are not considered air pollutants. Their resident time in the atmosphere is very short lived by design. Chaff and flare would be released by dispensers mounted on the exterior of the aircraft or manually by aircraft personnel. The dispensers contain a small charge to release the chaff or flare into the air away from the aircraft. Chaff bundles are dispersed as small fibers to confuse enemy radar and would

disperse widely over the area before drifting slowly to the ground. Flares are designed to burn upon their descent away from the aircraft and before reaching the ground. The quantity of flares released can range from single to multiple flares at a time. The small explosive charge from the dispensers and the limited by-products of chaff and flares are similar to those generated by ongoing training activities at Camp Lejeune. Chaff fibers are composed of minute amounts of naturally occurring elements, silica and aluminum. Flares contain teflon and magnesium, which are designed to completely burn within the cardboard or soft aluminum containers they are packaged in, leaving behind only ashes. Prevailing winds and helicopter down drafts would contribute to their dispersal within the impact areas where they are released. Drift to adjacent areas outside of the impact areas are not expected because of low training altitudes and Range Control regulations governing aircraft training and wind speeds. Chaff and flare training would result in no significant impacts to the air quality of Camp Lejeune and the surrounding Onslow County.

- EA for Construction and Operation of a Multi-Purpose Machine Gun Range, Greater Sandy Run Area, MCB Camp Lejeune, North Carolina: Construction at the proposed Multi-Purpose Machine Gun Range at site SR-8 would entail earth movement both within the range and possible from off-site borrow quarries, which would cause minor impacts to air quality from vehicle emissions and fugitive dust. These emissions would be short term and minor. Fugitive dust control would be mitigated as part of the construction plan.
- *EA for D-30 Range, MCB Camp Lejeune, North Carolina:* The construction of the D-30 Range at the French Creek would cause minor impacts to air quality through emissions from construction equipment and fugitive dust from earth-moving activities to construct the earthen berm. Construction of the range facility (range, bullet impact area with bullet trap, and air filter) would require no site work that involves earth-moving equipment. A few trucks delivering supplies and handheld tools would be utilized over a few months to complete construction of the range. Emissions from these vehicles would be very transient and minor, and would cause negligible impacts to overall air quality. Grading with earth-moving equipment would be required at the parking lot site during construction of the lot. This would require earth-moving equipment be utilized for only a few days, with emissions from this equipment being minor and short term. Fugitive dust during site work would be generated. Controls would need to be implemented to minimize this fugitive dust. Emissions from construction of the parking lot would be short term and minor, and would cause negligible impacts to overall air quality. Emissions from activities associated with the operation of the proposed D-30 Range would primarily be particulate matter with other criteria pollutants emitted to a much smaller extent. Firing small arms at the range causes local, minor emissions from the detonation of gunpowder during weapons firing. Due to the irregularity of firing in small arms training and the small amount of gunpowder detonated, total emissions are expected to be low. Lead dust and fragments would be released due to impact of the lead round (bullet) with the earthen berm and wooden backstop. Once the range is upgraded, the air filter system would collect the dust resulting from the impact of rounds in the bullet trap. Therefore, air quality impacts due to weapons firing or lead dust would be mitigated and therefore insignificant.
- *EA for Military Operations in Urban Terrain Training Complex Enhancements, MCB Camp Lejeune, North Carolina:* The proposed action under this EA includes several actions that would increase air emissions both in the short and long term: construction of

facilities and roads, operation of construction vehicles, and a slight increase in training levels. The number of training operations conducted at an enhanced Military Operations in Urban Terrain Complex is expected to increase since three or more units could train simultaneously in different portions of the military complex. Currently, only one unit can use the facility. Such shared use would have the effect of increasing the amount of live and training practice rounds, including smoke and illumination rounds, expended in the area at a given time. However, these air emissions would not result in significant impacts to air quality for the reasons listed below. Proposed Military Operations in Urban Terrain Complex facilities would be approximately 125,000 square meters (150,000 square yards) in size. Approximately 4 km (2.5 mi) of roads would be constructed. The principal air quality concern during their construction would be fugitive dust emissions. During construction mobile emission sources such as construction vehicles, equipment, and private autos used to access the work area could contribute to air pollution. However, construction effects would be temporary and would be controlled using standard management practices (e.g., routine sweeping and wetting). Consequently, construction impacts would be short-term in nature, lasting only for the duration of facility construction. Some facilities would be equipped with their own (or shared) heating and cooling systems. Air emissions from these units would be minimal, comparable to the typical heating and cooling systems of a moderate-sized commercial building. Once the boilers are installed, their emission levels, based on design heating capacity, fuel type, and operational conditions would be integrated into the base-wide emission inventory.

- *EA for Steel-Cutting Pit, MCB Camp Lejeune, North Carolina:* In the long term, construction of the proposed new steel-cutting pit would have no effect on air quality. The type or frequency of training activities conducted at the new site would be the same as those currently being conducted at the existing pit, which will become inactive when the new one is operational. In the short term, construction of the pit, which would primarily involve grading and erection of earthen berms, would result in some minor and localized air quality impacts, mostly from fugitive dust. These effects would be temporary and controlled using standard management practices, such as sweeping and wetting to control flying dust, as needed. Emissions from construction equipment also would be temporary and negligible.
- *EA K-2 Ranges, MCB Camp Lejeune, North Carolina:* The proposed action under this EA includes several actions that would increase air emissions both in the short and long term: construction of training support facilities, improvements to the road network, construction of new access roads, operation of construction vehicles, controlled burning of vegetation, and a slight increase in live fire training. These air emissions would not result in significant impacts to air quality for the reasons listed below. Proposed new facilities would total approximately 6,000 m² (64,600 ft²) in size. Construction of berms, parking lots, and bivouac areas would total approximately 11 ha (27 ac). Approximately 9.3 km (5.8 mi) of new gravel roads would be constructed to provide access to automated targetry within the ranges. The principal air quality concern during construction would be fugitive dust emissions. In addition, during construction, mobile emission sources such as construction vehicles, equipment, and private autos used to access the work area could contribute to air pollution. However, construction effects would be temporary and would be controlled using standard management practices (e.g., routine sweeping and wetting). Consequently, construction impacts would be short-term in nature, lasting only for the duration of unexploded ordnance cleanup and road and training facility construction.

Particulate matter would continue to be generated from training activities, such as when live rounds impact the soil. Fires that ignite in the impact area during training would continue to be allowed to burn at roughly the same frequency because they help keep vegetation at lower heights between firing lines and targets (necessary for line of sight). Even so, these activities are not expected to significantly increase air emissions because there would only be a slight increase in training, approximately ten percent, and the fires in the impact area would occur nearly at the same frequency.

- *EA for Testing of the Expeditionary Fighting Vehicle Prototypes, MCB Camp Lejeune, North Carolina:* Project air emissions under this EA would remain below all emission significance thresholds except the carbon monoxide (CO) threshold during project years 2005 and 2006 and the PM₁₀ threshold in years 2006 and 2007. As a result, air emissions of all pollutants generated by the proposed action, except potentially CO and PM₁₀ would not result in significant air quality impacts. The significance of project CO and PM₁₀ emissions ultimately would be based on whether these emissions contribute to an exceedance of an ambient air quality standard. The overwhelming majority of CO emissions from proposed testing activities would occur from support vessels that operate within the riverine areas and offshore waters of MCB Camp Lejeune and almost all of the PM₁₀ emissions from proposed testing activities would occur as fugitive dust emissions from the operation of Expeditionary Fighting Vehicles and Amphibious Assault Vehicles on unpaved surfaces within MCB Camp Lejeune. As a result, emissions from testing activities would disperse over a large geographic area and due to their intermittent nature; they would not produce substantial impacts in a particular locality. With the addition of project emissions to the relatively low background pollutant levels in the project region, total combined project CO and PM₁₀ impacts would not contribute to an exceedance of an ambient air quality standard. As a result, significant impacts to ambient CO and PM₁₀ levels from the proposed testing activities would not occur. Combustive emissions from the operation of the Expeditionary Fighting Vehicles and support equipment would contain hazardous air pollutants and toxic air pollutants that could potentially impact public health (Subchapters 2D.1100 and .0700 of Title 15A of the North Carolina Administrative Code). It is expected that significant impacts to public health from hazardous air pollutants and toxic air pollutants emitted in association with Expeditionary Fighting Vehicle testing activities would not occur, as the mobile and intermittent nature of these sources and the wide geographic regions of proposed operations would produce minimal impacts of hazardous air pollutants and toxic air pollutants in a localized area.
- *EA for Stone Bay Urban Training Complex at MCB Camp Lejeune, North Carolina:* For the proposed action under this EA, the construction and demolition projects could cause minor temporary impacts to air quality through emissions and fugitive dust from construction equipment and delivery trucks. However, this is a relatively small construction project with minor site preparation work. These emissions would be very short term and localized effects. Fugitive dust control would be implemented as part of the construction plan. Construction would cause negligible impacts to air quality from vehicle emissions and fugitive dust. Outdoor air emissions from activities associated with the existing breacher pit would be primarily particulate matter (sand and concrete particles) and combustion by-products of organic materials (charred wood fragments and ash) with other criteria pollutants emitted to a much smaller extent. Firing small arms causes local, minor emissions from the detonation of gunpowder. Due to the irregularity of firing in small arms training and the small amount of gunpowder detonated, total

emissions are expected to be low. Dust could be released due to impact of the frangible round (bullet) with the bullet trap. Specially designed indoor air handlers and air curtains are used in the existing shoot house, and would be used in the proposed multi-story urban assault building and the proposed breacher facility. These air handlers contain and trap emissions from the small arms weapons firings and breaching activities. The air handlers will be designed, operated and maintained in accordance with Occupation, Safety and Health Administration (OSHA) standards. In addition, MCB Camp Lejeune has standing operating procedures for Industrial Hygienists to sample indoor range surfaces and to maintain and clean these facilities. Therefore, air quality impacts due to gunpowder detonation or lead dust would be insignificant and mitigated. When a training segment is completed at the Stone Bay Urban Training Complex, the Marines and instructors would shower and dress at the on-site Decontamination facility. Outer clothing would be laundered on-site daily to remove any particulate matter that may have been deposited on the clothing during training.

- *EA for US Joint Maritime Complex at MCB Camp Lejeune, North Carolina:* The proposed action under this EA includes several actions that would be expected to increase air emissions: facility construction, operation of facilities, and watercraft operations. Air emissions generated by these sources would have minimal impact on air quality and would not be significant. Proposed new facilities would be about 12,780 m² (137,420 ft²) in size. The principal air quality concern during their construction would be fugitive dust emissions. In addition, during construction mobile emissions sources such as construction vehicles and equipment and private autos used to access the work area could contribute to air pollution. However, construction effects would be temporary and would be controlled using standard management practices (e.g., routine sweeping and wetting). Consequently, construction impacts would be short-term in nature. Facilities would be equipped with their own (or shared) heating and cooling systems. However, the air emissions from these units would be minimal, comparable to the typical heating and cooling systems of a moderate-sized commercial building. Once the boilers are installed, their emission levels, based on design heating capacity, fuel type, and operational conditions would be integrated into the base-wide emission inventory. With the additional watercraft and the increased training operations, there would be an increase in emissions from boat engines. However, watercraft engine exhausts are considered to be minor emission sources. On average per year, it is expected that the boats would operate about five hours daily. The boat engines would be diesel powered, similar to typical land-based construction equipment. Moreover, these emissions would occur on water (riverine or maritime based), away from potential sensitive receptors. Additionally, the training operations would require movement of the boats and therefore, emissions would be dispersed over the water training area, and would not be released at one location.
- *EA for the East Coast Introduction of the Assault Breacher Vehicle MCB Camp Lejeune, North Carolina:* Construction activities associated with the 2d CEB compound would disturb a total of approximately 5,000 m² (1.25 acres) over a six-month estimated construction period. This level of land disturbance would generate approximately 12 pounds of 10-micrometer particulate matter (PM₁₀) per day. Estimated air emissions data for Assault Breacher Vehicle operation show the overwhelming majority of emissions would be fugitive dust due to operation of Assault Breacher Vehicle associated with plow and driver training. Increases in emissions resulting from munitions use would be

negligible as there would potentially be only a small increase in the amount of munitions used, and this would not significantly increase MCB Camp Lejeune's air emissions.

- *Environmental Impact Statement for Introduction of F/A-18 E/F Super Hornets to the East Coast of the US:* Under the proposed action the existing Title V air operating permit would require modification to incorporate potential new emission sources associated with the Aircraft Intermediate Maintenance Department, aircraft acoustical enclosure and an engine test cell. These sources would be subject to existing emission limits and would be required to maintain records and data to demonstrate compliance with applicable air quality regulations. If emissions of volatile organic chemicals result from solvent or painting operations associated with the Aircraft Intermediate Maintenance Department or any other new facility, these emissions would have to be included in the daily facility-wide volatile organic chemical limit as specified in Special Condition 4 of the existing Title V permit. Aircraft and engine test facilities are regulated by Special Condition 5 and 6 of the existing Title V permit; thus, the aircraft acoustical enclosure and engine test cell would be subject to visible emission control. Aircraft emissions are considered mobile emissions, which are not covered under the state's air emission permitting program. No significance thresholds have been established by North Carolina for evaluation of these emissions. Due to the increase in personnel at the station, emissions from personnel vehicles would increase. Temporary emissions from construction equipment would also occur under the proposed action.
- *EA Routine Shore Fire Control Party Training EA, MCB Camp Lejeune, North Carolina:* Under this EA approximately 400 additional 155 mm rounds would be fired into G-10. The explosive products of these rounds are similar to those used in ongoing training activities at Cam Lejeune. The detonation process, including the continued combustion that occurs in the plume immediately after initial detonation, results in nearly complete combustion of the explosive compounds in the rounds to form oxides of carbon, nitrogen and water. Thus there would be no significant impacts to air quality under the proposed action.
- *Environmental Impact Statement for Introduction of the V-22 to the Second Marine Aircraft Wing:* Emissions from sources associated with construction and operation of this project occurred in counties within the Southern Coastal Plain Intrastate Air Quality Control Region. Each of these counties is designated as being in attainment of the National Ambient Air Quality Standards for all criteria pollutants. The net increase in emissions for each county within the air quality control region resulting from this project (including operations at landing fields and training areas) was below 250 tons per year for all criteria pollutants. Thus, this project did not have a significant adverse impact on air quality.
- *EA Waterborne Refueling Training Operations on New River, North Carolina:* Under this EA there would be no net increase in the release of VOCs from small craft refueling activities. Any emissions from refueling would be the same regardless of the location of the refueling activity. Because MCB Camp Lejeune is in an attainment area and due to the nature of the release, these releases of VOCs would be exempt from regulatory limits and from inventory requirements. As a result the proposed action is not expected to have adverse impacts on air quality.
- *EA P-028 Infantry Platoon Battle Course, US MCB Camp Lejeune, North Carolina:* Construction of the proposed project will result in fugitive dust emissions as well as emissions from trucks and other earth moving equipments. These emissions would be

short term and minor and subject to fugitive dust control mitigation. Emissions associated with the operation of the proposed action would be particulate matter and other criteria pollutant emitted at a much smaller extent. Due to the irregularity of emission production (gunpowder detonation) total emissions from the site are expected to be low. No long term or cumulative impacts are expected from the proposed action.

- *EA for P-933, Multi-Purpose Range Complex, Greater Sandy Run Area (GSRA) MCB Camp Lejeune, North Carolina:* The proposed action under this EA would have no significant impacts to air quality. Construction activities will result in fugitive dust emissions as well as emissions from trucks and other earth moving equipments. These emissions would be short term and minor and subject to fugitive dust control mitigation. Operational emissions associated with the operation of the proposed action would be particulate matter and other criteria pollutant emitted at a much smaller extent. Due to the irregularity of emission production (tank movement, gunpowder detonation, vehicle emissions) total emissions from the site are expected to be low. No long term or cumulative impacts are expected from the proposed action.
- *EA for MCON P-949, Multipurpose Training Range, MCB Camp Lejeune, North Carolina:* The proposed action under this EA would have no significant impacts to air quality. Construction activities will result in fugitive dust emissions as well as emissions from trucks and other earth moving equipments. These emissions would be short-term and minor and subject to fugitive dust control mitigation. Emissions associated with the operations under the proposed action would be particulate matter and other criteria pollutant emitted at a much smaller extent. Due to the irregularity of emission production (tank movement, gunpowder detonation, vehicle emissions) total emissions from the site are expected to be low. No long-term or cumulative impacts are expected from the proposed action.
- *EA MCAS Cherry Point Range Operations, Craven, Carteret, and Pamlico Counties, North Carolina:* Training activities associated with Alternative 1 would result in minor increases in air pollutant emissions from the detonation of munitions. The increase in ordnance-related emissions would have a small impact on local air quality. The primary emissions from ordnance detonation are carbon dioxide (CO₂), carbon monoxide (CO), and particulate matter. Other criteria pollutants, hazardous air pollutants as defined by the Clean Air Act, and toxic chemicals (i.e., those chemicals regulated under Section 313 of the Emergency Planning and Community Right-to-Know Act) would be emitted at low levels. As this ordnance is typically used in the field, there are no controls associated with its use. There would be a slight increase in air emissions due to the increase in munitions usage, and so a small negative impact to the regional air quality is expected. However, the air quality in Craven, Carteret, and Pamlico Counties is well within regulatory limits, and air pollution concentrations would not exceed the National Ambient Air Quality Standards as a result of Alternative 1. Although the ranges affected by Alternative 1 are located within 100 km (62 mi) of a Class I Wilderness Area (Swanquarter Wilderness Area), there are no new or modified stationary source issues associated with the increase in munitions usage on the ranges, and so visibility impairment within a Class I Wilderness Area is not an issue requiring evaluation as part of this air quality analysis. Mobile source usage would increase in terms of rotary-wing aircraft in the airspace in and around the ranges. MCAS Cherry Point is located in an area classified by the US Environmental Protection Agency as in attainment for all criteria pollutants and therefore is not required to keep records on or otherwise track air emissions generated by these

mobile sources operating on and around the ranges. The combined impacts of the slight increase in munitions expenditures and use of rotary-wing aircraft at the ranges is expected to have an overall slightly negative impact on air quality for the area.

- *EA for Engineer in Training Complex and G-10 Range Realignment, Marine Corps Base Camp Lejeune, North Carolina:* Military installations such as MCB Camp Lejeune must ensure the long-term viability of their critical training capabilities to sustain mission readiness. The purpose and need of the proposed action is to allow MCB Camp Lejeune to continue to sustain mission readiness effectively by maximizing the base's training capabilities to meet current and emerging requirements, consistent with the Range and Training Area Transformation Plan for 2020 concepts. Implementation of the proposed action would result in a slight increase in total air pollutant emissions at MCB Camp Lejeune due to the boilers used to heat the range support facilities that are part of the proposed action. Based on the size of the proposed facilities, the increase in emissions is expected to be minor and is not anticipated to result in violations of applicable standards.
- *EA Construction and Operation of an Infantry Platoon Battle Course, Greater Sandy Run Area, MCB Camp Lejeune, North Carolina:* Implementation of the proposed action under this EA would include several activities that would temporarily increase air emissions: site preparation activities, construction of training support facilities, construction of a new access road, and operation of construction vehicles. After construction is complete, emissions from military vehicles and training, and range fires would be minimal. These air emissions would not result in significant impacts to air quality. The proposed new facilities would total approximately 500 m² (5,382 ft²) in size. Construction of berms, parking lots, and bivouac areas would total approximately 1 ha (2 ac). The proposed range maintenance roads, approximately 7 km (4 mi) in length, would be constructed to provide access to automated targetry within the ranges. Additionally, activities associated with the grading and fill of the entire range area, approximately 181 ha (446 ac), along with mining a fill material borrow source would also contribute to air emissions. The principal air quality concern during such construction and earthwork would be fugitive dust emissions. In addition, during construction, mobile emission sources such as construction vehicles, equipment, and private autos used to access the work area would contribute to air emissions. However, construction-related emissions would be temporary and would be minimized using standard best management practices (e.g., routing, sweeping, and wetting). When the range is in operation, training activities would generate particulate matter, such as when live rounds hit the ground or vehicles travel over dusty, gravel roads. These impacts would be intermittent and minor. Training activities may cause vegetation fires down-range. Such fires would either be extinguished right away or allowed to burn to serve vegetation management objectives, taking the place of a prescribed fire used to keep vegetation in areas surrounding objectives and maneuver areas at lower heights (necessary for line of sight). Training-ignited fires are not expected to significantly increase air emissions because the total area burned annually in Greater Sandy Run Area would remain at current levels since all fires are managed by base personnel. Fire management objectives and general procedures are outlined in MCB Camp Lejeune's Integrated Natural Resource Management Plan (US Marine Corps, January 2007).
- *Environmental Impact Statement, United States Marine Corps Grow the Force at MCB Camp Lejeune, MCAS New River, and MCAS Cherry Point, North Carolina:* The Preferred Alternative would result in a multi-year construction project at the Station.

Baseline emissions are expected to increase during the construction phase of the proposed action and with the ongoing operation phase. However, the Preferred Alternative would not change the attainment status of the surrounding area.

- *EA Wallace Creek Regimental Area, MCB Camp Lejeune, North Carolina:* Long- and short-term impacts to air quality for criteria pollutants from the proposed action would be considered minor. Emission thresholds associated with the Federal Clean Air Act conformity requirements are the primary means of assessing the significance of air quality impacts and do not apply to the proposed action because the proposed project area is in attainment for all criteria pollutants. Potential impacts are evaluated based on estimated direct and indirect emissions associated with the construction and operation of the Wallace Creek Regimental Area. The Clean Air Act requires that the US Environmental Protection Agency promulgate rules to ensure that Federal actions conform to the appropriate State Implementation Plan. These rules also are only applicable to non-attainment areas, and are therefore not relevant to this proposed project since Onslow County is in attainment for all criteria pollutants. However, due to the large scale of this project, emissions estimates were calculated and are provided below. No lead containing materials or leaded gasoline would be used under the proposed action; therefore, lead emissions would be zero. There would be minor and short-term impacts to air quality from the construction of the proposed Wallace Creek Regimental Area. These impacts would be related to emissions from worker privately owned vehicles, mobile sources utilized at the site (i.e., construction vehicles and petroleum-fueled equipment) and from fugitive dust emissions. These impacts would be temporary in nature and would cease following the completion of construction activities and therefore, would not result in the proposed project area falling into non-attainment status under the Clean Air Act. The greatest emissions would occur during the final year of construction when the largest amount of facilities are built (2010). Emissions calculations for 2007-2009 are in compliance with the most stringent emissions *de minimis* thresholds for all criteria pollutants. With the exception of PM₁₀ emissions, estimated criteria pollutant emission for 2010 would be within the *de minimis* thresholds set for marginal/moderate nonattainment areas. Particulate matter emissions would be greatly reduced and controlled using standard management practices (e.g., routine sweeping and wetting). There would be minor long-term impacts to air quality as a result of privately owned vehicles of Marines commuting from areas off-base and from the operation of standard heating equipment in the newly constructed facilities. Long-term emissions calculations are in compliance with the most stringent emissions *de minimis* thresholds for all criteria pollutants and not considered to be significant.
- *EA Testing of the Expeditionary Fighting Vehicle Prototypes, MCB Camp Lejeune, North Carolina:* Under this EA air pollutant emissions produced from the proposed action were estimated using the most current emission factors and methods and compared to the criteria identified above to determine their significance. Emission sources associated with the proposed action would include combustive and/or fugitive dust emissions generated by the Expeditionary Fighting Vehicle and land-based mobile equipment and vessels used to support the testing activities. Testing was anticipated to occur from 2008 through 2014. Emissions were estimated for an annual period, assuming that the activities that could occur in a single maximum testing year represent the maximum emissions for the testing period. It is assumed that the annual emissions calculated could occur during each year of testing. Engine operational data and factors used to calculate Expeditionary

Fighting Vehicle and Amphibious Assault Vehicle combustive and fugitive dust emissions were obtained from the Amphibious Assault Vehicle Final Environmental Impact Statement (Department of the Navy, 2003). The Expeditionary Fighting Vehicle engine has a maximum power rating of about 2,708 Hp. Factors used to estimate emissions from other support vehicles and vessels were obtained from the US Environmental Protection Agency Non-road Engine Model (US Environmental Protection Agency, 2002), special studies on vessels (US Environmental Protection Agency, 2002), and the AP-42 emissions documentation. Project air emissions would remain below all emission significance thresholds for all criteria pollutants with the exception of CO. As a result, air emissions of all pollutants generated by the proposed action, except potentially CO, would not result in significant air quality impacts. The significance of project CO emissions ultimately would be based on whether these emissions contribute to an exceedance of an ambient air quality standard. The overwhelming majority of CO emissions from proposed testing activities would occur from support vessels that operate within the riverine areas and offshore waters of MCB Camp Lejeune. These sources are mobile and operations from these sources are not likely to be concentrated in a single location as to cause pollutant “hot spots.” As a result, emissions from testing activities would disperse over a large geographic area and due to their intermittent nature they would not produce substantial impacts in a particular locality. With the addition of project emissions to the relatively low background pollutant levels in the project region, total combined project CO impacts would not contribute to an exceedance of an ambient air quality standard. As a result, significant impact to ambient CO levels from the proposed testing activities would not occur. Combustive emissions from the operation of the Expeditionary Fighting Vehicles and support equipment would contain hazardous air pollutants (HAPs) and toxic air pollutants (TAPs) that could potentially impact public health (Subchapters 2D.1100 and .0700 of Title 15A of the North Carolina Administrative Code). It is expected that significant impacts to public health from HAPs and TAPs emitted in association with Expeditionary Fighting Vehicle testing activities would not occur as the mobile and intermittent nature of these sources and the wide geographic regions of proposed operations would produce minimal impacts of HAPs and TAPs in a localized area. In summary, the proposed action would not violate standards for the criteria pollutants discussed previously. Implementation of the proposed action would not adversely impact air quality in or around MCB Camp Lejeune.

- *Environmental Impact Statement/Overseas Environmental Impact Statement Navy Cherry Point Range Complex:* In general terms, the air quality of the Navy Cherry Point Study Area is considered very good and is reflective of the pollutant concentrations, the size and topography of the Navy Cherry Point Study Area, and the prevailing meteorological conditions. Emission sources (environmental stressors) associated with warfare areas and distances from shore where the exercises take place and the percentage of training events which take place below 914 m (3,000 ft) were considered for the analysis. Emissions occurring or that would occur above 914 m (3,000 ft) are considered to be above the atmospheric inversion layer and are, therefore, without impact on the local air quality. The affected environment for purposes of air quality includes the special use airspace associated with the Cherry Point Operating Area, and the air above adjoining cities/counties in North Carolina whose air could mix with the Navy training space in the Navy Cherry Point Study Area. The Navy Cherry Point Range Complex Study Area assessed in this document is entirely offshore training sea space, undersea space, and

special use airspace. For air quality purposes, the majority of area assessed is the 18,966 nm² of special use airspace located above the Cherry Point Operating Area. This vast area begins 3 nm from shore, where state waters end. Pursuant to 40 CFR §81.334, each of the counties in North Carolina bordering the Study Area has been designated as being in attainment for all criteria pollutants. Therefore, the Clean Air Act General Conformity Review is not applicable. Implementation of the proposed action would result in minor, short-term effects, such as minor increases of aircraft air emissions within the airsheds, but would have no unavoidable significant environmental effects. Implementation of the proposed action would not result in significant adverse impacts to regional air quality and would not result in significant harm to the air quality of the global commons (see Glossary for definition of this area).

Past, present, and planned projects in the MCB Camp Lejeune include various construction projects, operational and training activities.

These training exercises have been required to demonstrate compliance with the existing Title V permit for the facility, which involves a demonstration that the emissions would not result in a cumulatively significant impact for criteria pollutants. Given the vast area across which these emissions occur and the relatively sparse emission sources, no significant cumulative impacts to air quality would occur as a result of these activities along with the additional training activities under the proposed action. Cumulative impacts to air emissions would also be controlled through the NAES Lakehurst Air Emissions Permits. Temporary impacts resulting from construction activities and fugitive dust emissions would result in direct, short-term adverse impacts which would be mitigated through the application of appropriate Best Management Practices and dust control measures during construction. As a result, no significant cumulative harm to air quality is expected.

The air quality within the Southern Coastal Plain Air Quality Control Region is designated as being in attainment for all criteria pollutants. Any other projects located at MCB Camp Lejeune would also be regulated by federal and state laws and should either fall under the installation's Title V operating permit or, in the event that a contractor was performing an operation they were solely responsible for and using their own equipment, it is possible that it would be the responsibility of the contractor to obtain a permit to construct and/or operate. These requirements would ensure that the No Action Alternative, in conjunction with past, present, or reasonably foreseeable future actions, would not contribute to major adverse cumulative air quality impacts.

Proposed Action. The increase in air emissions associated with increased munitions use and aircraft sorties associated with the proposed action would not alter the attainment status of the Southern Coastal Plain Air Quality Control Region in which MCB Camp Lejeune is located. Any other project located at MCB Camp Lejeune would also be regulated by federal and state laws and increases in stationary source emissions would be regulated under the installation's Title V operating permit. These requirements would ensure that the proposed action, in conjunction with past, present, or reasonably foreseeable future actions, would have minor adverse cumulative air quality impacts in the air quality control region.

5.2.6 Noise

Since DNL noise levels from one scale (A-weighted or C-weighted) cannot be added or converted mathematically to levels in another weighting scale, cumulative noise resulting from operations from land ranges and special use airspace can only be evaluated separately. Moreover, as evaluated in the EA, the noise zone condition around the base is dominated by operations of large caliber weapon firing and explosive detonations as compared to small arms and aircraft operations.

The following past or planned projects were reviewed and evaluated to determine cumulative effects associated with noise as a result of the proposed action:

- EA for Temporary Beddown of Proposed Increase in End Strength at MCB Camp Lejeune, North Carolina
- EA Proposed Military Operations Areas in Eastern North Carolina
- EA Marine Special Operations Command Complex, MCB Camp Lejeune, Onslow County, North Carolina
- EA Chaff and Flare Training, MCB Camp Lejeune, Onslow County, North Carolina
- EA for D-30 Range, MCB Camp Lejeune, North Carolina
- EA for Construction and Operation of a Multi-Purpose Machine Gun Range in the Greater Sandy Run Area at MCB Camp Lejeune, North Carolina
- EA for D-30 Range, MCB Camp Lejeune, North Carolina
- EA Military Operations in Urban Terrain Training Complex Enhancements, MCB Camp Lejeune, Onslow County, North Carolina
- EA for Steel-Cutting Pit, MCB Camp Lejeune, Onslow County, North Carolina
- EA K-2 Ranges, MCB Camp Lejeune, Onslow County, North Carolina
- EA for Testing of the Expeditionary Fighting Vehicle Prototypes, MCB Camp Lejeune, North Carolina
- EA for Stone Bay Urban Training Complex at MCB Camp Lejeune, NC
- EA for US Joint Maritime Complex at MCB Camp Lejeune, NC
- EA for the East Coast Introduction of the Assault Breacher Vehicle MCB Camp Lejeune, NC
- Environmental Impact Statement: Introduction of F/A-18 E/F Super Hornets to the East Coast of the US
- EA Routine Shore Fire Control Party Training EA, MCB Camp Lejeune, Onslow County, North Carolina
- Environmental Impact Statement, Introduction of the V-22 to the Second Marine Aircraft Wing
- EA Waterborne Refueling Training Operations on New River, Onslow County, North Carolina
- EA P-028 Infantry Platoon Battle Course, US MCB Camp Lejeune, North Carolina
- Final EA for P-933, Multi-Purpose Range Complex US MCB Camp Lejeune, North Carolina
- EA for MCON P-949, Multipurpose Training Range, MCB Camp Lejeune, NC
- EA MCAS Cherry Point Range Operations, Craven, Carteret, and Pamlico Counties, NC

- EA for Engineer in Training Complex and G-10 Range Realignment, Marine Corps Base Camp Lejeune, North Carolina
- EA Construction and Operation of an Infantry Platoon Battle Course, Greater Sandy Run Area, MCB Camp Lejeune, NC
- EIS US Marine Corps Grow the Force Initiative at MCB Camp Lejeune, MCAS New River, and MCAS Cherry Point, NC
- EA Wallace Creek Regimental Area, MCB Camp Lejeune, NC
- EA Testing of the Expeditionary Fighting Vehicle Prototypes, MCB Camp Lejeune, NC
- EIS/OEIS Navy Cherry Point Range Complex
- EIS/OEIS Navy Undersea Warfare Training Range
- EIS, US Army Corps of Engineers, North Topsail Beach Shoreline Protection Project, NC
- EIS, US Army Corps of Engineers, West Onslow Beach and New River Inlet (Topsail Beach) Shore Protection Project, NC

Land Ranges

No Action Alternative. The No Action Alternative would continue ongoing training operations, which for this analysis includes noise impacts of several actions that have been approved, but not completed (Marine Special Operations Command Complex Breaching Facility; the Military Operations in Urban Terrain Training Complex Enhancement; the relocation of activities conducted at Engineering Training Area 1; and the realignment of the K-2 Ranges which involves consolidating the current 21 K-2 ranges into 12 ranges). The No Action Alternative would not alter the existing land range operational noise impacts. Other projects located on MCB Camp Lejeune would also be subject to existing federal regulations/guidelines and state, regional, and local policies and programs relating to noise exposure. Therefore, the No Action Alternative, in conjunction with past, present, or reasonably foreseeable actions, would not be expected to result in cumulative noise impacts.

Proposed Action. The proposed action involves an increase in munitions use, including large-caliber weapons and small arms. Essentially, noise impacts increase very little from the added large weapons firing above the no action levels. The increase above existing noise impacts beyond the Base boundary (using C-weighted DNL contours) would be less than 1 dB, which would be below 3 dB, a barely perceptible difference. Evaluated small arms noise effects (using A-weighted DNL scale) are masked by large-caliber weapon operations that dominate the overall land range operational noise effects in terms of noise zones around the base. Vibration conditions around the Base are anticipated to remain unchanged from the no action level. Because the proposed action would not increase the size of weapons fired, vibration conditions around the Base perimeter would remain unchanged. The very slight change in noise impacts would not amount to an adverse impact. Other projects located on MCB Camp Lejeune would also be subject to existing federal regulations/guidelines and state, regional, and local policies and programs relating to noise exposure. Therefore, the proposed action, in conjunction with past, present, or reasonably foreseeable actions, would not be expected to result in major adverse cumulative noise impacts.

Water Ranges

No Action Alternative. Weapon operations within water ranges under the No Action Alternative would not alter the existing water ranges operational impacts that were considered as part of the noise impacts from land range operations discussed above. Therefore, the No Action Alternative, in conjunction with past, present, or reasonably foreseeable actions, would not be expected to result in cumulative noise impacts.

Proposed Action. The proposed action involves an increase in munitions use, including large-caliber weapons and small arms within water ranges. However, the increase was considered as part of the land range firing noise impact modeling analysis described above. The very slight change in noise impacts would not amount to major adverse cumulative impacts.

Special Use Airspace

No Action Alternative. The No Action Alternative would continue the current levels and types of training operations. It would not result in noise impacts. Other projects located on MCB Camp Lejeune would also be subject to existing federal regulations/guidelines and state, regional, and local policies and programs relating to noise exposure. Therefore, the No Action Alternative, in conjunction with past, present, or reasonably foreseeable actions, would not be expected to result in major adverse cumulative noise impacts.

Proposed Action. The proposed action would involve increases in helicopter sorties within existing special use airspace. However, there would be no changes to designated purpose, dimension, and times of use of the existing airspace under the proposed action. The proposed action would result in minor increased noise impacts of less than 3 dBA, which is the level at which a change is barely perceptible. Other projects located on MCB Camp Lejeune would also be subject to existing federal regulations/guidelines and state, regional, and local policies and programs relating to noise exposure. Therefore, the proposed action, in conjunction with past, present, or reasonably foreseeable projects, would result in minor cumulative noise impacts.

5.2.7 Cultural Resources

Land Ranges

No Action Alternative. The No Action Alternative would continue the current type and level of training operations. Present training operations are contained within well defined, existing training areas and ranges, no additional impacts would occur.

Other past and present projects that, in conjunction with the No Action Alternative, have the potential to result in cumulative impacts on cultural resources include:

- *EA Proposed Military Operations Areas in Eastern North Carolina:* The analysis in this EA determined the impact of aircraft noise and overflights on the setting of historic properties in the land area underlying the proposed Core Military Operations Area would be brief and transitory in nature and thus, would not adversely impact qualities of

integrity or jeopardize historic properties' eligibility for listing on the National Register of Historic Places.

- *EA Marine Special Operations Command Complex, MCB Camp Lejeune, Onslow County, North Carolina*: This EA indicates that the construction of the Marine Special Operations Command Complex would have an adverse effect on nine contributing resources in the Stone Bay Rifle Range Historic District, but would not have an adverse effect on the district as a whole. MCB Camp Lejeune mitigated this adverse effect on the contributing resources by executing a Programmatic Agreement with the North Carolina State Historic Preservation Officer.
- Environmental Impact Statement US Marine Corps Grow the Force Initiative at MCB Camp Lejeune, MCAS New River, and MCAS Cherry Point, North Carolina: The analysis in this EIS concludes that the preferred alternative has the potential to impact historic properties at MCB Camp Lejeune. Once construction design plans have been finalized, the Marine Corps would consult with the North Carolina State Historic Preservation Office in accordance with 36 CFR Part 800 to avoid, minimize, or mitigate adverse effects resulting from the proposed action.
- EA for P-933, Multi-Purpose Range Complex, Greater Sandy Run Area (GSRA) MCB Camp Lejeune, North Carolina: See paragraph below.
- EA for MCON P-949, Multipurpose Training Range, MCB Camp Lejeune, North Carolina: See paragraph below.

The last two projects in the list are past projects that had the potential to impact archaeological sites that may be eligible for inclusion in the National Register of Historic Places. Both projects were for the construction of training ranges in the Greater Sandy Run Area. MCB Camp Lejeune developed a Programmatic Agreement with the North Carolina State Historic Preservation Officer to complete archaeological surveys in areas in the Greater Sandy Run Area that have moderate to high potential for archaeological resources prior to development of any proposed ranges or facilities. Thus, there would be no adverse effects to historic properties.

For the reasons described above, the No Action Alternative, in conjunction with past, present, or reasonably foreseeable projects, would not result in cumulative impacts to cultural resources.

Proposed Action. The proposed action represents an increase in usage of existing land ranges. Impacts to onshore cultural resources are expected to increase slightly based on the increase of range and munitions use. The increase in ground disturbance in range areas plus additional off-road travel on Base have the potential to increase impacts to archaeological sites onshore and potentially in near-shore areas through sediment and silt run-off. However, this potential is minor, and mitigation measures, if required, would be developed with the North Carolina State Historic Preservation Office. Past and present projects that, in conjunction with the proposed action, have the potential to result in cumulative impacts on cultural resources are the same as those described in the No Action Alternative. Therefore, the proposed action, in conjunction with past, present, or reasonably foreseeable projects, would not result in major cumulative impacts to cultural resources.

Water Ranges

No Action Alternative. The No Action Alternative would continue the current levels and types of training operations. No additional impacts would occur. No past, present, or reasonably foreseeable projects in the region of influence involve adverse impacts to underwater historic properties. Therefore, the No Action Alternative, in conjunction with past, present, or reasonably foreseeable projects, would not result in cumulative impacts to underwater cultural resources.

Proposed Action. The proposed action is not expected to impact cultural resources in water areas surrounding MCB Camp Lejeune. The BT-3 offshore impact area has been extensively disturbed by bombing activities over the past years and is not considered to have potential for prehistoric or historic cultural resources. Past, present, and reasonably foreseeable projects in the region of influence do not involve negative impacts to underwater historic properties. Therefore, the proposed action, in conjunction with past, present, or reasonably foreseeable projects, would not result in cumulative impacts to underwater cultural resources.

5.2.8 Natural Resources

5.2.8.1 Soils

No Action Alternative. The current levels and types of training operations would continue under the No Action Alternative. Following current procedures and practices outlined in the *Integrated Natural Resources Management Plan* would reduce the potential impacts to soils. Other projects located at MCB Camp Lejeune would also be required to follow the *Integrated Natural Resources Management Plan* and other applicable requirements. The following projects were reviewed and evaluated to determine cumulative effects associated with soils as a result of the No Action Alternative and the proposed action:

- *EA for Temporary Beddown of Proposed Increase in End Strength at MCB Camp Lejeune:* The proposed action would not result in adverse impacts to topography and soils. Minor impacts to existing topography would occur during clearing and grading of the proposed project areas for the temporary facilities. During construction, soils at the sites would be affected through clearing, grading, compaction, and potential erosion. Erosion impacts would be temporary and would be minimized by employing BMPs for soil erosion and sedimentation control at the construction sites, such as silt fencing, sediment traps, application of water sprays, and revegetating disturbed soils with native plants. Most of the affected soils would eventually be covered with impervious surfaces or vegetation, preventing long-term erosion.
- *EA for Marine Special Operations Command Complex, MCB Camp Lejeune:* The proposed action would not result in significant impacts to soils. Minor impacts to existing topography would occur during clearing and grading of the Marine Special Operations Command Complex project area. Construction activities would have no direct impact on geological formations at Stone Bay. During construction, soils at the sites would be impacted through clearing, grading, compaction, and potential erosion. Erosion impacts would be temporary and would be minimized by employing applicable soil erosion and sedimentation control techniques at the construction sites. Prior to construction, approval would be obtained by North Carolina Department of Environment and Natural Resources on all Erosion and Sedimentation Control plans for the different phases of the project.

Erosion and Sedimentation Control devices that would be used include a sediment fence, silt fence, curb inlet protection, dust suppressors, temporary seeding, and matting (NAVFAC MIDLANT, January 2007). Most of the soil to be impacted would eventually be covered with impervious surfaces or vegetation, preventing long-term erosion

- *EA for Chaff and Flare Training, MCB Camp Lejeune:* The release of chaff and flares would not cause any disturbance of the soils of Browns Island located within N-1/BT-3, and, G-10 and K-2 impact area and the Greater Sandy Run Area SR-10 range. Chaff fibers are composed of silica and aluminum, which are naturally occurring elements found in soils. Chaff fibers would be widely dispersed over the impact and training area and would degrade in the soils. Flare incidental debris and residual ashes also would biodegrade naturally in the soils
- *EA for the Construction of Multi-Purpose Machine Gun Range in the Greater Sandy Run Area at MCB Camp Lejeune:* Construction of the Multi-Purpose Machine Gun Range would result in the direct disturbance of soils at the SR -8 site. Potential impacts could result from grading and filling the area in preparation for construction of the cantonment area and target emplacements; digging trenches for utility lines; digging holes for building footings; and building gravel roads along the range. There will also be some impacts to soil caused by the clearing, grubbing and reseeded with lawn type grasses to reduce maintenance costs. During the operation of the range, very minor soil-disturbing impacts could occur from bullets impacting the ground, and vehicle and foot traffic in designated areas (roads, parking lot, and cantonment area). Soil erosion impacts due to the construction of the Multi-Purpose Machine Gun Range would be minor and localized due to the areas flat terrain, sluggish water flow, and the soils low potential for water and wind erosion. Mitigation measures would further reduce impacts. The application of best management practices during construction would be implemented to reduce potential impacts to soils. In addition, standard erosion control measures (e.g. silt fencing, sediment traps, application of water sprays, and re-vegetation of disturbed soils) would be implemented to further reduce potential impacts to soils during the construction phase. Therefore, ground-disturbing activities during construction would result in short-term impacts to soils. Soil impacts due to the operation of the Multi-Purpose Machine Gun Range would be minor and localized. No soil impacts are expected as a result of the day-to-day operations at the Multi-Purpose Machine Gun Range.
- *EA for D-30 Range, MCB Camp Lejeune:* The proposed action would result in soil erosion impacts due to construction and would be minor and temporary. The French Creek site is a formerly developed site, and is now an open field. Land disturbing activities for the range itself would be limited to digging small holes for structural footings. Construction of the parking lot would result in significant land disturbing activities. Mitigation measures would reduce impacts from soil erosion. Best management practices would be used during construction in order to reduce potential impacts to soils and minimize sediment runoff during storm events. In addition, standard erosion control measures (silt fencing, sediment traps, application of potential impacts to soils during the construction phase. These best management practices and standard erosion control measures would be enforceable requirements under a discharge permit issued for the construction activities at the site by the North Carolina Department of Natural Resources. Therefore, land disturbing activities during construction would result in only minor and short-term impacts to soils. Soil impacts due to the operation of the newly constructed D-30 Range would be minor and limited to disturbances by vehicle

and foot traffic. A reduction in eroded soil would be expected with the installation of a bullet trap and with the removal of the earthen berms (at existing D-30 and the proposed site). Spent rounds are currently embedded on impact in the earthen berm, causing wear of the berm that leads to erosion of the soils that make up the berm. With the installation of new bullet traps, spent rounds would be captured in the enclosed metal bullet trap and no longer come in contact with the berms. The result would be a positive impact related to soil erosion if this alternative were implemented.

- *EA for Military Operations in Urban Terrain Training Complex Enhancements, MCB Camp Lejeune:* Construction activities would have no direct impact on geological features within the project area. Facilities would be constructed on approximately 12.5 ha (31 ac) within the 93-ha (230-ac) project area. Also, approximately 4 km (2.5 mi) of roads would be constructed. As a result, soils in these developed areas would be disturbed and in many cases covered with impervious surfaces. Erosion impacts would be temporary and would be minimized by employing applicable soil erosion and sedimentation control techniques at the construction sites. Best Management Practices for vegetation management and land clearing would also be applied.
- *EA for Steel-Cutting Pit, MCB Camp Lejeune:* The proposed project site is currently open and no significant land clearing would be required. The new access road would be an unpaved gravel road, fully pervious. The area within the pit would be graded and planted with turf grasses, as would the berm. This would minimize the potential for soil erosion. Following each use of the pit, range debris would be removed. From time to time, as conditions warrant, the pit would be regraded (holes filled in), and replanted with turf grasses. The potential for minor soil erosion exists during periods when there is insufficient vegetation cover. Soil erosion would be minimized through the use of best management practices.
- *EA for K-2 Ranges, MCB Camp Lejeune:* Soils would be disturbed by surface unexploded ordnance sweeps over approximately 85 ha (210 ac). Subterranean unexploded ordnance sweeps would be conducted over approximately 115 ha (285 ac). Surface unexploded ordnance cleanup and removal would result in minimal disturbance to soils. The subsurface investigations would require excavations to a depth of up to 1 m (3.3 ft). Soils removed during unexploded ordnance cleanup would be replaced to the extent practicable. Subterranean unexploded ordnance sweeps would be executed incrementally as funding becomes available. This would have the effect minimizing, at a given time, the area of exposed soil subject to erosion. Other minor soil disturbances associated with the proposed action include site preparation for facilities construction, utilities connections, road improvements, and vegetation management or clearing practices. Erosion impacts would be temporary and would be minimized by employing applicable soil erosion and sedimentation control techniques at the construction sites. Best management practices for vegetation management and land clearing would also be applied.
- *Environmental Impact Statement for Bogue Inlet Channel Erosion Response Project, Carteret and Onslow Counties:* The proposed action will address a severe erosion problem that is threatening existing development and town infrastructure along the west end of town in an area known as The Pointe and seeks beach compatible material to nourish approximately 4.0 miles of beachfront. The project will have a beneficial cumulative impact as it is being designed to minimize the loss of soils due to beach erosion.

- *EA for Testing of the Expeditionary Fighting Vehicle Prototypes at MCB Camp Lejeune:* The Proposed Action would involve use of the existing tank trails and ranges. These areas are heavily used by Amphibious Assault Vehicles, such that the additional incremental use associated with the Expeditionary Fighting Vehicle would be very minor. Expeditionary Fighting Vehicle testing in water includes the use of designated splash points along the New River and the amphibious landing area at Onslow Beach, and would add incrementally to the potential erosion of these sites. The potential impact of the Expeditionary Fighting Vehicle would be minimized by the use of existing trails and splash points, as required by Base Order P3570.1A, Standard operating procedures for Range Control. The Base Order further requires operators to report eroded conditions along trails and at splash points to the Base Range Control Officer for remediation. Erosion problems associated with training activities were recognized in Section 11.2 of the *Integrated Natural Resources Management Plan* as potentially degrading natural communities and the sustainability of training activities on MCB Camp Lejeune. Of particular concern is erosion and sedimentation in the New River watershed, resulting in increased turbidity and potentially degrading the quality of habitats in the New River. The *Integrated Natural Resources Management Plan* has developed general goals and specific objectives related to the protection of the New River watershed (Section 11.2 of Camp Lejeune 2001). These include the restoration and rehabilitation of specific degraded sites, monitoring of training areas to identify and correct erosion problems, and shoreline stabilization efforts. The *Integrated Natural Resources Management Plan* has identified these actions as having high priority. With continuing implementation of the actions identified in Section 11.2 of the *Integrated Natural Resources Management Plan*, and in conjunction with the standard operating procedures - that limit the extent of erosion, significant impacts would not occur from the proposed Expeditionary Fighting Vehicle testing.
- *EA for East Coast Introduction of the Assault Breacher Vehicle MCB Camp Lejeune:* Ground disturbance associated with construction activities and driver training would create the potential for soil erosion. Increases in impervious surface area for the maintenance facility may also result in erosion of soils in the immediate vicinity due to excessive runoff during storm events. An approved soil erosion and sedimentation control plan from North Carolina Department of Natural Resources would be required. Based on the analysis of the environmental effects to the proposed Action areas, no significant impacts to topography and soils would occur due to the proposed action.
- *EA for P-028 Infantry Platoon Battle Course, US MCB Camp Lejeune:* Ground disturbance associated with construction would result in minor soil erosion impacts. Soil erosion impacts would be localized due to the flat terrain and sluggish water flow, and for this reason mitigation measures would consist of the use of temporary ground cover and silt fencing during construction phases. Long-term control would include berms equipped with side walls and vegetative buffer zones to help direct or channel runoff away from sensitive areas.
- *EA for P-933, Multi-Purpose Range Complex US MCB Camp Lejeune:* The proposed action would impact soils primarily through the construction of four maneuver tank trails. Removal of vegetation for construction and the soil disturbance created by heavy tracked vehicles could contribute to soil erosion. Runoff from these areas could contain high levels of sediment which would add silt to the drainage system and drainage ditches in the area. Soil erosion impacts would be localized due to the flat terrain and sluggish water

flow, therefore short-term mitigation measures would consist of temporary ground cover and silt fence use during construction phases to help contain sediment. Long-term control would include vegetative buffer zones and possibly berms to direct or channel runoff away from sensitive areas.

- *EA for Engineer in Training Complex and G-10 Range Realignment, Marine Corps Base Camp Lejeune:* In the short-term, construction of the different facilities and improvements included in the proposed action would result in various degrees of soil disturbance within the different projects' footprints. The primary potential impact from soil-disturbing activities is increased erosion, as loose soil is carried off by wind and rain and increases the sediment load of the streams and other water bodies it washes into. However, in addition to being temporary, construction-related soil impacts would be minimized through implementation of appropriate erosion and sedimentation control best management practices. These may include, as needed, setting up sediment barriers or traps; temporary seeding or mulching areas of soil exposure; protecting curb inlets; matting; and setting up temporary sedimentation basins and appropriate drainage features (such as water bars) along temporary access and haul roads. State-approved erosion and sedimentation control plans would be prepared and implemented, as required, for each of the proposed construction activities. implementation of best management practice. Long-term soil impacts would result from the exploitation of the proposed new borrow pit. Excavation would result in the creation of one or several permanently flooded pits, similar to the existing one. Establishment of the proposed borrow pit may require a mining permit from the North Carolina Department of the Environment and Natural Resources Division of Land Resources. Excavation would not begin until applicable permit requirements have been identified and complied with. Other long-term soil impacts are expected to be minimal. Construction of the proposed utility corridors would have no long-term impacts because, following completion, the ground would be returned to a condition similar to the existing one: paved areas would be repaved; pervious and vegetated areas would remain pervious and be seeded to promote quick re-vegetation. Operations at the proposed new ranges would not include the kind of heavy equipment usage and maneuvering of tracked vehicles that could result in long-term soil disturbance and increased erosion. Target areas, berms, and demolition pits in the ETC and G-10 range areas would be maintained in low vegetation cover, which would minimize the risk of long-term erosion. Similarly, long-term erosion impacts in the proposed clear-cut area would be minimal because stumps would be left in place and plant growth would be allowed to resume after the cut, ensuring sufficient vegetation cover to prevent excess erosion.
- *EA for Testing of the Expeditionary Fighting Vehicles Prototypes, MCB Camp Lejeune, NC:* The Proposed Action would involve use of the existing tank trails and ranges. These areas are heavily used by Amphibious Assault Vehicles, such that the additional incremental use associated with the Expeditionary Fighting Vehicles would be very minor. Erosion problems associated with training activities were recognized in Section 11.2 of the *Integrated Natural Resources Management Plan* as potentially degrading natural communities and the sustainability of training activities on MCB Camp Lejeune. Of particular concern is erosion and sedimentation in the New River watershed, resulting in increased turbidity and potentially degrading the quality of habitats in the New River. The *Integrated Natural Resources Management Plan* has developed general goals and specific objectives related to the protection of the New River watershed (Section 11.2 of

MCB Camp Lejeune 2006b). These include the restoration and rehabilitation of specific degraded sites, monitoring of training areas to identify and correct erosion problems, and shoreline stabilization efforts. The *Integrated Natural Resources Management Plan* has identified these actions as having high priority. Under the proposed action, the Expeditionary Fighting Vehicle would be operated at slower speeds in shallower waters. Operators would be aware of the water depth and would operate the Expeditionary Fighting Vehicle at the appropriate speeds to limit sediment disturbance and resulting water turbidity. Therefore, there would be no significant impact to sediments or the turbidity of the water from Expeditionary Fighting Vehicle operation. Therefore, with continuing implementation of the actions identified in Section 11.2 of the *Integrated Natural Resources Management Plan*, and in conjunction with the Standard Operating Procedures that limit the extent of erosion, significant impacts from the proposed Expeditionary Fighting Vehicle testing would not occur.

- *Environmental Impact Statement, US Army Corps of Engineers, North Topsail Beach Shoreline Protection Project, NC*: The proposed action will address a severe erosion problem. The project will have a beneficial cumulative impact as it is being designed to minimize the loss of soils due to beach erosion. Turbidity associated with the project would be localized and short-term.
- *Environmental Impact Statement, US Army Corps of Engineers, West Onslow Beach and New River Inlet (Topsail Beach) Shore Protection Project, NC*: The proposed action will address a severe erosion problem. The project will have a beneficial cumulative impact as it is being designed to minimize the loss of soils due to beach erosion. Turbidity associated with the project would be localized and short-term.

Therefore, the No Action Alternative, in conjunction with past, present, or reasonably foreseeable projects, would not be expected to contribute to cumulative soil impacts.

Proposed Action. While increased training on land ranges adds to the potential for soil disturbances and erosion, mitigation through following the *Installation Natural Resources Management Plan* would counter or contain adverse direct impacts associated with the increase in training operations. The projects reviewed for cumulative impact assessment under the No Action Alternative were also reviewed for cumulative impacts resulting from the proposed action.

Review of these relevant past and present projects indicated minor impacts during clearing and grading activities however, potential erosion impacts were temporary and minimized by utilizing best management practices for soil erosion and sedimentation. Affected soils were eventually covered with impervious surfaces or vegetation to prevent long-term erosion. Additional impacts were associated with the release of chaff and flares. Chaff fibers are composed of silica and aluminum, which are naturally occurring elements found in soils. Chaff fibers are widely dispersed over the impact and training area and would degrade in the soils. Flare debris and residual ashes would also biodegrade naturally in the soils. Based on the review of these projects there have been minor impacts to soils and therefore no cumulative effects from these projects.

Future projects located at MCB Camp Lejeune would also be required to follow the *Integrated Natural Resources Management Plan* and other applicable requirements and best management practices to minimize erosion and sedimentation as a result of impacts to soils.

Therefore, the proposed action, in conjunction with past, present, or reasonably foreseeable projects, would not be expected to contribute to major adverse cumulative soil impacts.

5.2.8.2 Underwater Sediments

No Action Alternative. The ongoing current training activities would not result in a measurable effect on underwater sediment quality. The No Action Alternative does not involve excavation or bottom disturbing activities such as new dredging, bulkheading, jetty or mooring construction, or subaqueous pipeline installation.

The following project was reviewed and evaluated to determine potential cumulative impacts associated with underwater sediments as a result of the No Action Alternative:

- *Environmental Impact Statement/Overseas Environmental Impact Statement Navy Undersea Warfare Training Range*: Review of this document determined that no impacts to underwater sediments were identified.

Disturbance to underwater sediments would occur over a broad region and would not be concentrated in MCB Camp Lejeune. Therefore, the No Action Alternative, in conjunction with other past, present, or reasonably foreseeable projects at MCB Camp Lejeune, would not result in cumulative impacts to underwater sediments.

Proposed Action. Under the proposed action, impacts to underwater sediments would be similar to those described under the No Action Alternative. The proposed increase in munitions firing and additional expended material would not measurably affect underwater sediment quality. The projects reviewed for cumulative impact assessment under the No Action Alternative were also reviewed for cumulative impacts resulting from the proposed action. Future projects would continue to evaluate the potential for impacts to underwater sediments. As outlined in the No Action Alternative, disturbance to underwater sediments would occur over a broad region and would not be concentrated in the MCB Camp Lejeune Range Complex. Therefore, the proposed action, in conjunction with other past, present, or reasonably foreseeable projects, would not be expected to result in cumulative impacts to underwater sediments.

5.2.8.3 Water Resources

Wetland Cumulative Impacts

No Action Alternative. The current levels and types of training operations would continue under the No Action Alternative. Ongoing Standard Operating Procedures and minimization measures designed to protect wetland resources on MCB Camp Lejeune would continue to be implemented.

Relevant projects were reviewed and evaluated to determine cumulative effects associated with wetlands as a result of the No Action Alternative and proposed action. **Table 5.2-3** identifies permanent wetland impacts associated with each of the projects as a result of an action requiring fill be placed in the wetland.

Table 5.2-3
Impacts to Wetlands

| Project | Estimated Permanent Impacts To Wetlands Resulting From the Placement of Fill | Notes |
|---|--|---|
| EA for Temporary Beddown of Proposed Increase in End Strength at MCB Camp Lejeune, North Carolina (MCB Camp Lejeune, June 2008) | Unknown until project designs are available. | 5 ha (13 ac) of wetlands are located within the proposed project areas, however MCB Camp Lejeune conceptual layouts for the proposed temporary facilities avoid construction in wetlands. |
| EA Proposed Military Operations Areas in Eastern North Carolina (Department of the Navy, June 2003) | 0 | The proposed action involved air space operations and thus had no direct physical impact to resources, such as wetlands, on the ground. |
| EA Marine Special Operations Command Complex, MCB Camp Lejeune, Onslow County, North Carolina (MCB Camp Lejeune, August 2007) | 5 ha (12a c) | 345 ac of wetlands within project area. |
| EA Construction and Operation of Digital Airport Surveillance Radar in Eastern North Carolina (MCAS Cherry Point, February 2007) | 0 | |
| EA Chaff and Flare Training, MCB Camp Lejeune, Onslow County, North Carolina (MCB Camp Lejeune, December 2006) | 0 | |
| EA for Construction and Operation of a Multi-Purpose Machine Gun Range in the Greater Sandy Run Area at MCB Camp Lejeune, North Carolina (MCB Camp Lejeune, January 2006) | 29.66 ha (73.28 ac) | |
| Final EA for D-30 Range, MCB Camp Lejeune, North Carolina (MCB Camp Lejeune, November 2005) | 0 | |
| EA Military Operations in Urban Terrain Training Complex Enhancements, MCB Camp Lejeune, Onslow County, North Carolina (MCB Camp Lejeune, September 2005) | Less than 0.2 ha (0.5 ac) of impact will occur due to a road crossing. | |
| EA for Steel-Cutting Pit, MCB Camp Lejeune, Onslow County, North Carolina, (MCB Camp Lejeune, September 2005) | 0 | |
| EA K-2 Ranges, MCB Camp Lejeune, Onslow County, North Carolina (MCB Camp Lejeune, March 2005) | 5.85 ha (14.48 ac) | An additional 5.2 ha (37.59 ac) of temporary wetland impacts will also occur. |
| Environmental Impact Statement, Bogue Inlet Channel Erosion Response Project, Carteret and Onslow Counties, North Carolina (US Army Corps of Engineers, March 2004) | 0 | |
| EA for Testing of the Expeditionary Fighting Vehicle Prototypes at MCB Camp Lejeune, North Carolina (MCB Camp Lejeune, June 2004) | 0 | |
| EA for Stone Bay Urban Training Complex at MCB Camp | 0 | |

| Project | Estimated Permanent Impacts To Wetlands Resulting From the Placement of Fill | Notes |
|---|--|---|
| Lejeune, Onslow County, North Carolina (MCB Camp Lejeune, May 2004) | | |
| EA for US Joint Maritime Complex at MCB Camp Lejeune, North Carolina (MCB Camp Lejeune, January 2004) | 0 | |
| EA for the East Coast Introduction of the Assault Breacher Vehicle MCB Camp Lejeune, Onslow County, North Carolina (MCB Camp Lejeune, October 2003) | 0 | |
| Environmental Impact Statement: Introduction of F/A-18 E/F Super Hornets to the East Coast of the US (Department of the Navy, July 2003) | 0 | |
| EA Routine Shore Fire Control Party Training EA, MCB Camp Lejeune, Onslow County, North Carolina (MCB Camp Lejeune, July 2002) | 0 | |
| Environmental Impact Statement, Introduction of the V-22 to the Second Marine Aircraft Wing (Department of the Navy, October 1999) | 0 | |
| EA Waterborne Refueling Training Operations on New River, Onslow County, North Carolina (MCB Camp Lejeune, April 1999) | 0 | |
| EA P-028 Infantry Platoon Battle Course, US MCB Camp Lejeune, North Carolina (MCB Camp Lejeune, September 1996) | 3.84 ha (9.5 ac) | |
| EA for P-933, Multi-Purpose Range Complex US MCB Camp Lejeune, North Carolina (MCB Camp Lejeune, August 1995) | 41.28 ha (102 ac) | An additional 155.8 ha (385 ac) of wetland vegetation would be cleared, however there would be no impacts to soils. |
| EA for MCON P-949, Multipurpose Training Range, MCB Camp Lejeune, North Carolina (MCB Camp Lejeune, May 1994) | 10.12 ha (25 ac) | |
| EA MCAS Cherry Point Range Operations, Craven, Carteret, and Pamlico Counties, North Carolina | 0 | |
| EA for Engineer Training Complex and G-10 Range Realignment, MCB Camp Lejeune, North Carolina (October 2008). | 30.3 ha (75.6 ac) | |
| EA Construction and Operation of an Infantry Platoon Battle Course, Greater Sandy Run Area, MCB Camp Lejeune, North Carolina | 17 ha (42 ac) | |
| Environmental Impact Statement US Marine Corps Grow the Force Initiative at MCB Camp Lejeune, MCAS New River, and MCAS Cherry Point, North Carolina | 0 | |
| EA Wallace Creek Regimental Area, MCB Camp Lejeune, North Carolina | 0.09 ha (0.22ac) | |
| EA Testing of the Expeditionary Fighting Vehicle Prototypes, MCB Camp Lejeune, North Carolina | 0 | |
| Environmental Impact Statement/Overseas Environmental Impact Statement Navy Cherry Point Range Complex | 0 | |
| Environmental Impact Statement/ Overseas Environmental Impact Statement Navy Undersea Warfare Training Range | 0 | |
| Environmental Impact Statement, US Army Corps of Engineers, North Topsail Beach Shoreline Protection Project, Onslow County, North Carolina | 0 | |
| Environmental Impact Statement, US Army Corps of Engineers, West Onslow Beach and New River Inlet (Topsail Beach) Shore | 0 | |

| Project | Estimated Permanent Impacts To Wetlands Resulting From the Placement of Fill | Notes |
|--|--|-------|
| Protection Project, Pender and Onslow Counties, North Carolina | | |
| No Action Alternative | 0 | |
| Proposed Action | 0 | |

There would be no impacts to wetlands under the No Action Alternative; therefore there would be no cumulative impacts.

Proposed Action . There will be no construction within wetlands, and there will be no discharges of dredged or fill material into waters of the US or wetlands as a result of the proposed action as outlined in Chapter 4. Therefore, there will be no impacts to wetlands as a result of the proposed action.

The projects reviewed for cumulative impact assessment under the No Action Alternative were also reviewed for cumulative impacts resulting from the proposed action. The impacts associated with these projects total approximately 70 ha (174 ac). A total of 58 ha (143,000 ac) of MCB Camp Lejeune are classified as wetlands, therefore while there have been additive effects associated with wetland impacts on previous projects, they have been minimal and have not contributed to negative cumulative impacts to wetland resources. Impacts associated with these projects were mitigated in accordance with permit requirements and wetland protection measures as outlined in the *Memorandum of Agreement Between the US Environmental Protection Agency and the Department of the Army Concerning the Determination of Mitigation under the Clean Water Act Section 404(b)(1) Guidelines* (US Army Corps of Engineers and US Environmental Protection Agency, 1989) were followed. Additionally, future actions will take these guidelines into consideration to avoid and minimize impacts, which will further help to reduce additive effects to wetlands.

The proposed action associated with this project will not impact wetlands and in conjunction with other past, present, or reasonably foreseeable projects will not contribute to cumulative impacts to the resource.

Surface and Groundwater Cumulative Impacts

No Action Alternative. The current levels and types of training operations would continue under the No Action Alternative. Ongoing Standard Operating Procedures and minimization measures designed to protect the water resources on MCB Camp Lejeune would continue to be implemented. Current rates of use indicate no adverse impacts to surface water quality, including marine water quality. There would be no change in the potential for groundwater contamination. There would be no impacts to floodplains. Other projects located at MCB Camp Lejeune would also be required to follow the *Integrated Natural Resources Management Plan* and other applicable requirements.

The following projects were reviewed and evaluated to determine cumulative effects associated with surface and groundwater as a result of the No Action Alternative:

- *EA for Marine Special Operations Command Complex, MCB Camp Lejeune, Onslow County, North Carolina:* The No Action Alternative would have no impacts to floodplains, groundwater, or surface water, including streams. The proposed action would impact approximately 3,901 m (12,800 linear ft) of ephemeral, intermittent, and perennial streams would be impacted by the construction of complex facilities. The proposed action would have no impacts to floodplains or groundwater.
- *EA Chaff and Flare Training, MCB Camp Lejeune, Onslow County, North Carolina:* The No Action Alternative and the proposed action were evaluated and determined to have no impacts to floodplains, groundwater or surface waters.
- *EA for Military Operations in Urban Terrain Training Complex Enhancements, MCB Camp Lejeune, Onslow County, North Carolina:* The No Action Alternative would have no impacts to floodplains, groundwater, or surface water, including streams. The proposed action would have minor stream impacts associated with a road crossing. Impacts to floodplains and groundwater would not occur as a result of the proposed action.
- *EA for Steel-Cutting Pit, MCB Camp Lejeune, Onslow County, North Carolina:* The No Action Alternative, as well as the proposed action, would have no impacts to floodplains, groundwater, or surface water, including streams.
- *EA for K-2 Ranges, MCB Camp Lejeune, Onslow County, North Carolina:* The No Action Alternative would have no impacts to floodplains, groundwater, or surface water, including streams. The proposed action would have no impacts to floodplains or groundwater, however there will be 151 m (496 linear ft) of stream impacts.
- *EA for the Construction of Multi-Purpose Machine Gun Range in the Greater Sandy Run Area at MCB Camp Lejeune, Onslow County, North Carolina:* The No Action Alternative would have no impacts to floodplains, groundwater, or surface water, including streams. Construction associated with the proposed action will cause minor impacts to surface waters as a result of increased impermeable surfaces and runoff, as well as minor sedimentation from ground disturbance. These impacts will be managed using Best Management Practices to minimize sedimentation and establish measures to prevent sediment from entering surface waters. The proposed action will have no impacts to floodplains or groundwater.
- *EA for D-30 Range, MCB Camp Lejeune, Onslow County, North Carolina:* The No Action Alternative would have no impacts to floodplains, groundwater, or surface water, including streams. Ground disturbance associated with the proposed action will cause minor impacts to surface waters as a result of minor sedimentation from exposed soils. These impacts will be managed using Best Management Practices to minimize sedimentation and establish measures to prevent sediment from entering surface waters. Minor impacts to floodplains may occur as a result of the construction of a parking lot, however it is not anticipated that the encroachment will increase the flood elevation. No impacts to groundwater will result from the proposed action.
- *EA P-028 Infantry Platoon Battle Course, US MCB Camp Lejeune, Onslow County, North Carolina:* The No Action Alternative and the proposed action were evaluated and determined to have no impacts with regard to water quality or impacts to streams. The potential for sedimentation entering surface waters during construction activities

associated with the proposed action exists. Proper design and incorporation of Best Management Practices will minimize impacts to surface waters. Minor impacts to streams due to the placement of two culverts associated with road crossings would also occur as a result of the proposed action. The proposed action would not impact groundwater or floodplains.

- *EA for Testing of the Expeditionary Fighting Vehicle Prototypes, MCB Camp Lejeune, Onslow County, North Carolina:* The No Action Alternative, as well as the proposed action, would have no impacts to floodplains, groundwater, or surface waters including streams.
- *EA for Engineer in Training Complex and G-10 Range Realignment, Marine Corps Base Camp Lejeune, Onslow County, North Carolina:* The No Action Alternative would have no impacts to floodplains, groundwater, or surface water, including streams. Construction activities associated with the proposed action may cause minor impacts to surface waters as a result of increased runoff, minor sedimentation from ground disturbance and the landing of ammunition or projectiles in surface waters. These impacts will be managed using Best Management Practices to minimize sedimentation and establish measures to prevent sediment from entering surface waters. Potential impacts associated with ammunition or projectiles is anticipated to be minimal due to limited number of annual training activities (7-8 times per year) and would only involve the use of inert materials. The proposed action will have no impacts to floodplains or groundwater.
- *Environmental Impact Statement/Overseas Environmental Impact Statement Navy Cherry Point Range Complex North Carolina:* The No Action Alternative, as well as the proposed action were evaluated and determined to have no impacts to floodplains, groundwater, or surface water.
- *Environmental Impact Statement, US Army Corps of Engineers, North Topsail Beach Shoreline Protection Project, Onslow County, North Carolina:* The No Action Alternative, as well as the proposed action were evaluated and determined to have no impacts to floodplains, groundwater, or surface water. The proposed action may have some increased turbidity during construction, however this increase is expected to be short term and temporary.
- *Environmental Impact Statement, US Army Corps of Engineers, West Onslow Beach and New River Inlet (Topsail Beach) Shore Protection Project, Pender and Onslow Counties, North Carolina:* The No Action Alternative, as well as the proposed action were evaluated and determined to have no impacts to floodplains, groundwater, or surface water.

Therefore, the No Action Alternative, in conjunction with other past, present, or reasonably foreseeable projects, would not be expected to result in adverse cumulative effects to surface water quality.

Proposed Action. Direct impacts upon water quality, including surface water, wetlands and floodplains, and groundwater from the increased munitions expenditures included in the proposed action are estimated to result in minimal changes in the potential for increased surface water or groundwater contamination.

The projects reviewed for cumulative impact assessment under the No Action Alternative were also reviewed for cumulative impacts resulting from the proposed action.

Ongoing Standard Operating Procedures and minimization measures designed to protect the water resources on MCB Camp Lejeune would continue to be implemented. In assessing cumulative impacts, the baseline impact potential must be considered. Therefore, despite the fact that the increase in munitions use at the various ranges included in the proposed action would result in no additional direct negative impacts, the increase in munitions expended on these ranges would add munitions constituents to the soil and therefore, result in an added potential for surface water and groundwater contamination, albeit very small. Other projects located at MCB Camp Lejeune would also be required to follow the *Integrated Natural Resources Management Plan* and other applicable requirements.

Impacts to water quality associated with these projects was determined to be minimal, therefore while there are additive effects, past, present, and future projects are required to follow the *Integrated Natural Resources Management Plan* and other applicable requirements. These requirements monitor water quality to determine if there are adverse effects associated with range operations.

In summary, the increase in munitions use at the various ranges, in conjunction with other past, present, or reasonably foreseeable projects, would result in a very small additive adverse cumulative impact on water quality within the area of impact analysis.

5.2.8.4 Terrestrial Biology

Vegetation and Wildlife Cumulative Impacts

No Action Alternative. The current levels and types of training operations would continue under the No Action Alternative. Ongoing Standard Operating Procedures and minimization measures designed to protect the habitats and animal and vegetative species on MCB Camp Lejeune would continue to be implemented. No changes would occur to terrestrial biological resources. Other projects located at MCB Camp Lejeune would also be required to follow the *Integrated Natural Resources Management Plan* and other applicable requirements. The No Action Alternative, in conjunction with other past, present, or reasonably foreseeable projects, would not be expected to result in cumulative impacts to terrestrial biological resources.

Relevant projects were reviewed and evaluated to determine cumulative effects associated with vegetation and wildlife as a result of the No Action Alternative and proposed action. **Table 5.2-4** identifies vegetation impacts associated with each of the projects and **Table 5.2-5** identifies potential impacts to red-cockaded woodpecker clusters associated with each of the projects.

Table 5.2-4
Impacts to Vegetation

| Project | Estimated Impacted Vegetation | Notes |
|---|-------------------------------|---|
| EA for Temporary Beddown of Proposed Increase in End Strength at MCB Camp Lejeune, North Carolina (MCB Camp Lejeune, June 2008) | 15 ha (38 ac) | Land cleared for construction of new temporary facilities. This impact may decrease depending on final layout. |
| EA Proposed Military Operations Areas in Eastern North Carolina (Department of the Navy, June 2003) | 0 | |
| EA Marine Special Operations Command Complex, MCB Camp Lejeune, Onslow County, North Carolina (MCB Camp Lejeune, August 2007) | 89 ha (220 ac) | Cleared for construction of new facilities. |
| EA Construction and Operation of Digital Airport Surveillance Radar in Eastern North Carolina (MCAS Cherry Point, February 2007) | 0 | |
| EA Chaff and Flare Training, MCB Camp Lejeune, Onslow County, North Carolina (MCB Camp Lejeune, December 2006) | 0 | |
| EA for Construction and Operation of a Multi-Purpose Machine Gun Range in the Greater Sandy Run Area at MCB Camp Lejeune, North Carolina (MCB Camp Lejeune, January 2006) | 121 ha (300 ac) | Cleared for construction of new facilities. An additional 201 ha (500 ac) would be disturbed, and maintained in a low-growth phase (mowing, drum-chopping, controlled burn, herbicide application). |
| EA for D-30 Range, MCB Camp Lejeune, North Carolina (MCB Camp Lejeune, November 2005) | 0 | |
| EA Military Operations in Urban Terrain Training Complex Enhancements, MCB Camp Lejeune, Onslow County, North Carolina (MCB Camp Lejeune, September 2005) | 34 ha (85 ac) | Cleared for construction of new facilities. |
| EA for Steel-Cutting Pit, MCB Camp Lejeune, Onslow County, North Carolina, (MCB Camp Lejeune, September 2005) | 0 | |
| EA K-2 Ranges, MCB Camp Lejeune, Onslow County, North Carolina (MCB Camp Lejeune, March 2005) | 240 ha (593 ac) | Impacts due to UXO sweeps, range construction, support facilities, and access roads. |
| Environmental Impact Statement, Bogue Inlet Channel Erosion Response Project, Carteret and Onslow Counties, North Carolina (US Army Corps of Engineers, March 2004) | 0 | |
| EA for Testing of the Expeditionary Fighting Vehicle Prototypes at MCB Camp Lejeune, North Carolina (MCB Camp Lejeune, June 2004) | 0 | |
| EA for Stone Bay Urban Training Complex at MCB Camp Lejeune, Onslow County, North Carolina (MCB Camp Lejeune, May 2004) | 0 | |
| EA for US Joint Maritime Complex at MCB Camp Lejeune, North Carolina (MCB Camp Lejeune, January 2004) | 7.92 ha (19.57 ac) | Impacts due to construction or roads and new facilities |
| EA for the East Coast Introduction of the Assault Breacher Vehicle MCB Camp Lejeune, Onslow County, North Carolina (MCB Camp Lejeune, October 2003) | 0 | |
| Environmental Impact Statement: Introduction of F/A-18 E/F Super Hornets to the East Coast of the US (Department of the Navy, July 2003) | 183 ha (452 ac) | Impacts due to construction footprint, would likely be reduced in final design. |
| EA Routine Shore Fire Control Party Training EA, MCB Camp Lejeune, Onslow County, North Carolina (MCB Camp Lejeune, July 2002) | 0 | |

| Project | Estimated Impacted Vegetation | Notes |
|--|--|---|
| Environmental Impact Statement, Introduction of the V-22 to the Second Marine Aircraft Wing (Department of the Navy, October 1999) | 0 | Minor impacts to upland forest, however no specific acreage given in document. |
| EA Waterborne Refueling Training Operations on New River, Onslow County, North Carolina (MCB Camp Lejeune, April 1999) | 0 | |
| EA P-028 Infantry Platoon Battle Course, US MCB Camp Lejeune, North Carolina (MCB Camp Lejeune, September 1996) | 16,8 ha (40 ac) | Upland vegetation cleared for construction of support facilities, troop training, firing of weapons. |
| EA for P-933, Multi-Purpose Range Complex US MCB Camp Lejeune, North Carolina (MCB Camp Lejeune, August 1995) | 198 ha (489 ac) | Impacts due to construction of support facilities, tank trails, line-of-site clearing. |
| EA for MCON P-949, Multipurpose Training Range, MCB Camp Lejeune, North Carolina (MCB Camp Lejeune, May 1994) | 44.5 ha (110 ac) | Impacts due to construction of support facilities, tank trails, line-of-site clearing. |
| EA MCAS Cherry Point Range Operations, Craven, Carteret, and Pamlico Counties, North Carolina | 0 | Minor impacts. No specific impact numbers given. |
| EA for Engineer Training Complex and G-10 Range Realignment, MCB Camp Lejeune, North Carolina (October 2008). | 371 ha (928 ac) | Impacts are a result of clearing and excavation for construction of facilities. Includes herbicide area. Does not include utility corridors because it is not possible to provide a reasonably accurate estimate at this stage. |
| EA Construction and Operation of an Infantry Platoon Battle Course, Greater Sandy Run Area, MCB Camp Lejeune, North Carolina | 227 ha (560 ac)-range 257 ha (635 ac)-pine plantation | Impacts associated with range are due to firing line, objectives, roads and support facilities. Impacts associated with pine plantation are temporary and would be re-vegetated with long leaf pine. |
| Environmental Impact Statement US Marine Corps Grow the Force Initiative at MCB Camp Lejeune, MCAS New River, and MCAS Cherry Point, North Carolina | 630 ha (1556 ac) | Impacts due to construction footprint and will likely decrease during final design. |
| EA Wallace Creek Regimental Area, MCB Camp Lejeune, North Carolina | 64 ha (158 ac) | Impacts due to construction of facilities. |
| EA Testing of the Expeditionary Fighting Vehicle Prototypes, MCB Camp Lejeune, North Carolina | 0 | |
| Environmental Impact Statement/Overseas Environmental Impact Statement Navy Cherry Point Range Complex | 0 | |
| Environmental Impact Statement/ Overseas Environmental Impact Statement Navy Undersea Warfare Training Range | 0 | |
| Environmental Impact Statement, US Army Corps of Engineers, North Topsail Beach Shoreline Protection Project, Onslow County, North Carolina | 0 | |
| Environmental Impact Statement, US Army Corps of Engineers, West Onslow Beach and New River Inlet (Topsail Beach) Shore Protection Project, Pender and Onslow Counties, North Carolina | 0 | |
| No Action Alternative | 0 | |
| Proposed Action | 0 | |

Table 5.2-5
Impacts to Red-cockaded Woodpecker Clusters

| Project | Estimated Impact To RCW Cluster | Notes |
|---|---|--|
| EA for Temporary Beddown of Proposed Increase in End Strength at MCB Camp Lejeune, North Carolina (MCB Camp Lejeune, June 2008) | 0 | No red-cockaded woodpeckers currently inhabit the area, therefore it is not likely to adversely affect the species. 4 ha (10 ac) of potential habitat will be impacted |
| EA Proposed Military Operations Areas in Eastern North Carolina (Department of the Navy, June 2003) | 0 | |
| EA Marine Special Operations Command Complex, MCB Camp Lejeune, Onslow County, North Carolina (MCB Camp Lejeune, August 2007) | 1 (future RCW habitat partition) | |
| EA Construction and Operation of Digital Airport Surveillance Radar in Eastern North Carolina (MCAS Cherry Point, February 2007) | 0 | |
| EA Chaff and Flare Training, MCB Camp Lejeune, Onslow County, North Carolina (MCB Camp Lejeune, December 2006) | 0 | |
| EA for Construction and Operation of a Multi-Purpose Machine Gun Range in the Greater Sandy Run Area at MCB Camp Lejeune, North Carolina (MCB Camp Lejeune, January 2006) | 0 | Some potential future habitat, but no active clusters and it did not affect CL recovery goal |
| EA for D-30 Range, MCB Camp Lejeune, North Carolina (MCB Camp Lejeune, November 2005) | 0 | |
| EA Military Operations in Urban Terrain Training Complex Enhancements, MCB Camp Lejeune, Onslow County, North Carolina (MCB Camp Lejeune, September 2005) | 0 | 34 ha (85 ac) of suitable habitat will be removed. No impact to existing clusters. |
| EA for Steel-Cutting Pit, MCB Camp Lejeune, Onslow County, North Carolina, (MCB Camp Lejeune, September 2005) | 0 | |
| EA K-2 Ranges, MCB Camp Lejeune, Onslow County, North Carolina (MCB Camp Lejeune, March 2005) | 0 | 15.8 ha (39.1 ac) of suitable habitat would be impacted. Would not affect active clusters. |
| Environmental Impact Statement, Bogue Inlet Channel Erosion Response Project, Carteret and Onslow Counties, North Carolina (US Army Corps of Engineers, March 2004) | 0 | |
| EA for Testing of the Expeditionary Fighting Vehicle Prototypes at MCB Camp Lejeune, North Carolina (MCB Camp Lejeune, June 2004) | 0 | |
| EA for Stone Bay Urban Training Complex at MCB Camp Lejeune, Onslow County, North Carolina (MCB Camp Lejeune, May 2004) | 0 | |
| EA for US Joint Maritime Complex at MCB Camp Lejeune, North Carolina (MCB Camp Lejeune, January 2004) | 0 | |
| EA for the East Coast Introduction of the Assault Breacher Vehicle MCB Camp Lejeune, Onslow County, North Carolina (MCB Camp Lejeune, October 2003) | 0 (affected 1 cluster, but cluster retained sufficient habitat) | 6.5 ha (16 ac) of habitat will be impacted. 10 ac minimally qualify as habitat. |
| Environmental Impact Statement: Introduction of F/A-18 E/F Super Hornets to the East Coast of the US (Department of the Navy, July 2003) | 0 | 1.2 ha (3 ac) of habitat will be impacted. No known nesting individuals in project area. |
| EA Routine Shore Fire Control Party Training EA, MCB Camp Lejeune, Onslow County, North Carolina (MCB Camp Lejeune, July 2002) | 0 | No anticipated loss of clusters. |

| Project | Estimated Impact To RCW Cluster | Notes |
|--|---------------------------------|--|
| Environmental Impact Statement, Introduction of the V-22 to the Second Marine Aircraft Wing (Department of the Navy, October 1999) | 0 | |
| EA Waterborne Refueling Training Operations on New River, Onslow County, North Carolina (MCB Camp Lejeune, April 1999) | 0 | |
| EA P-028 Infantry Platoon Battle Course, US MCB Camp Lejeune, North Carolina (MCB Camp Lejeune, September 1996) | 0 | |
| EA for P-933, Multi-Purpose Range Complex US MCB Camp Lejeune, North Carolina (MCB Camp Lejeune, August 1995) | 0 | |
| EA for MCON P-949, Multipurpose Training Range, MCB Camp Lejeune, North Carolina (MCB Camp Lejeune, May 1994) | 0 | |
| EA MCAS Cherry Point Range Operations, Craven, Carteret, and Pamlico Counties, North Carolina | 0 | |
| EA for Engineer Training Complex and G-10 Range Realignment, MCB Camp Lejeune, North Carolina (October 2008). | 4 | 3 clusters would not retain enough habitat to meet the recovery standard for habitat although they would still meet the managed stability standard. Three Clusters would be adversely affected by the proximity of clear cuts, weapons firing, and by habitat fragmentation. Five partitions would be affected in the etc. area. No impact to MCB Camp Lejeune's ability to meet recovery goals. |
| EA Construction and Operation of an Infantry Platoon Battle Course, Greater Sandy Run Area, MCB Camp Lejeune, North Carolina | 0 | 411 ha (1041 ac) of habitat may be impacted, but 256 ha (633 ac) of this would be lost for the short term, but may provide quality long leaf habitat in the future. |
| Environmental Impact Statement US Marine Corps Grow the Force Initiative at MCB Camp Lejeune, MCAS New River, and MCAS Cherry Point, North Carolina | 0 | |
| EA Wallace Creek Regimental Area, MCB Camp Lejeune, North Carolina | 0 | |
| EA Testing of the Expeditionary Fighting Vehicle Prototypes, MCB Camp Lejeune, North Carolina | 0 | |
| Environmental Impact Statement/Overseas Environmental Impact Statement Navy Cherry Point Range Complex | 0 | |
| Environmental Impact Statement/ Overseas Environmental Impact Statement Navy Undersea Warfare Training Range | 0 | |
| Environmental Impact Statement, US Army Corps of Engineers, North Topsail Beach Shoreline Protection Project, Onslow County, North Carolina | 0 | |
| Environmental Impact Statement, US Army Corps of Engineers, West Onslow Beach and New River Inlet (Topsail Beach) Shore Protection Project, Pender and Onslow Counties, North Carolina | 0 | |
| No Action Alternative | 0 | May affect clusters, but no loss of clusters expected. Incidental take for training activities. |
| Proposed Action | 0 | May affect clusters, but no loss of clusters expected. Incidental take for training activities. |

With respect to the red-cockaded woodpecker and cumulative impacts, avoidance and minimization measures are currently being implemented at MCB Camp Lejeune to prevent or reduce impacts to the species. Avoidance and minimization measures are described collectively, in the: *MCB Camp Lejeune Recovery Plan for Red-cockaded Woodpeckers, Integrated Natural Resources Management Plan, Range and Training Regulations, Standing Operating Procedures for Range Control* (Base Order P3570.1B), and the *Environmental Handbook for Trainers*. Part of the recovery plan is extensive forest management to maintain existing populations and habitats and promote population growth including:

- Maintenance of a 61 m (200 ft) buffer around existing clusters. No cutting or damage to pine trees within the buffer zone is permitted
- MCB Camp Lejeune will attempt to speed up the rate of red-cockaded woodpecker population growth by promoting growth in areas that previously have been low priority for red-cockaded woodpecker growth
- MCB Camp Lejeune will promote red-cockaded woodpecker population growth in designated High-Use Training Areas by allowing unmarked recruitment clusters to be placed there; by designating high use areas where new clusters will not be marked, MCB Camp Lejeune will remove what has been a disincentive to red-cockaded woodpecker growth in certain areas
- Forest management practices described in the revised *Integrated Natural Resources Management Plan* represent a shift in management philosophy toward a system that maximizes the acreage and quality of red-cockaded woodpecker habitat, while allowing for efficient restoration of the longleaf pine-wiregrass ecosystem that historically occurred on MCB Camp Lejeune
- On Mainside MCB Camp Lejeune and the Greater Sandy Run Area, longleaf pine will be restored in areas of suitable soils, except where a site-specific analysis shows that short-term impacts would outweigh long-term benefits to the red-cockaded woodpecker
- MCB Camp Lejeune has an aggressive program to convert offsite loblolly pine to longleaf pine; to ensure that longleaf restoration provides a benefit in the long term, and does not cause habitat to fall below acceptable levels in the short term, MCB Camp Lejeune is developing an ecosystem management model to predict red-cockaded woodpecker habitat quantity and quality
- MCB Camp Lejeune will retain potential cavity trees in areas that are not being restored to longleaf pine, and no regeneration of loblolly will take place on soils that historically supported longleaf pine
- In restoring longleaf to the landscape, MCB Camp Lejeune will employ several methods, with the intent of converting loblolly stands in the most efficient manner, while retaining habitat value for red-cockaded woodpecker when necessary; during restoration efforts, existing trees of the species to be restored should be retained
- Periodic fires historically maintained the open structure of longleaf pine forests preferred by the red-cockaded woodpecker. Over most of the red-cockaded woodpecker's range, these fires occurred during the growing season, although natural fires did occur year-round. Continued use of fire, through an intensive prescribed burning program is critical to the survival and recovery of the red-cockaded woodpecker. Since red-cockaded woodpeckers prefer to nest and forage in habitat with little to no hardwood mid-story, the control of mid-story can have a dramatic effect on habitat quality. Prescribed burning is

generally the best way to control mid-story vegetation, especially small hardwoods. For reporting purposes, MCB Camp Lejeune will calculate the number of red-cockaded woodpecker management acres (as defined in the *Revised Red-cockaded Woodpecker Plan*) burned per year. For reporting purposes, MCB Camp Lejeune will calculate the number of red-cockaded woodpecker management acres (as defined in the *Revised Red-cockaded Woodpecker Plan*) burned per year.

- Forest management practices on MCB Camp Lejeune focus greater attention to red-cockaded woodpecker management needs at the level of individual clusters

The forest management practices on MCB Camp Lejeune will provide increased habitat for the red-cockaded woodpecker, which will promote red-cockaded woodpecker population growth on base. These practices will also maintain existing red-cockaded woodpecker populations. As a result negative cumulative impacts to the species are not anticipated.

Proposed Action. The increased training operations, including increased munitions usage on certain ranges, could have minor impacts on terrestrial biological resources. Although there would be no change in land use, and no on-station habitats would be changed, existing vegetation and wildlife, including threatened and endangered species, could possibly realize temporary, minor adverse impacts from added munitions and personnel movements. However, these temporary impacts would be mitigated through the use of current ongoing Standard Operating Procedures and mitigation measures outlined in the *Installation Natural Resources Management Plan*. The projects reviewed for cumulative impact assessment under the No Action Alternative were also reviewed for cumulative impacts resulting from the proposed action. Review of these projects determined that approximately 2652 acres of vegetation, primarily forested areas, have been impacted by previous projects. MCB Camp Lejeune contains approximately 92,000 acres of forested area comprised of hardwood and pine forests. Therefore while there have been additive effects associated with vegetation impacts from previous projects, they have been minimal and have not contributed to negative cumulative impacts to vegetation resources. These projects were required to follow mitigation measures outlined in the *Installation Natural Resources Management Plan*. Additionally, future actions will be required to follow the same mitigation measures, which will further help to reduce additive effects of vegetation loss.

Review of the previous projects also identified the loss of approximately 1109 acres of red-cockaded woodpecker habitat. Although there has been a loss of habitat the Base works with the US Fish and Wildlife Service to implement its own recovery plan, as described above, and has instituted a monitoring plan to aid in the continued growth of clusters on Base. Since implementing the management plan in 1986, there has been consistent annual growth average in active clusters of over 9 percent. There are currently 88 active red-cockaded woodpecker nesting clusters within MCB Camp Lejeune. Future actions will follow the guidelines set forth in the management and recovery plan to continue to protect the species.

Therefore, the proposed action, in conjunction with other past, present, or reasonably foreseeable projects, would not be expected to result in major adverse cumulative impacts to vegetation resources or the red-cockaded woodpecker.

5.2.9 Marine Biology

No Action Alternative. The current levels and types of training operations would continue under the No Action Alternative. Ongoing Standard Operating Procedures and minimization measures designed to protect marine resources on MCB Camp Lejeune water ranges would continue to be implemented. No long-term changes would occur to marine biological resources and impacts are considered to be short-term and minor. Other projects located at MCB Camp Lejeune would also be required to follow the *Integrated Natural Resources Management Plan* and other applicable requirements.

Other past and present projects that in conjunction with the No Action Alternative, that have the potential to result in cumulative impacts to marine biological resources include:

- *EA for Chaff and Flare Training, MCB Camp Lejeune, Onslow County, North Carolina:* Based upon the known low toxicity effects of chaff and flare and the exclusive use within the impact and range areas, there would be no impact to threatened and endangered marine animals. Studies have demonstrated that chaff is nontoxic to aquatic organisms. There have been no reports on any adverse impacts on threatened and endangered marine animals from worldwide chaff and flare training.
- *EA Testing of the Expeditionary Fighting Vehicle Prototypes, MCB Camp Lejeune, North Carolina:* The proposed action involves a very small increase in the use of existing water ranges that are subject to similar, ongoing usage. Special Operating Procedures for Range Control (Base Order P3570.1A) would apply to all Expeditionary Fighting Vehicle activities and avoid/minimize take of marine biological resources. Additional measures are recommended to avoid/minimize the possibility of incurring any take of marine mammals and sea turtles.
- *Environmental Impact Statement US Army Corps of Engineers, West Onslow Beach and New River Inlet (Topsail Beach) Shore Protection Project, North Carolina:* The green sea turtle, loggerhead sea turtle, Kemp's ridley sea turtle, and leatherback sea turtle occur in offshore waters and may be affected if hopper dredges are used. Periodic nourishment activities will be timed, to the extent practicable, to avoid the sea turtle nesting season and avoid hopper dredging during months when water temperatures are warm and turtles may be present. Placement of fill will increase nesting habitat for sea turtles. Turbidities would be temporarily elevated over existing conditions during initial construction and nourishment in the nearshore and offshore borrow areas. Benthic organisms in burrow areas will be removed, but will be recolonized by opportunistic species. Temporary impacts are expected on intertidal microfauna in the immediate vicinity of the beach nourishment, and to adult, larval, and juvenile fish due to turbidity and reduced benthic food in dredging and disposal areas. Minimal threats of collision with whales during dredging operations exist.
- *Environmental Impact Statement/Overseas Environmental Impact Statement Navy Cherry Point Range Complex:* Marine communities including *Sargassum*, benthic organisms and water column organisms would be temporarily disturbed from project activities. Marine mammals including non-endangered species act listed and endangered species act listed would be disturbed on an incidental basis by vessel movements, and the potential for vessel strike exists. Ingestion of debris, the potential for munitions strike are also of concern for these organisms. Training activities in general may lead to disturbance of

marine mammals, but specific avoidance measures are practiced to minimize negative impacts from these activities. Similar disturbances are expected for sea turtles.

- *EA Testing of the Expeditionary Fighting Vehicle Prototypes, MCB Camp Lejeune, North Carolina:* A small increase in the use of existing water ranges would take place for the proposed action. Standard Operating Procedures were applied to all Expeditionary Fighting Vehicle operation to minimize impacts to marine biological resources, including marine mammals and sea turtles.
- *EA Waterborne Refueling Training Operations on New River, North Carolina:* The proposed action included waterborne refueling operation on the New River, which had minor impacts to fish and shellfish. The conclusion is that the proposed action had no significant impact on these resources.
- *Environmental Impact Statement, US Army Corps of Engineers, West Onslow Beach and New River Inlet (Topsail Beach) Shore Protection Project, Pender and Onslow Counties, North Carolina:* The proposed action included potential impacts to various habitats (wetlands and essential fish habitat), fish, and benthic resources. Determinations were no effect for wetlands, the inlet, flats and sounds. Insignificant impacts were determined for essential fish habitat, including the estuarine water column, live/hard bottoms, and the marine water column.
- *EA Infantry Platoon Battle Course, US MCB Camp Lejeune, North Carolina:* Palustrine wetlands were impacted by the proposed action and mitigation measures were in effect.
- *EA Routine Shore Fire Control Party Training, MCB Camp Lejeune, North Carolina:* The potential for significant impacts to marine mammals from noise, ship collisions, or munitions strike was expected to be minimal during shore fire training operations.
- *Environmental Impact Statement/Overseas Environmental Impact Statement, Navy Undersea Warfare Training Range:* Impacts to the habitat include temporary increases in turbidity and the permanent reduction in quantity and quality of habitat, including essential fish habitat. Marine mammals including non-endangered species act listed and endangered species act listed would be disturbed on an incidental basis by vessel movements, and the potential for vessel strike exists. Specific avoidance measures are practiced to minimize negative impacts from these activities. The deployment of materials was determined to have no affect on marine mammals. Impacts from acoustic disturbances to marine mammals is expected, but the action will not jeopardize the existence of any species and impacts are considered negligible.

The No Action Alternative, in conjunction with other past, present, or reasonably foreseeable projects, would not be expected to result in major cumulative impacts to marine biological resources.

Proposed Action. The proposed action includes increased weapons firing. Ongoing Standard Operating Procedures and mitigation measures designed to protect marine resources on MCB Camp Lejeune would continue to be implemented. Impacts would be short-term and minor. Other projects located at MCB Camp Lejeune would also be required to follow the *Integrated Natural Resources Management Plan* and other applicable requirements. Because of their rare presence in the target areas, the increased weapons use associated with the proposed action would not result in an increased cumulative impact upon threatened and endangered species, including fish, mammals and sea turtles. There would be a minor cumulative impact on local marine mammals (bottlenose dolphin), due to the increased use of munitions and therefore the

minute increase in likelihood of a direct hit by a projectile or damaging noise impact if the animal is close to a detonation. Hence, there would be a minor adverse cumulative impact to marine mammals under the proposed action.

5.2.10 Hazardous Materials and Hazardous Waste Management

Land Ranges

No Action Alternative. The current levels and types of training operations would continue under the No Action Alternative. The existing conditions with respect to hazardous materials and hazardous waste management throughout the Base and at contaminated sites would not change.

The following projects were reviewed and evaluated to determine cumulative effects associated with the No Action Alternative and proposed action:

- *EA for Temporary Beddown of Proposed Increase in End Strength at MCB Camp Lejeune, North Carolina:* The proposed action for construction of temporary facilities to maintain operations for increased Marine numbers has the potential to disturb some IR and MRP sites that occur within possible construction boundaries. Planning of exact sites would take into account these areas, and avoidance would occur to the maximum extent practicable. However, if these sites are unavoidable, usual BMPs and agency coordination would be undertaken to ensure appropriate course of action is taken, with maximum regard for safety and avoidance of any contamination from the disturbance of these sites.
- *EA for Marine Special Operations Command Complex, MCB Camp Lejeune, Onslow County, North Carolina:* Construction of the complex would avoid three of four hazardous waste sites within the project area. The one site in question, a former gun position, cannot be avoided and a preliminary site assessment/investigation would be completed for this site. Once potential contamination is determined, remediation would occur as necessary, before construction would begin. The effects on Hazardous Materials and Hazardous Waste Management would be minimal.
- *EA for Chaff and Flare Training, MCB Camp Lejeune, Onslow County, North Carolina:* Chaff and flare are not manufactured with hazardous or toxic materials, and their end products are not considered to be hazardous or toxic. The only concerns with chaff and flare are incidental debris and residual remains would be primarily aesthetic, with landscape litter. Within the impact boundaries, this is not an issue. Marine Corps personnel will follow procedures established by Base Order P3570.1 for handling hazardous materials and petroleum, oils, and lubricants.
- *EA for Construction and Operation of Multi-Purpose Machine Gun Range in the Greater Sandy Run Area at MCB Camp Lejeune, North Carolina:* Construction and operation of the Multi-Purposed Machine Gun Range could result in potential hazardous materials impacts to humans and the environment due to hindering ongoing installation restoration cleanup efforts, or contaminating the environment from training activities. General and range specific Standard Operating Procedures would be implemented prior to range operations, and would outline measures to reduce the potential for contamination on the range complex. Due to the measures in place to reduce and avoid contamination, it is unlikely that this action will cause impacts that conflict with current environmental regulations.

- *EA Military Operations in Urban Terrain Training Complex Enhancements, MCB Camp Lejeune, Onslow County, North Carolina:* Impacts to Hazardous Materials and Hazardous Waste Management would be insignificant due to Marine Corps personnel following procedures established by Base Orders 5090.9 and 5090.91, the Hazardous Waste and Material Management Program, and the Oil and Hazardous Substance Pollution Prevention and Pollution Abatement Facility Management Plan, respectively. By following these Base Orders, release of contaminants from training and operations would not occur. Any construction in the vicinity of the dipping vat site would be coordinated with clean up efforts by Environmental Management Division.
- *EA for Steel Cutting Pit, MCB Camp Lejeune, Onslow County, North Carolina:* No significant impacts resulting from Hazardous Materials or Hazardous Waste Management are anticipated from implementation of the proposed action because all personnel would follow the procedures established by Base Orders 5090.9 and 5090.91 for the handling of hazardous materials and petroleum, oils, and lubricants. Base Order 5090.9 is the Base's *Hazardous Waste and Hazardous Material Management Program* (MCB Camp Lejeune, April 1999). Base Order 5090.91 is the Base's *Oil and Hazardous Substance Pollution Prevention and Pollution Abatement Facility Management Plan* (MCB Camp Lejeune, May 1999). By following procedures outlined in these base orders, personnel would avoid a release of contaminants during training and operations at the new steel-cutting pit.
- *EA for K-2 Ranges, MCB Camp Lejeune, Onslow County, North Carolina:* No significant impacts resulting from Hazardous Materials or Hazardous Waste Management are anticipated from implementation of the proposed action because all personnel would follow the procedures established by Base Orders 5090.9 and 5090.91 for the handling of hazardous materials and petroleum, oils, and lubricants, as described above. Following of the procedures outlined by these Base Orders will prevent any release of contamination from training and operations on the K-2 Ranges.
- *EA for Stone Bay Urban Training Complex at MCB Camp Lejeune, Onslow County, North Carolina:* The Marine Corps follows standard operating procedures for handling fuel, oil, and other potential contaminants that minimize the potential for contaminants to enter surface waters or groundwater. A response team would be dispatched to the site of the spill to quickly clean up any material released. Lead from small arms rounds is classified as a hazardous material. Lead and brass casings from spent ammunition would be collected from situational training exercise sites and transported to approved collection sites. Procedures are in place to minimize the potential effects of handling hazardous materials. Therefore, there is no potential to effect the environment from this action.
- *EA for US Joint Maritime Complex at MCB Camp Lejeune, North Carolina:* No significant impacts resulting from hazardous materials management are anticipated from implementation of the proposed action due to personnel following the procedures established by Base Orders 5090.9 and 5090.91 for the handling of hazardous materials and petroleum, oils, and lubricants, thereby avoiding release of contaminants during routine maritime special missions training and operations at complex facilities. Prior to construction at the Decentralized Alternative, remediation would be performed where there is soil and groundwater contamination near the leaking underground storage site Y-BBSBB99-01U, near building BB-30. All excavated soils would be stockpiled on-site, tested, and properly disposed. For any aboveground storage tanks in the area that would need to be removed, the tanks, contents of the tanks, and residual materials would be

properly disposed. Personnel performing intrusive activities must be 40-hour HAZWOPER trained. Coordination with the Base's Environmental Quality Branch, Environmental Management Division would be conducted for all remediation efforts.

- *EA for East Coast Introduction of the Assault Breacher Vehicle MCB Camp Lejeune, Onslow County, North Carolina:* The demolition of the 2d CEB storage building would remove and dispose of hazardous or toxic materials (e.g., asbestos, fluorescent light bulbs, PCB light ballasts, lead paint and mercury switches). The impact of the hazardous and non-hazardous debris generated from the building demolition would be temporary, and no significant impacts would occur. The 2d CEB compound is located on an Installation Restoration Program Site. Base Orders and proper procedures would be followed to limit the amount of exposure, as well as ensuring that disturbance of the Installation restoration Program site will be minimized or remediated as necessary before activity begins.
- *EA for Routine Shore Fire Control Party Training MCB Camp Lejeune, Onslow County, North Carolina:* The primary contaminants likely to be released while using explosive ordinance during training include trinitrotoluene (TNT) and cyclonite (RDX), along with some lesser compounds that are used in fuses and primers. However, after detonation, the combustion that occurs normally produces oxides of carbon, nitrogen, and water, thereby making it unlikely that significant quantities of the parent explosives would be released into the environment. Additionally, Marine Corps personnel would follow procedures outlined by Base Order P3570.1, further reducing the chances for environmental contamination.
- *Environmental Impact Statement for the Introduction of the V-22 to the Second Marine Aircraft Wing:* One Installation Restoration Program site occurs within the vicinity of the proposed action. Building AS-318 is in the vicinity of Site 86 and construction of the addition to that building could disrupt the groundwater plume. To prevent exacerbation of groundwater contamination at this site mitigation measures would be taken by the construction contractor which may include the following: construction work would be done in the dry season when the water table is the lowest; groundwater encountered during construction would be containerized and tested. Contaminated water would be properly disposed; If needed, a stormwater detention pond would be constructed, with a liner to prevent contaminated groundwater from interacting with collected runoff water. The MV-22 would be one of the most "environmentally friendly" aircraft in the current Department of Defense aircraft inventory. Pollution Prevention (P2) has been an integral part of the MV-22 design. Program contracts have required eliminating a significant number of hazardous substances used in the construction and maintenance of the aircraft, or reducing the amount of hazardous substances where elimination was not feasible. Based on the design of the aircraft and the preventative measures that will occur during construction activities hazardous waste impacts would be minimal.
- *EA for Waterborne Refueling Training Operations on New River, Onslow County, North Carolina:* There is potential for release of unleaded gasoline and diesel fuel from these training operations. Use of a three-level rigid containment system for the fuel containers, back up equipment, empty fuel containers, extra three-level rigid containment system, safety measures, pollution prevention, measures, Spill Response Kits, Spill Contingency Plan, and adherence to standard operating procedures would reduce chances for environmental contamination.

- *EA for P-933, Multi-Purpose Range Complex US MCB Camp Lejeune, North Carolina:* No existing contamination has been found within the range vicinity, and there would not be routine vehicle maintenance occurring here. The filling of vehicle fuel tanks may have the potential for contamination. Accidental spill response would be prepared and implemented in case of a fuel spill. There would be no vehicle or tank washing at the proposed project site.
- *EA MCAS Cherry Point Range Operations, Craven, Carteret, and Pamlico Counties, North Carolina:* The proposed action would result in an increase in training operations involving hazardous constituents. Amounts of expended training materials would increase in rough proportion to the overall increases in these training operations. No new types of hazardous constituents would be used at MCAS Cherry Point. The increases in training would increase the amount of lead bullets and other munitions expended in the range areas. Live-fire small arms ranges would retain their berms to stop projectiles fired at the ranges. Although more lead from live-fire activities would be fired into the impact berms, the installation has mitigation measures in place so berms are well maintained and re-graded as needed. Increases in hazardous waste generation are anticipated to be incrementally greater than current hazardous waste generation, and would continue to be managed in compliance with Marine Corps Order P5090.2A.
- *EA for Construction and Operation of an Infantry Platoon Battle Course, Greater Sandy Run Area, MCB Camp Lejeune, North Carolina:* No significant impacts are anticipated to result from implementation of the proposed action. No existing contamination has been discovered near the proposed project area. Therefore, there is no potential to impact Installation Restoration Sites or other cleanup efforts. Since none are present in or near the project area, no underground storage tanks or stormwater management units would be affected by the proposed project. All personnel would follow the procedures established by Base Orders 5090.9 and 5090.91 for the handling of hazardous materials and petroleum, oils, and lubricants. By following the procedures outlined in these documents, personnel would avoid releases of contaminants during training and operations at the Infantry Platoon Battle Course. Only inert and training practice ammunition would be authorized for use at the proposed Infantry Platoon Battle Course. Any metal contamination would be negligible because of the dispersion of rounds over the large surface danger zone and the low solubility of these metals. Furthermore, the Final Military Munitions Rule (40 CFR § 260-266 and 270) states that when military munitions are used for their intended purpose (i.e., training), they are not considered hazardous waste for regulatory purposes, even if their use results in the deposit of munitions on land. Therefore, the munitions that would be used at the proposed Infantry Platoon Battle Course would not cause significant impact to the environment or conflict with any existing regulations.
- *Environmental Impact Statement US Marine Corps Grow the Force Initiative at MCB Camp Lejeune, MCAS New River, and MCAS Cherry Point, North Carolina:* The proposed action would take place near several Installation Restoration sites. The proposed construction activities would avoid disturbing contaminated soil or groundwater associated with these sites to the maximum extent practicable. For a potentially affected Installation Restoration Site, remediation of contamination would be completed as needed prior to construction activities. Usual Best Management Practices would be employed in the handling, removal, and disposal of potential hazardous substances.

Implementing the proposed action would not result in adverse impacts from hazardous materials, waste management, or existing contaminated sites.

- *EA for Wallace Creek Regimental Area, MCB Camp Lejeune, North Carolina:* Implementation of the proposed action would result in an increase in the use of various hazardous materials including but not limited to; oils, lubricants, acids, solvents and degreasers. This increase would in turn result in an increase in the volumes of hazardous materials and wastes entering and leaving the base. During operations and maintenance of the proposed Wallace Creek Regimental Area, the management of hazardous materials would be conducted in accordance with all applicable laws and regulations, and personnel would be required to follow the procedures established by Base Orders 5090.9 and 5090.91 for handling hazardous materials and petroleum, oil, and lubricants. By following these procedures, releases of contaminants would be minimized. Handling of hazardous materials and wastes by personnel would be conducted in accordance with all applicable procedures in order to minimize spill occurrence and any accidental releases would be immediately addressed in accordance with the facility spill response plan. As a result, impacts from accidental releases or hazardous material would be considered minor.
- *Environmental Impact Statement/Overseas Environmental Impact Statement Navy Cherry Point Range Complex:* Hazardous materials, waste, and munitions expenditure materials used and generated during the Navy Cherry Point Study Area operations would be managed in accordance with applicable federal and state regulations, and Department of Defense service guidelines. Any spills or mishaps would be handled pursuant to all applicable federal and state laws, and Department of Defense regulations. Munitions expenditures material would introduce small amounts of potentially hazardous chemicals into the marine environment. However, water quality analysis of all current and proposed operations indicates that concentrations of constituents of concern associated with material expended in the Navy Cherry Point Study Area are well below water quality criteria established to protect aquatic life. Overall, impacts from hazardous materials or waste management are anticipated under the No Action Alternative, Alternative 1, or the Preferred Alternative (Alternative 2) would be less than significant. Discarded munitions expenditure material would be deposited in offshore areas, become buried in the sea floor sediments, and have no measurable environmental effects.
- *Environmental Impact Statement, US Army Corps of Engineers, North Topsail Beach Shoreline Protection Project, Onslow County, North Carolina:* A remote possibility exists that anti-aircraft ammunition could be present in the material to be dredged from offshore borrow areas and placed on the beach.
- *Environmental Impact Statement, US Army Corps of Engineers, West Onslow Beach and New River Inlet (Topsail Beach) Shore Protection Project, Pender and Onslow Counties, North Carolina:* A remote possibility exists that anti-aircraft ammunition could be present in the material to be dredged from offshore borrow areas and placed on the beach.

MCB Camp Lejeune would continue to follow all federal, state and installation requirements. Ongoing and planned remedial actions and pollution abatement programs would continue. The No Action Alternative, in conjunction with past, present, or foreseeable actions, would not result in adverse cumulative impacts.

Proposed Action. This alternative would result in added hazardous constituents being deposited on the ranges from munitions, and an increase in hazardous materials and weapons storage and movement on the Base, including additional storage and movement of petroleum products and other machinery maintenance chemicals. The level of increase in the use of hazardous materials would vary from current levels in different degrees, but the amounts of expended training materials would be a minor increase when compared to existing requirements.

The amount of hazardous waste generated would increase, commensurate with the increase in training operations. The increase in hazardous materials and hazardous waste associated with the proposed action would increase the potential damage a release might cause; however, the existing Hazardous Materials and Hazardous Waste Management programs and capabilities at MCB Camp Lejeune could easily handle such an eventuality and contain the release.

Other projects located at MCB Camp Lejeune would also adhere to all requirements. The increase in hazardous materials and normal industrial hazardous waste associated with this alternative is not expected to perceptively add to the existing cumulative hazardous materials and waste impacts associated with the functions of the Base. Although hazardous weapons constituents are not considered hazardous waste until they leave the range, the increase in hazardous constituents from expended munitions in the soil of the ranges or water areas surrounding targets amounts to a potential contaminant and would be an added minor negative cumulative impact. Operational ranges will continue to be evaluated at a minimum every five years to determine whether a release or substantial threat of a release of munitions constituents from a range to an off-range area poses an imminent and substantial threat to human health and/or the environment. If a significant increase in range operations occurs or new munitions types are used on the range then the assessment should occur earlier than five years to ensure no additional threat resulting from the change in operation.

Water Ranges

No Action Alternative. The current levels and types of training operations would continue under the No Action Alternative. MCB Camp Lejeune would continue to follow all federal, state, and installation requirements. Other projects located at MCB Camp Lejeune would also adhere to all requirements. Therefore, the No Action Alternative, in conjunction with past, present, or foreseeable actions, would not result in adverse cumulative impacts.

Proposed Action. The proposed action's hazardous materials and hazardous waste impacts would be limited to hazardous constituent releases from the munitions that fall into the water and migrate off of the range or from hazardous constituents that might migrate from land ranges into the water. This impact would be extremely small, but in conjunction with past, present, or reasonably foreseeable projects, would amount to a minor adverse cumulative impact on the waters adjacent to the target areas.

5.2.11 Public Health and Safety

No Action Alternative. The current levels and types of training operations would continue under the No Action Alternative. Public health and safety concerns are centered on laser and munitions use on the MCB Camp Lejeune Range Complex. The existing safety precautions would continue in effect; therefore, there would be no impact. Other projects located at MCB Camp Lejeune would also adhere to all requirements. Therefore, the No Action Alternative, in conjunction with past, present, or foreseeable actions, would not result in adverse cumulative impacts.

The following past, present and reasonably foreseeable projects have been determined to have possible impacts to public health and safety:

- *EA Proposed Military Operations Areas in Eastern North Carolina:* Based on information contained in a Federal Aviation Administration database the potential for mishaps during military aircraft training operations is low and is not expected to change under the Core and Mattamuskeet alternative. The outstanding safety record for special use airspace in eastern North Carolina is expected to continue under this alternative. The potential risk for bird/aircraft strike hazards is assessed as a function of flight hours flown in a given airspace as well as the population and distribution of waterfowl (e.g., geese, ducks, and swans) and raptors that may be present annually and seasonally in the same area. According to the US Bird Avoidance Model, moderate to severe seasonal Bird-Animal Strike Hazard risks would theoretically exist in the proposed Military Operating Areas. These risks would be associated with waterfowl movements during the dawn and dusk periods while fall and spring migrations are in progress. However, based on documented US Air Force experience, over 98 percent of Bird-Animal Strike Hazard incidents occur at/or below an altitude of 914 m (3,000 ft) mean sea level. Since, the floor of the proposed Core and Mattamuskeet Alternative is 914 m (3,000 ft), in actuality bird-animal strike hazard is expected to be low for this alternative.
- *EA Chaff and Flare Training MCB Camp Lejeune, North Carolina:* Based upon a 2003 public health assessment of Vieques Island by the Agency for Toxic Substances and Disease Registry, chaff exposure by inhalation and ingestion does not constitute a public health or toxicity hazard concern. Similar conclusions exist for flare ingestion by humans and animals.
- *EA for D-30 Range, MCB Camp Lejeune, North Carolina:* When equipment funds are available, the proposed range would be upgraded with a bullet trap and an air filter system; and the earthen berm would be removed, including the removal of any lead contaminated materials. These upgrades would greatly improve range safety and would have positive effects on public safety. The bullet trap would capture spent rounds, and the air filtering system would reduce the potential safety and environmental impacts from spent lead rounds and lead dust generated at the range. However remote, there is a slight possibility that a round could escape the range by a ricochet effect. As an added precaution, a 100 percent surface danger zone is retained.
- *EA K-2 Ranges, MCB Camp Lejeune, North Carolina:* The proposed action includes several components that would provide a beneficial impact by improving range safety conditions. The combination of new signs, the installation of automated targetry, vegetation management, and access road improvements would create a safer training environment. The nearly 88 percent reduction in the water area affected by surface

danger zones would improve safety for commercial and recreational boaters. Under the proposed action, the Commanding General, MCB Camp Lejeune, would continue to exercise authority granted in 33 CFR Par 334, as it applies the New River restricted areas. Areas of the New River subject to controlled access when K-2 ranges are being used for training would remain the same, including the Grey Point, Farnell Bay, Stone Bay, and Stone Creek sectors. The shoreline along the affected area would continue to be equipped with signs and rotating/flashing lights warning of the danger. Further, the construction of an observation tower at Rhodes Point would provide another means to ensure public safety in the areas affected by live-fire training at the K-2 ranges.

- *EA for Stone Bay Urban Training Complex at MCB Camp Lejeune, North Carolina:* The direct and indirect affects to human health and safety are similar for both the proposed action and the No Action Alternatives. However, the proposed action would permit the use of live-fire weapons inside the proposed multi-story urban assault building and the existing shoot house. MCB Camp Lejeune take safety seriously and have established standing operating procedures that dictate the procedures for conducting urban training using non-lethal and live-fire weapons. Emergency service personnel are present during training to provide emergency response, if required. Other specific safety measures have been implemented as well.
- *EA for the East Coast Introduction of the Assault Breacher Vehicle MCB Camp Lejeune, North Carolina:* Public health and safety issues would primarily be related to construction workers and other persons on-site during construction activities. Construction workers would use hearing protection during work hours and would follow Occupational Health and Safety Administration standards and procedures. The proposed action would consist of the same types of training currently conducted on site, therefore no additional public health and safety concerns or impacts would occur.
- *EA Routine Shore Fire Control Party Training, MCB Camp Lejeune, North Carolina:* Marine Corps Order 3570.1A and Army Regulation 385-63 establish policies and procedure for firing ammunition for training, target, and combat. These regulations include standards for determining surface danger zones for target areas. The Navy and Marines have existing data from studies of naval gunfire which is used in model to establish the surface danger zones. In addition, there are regulations that determine a minimal angle for fire artillery to prevent skipping. Marine Corps Order P3570.1B provides procedures for handling any live ordnance that must be removed in the event that it has landed outside a designated area for example if the round should fall short.
- *EA for P-028 Infantry Platoon Battle Course, MCB Camp Lejeune, North Carolina:* Implementation of the proposed action would provide live-fire training facilities that will utilize machine guns. Safety and Standard Operating Procedures are in place for those weapons. Construction of the proposed project would result in the development of site specific procedures for the individual range operation. Additional warning signs, barriers and range guards would be put in place to ensure public awareness and safety.
- *EA for P-933 Multi-Purpose Range Complex, Greater Sandy Run Area:* Implementation of the proposed action would provide live-fire training facilities that will utilize machine guns. Standard operating procedures are in place for those weapons. Construction of the proposed project would result in the development of site specific procedures for the individual range operation. The use of laser range finder in the M1A1 tank at the proposed project could injure the eyes. The lack of reflective surfaces (large body of water) within the proposed training area and the use of laser filter would minimize the

risk of eye injuries. Additional warning signs, barriers and range guards would be put in place to ensure public awareness and safety.

- *EA for P-949 Multi-Purpose Training Range, MCB Camp Lejeune, North Carolina:* Safety and standard operating procedures exist for the weapons and incendiary devices to be used at the facility. The Marine Corps regulation also requires site specific procedure to be developed for the range operation. Target design, a surface danger zone and restricted airspace will be established to provide safe range operations. A laser range certification of the range would be required before laser would be allowed. The certification process would review hazards and include mitigation measures.
- *EA Construction and Operation of an Infantry Platoon Battle Course, Greater Sandy Run Area, MCB Camp Lejeune, North Carolina:* Implementation of this action would have no adverse impact on safety. The alternative would establish a surface danger zone that would restrict access to and use of the affected area while the battle course is active. The restriction would be enforced by the placement of signs, lights, or barriers, and road guards. The range would be equipped with signs indicating lateral and forward limits of firing to ensure that rounds fired terminate within the surface danger zone. Battle zone specific operation procedures would be produced to facilitate safe training evolutions, as required by Marine Corps regulations (MCO P3570.1B/AR 385-63 and Base Order BO3570.1A). The entire surface danger zone for the proposed facility would be contained within the installation boundary and, therefore, presents no risk to the public.
- *Environmental Impact Statement/Overseas Environmental Impact Statement Navy Cherry Point Range Complex:* The safety procedures implemented for this action would be effective in protecting public health and safety. Therefore, the types of operations that would have been included would not result in any measurable changes in accidents, injuries, or illnesses. Because of the Navy's strict implementation of safety measures, current use of high-explosive bombs has not resulted in any civilian deaths or injuries. One of the Alternatives would establish a littoral Mine Warfare Training Area in the Cherry Point Operating Area and in nearshore waters in Onslow Bay. Safety measures that would be implemented for the establishment and use of these training areas would include: 1) Avoiding shipping lanes, popular dive sites, shipwrecks, and recreational fishing areas when selecting training area locations; 2) If a training area was fouled by recreational pursuits, cancelling or delaying training until the training area was clear; 3) Using the live fire mine countermeasures platforms only in designated live-fire areas. As a result of these measures, there would not be measurable changes in accidents, injuries, or illnesses compared to the No Action Alternative. This project would have no significant impact on public health and safety due to Naval Activity in US territory. In accordance with Executive Order 12114, naval activity in non-territorial waters would not cause harm to public safety.

The No Action Alternative, in conjunction with past, present, or reasonably foreseeable future actions, would not be expected to result in adverse cumulative effects to public health and safety.

Proposed Action. The same project as those discussed above have implication in the proposed action impacts. The proposed action would involve increased laser use at MCB Camp Lejeune ranges proportionally with the increase in training exercises. MCB Camp Lejeune is certified for laser use and has formalized safety precautions that must be followed to protect the public from injury, including buffer zones, notification procedures, area restrictions and exercise shut-down

procedures. Because of the comprehensive safety precautions and since no accidents have occurred in over 10 years of laser use, it is considered that there would be no increased adverse impacts associated with the moderate increased use of lasers. Other project located at MCB Camp Lejeune would also have to adhere to all requirements. Therefore, the proposed action, in conjunction with past, present, or reasonably foreseeable projects, listed above in the No Action discussion, would not result in cumulative impacts.

There would be an increase in munitions used on certain ranges. Because this increase in munitions is small, and effective mitigation measures are in place to protect the impact areas, and that all other projects would have to adhere to the same regulations, it is considered that there would not be an increase in adverse cumulative impacts due to the increased level of munitions used.

The increase in aircraft sorties, while small, nevertheless increases the chance of bird/animal-aircraft strike accidents and the potential for injury or damage to pilots, aircraft and/or persons or property on the ground. This increased danger is small and is not considered to be sufficient enough to amount to an additive adverse cumulative impact to public health and safety within the area for impact analysis.

5.2.12 Civil (Non-Military) Aircraft Operations

No Action Alternative. Under the No Action Alternative, MCB Camp Lejeune Range Complex activities in special use airspace would remain the same as they are today. Commercial and general aviation would continue to conduct their current operations to and from the public and private use airports, along airway route structures and along the coastal areas following their existing procedures. There is no impact on civil aircraft operations under the No Action Alternative.

Other past and present projects that, in conjunction with the No Action Alternative, have the potential to result in cumulative impacts to civil (non-military) aircraft operations include:

- *EA Proposed Military Operations Areas in Eastern North Carolina:* This EA analyzed the implementation of the Core Military Operations Area Alternative which would result in 1,404 day sorties and 56 night sorties conducted over the Core Banks. This would equate to about 6 sorties of one minute duration per 24-hour period (assuming 260 training days per year). Cumulatively, the Core Military Operations Area would be used for a total of about 24 hours per year (5.6 minutes per training day). The Core Military Operations Area would provide an essential training benefit to Marine Corp aviators by allowing entry to and exit from W-122 (the Atlantic Ocean) into existing R-5306A at a minimum altitude of 914 m (3,000 ft) mean sea level and at speeds less than supersonic. General aviation aircraft would continue to be able to fly at all times up to 914 m (3,000 ft). Military pilots would be responsible for avoiding all other aircraft that could be flying Instrument Flight Rules or Visual Flight Rules within or near the Military Operations Area. Military aircraft would not be able to fly parallel to the Core Banks (only perpendicular) or linger within proposed Core Military Operations Area. Core Military Operations Area airspace would be considered in use (active) only when scheduled by

military aircraft. In addition, there would be no potential to adversely affect non-participating civil aircraft operations as a result of the proposed Core Military Operations because the level of projected operations is low and there are no public or private airports located in the land areas underlying the proposed Military Operations Area.

- *EA Marine Special Operations Command Complex, MCB Camp Lejeune, Onslow County, North Carolina:* This EA analyzed the impacts of the construction, operation, and maintenance of the Marine Special Operations Command Complex on roughly 220 ha (544 ac) in the Stone Bay Rifle Range part of the installation. Also addressed in this EA were the impacts from increased flight operations at Tactical Landing Zone Owl. The instrumented helicopter pad would be constructed on the parade field in the northern part of the project area. The existing Tactical Landing Zone Owl in the southeast portion of the complex would be roughly doubled in size to 2.4 ha (6 ac) to become the new helicopter pad. So, instead of two aircraft being able to land at Tactical Landing Zone Owl, the expanded Tactical Landing Zone would accommodate four aircraft at a time. The current use of Tactical Landing Zone Owl consists of approximately 60 flight operations per year. Once this landing zone is expanded, proposed Marine Special Operations Command flight operations would be approximately 350 per year. Aircraft likely to be used by Marine Special Operations Command during training would include: MV-22, CH-53E, UH-1N, AH-1W, MH-47E/G, and MH-60. Special use airspace would be considered in use (active) only when scheduled by military aircraft. There would be no potential to adversely affect non-participating civil aircraft operations as a result of the increased flight operations at Tactical Landing Zone Owl.
- *EA Construction and Operation of Digital Airport Surveillance Radar in Eastern North Carolina:* The objective of the radar is improved airspace management, air traffic control services, and safety in eastern North Carolina. The Digital Airport Surveillance Radar system would provide continuous and complete radar surveillance coverage in eastern North Carolina for air traffic control services. The analysis concluded that the impacts would be beneficial to all airspace users.
- *EA Chaff and Flare Training, MCB Camp Lejeune, Onslow County, North Carolina:* Chaff and flare training is part of the training provided to aircrews on electronic warfare and defensive measures. Chaff has long been considered a potential airspace safety issue. There have been past incidences where military chaff use has interfered with Federal Aviation Administration civilian radar frequencies. As a result, chaff manufacturers have produced military training chaff that has certain radar band frequencies that will not interfere with civilian radar frequencies. Chaff training within MCB Camp Lejeune's designated boundaries would occur at low altitudes where military air traffic controllers and aviation trainers can monitor the known chaff radar frequencies. The Federal Aviation Administration has designated MCB Camp Lejeune's airspace as restricted to military aircraft. No civilian aircraft can fly into MCB Camp Lejeune's airspace. MCAS New River, MCB Camp Lejeune, and Federal Aviation Administration air traffic controllers routinely monitor the airspace in and around MCB Camp Lejeune. MCB Camp Lejeune would advise the Federal Aviation Administration of chaff and flare training events as an air safety measure. The analysis in this EA concluded that the impacts would not be significant.
- *EA for Construction and Operation of a Multi-Purpose Machine Gun Range in the Greater Sandy Run Area at MCB Camp Lejeune, North Carolina:* This EA analyzed impacts from helicopters conducting door gunnery exercises from below 152 m (500 ft)

above ground with inert rounds. Restricted airspace R-5303A/B/C and R-5304A/B/C bounds the Greater Sandy Run Area and encompasses all the ordnance impact areas and the helicopter training areas discussed in this EA. In accordance with Federal Aviation Administration ruling, the federal airway Victor 139 (V139) crosses through R-5303A/B/C and R-5304A/B/C airspace. Commercial and/or general aviation aircraft using V139 normally transit R-5303A and R-5304A at or above 2,133.6 m (7,000 ft) mean sea level or are vectored around it by air traffic control with no interference to MCB Camp Lejeune Range Complex activities. When non-participating aircraft on V139 are unable to transit above the Restricted Airspace altitudes in use and unable to accept vectors around, range activity is either capped or a cease-fire is imposed to accommodate the aircraft on the airway. For these reasons, the additional helicopter exercises would not impact civil (non-military) aircraft operations.

- *Environmental Impact Statement: Introduction of F/A-18 E/F Super Hornets to the East Coast of the US:* This Environmental Impact Statement analyzed the impacts of homebasing eight Super Hornet fleet squadrons (96 aircraft) and one Super Hornet Fleet Replacement Squadron (24 aircraft) at Naval Air Station Oceana, and two fleet squadrons (24 aircraft) at MCAS Cherry Point, and to construct an Outlying Landing Field in Washington County. The analysis considered that there may be significant impacts on airspace in the area around the Outlying Landing Field proposed Site C. Aircraft operations at Site C may affect commercial and private users of airspace in the vicinity of the Plymouth Municipal Airport in Plymouth, North Carolina. Aircraft will not be able to utilize Visual Flight Rules (VFR) when transiting airspace in the area of Site C. Additionally, the Navy will purchase a private airfield and provide relocation assistance to the owner. The Navy proposed to mitigate the impacts on airspace by designating a flights operations plan. This will be submitted to the Federal Aviation Administration for a final aeronautical review/approval of Site C. Deconfliction of military and civilian air traffic will be accomplished through the establishment of Class D airspace in conjunction with an air traffic control tower at Site C. Air traffic flying in Class D airspace at altitudes of 762 m (2,500 ft) or below will be required to contact the control tower in accordance with Federal Aviation Administration regulations. Air traffic control personnel at the tower will facilitate the sequencing of aircraft inbound to the Outlying Landing Field and provide other air traffic with advisories regarding Outlying Landing Field operations. The Navy will prepare/update and implement Air Installations Compatible Use Zones plans for Naval Air Station Oceana, MCAS Cherry Point, and Outlying Landing Field Site C. This will ensure that the local communities understand the Navy's operational mission and will assist the local communities in land use planning decisions.
- *Environmental Impact Statement, Introduction of the V-22 to the Second Marine Aircraft Wing:* This Environmental Impact Statement analyzed the impacts of introducing the MV-22, a new type of tiltrotor aircraft, to the Second Marine Aircraft Wing. The analysis also considered the impacts of aircraft training and readiness operations at existing outlying landing fields, targets, military training routes, and within special use airspace in eastern North Carolina. The Environmental Impact Statement concluded that none of the impacts of basing the MV-22 at MCAS New River were considered to be significant.
- *EA P-028 Infantry Platoon Battle Course, US MCB Camp Lejeune, North Carolina:* This EA evaluated the impacts of helicopter training exercises in two helicopter landing zones. There are two private airports which have some public use airspace in the vicinity of the proposed project. Sky Manor Airpark and Holly Ridge Airport would be impacted by the

proposed action. Actions taken to minimize the impacts to the two airports include exempting peripheral segments of the Greater Sandy Run Area airspace which overlap the public use airspace from the restricted airspace.

- *EA for P-933, Multi-Purpose Range Complex US MCB Camp Lejeune, North Carolina:* This EA evaluated the impacts of constructing and operating a series of ranges and support facilities in the Greater Sandy Run Area that would provide simultaneous, combined tank, light armored vehicle, dismounted infantry, and attack helicopter training. There are two private airports which have some public use airspace in the vicinity of the proposed project. Sky Manor Airpark and Holly Ridge Airport would be impacted by the proposed action. Actions taken to minimize the impacts to the two airports include exempting peripheral segments of the Greater Sandy Run Area airspace which overlap the public use airspace from the restricted zone.
- *EA for MCON P-949, Multipurpose Training Range, MCB Camp Lejeune, North Carolina:* This EA assessed the impacts of establishing restricted airspace over the Greater Sandy Run Area for safe operation of the Multipurpose Training Range. Because Multipurpose Training Range operations take place in the lowest layer of airspace from 0 to 2,133.3 m (0 to 6,999 ft) above ground level. Commercial and/or general aviation aircraft transit at or above 2,133.6 m (7,000 ft) mean sea level or are vectored around it by air traffic control with no interference to training activities. When non-participating aircraft are unable to transit above the restricted airspace altitudes in use and unable to accept vectors around, range activity is either capped or a cease-fire is imposed to accommodate the aircraft on the airway. In addition, joint use protocols ensures that when military training operations are not being conducted, the restricted airspace is opened to civil aviation and non-participating military aircraft. For these reasons, the additional helicopter exercises would not impact civil (non-military) aircraft operations.
- *EA MCAS Cherry Point Range Operations, Craven, Carteret, and Pamlico Counties, North Carolina:* The analysis in this EA indicated that implementation of the No Action Alternative, Alternative 1, or Alternative 2 would not result in impacts on civil aircraft operations. The preferred alternative includes additional sortie-operations in R-5306A associated with rotary-wing aircraft (CH-53, AH-1, and UH-1) squadrons. However, airspace training exercises and locations would remain the same and there would be no changes to the designated purpose, dimensions (shape or altitude), or times of use of the existing special use airspace for the MCAS Cherry Point Range Complex.
- *Environmental Impact Statement/Overseas Environmental Impact Statement Navy Cherry Point Range Complex:* This Environmental Impact Statement/Overseas Environmental Impact Statement addresses marine and air traffic within the vicinity of the Navy Cherry Point Operating Area. Military and civilian use of the offshore sea and air areas is compatible with Navy ship activities. Where naval vessels and aircraft are conducting operations that are not compatible (e.g., hazardous weapons firing), they are confined to the Operating Area away from shipping lanes and inside special use airspace (W-122). The analysis of environmental stressors indicated that implementation of the No Action Alternative, Alternative 1, or Alternative 2 would not result in unavoidable significant adverse effects to civil aircraft operations. The flow of civil air traffic in eastern North Carolina is routinely routed above, around, and sometimes through active special use airspace by Air Route Traffic Control Centers. In addition, joint use protocols ensure that airspace becomes available for access by non-participating aircraft during periods when the special use airspace is not needed for its designated purpose. Therefore, the No

Action Alternative, in conjunction with past, present, or reasonably foreseeable future actions would not be expected to result in adverse cumulative impacts to civil aircraft operations for either commercial or general aviation. Commercial and general aviation flight operations would continue to conduct their current flight operations to and from the public and private use airports, along airway route structures, and along the coastal areas in North Carolina.

Proposed Action. Airspace training exercises and locations for the proposed action would remain the same as the No Action Alternative. There would be additional helicopter sortie-operations associated with the proposed action; however, there would be no changes to the current restrictions, dimensions (shape or altitude), or hours of use of the existing special use airspace for MCB Camp Lejeune Range Complex.

Other past and present projects that, in conjunction with the proposed action, have the potential to result in cumulative impacts to civil aircraft operations are the same as listed above for the No Action Alternative. Similar to the No Action Alternative, the proposed action, in conjunction with past, present, or reasonably foreseeable future actions, would not be expected to result in adverse cumulative impacts to civil (non-military) aircraft operations in eastern North Carolina.

5.3 CONCLUSION

Implementation of the proposed action would result in minor adverse impacts to the environment. These impacts, in conjunction with other past, present and reasonably foreseeable future actions, would be expected to result in cumulative impacts that also would be minor.

6.0 OTHER CONSIDERATIONS

6.1 RELATIONSHIP OF MCB CAMP LEJEUNE RANGE OPERATIONS TO FEDERAL, STATE, AND LOCAL PLANS, POLICIES, AND CONTROLS

There are numerous Federal, state, and local plans, policies, and controls that may have an effect on the proposed action at Marine Corps Base Camp Lejeune. The following discussion identifies statutes (Federal, state, and local) and Executive Orders that may affect the proposed project.

6.1.1 National Environmental Policy Act (42 USC. 4321 et seq.)

The National Environmental Policy Act is a basic national charter for protection of the environment. It establishes policy, sets goals, and provides a means for carrying out environmental policy. The National Environmental Policy Act mandates that Federal agencies “utilize a systematic, interdisciplinary approach that will ensure the integrated use of the natural and social sciences and the environmental design arts in planning and decision making which may have an impact on man’s environment.” The National Environmental Policy Act, implementing regulations promulgated by the Council on Environmental Quality and the Navy, requires that environmental information is made available to decision makers and citizens before making decisions and taking major Federal actions, and that the National Environmental Policy Act process should identify and assess reasonable alternatives to proposed actions to avoid or minimize adverse environmental effects.

The EA is an analysis of the potential environmental impact of a proposed action. Action proponents must prepare an EA when they do not know beforehand whether or not the proposed action will significantly affect the human environment or be controversial regarding environmental effects. An EA will result in a Finding of No Significant Impact, or, if a significant impact is expected, preparation of an Environmental Impact Statement.

6.1.2 National Historic Preservation Act (16 USC. 470 [f])

The National Historic Preservation Act requires that Federal agencies allow the Advisory Council on Historic Preservation an opportunity to comment whenever their undertakings may affect resources that are listed, or determined eligible for listing, on the National Register of Historic Places. The National Historic Preservation Act also requires Federal agencies to identify, evaluate, inventory, and protect National Register of Historic Places resources (or resources that are determined eligible for listing on the National Register of Historic Places) on properties that they control. The governor of each state or territory appoints a State Historic Preservation Officer who is responsible for administering cultural resources programs within a given jurisdiction. Prior to the approval of an expenditure of any Federal funds or the approval of any Federal licenses or permits for an undertaking that may affect a National Register of Historic Places resource, the Marine Corps must initiate consultation procedures with the respective State Historic Preservation Officer(s) in accordance with National Historic Preservation Act.

6.1.3 Rivers and Harbors Act (33 USC. 401 et seq.)

The Rivers and Harbors Act of 1899 regulates the disposal of refuse and debris into the rivers and harbors of the US and makes it illegal to create any obstruction to navigable waters without the approval of the US Army Corps of Engineers. The US Environmental Protection Agency, the US Army Corps of Engineers, and the States regulate dredge and fill operations and dredge fill material disposal. The US Environmental Protection Agency establishes criteria and guidelines to protect the nation's waters from contamination by dredged or fill material. The United States Army Corps of Engineers and the State of North Carolina administer permit programs for dredge and fill operations in waterways and for construction activities in navigable waters.

6.1.4 Coastal Zone Management Act (16 USC. 1451 et seq.)

Pursuant to the Coastal Zone Management Act of 1972, the State of North Carolina has prepared a Federally-approved coastal management program, which is known as the North Carolina Coastal Area Management Act of 1974. Section 307(c) of the Coastal Zone Management Act requires that any Federal activity that directly or indirectly affects any land or water use or natural resource of the coastal zone be consistent with the enforcement policies of the Coastal Management Program to the maximum extent possible. The North Carolina Coastal Resources Commission is responsible for overseeing implementation of the North Carolina Coastal Management Program.

The North Carolina Coastal Management Program defines the coastal zone, identifies the existing sensitive ecosystems within the zone, highlights potential threats resulting from development, and outlines programs designed to manage and protect this sensitive area. The coastal zone includes 20 counties that are adjacent to, adjoining, intersected by, or bounded by the Atlantic Ocean or any coastal sound, including Onslow County. The coastal zone extends seaward to the 6 km (3 nm) territorial sea limit.

6.1.5 Executive Order 11988 – Floodplain Management

Executive Order 11988, *Floodplain Management*, was issued to help avoid possible long- and short-term adverse impacts associated with the occupancy and modification of floodplains and to avoid direct or indirect support of floodplain development wherever there is a practicable alternative. Executive Order 11988 requires that Federal agencies establish and implement certain procedures to minimize development in floodplains and if such development is unavoidable to follow established design and construction guidelines.

6.1.6 Executive Order 11990 – Protection of Wetlands

Executive Order 11990, *Protection of Wetlands*, was issued to help avoid possible long- and short-term adverse impacts associated with the destruction and modification of wetlands and to avoid direct or indirect support of development in wetlands wherever there is a practicable alternative. Executive Order 11990 requires that Federal agencies establish and implement procedures to minimize development in wetlands.

The Marine Corps supports the national goal of “no net loss of wetlands”, and have a policy of avoiding loss of size, function, and value of wetlands on property under its control. The Marine Corps has also committed to preserving and enhancing the natural and beneficial values of wetlands in carrying out its activities. In support of this policy, all Marine Corps construction and operational actions must avoid, to the maximum degree feasible, adverse impacts to or destruction of wetlands. Any construction requirement that cannot be sited to avoid wetlands shall be designed to minimize wetlands degradation and shall include compensatory mitigation as required by wetlands agencies in all phases of the project’s planning, programming, and budgeting process.

6.1.7 Executive Order 12898 – Environmental Justice in Minority Populations and Low Income Populations

Executive Order 12898, *Federal Actions to Address Environmental Justice in Minority and Low-Income Populations*, was issued to focus the attention of Federal agencies on human health and environmental conditions in minority and low-income communities.

6.1.8 Executive Order 13045 – Protection of Children from Environmental Health Risks and Safety Risks

Executive Order 13045, *Protection of Children from Environmental Health Risks and Safety Risks*, was issued to ensure the protection of children. Federal agencies shall identify and assess environmental health risks and safety risks that may disproportionately affect children.

6.1.9 Clean Water Act (33 USC. 1251 et seq.)

The Federal Water Pollution Control Act, as amended by the Clean Water Act of 1977, is intended to restore and maintain the chemical, physical, and biological integrity of the Nation’s waters. The Clean Water Act regulates the discharge of pollutants from point sources into waters of the US. The Clean Water Act, as amended in 1987, requires each State to establish water quality standards for its surface waters derived from the amount of pollutants that can be assimilated by a body of water without deterioration of a designated use. The State of North Carolina has promulgated Water Quality Regulations (Title 15A of the North Carolina Administrative Code) in accordance with the Clean Water Act.

The Clean Water Act prohibits spills, leaks, or other discharges of oil or hazardous substances into the waters of the US in quantities that may be harmful. The Clean Water Act limits any discharge of pollutants to a level sufficient to assure compliance with the State water quality standards. Direct discharges of effluents are regulated under numerical limitations contained in the National Pollutant Discharge Elimination System permits issued by the US Environmental Protection Agency or under State National Pollutant Discharge Elimination System programs approved by the US Environmental Protection Agency. The National Pollutant Discharge Elimination System Permitting and Compliance Programs of North Carolina’s Division of Water Quality is responsible for administering the program for the state.

6.1.10 Clean Air Act (42 USC. 7401 et seq.)

The Clean Air Act, as amended, is intended “to protect and enhance the quality of the nation’s air resources so as to promote public health and welfare and the productive capacity of its population...” To achieve this goal, the Clean Air Act established two strategies for setting standards: (1) National Ambient Air Quality Standards for six criteria pollutants; and (2) national emissions standards for individual sources of hazardous air pollutants. In addition, the Clean Air Act requires regulation of mobile sources of air emissions and a permit program for stationary sources.

Achieving Clean Air Act standards is the responsibility of the States. Each state must develop a State Implementation Plan that outlines to the US Environmental Protection Agency how it will achieve and maintain the standards. State Implementation Plans implement the Clean Air Act programs such as the Title V operating permit, New Source Performance Standards, new source review, and National Emission Standards for Hazardous Air Pollutants at the state and local levels. States may require pollution control and prevention standards that are more stringent than those mandated by the US Environmental Protection Agency, but may not allow measures that are less stringent. Federal agencies must comply with the requirements of Federal, state, interstate, and local air pollution regulations.

The Clean Air Act prohibits Federal agencies from engaging in, supporting, providing financial assistance for, licensing, permitting, or approving any activity that does not conform to an applicable State Implementation Plan. Federal agencies must make a determination that a Federal action conforms to the State Implementation Plans before proceeding with the action.

6.1.11 Endangered Species Act (16 USC. 1531 et seq.)

The Endangered Species Act provides for the identification and protection of Federally-listed threatened and endangered species of plants and animals, and designation of critical habitat for animal species. The Endangered Species Act establishes Federal policy that Federal agencies, in exercise of their authorities, shall seek to conserve endangered species. The Act prohibits Federal agencies from taking any action that would adversely affect any endangered or threatened species, or critical habitat. It establishes a consultation process involving Federal agencies and Federal wildlife management agencies to facilitate avoidance of agency action that would adversely affect species or their habitat. The Endangered Species Act prohibits all persons subject to US jurisdiction, including Federal agencies, from “taking” endangered species. The taking prohibition includes any harm or harassment, and applies within the US and on the high seas. Although the Marine Corps is not required by law to protect State-listed rare and endangered species, Marine Corps policy encourages cooperation with states and territories to protect such species.

6.1.12 Comprehensive Environmental Response, Compensation and Liability Act (CERCLA or “Superfund”) (42 USC. 9601 et seq.)

In 1980, the Comprehensive Environmental Response Compensation and Liability Act (42 USC Part 9601 et seq.: 26 USC Parts 4611, 4612, 4661, 4662, 4671, and 4672) was passed to provide

a “Superfund” for cleanup of sites with uncontrolled releases of hazardous substances. This law created a tax on the chemical and petroleum industries and provided Federal authority to respond directly to releases or threatened releases of hazardous substances that may endanger public health or the environment. The Comprehensive Environmental Response Compensation and Liability Act also established prohibitions and requirements concerning closed and abandoned hazardous waste sites, provided for liability of persons responsible for releases of hazardous waste at these sites, and established a trust fund to provide for cleanup when no responsible party could be identified. The Comprehensive Environmental Response Compensation and Liability Act enabled the revision of the National Contingency Plan, which provided the guidelines and procedures needed to respond to releases and threatened releases of hazardous substances, pollutants, or contaminants.

This program was continued in the Superfund Amendments and Reauthorization Act of 1986 (42 USC Part 11001 et seq.). Section 211 of the Superfund Amendments and Reauthorization Act provides continued authorization for the Department of Defense Environmental Restoration Account. Major responsibility for monitoring compliance with these acts rests with the US Environmental Protection Agency.

6.1.13 Resource Conservation and Recovery Act (RCRA) (42 USC. 6901 et seq.)

In 1976, The Resource Conservation and Recovery Act (42 USC Part 6901) was passed to govern the disposal of solid waste. It established the Federal standards and requirements for state and regional solid waste authorities. The Act provides a “cradle to grave” approach to solid and hazardous waste regulations. It regulated transportation and tracking of hazardous waste; established standards for storage and treatment by waste generators; provided an identifying procedure for hazardous waste; provided minimum technology standards for treatment, storage, and disposal facilities; provided for corrective action for historic solid and hazardous waste management units; established land disposal prohibitions and restrictions; regulated the installation, testing, and removal and remediation of underground storage tanks; regulated the management of used oil; and provided an enforcement mechanism.

The Resource Conservation and Recovery Act was amended by the Federal Facilities Compliance Act of 1992 (Public Law 102-386, 106 STAT. 1505), which provided a waiver of sovereign immunity with respect to Federal, state, and local procedural and substantive requirements relating to the Resource Conservation and Recovery Act of solid and hazardous waste laws and regulations at Federal facilities.

6.1.14 State 401 Water Quality Certification

When a 404 permit or section 10 permit is required because the proposed project involves impacts to wetlands or waters, then a 401 water quality certification is also required. When the state issues a 401 certification, this certifies that a given project will not degrade waters of the state or otherwise violate water quality standards.

6.1.15 Magnuson-Stevens Fishery Conservation And Management Act (16 USC. 1801 et seq.)

This act governs the conservation and management of ocean fishing. The act established regional fishery management councils comprising Federal and state officials, including the Fish and Wildlife Service. It became effective March 1, 1977 by establishing exclusive US management authority over all fishing within the exclusive economic zone, all anadromous fish (species of fish that spawn in US fresh or estuarine waters and migrate to ocean waters) throughout their migratory range except when in a foreign nation's waters, and all fish on the Continental Shelf. The act establishes eight Regional Fishery Management Councils responsible for the preparation of fishery management plans to achieve the optimum yield from the US fisheries in their regions. Congress amended the act extensively when it passed the Sustainable Fisheries Act in 1996. On January 12, 2007, the President signed the Magnuson-Stevens Fishery Conservation and Management Reauthorization Act of 2006.

6.1.16 State Stormwater Management Plan

The State Stormwater Management Program was established in the late 1980s under the authority of the North Carolina Environmental Management Commission and North Carolina General Statute 143-214.7. This program, codified in 15A NCAC 2H.1000, affects development activities that require either an Erosion and Sediment Control Plan (for disturbances of one or more acres) or a Coastal and Aquatic Managed Area major permit within one of the following areas:

- The 20 coastal counties
- Development draining to Outstanding Resource Waters or High Quality Waters

The State Stormwater Management Program requires developments to protect these sensitive waters by maintaining a low density of impervious surfaces, maintaining vegetative buffers, and transporting runoff through vegetative conveyances. Low density development thresholds vary from 12-30 percent built upon area (impervious surface) depending on the classification of the receiving stream. If low density design criteria cannot be met, then high density development requires the installation of structural Best Management Practices to collect and treat stormwater runoff from the project. High density Best Management Practices must control the runoff from the 0.03 to 0.04 m(1 or 1.5 inch) storm event (depending on the receiving stream classification) and remove 85 percent of the total suspended solids.

6.1.17 Migratory Bird Treaty Act (16 USC. 701-715s)

The Migratory Bird Treaty Act was implemented in 1918 for the protection of migratory birds. The Migratory Bird Treaty Act implemented conventions between the US and Great Britain, the US and Mexico, the US and Japan, and the US and Russia. The Act prohibits, unless permitted by regulations, to take, kill or possess any migratory bird listed under the conventions.

In 2003, the National Defense Authorization Act was signed, implementing regulations by the Secretary of Defense, to exempt a member of the armed forces for an incidental taking of a migratory bird during military exercise activities.

6.2 REQUIRED PERMITS, APPROVALS, AND CONSULTATIONS

6.2.1 Coastal Consistency Determination

A number of activities are required to comply with the enforceable policies of North Carolina's certified Coastal Management Program, even if those activities do not require permits under state law. This "Federal Consistency" authority exists under the federal Coastal Zone Management Act. The Coastal Zone Management Act was enacted on October 27, 1972 to encourage coastal states to develop comprehensive programs to manage and balance competing uses of and impacts to coastal resources. It applies to any activity that is within the state's coastal zone that may reasonably affect any coastal resource or coastal use within the coastal zone (even if the activity is outside of the coastal zone), if the activity is a federal activity; requires a federal license or permit; receives federal money; or is a plan for exploration, development, or production from any area leased under the Outer Continental Shelf Lands Act.

6.2.2 Biological Assessments

Under Section 7 of the Endangered Species Act, consultation is required with the US Fish and Wildlife Service and the National Marine Fisheries Service for proposed actions that have the potential to adversely impact federally listed species.

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APPENDIX A
MCB CAMP LEJEUNE ENVIRONMENTAL HANDBOOK FOR
TRAINERS

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ENVIRONMENTAL HAND BOOK FOR TRAINERS



**MARINE CORPS BASE
CAMP LEJEUNE, NC 28542-0004**

JANUARY 2007

ENVIRONMENTAL HANDBOOK FOR TRAINERS

- Affects training/operations within areas designated as historically important. It lists known historical areas and requires personnel to report finding suspected bones, pottery, bottles, ruins, or other items of historical interest.

BO 11015.3B ENDANGERED SPECIES PROTECTION PROGRAM

- Establishes regulations that protect the several endangered and threatened species aboard the Base and affects training in several areas aboard the Base. Check this order to determine if there are endangered species in the training area you intend to use.
- Check the notes for the training activity that you are planning to see if there are endangered species in the training area.

BO 11015.6C RED-COCKADED WOODPECKER (PICOIDES BOREALIS) PROTECTION PROGRAM/MEASURES

- Sets forth regulations and establish responsibilities to ensure the conservation of the RCW aboard Camp Lejeune.

BO 11015.7C SEA TURTLE PROTECTION PROGRAM

- Sets forth regulations and establishes responsibilities to ensure the conservation of the Atlantic loggerhead turtle and green sea turtle aboard Camp Lejeune.
- Training activities that use Onslow Beach between May and October are affected by the restrictions included in this Order.

BO 11017.1D OFF ROAD RECREATIONAL VEHICLES (ORRV) REGULATIONS

BO 11090.3A OIL AND HAZARDOUS SUBSTANCE POLLUTION PREVENTION AND POLLUTION ABATEMENT FACILITY MANAGEMENT

- This Order states existing oil and other hazardous material-related pollution abatement and prevention procedures and to establish responsibilities for operation and maintenance of pollution abatement facilities required to comply with federal and state water control standards.

BO 11320.1K FIRE REGULATIONS

- Establishes fire regulations for MCB CLNC and Marine Corps Air Station, New River.

BO 1710.20P HUNTING, FISHING, TRAPPING AND BOATING REGULATIONS

- Establishes MCB CLNC regulations/procedures for hunting, fishing, trapping and boating

BO P3570.1A STANDING OPERATING PROCEDURES FOR RANGE CONTROL

- This Order affects all use of maneuver area and live fire ranges aboard Camp Lejeune.
- Provides regulations for the assignment, control, safe use, and maintenance of ranges Camp Lejeune to include live field firing ranges, maneuver areas and field training facilities under the control of the Commanding General, Marine Corps Base.
- Also provides information and instructions regarding available training services

BO 5090.4 SOLID WASTE REDUCTION-QUALIFIED RECYCLING PROGRAM

- Provides policy, describes procedures, and assigns responsibilities for the management, disposal and recycling of solid waste.

BO 6240.5B HAZARDOUS WASTE AND MATERIAL PROGRAM MANAGEMENT

- Establishes responsibilities, procedures and guidance for hazardous material and hazardous waste disposal.

ENVIRONMENTAL HANDBOOK FOR TRAINERS

This handbook is intended to make you, the leader, more effective as a trainer here at Camp Lejeune, North Carolina. History shows that wars have been fought and won while observing the rules of land warfare, the Geneva Convention and other local and political restraints. Training to fight and win requires strong leadership at the small unit level and well-disciplined troops.

In every training situation, we strive to train as we fight. But we must be prudent in how we treat our training environment. The Marine Corps stormed the beaches of Iwo Jima just once. At Camp Lejeune, Marines, and Sailors have been storming the beach and maneuvering through the forests thousands of times over the last half century. To ensure that our training continues to support the operational readiness of the Marine Corps, we must remain dedicated stewards of the land on which we train. Camp Lejeune's policies and procedures have been developed in order to maintain the natural beauty and functioning of our landscape while still allowing realistic training for combat. It is up to you, the leaders of Marines and Sailors to sustain the training opportunities found on Camp Lejeune's unique landscape.

This handbook provides the guidance you need to ensure that both your Marines, Sailors and future generations of Marines, have quality training experiences aboard Camp Lejeune. The Camp Lejeune landscape, with all of its rare and rich diversity, has been professionally managed for decades with the goal of long-term sustainability of the training mission. This goal cannot be achieved without the support of the Marines, Sailors, Coast Guard and Civilians that use these natural resources.

R.C. Dickerson

R.C. DICKERSON
Brigadier General, U.S. Marine Corps
Commanding General, Marine Corps Base
Camp Lejeune, North Carolina

ENVIRONMENTAL HANDBOOK FOR TRAINERS

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DEPARTMENT OF THE NAVY
HEADQUARTERS UNITED STATES MARINE CORPS
2 NAVY ANNEX
WASHINGTON, DC 20380-1775

IN REPLY REFER TO:
LFL
29 Sep 99

WHITE LETTER NO. 03-99

From: Commandant of the Marine Corps
To: All General Officers
All Commanding Officers
All Officers in Charge

Subj: ENVIRONMENTAL COMPLIANCE

1. Since Congress passed the Federal Facilities Compliance Act in 1992, the Marine Corps has made significant strides in achieving and maintaining environmental compliance. While installation commanders are at the fore of this compliance effort, I expect every commander who resides or trains on an installation to actively support that installation's environmental compliance and protection programs. All Marine commanders should emphasize environmental awareness and incorporate environmental compliance into every aspect of how they conduct business, taking affirmative steps to make compliance happen.

2. A disturbing trend has emerged in recent months that I need your assistance in curtailing. Historically, administrative types of violations such as record-keeping and house-keeping mistakes have been minimal. During the past year, however, these types of violations have significantly increased. Practically all of these violations are preventable through attention to detail and appropriate awareness.

3. The environmental regulations that apply to Marine Corps operations in many states are increasing and environmental inspectors are quick to cite violators. The Marine Corps cannot afford the cost of environmental inattention. In this era of constrained resources, every dollar spent to pay for fines or litigation costs resulting from noncompliance is one less dollar available to train our Marines. Marine Corps policy requires units responsible for violations to pay environmental fines from O&M accounts. We have been fortunate not to receive any large fines recently, and I encourage your vigilance to ensure that we continue to improve our excellent performance.

4. In my initial guidance, I stated that we cannot mortgage the future of our installations and continue to meet our requirements. Part of ensuring the sustainability of our installations and training areas is continued compliance with environmental laws and a good working relationship with the communities that surround us. Our goal is to meet the challenge of training our Marine Corps while exercising stewardship of the land, air, and waters entrusted to us by the citizens we are pledged to protect. In meeting this goal, failure to achieve environmental compliance is simply not an option.

J. L. Jones
J. L. JONES

ENVIRONMENTAL HANDBOOK FOR TRAINERS

INTRODUCTION

This booklet provides information concerning the relationship between military training and environmental protection. It is the responsibility of each individual to preserve our natural resources for training and military operations. As Marines and Sailors, we must strive to provide realistic training while protecting Camp Lejeune's natural environment so it can be used in the future. The following guidelines were developed to help us make the best use of Camp Lejeune's training areas and also protect the environment. By following these guidelines, we can meet both our obligation to our Marines/Sailors and to the environment.

PROTECTED SPECIES

Camp Lejeune is home to five Federally listed threatened or endangered animals and plants. In addition, there are five species of endangered marine mammals and three species of endangered sea turtles that can frequent the adjacent waters. Commanders, officers-in-charge and NCOICs will ensure strict compliance with applicable regulations.

Red-cockaded Woodpecker (RCW)

The RCW is an endangered species protected by Federal law. Red-cockaded Woodpeckers are cavity-nesting birds and depend on live pine trees for their survival. The Base Commander has implemented the following program to protect RCW habitat:

- Cavity trees are marked with a double band of blue paint and have a metal identification tag nailed into the tree.
- Buffer Zones for nesting habitat extend 200 feet out from each cluster of cavity trees and are marked with single bands of white paint on the trees and signs as shown below:



The following actions are prohibited under Public Law 93-205, Endangered Species Act of 1973, and Base Orders concerning the RCW and marked buffer zones:

- The use of any vehicle, wheeled or tracked, off designated trails in the buffer zone.
- The cutting or damaging of pine trees of any size within the buffer zone.
- Any excavating or digging within the buffer zone.
- Bivouacking and the establishment of command posts within the buffer zone.
- "Tree topping" of antennas, girdling of pine trees with communications wire, burying of cable and the climbing of pine trees with tree gaffs within the buffer zone.

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- The firing of artillery within 200 meters of a cavity tree.
- The removal or destruction of signs marking a restricted area.
- Cutting down or damaging trees in any training area unless authorized by the Assistant Chief of Staff, Installations and Environment Department, Environmental Management Division.

Failure to comply with the above actions may result in punitive action.

The following actions are authorized inside or within the RCW and buffer zone:

- ✓ Transient foot travel.
- ✓ Transient vehicular traffic ONLY on EXISTING MAINTAINED trails/roads.
- ✓ Blank small arms firing.
- ✓ The cutting of hardwood foliage is permissible for camouflage and concealment.

Unmarked RCW Nesting Sites

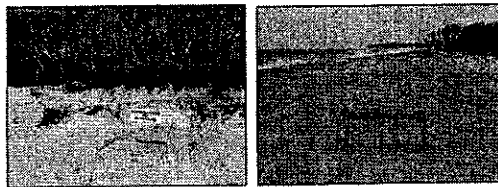
To reduce the impact of training restrictions associated with RCW, many nesting sites are free from the white painted field markings. The impacts of specific training activities are being monitored in these sites to determine what affect, if any, these activities have on RCW. Even though these areas are unmarked, it is imperative that they not be subjected to impacts prohibited by guidance in Base Order P3570.1A, the Standard Operating Procedures for Range Control. In particular, the following prohibited activities, which are prohibited throughout all the training areas, must be adhered to:

- No tracked vehicles off of designated trails
- No cutting or damaging of pine trees
- No girdling pine trees with communications or barbed wire

Sea Turtles

Although there are many species of sea turtles, Camp Lejeune beaches are most frequently visited by the Atlantic loggerhead turtle and the green sea turtle. These threatened species are particularly vulnerable to predators, poachers, entanglement with fishing gear, and coastal development. On Onslow Beach, sea turtles are vulnerable to many activities occurring during the May-October nesting season. These include collisions with vehicles, light disorientation, entanglement with debris on the beach, and nest disturbance. Federal law prohibits disturbance of the turtles, their nests, or eggs.

Environmental Conservation (ECON) Branch personnel relocate all nests laid from Riseley Pier to Onslow South Tower to a place outside of the training area. All other nests are left in place and marked with a wire cage placed over them, as shown below:



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The following rules for the protection of the sea turtles apply:

- Regular use of Onslow Beach between Riseley Pier (903262) and Onslow South Tower (881247) is authorized. All other areas of Onslow Beach are subject to restrictions and/or coordination with ECON Branch during the nesting season of May through October.
- An exercise during nesting season which involves activities such as leaving gear or equipment on the beach overnight, large excavations, or significant nighttime lighting must be coordinated with the ECON Branch prior to initiation.
- During the nesting season, night landing exercises should be reduced to the minimum level.
- During the nesting season, night lighting on the beaches should be kept to a minimum or eliminated, if possible.
- Vehicular traffic on the beaches is restricted to the tidal zone except within the identified operating area, providing all turtle nests have been removed from the operating areas prior to any landings.
- ECON Branch, Environmental Management Division, Installations and Environment Department must be notified immediately at extension 451-5063 upon discovery of any sea turtle nest that has not been marked/protected to ensure its successful relocation. Further, any sightings of sea turtles during daylight hours should be reported.
- During the nesting season, nighttime use of the beaches for recreation will be restricted to those uses not requiring artificial lighting.
- Off road recreational vehicles (ORRVs) utilizing Onslow Beach must be permitted by MCBCL Game Warden and are subject to regulations in BO11017.1D.

Bald Eagle

A single bald eagle nest has been identified in the JB training area (802298) with another suspected in the HA training area. Buffer zones that radiate from the nest itself have been identified and indicate that certain activities are restricted. The buffer zones and their implications are listed below.

- **750 ft buffer:** year-round prohibition of tree-cutting and chemical applications; unauthorized human entry prohibited from December-June
- **1000 ft buffer:** airspace restriction in place, minimum AGL greater than 500' from December-June
- **1500 ft buffer:** Permanent habitat alterations prohibited

American Alligator

The American alligator is on the Federal Threatened Species list due to its similarity in appearance to the endangered American Crocodile. Camp Lejeune's wetlands provide suitable habitat for alligators in both fresh and salt-water estuarine areas. Precautions should be taken between the months of May and June when the female alligator usually lays her eggs. She lays 20-60 eggs in a nest

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consisting of mounds of vegetation. Areas known to host alligators are posted with signs warning against swimming, allowing pets to swim, and feeding alligators.

Endangered Plants

Two federally protected plant species are found aboard Camp Lejeune:

Rough-leaved Loosestrife is a federally endangered plant usually found in or adjacent to forested wetlands. Sites containing Rough-leaved Loosestrife are clearly marked as restricted areas, with a single band of white, non-toxic latex paint on the lower portion of tree trunks and signs reading "Restricted Area Endangered Species Site," or "No Vehicles Allowed." This restricted area will extend 100 feet from the outermost plant. Within the marked area, the following activities are prohibited:

- Vehicle traffic
- Excavation of any kind
- Alteration of site hydrology by excavations outside of buffer zone
- Cutting or removal of pine trees

Seabeach Amaranth is a federally listed threatened plant found on the frontal dunes of Onslow Beach. Any Seabeach Amaranth sites will be posted with "No Vehicles Allowed" signs. All vehicular and pedestrian traffic must avoid these small sites.

Other Species of Conservation Significance

Shorebirds

The southern section of Onslow Beach provides unique and important nesting habitat for migratory shorebirds that receive Federal protection. At least five species of birds nest along the sparsely vegetated beach area and among the accreting and/or eroding sand dunes at this location. From April to August, portions of Onslow Beach are closed to vehicle traffic with signs:



Venus Flytrap

The Venus flytrap is a state-listed species and is protected by North Carolina Law. An easily identifiable plant species that grows where there is frequent fire, poaching Venus flytraps is strictly prohibited.

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Coastal Goldenrod

Camp Lejeune is home to three of the four known locations of this recently identified species. Sites are posted with signs reading "Conservation Area, Do Not Disturb". Please refrain from heavy site disturbance, specifically large excavations or excessive vehicle movement.

TRAINING AREA CONSERVATION

Off Road Personnel Movement

Do not climb over any chain-link fences or enter any areas that are posted as "Hazardous Waste Site," or "Authorized Personnel Only."

Off Road Vehicle Movement

Off road vehicle movement can damage grasses and shrubs, leaving bare soil that is subject to erosion. Over time, erosion results in a barren area of deep ruts, large holes and flooding, greatly restricting foot and vehicle movement. Watch for signs and follow these simple rules:



- Tracked vehicles will cross hard-surfaced roads and railroad tracks only at designated tank crossing sites/tanks pads.
- Use road guards when crossing roads.
- To avoid leaving traffic hazards, the tracked vehicle unit is responsible for removing debris left on the road after the crossing.
- Trees will not be knocked over.
- Keep tracked vehicles on trails and at least fifty meters from fresh water fishponds.
- Keep off the road shoulders of paved highways. Trails for vehicle use generally parallel the highway from 10 to 50 meters. Use these trails.
- Due to the high water table at Camp Lejeune, avoid wet areas. Vehicles frequently get stuck in these wet areas and damage to them and road shoulders usually creates a drainage and/or flooding problem. Tracked vehicles are to avoid wetlands. If the operator is not sure if an area is authorized, move to higher ground.
- Tracked vehicle movement is prohibited on marked/signed archaeological and endangered species sites.
- Tracked vehicles should refrain from locked tread turns whenever possible.

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- Keep all tracked vehicles away from eroded areas and gullies. Heavy use will cause more erosion.
- Keep tracked vehicles to tank trails transiting to/from designated training areas i.e., tactical landing zones accessible by tank trails, free play tracked vehicle training areas designated by Range Control, MOUT CTF and Combat Town.
- Per BO 11017.1D, POV's are not authorized off-road

Fighting Positions

Fighting holes, trench systems, tank traps, hull down positions for tanks and artillery, and other fighting positions are an important part of training and are authorized at the required locations. However, everything you dig must be refilled and leveled after you've finished training. This prevents erosion and enables other units to use this area safely.

- All ground repairs will be done within 72 hours of the end of the training. Only the Base Range Control Officer may grant extensions.
- Do not dig any manner of hole nor deposit any manner of fill in wetlands. Wetlands include salt marshes, creeks, streams and ponds, as well as forested and shrub swamps in low-lying areas. If you think you are in wetlands, go to higher ground before digging.
- Do not dig up any drums or other potentially hazardous waste material. If drums or other unknown materials are encountered during excavation, stop and immediately notify the Installation Restoration Division, EMD at 451-5068.
- Do not cut tank traps, dig fighting holes, or create obstacles in Landing Zones, Drop Zones, or wildlife clearings/food plots.
- Any excavation or digging within the marked/signed boundary of an archaeological site is prohibited unless coordinated with the Base Archaeologist, EMD/ECON, at 451-7230/5063.
- The excavation of fighting holes for training exercises involving larger than platoon size unit participation must be coordinated with the Base Archaeologist.

When placing roadblocks during tactical exercises, ensure that they are kept under observation and manned while in use, as emergency vehicles and/or official observers may require access. When not in use, remove them.

All digging within the RCW or Rough-leaved Loosetrife buffer zones is prohibited.

Laying Cable and Field Wire

Use of communication wire and concertina/barbed wire is essential during training, but when these wires are left behind they become real hazards. Old wire left behind in the training areas can become tangled around Marines and their tracked/wheeled vehicles and can harm wildlife and impede forestry operations.

- Recover and police all communications and concertina/barbed wire. It is expensive and can normally be used again.
- Double check to see if you've picked up all trip wires, especially those connected to pyrotechnics.

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Cutting Brush and Trees

Forested areas are an extremely important resource on Camp Lejeune for both training and the environment.

- When it is necessary to cut brush and tree limbs for camouflage, do not cut or knock down any standing trees that are larger than the diameter of your arm and do not cut any pine trees or pine foliage for camouflage.
- Taking down any size tree by explosive methods and the cutting or knocking over of trees on any engineer training range is prohibited.
- The cutting or damaging of pine trees of any size within the RCW buffer zone is prohibited.

FIRE

All brush/wild fires, regardless of size, even those fires that have been extinguished, are to be reported immediately to the Range Control Duty Officer (BLACKBURN) on frequency 38.60 MHZ, who will notify the Base Fire Department.

Fire Readiness Plans. Readiness Plans, and their effect on the use of training areas/ranges and facilities, are:

- ✓ **Readiness Plan I** - Fire danger is low. No restrictions on authorized ranges and training areas. Normal safety precautions will be followed.
- ✓ **Readiness Plan II** - Occasional fire activity. Little or no chance of fire. No restrictions on authorized ranges and training areas. Normal safety precautions will be followed.
- ✓ **Readiness Plan III** - Fire danger is moderate. The use of ranges and training areas will be at the discretion of the commanding officer of the training unit. Caution will be exercised in the use of all pyrotechnics.
- ✓ **Readiness Plan IV** - Normal fire season. When Readiness Plan IV is reached, the RCDO (Blackburn) will notify all training units. Heat tabs and warming fires will be used only in designated places under supervision of a SNCO/NCO. Pyrotechnics are restricted to authorize ranges.
- ✓ **Readiness Plan V** - Fire danger is very high/extreme. Pyrotechnics/incendiary ammunition will be restricted to the BT-3/N-1, G-10 and K-2 impact areas. Tracer ammunition is restricted to the BT-3/N-1, G-10, Greater Sandy Run Area (GSRA) ranges and K-2 impact areas. Authority to use tracer ammunition in the GSRA is a situational MCB command decision. After consulting with the AC/S I&E, AC/S ISS, AC/S T&O, and 2d MARDIV (G-3), 2d FSSG (G-3), 2d MAW (G-3), the Chief of Staff (C/S) or Commanding General (CG), MCBCL will issue a decision regarding the firing of tracers in GSRA or other locations as required. In all field areas, smoking is permitted only in locations specifically designated by the unit commander. Smoking areas will be cleared of all dry vegetation and the area supervised by a NCO. The use of generators will be restricted to areas that have been cleared of all combustibles, including dry vegetation for a 50 ft diameter circle around each generator. Heat tabs will be used only in restricted areas designated by the training unit commander and under the supervision of a SNCO/NCO. Warming fires are not authorized.

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- ✓ **Readiness Plan VI:** Fire danger is critical. All military training in forested areas and other activities likely to start forest fires will be suspended. Only ball ammunition, fragmentation hand grenades, demolition materials and high explosive mortar ammunition on designated ranges/ impact areas can be used during Readiness Plan VI.
- ✓ **Readiness Plan VII:** Fire danger is extreme. All training will cease and troops will come out of the field. Request to train during Readiness Plan VII will be submitted to the CG, MCBCL.
- ✓ **Blow-up Alert:** Fire danger is explosive. Precautions taken for Readiness Plan VII are utilized during blow-up Alerts.

NOTES:

- Fire Department personnel will allow fires in the impact areas to burn until they reach the buffer zone. They will not enter the impact areas.
- Controlled burning is accomplished and controlled by the Base Forester. Controlled burning is done to stimulate new growth, control insects, and to clear underbrush, which feeds forest fires.
- Catalytic converters and vehicle exhausts can get very hot, so hot that nearby groundcover can catch fire. Do not park or leave engine running over dry leaves/grass.

CULTURAL, ARCHAEOLOGICAL AND HISTORIC SITES

A high number of archaeological sites are present throughout the training areas of Camp Lejeune. For those areas with signs posted indicating an archaeological site, training is restricted as follows:

- Wheeled vehicles and troop maneuvers may continue in areas presently designated for those activities. Tracked vehicles are restricted to existing trails. Operations or exercises on or around marked/signed sites require coordination with the Base Archaeologist.
- Collecting bone or artifacts from any archaeological site is strictly prohibited.
- If human remains are discovered or suspected, immediately stop all ground disturbing activities to avoid further disinterment. Notify the Base Archaeologist and EMD/ECON at 451-7230/5063, and the Provost Marshall, 451-5620/1901, so that it can be determined if the remains are of an archaeological nature.
- For clarification of training impact adjacent to these areas, contact the Base Archaeologist.

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FIELD WASTE DISPOSAL

Field mess facilities generate three types of waste: Liquid, garbage, and rubbish. The disposal of this waste must not create conditions that endanger troop health, either in your unit or the next one to use the area.

Liquid Waste

In the field, bathing and liquid field mess wastes (gray water) are disposed of in the soil by constructing a soakage trench. Camp Lejeune soil conditions make the use of a soakage trench the only allowable method for disposal of liquid waste.

- A soakage trench consists of a central pit, two feet on a side, one foot deep. A trench is dug outward from each side of the pit at least six feet. It must be one foot wide and one foot deep at the central pit and increase to one and a half feet deep at the far end. The bottom of the pit and trenches is filled with small rocks. One soakage trench can absorb the liquid waste from 200 diners for up to two weeks. If the field mess is to be used for more than two weeks, construct two trenches for each 200 diners and rotate them daily.
- In order for the soil to absorb liquid field mess waste, a grease trap must first remove grease, scrap food, and other suspended solids. A grease trap must be placed between the field mess or shower unit and the soakage trench. It may be of the filter or the baffle type.
- Liquid field mess/bathing wastewater will be disposed of in the soil by a soakage trench. Field showers/mess units must be located on adequately drained soils, at least 150 feet from nearest surface water and at least 500 feet from nearest drinking water well.
- Contact EMD to have a site evaluated for soakage trench use prior to construction. Also, contact the Preventive Medicine Unit (PMU), Naval Hospital at extension 450-5707; PMU must inspect the soakage trench prior to use.

Requirements for soakage trench closure are:

- Spray the pit contents and the closest two feet of the surrounding area with an approved residual insecticide.
- Fill the trench and pit with successive layers of earth, packing each layer down before adding the next layer.
- Mound the trench with at least one foot of compacted dirt.
- Spray the mound with an approved residual insecticide.
- Contact the Preventive Medicine Unit, Naval Hospital, extension 450-5707; they will inspect the soakage trench again after closing.

If field mess/bathing is required in area that soils will not allow for graywater absorption, contact is Utility Systems Operations Supervisor at 451-7190, extension 223.

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Garbage

Garbage is the solid or semisolid wet waste that results from food preparation, cooking and serving. Because it is composed of organic material, garbage attracts flies and animals that spread disease. It also quickly decomposes into a stinking mess. At Camp Lejeune, garbage will be returned to an administrative mess hall for proper disposal. While in the field, and during transportation to a mess hall, keep it in covered containers or plastic garbage bags.

Rubbish

Expeditionary operations generate rubbish/trash, but disciplined units don't leave an "intelligence" track for the enemy to exploit. Habits formed with regard to rubbish handling pay off in combat. The following actions are required:

- Each unit utilizing a training area is responsible for its state of police upon completion of training. For all trash accumulated, recycle when possible. Segregate trash by type and transport to the Recycling Center, Bldg. 978, next to the landfill (451-1690) or to the landfill itself, as appropriate. Use dumpsters when available, but only for small trash intended for the landfill. At no time will trash be buried in a training area.
- Crush and flatten all cardboard boxes and transport to the Recycling Center when appropriate; otherwise place in green "cardboard only dumpsters."
- Do not place grass, leaves, pine straw, lumber, metal, pallets, dirt, or other weighty materials in the dumpsters.
- Process ammunition boxes/ammunition cans and other related ammunition dunnage with reusable value through the Defense Reutilization and Marketing Office (DRMO). Transport scrap wood and unserviceable wooden boxes to the Base landfill located on Piney Green Road to be weighed. Each vehicle must receive a weight ticket from the Base Landfill scale master prior to transit to the appropriate disposal facility. Once weighed, transport the wood debris to the wood-waste site across the road from the landfill. Take usable pallets to the Recycling Center.
- Do not place any type of explosives, ammunition, or ammunition boxes/containers with the recyclable materials being transported to the Recycling Center.
- Remember, MRE wrappers are not biodegradable. They must be picked up throughout the training area and disposed of in dumpsters.

Wildlife and Waste

Garbage and rubbish, when improperly handled, will attract wildlife to field mess facilities and bivouac/encampments, greatly increasing the risk of disease transmission and personal injury. Plan to avoid these conflicts by following these handling guidelines for garbage/rubbish:

- Do not leave garbage/rubbish on the ground overnight, even if it is contained in plastic bags.
- Store food in lockable or animal proof containers.
- Locate dumpsters away from tents, high pedestrian traffic areas, and high-speed roads.

DO NOT FEED WILD ANIMALS.

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Human Waste

The use of large, field expedient head facilities is authorized at Camp Lejeune; i.e., slit trenches, cat holes. Consult local preventative medicine units (PMU) for guidance on using slit trenches and cat holes; see paragraph 6009.1.d. of BO P3570.1A for complete details. Contact EMD for site evaluation for human waste disposal. Requests for sanitary chemical toilets (port-a-johns) are submitted through normal unit logistics channels. Cat holes are permissible in remote training/maneuver areas.

SPILLS OF HAZARDOUS MATERIALS, FUEL, POL

Spills of hazardous materials, fuels, and POLs of any quantity on land and water must be reported promptly to the base fire department by telephoning 911. After reporting, the unit responsible for the spill will follow guidance received from the Base Fire Protection and Emergency Response Division. EMD will assist as necessary in clean up of the spill and management of the recovered product and any contaminated soil. Higher authority must arrange contract spill response for any spills occurring on or having the potential to reach the Atlantic Ocean, the Atlantic Intracoastal Waterway (AIWW), New River, or salt marshes. Oil soaked dirt must be dug up by the spilling unit, placed in plastic bags or on plastic sheeting, so that it is not washed away by rain. Unit personnel will coordinate with each command Environmental Compliance Coordinator (ECC) and will be responsible for the transportation of the contaminated soils to the Base Hazardous Material/ Hazardous Waste Consolidation Site. Contact Resource Collection and Recovery Section, EMD at 451-1482 to coordinate drop off.

Battery Waste

Proper disposal of all waste batteries will be arranged through the unit's environmental compliance officer (ECO). Using units are responsible for turn-in of the batteries to their designated unit hazardous material handler. The unit's ECO may coordinate the receipt of battery waste directly from field operations with their command's ECC or the Base Hazardous Material/ Hazardous Waste Consolidation Site manager by calling 451-1482.

Fuel Storage Restrictions

The Range Control Officer at 451-5803 must approve locations for tactical fuel farms. Prior to approval, unit personnel must receive a briefing on fuel storage and spill response requirements from EMD personnel. Containers having a 55-gallon or greater capacity must be bermed with soil or sandbags and have an impervious liner. Each storage or use area must be marked as set forth within BO 11090.3A, have a current and properly posted spill contingency plan and have appropriate spill response and communication equipment immediately available at the site. A complete list of requirements will be provided from the EMD. Contaminated oil, fuel and anti-freeze in the field should be stored within properly marked containers and returned to the unit motor pool or the unit must have coordinated with Base EMD for the removal from the field. Coordination for the required briefings, spill response and fuel storage requirements or coordination for removal of contaminated oils, fuels, anti-freeze may be completed by calling extension 451-1482.

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BEACH OPERATIONS

Camp Lejeune's ocean beaches, inlets, marshes, and bays are important training and recreational assets. All marine environments are very fragile and ours is no exception; extra caution is required to ensure that the balance of nature is not disturbed. As Marines, we have a responsibility to protect the waterways for training, recreation, and the wide variety of plants and animals living there. By following these simple rules during training or recreational use, we should be able to preserve our beaches:

- Never disturb or remove grass or plants from the beach. Dune plants help prevent erosion.
- Exit and enter the beach only at designated areas marked by yellow-black poles.
- Keep all heavy equipment and vehicles off the sand dunes and vegetation.
- Do not damage or destroy sand fences installed on the beach; they are there to help build new sand dunes and prevent the erosion of existing dunes.
- Bivouac on the north side of the beach road, not the beach itself.
- Police the area after your exercises; abandoned wire, netting and other debris poses a danger to people and wildlife.
- The collection of archaeological material (bone, stone tools, etc) is prohibited.
- Call Blackburn/Range Control for a Range Inspector to be properly cleared from the training Beach at 451 3064 or 451-5803

Rules regarding the recreational use of the beach are covered in BO 11017.1D, Off-Road Recreational Vehicles (ORRVs). Copies of the order may be obtained by calling the Environmental Conservation Branch, EMD at 451-5063. Permits are required to drive ORRVs on the beach. They can be obtained at the Game Warden's office (451-2196).

Training exercises will generally be limited to the operating area between Riseley Pier (903262) and the Onslow South Tower (881247). In all cases, training exercises shall be confined to the minimum amount of beach necessary to complete the training objectives. Requests for use of other than the identified operating area will be addressed to the Base Range Control Officer.

Egress from the beach to the road behind the sand dunes shall be at designated egress routes. Vehicular traffic is prohibited on or between the dunes. Access points for military traffic are marked with black and yellow striped posts. Access for ORRVs is at Riseley Pier and South Tower only, per BO 11017.1D.

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STREAM CROSSINGS

Crossing streams with heavy vehicles is detrimental to the stream and its banks. Erosion takes place on the banks and approaches/exits and engine/chassis oil is washed off while crossing, thereby contaminating the water.

Simple precautions when vehicles have to cross a stream are:

- Use existing bridges.
- If there aren't any bridges in the area, use designated crossings and cross only as often as absolutely necessary.
- Don't drive vehicles in the stream.

The best guide is to cross water only when required by the mission, and then only at points where your CO authorizes.

Amphibious Vehicle Splash Points

Forty-one splash points have been established for amphibious vehicles to enter or leave the water. Use only existing splash points. Do not make new splash points or widen existing splash points. If an authorized splash point is eroded, report it to Base Range Control at 451-5803/2102.

| <u>Grid</u> | <u>Description</u> | <u>Grid</u> | <u>Description</u> |
|-------------|------------------------------|-------------|--------------------------|
| 97583409 | SP1 Bear Tower | 95933227 | SP2 Browns Tower |
| 93863052 | SP3 Freeman Landing | 92102855 | SP4 TLZ Falcon E |
| 91912841 | SP5 TLZ Falcon | 91632811 | SP6 TLZ Falcon W |
| 91022755 | SP7 Onslow AIWW | 90102693 | SP9 TLZ Albatross N |
| 90202677 | SP10 TLZ Albatross S | 87792540 | SP11 TLZ Bluebird S |
| 87612545 | SP12 TLZ Bluebird N | 86732604 | SP13 Mile Hammock Bay |
| 85813379 | SP15 Duck Creek N | 85923373 | SP16 Duck Creek S |
| 85642768 | SP18 Traps Bay S | 85552784 | SP19 Traps Bay N |
| 85523526 | SP20 Weil Point | 84273378 | SP22 Tank Trail 1 |
| 84903451 | SP23 Tank Trail 2 | 84533750 | SP24 6th Marines |
| 83973870 | SP25 8 th Marines | 83663298 | SP26 Tank Trail 3 |
| 82863013 | SP27 Courthouse Bay N | 82233951 | SP28 Hadnot Point |
| 82873188 | SP29 Tank Trail 4 | 82673551 | SP30 Rhodes Point |
| 82442996 | SP31 Courthouse Bay | 82283132 | SP32 TLZ Sandpiper |
| 82172972 | SP34 Courthouse Bay S | 81762928 | SP35 TLZ Kite |
| 81843834 | SP36 Town Point | 81203853 | SP38 Town Point N |
| 80793146 | SP40 Gillette Point | 80413132 | SP41 Oriole |
| 80393886 | SP42 Magnolia Lane | 76214080 | SP43 Ragged Point S |
| 78674242 | SP44 Ragged Point N | 78552807 | SP45 Everett Creek |
| 77313359 | SP46 Foys Landing | 76724039 | SP48 Stone Creek Landing |
| 85002820 | SP49 Traps Bay | | |

***Notes:**

1. Stone Creek Landing SP48 requires prior coordination with Rifle Range S-3 (450-2705/2917).
 2. Everett Creek SP45 - exercise extreme caution to avoid damage to telephone cable.
 3. Splash Points 4, 5, 6 - exercise extreme caution to avoid damage to telephone cable.
 4. When using SP11, 877254, avoid the waterfowl impoundment area.
- *****

ENVIRONMENTAL HANDBOOK FOR TRAINERS

ENVIRONMENTAL IMPACT REVIEW

The National Environmental Policy Act requires that careful considerations be given to environmental impacts of proposed projects or actions. Further, it requires the consideration and documentation of alternatives to the proposed action. Some training exercises require the preparation of a document called a request for environmental impact review (REIR). The blank REIR form is available on the Camp Lejeune website at http://facilities.lejeune.usmc.mil/EMD/Working_Groups/eiwg/REIR-JULY%2003.doc. It should be reviewed with the unit environmental compliance coordinator (ECC) and submitted to Base T&O for endorsement and forwarding to the Base environmental staff for review. Examples of training that require a REIR include: training with impacts on wetlands, endangered species, or archeological sites, and any training exercise taking place on or over non-military property. In those cases, and whenever there is any potential for significant environmental impact, exercise planners should consult the appropriate directives and then contact MCB Training and Operations Department at 451-5328 for guidance and support.

PROTECTION OF VEGETATION AND ANIMAL LIFE

Endangered species habitat boundaries are marked on the ground. The only authorized activities in endangered species habitats (clearly marked) are: blank small arms firing, movement on foot, and use of wheeled or tracked vehicles on existing well-defined main roads/trails through such habitat. To protect sea turtles, do not dig, excavate, or build tank traps on the beach. Vehicular traffic is prohibited on the sand dunes, and night lighting should be kept to a minimum on the beach. Endangered plant species populations are clearly marked on the ground and entry is prohibited. If you are unsure of what species are present in your area of operation or if your activities will have any impacts, call the Environmental Conservation Branch at 451-5063.

SUMMARY

Protecting the environment is everyone's job at Camp Lejeune. When you damage plants, animals, and other natural resources, the Marine Corps, Camp Lejeune, and your training all suffer. Severe damage can curtail training, and, in the case of Endangered Species, result in legal action. Caring for natural resources isn't something that takes a lot of time. It just takes a little planning, awareness, leadership and, most importantly, supervision for the unit leaders.

ENVIRONMENTAL HANDBOOK FOR TRAINERS

IMPORTANT PHONE NUMBERS

| | |
|--|---------------|
| Base Fire Department | 911 |
| Base Hazardous Material / Hazardous Waste Consolidation Site Personnel | 451-1482 |
| Base Training Education and Operation Department | 451-5326 |
| Blackburn | 451-3064 |
| Environmental Management Division (EMD) | 451-5003 |
| EMD disposal instructions | 451-1482 |
| Environmental Conservation Branch | 451-5063 |
| Game Warden's Office | 451-5226 |
| Installation Restoration Division | 451-5068 |
| NCIS | 451-8071 |
| Onslow Beach Caretakers | 450-7502 |
| Preventive Medicine Unit, Naval Hospital | 451-5707 |
| Provost Marshal | 451-2455 |
| Range Control Officer | 451-3932/1235 |
| Range Safety Specialist | 451-1240 |
| Recycling Center | 451-1690 |
| Stone Bay Rifle Range S-3 | 450-2705/2917 |

LOCAL ENVIRONMENTAL REFERENCES

The requirements identified in this handbook are taken from the following references. If your unit does not hold copies, contact MCB Directives Control Point in John A. Lejeune Hall (Building 1).

NAVMED P5010 MANUAL OF PREVENTIVE MEDICINE, CHAPTER 9

- > Chapter 9 provides instructions/procedures concerning field sanitation.

FM 21-10 FIELD HYGIENE AND SANITATION

- > Provides instructions/procedures concerning field hygiene and sanitation practices.

BO 11000.1D ENVIRONMENTAL IMPACT REVIEW PROCEDURES

- > Publishes procedures and responsibilities for environmental planning and environmental impact assessment, in order to comply with and implement directives of higher authority.
- > It affects major exercises and other actions beyond the scope of the Environmental Handbook for Trainers

BO 11000.19A ARCHAEOLOGICAL AND HISTORIC RESOURCES MANAGEMENT

- > Announces policy prescribes procedures and assigns responsibilities for the management of archaeological and historic (cultural) resources located in and under the waters and on the land of Camp Lejeune and Marine Corps Air Station, New River.

APPENDIX B

RANGE COMPLEX ASSETS, MUNITIONS, AND WEAPONS

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Appendix B – Range Complex Assets, Munitions, and Weapons

This Appendix B describes MCB Camp Lejeune Range Complex Assets in detail and presents tables listing the specific munitions and weapons used at the range complex.

MCB CAMP LEJEUNE RANGE COMPLEX ASSETS

A summary of MCB Camp Lejeune Range Complex assets is provided in **Chapter 2, Table 2.1-1**. Detailed descriptions for these range complex assets are provided below.

Training/Maneuver Areas

There are 82 designated training/maneuver areas in and around the live-fire ranges and impact areas. Scheduling of some training/maneuver areas can be affected by live-fire operations on the ranges. Each training area is designated alphabetical from “BC” to “SW.” Of the 82 training areas, 77 are designated as tactical maneuver areas; four areas (EA, EB, JB and JC) are designated separately for amphibious exercise support and beach training. Training area EC is the recreational portion of Onslow Beach and typically not scheduled for training.

Impact Areas

The three duded impact areas are: G-10, K-2, and BT-3, which support munitions from 5.56 mm to 155 mm delivered by direct fire, indirect fire, fixed-wing close-air support, rotary-wing close-air support, and naval gunfire. Duded impact areas contain munitions that fail to fire or explode.

- **G-10 Impact Area** - Located east of the New River, this impact area supports air-to-ground operations, helicopter gunnery exercises, mortar fire, field artillery indirect fires, infantry weapons, and infantry rocket and missile live-fire (use of live ammunition) evolutions. Live-fire includes artillery, mortar, or direct fire mission involving the use of live ammunition. Laser designators can be used within the G-10 Impact Area. Seven ranges encircle the G-10 Impact Area: G-3, G-3A, G-5, G-6 Company Battle Course, and the G-8 and G-9 specialized shooting ranges. Each range can support multiple direct and indirect fire weapon systems. Ranges G-3, 3A, 5, 8, and 9 are oriented to support infantry weapons training evolutions with all ordnance impacting in the G-10 Impact Area. The G-6 Company Battle Course is a company sized combined arms, live-fire and maneuver attack range.
- **K-2 Impact Area** - Located on the western bank of the New River, this impact area supports infantry weapons training, mortar fire, field artillery indirect fires, and infantry rocket training. The K-2 Impact Area has 23 live-fire ranges oriented around its perimeter. Each range can support multiple direct and indirect fire weapon systems. These ranges are oriented to support infantry weapon systems and infantry tactics. All ordnance expended at these ranges impact within the K-2 Impact Area. A modernization effort for the K-2 Ranges is currently underway to consolidate and realign the 23 ranges in order to develop 12 ranges with automated targetry.

- **BT-3** – This impact area is located on the southeast portion of MCB Camp Lejeune, includes Brown's Island, and extends 11,000 m (36,089 ft) into Onslow Bay and the Atlantic Ocean. The BT-3 impact area is used for infantry weapons training, mortar fire, field artillery indirect fires, and infantry rocket training. The H Range, (the Riverine Assault and Waterborne Gunnery Range), is located within BT-3's boundaries. Additionally, the G-7 range orients the firing of all weapon systems and ordnance to impact within the BT-3 Impact Area. The G-7 range supports field artillery direct fire and infantry weapons training evolutions. The E-1 range supports Stinger missile live fire.

Engineer Training Areas

There are eight Engineering Training Areas at MCB Camp Lejeune: 1, 2, 3, 4, 5, 5A, 6 and 7. The primary function of the Engineering Training Areas is to provide operational engineering units and Marine Corps Engineer School with facilities to conduct engineer demolition training. Alternative uses of the Engineering Training Areas are: as an infiltration course at Engineering Training Area- 1, a mechanized assault course and breaching operations range at Engineering Training Area-2, execution of live-fire breaching exercises at Engineering Training Area-4, and a close quarters battle area and Military Operations in Urban Terrain breaching house at Engineering Training Area-5A. Engineering Training Area-6 is not a live-fire Engineering Training Area and has been converted to a Combat Vehicle Operators Training Confidence Course. Trinitrotoluene charge equivalency ranges between 15 and 50 lbs per shot are authorized, depending on the Engineering Training Areas and as delineated within the MCB Camp Lejeune Range Regulations. MCB Camp Lejeune also has two separate explosive ordnance disposal ranges in addition to the 7 Engineering Training Areas.

Military Operations in Urban Terrain Facility and Military Operations in Urban Terrain Facility Assault Courses

The Military Operations in Urban Terrain Facility is a 31 building facility focused on training for combat in urban areas. Within the Military Operations in Urban Terrain Facility training area, there are six live-fire assault courses, Military Operations in Urban Terrain Assault Courses 1-6, maintained for individual, fire team, and squad level urban training. Each range authorizes pistol, M-16, M4, and shotgun ammunition. Military Operations in Urban Terrain Assault Course -1, the Urban Quick Kill Range, is used for basic room entry and clearing. Military Operations in Urban Terrain Assault Course -2, the Search and Kill Range, is used for search and clearance operations. Military Operations in Urban Terrain Assault Course -3, the Live Fire Grenade House, is for live-fire room clearing in a shock-absorbing concrete structure. Military Operations in Urban Terrain Assault Course -4, the Cover and Clear range, is primarily a fire team Military Operations in Urban Terrain/urban battle drill facility. Military Operations in Urban Terrain Assault Course -5, Dodge City, is the basic squad Military Operations in Urban Terrain Assault Course range. Military Operations in Urban Terrain Assault Course 6 is the Enhanced Marksmanship Program range. The new Urban Training Facility, located nearby, has 69 buildings (including 5 live-fire houses) and is laid out to resemble a middle-eastern village and

includes a market area, tunnels, walls, and courtyards, with a firm Base and vehicle check point nearby.

Greater Sandy Run Area Ranges

There are four live-fire ranges located on the western side of MCB Camp Lejeune. These ranges primarily support Tank, Light Armored Vehicle, Amphibious Assault Vehicle, and Infantry platoon training. SR-6 is an automated Infantry Platoon Battle Course range, allowing live-fire and maneuver to be combined. SR-7 and SR-10 are both automated Multi-purpose training ranges. SR-7 is utilized as the Light Armored Reconnaissance Crew qualification range and Light Armored Vehicle, Amphibious Assault Vehicle multipurpose mechanized assault range. SR-10 serves as the Tank Crew Qualification Range, supporting individual and tank platoon crew qualifications through Gunnery Table 12. SR-11 is the Baffled Pistol Range and supports individual pistol qualification. Also located within the Greater Sandy Run Area is the Camp Davis Airfield Seizure Facility. This facility is comprised of five cinder block shell structures that serve as a mock tower, two mock hangers, a mock maintenance building, and a mock terminal. The facility also includes two A-4 aircraft to simulate ongoing airfield operations.

Stone Bay Ranges

Stone Bay has three 50-target known distance rifle ranges, two pistol ranges and a 1,000-yard sniper range. Pistol and rifle qualification/re-qualification operations are conducted at the Stone Bay Ranges. Weapons Training Battalion maintains and operates these pistol and rifle ranges for annual marksmanship qualification training and familiarization firing. Eight additional ranges at Stone Bay are within the Special Operations Training Group compound, including Dodge City, one- and three-story shoot houses, breacher facilities/breacher pit, climbing walls/towers and a multipurpose range, which supports Marine Expeditionary Unit Special Operations Capable and Marine Expeditionary Fighting training requirements.

Area F Ranges

There are 7 live-fire ranges and 1 fast-roping tower within the F Areas. The live-fire ranges include ranges F-2, F-4, F-5, F-6, F-11A, F-11B, and F-18. Ranges F-2 and F-4 are small arms live-fire ranges. Range F-5 is an automated range that allows live-fire and maneuver training. Range F-6 is a hand grenade range. Ranges F-11A and F-11B serve as a M16A2 “Zero” range and pistol qualification range. Range F-18 serves as a machinegun field firing range. Range F-17 is not for live-fire training; it is a fast roping, climbing and rappelling training area, complete with tower.

Area D Ranges

There are four live-fire ranges within the Area D Training Area: D-9, 29A, 29B, and 30. Range D-9 is a Trap and Skeet range. Ranges D-29A, 29B, and 30 serve as pistol qualification and re-qualification ranges.

Area I Range

Range I-1, located within the boundaries of the Marine Corps Engineer School, serves as a pistol qualification and re-qualification range.

Area L Range

Range L-5 is an automated infantry small arms live-fire and maneuver range located within the Area L Training Area.

Observation Posts

There are 12 Observation Posts at MCB Camp Lejeune. The Observation Posts are used for observation of live-fire and laser operations at each of the impact areas, amphibious operations on the beach area, live-fire and maneuver events at the Greater Sandy Run Area and on ranges L-5 and F-5.

Helicopter Landing Zones

MCB Camp Lejeune has two types of helicopter landing zones: tactical landing zones and administrative landing zones. There are 48 tactical landing zones within MCB Camp Lejeune's boundaries (named after birds) and 24 numerically identified administrative landing zones. The tactical landing zones are scheduled for heliborne operations, rappelling, fast rope, and Special Purpose Insertion Extraction rig training. Unscheduled helicopter operations may be made into tactical landing zones after authorization is granted by BLACKBURN (the call sign for the Range Duty Officer's station) and ensuring that the tactical landing zones are not occupied.

Drop Zones

Drop zones are tactical landing zones designated for parachute operations. MCB Camp Lejeune has twelve drop zones and five additional water drop zones.

Special Use Airspace

MCB Camp Lejeune has 518 km² (200 mi²) of special use airspace that is restricted for military use. Four specific special use airspace segments are designated for control and utilization and are shown in **Table B-1**.

Table B-1
Special Use Airspace

| Airspace Name | Authorized Flight Altitudes |
|----------------|--------------------------------|
| R-5303 A/B/C | Surface to 5,486 m (17,999 ft) |
| R-5304 A/B/C | Surface to 5,486 m (17,999 ft) |
| R-5306 D/E | Surface to 5,486 m (17,999 ft) |
| Hatteras F MOA | Surface to 3,962 m (13,000 ft) |

All restricted airspace is activated as needed in order to support safe range operations, as designated by Notices to Airmen at least 48 hours in advance. Aircraft participate in live firing operations, bombing, close air support (live or simulated), and/or combined air-ground exercises.

Assault Amphibious Vehicle Splash Points

MCB Camp Lejeune has 2.6 km (1.4 nm) of amphibious landing beach and 7.4 km (4 nm) of buffer/impact area beach. Shallow ocean areas, less than 182 m (600 ft) in Onslow Bay are used for amphibious training. Riverine training is conducted in areas in the New River and Atlantic Intracoastal Waterway. There are 41 splash points that have been established for amphibious vehicles to enter or leave the water in order to conduct military operations training involving Assault Amphibious Vehicles, Light Armored Vehicles, small boats, swimmers, Landing Craft Utility, Landing Craft Air Cushions, etc.

Outlying Landing Fields

MCB Camp Lejeune has two Outlying Landing Fields, Oak Grove and Camp Davis. These outlying landing fields are used for flying and other units and equipment in support of training requirements for MCB Camp Lejeune primary range users. Oak Grove is located 3.2 km (2 mi) northwest of Pollocksville, North Carolina and approximately 40 km (25 mi) north of MCB Camp Lejeune. Camp Davis is an unmanned, uncontrolled airstrip situated in the extreme southeast corner of the Greater Sandy Run Area. The airfield is one nautical mile northeast of the town of Holly Ridge and 13 nm south of MCAS New River.

Existing Danger Zone (Water)

There is a prohibited area (existing danger zone [water]) in Onslow Bay that surrounds the BT-3 Impact Area. An existing danger zone (water) is defined as a water area (or areas) used for target practice, bombing, rocket-firing or other especially hazardous operations, normally for the armed forces. The existing danger zones (water) may be closed to the public on a full-time or intermittent basis, and the Commanding Officer of MCB Camp Lejeune exercises the authority to control access to these navigable waters.

Water Restricted Areas

A Water Restricted Area is a defined water area for the purpose of prohibiting or limiting public access to the area. Restricted areas generally provide security for Government property and/or protection to the public from the risks of damage or injury arising from the Government's use of that area.

The water restricted areas at MCB Camp Lejeune are broken down into three areas: Atlantic Coast, New River, and the Atlantic Intracoastal Waterway. The New River area is further separated into 11 sectors: Traps Bay Sector, Courthouse Bay Sector, Stone Bay Sector, Stone Creek Sector, Grey Point Sector, Farnell Bay Sector, Morgan Bay Sector, and Jacksonville Sector.

All navigable waters between Brown's Island and the Atlantic Intracoastal Waterway (bounded by Brown's Inlet and Bear Inlet) are closed to navigation at all times. There are highly sensitive unexploded projectiles within the limits of this area.

Table B-2 presents the different types of small arms rounds used at the MCB Camp Lejeune Range Complex.

Table B-2
Small Arms Rounds

| Types of Small Arms Rounds Used | | |
|-----------------------------------|----------------------------------|---------------------------------------|
| .22 caliber | .50 caliber Black Powder | 5.56 mm BLK F M-16A1/A2 |
| .22 caliber Ball Long Range Match | .50 caliber SLP/SLPT 4/1M903 | 5.56 mm TR F/M-16A2 |
| .22 caliber Ball Long rifle | .50 caliber Blank-M1 F/ACFT | 5.56 mm TR Rifle F/M-16 |
| .22 caliber Tracer | .50 caliber Blank F/M85 | 5.56 mm Tracer (FPW) |
| .22 caliber Long range pistol MAT | .50 caliber 4 Ball-1 Tracer F/M2 | 5.56 mm Ball TR 4/1 F/SAW |
| .30 caliber | 10 Gauge Blank | 5.56 mm Blank M755 F/Grenade Launcher |
| .30 caliber Ball Magnum (300 H&H) | 12 Gauge Primers | 5.56 mm Blank M200 |
| .30 Tracer M1 OR M25 | 12 Gauge | 7.62 mm Blank LNKDM82 |
| .32 caliber | 12 Gauge Bean Bag Non-Lethal | 7.62/39 mm |
| .357 caliber Magnum | 12 Gauge Launch Grenade | 7.62 mm |
| .38 Blank (Sentry Dog) | 12 Gauge #00 Buckshot | 7.62 mm Blank Single round/AK 47 |
| .38 caliber | 12 Gauge Dummy | 7.62 mm Blank CTN F/M14 |
| (A403).38 caliber Spec Blank | 12 Gauge #8 Shot | 7.62MM DIM Tracer M276 |
| .40 caliber Ball | 12 Gauge 3-in Rubber Ball | 7.62 mm TR M62 |
| .45 Blank | 12 Gauge 3-in Rubber Baton FS | Metallic Belt 7.62 mm |
| .45 caliber | 12 Gauge Skeet #9 Shot | OP-4, 7.62 x 54 mm Ball |
| .45 TRCR M26 | 7.62 mm Blank LNKD | 9 mm |
| .50 caliber | 7.62 mm Tracer F/M14 | OP-4, 9 x 18 mm Ball Makarov |
| .50 caliber APIMK211MOD O | 7.62 mm Tracer LNKD | Powder Actuated Tool .27 caliber |
| .50 caliber 4 Ball 1 TRCE W | 20 Gauge Skeet #9 Shot | Powder Actuated Tool .32 caliber |
| .50 caliber API M8 CTN PK F/M2 | 28 Gauge Skeet #9 Shot | PAN Aluminum Slug |
| .50 caliber APIT M20 | 410 Gauge Skeet #9 Shot | PAN AVON Round |
| .50 caliber Ball | 12 Gauge 4 Buckshot Spec | PAN COMM Black Powder Blank |
| .50 caliber SLAP-T RND | 5.56 mm | 5.56 mm Blank LKDF/SAW |
| .50 caliber Dummy M2 | 5.56 mm (Frange) | .50 caliber LKD INC & TRAC |
| .50 caliber Blank F/M2 (MILES) | 5.56 mm Ball TR 4/1 F/SAW | |

Table B-3 presents the different types of large arms rounds used at the MCB Camp Lejeune Range Complex.

Table B-3
Large Arms Rounds

| Types of Large Arms Rounds | | |
|----------------------------|---|---|
| 20 mm | 155 mm HE M795 | 5-in .54 caliber HE MK115 Mod 0 |
| 20 mm Dummy M51A2 Single | 155 mm, M687 W/OPA | 5 in .54 caliber HE MK82 Mod 0 |
| 25 mm | 155 mm | 5 in .54 caliber HE-CVT MK41 MODS |
| 25 mm M28 | 155 mm HE ADATM | 5 in .54 caliber HE-CVT MK65 |
| 25 mm HEI-T MK210 | 155 mm HE Copperhead | 5-in .54 caliber HE-PD MK61 (EXPL D) |
| 25 mm TPDS-T (ILO A940?) | 155 mm HE ICM | 5 in 54 caliber HE-PD/D MK83 |
| 30 mm | 155 mm HE M107 | 5 in 54 caliber Illum MK48 Mod 0 |
| 30 mm Dummy M838 | 155 mm HE RAP | 5 in 54 caliber TP Non-Expl Puff MK41 |
| 40 mm Blank Saluting | 155 mm Illum | 5 in 54 caliber VT MK41/64/101 |
| 40 mm Training Practice | 155 mm SK M825 | HG Practice M69 |
| 40 mm | 155 mm SMK Red | GLTD-2 |
| Dummy 40 mm Linked | 155 mm SMK Yellow (M116) | Activator M1 (K257) |
| 57 mm CANISTER T25E5 | 155 mm Charge Green | Ammunition Transfer Point |
| 60 mm | 155 mm Charge WB | Dragon Heat |
| 76 mm Clearing Charge MK76 | 155 mm Charge White | Riot Control Agent CS Capsule |
| 76 mm HE-VT, MK208-0 | 155 mm WB Charge XM119E4 | Riot Control, Agent, CN, Pellet |
| 81 mm | 4.2-in Illum Mortar | Remover, Aircraft Canopy M4 |
| 84 mm | 5-in/.38 caliber Illum | ATWESS (MILES) |
| 105 mm | 5-in .38 caliber HE-CVT MK56/66 Mod 0 | Body Prac Hand Grenade M21 |
| 120 mm | 5-in .38 caliber HE-PD MK66 | Breaching Round (M1030) Canister, Actuated M9 |
| 120 mm Tank Rounds | 5-in .54 caliber Illum MK91 MOD 0 W/MK18 Load | AT4 Lightweight Multi-purpose weapon |
| 120 mm APFSDS-T M829 | 5-in/.54 caliber Hi-Frag VT-MK86 | |
| 152 mm Dummy M596 | 155 mm WP M110 Series | |

Table B-4 presents the different types of weapons used at the MCB Camp Lejeune Range Complex.

Table B-4
Weapons

| Types of Weapons Used | |
|--|---|
| All military issue pistols (.45 caliber or less) | All military issue pistols (.45 caliber or less) |
| Shotgun | M-68 Inert MICLIC |
| Guided Missile Systems | 20 mm (Aircraft Mounted) |
| Demolitions/Pyrotechnics | 30 mm (Aircraft Mounted) |
| 12 Gauge Shotgun | M1 Tank Main Gun/.50 caliber Machinegun (Limited) |
| M-16 Rifle | AAV .50 caliber/40 mm Machinegun (Limited) |
| M4 Rifle | M777A2 (Field Artillery 155 mm) |
| M249 Squad Automatic Weapon | 105mm Artillery (Army) |
| M240G Medium Machinegun | 84 mm M136 AT-4 (HEAT) |
| M203 Grenade Launcher | M136 AT-4, AT-4 Trainer |
| M257 Smoke Grenade Launchers on the Tank/AAV/LAR | Claymore Mine |
| Hand Grenades | GAU-17 (7.62 mm) (helicopters) |
| M2 .50 caliber Machinegun | GAU-19 (.50 caliber) |
| M40/MK-11 7.62 mm Sniper Rifle | M3 (.50 caliber) |
| M82 SASR .50 caliber Sniper Rifle | 2.75 Rocket |
| M240G/M219/M240 Coax MG | 120 mm Main Gun M1A1 |
| MK19 | 30 mm MK44 Main Gun EFV |
| TOW | MK 153 SMAW |
| AT-4, , , | Javelin M98A1 |
| 60 mm Mortar | Explosive Breaching |
| 81 mm Mortar | Stinger, Avenger Weapons (Anti-Air) |
| 120 mm Mortar | M72A7 LAAW |
| 25 mm Chain Gun | M242 Chain Gun |

Table B-5 presents the different types of explosives used at the MCB Camp Lejeune Range Complex.

Table B-5
Explosives

| Types of Explosives | | |
|--|---|---|
| Demolition Charges 1-1/4 LB | Demolition Sheet, 8 m (25 ft). | Rocket 2.75 inch Practice M274 |
| Blasting Cap Shock Tube | Demolition Sheet, 12 m (38 ft). | Rocket 2.75 inch |
| Detonation Cord, MU42 | Detonation Cord, F CDC, MD15 | 2.75 inch Rock MK1 F Warhead |
| Blasting Cap Shock Tube, Non-explosive 152 m (500 ft). | Impulse Cartridge | TOW HEAT Missile |
| Blasting Cap, Electric | Cratering Demolition Kit, M180 | TOW Practice Missile |
| Blasting Cap, Electric M6 | Detonation Percussion Delay, 175MS | Sub-Cal Trainer Rocket, M72AS 21mm |
| Blasting Cap, Non-Electric M7 | Military Dynamite, M1 | 83mm Rocket, Common Practice |
| Demolition Charges, C-4, 1-1/4 lb | Thermite Hand Grenade, AN-M14 | 83mm Rocket, Assault, Shoulder-Launched Multipurpose Assault Weapon |
| Reinforced Detonation Cord, M456 | Igniter Fuse, M60 | 83mm Rocket, High Explosive Anti-Armor |
| Fuse Blasting Timer M700 | Directional Claymore Mine, M18A1 | Stinger Missile |
| Blasting Cap Electric Number 8 | Demolition Booster Charge, 9 m (30 ft)., Practice | 25 lb Practice Bomb |
| Diversionary Charge | Can Mine Volcano, Practice | 500 lb Practice Bomb |
| Demolition Charge Assembly M183 | (APOBS) Anti-Personnel Obstacle Breaching System, MK 47 MOD 1 | BDU-48, 9lb Practice Bomb |
| 40 lb Cratering Demolition Charge | Shape Charge, 25 Grains | Hydra 70 Rocket Illumination |
| Demolition Charges, TNT, 1lb | Shaped Flex Linear | Hydra 70 Rocket, M274 Practice |
| Demolition Charges, TNT, 1/4lb | TOW II Guided Missile | Initiators |

Table B-6 presents the different types of pyrotechnics used at the MCB Camp Lejeune Range Complex.

Table B-6
Pyrotechnics

| Types of Pyrotechnics | | |
|---|--|---|
| M83 Smoke Hand Grenade TNG (Terephthalic Acid [TA])-Inert | M159 Signal Illuminating WS Cluster | Practice Mine-DDI |
| M84 Non-Lethal Stun Grenade | Fuze Practice Hand Grenade | M18 Red Smoke Hand Grenade |
| CHEMICAL AGENT, H | M21 Body Practice Hand Grenade | Noise Simulator |
| M47 Riot CS Hand Grenade | Signal Flare-Green | 30.5 m (100 ft) Blast Fuze-DDI |
| M25A2 CS Hand Grenade | M110 Simulated Artillery Flash | M20 Practice Mine-DDI |
| Ballistic Aerial Target | M17A1 Signal Illuminating White Star | M49A1 Flare Surface Trip |
| Stinger Missile Simulator | M69 Practice Hand Grenade | M700 Fuse Blasting Time |
| AN-M8 Smoke Hand Grenade | M116 Simulated Hand Grenade | M18 Yellow Smoke Hand Grenade |
| MK34 MOD 0 Pyrotechnic Initiator | MK117 Signal Smoke and Illumination Marine Green | M115A2 Simulated Projectile Groundburst |
| M18 Green Smoke Grenade (MILES) | M118 Simulated Booby Trap Illuminating | M125A1 Signal Illuminating Green Star |
| M117 Simulated Booby Trap Flash | Simulated Projectile Airburst | |

APPENDIX C

NOISE

| | |
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| C.2- Large Caliber Weapon BNOISE2 and Small Arms SARNAM Noise Modeling..... | C-3 |
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C.1- US Marine Corps Ground Training Noise Guidance for Marine Corps Installations



DEPARTMENT OF THE NAVY
HEADQUARTERS UNITED STATES MARINE CORPS
2 NAVY ANNEX
WASHINGTON, DC 20380-1775

IN REPLY REFER TO:
11011
LFL

29 JUN 2005

From: Assistant Deputy Commandant, Installations and Logistics
(Facilities)

Subj: GROUND TRAINING NOISE GUIDANCE FOR MARINE CORPS
INSTALLATIONS

1. Encroachment is a serious threat to the readiness of the Marine Corps. Many external pressures influence and in some cases, constrain the timing, location and frequency of training aboard our installations. As local communities prepare land use plans and zoning ordinances, the Marine Corps has the responsibility to, and is well served by, providing input to them on our installation activities that might impact them. This includes noise emanating from our ranges.

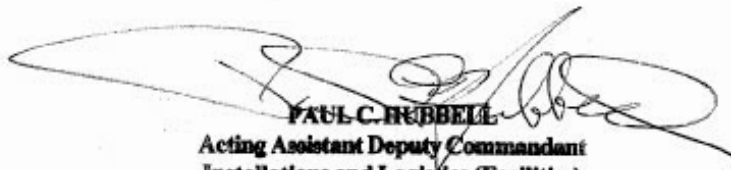
2. To assist your efforts in identifying appropriate metrics for representing and displaying ground fire noise analysis from military training, the following guidance is provided. The Defense Environmental Noise Working Group (DENWG) endorsed this guidance in April 2005. This guidance should be used by installation Community Plans and Liaison Officers (CPLO) and Land Use Planners until formal policy is issued.

C-weighted day-night average sound level (CDNL) is an appropriate noise metric to represent the effects of noise from Marine Corps ground training ranges. This noise metric shall be further defined at the installation/range level with a specific, designated time horizon as the annual average CDNL or busiest month CDNL when the operational tempo is significantly different during certain peak periods of the year. For land use planning purposes, a reasonable growth factor, based on historic or projected trends, may be incorporated to reflect future training requirements, if appropriate. Single event noise data (ex: Peak, PK15 (event) or C-weighted sound exposure level) may be employed where appropriate to provide additional information on the effects of noise from Marine Corps ground training ranges. This guidance is consistent with current practice.

3. The Headquarters Marine Corps (LFL) points of contact for further assistance are our support contractor, Mr. Mike Lynch,

Subj: GROUND TRAINING NOISE GUIDANCE FOR MARINE CORPS
INSTALLATIONS

and Head, Real Estate Section, Mr. Dave Bixler, DSN 225-8240 or
(703) 695-8240.


PAUL C. HUBBELL
Acting Assistant Deputy Commandant
Installations and Logistics (Facilities)

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C.2- Large Caliber Weapon BNOISE2 and Small Arms SARNAM Noise Modeling

Large-caliber weapon fire consists of live (explosive projectile) and inert (non-explosive projectile) fire. When a large-caliber, live projectile is fired, there is impulsive noise both when the gun is fired and when the projectile hits the target area and explodes, as well as bow shock noise from the projectile. The firing of an inert projectile does not create an explosion when the projectile hits a target area; therefore, only the firing of the gun creates an impulsive noise plus bow shock noise from the projectile. The modeled large-caliber weapon types and rounds fired, including explosives, are based on the data described in the report entitled *MCB Camp Lejeune Operations Data Collection* (US Marine Corps, October 2008). The average annual numbers of firing rounds under the 2004-2006 average condition, No Action Alternative and the proposed action were considered in the noise modeling and are presented in **Table C-2.1**.

For the subject noise modeling, the BNOISE2 BN3.2 weather emulation option, which reflects average weather and sound propagation conditions, was applied in predicting annual average CDNLs around MCB Camp Lejeune. If a less than average weather condition was needed, other weather options depicted in BNOISE2 can be used for specific special case weather criteria, such as desert, water, or night focus conditions, etc. The applicable land and water boundary file specifically generated for MCB Camp Lejeune was also considered in the modeling to evaluate noise effects through a base-specific sound propagation media. This allows for more realistic modeling results since the sound is traveling over the appropriate media, land or water, and water surface results in greater sound reflection than land in sound propagation.

The following modeling assumptions were used in developing a noise model using BNOISE2 to predict CDNL contours around the base:

- Daily rounds were averages based on annual rounds over average range operational days (i.e., 244 days per year) as per MCB Camp Lejeune direction (via email on June 27, 2008).
- Average daytime and nighttime (10PM-7AM) operational percentages are 90% of day shots and 10% of nighttime shots as per MCB Camp Lejeune's recommendation (via email on June 27, 2008).
- Large explosive detonations that are typically buried were identified by MCB Camp Lejeune (based upon June 26, 2008 phone conversation). Buried explosive detonations result in less noise impact due to the earth attenuation on sound propagation.
- All target areas and points are assumed to be at ground level and not buried.
- Average line charges have a net explosive weight (NEW) of 5 pounds (lbs) per event, if a NEW was not specified in the *MCB Camp Lejeune Operations Data Collection* report (via email from MCB Camp Lejeune on June 27, 2008). A line charge is a device in which explosive charges are placed on a line at regular intervals to be detonated over areas such as suspected minefields.
- Insignificant explosive detonations (e.g., a detonation cord event with a negligible NEW) were not considered in the modeling. An explosive detonation was considered insignificant or negligible if it has a NEW that is less than 0.02 pounds which is the

minimal NEW identified in BNOISE2 with the sound intensity data. Inert projectiles that have zero NEW were considered in the model since, as stated in **Chapter 3**, the firing of the gun creates an impulsive noise plus bow shock noise from the projectile.

- Live hand grenades are fired at MAC-3, F-6, and K-405 (including its equivalent P range under the proposed action condition) ranges. Hand grenades operated within other ranges are considered inert as per MCB Camp Lejeune's direction (via a phone conversation on June 26, 2008) and they are assumed to have negligible noise effects and not considered in the modeling or **Table C-2.1**.
- Within K Area ranges, 40 mm (not including MK-19) shots are considered as live fire at K-303 and K-304 (including the equivalent P ranges under the proposed action condition) ranges. 40 mm (not including MK-19) operated within other ranges are considered inert as per MCB Camp Lejeune's direction (via a phone conversation on June 26, 2008) and they are assumed to have negligible noise effects and not considered in the modeling or **Table C-2.1**.

Small Arms Weapon SARNAM Noise Modeling

Given the high frequency characteristics of small weapon firing noise, the ADNL metric is most appropriate in describing potential associated noise effects. The ADNLs were predicted using the Department of Defense's small arms weapon noise model – Small Arms Range Noise Assessment Model (SARNAM, Version 2.6.2003-06-06). SARNAM is a computer model that provides the capability to calculate and display noise level contours for firing operations at small arms ranges. It includes consideration of type of weapon and ammunition, number of rounds fired, time of day, range attributes such as size and barriers, and assessment procedure and metrics. The model accounts for the spectra and directivity of both muzzle blast and projectile bow shock, and assumes a moderate downwind propagation condition. The source model parameter values are based on empirical data. The modeling input data of each weapon type and annual rounds are presented in **Table C-2.1**.

Based on a review of the small arms firing at each range, the noise from the Stone Bay ranges and the L-5 ranges were considered further in the noise modeling to establish the likely worst-case representative small arms weapon firing noise around the base. The modeling input data of each weapon type and annual rounds are presented in the table below. The following modeling assumptions were used in developing a noise model using SARNAM to predict ADNL contours around Stone Bay area:

- Daily rounds were averages based on annual rounds over average range operational days (i.e., 244 days per year) as per MCB Camp Lejeune direction (via email on June 27, 2008).
- Average daytime and nighttime (10PM-7AM) operational percentages are 90% of day shots and 10% of nighttime shots as per MCB Camp Lejeune's recommendation (via email on June 27, 2008).
- Blank rounds are not considered given 1) blank shots result in negligible noise as compared to live firing and 2) the large number of live shots that would mask the noise

from blank rounds. The modeled annual live rounds under 2004-2006 average condition, No Action Alternative and proposed action conditions are summarized in **Table C-2.2**.

- All firing occurs at fixed firing lanes with varying target positions at several average firing distances based on the information provided by MCB Camp Lejeune as below:
 - Stone Bay Walkdown and Mechanical Pistol Range: 50, 25, 15, and 7 yards (yds).
 - Stone Bay Dodge City: 200, 100, and 50 yds.
 - Stone Bay Hathcock: 1000, 900, 800, 700, 600, 500, 400, 300, 200, and 100 yds.
 - Stone Bay Multi-Purpose: 100, 50, and 25 yds.
 - Stone Bay Alpha, Bravo, and Charlie Rifle Ranges: 600, 500, 300, 200, 100, and 50 yds
 - L-5 (includes L-5 (7.62)): 800, 700, 600, 500, 300, 200, and 100 yds.
- Total annual firing rounds within each range are evenly distributed to each fire-target distance as identified above, where applicable.

Table C-2.1
BNOISE2 Modeled Large Caliber Weapon Expenditures

| Range | Weapon/Ammo Type | Annual Number of Rounds | | | Net Explosive Weight (lb) |
|---------------------|---|-----------------------------|-----------|-----------------|------------------------------|
| | | 2004-2006 Average Condition | No Action | Proposed Action | |
| BROWNS ISLAND | CHG DEMO 1-1/4 LB-HE | 15 | 15 | 15 | 1.25 |
| | CHG DEMO C4 1-1/4LB-HE | 44 | 44 | 44 | 1.25 |
| BT-3A/NAVAL GUNFIRE | 5 inch 38 caliber projectile-HE | 152 | 152 | 160 | 0 |
| | 5 inch 38 caliber projectile-Inert | 3 | 3 | 3 | 55 |
| | 5 inch 54 caliber projectile-Inert | 21 | 21 | 22 | 0 |
| | 5 inch 54 caliber projectile-HE | 1,933 | 1,933 | 2,030 | 70 |
| E-1 | GM SUBSYSTEM SUBSYSTEM,INTERCE-HE | 2 | 2 | 2 | 6.6 |
| | GM,INTER-ARIEL FIM 92A (BASIC) (Stinger)-HE | 8 | 8 | 8 | 6.6 |
| | STINGER (PL90)-HE | 21 | 21 | 21 | 6.6 |
| | STINGER, WPN RD PARTIAL-HE | 19 | 19 | 19 | 6.6 |
| EB | CHG ASSY DEMO M183-HE | 1 | 1 | 1 | 1 |
| | CHG DEMO TNT 1/4 LB-HE | 38 | 38 | 38 | 0.25 |
| EOD-1 | 60 mm-Inert | 4 | 4 | 4 | 0 |
| | 60 mm-HE | 30 | 30 | 32 | 0.0457 |
| | CHG DEMO C4 1-1/4LB-HE | 11 | 11 | 11 | 1.25 |
| | CHG, DEMO SHEET 38 FT-HE | 9 | 9 | 9 | .50LBS/SHEET |
| | IGNBLST FUSM81 S/TUB CPBLTY-HE | 14 | 14 | 14 | 0.137 |
| | NOMEN PYROTECHNIC INITIATOR MK34 MOD 0-HE | 3 | 3 | 3 | C-3 plastic demo with 2.5 lb |
| EOD-2 | HAND GRENADE SMOKE TNG M83 (Terephthalic Acid [TA])-Inert | 10 | 10 | 10 | 0.072 |
| | SIMULATOR, NOISE, (SMAW)-Inert | 5 | 5 | 5 | 0.141 |
| | CHG ASSY DEMO M183-HE | 19 | 19 | 19 | 1 |
| | CHG DEMO 1-1/4 LB-HE | 1 | 1 | 1 | 1.25 |
| | CHG DEMO 40LB CRATERING-HE | 1 | 1 | 1 | 40 |
| | CHG DEMO C4 1-1/4LB-HE | 45 | 45 | 45 | 1.25 |
| | CHG DEMO TNT 1 LB-HE | 17 | 17 | 17 | 1 |
| | CHG DEMO TNT 1/4 LB-HE | 6 | 6 | 6 | 0.25 |
| | CHG, DEMO SHEET 25 FT-HE | 27 | 27 | 27 | .50LBS/SHEET |
| | CHG, DEMO SHEET 38 FT-HE | 88 | 88 | 88 | .50LBS/SHEET |
| | CNTR DEMO MK1-0ITION CHARGE-HE | 5 | 5 | 5 | 1.13 |
| | DEMO KIT CRATERING M180-HE | 2 | 2 | 2 | 45 |

| Range | Weapon/Ammo Type | Annual Number of Rounds | | | Net Explosive Weight (lb) |
|--|---|-----------------------------|-----------|-----------------|---------------------------|
| | | 2004-2006 Average Condition | No Action | Proposed Action | |
| | DYNAMITE MILITARY M1-HE | 4 | 4 | 4 | 0.037 |
| | GREN HAND INC AN-M14 (Thermite)-HE | 2 | 2 | 2 | 1.55 |
| | IGNBLST FUSM81 S/TUB CPBLTY-HE | 80 | 80 | 80 | 0.137 |
| | MINE AP DIR M18A1 CLAYMORE-HE | 3 | 3 | 3 | 1.5 |
| ETA-1/ETA-1 STEEL/ETA-1 CRATER PIT | CHARGE, DEMO (MM46)-HE | 1 | - | - | 225GRAINS/FT |
| | CHARGE, DEMOLITION (MM30)-HE | 40 | - | - | 1 |
| | CHARGE, DEMO (MM44)-HE | 5 | - | - | 1 |
| | CHARGE, DEMO FLEX LINEAR SHAPED-HE | 9 | - | - | 0.0728 |
| | CHG ASSY DEMO M183-HE | 641 | - | - | 1 |
| ETA-1/ETA-1 STEEL/ETA-1 CRATER PIT (cont.) | CHG ASSY DEMO-HE | 1 | - | - | 1 |
| | CHG DEMO 1-1/4 LB-HE | 1 | - | - | 1.25 |
| | CHG DEMO 40LB CRATERING-HE | 70 | - | - | 40 |
| | CHG DEMO BLCK M1-HE | 1 | - | - | 1.25 |
| | CHG DEMO C4 1-1/4LB-HE | 191 | - | - | 1.25 |
| | CHG DEMO LINEAR COMPONENT-HE | 7 | - | - | 225 GRAINS/FT |
| | CHG DEMO LINEAR M58 (MICLIC)-HE | 13 | - | - | 5LBS/FT |
| | CHG DEMO LINFLEX 225GR-HE | 5 | - | - | 225GR/FT |
| | CHG DEMO LINFLEX 300GR-HE | 41 | - | - | 300GR/FT |
| | CHG DEMO LINFLEX 600GR-HE | 2 | - | - | 600GR/FT |
| | CHG DEMO LINFLEX 75GR-HE | 11 | - | - | 75GR/FT |
| | CHG DEMO ORD DISP MK89-0-HE | 10 | - | - | 1.25 |
| | CHG DEMO SHAPED 15 LB M2A4-HE | 52 | - | - | 15 |
| | CHG DEMO SHAPED 40 LB M3-HE | 2 | - | - | 40 |
| | CHG DEMO SHAPED RDX MK45 MOD 0-HE | 2 | - | - | 11 |
| | CHG DEMO TNT 1 LB-HE | 2,302 | - | - | 1 |
| | CHG DEMO TNT 1/4 LB-HE | 2,986 | - | - | 0.25 |
| | CHG, ASSY, DEMO MK133 MODS 0/1/2-HE | 1 | - | - | 0.5 |
| | CHG, DEMO (MM47)-HE | 8 | - | - | 400GR/FT |
| | CHG, DEMO EXPL SHEET 28 OZ-HE | 8 | - | - | 2.3 |
| | CHG, DEMO LINEAR M58 COMP C-4-HE | 5 | - | - | 0.0375 |
| | CHG, DEMO MK20 MOD 0 COMP C-2/3-HE | 1 | - | - | 20 |
| | CHG, DEMO SHAPED FLEX LINEAR-HE | 1 | - | - | 125GR/FT |
| | CHG, DEMO SHAPED PETN-HE | 5 | - | - | 0.0321 |
| | CHG, DEMO SHEET 19 FT-HE | 88 | - | - | .50LBS/SHEET |
| | CHG, DEMO SHEET 25 FT-HE | 4 | - | - | .50LBS/SHEET |
| | CTG, DELAY M70-HE | 1 | - | - | 0.1 |
| | CUTTER, CTG ACTUATED MK18 MOD 0-HE | 200 | - | - | 0.1 |
| | DEMO CHARGE, SHAPED-HE | 16 | - | - | 0.0728 |
| | DEMO KIT BANG TORPEDO-HE | 97 | - | - | 9 |
| | DEMO KIT BANG TORP-HE | 1 | - | - | 9 |
| | DEMO KIT CRATERING M180-HE | 21 | - | - | 45 |
| | DEMO KIT, PROJECTED CHG M1 W/O RCKT MTR-HE | 376 | - | - | 1 |
| | DYNAMITE MILITARY M1-HE | 817 | - | - | 0.037 |
| | HAND GRENADE SMOKE TNG M83 (Terephthalic Acid [TA])-Inert | 161 | - | - | 0.072 |
| | IGNBLST FUSM81 S/TUB CPBLTY-HE | 1,555 | - | - | 0.137 |
| | MINE AP DIR M18A1 CLAYMORE-HE | 105 | - | - | 1.5 |
| | MINE AP M16A1 W/FUZE M605-HE | 1 | - | - | 2 |
| | MINE AT HE M15 W/FUZE M603-HE | 620 | - | - | 15 |
| | MINE AT M21 W/F M607-HE | 52 | - | - | 20 |
| ETA-1/ETA-1 STEEL/ETA-1 CRATER PIT | ROCKET MOTOR, MK76 MOD 0-HE | 6 | - | - | 6.1 |
| | ROCKET MOTOR, MK82 MOD 0-HE | 2 | - | - | 6.1 |
| | SHAPE CHARGE 25 GR-HE | 3 | - | - | 25GR/FT |
| | TNT 1/2 LB M1A4-HE | 297 | - | - | 0.25 |

| Range | Weapon/Ammo Type | Annual Number of Rounds | | | Net Explosive Weight (lb) |
|------------------|---|-----------------------------|-----------|-----------------|---------------------------|
| | | 2004-2006 Average Condition | No Action | Proposed Action | |
| | TNT 8 LB-HE | 6 | - | - | 8 |
| ETC | CHARGE, DEMO (MM46)-HE | - | 1 | 1 | 225GRAINS/FT |
| | CHARGE, DEMOLITION (MM30)-HE | - | 40 | 40 | 1 |
| | CHARGE, DEMO (MM44)-HE | - | 5 | 5 | 1 |
| | CHARGE, DEMO FLEX LINEAR SHAPED-HE | - | 9 | 9 | 0.0728 |
| | CHG ASSY DEMO M183-HE | - | 641 | 641 | 1 |
| | CHG ASSY DEMO-HE | - | 1 | 1 | 1 |
| | CHG DEMO 1-1/4 LB-HE | - | 1 | 1 | 1.25 |
| | CHG DEMO 40LB CRATERING-HE | - | 70 | 70 | 40 |
| | CHG DEMO BLCK M1-HE | - | 1 | 1 | 1.25 |
| | CHG DEMO C4 1-1/4LB-HE | - | 191 | 191 | 1.25 |
| | CHG DEMO LINEAR COMPONENT-HE | - | 7 | 7 | 225 GRAINS/FT |
| | CHG DEMO LINEAR M58 (MICLIC)-HE | - | 13 | 13 | 5LBS/FT |
| | CHG DEMO LINFLEX 225GR-HE | - | 5 | 5 | 225GR/FT |
| | CHG DEMO LINFLEX 300GR-HE | - | 41 | 41 | 300GR/FT |
| | CHG DEMO LINFLEX 600GR-HE | - | 2 | 2 | 600GR/FT |
| | CHG DEMO LINFLEX 75GR-HE | - | 11 | 11 | 75GR/FT |
| | CHG DEMO ORD DISP MK89-0-HE | - | 10 | 10 | 1.25 |
| | CHG DEMO SHAPED 15 LB M2A4-HE | - | 52 | 52 | 15 |
| | CHG DEMO SHAPED 40 LB M3-HE | - | 2 | 2 | 40 |
| | CHG DEMO SHAPED RDX MK45 MOD 0-HE | - | 2 | 2 | 11 |
| | CHG DEMO TNT 1 LB-HE | - | 2,302 | 2,302 | 1 |
| | CHG DEMO TNT 1/4 LB-HE | - | 2,986 | 2,986 | 0.25 |
| | CHG, ASSY, DEMO MK133 MODS 0/1/2-HE | - | 1 | 1 | 0.5 |
| | CHG, DEMO (MM47)-HE | - | 8 | 8 | 400GR/FT |
| | CHG, DEMO EXPL SHEET 28 OZ-HE | - | 8 | 8 | 2.3 |
| | CHG, DEMO LINEAR M58 COMP C-4-HE | - | 5 | 5 | 0.0375 |
| | CHG, DEMO MK20 MOD 0 COMP C-2/3-HE | - | 1 | 1 | 20 |
| | CHG, DEMO SHAPED FLEX LINEAR-HE | - | 1 | 1 | 125GR/FT |
| | CHG, DEMO SHAPED PETN-HE | - | 5 | 5 | 0.0321 |
| | CHG, DEMO SHEET 19 FT-HE | - | 88 | 88 | .50LBS/SHEET |
| | CHG, DEMO SHEET 25 FT-HE | - | 4 | 4 | .50LBS/SHEET |
| | CTG, DELAY M70-HE | - | 1 | 1 | 0.1 |
| | CUTTER, CTG ACTUATED MK18 MOD 0-HE | - | 200 | 200 | 0.1 |
| | DEMO CHARGE, SHAPED-HE | - | 16 | 16 | 0.0728 |
| | DEMO KIT BANG TORPEDO-HE | - | 97 | 97 | 9 |
| | DEMO KIT BANG TORP-HE | - | 1 | 1 | 9 |
| | DEMO KIT CRATERING M180-HE | - | 21 | 21 | 45 |
| ETC (cont.) | DEMO KIT, PROJECTED CHG M1 W/O RCKT MTR-HE | - | 376 | 376 | 1 |
| | DYNAMITE MILITARY M1-HE | - | 817 | 817 | 0.037 |
| | HAND GRENADE SMOKE TNG M83 (Terephthalic Acid [TA])-Inert | - | 161 | 161 | 0.072 |
| | IGNBLST FUSM81 S/TUB CPBLTY-HE | - | 1,555 | 1,555 | 0.137 |
| | MINE AP DIR M18A1 CLAYMORE-HE | - | 105 | 105 | 1.5 |
| | MINE AP M16A1 W/FUZE M605-HE | - | 1 | 1 | 2 |
| | MINE AT HE M15 W/FUZE M603-HE | - | 620 | 620 | 15 |
| | MINE AT M21 W/F M607-HE | - | 52 | 52 | 20 |
| | ROCKET MOTOR, MK76 MOD 0-HE | - | 6 | 6 | 6.1 |
| | ROCKET MOTOR, MK82 MOD 0-HE | - | 2 | 2 | 6.1 |
| | SHAPE CHARGE 25 GR-HE | - | 3 | 3 | 25GR/FT |
| | TNT 1/2 LB M1A4-HE | - | 297 | 297 | 0.25 |
| ETA-2/ETA-2 (LC) | TNT 8 LB-HE | - | 6 | 6 | 8 |
| | (APOBS) ANTI-PERSONNEL OBSTACLE BREACHING SYSTEM MK 47 MOD 1-HE | 1 | 1 | 1 | 118 |

| Range | Weapon/Ammo Type | Annual Number of Rounds | | | Net Explosive Weight (lb) |
|---------------|---|-----------------------------|-----------|-----------------|---------------------------|
| | | 2004-2006 Average Condition | No Action | Proposed Action | |
| | CHARGE, DEMOLITION (MM28)-HE | 18 | 18 | 18 | 20LBS /SHEET |
| | CHARGE, DEMO FLEX LINEAR SHAPED-HE | 1 | 1 | 1 | 0.0728 |
| | CHG ASSY DEMO M183-HE | 46 | 46 | 46 | 1 |
| | CHG DEMO 40LB CRATERING-HE | 6 | 6 | 6 | 40 |
| | CHG DEMO C4 1-1/4LB-HE | 12 | 12 | 12 | 1.25 |
| | CHG DEMO LINEAR M58 (MICLIC)-HE | 272 | 272 | 272 | 5LBS/FT |
| | CHG DEMO LINFLEX 600GR-HE | 9 | 9 | 9 | 600GR/FT |
| | CHG DEMO SHAPED 15 LB M2A4-HE | 7 | 7 | 7 | 15 |
| | CHG DEMO SHAPED 40 LB M3-HE | 1 | 1 | 1 | 40 |
| | CHG DEMO TNT 1 LB-HE | 57 | 57 | 57 | 1 |
| | CHG DEMO TNT 1/4 LB-HE | 149 | 149 | 149 | 0.25 |
| | CHG, DEMO SHEET 19 FT-HE | 23 | 23 | 23 | .50LBS/SHEET |
| | CHG, DEMO SHEET 25 FT-HE | 35 | 35 | 35 | .50LBS/SHEET |
| | CHG, DEMO SHEET 38 FT-HE | 42 | 42 | 42 | .50LBS/SHEET |
| | CHG, DEMO SHEET 9 FT-HE | 5 | 5 | 5 | .50LBS/SHEET |
| | CHG, DEMO, LINEAR SHAPED 6FT-HE | 1 | 1 | 1 | .50LBS/SHEET |
| | DEMO KIT BANG TORPEDO-HE | 11 | 11 | 11 | 9 |
| | DYNAMITE MILITARY M1-HE | 26 | 26 | 26 | 0.037 |
| | IGNBLST FUSM81 S/TUB CPBLTY-HE | 15 | 15 | 15 | 0.137 |
| | MINE AP DIR M18A1 CLAYMORE-HE | 10 | 10 | 10 | 1.5 |
| | MINE AT HE M15 W/FUZE M603-HE | 6 | 6 | 6 | 15 |
| | MINE AT M21 W/F M607-HE | 5 | 5 | 5 | 20 |
| | TNT 1/2 LB M1A4-HE | 20 | 20 | 20 | 0.25 |
| | CHG, ASSY, DEMO MK133 MODS 0/1/2-HE | 232 | 232 | 232 | 0.5 |
| ETA-3 | CHARGE, DEMOLITION (MM30)-HE | 7 | 7 | 7 | 1 |
| | CHARGE, DEMO FLEX LINEAR SHAPED-HE | 17 | 17 | 17 | 0.0728 |
| ETA-3 (cont.) | CHG ASSY DEMO M183-HE | 650 | 650 | 650 | 1 |
| | CHG DEMO C4 1-1/4LB-HE | 52 | 52 | 52 | 1.25 |
| | CHG DEMO LINFLEX 400GR-HE | 2 | 2 | 2 | 400GR/FT |
| | CHG DEMO LINFLEX 600GR-HE | 3 | 3 | 3 | 600GR/FT |
| | CHG DEMO SHAPED 15 LB M2A4-HE | 126 | 126 | 126 | 15 |
| | CHG DEMO ORD DISP MK89-0-HE | 50 | 50 | 50 | 1.25 |
| | CHG DEMO TNT 1 LB-HE | 1,530 | 1,530 | 1,530 | 1 |
| | CHG DEMO TNT 1/4 LB-HE | 915 | 915 | 915 | 0.25 |
| | CHG, DEMO (MM47)-HE | 13 | 13 | 13 | 400GR/FT |
| | CHG, DEMO LINEAR M58 COMP C-4-HE | 2 | 2 | 2 | 0.0375 |
| | CHG, DEMO SHAPED FLEX LINEAR-HE | 2 | 2 | 2 | 125GR/FT |
| | CHG, DEMO SHEET 19 FT-HE | 48 | 48 | 48 | .50LBS/SHEET |
| | CHG, DEMO SHEET 25 FT-HE | 84 | 84 | 84 | .50LBS/SHEET |
| | CHG, DEMO SHEET 38 FT-HE | 70 | 70 | 70 | .50LBS/SHEET |
| | CTG, IMPULSE M270-HE | 63 | 63 | 63 | 0.1 |
| | DEMO KIT BANG TORPEDO-HE | 735 | 735 | 735 | 9 |
| | DESTROYER, CRYPTO EQUIP M1A2 INCD TH1-HE | 1 | 1 | 1 | 1 |
| | DYNAMITE MILITARY M1-HE | 209 | 209 | 209 | 0.037 |
| | IGNBLST FUSM81 S/TUB CPBLTY-HE | 212 | 212 | 212 | 0.137 |
| | MINE AP DIR M18A1 CLAYMORE-HE | 6 | 6 | 6 | 1.5 |
| | TNT 1/2 LB M1A4-HE | 25 | 25 | 25 | 0.25 |
| ETA-4 | (APOBS) ANTI-PERSONNEL OBSTACLE BREACHING SYSTEM MK 47 MOD 1-HE | 47 | 47 | 47 | 118 |
| | CHARGE, DEMOLITION (MM30)-HE | 20 | 20 | 20 | 1 |
| | CHARGE, DEMO FLEX LINEAR SHAPED-HE | 2 | 2 | 2 | 0.0728 |
| | CHG ASSY DEMO-HE | 6 | 6 | 6 | 1 |
| | CHG ASSY DEMO M183-HE | 218 | 218 | 218 | 1 |
| | CHG DEMO 40LB CRATERING-HE | 11 | 11 | 11 | 40 |

| Range | Weapon/Ammo Type | Annual Number of Rounds | | | Net Explosive Weight (lb) |
|---------------|------------------------------------|-----------------------------|-----------|-----------------|---------------------------|
| | | 2004-2006 Average Condition | No Action | Proposed Action | |
| | CHG DEMO C4 1-1/4LB-HE | 255 | 255 | 255 | 1.25 |
| | CHG DEMO LINEAR M58 (MICLIC)-HE | 1 | 1 | 1 | 5LBS/FT |
| | CHG DEMO SHAPED 15 LB M2A4-HE | 6 | 6 | 6 | 15 |
| | CHG DEMO ORD DISP MK89-0-HE | 59 | 59 | 59 | 1.25 |
| | CHG DEMO SHAPED 40 LB M3-HE | 4 | 4 | 4 | 40 |
| | CHG DEMO SHAPED RDX MK45 MOD 0-HE | 1 | 1 | 1 | 11 |
| | CHG DEMO TNT 1 LB-HE | 438 | 438 | 438 | 1 |
| | CHG DEMO TNT 1/4 LB-HE | 242 | 242 | 242 | 0.25 |
| | CHG, DEMO LINEAR M58 COMP C-4-HE | 105 | 105 | 105 | 0.0375 |
| | CHG, DEMO MK14 MOD 1 50 LB TNT-HE | 1 | 1 | 1 | 20 |
| | CHG, DEMO SHAPED PETN-HE | 25 | 25 | 25 | 0.0321 |
| | CHG, DEMO SHEET 25 FT-HE | 17 | 17 | 17 | .50LBS/SHEET |
| ETA-4 (cont.) | CHG, DEMO SHEET 38 FT-HE | 26 | 26 | 26 | .50LBS/SHEET |
| | CHG, DEMO, EXP SHEET 2 GR-HE | 31 | 31 | 31 | 20 |
| | CHG, DEMO, EXP SHEET 4GR-HE | 25 | 25 | 25 | 4GR/FT |
| | CNTR DEMO MK7-3ITION CHARGE-HE | 3 | 3 | 3 | 4 |
| | CNTR DEMO MK7-4ITION CHARGE-HE | 1 | 1 | 1 | 4 |
| | CTG, IMPULSE-HE | 10 | 10 | 10 | 0.1 |
| | CUTTER HE MK23-0-HE | 1 | 1 | 1 | 0.1 |
| | DEMO CHARGE, SHAPED-HE | 33 | 33 | 33 | 0.0728 |
| | DEMO KIT BANG TORPEDO-HE | 23 | 23 | 23 | 9 |
| | DEMO KIT CRATERING M180-HE | 1 | 1 | 1 | 45 |
| | DYNAMITE MILITARY M1-HE | 38 | 38 | 38 | 0.037 |
| | IGNBLST FUSM81 S/TUB CPBLTY-HE | 188 | 188 | 188 | 0.137 |
| | KIT, FOXHOLE DIGGER-HE | 2 | 2 | 2 | 5 |
| | MINE AP DIR M18A1 CLAYMORE-HE | 44 | 44 | 44 | 1.5 |
| | MINE AT HE M15 W/FUZE M603-HE | 7 | 7 | 7 | 15 |
| | MINE AT HE M19 W/FUZE M606-HE | 1 | 1 | 1 | 15 |
| | MINE AT M21 W/F M607-HE | 7 | 7 | 7 | 20 |
| | TNT 1/2 LB M1A4-HE | 86 | 86 | 86 | 0.25 |
| | TNT 8 LB-HE | 1 | 1 | 1 | 8 |
| ETA-5/ETA-5A | CHARGE, DEMOLITION (MM28)-HE | 3 | 3 | 3 | 20LBS /SHEET |
| | CHARGE, DEMOLITION (MM30)-HE | 17 | 17 | 17 | 1 |
| | CHARGE, DEMO FLEX LINEAR SHAPED-HE | 17 | 17 | 17 | 0.0728 |
| | CHG ASSY DEMO M183-HE | 113 | 113 | 113 | 1 |
| | CHG ASSY DEMO-HE | 500 | 500 | 500 | 1 |
| | CHG DEMO 40LB CRATERING-HE | 1 | 1 | 1 | 40 |
| | CHG DEMO BLK M118 PETN 2LB-HE | 171 | 171 | 171 | 4.5 |
| | CHG DEMO C4 1-1/4LB-HE | 1,797 | 1,797 | 1,797 | 1.25 |
| | CHG DEMO LINEAR COMPONENT-HE | 15 | 15 | 15 | 225 GRAINS/FT |
| | CHG DEMO ORD DISP MK89-0-HE | 31 | 31 | 31 | 1.25 |
| | CHG DEMO SHAPED 15 LB M2A4-HE | 14 | 14 | 14 | 15 |
| | CHG DEMO TNT 1 LB-HE | 1,788 | 1,788 | 1,788 | 1 |
| | CHG DEMO TNT 1/4 LB-HE | 529 | 529 | 529 | 0.25 |
| | CHG, DEMO LINEAR M58 COMP C-4-HE | 70 | 70 | 70 | 0.0375 |
| | CHG, DEMO SHEET 19 FT-HE | 10 | 10 | 10 | .50LBS/SHEET |
| | CHG, DEMO SHEET 25 FT-HE | 30 | 30 | 30 | .50LBS/SHEET |
| | CHG, DEMO SHEET 38 FT-HE | 33 | 33 | 33 | .50LBS/SHEET |
| | CHG, DEMO, EXP SHEET 2 GR-HE | 1 | 1 | 1 | 20 |
| | DEMO KIT BANG TORPEDO-HE | 43 | 43 | 43 | 9 |
| ETA-5/ETA-5A | DESTRUCT UNIVERSAL M10-HE | 1 | 1 | 1 | 1 |
| | DET KIT CONCUSSION-HE | 100 | 100 | 100 | 1 |
| | DYNAMITE MILITARY M1-HE | 23 | 23 | 23 | 0.037 |
| | GREN HAND INC AN-M14 (Thermite)-HE | 2 | 2 | 2 | 1.55 |
| | HAND GRENADE SMOKE TNG M83 | 1 | 1 | 1 | 0.072 |

| Range | Weapon/Ammo Type | Annual Number of Rounds | | | Net Explosive Weight (lb) |
|------------------------------|--|-----------------------------|-----------|-----------------|---------------------------|
| | | 2004-2006 Average Condition | No Action | Proposed Action | |
| | (Terephthalic Acid [TA])-Inert | | | | |
| | IGNBLST FUSM81 S/TUB CPBLTY-HE | 1,853 | 1,853 | 1,853 | 0.137 |
| | M84 NON LETHAL STUN GRENADE (M84)-Inert | 5 | 5 | 5 | 0.072 |
| | MINE AP DIR M18A1 CLAYMORE-HE | 521 | 521 | 521 | 1.5 |
| | TNT 1/2 LB M1A4-HE | 63 | 63 | 63 | 0.25 |
| F-6 | GREN HAND FRAG M67-HE | 2,748 | 2,748 | 2,748 | 0.5 |
| | IGNBLST FUSM81 S/TUB CPBLTY-HE | 1 | 1 | 1 | 0.137 |
| G-10 | 105 mm-HE | 85 | 85 | 89 | 12.08 |
| | 155 mm-HE | 165 | 165 | 173 | 22.47 |
| | 20 mm-HE | 5,425 | 5,425 | 5,697 | 0.0861 |
| | 25 mm-Inert | 6,228 | 6,228 | 6,539 | 0 |
| | 25 mm-HE | 750 | 750 | 788 | 0.173 |
| | 30 mm-HE | 665 | 665 | 698 | 0.331 |
| | BOMB, PRAC 25 LB BDU-33 80/PL-Inert | 963 | 963 | 963 | 0 |
| | BOMB, PRACTICE, 9LB, BDU-48-Inert | 324 | 324 | 324 | 0 |
| | HAND GRENADE SMOKE TNG M83 (Terephthalic Acid [TA])-Inert | 41 | 41 | 41 | 0.072 |
| | RKT 2.75 IN PRAC M274-Inert | 729 | 729 | 729 | 0 |
| | RKT 2.75 IN PRAC M274 MK66-4-Inert | 12 | 12 | 12 | 0 |
| | RKT 2.75 SMK WP-Inert | 370 | 370 | 370 | 0.0087 |
| | RKT 83MM,COMMON PRACTICE-Inert | 17 | 17 | 17 | 0 |
| | ROCKET, 2.75 IN PRAC-Inert | 190 | 190 | 190 | 0 |
| | SIGNAL CTG GREEN FLARE-Inert | 1 | 1 | 1 | 1.669 |
| | CHG DEMO BLK M118 PETN 2LB-HE | 3 | 3 | 3 | 4.5 |
| | CHG DEMO C4 1-1/4LB-HE | 10 | 10 | 10 | 1.25 |
| | CHG DEMO ORD DISP MK89-0-HE | 530 | 530 | 530 | 1.25 |
| | CUTTER,MK 24-0-HE | 18 | 18 | 18 | 0.1 |
| | RKT 2.75-HE | 26 | 26 | 26 | 6.1 |
| | RKT 2.75 HE M229 W/H (PRO-HE | 21 | 21 | 21 | 6.1 |
| | RKT 2.75 HE XM299 W/FUZE-HE | 10 | 10 | 10 | 6.1 |
| | RKT 2.75IN CS XM99 W/WHD-HE | 4 | 4 | 4 | 6.1 |
| | RKT MTR 2.75 IN LSFFAR MK40-HE | 1 | 1 | 1 | 6.1 |
| | ROCKET MOTOR, MK76 MOD 0-HE | 13 | 13 | 13 | 6.1 |
| | ROCKET, 17WH, MK66 MTR-HE | 29 | 29 | 29 | 16.1 |
| G-10 (cont.) | ROCKET, 2.75 IN HE (H162)-HE | 62 | 62 | 62 | 16.1 |
| | ROCKET, 2.75 IN HE (H485)-HE | 163 | 163 | 163 | 16.1 |
| | GUIDED MISSILE TOWII-HE | 95 | 95 | 95 | 12.18 |
| | GUIDED MISSILE, PRACTICE BTM-71A-3B (TOW EXTENDED RANGE)-Inert | 1 | 1 | 1 | 0 |
| | Guided Missile, Surface Attack BGM-71C-1 (TOW)-HE | 1 | 1 | 1 | 12.18 |
| | GUIDED MISSILE, SURFACE ATTACK-HE | 1 | 1 | 1 | 35 |
| | KIT FLARE PERS DIST MIXED (M186)-HE | 1,000 | 1,000 | 1,000 | 0.212 |
| | RKT 83MM, ASSAULT, (SMAW)-HE | 4 | 4 | 4 | 9.46 |
| | ROCKET, 2.75 IN-HE | 6 | 6 | 6 | 16.1 |
| | CHG ASSY DEMO M183-HE | 1 | 1 | 1 | 1 |
| | ROCKET MOTOR, 2.75 IN MK2-HE | 10 | 10 | 10 | 6.1 |
| | WARHEAD, HE MK1 F/2.75 IN RCKT-HE | 11 | 11 | 11 | 8.7 |
| G-3/G-3 .50 CAL/G-3 TOW/OP-5 | 20 mm-HE | 250 | 250 | 263 | 0.0861 |
| | Mk-19, 40mm-HE | 121,565 | 121,565 | 133,722 | 0.0835 |
| | 60 mm-HE | 560 | 560 | 588 | 0.0457 |
| | 60 mm-Inert | 131 | 131 | 138 | 0 |
| | 81 mm-HE | 1,463 | 1,463 | 1,536 | 2 |
| | AT4 LTWT MULTI-PURPOSE WPN-HE | 41 | 41 | 43 | 0.0104 |
| | CHG ASSY DEMO M183-HE | 12 | 12 | 12 | 1 |

| Range | Weapon/Ammo Type | Annual Number of Rounds | | | Net Explosive Weight (lb) |
|-------------|---|-----------------------------|-----------|-----------------|---------------------------|
| | | 2004-2006 Average Condition | No Action | Proposed Action | |
| | CHG DEMO C4 1-1/4LB-HE | 5 | 5 | 5 | 1.25 |
| | CHG DEMO TNT 1/4 LB-HE | 20 | 20 | 20 | 0.25 |
| | Dragon-HE | 2 | 2 | 2 | 25 |
| | G MSL BGM-71A-1SUR ATT BGM-71A-HE | 6 | 6 | 6 | 5.786 |
| | TOW HEAT-HE | 7 | 7 | 7 | 12.18 |
| | TOW PRACTICE-Inert | 1 | 1 | 1 | 0 |
| | TOW W/MOIC & PRACT-Inert | 34 | 34 | 34 | 0 |
| | TOW,W/MOIC & HEAT-HE | 16 | 16 | 16 | 27.28 |
| | TOW/BGM-71F-2B-HE | 13 | 13 | 13 | 27.28 |
| G-5 | CHG DEMO TNT 1 LB-HE | 63 | 63 | 63 | 1 |
| | CUTTER HE MK23-0-HE | 225 | 225 | 225 | 0.1 |
| G-6 (CBC) | Mk-19, 40mm-HE | 600 | 600 | 660 | 0.0835 |
| | 60 mm-Inert | 4 | 4 | 4 | 0 |
| | 60 mm-HE | 151 | 151 | 159 | 0.0457 |
| | AT4 LTWT MULTI-PURPOSE WPN-HE | 22 | 22 | 23 | 0.0104 |
| | HAND GRENADE SMOKE TNG M83 (Terephthalic Acid [TA])-Inert | 6 | 6 | 6 | 0.072 |
| | RKT 83MM,COMMON PRACTICE-Inert | 9 | 9 | 9 | 0 |
| | SIMULATOR, NOISE, (SMAW)-Inert | 2 | 2 | 2 | 0.141 |
| | RKT 83MM, ASSAULT, (SMAW)-HE | 11 | 11 | 11 | 9.46 |
| G-7 | 155 mm-HE | 68 | 68 | 71 | 22.47 |
| G-8 | Mk-19, 40mm-HE | 244 | 244 | 268 | 0.0835 |
| G-9 | AT4 LTWT MULTI-PURPOSE WPN-HE | 106 | 106 | 111 | 0.0104 |
| | M72AS 21MM SUB-CAL TRAINER ROCKET-Inert | 94 | 94 | 94 | 0 |
| | RKT 83MM,COMMON PRACTICE-Inert | 100 | 100 | 100 | 0 |
| | ROCKET, 83MM ASSAULT PRAC MK4 MOD 0 (SMAW)-Inert | 5 | 5 | 5 | 0 |
| | RKT 83MM, ASSAULT, (SMAW)-HE | 34 | 34 | 34 | 9.46 |
| G-9 (cont.) | RKT 83MM, HEAA-HE | 9 | 9 | 9 | 9.46 |
| | | | | | |
| GP-1 | 155 mm-Inert | 293 | 293 | 308 | 0 |
| | 155 mm-HE | 633 | 633 | 665 | 22.47 |
| GP-10 | 155 mm-Inert | 29 | 29 | 30 | 0 |
| | 155 mm-HE | 74 | 74 | 78 | 22.47 |
| GP-12 | 155 mm-Inert | 19 | 19 | 20 | 0 |
| | 155 mm-HE | 291 | 291 | 306 | 22.47 |
| GP-13 | 155 mm-Inert | 2,190 | 2,190 | 2,300 | 0 |
| | 155 mm-HE | 2,397 | 2,397 | 2,517 | 22.47 |
| | 81 mm-Inert | 6 | 6 | 6 | 0 |
| GP-15 | 155 mm-Inert | 497 | 497 | 522 | 0 |
| | 155 mm-HE | 1,075 | 1,075 | 1,129 | 22.47 |
| GP-16 | 155 mm-Inert | 189 | 189 | 198 | 0 |
| | 155 mm-HE | 746 | 746 | 783 | 22.47 |
| GP-17 | 155 mm-Inert | 495 | 495 | 520 | 0 |
| | 155 mm-HE | 913 | 913 | 959 | 22.47 |
| GP-18 | 155 mm-Inert | 277 | 277 | 291 | 0 |
| | 155 mm-HE | 952 | 952 | 1,000 | 22.47 |
| GP-19 | 155 mm-Inert | 36 | 36 | 38 | 0 |
| | 155 mm-HE | 106 | 106 | 111 | 22.47 |
| GP-21 | 155 mm-Inert | 307 | 307 | 322 | 0 |
| | 155 mm-HE | 479 | 479 | 503 | 22.47 |
| | CUTTER-HE | 2 | 2 | 2 | 0.1 |
| GP-22 | 155 mm-Inert | 153 | 153 | 161 | 0 |
| | 155 mm-HE | 360 | 360 | 378 | 22.47 |
| GP-23 | 155 mm-Inert | 656 | 656 | 689 | 0 |

| Range | Weapon/Ammo Type | Annual Number of Rounds | | | Net Explosive Weight (lb) |
|---------------|---|-----------------------------|-----------|-----------------|---------------------------|
| | | 2004-2006 Average Condition | No Action | Proposed Action | |
| | 155 mm-HE | 1,394 | 1,394 | 1,464 | 22.47 |
| GP-25 | 155 mm-Inert | 351 | 351 | 369 | 0 |
| GP-25 (cont.) | 155 mm-HE | 690 | 690 | 725 | 22.47 |
| GP-26 | 155 mm-Inert | 122 | 122 | 128 | 0 |
| | 155 mm-HE | 773 | 773 | 812 | 22.47 |
| GP-27 | 155 mm-Inert | 304 | 304 | 319 | 0 |
| | 155 mm-HE | 630 | 630 | 662 | 22.47 |
| GP-28 | 155 mm-Inert | 193 | 193 | 203 | 0 |
| | 155 mm-HE | 710 | 710 | 746 | 22.47 |
| GP-29 | 155 mm-Inert | 221 | 221 | 232 | 0 |
| | 155 mm-HE | 948 | 948 | 995 | 22.47 |
| GP-3 | 155 mm-Inert | 305 | 305 | 320 | 0 |
| | 155 mm-HE | 754 | 754 | 792 | 22.47 |
| GP-30 | 155 mm-Inert | 164 | 164 | 172 | 0 |
| | 155 mm-HE | 587 | 587 | 616 | 22.47 |
| GP-31 | 155 mm-Inert | 397 | 397 | 417 | 0 |
| | 155 mm-HE | 589 | 589 | 618 | 22.47 |
| GP-32 | 155 mm-Inert | 1 | 1 | 1 | 0 |
| | 155 mm-HE | 14 | 14 | 15 | 22.47 |
| GP-33 | 155 mm-Inert | 30 | 30 | 32 | 0 |
| | 155 mm-HE | 64 | 64 | 67 | 22.47 |
| GP-9 | RKT 83MM,COMMON PRACTICE-Inert | 11 | 11 | 11 | 0 |
| GP-CAPEX | 155 mm-HE | 55 | 55 | 58 | 22.47 |
| | CHG ASSY DEMO M183-HE | 1 | 1 | 1 | 1 |
| | CHG DEMO TNT 1/4 LB-HE | 1 | 1 | 1 | 0.25 |
| HG | CHG DEMO C4 1-1/4LB-HE | 3 | 3 | 3 | 1.25 |
| | CHG DEMO TNT 1/4 LB-HE | 27 | 27 | 27 | 0.25 |
| HH | CHG DEMO C4 1-1/4LB-HE | 16 | 16 | 16 | 1.25 |
| HUNT/RB | CHG DEMO 1-1/4 LB-HE | 2 | 2 | 2 | 1.25 |
| K-211 | Mk-19, 40mm-HE | 107,182 | 107,182 | 117,900 | 0.0835 |
| | 25 mm-Inert | 900 | 900 | 945 | 0 |
| | HAND GRENADE SMOKE TNG M83 (Terephthalic Acid [TA])-Inert | 5 | 5 | 5 | 0.072 |
| K-212 | AT4 LTWT MULTI-PURPOSE WPN-HE | 11 | 11 | 12 | 0.0104 |
| | RKT 83MM,COMMON PRACTICE-Inert | 67 | 67 | 67 | 0 |
| | RKT 83MM, ASSAULT, (SMAW)-HE | 100 | 100 | 100 | 9.46 |
| | RKT 83MM, HEAA-HE | 63 | 63 | 63 | 9.46 |
| | ROCKET MOTOR, MK87 MOD 0-HE | 810 | 810 | 810 | 6.53 |
| K-2A A1032 | CHG ASSY DEMO M183-HE | 5 | 5 | 5 | 1 |
| | CHG DEMO C4 1-1/4LB-HE | 20 | 20 | 20 | 1.25 |
| | IGNBLST FUSM81 S/TUB CPBLTY-HE | 40 | 40 | 40 | 0.137 |
| K-301 | AT4 LTWT MULTI-PURPOSE WPN-HE | 135 | - | - | 0.0104 |
| | M72AS 21MM SUB-CAL TRAINER ROCKET-Inert | 108 | - | - | 0 |
| | RKT 83MM,COMMON PRACTICE-Inert | 153 | - | - | 0 |
| | ROCKET, 83MM ASSAULT PRAC MK4 MOD 0 (SMAW)-Inert | 27 | - | - | 0 |
| | RKT 83MM, ASSAULT, (SMAW)-HE | 91 | - | - | 9.46 |
| | RKT 83MM, HEAA-HE | 25 | - | - | 9.46 |
| | ROCKET MOTOR, MK54 MOD 0 SEAT EJECT-HE | 3 | - | - | 0.0485 |
| | ROCKET MOTOR, MK87 MOD 0-HE | 1,714 | - | - | 6.53 |
| K-302 | 60 mm-HE | 13 | - | - | 0.0457 |
| | SIGNAL, ILLUM GRND WHT STAR PARA M17A1-Inert | 33 | - | - | 0.0207 |

| Range | Weapon/Ammo Type | Annual Number of Rounds | | | Net Explosive Weight (lb) |
|--------------------|---|-----------------------------|-----------|-----------------|---------------------------|
| | | 2004-2006 Average Condition | No Action | Proposed Action | |
| K-303 | Mk-19, 40mm-HE | 13,811 | - | - | 0.0835 |
| | 40 mm-HE (Not including MK-19) | 5,931 | - | - | 11.69 |
| | 60 mm-Inert | 376 | - | - | 0 |
| | 60 mm-HE | 1,821 | - | - | 0.0457 |
| | 81 mm-Inert | 626 | - | - | 0 |
| | 81 mm-HE | 1,196 | - | - | 2 |
| | AT4 LTWT MULTI-PURPOSE WPN-HE | 38 | - | - | 0.0104 |
| | RKT 83MM,COMMON PRACTICE-Inert | 33 | - | - | 0 |
| | ROCKET, 83MM ASSAULT PRAC MK4 MOD 0 (SMAW)-Inert | 19 | - | - | 0 |
| | RKT 83MM, ASSAULT, (SMAW)-HE | 49 | - | - | 9.46 |
| | RKT 83MM, HEAA-HE | 2 | - | - | 9.46 |
| K-304 | Mk-19, 40mm-HE | 78,186 | - | - | 0.0835 |
| | 40 mm-HE (Not including MK-19) | 8,016 | - | - | 11.69 |
| | 60 mm-Inert | 586 | - | - | 0 |
| | 60 mm-HE | 4,483 | - | - | 0.0457 |
| | 81 mm-Inert | 430 | - | - | 0 |
| | 81 mm-HE | 2,389 | - | - | 2 |
| | AT4 LTWT MULTI-PURPOSE WPN-HE | 67 | - | - | 0.0104 |
| | RKT 83MM,COMMON PRACTICE-Inert | 145 | - | - | 0 |
| | ROCKET, 83MM ASSAULT PRAC MK4 MOD 0 (SMAW)-Inert | 6 | - | - | 0 |
| | RKT 83MM, ASSAULT, (SMAW)-HE | 86 | - | - | 9.46 |
| | RKT 83MM, HEAA-HE | 7 | - | - | 9.46 |
| K-305 | ROCKET MOTOR, MK87 MOD 0-HE | 1,150 | - | - | 6.53 |
| | Mk-19, 40mm-HE | 14,697 | - | - | 0.0835 |
| K-305 (cont.) | 60 mm-Inert | 1,722 | - | - | 0 |
| | 60 mm-HE | 9,920 | - | - | 0.0457 |
| | 81 mm-Inert | 1,499 | - | - | 0 |
| | 81 mm-HE | 5,413 | - | - | 2 |
| | 84 mm-HE | 1 | - | - | 2 |
| | AT4 LTWT MULTI-PURPOSE WPN-HE | 759 | - | - | 0.0104 |
| | RKT 83MM,COMMON PRACTICE-Inert | 590 | - | - | 0 |
| | ROCKET, 83MM ASSAULT PRAC MK4 MOD 0 (SMAW)-Inert | 18 | - | - | 0 |
| | SIMULATOR, NOISE, (SMAW)-Inert | 9 | - | - | 0.141 |
| | RKT 83MM, ASSAULT, (SMAW)-HE | 559 | - | - | 9.46 |
| | RKT 83MM, HEAA-HE | 26 | - | - | 9.46 |
| | ROCKET MOTOR, MK87 MOD 0-HE | 2,330 | - | - | 6.53 |
| K-321 | CHG, DEMO SHEET 19 FT-HE | 500 | - | - | .50LBS/SHEET |
| K-325 | AT4 LTWT MULTI-PURPOSE WPN-HE | 30 | - | - | 0.0104 |
| K-402 | 4.2 inch mortar-Inert | 650 | 650 | 683 | 0 |
| K-405 | HAND GREN,ILLUM MK1-2 MK372-0-Inert | 1 | - | - | 0.0733 |
| | HAND GRENADE SMOKE TNG M83 (Terephthalic Acid [TA])-Inert | 10 | - | - | 0.072 |
| | GREN HAND FRAG M61-HE | 70 | - | - | 0.5 |
| | GREN HAND FRAG M67-HE | 31,191 | - | - | 0.5 |
| | GREN HAND INC AN-M14 (Thermite)-HE | 29 | - | - | 1.55 |
| | M151 PERCUSSION INITIATED-HE | 1,275 | - | - | 2 |
| P-4 (RealignedK-2) | 40 mm-HE (Not including MK-19) | - | 13,947 | 14,645 | 11.69 |
| P-5 (RealignedK-2) | AT4 LTWT MULTI-PURPOSE WPN-HE | - | 1,029 | 1,081 | 0.0104 |
| | RKT 83MM, ASSAULT, (SMAW)-HE | - | 785 | 785 | 9.46 |
| | RKT 83MM, HEAA-HE | - | 60 | 60 | 9.46 |
| | ROCKET MOTOR, MK54 MOD 0 SEAT EJECT- | - | 3 | 3 | 0.0485 |

| Range | Weapon/Ammo Type | Annual Number of Rounds | | | Net Explosive Weight (lb) |
|---|---|-----------------------------|-----------|-----------------|---------------------------|
| | | 2004-2006 Average Condition | No Action | Proposed Action | |
| | HE | | | | |
| | ROCKET MOTOR, MK87 MOD 0-HE | - | 5,194 | 5,194 | 6.53 |
| P-6 (RealignedK-2) | GREN HAND FRAG M61-HE | - | 70 | 70 | 0.5 |
| | GREN HAND FRAG M67-HE | - | 31,191 | 31,191 | 0.5 |
| | GREN HAND INC AN-M14 (Thermite)-HE | - | 29 | 29 | 1.55 |
| | M151 PERCUSSION INITIATED-HE | - | 1,275 | 1,275 | 2 |
| | | | | | |
| P-7 (RealignedK-2) | Mk-19, 40mm-HE | - | 106,694 | 117,364 | 0.0835 |
| P-8 (RealignedK-2) | 60 mm-Inert | - | 2,684 | 2,818 | 0 |
| | 60 mm-HE | - | 16,237 | 17,049 | 0.0457 |
| | 81 mm-Inert | - | 2,555 | 2,683 | 0 |
| | 81 mm-HE | - | 8,998 | 9,448 | 2 |
| P-8 (RealignedK-2) (cont.) | 84 mm-HE | - | 1 | 1 | 2 |
| P-10 (Realigned K-2) | M72AS 21MM SUB-CAL TRAINER ROCKET-Inert | - | 108 | 108 | 0 |
| | RKT 83MM,COMMON PRACTICE-Inert | - | 921 | 921 | 0 |
| | ROCKET, 83MM ASSAULT PRAC MK4 MOD 0 (SMAW)-Inert | - | 70 | 70 | 0 |
| | SIMULATOR, NOISE, (SMAW)-Inert | - | 9 | 9 | 0.141 |
| P-11 (Realigned K-2) | SIGNAL, ILLUM GRND WHT STAR PARA M17A1-Inert | - | 33 | 33 | 0.0207 |
| P-11 (Realigned K-2) (cont.) | HAND GRENADE SMOKE TNG M83 (Terephthalic Acid [TA])-Inert | - | 16 | 16 | 0.072 |
| | IGNBLST FUSM81 S/TUB CPBLTY-HE | - | 35 | 35 | 0.137 |
| | CHG, DEMO SHEET 19 FT-HE | - | 500 | 500 | .50LBS/SHEET |
| | HAND GREN,ILLUM MK1-2 MK372-0-Inert | - | 1 | 1 | 0.0733 |
| L-5 | 81 mm-Inert | 105 | 105 | 110 | 0 |
| | HAND GRENADE SMOKE TNG M83 (Terephthalic Acid [TA])-Inert | 15 | 15 | 15 | 0.072 |
| | M84 NON LETHAL STUN GRENADE (M84)-Inert | 60 | 60 | 60 | 0.072 |
| | SIGNAL, ILLUM GRND WHT STAR PARA M17A1-Inert | 5 | 5 | 5 | 0.0207 |
| | | | | | |
| MAC-3 | GREN HAND FRAG M67-HE | 315 | 315 | 315 | 0.5 |
| MB | CHG ASSY DEMO M183-HE | 2 | 2 | 2 | 1 |
| MOUT/ MOUT DEMO/ MOUT CBT TOWN/ MOUT LEJEUNE BIVOUAC/ MOUT SIMMS HOUSE | CHARGE, DEMOLITION (MM28)-HE | 34 | 34 | 34 | 20LBS /SHEET |
| | CHARGE, DEMOLITION (MM30)-HE | 7 | 7 | 7 | 1 |
| | CHG ASSY DEMO M183-HE | 3 | 3 | 3 | 1 |
| | CHG DEMO C4 1-1/4LB-HE | 21 | 21 | 21 | 1.25 |
| | CHG DEMO TNT 1/4 LB-HE | 58 | 58 | 58 | 0.25 |
| | CHG, DEMO LINEAR MK8 50 LB COMP A-3-HE | 1 | 1 | 1 | 50 |
| | CHG, DEMO SHEET 13 FT-HE | 2 | 2 | 2 | .50LBS/SHEET |
| | CHG, DEMO SHEET 19 FT-HE | 5 | 5 | 5 | .50LBS/SHEET |
| | CHG, DEMO SHEET 38 FT-HE | 2 | 2 | 2 | .50LBS/SHEET |
| | CHG,DEMO,20GR PELLET-HE | 1 | 1 | 1 | 20 GRAINS/FT |
| | CHG,DEMO,EXP SHEET 2 GR-HE | 5 | 5 | 5 | 20 |
| | CHG,DEMO,EXP SHEET 4GR-HE | 3 | 3 | 3 | 4GR/FT |
| | HAND GRENADE SMOKE TNG M83 (Terephthalic Acid [TA])-Inert | 543 | 543 | 543 | 0.072 |
| | M84 NON LETHAL STUN GRENADE (M84)-Inert | 73 | 73 | 73 | 0.072 |
| ENHANCED MOUT BREACHING | TNT 1/2 LB M1A4-HE | 8 | 8 | 8 | 0.25 |
| | 1/4 lb. Breaching | - | 26 | 26 | NA |

| Range | Weapon/Ammo Type | Annual Number of Rounds | | | Net Explosive Weight (lb) |
|-----------------------------|------------------------------------|-----------------------------|-----------|-----------------|---------------------------|
| | | 2004-2006 Average Condition | No Action | Proposed Action | |
| FACILITY | | | | | |
| MARSOC BREACHER FACILITY | 1/4 lb Breaching | - | 1,300 | 1,300 | NA |
| MP-2 | 120 mm-Inert | 34 | 34 | 36 | 0 |
| | 60 mm-Inert | 197 | 197 | 207 | 0 |
| | 60 mm-HE | 837 | 837 | 879 | 0.0457 |
| | 81 mm-Inert | 4,265 | 4,265 | 4,478 | 0 |
| | 81 mm-HE | 10,844 | 10,844 | 11,386 | 2 |
| MP-3 | 105 mm-HE | 17 | 17 | 18 | 12.08 |
| | 120 mm-HE | 75 | 75 | 79 | 0.47 |
| | 60 mm-HE | 116 | 116 | 122 | 0.0457 |
| | 81 mm-Inert | 723 | 723 | 759 | 0 |
| | 81 mm-HE | 2,531 | 2,531 | 2,658 | 2 |
| MP-4 | 60 mm-Inert | 10 | 10 | 11 | 0 |
| | 60 mm-HE | 35 | 35 | 37 | 0.0457 |
| | 81 mm-Inert | 195 | 195 | 205 | 0 |
| | 81 mm-HE | 393 | 393 | 413 | 2 |
| MP-5 | 81 mm-Inert | 26 | 26 | 27 | 0 |
| | 81 mm-HE | 338 | 338 | 355 | 2 |
| MP-6 | 120 mm-HE | 7 | 7 | 7 | 0.47 |
| | 60 mm-Inert | 26 | 26 | 27 | 0 |
| | 60 mm-HE | 221 | 221 | 232 | 0.0457 |
| | 81 mm-Inert | 149 | 149 | 156 | 0 |
| | 81 mm-HE | 669 | 669 | 702 | 2 |
| MP-7 | 120 mm-HE | 98 | 98 | 103 | 0.47 |
| | 60 mm-Inert | 108 | 108 | 113 | 0 |
| | 60 mm-HE | 1,311 | 1,311 | 1,377 | 0.0457 |
| | 81 mm-Inert | 424 | 424 | 445 | 0 |
| | 81 mm-HE | 401 | 401 | 421 | 2 |
| MP-7 | 90 mm-Inert | 143 | 143 | 150 | 0 |
| OSPREY | CHG ASSY DEMO M183-HE | 30 | 30 | 30 | 1 |
| RB | CHG DEMO C4 1-1/4LB-HE | 1 | 1 | 1 | 1.25 |
| | CHG DEMO TNT 1 LB-HE | 8 | 8 | 8 | 1 |
| | DYNAMITE MILITARY M1-HE | 13 | 13 | 13 | 0.037 |
| RR-215 BREACHER FAC | CHARGE, DEMO (MM45)-HE | 2 | 2 | 2 | 125GR/FT |
| RR-215 BREACHER FAC (cont.) | CHARGE, DEMOLITION (MM30)-HE | 13 | 13 | 13 | 1 |
| | CHG DEMO LINFLEX 75GR-HE | 2 | 2 | 2 | 75GR/FT |
| | CHG, DEMO SHEET 19 FT-HE | 1 | 1 | 1 | .50LBS/SHEET |
| | CHG, DEMO SHEET 25 FT-HE | 4 | 4 | 4 | .50LBS/SHEET |
| | CHG, DEMO SHEET 38 FT-HE | 2 | 2 | 2 | .50LBS/SHEET |
| | CHG, DEMO, EXP SHEET 2 GR-HE | 1 | 1 | 1 | 20 |
| | CHG, DEMO, EXP SHEET 4GR-HE | 1 | 1 | 1 | 4GR/FT |
| | SHAPE CHARGE 25 GR-HE | 5 | 5 | 5 | 25GR/FT |
| RR-249 UTF (1 STORY) | CHARGE, DEMOLITION (MM28)-HE | 55 | 55 | 55 | 20LBS /SHEET |
| | CHARGE, DEMOLITION (MM30)-HE | 26 | 26 | 26 | 1 |
| | CHARGE, DEMO FLEX LINEAR SHAPED-HE | 2 | 2 | 2 | 0.0728 |
| | CHARGE, DIVERSIO-HE | 590 | 590 | 590 | 0.0095 |
| | CHG DEMO C4 1-1/4LB-HE | 2 | 2 | 2 | 1.25 |
| | CHG DEMO LINFLEX 125GR-HE | 12 | 12 | 12 | 125 GR/FT |
| | CHG DEMO LINFLEX 75GR-HE | 18 | 18 | 18 | 75GR/FT |
| | CHG, DEMO SHEET 19 FT-HE | 1 | 1 | 1 | .50LBS/SHEET |
| | CHG, DEMO SHEET 25 FT-HE | 14 | 14 | 14 | .50LBS/SHEET |
| | CHG, DEMO SHEET 38 FT-HE | 3 | 3 | 3 | .50LBS/SHEET |

| Range | Weapon/Ammo Type | Annual Number of Rounds | | | Net Explosive Weight (lb) |
|-----------------------------|---|-----------------------------|-----------|-----------------|---------------------------|
| | | 2004-2006 Average Condition | No Action | Proposed Action | |
| | CHG, DEMO, EXP SHEET 2 GR-HE | 17 | 17 | 17 | 20 |
| | CHG, DEMO, EXP SHEET 4GR-HE | 1 | 1 | 1 | 4GR/FT |
| | DET KIT CONCUSSION-HE | 13 | 13 | 13 | 1 |
| | SHAPE CHARGE 25 GR-HE | 15 | 15 | 15 | 25GR/FT |
| RR-UTF BREACHER PIT | CHARGE, DEMO (MM45)-HE | 1 | 1 | 1 | 125GR/FT |
| | CHARGE, DEMO (MM46)-HE | 3 | 3 | 3 | 225GRAINS/FT |
| | CHARGE, DEMOLITION (MM28)-HE | 56 | 56 | 56 | 20LBS /SHEET |
| | CHARGE, DEMOLITION (MM30)-HE | 77 | 77 | 77 | 1 |
| | CHARGE, DEMO (MM44)-HE | 1 | 1 | 1 | 1 |
| | CHG DEMO C4 1-1/4LB-HE | 3 | 3 | 3 | 1.25 |
| | CHG DEMO LINFLEX 125GR-HE | 61 | 61 | 61 | 125 GR/FT |
| | CHG DEMO LINFLEX 225GR-HE | 49 | 49 | 49 | 225GR/FT |
| | CHG DEMO LINFLEX 400GR-HE | 2 | 2 | 2 | 400GR/FT |
| | CHG DEMO LINFLEX 75GR-HE | 75 | 75 | 75 | 75GR/FT |
| | CHG, DEMO SHEET 25 FT-HE | 18 | 18 | 18 | .50LBS/SHEET |
| | CHG, DEMO SHEET 38 FT-HE | 1 | 1 | 1 | .50LBS/SHEET |
| | CHG, DEMO, EXP SHEET 2 GR-HE | 70 | 70 | 70 | 20 |
| | CHG, DEMO, EXP SHEET 4GR-HE | 65 | 65 | 65 | 4GR/FT |
| | DEMO KIT, PROJECTED CHG M1 W/O RCKT MTR-HE | 50 | 50 | 50 | 1 |
| | DEMO SPRINGING-HE | 1 | 1 | 1 | 1 |
| RR-UTF BREACHER PIT (cont.) | IGNBLST FUSM81 S/TUB CPBLTY-HE | 2 | 2 | 2 | 0.137 |
| | SHAPE CHARGE 25 GR-HE | 5 | 5 | 5 | 25GR/FT |
| | SHAPE CHARGE 75 GR-HE | 22 | 22 | 22 | 75GR/FT |
| SR-10 | 105 mm Tank-Inert | 20 | 20 | 28 | 0 |
| | 120 mm Tank-Inert | 7,383 | 7,383 | 10,262 | 0 |
| | 20 mm-Inert | 300 | 300 | 315 | 0 |
| | 30 mm-Inert | 796 | 796 | 836 | 0 |
| | 81 mm-Inert | 116 | 116 | 122 | 0 |
| | ROCKET, 2.75 IN SMK WP W/WH D M156 (HYDRA-70)-Inert | 10 | 10 | 10 | 0 |
| SR-6S | HAND GRENADE SMOKE TNG M83 (Terephthalic Acid [TA])-Inert | 5 | 5 | 5 | 0.072 |
| | RKT 83MM, COMMON PRACTICE-Inert | 3 | 3 | 3 | 0 |
| SR-7 (CHPPM) | 20 mm-Inert | 21,640 | 21,640 | 22,715 | 0 |
| | 25 mm-Inert | 27,441 | 27,441 | 28,813 | 0 |
| | 30 mm-Inert | 1,075 | 1,075 | 1,129 | 0 |
| | RKT 2.75 SMK WP-Inert | 3 | 3 | 3 | NA |
| | TOW PRAC (INERT)-Inert | 10 | 10 | 10 | 0 |
| | TOW W/MOIC & PRACT-Inert | 8 | 8 | 8 | 0 |
| STONE BAY | MINE AP DIR M18A1 CLAYMORE-HE | 50 | 50 | 50 | 1.5 |
| MP-8 | 81 mm-Inert | 14 | 14 | 15 | 0 |
| N1-BT3 | 155 mm-HE | 41 | 41 | 43 | 22.47 |
| | C4 Blocks (1.25 lbs each)-HE | 78 | 78 | 78 | 1.25 |
| | Stinger Missiles-HE | 19 | 19 | 19 | 6.6 |

Table C-2.2

SARNAM Modeled Small Arms Expenditures from Stone Bay Ranges and L-5 Ranges

| Range | Weapon/Ammo Type | Annual Number of Rounds | | |
|---------------------|------------------|-----------------------------|-----------|-----------------|
| | | 2004-2006 Average Condition | No Action | Proposed Action |
| STONE BAY WALK DOWN | .22 caliber-Live | 150 | 150 | 180 |
| | 5.56 mm-Live | 8,492 | 8,492 | 10,190 |
| | 9 mm-Live | 162,017 | 162,017 | 194,420 |

| Range | Weapon/Ammo Type | Annual Number of Rounds | | |
|----------------------|------------------|-----------------------------|-----------|-----------------|
| | | 2004-2006 Average Condition | No Action | Proposed Action |
| | .45 caliber-Live | 15,892 | 15,892 | 19,070 |
| STONE BAY DODGE CITY | 5.56 mm-Live | 59,595 | 59,595 | 71,514 |
| | 7.62 mm-Live | 26,793 | 26,793 | 32,152 |
| | 9 mm-Live | 7,665 | 7,665 | 9,198 |
| | .45 caliber-Live | 17,181 | 17,181 | 20,617 |
| STONE BAY HATHCOCK | 5.56 mm-Live | 41,689 | 41,689 | 50,027 |
| | 7.62 mm-Live | 126,215 | 126,215 | 151,458 |
| STONE BAY MECH PR | .22 caliber-Live | 350 | 350 | 420 |
| | 9 mm-Live | 49,774 | 49,774 | 59,729 |
| | .45 caliber-Live | 450 | 450 | 540 |
| STONE BAY MULTI PURP | .22 caliber-Live | 1,866 | 1,866 | 2,239 |
| | 5.56 mm-Live | 403,550 | 403,550 | 484,260 |
| | 7.62 mm-Live | 7,195 | 7,195 | 8,634 |
| | 9 mm-Live | 253,902 | 253,902 | 304,683 |
| | .38 caliber-Live | 25 | 25 | 30 |
| | .45 caliber-Live | 380,086 | 380,086 | 456,103 |
| | 12 gauge-Live | 13,921 | 13,921 | 16,705 |
| STONE BAY RR ALPHA | 5.56 mm-Live | 1,778,662 | 1,778,662 | 2,134,394 |
| | 7.62 mm-Live | 7,751 | 7,751 | 9,301 |
| STONE BAY RR BRAVO | 5.56 mm-Live | 5,183,452 | 5,183,452 | 6,220,142 |
| | 7.62 mm-Live | 115,305 | 115,305 | 138,366 |
| STONE BAY RR CHARLIE | 5.56 mm-Live | 2,174,182 | 2,174,182 | 2,609,018 |
| | 7.62 mm-Live | 340 | 340 | 408 |
| L-5 | 12 gauge-Live | 290 | 290 | 348 |
| | 5.56 mm-Live | 1,577,718 | 1,577,718 | 1,893,262 |
| | 7.62 mm-Live | 300,235 | 300,235 | 360,282 |
| | 9 mm-Live | 19,690 | 19,690 | 23,628 |
| L-5 (7.62) | 5.56 mm-Live | 31,550 | 31,550 | 37,860 |
| | 7.62 mm-Live | 18,350 | 18,350 | 22,020 |

C.3- Previous MCB Camp Lejeune Aircraft Noise Study Summary Table

Table C-3.1

MCB Camp Lejeune Training Area Annual Sorties and Predicted A- weighted Day Night Levels

| Aircraft Type | 1999 Baseline Annual Sorties | MV-22 Introduction | Change under MV-22 Introduction Condition |
|--|------------------------------|--------------------|---|
| MV-22 Fleet | 0 | 3,245 | 3,245 |
| MV-22 FRS | 0 | 1,377 | 1,377 |
| CH-46 Fleet | 2,533 | 0 | -2,533 |
| CH-46 FRS | 801 | 0 | -801 |
| CH-53 Fleet | 1,224 | 1,245 | 21 |
| H-53 FRS | 780 | 775 | -5 |
| AH-1 Fleet | 562 | 527 | -35 |
| UH-1 Fleet | 582 | 585 | 3 |
| Total | 6,482 | 7,754 | 1,272 |
| Average A- weighted Day Night Level within Training Area | 57 | 58 | 1 |
| Source: Department of the Navy, October 1999. Final Environmental Impact Statement, Introduction of the V-22 to the Second Marine Aircraft Wing in Eastern North Carolina. | | | |

C.4- Air-to-Surface (Water) Sound Transmission from Aircraft

The loudness of a sound is dependent on the sound power of the source and the propagation and attenuation characteristics of the medium that the sound energy passes through. Waterborne (underwater) sound measurements are different from airborne sound measurements. When underwater objects vibrate, they create sound-pressure waves that alternately compress and decompress the water molecules as the sound wave travels through the water. Because of the differences in reference standards, noise levels cited for air do not equal underwater levels. In order to be useful, the sound levels need to be referenced to some standard pressure at a standard distance. The reference level used in air (20 micropascals (μPa) at 1m) was selected to match human hearing sensitivity. A different reference level is used for underwater sound (1 μPa at 1m). In addition, underwater sound measurements typically do not have any frequency weighting applied (i.e., A-weighted), while airborne noise is often measured using one of several frequency weighting scales (see **Subchapter 3.1.4**). In many cases, underwater noise levels are reported only for limited frequency bands, while airborne noise is usually reported as an integrated value over a very wide range of frequencies. To compare noise levels in water to noise levels in air, one must subtract 26 dB from the noise level referenced in water. **Table C-4.1** illustrates common sounds in the different mediums and compares the noise that a very large crude carrier makes in the air and the water. A supertanker radiates noise in the water at 190 dB (re 1 μPa at 1m) which has an equivalent noise level in the air of about 164 dB (re 20 μPa at 1m), which is much louder than a jet engine (National Oceanic and Atmospheric Administration, 2003). These numbers (**Table C-4.1**) are approximate and amplitude often varies with frequency.

Table C-4.1
Commons Sounds in Air and Water

| Amplitude of Example Sounds | In Air (dB re 20μPa at 1m) | In Water (dB re 1μPa at 1m) |
|---|-------------------------------|--------------------------------|
| Threshold of hearing | 0 dB | -- |
| Whisper at 1 meter | 20 dB | -- |
| Normal conversation | 60 dB | -- |
| Painful to human ear | 130 dB | -- |
| Jet engine | 140 dB | -- |
| Blue whale | -- | 165 dB |
| Earthquake | -- | 210 dB |
| Supertanker | 164 dB | 190 dB |
| Source: National Oceanic and Atmospheric Administration, 2003. Note: *example conversion | | |

With regard to air-to-water sound transmission from aircraft, the underwater noise effects resulting from an aircraft flyover is not the same as an in-water vessel. Sound traveling from a source in air to a receiver underwater propagates in four ways: 1) via a direct refracted path, 2) via direct refracted paths that are reflected by the bottom, 3) via a “lateral” (surface traveling) wave, and 4) via scattering from a rough sea surface. The types of propagation vary depending on local conditions, depth of receiver, and bottom depth. The direct refracted path is important when the receiver is nearly under the aircraft. The critical angle is approximately 13 degrees from the vertical for the transmission of sound from air to water, (i.e., under calm sea conditions, sound is reflected at large angles [greater than 13 degrees] and does not enter the water).

Levels received underwater from a passing aircraft depend on the altitude, aircraft types, receiver depth, and water depth. **Table C-4.2** summarizes some available measurements of underwater noise received at a range of 3 to 18 m (10 to 59 ft) underwater from aircraft flyover at different altitudes. **Table C-4.3** shows several typical underwater noises generated by traveling vessels for comparison purposes. Based on the results presented in both tables, aircraft flyover would unlikely result in significant underwater noise impacts.

Table C-4.2
Underwater Sound Pressure Levels under Dominant Frequency Bands from Aircraft

| Aircraft | Altitude | Received Level (dB re 1μPa) |
|---------------------------------|------------------|--------------------------------|
| Helicopter | | |
| Bell 212 *20 Hz | 152 m (499 ft) | 109 |
| | 305 m (1,001 ft) | 107 |
| | 610 m (2,001 ft) | 101 |
| Fixed Wing | | |
| B-N Islander (70 Hz) | 152 m (499 ft) | 101 |
| Twin Otter (82 Hz) | 457 m (1,499 ft) | 107 |
| | 610 m (2,001 ft) | 100 |
| P-3 Orion (56 – 80 Hz) | 76 m (249 ft) | 124 |
| | 152 m (499 ft) | 121 |
| | 305 m (1,001 ft) | 114 |
| Source: Richardson et al., 1995 | | |

Table C-4.3
Underwater Sound Pressure Levels for Various Vessels

| Vessel Length and Description | Frequency (Hz) | Source Level (dB re 1 μ Pa at 1 meter) |
|---|----------------|--|
| Outboard drive – 7 m (23 ft) (2 engines, 80 horsepower each) | 630 | 156 |
| Twin Diesel – 34 m (112 ft) | 630 | 159 |
| Small Supply Ships – 55 to 85 m (180 to 279 ft) | 1,000 | 125–135(at 50 m [164 ft]) |
| Freighter – 135 m (443 ft) | 41 | 172 |
| Source: Richardson et al., 1995 | | |

C.5- Criteria and Impact Thresholds for Underwater Noise

Criteria and Thresholds for Small Explosives

Criteria and thresholds for estimating the exposures from a single explosive activity on marine mammals were established for the Seawolf Submarine Shock Test Final Environmental Impact Statement (“Seawolf”) and subsequently used in the USS Winston S. Churchill (DDG 81) Ship Shock Final Environmental Impact Statement (“Churchill”) (Department of the Navy, 1998 and 2001b). Due to the physical and time spacing, these detonations are treated as individual explosions with non-overlapping sound fields for the purpose of this analysis. National Marine Fisheries Service adopted these criteria and thresholds in its final rule on unintentional taking of marine animals occurring incidental to the shock testing (National Oceanic and Atmospheric Administration, 1998). In addition, this section reflects a revised acoustic criterion for small underwater explosions (i.e., 23 pounds per square inch [psi] instead of previous acoustic criteria of 12 psi for peak pressure over all exposures). This dual criterion is based on an incidental harassment authorization issued to the US Air Force (National Oceanic and Atmospheric Administration, 2006a). Criteria and thresholds are summarized in **Table C-5.1**.

Table C-5.1
Effects, Criteria, and Thresholds for Impacts to Marine Mammals from Small Explosives

| Harassment Level | Criteria | Metric | Threshold |
|---|--|--|---|
| A, Onset Mortality | Onset extensive lung injury | Goertner modified positive impulse | 30.5 psi-ms |
| A | 50 percent TM rupture | Energy flux density | 1.17 in-lb/in ² (about 205 dB re 1 μ Pa ² -s) |
| A | Onset slight lung injury | Goertner modified positive impulse | indexed to 13 psi-ms |
| B | TTS for toothed whales and sea turtles | Greatest energy flux density level in any 1/3-octave band above 100 Hz - for total energy over all exposures | 182 dB re 1 μ Pa ² -s |
| B | TTS | Peak pressure over all exposures | 23 psi |
| Note: dB 1 μ Pa ² -s = decibel referenced to 1 micropascal squared second; Hz = hertz; psi-ms = pounds per square inch-millisecond; TM = tympanic membrane; TTS = temporary threshold shift. | | | |

Criteria and Thresholds for Injurious Physiological Effects

The approach to risk assessment for impulsive sound in the water was derived from the Seawolf/Churchill approach. Churchill used three criteria: eardrum rupture (i.e., tympanic-membrane rupture), onset of extensive lung injury, and onset of slight lung injury. The threshold for tympanic membrane rupture corresponds to a 50 percent rate of rupture (i.e., 50 percent of animals exposed to the level are expected to suffer tympanic membrane); this is stated in terms of an energy level value of 1.17 inch pounds per square inch (in lb/in²) (about 205 dB re 1 μPa^2 s). This recognizes that tympanic membrane rupture is not necessarily a serious or life-threatening injury, but it is a useful index of possible injury that is well correlated with measures of permanent hearing impairment (e.g., Ketten [1998] indicates a 30 percent incidence of PTS at the same threshold).

The criterion for mortality is the onset of extensive lung injury. For small mammals, the threshold is given in terms of the Goertner modified positive impulse, indexed to 30.5 pounds per square inch-millisecond (psi-ms). For medium and large mammals, the threshold is 73.9 and 111.7 psi-ms, respectively. In this assessment, all cetaceans were analyzed using the threshold for small mammals for extensive lung injury. Therefore, the results of the analysis are conservative.

The threshold for onset of slight lung injury was calculated for a calf dolphin (12.2 kg [27 lbs]); it is given in terms of the Goertner modified positive impulse, indexed to 13 psi-ms and 32 psi-ms, respectively. In this assessment, all cetaceans were analyzed using the threshold for a calf dolphin for onset slight lung injury. Thus, the results of the analysis are conservative.

Criteria and Thresholds for Non-injurious Physiological Effects

The Churchill criterion for non-injurious harassment is TTS, which is a slight, recoverable loss of hearing sensitivity (Department of the Navy, 2001b). In this case, there are two thresholds, one for energy and one for peak pressure.

TTS Energy Threshold

The TTS energy threshold is a 182 dB re 1 μPa^2 -s maximum energy flux density level in any 1/3-octave band at frequencies above 0.1 kHz for toothed whales and in any 1/3 octave band above 0.010 kHz for baleen whales. For large explosives, the latter limits at 0.01 and 0.1 kHz make a difference in the range estimates. National Marine Fisheries Service has defined large explosives in prior rulemaking as greater than 907 kg (2,000 lbs) Net Explosive Weight (NEW) (National Marine Fisheries Service, 2006c). The Navy has defined small explosives as less than 680 kg (1,500 lbs) NEW per directive. For small explosives, the spectrum of the shot arrival is broad and there is essentially no difference in the range of effects for the two classes of animals.

TTS Peak Pressure Threshold

The TTS peak pressure threshold applies to all cetacean species and is stated in terms of peak pressure at 23 psi (National Oceanic and Atmospheric Administration, 2006b). This threshold is derived from the Churchill threshold. However, peak pressure and energy scale at different rates with charge weight. Ranges based on the peak-pressure threshold are much greater than those for the energy metric when charge weights are small—even when source and animal are away from the surface. To more accurately estimate TTS for smaller shots while preserving the safety feature provided by the peak pressure threshold, the peak pressure threshold was appropriately scaled for small detonations. This scaling is based on the similitude formulas (e.g., Urick, 1983) used in virtually all compliance documents for short ranges. Further, the peak-pressure threshold for marine mammal TTS for explosives offers a safety margin for a source or an animal near the ocean surface.

Criteria and Thresholds for Behavioral Effects

Behavioral modification (sub-TTS) is only applied to successive detonations. For single detonations, behavioral disturbance is likely to be limited to a short-lived startle reaction. However, based on the proposed action there would only be one individual 155 mm explosive round entering the water per. Thus, the 177 dB threshold associated with successive detonations would not apply.

The harassment status of slight behavior disruption (without physiological effects) has been addressed in workshops, previous actions, and rulings (National Oceanic and Atmospheric Association, 1999, 2001; Department of the Navy, 2001a). The conclusion is that a momentary behavioral reaction of an animal to a brief, time-isolated acoustic event does not qualify as Level B harassment. A more general conclusion, that Level B harassment occurs only when there is “a potential for a significant behavioral change or response in a biologically important behavior or activity,” is found in recent rulings (National Oceanic and Atmospheric Association, 2002). Public Law 108-136 (2004) amended the definition of Level B harassment for military readiness activities, which applies to this action. As previously stated, Level B harassment for military readiness activities is defined as “any act that disturbs or is likely to disturb a marine mammal or marine mammal stock by causing disruption of natural behavioral patterns...to a point where such behaviors are abandoned or significantly altered.” These conclusions and definitions, including the 2004 amendments to the definitions of harassment, were considered in developing conservative thresholds for behavioral disruptions. As a result, the actual incidental harassment of marine mammals associated with this action may be less than calculated.

Estimating Impact Ranges for Underwater Noise Impacts on Marine Mammals

Some physiological responses to sound exposure can occur, which are non-injurious but can potentially disrupt the behavior of a marine mammal. These responses include temporary distortions in sensory tissue that alter physiological function, but are fully recoverable without the requirement for tissue replacement or regeneration. For example, an animal that experiences

a TTS suffers no injury to its auditory system, but may not perceive some sounds due to the reduction in sensitivity. As a result, the animal may not respond to sounds that would normally produce a behavioral reaction. This lack of response qualifies as a temporary disruption of normal behavioral patterns, therefore the animal is impeded from responding in a normal manner to an acoustic stimulus. The analysis assumes that all TTS (slight to severe) is considered Level B harassment, even if the effect from the temporary impairment is biologically insignificant.

The volumes of ocean in which Level A and Level B harassment are predicted to occur are described as harassment zones. The Level A harassment zone extends from the source out to the distance and exposure at which the slightest amount of injury is predicted to occur. The acoustic exposure that produces the slightest degree of injury is, therefore, the threshold value defining the outermost limit of the Level A harassment zone. Use of the threshold associated with the onset of slight injury as the most distant point and least injurious exposure takes account of all more serious injuries by inclusion within the Level A harassment zone. The threshold used to define the outer limit of the Level A harassment zone is given in **Table C-5.1**.

The Level B harassment zone begins just beyond the point of slightest injury and extends outward from that point to include all animals with the potential to experience Level B harassment. The animals predicted to be in the portion of the zone where temporary impairment of sensory function (altered physiological function) is expected are all assumed to experience Level B harassment because of the potential impediment of behaviors that rely on acoustic cues. Beyond that distance, the Level B harassment zone continues to the point at which no behavioral disruption is expected to occur. **Table C-5.1** presents the criterion and threshold used to define the outer limit of the Level B harassment zone.

Because the tissues of the ear appear to be the most susceptible to the physiological effects of sound and threshold shifts tend to occur at lower exposures than other more serious auditory effects, PTS and TTS are used in this environmental assessment as biological indicators of physiological responses that qualify as harassment.

PTS is non-recoverable and, by definition, must result from the destruction of tissues within the auditory system. PTS therefore qualifies as an injury and is classified as Level A harassment under the wording of the MMPA. In this document, the smallest amount of PTS (onset-PTS) is taken to be the indicator for the smallest degree of injury that can be measured. The acoustic exposure associated with onset-PTS is used to define the outer limit of the Level A harassment zone.

TTS is recoverable and, as in recent rulings (National Oceanic and Atmospheric Association 2001, 2002), is considered to result from the temporary, non-injurious distortion of hearing-related tissues. In this document, the smallest measurable amount of TTS (onset-TTS) is taken as the best indicator for slight temporary sensory impairment. Because it is considered non-injurious, the acoustic exposure associated with onset-TTS is used to define the outer limit of the portion of the Level B harassment zone attributable to a physiological impairment, and within which all animals are assumed to incur Level B harassment. This follows from the concept that

hearing loss potentially affects an animal's ability to react normally to the sounds around it. Therefore, in this environmental assessment the potential for TTS is considered as a Level B harassment that is mediated by a physiological effect upon the auditory system.

At exposure levels below those which can cause TTS, animals may respond to the sound and alter their natural behaviors. Whether or not these alterations result in "a potential for a significant behavioral change or response in a biologically important behavior or activity" depends on the physical characteristics of the sound (e.g., amplitude, frequency characteristics, temporal pattern, duration, etc.) as well as the animal's experience with the sound, the context of the exposure (e.g., what is the animal doing at the time of the exposure), and the animal's life history stage. Responses will be species-specific and must consider the acoustic sensitivity of the species. In this document a risk function is used to determine the outer limit of the portion of the Level B harassment zone attributable to significant changes in biologically important behaviors, but which is not a function of TTS. The risk function defines a probability of a significant change in biologically important behaviors as a function of the received sound pressure level. This follows from the concept that the probability of a behavioral response will generally decline as a function of decreasing exposure level.

The volumes of ocean in which Level A and Level B harassment are predicted to occur are described as harassment zones. The Level A harassment zone extends from the source out to the distance and exposure where onset-PTS is predicted to occur. The Level B harassment zone begins just beyond the point of onset-PTS and extends outward to the distance and exposure where no (biologically significant) behavioral disruption is expected to occur. The Level B harassment zone includes both the region in which TTS is predicted to occur and the region in which significant behavioral responses without TS are predicted to occur.

APPENDIX D
MIGRATORY BIRD INVENTORY

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| Species, Status, Family | Habitat | Rangewide and MCB Camp Lejeune Distribution |
|--|--|---|
| COMMON LOON (<i>Gavia immer</i>) Status: NAWCP Family: Gaviidae | Breeds on clear freshwater lakes with rocky shorelines surrounded by forest; also on subarctic tundra lakes. Stages for migration on large lakes and rivers. Winters primarily in coastal marine areas near shore; also in large freshwater lakes. | Breeds across Alaska and Canada, southward to northern US and Yellowstone region. Also in Greenland, Iceland, and rarely in Scotland. Winters along both coasts and inland on large lakes from Alaska to southern Mexico, and Newfoundland to eastern Mexico. Also winters in Europe from Iceland to the Mediterranean. |
| RED-THROATED LOON (<i>Gavia stellata</i>) Status: NAWCP Family: Gaviidae | Breeds in low tundra wetlands, bogs, lakes, and ponds in forests and arctic coasts. In migration, flocks stage on large lakes. Winters in relatively shallow, sheltered marine habitat along coasts and in Great Lakes. | Breeds in coastal and inland tundra in Alaska and northern Canada. Also breeds across extreme northern Europe and Russia. Winters along Pacific Coast from Aleutian Islands to Baja California, and on the Atlantic Coast from southern Newfoundland to Georgia. Also winters in small numbers on the lower Great Lakes. Also on temperate near-shore waters off Europe and Asia. |
| PIED-BILLED GREBE (<i>Podilymbus podiceps</i>) Status: NAWCP Family: Podicipedidae | Breeds on seasonal or permanent ponds or lakes with dense stands of emergent vegetation, bays and sloughs. Uses most types of wetlands or sheltered saltwater bays in winter. | Breeds from southern Northwest Territories and central and southern Canada southward across the US into Central America, the Caribbean, and South America. Winters in central and southern US southward to Central America, wherever open water can be found. |
| HORNED GREBE (<i>Podiceps auritus</i>) Status: NAWCP Family: Podicipedidae | Breeds on small to moderate-sized, shallow freshwater ponds and marshes. Winters along coasts and on large bodies of water. | Breeds from central and western Alaska eastward to Manitoba, and southward to Oregon, northern Montana, northern South Dakota, and northwestern Minnesota. Also in Greenland and across northern Eurasia. Winters mostly along coasts from Alaska and Nova Scotia southward to Mexico and Texas. Also on inland lakes and rivers. Also along European and Asian coasts. |
| BROWN PELICAN (<i>Pelecanus occidentalis</i>) Status: NAWCP Family: Pelecanidae | Found in warm coastal marine and estuarine environments. Rare inland; breeds primarily on islands. | Breeds in scattered locations along coasts from Maryland southward around Florida and westward to southern Texas and Mexico, to Honduras. Winters along both coasts from central California and Virginia southward to South America. |
| DOUBLE-CRESTED CORMORANT (<i>Phalacrocorax auritus</i>) Status: NAWCP Family: Phalacrocoracidae | Found in diverse aquatic habitats, such as ponds, lakes, rivers, lagoons, estuaries, and open coastline; more widespread in winter. | Widely distributed across North America. Breeds locally along all coasts and extensively in Florida, the center of continent, and along the Great Lakes and the St. Lawrence Seaway. Winters along the Atlantic and Gulf coasts from North Carolina to Belize and at inland sites along large rivers and lakes northward to Indiana. |
| GREAT CORMORANT (<i>Phalacrocorax carbo</i>) Status: NAWCP Family: Phalacrocoracidae | Breeds along rocky maritime coasts, nesting on cliff ledges or rocky islands free of predators, and feeding in sheltered inshore waters. Winters along coast. | In the summer, breeds along coast from Maine northward to Newfoundland. Non-breeding individuals may occur southward to New Jersey. Winters from Maritime Provinces southward along the Atlantic Coast to the Carolinas. |
| LEAST BITTERN (<i>Ixobrychus exilis</i>) Status: NAWCP Family: Ardeidae | Freshwater or brackish marshes with tall, dense emergent vegetation including sedges and cattails. | Breeds in summer throughout the eastern and central US and southern Ontario from coastal Maine to Florida, and westward to the eastern Dakotas and central Texas. Winters from the mid-Atlantic seaboard to south Florida and southward. Also along western Mexico. |
| GT. BLUE HERON (<i>Ardea herodias</i>) Status: NAWCP Family: Ardeidae | Found along marshes, swamps, rivers, lake edges, tidal flats, mangroves, and seacoasts. Usually nests in trees near water, but colonies can be found away from water. | In summer, breeds from southern Alaska and central Canada southward to Central America and the Caribbean. Winters from southern Canada southward to northern South America, and along the coasts as far north as Alaska and Nova Scotia. |
| GREAT EGRET (<i>Ardea alba</i>) Status: NAWCP Family: Ardeidae | Nests in colonies with other species, in shrubs and trees over water, and on islands. Feeds in variety of wetlands, including marshes, swamps, streams, rivers, ponds, lakes, tide flats, seashores, canals, and flooded fields. | Breeds in isolated locations in southern Canada and the northern US. Common along coasts from Washington and Maine southward and the southern Mississippi River drainage. Wanders in summer to areas outside breeding range. Winters from Oregon and New Jersey southward in breeding range. |

| Species, Status, Family | Habitat | Rangewide and MCB Camp Lejeune Distribution |
|--|---|---|
| SNOWY EGRET (<i>Egretta thula</i>) Status: NCWRC-SC, NAWCP Family: Ardeidae | Coastal areas, marshes, river valleys, lake edges. | Breeds in summer primarily coastally from southern Maine southward, and inland across the western US. Winters along the southern coasts of the US and southward. Also along southern California coast into Mexico. |
| LITTLE BLUE HERON (<i>Egretta caerulea</i>) Status: NCWRC-SC, BCC, NAWCP Family: Ardeidae | Swamps, inland marshes, estuaries, rivers, ponds, lakes, and coastal areas. | Breeds in summer in the southeastern US, from the southern Ohio and Missouri River valleys to the Gulf Coast of Texas and Florida, and up the Atlantic Coast to New England. Winters along the coasts of the southeastern US, from New Jersey to Florida and south Texas. |
| TRICOLOR HERON (<i>Egretta tricolor</i>) Status: NCWRC-SC, NAWCP Family: Ardeidae | Marshes, shores, mudflats, and tidal creeks. | Breeds along coast from New Jersey southward to Mexico, winters in most of its breeding range. |
| CATTLE EGRET (<i>Bubulcus ibis</i>) Status: NAWCP Family: Ardeidae | Breeds in colonies with other herons on islands, isolated woods, and swamps. Found foraging in many habitats, terrestrial and aquatic, such as ponds, cattle pasture, roadsides, farmland, dumps, parks, sports fields, and lawns. | Common in southeastern US. Found throughout US and southern Canada, southward throughout Central and South America. Winters in southern California, coastal Texas, Florida, and southward. |
| GREEN HERON (<i>Butorides virescens</i>) Status: NAWCP Family: Ardeidae | Breeds in swampy thickets. Forages in swamps, along creeks and streams, in marshes, ponds, lake edges, salt marshes, ponds and pastures. Winters mostly in coastal areas, especially mangrove swamps. | Breeds from southern Canada through Central America, avoiding the higher and drier areas of the continent. Winters from the southern US southward. |
| BLACK-CROWNED NIGHT HERON (<i>Nycticorax nycticorax</i>) Status: NAWCP Family: Ardeidae | Various wetland habitats, including salt, brackish, and freshwater marshes, swamps, streams, lakes, and agricultural fields. | Breeds across most of the US and very southern Canada, southward to southern South America. Winters from southern US southward. |
| WHITE IBIS (<i>Eudocimus albus</i>) Status: NAWCP Family: Threskiornithidae | Salt, brackish, and fresh marshes, rice fields, mangroves. May forage in any kind of shallow water, commonly flying to feed in fresh water even in coastal regions. Foraging sites include marshes, mudflats, flooded pastures, lake edges, mangrove lagoons, grassy fields. Nests in mangroves, trees in swamps, dense thickets, sometimes on ground on islands or in marshes. | Breeds along the Atlantic coast from North Carolina southward, along the Gulf Coast to Mexico, and throughout the Caribbean to South America. |
| GLOSSY IBIS (<i>Plegadis falcinellus</i>) Status: NCWRC-SC, NAWCP Family: Threskiornithidae | At edges of fresh, brackish, and salt water. | Resident along coast from southern Maine to eastern Louisiana. |
| CANADA GOOSE (<i>Branta canadensis</i>) Status: NAWMP, GBBDC Family: Anatidae | Breeds in a broad range of habitats from low Arctic tundra to prairies and parklands, including lakes, meadows, golf courses, and city parks. | Breeds from central and southeastern Alaska eastward across Canada to western Greenland, and southward to the central US. |
| SNOW GOOSE (<i>Chen caerulescens</i>) Status: Family: Anatidae | Breeds on subarctic and arctic tundra, near ponds or streams. Winters in coastal marshes and bays, wet grasslands, freshwater marshes, and cultivated fields. | Breeds in scattered colonies north of the tree line from northern Alaska across arctic Canada to Greenland. Winters primarily in central California, western Gulf Coast, and the middle Atlantic coast. Also in lesser numbers in Pacific Northwest, in the central states, and the Southwest and central Mexico. |

| Species, Status, Family | Habitat | Rangewide and MCB Camp Lejeune Distribution |
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| MUTE SWAN (<i>Cygnus olor</i>) Status: Family: Anatidae | Prefers shallow coastal ponds, estuaries, ponds, bogs, and streams flowing into lakes. | Introduced. Resident along Atlantic Coast from New Hampshire southward to Virginia, around the Great Lakes, and in Pacific Northwest. Captives and escapees may be seen throughout North America. Native across Eurasia. |
| WOOD DUCK (<i>Aix sponsa</i>) Status: GBBDC Family: Anatidae | Found in forested wetlands, including along rivers, swamps, marshes, ponds, and lakes. | Breeds from southern Canada, throughout the eastern half of the US, southward to Cuba. In the West, breeds from British Columbia southward along Pacific Coast to southern California, and at scattered locations inland. Winters in southern three-quarters of breeding range, and in Southwest. |
| AMERICAN BLACK DUCK (<i>Anas rubripes</i>) Status: NAWMP, GBBDC Family: Anatidae | Breeds in a variety of wetland habitats, from salt marshes to beaver ponds, river islands, and boreal bogs. Winters primarily in salt water along coasts, but in a variety of freshwater areas inland. | Eastern Canada and US, from northeastern Manitoba through Newfoundland, southward to northern Minnesota and eastern Virginia. Winters from southern Canada to Gulf Coast and northern Florida, westward to western Iowa. |
| MALLARD (<i>Anas platyrhynchos</i>) Status: NAWMP, GBBDC Family: Anatidae | Found in all wetland habitats, lakes, rivers, bays, and parks. | Breeds from Alaska to Nova Scotia southward to Mexico, northern Texas, Tennessee, and northern Georgia. Winters from southern Canada southward to Gulf Coast, northern Florida, and into northern Mexico. |
| BLUE-WINGED TEAL (<i>Anas discors</i>) Status: NAWMP Family: Anatidae | Shallow ponds, small lakes and open grasslands, and seasonal and permanent wetlands ; winters on marshes and protected coastal areas. | Breeds throughout much of North America, from southeastern Alaska to the Atlantic coast, and through the Great Plains as far south as the Gulf coast of Texas and Louisiana. Greatest breeding densities in the prairie states and provinces. Winters in small numbers along the southern coastlines of the US, from California and the Carolinas southward. |
| GREEN-WINGED TEAL (<i>Anas crecca</i>) Status: Family: Anatidae | Shallow freshwater ponds and lakes with lots of emergent vegetation. Along the coast in winter, it prefers tidal creeks, rivers, mudflats, and sheltered marshes to more open water. | Breeds in northern Alaska, Manitoba, and Quebec south to California, Colorado, Nebraska, and New York. Spends winters in southern states and along the coasts. |
| CINNAMON TEAL (<i>Anas cyanoptera</i>) Status: NAWMP Family: Anatidae | Uses freshwater (including highly alkaline) seasonal and semi-permanent wetlands of various sizes, including large marshes, open shallow lakes, reservoirs, sluggish streams, ditches, and stock ponds. | Breeds from southern Canada southward to central Mexico, eastward to very western Nebraska. Also in South America. Winters from southern Texas and California southward to Central America. Also in South America. Should not be found in coastal NC. |
| BUFFLEHEAD (<i>Bucephala albeola</i>) Status: Family: Anatidae | Breeds along wooded freshwater ponds, small lakes, and rivers in forests inhabited by Northern Flickers. Winters in shallow saltwater, or in lakes and rivers. | Breeds from central Alaska throughout Canada to western Quebec. Also in scattered localities in Mountain West. Winters along coasts from Alaska and Nova Scotia southward to Mexico and Florida, and inland across much of the US. |
| NORTHERN PINTAIL (<i>Anas acuta</i>) Status: GBBDC, NAWMP Family: Anatidae | Nests in open country with shallow, seasonal wetlands or ponds and low vegetation. Winters in wide variety of shallow inland freshwater and intertidal habitats such as coastal bays, lakes, and agricultural fields. | Breeds throughout Alaska and Canada, southward to central Great Plains, Great Lakes, California, and Nevada. Also in northern Eurasia. Winters from central and northwestern US southward to northern South America. Also along Atlantic coast from New Jersey throughout Florida. Also in southern Europe, northern Africa, and southern Asia. |
| N. SHOVELER (<i>Anas clypeata</i>) Status: Family: Anatidae | Breeds in open, shallow wetlands and lakes. In winter, inhabits both freshwater and saline marshes as well as protected coastal areas. | Breeds from northern Alaska eastward to Manitoba and Minnesota and southward to the Central Valley of California and northern New Mexico. Also locally across eastern Canada and along Great Lakes and St. Lawrence Seaway. Winters throughout much of the southern and southwestern US, Mexico, western Central America, and the Caribbean. |

| Species, Status, Family | Habitat | Rangewide and MCB Camp Lejeune Distribution |
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| AMERICAN WIGEON (<i>Anas americana</i>) Status: GBBDC, NAWMP Family: Anatidae | Shallow freshwater wetlands, including ponds, lakes, marshes, and rivers. Winters on wet meadows, lakes, protected coastal waters. | Breeds across Alaska and Canada, southward to northern tier of US. Winters from southern Alaska and British Columbia along Pacific coast to Baja California, and from southern US southward to northern South America. Also along Atlantic coast from Maine to the Gulf of Mexico southward to northern South America. |
| GADWALL (<i>Anas strepera</i>) Status: Family: Anatidae | Open lakes and marshes. | Breeds from southeastern Alaska to the Great lakes southward to Texas and California. Greatest breeding densities in the prairie states and provinces. Winters in southern half of the US (Atlantic coast and Florida) and southward to Mexico and Cuba. |
| GREATER SCAUP (<i>Aythya marila</i>) Status: GBBDC Family: Anatidae | Found on tundra lakes, ponds, and bays. Winters on salt water and coastal ponds. | Breeds from Alaska to Labrador, and in scattered localities across Canada. Also across northern Eurasia. Winters primarily on Pacific and Atlantic coasts from Alaska to Baja California, and from Newfoundland to Texas. Also on Great Lakes and other unfrozen large lakes. Also in Eurasia. |
| LESSER SCAUP (<i>Aythya affinis</i>) Status: NAWMP, GBBDC Family: Anatidae | Summers on prairie lakes and marshes; winters on lakes, sheltered coastal areas, freshwater ponds. | Breeds from Alaska and western Ontario southward to Minnesota, northern Colorado, and very northern California. Winters across US where water is open, southward through Caribbean and Central America to northern South America. |
| HOODED MERGANSER (<i>Lophodytes cucullatus</i>) Status: Family: Anatidae | Breeds in forested wetlands and wooded rivers and lakes. In migration and in winter found in wider range of open waters, along coasts, and in shallower waters than other mergansers. | Breeds from central British Columbia southward to coastal Oregon and western Montana. Also from eastern Saskatchewan and eastern Dakotas eastward to Atlantic Coast northward to Nova Scotia, southward to Louisiana and northern Florida. Winters from southeastern Alaska to southern California, and Arizona. Also from southeastern Minnesota, southern Ontario, and central Maine southward to Gulf Coast and Florida. |
| RED-BREASTED MERGANSER (<i>Mergus serrator</i>) Status: Family: Anatidae | Summers on rivers and lakes; winters along sheltered coastal waters, preferring salt water. | Breeds across Alaska and northern Canada southward to very northeastern US. Winters along all coasts from Alaska and Newfoundland southward to Mexico and in the Great Lakes. |
| MOTTLED DUCK (<i>Anas fulvigula</i>) Status: GBBDC Family: Anatidae | Freshwater wetlands, ditches, wet prairies, and seasonally flooded marshes. | Resident from Florida to Gulf Coast of northern Mexico. Introduced to coastal South Carolina. |
| RING-NECKED DUCK (<i>Aythya collaris</i>) Status: GBBDC Family: Anatidae | Summers on open lakes, marshes; winters on large lakes and coastal areas. | Breeds across Canada southward to the northern US, and farther southward to northern California and Colorado. Winters across the southern US, up the coasts, and southward through Mexico, Central America, and the Caribbean. |
| REDHEAD (<i>Aythya americana</i>) Status: NAWMP, GBBDC Family: Anatidae | Nests in marshes, open lakes, and bays; often winters on saltwater. | Breeds in the northern prairies of the US and Canada and intermountain marshes of the west. Also in scattered localities around the Great Lakes. Winters in much of US and Mexico with open water, mostly in Texas and Mexico. |
| RUDDY DUCK (<i>Oxyura jamaicensis</i>) Status: Family: Anatidae | Summers on open lakes and freshwater marshes, marshy lakes, and ponds; winters along coast, marshes, and shallow coastal bays. | Breeds across American West from Northwestern Territories southward to Mexico, and in scattered localities in Midwest and Northeast. Winters along coasts from southern Canada southward, and southern US southward to northern Central America and the Caribbean. |

| Species, Status, Family | Habitat | Rangewide and MCB Camp Lejeune Distribution |
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| BLACK SCOTER (<i>Melanitta nigra</i>) Status: NAWMP Family: Anatidae | Breeds on small tundra lakes. Winters in coastal waters, especially over rocky bottoms. | Breeds in Alaska and northern Quebec and Labrador. Also across northern Eurasia. Winters along Pacific and Atlantic coasts from Alaska and Newfoundland southward to Mexico and northern Florida. Also from Siberia to China and from northern Europe to northern Africa. |
| SURF SCOTER (<i>Melanitta perspicillata</i>) Status: NAWMP Family: Anatidae | Breeds on shallow semi-wooded arctic lakes and rivers in boreal forest and tundra. Winters in shallow marine coastal waters, usually over pebble and sand bottom, very infrequently found inland. | Breeds across Alaska and northern Canada. Winters along Pacific and Atlantic coasts from Alaska and Nova Scotia southward to Mexico and northern Florida. |
| BLACK VULTURE (<i>Coragyps atratus</i>) Status: NCWRC-SC Family: Cathartidae | Open country, dumps, and urban areas. | Resident from southern New York and southern Ohio southward through Texas to Central and South America. |
| TURKEY VULTURE (<i>Cathartes aura</i>) Status: Family: Cathartidae | Prefers rangeland and areas of mixed farmland and forest. Roosts in large trees or on large urban buildings. | Breeds from southern Canada throughout the US and southward through southern South America and the Caribbean. Local or absent in Great Plains. Winters from northern California, Mexican border, eastern Texas, southern Missouri, and southern New York southward throughout the southeastern US and south. |
| OSPREY (<i>Pandion haliaetus</i>) Status: Family: Accipitridae | Breeds in variety of habitats with shallow water and large fish, including boreal forest ponds, desert salt-flat lagoons, temperate lakes, and tropical coasts. Winters along large bodies of water containing fish. | Breeds from Alaska across Canada, southward locally and along coasts to Mexico and Caribbean. Winters from southern US southward to South America. Orton Pond, North Carolina once had highest nesting density of osprey in North America, 61 pairs in 1974. |
| BALD EAGLE (<i>Haliaeetus leucocephalus</i>) Status: NCWRC-T Family: Accipitridae | Breeds in forested areas near large bodies of water. Winters in coastal areas, along large rivers, and large unfrozen lakes. | Breeds near water from Alaska throughout Canada and in scattered localities in nearly all of the US. Also a small number in Mexico. Winters in coastal Alaska and Canada, and throughout lower 48 states. A breeding pair has a nest aboard MCB Camp Lejeune on the New River near the Sneads Ferry Bridge. |
| SWALLOW-TAILED KITE (<i>Elanoides forficatus</i>) Status: BCC, PIF Family: Accipitridae | Forested regions near marshes or swamps, often bottomland, or riverine forest, also open pine woodland. | Breeds in scattered locations in very southeastern US; primarily in Florida. Winters in South America. There was a possible range extension into coastal North Carolina at the Cape Fear River in 2003. |
| NORTHERN HARRIER (<i>Circus cyaneus</i>) Status: Family: Accipitridae | Open fields, wetlands, meadows, pastures, prairies, grasslands, croplands, and riparian woodlands. | Breeds across Alaska and Canada, southward to California, Oklahoma, Wisconsin, and Maryland. Winters from southern Canada throughout the US southward throughout Central America and the Caribbean to northern South America. |
| AMERICAN KESTREL (<i>Falco sparverius</i>) Status: BCC, PIF Family: Falconidae | Breeds in a variety of open habitats, including meadows, grasslands, deserts, parkland, agricultural fields, urban and suburban areas. | Breeds from Alaska across most of Canada and the US into Central and South America. Winters in southern portion of breeding range from Canadian border and northern Nebraska and Ohio southward. |
| SHARP-SHINNED HAWK (<i>Accipiter striatus</i>) Status: Family: Accipitridae | Nests in forests, usually with conifers. Generally not present in small woodlots and open areas. Winters in larger variety of habitats, including urban and suburban areas. | Breeds from central Alaska, throughout most of Canada, south to the northern states and through the Appalachians to northern Alabama. Largely absent through much of the Midwest and the Great Plains. Breeds locally throughout western US, south through central Mexico and Central America. Winters through most of the US. |
| COOPER'S HAWK (<i>Accipiter cooperii</i>) Status: NCWRC-SC Family: Accipitridae | Breeds in deciduous, mixed, coniferous forests and open woodland. Becoming more common in suburban and urban areas. | Breeds across southern Canada southward to southern US and into central Mexico. Winters throughout the US and Mexico. |

| Species, Status, Family | Habitat | Rangewide and MCB Camp Lejeune Distribution |
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| RED-SHOULDERED HAWK (<i>Buteo lineatus</i>) Status: Family: Accipitridae | Forests with open understory, especially bottomland hardwoods, riparian areas, and flooded swamps. | Breeds from Minnesota to New Brunswick, southward to eastern Texas and Florida, and on Pacific Coast from southwestern Oregon into Baja California. Winters throughout much of range below Canadian border. |
| BROADWINGED HAWK (<i>Buteo platypterus</i>) Status: Family: Accipitridae | Breeds in continuous deciduous or mixed-deciduous forest. Winters in tropical forests. | Breeds from Ontario to Nova Scotia, southward to Texas and northern Florida, and westward to central Alberta. Winters from southern Mexico southward to South America, and in Caribbean. Some winter in southern Florida. |
| RED-TAILED HAWK (<i>Buteo jamaicensis</i>) Status: Family: Accipitridae | Found in open areas with scattered elevated perches, including agricultural areas, fields, pasture, parkland, broken woodland, and scrub desert. | Breeds from Alaska to Labrador, southward to Mexico and the Caribbean, down to Panama. Winters from southern Canada southward. |
| WILD TURKEY (<i>Meleagris gallopavo</i>) Status: Family: Phasianidae | Found in hardwood forests with scattered openings, wooded swamps, mesquite grassland, ponderosa pine, and chaparral. | Resident from very southern Canada southward into Mexico and Florida, very local in West. |
| MERLIN (<i>Falco columbarius</i>) Status: Family: Falconidae | Breeds in open country from open coniferous woodland to prairie; also forest edges and farmland, occasionally in adjacent suburbs or urban areas. Winters in open woodland, grasslands, prairies, open cultivated fields, coastal lowlands, marshes, and estuaries. | Breeds across Alaska and Canada, southward to very northern US. Also across northern Eurasia. Winters in Western US, along Pacific coast to southern Alaska, along the Atlantic coast from Connecticut to southern Florida, along Gulf of Mexico, and into central Mexico. |
| N. BOB-WHITE (<i>Colinus virginianus</i>) Status: Family: Odontophoridae | Farmland, brushy fields, open woodland. | Resident from Nebraska, Wisconsin, southern Ontario and Massachusetts southward to Florida and southern Mexico. Also introduced in Pacific Northwest, Caribbean. |
| CLAPPER RAIL (<i>Rallus longirostris</i>) Status: NAWCP Family: Rallidae | Salt marshes and mangrove swamps. | Breeds along coast from Massachusetts southward to Florida, and around the Gulf Coast to Mexico. Also Pacific Coast from central California southward to southern Mexico and up the Colorado River. Also in Caribbean, Mexico, Central America, and both coasts of South America. Resident in most of breeding range, but leaves northern parts in winter. |
| VIRGINIA RAIL (<i>Rallus limicola</i>) Status: NAWCP Family: Rallidae | Freshwater marshes; occasionally inhabits salt marshes. Lives in dense emergent vegetation. | Breeds in appropriate habitat from southern British Columbia to the maritime provinces, and from Baja California across the desert states and the Great Plains to Pennsylvania, New York, and New England, and southward along the Atlantic coast to North Carolina. Winters along the coastlines from New Jersey and southern British Columbia to Mexico. Also in scattered localities in interior US. |
| SORA (<i>Porzana carolina</i>) Status: NAWCP Family: Rallidae | Breeds in shallow salt and freshwater marshes with lots of emergent vegetation. | Breeds from northern Canada southward to New Jersey, Illinois, Nebraska, New Mexico, and central California. Winters from southern US southward throughout Central America and the Caribbean to northern South America. |
| COMMON MOORHEN (<i>Gallinula chloropus</i>) Status: NAWCP Family: Rallidae | Freshwater or brackish marshes with tall emergent vegetation, ponds, canals, and rice fields. | Breeds in appropriate habitat scattered throughout the US, from southern Minnesota through the Great Lakes region to the Atlantic Coast, southward through the Mississippi River basin to the Gulf Coast, and locally in the western states. Resident in West, along Gulf Coast, and southern Atlantic Coast. Moorhens breeding in the north Atlantic and Midwestern states winter from North Carolina to Texas, and possibly southward to Central and South America. |

| Species, Status, Family | Habitat | Rangewide and MCB Camp Lejeune Distribution |
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| AMERICAN COOT (<i>Fulica americana</i>) Status: NAWCP Family: Rallidae | Summers on marshy lakes; winters also along the coast. | Breeds from British Columbia eastward to Atlantic Coast and southward to Central America and Caribbean. Winters from northern US southward, and northward in Canada along the coasts. |
| SANDHILL CRANE (<i>Grus canadensis</i>) Status: NAWCP Family: Gruinae | Breeds in open marshes or bogs, and in wet grasslands and meadows. Feed in marshes and grain fields. Summers on prairies and tundra; during winter, roosts on shallow water and feeds in agricultural fields. | Breeds across Alaska and Canada, eastward to western Quebec, and southward to northern US. Also in scattered localities across western US. Also in Siberia. Resident in southern Florida and Cuba. Winters in southern US and northern Mexico. |
| BLACK-BELLIED PLOVER (<i>Pluvialis squatarola</i>) Status: Family: Charadriidae | Nests in Arctic lowlands on dry tundra. Winters on coastal beaches, mudflats, and estuaries. May use flooded pasture and agricultural land. | Breeds along Arctic coast, from western Alaska to Baffin Island. Winters from British Columbia and Massachusetts southward along coasts of US and Central America, Bermuda, and West Indies, to southern coastal South America. |
| WILSON'S PLOVER (<i>Charadrius wilsonia</i>) Status: BCC, USSCP Family: Charadriidae | Ocean beaches, lagoons, and salt flats. | Breeds along Atlantic and Gulf coasts from Virginia southward to Central America. Also in Caribbean, parts of South America, and along Pacific Coast from Baja California southward to South America. Winters from Florida and Texas southward. |
| PIPING PLOVER (<i>Charadrius melodus</i>) Status:NCWRC-T, USSCP Family: Charadriidae | Open sandy beaches, especially above tideline, and alkali flats. | Breeds in the northern Great Plains from Alberta to Oklahoma, along the northern Great Lakes, and along the Atlantic Coast from Newfoundland to North Carolina. Winters along Atlantic and Gulf coasts from North Carolina to the Yucatan Peninsula, and on northern coast of Gulf of California. |
| SEMIPALMATED PLOVER (<i>Charadrius semipalmatus</i>) Status: Family: Charadriidae | Summers on tundra; winters on muddy shores, tidal flats, sandy beaches. | Breeds across Alaska and northern Canada eastward to Newfoundland, southward to southern shore of James Bay. Winters along coasts from northern California and southern Virginia southward to southern South America. |
| KILLDEER (<i>Charadrius vociferus</i>) Status: Family: Charadriidae | Open areas, especially sandbars, mudflats, pastures, cultivated fields, athletic fields, airports, golf courses, gravel parking lots, and graveled rooftops. Suburban or rural. | Breeds from east-central Alaska across northern Canada, southward to southern Mexico and the Caribbean. Winters from southeastern Alaska (rarely), southern and coastal British Columbia, southern Midwestern states, and coastal Massachusetts southward through rest of breeding range and northern and western South America. |
| PILEATED WOODPECKER (<i>Dryocopus pileatus</i>) Status: Family: Picidae | Found in deciduous or coniferous forests with large trees, suburbs. | Resident throughout southern Canada, Midwest, and Eastern half of US, from the coast westward to eastern North Dakota and eastern Texas. In western US found along Pacific Coast and northern Rockies. |
| EASTERN WOOD-PEWEE (<i>Contopus virens</i>) Status: Family: Tyrannidae | Breeds in all woodland types in the east. Winters in partially cleared shrubby habitats and secondary forests. | Breeds from southeastern Saskatchewan eastward to Nova Scotia, and southward to central Texas and northern Florida. |
| ACADIAN FLYCATCHER (<i>Empidonax virens</i>) Status: Family: Tyrannidae | Breeds in mature forest, especially deciduous woods, along streams, in ravines, and in swamps. Winters in lowland tropical forest and second growth. | Breeds from southern Minnesota, southern Ontario, and southern New England southward to upper Gulf Coast and northern Florida. Winters in southern Central America and northern South America. |
| EASTERN PHOEBE (<i>Sayornis phoebe</i>) Status: Family: Tyrannidae | Found in woodlands and along forest edges, often near water, farmlands, suburbs; nests on bridges, outbuildings. | Breeds from southeastern Yukon and northeastern British Columbia eastward to Nova Scotia and southern Quebec, southward to central Texas, northern Mississippi, and central Georgia. Winters from Maryland, West Virginia, very southern Illinois, and southeastern Oklahoma, southward to Florida, the Gulf Coast, and eastern Mexico. |

| Species, Status, Family | Habitat | Rangewide and MCB Camp Lejeune Distribution |
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| GREAT CRESTED FLYCATCHER (<i>Myiarchus crinitus</i>) Status: Family: Tyrannidae | Breeds in open deciduous woodlands, old orchards, riparian corridors, wooded swamps, parks, cemeteries, and urban areas with large shade trees. Winters in humid forests and second growth. | Breeds from eastern Alberta through southern Canada to Nova Scotia, and southward to central Texas and Florida. Winters from southern Mexico to northern South America. Some in southern Florida. |
| EASTERN KINGBIRD (<i>Tyrannus tyrannus</i>) Status: Family: Tyrannidae | Breeds in open environments with scattered perches, such as fields, orchards, shelterbelts, and forest edges. Uses urban parks and golf courses. Winters in river- and lake-edge habitats and canopy of tropical forests. | Breeds from western Northwest Territories and eastern and southern British Columbia eastward across Canada, across all of the eastern US, and southward in the western states to northern Nevada, northern New Mexico, and southern Texas. Winters in South America. |
| LOGGERHEAD SHRIKE (<i>Lanius ludovicianus</i>) Status: NCWRC-SC Family: Laniidae | Open country with some shrubs and trees. | Breeds from central prairie provinces and Canadian border southward throughout the US to Florida and southern Mexico. Winters from very southern Oregon, southern Kansas, Tennessee, and Virginia southward throughout the US to southern Mexico. |
| HORNED LARK (<i>Eremophila alpestris</i>) Status: Family: Alaudidae | Open, barren country. Prefers bare ground to short grasses. | Breeds across North America from Alaska and the Canadian arctic southward to northern Georgia, Louisiana, and Mexico. Winters in southern part of breeding range from southern Canada southward. |
| PURPLE MARTIN (<i>Progne subis</i>) Status: Family: Hirundinidae | Breeds near human settlements where nest houses are provided, especially near water and large open areas. Also in saguaro cactus, and in western montane forests around beaver ponds. In winter, feeds in rainforest, clearings, and agricultural areas; may roost in village plazas. | Breeds from Alberta to New Brunswick, southward to central Texas and Florida. Also in scattered locations along Pacific Coast, and in the deserts and mountains of the southwestern US into Mexico. Winters in South America, in lowlands east of the Andes. |
| TREE SWALLOW (<i>Tachycineta bicolor</i>) Status: Family: Hirundinidae | Open areas near water and fields, especially wooded swamps and shorelines. | Breeds from Alaska to Labrador, southward to southern California, New Mexico, northern South Dakota, Ohio, and Maryland. Winters from southern California, coastal North Carolina, Florida, and the Gulf Coast southward to Panama. |
| N. ROUGH-WINGED SWALLOW (<i>Stelgidopteryx serripennis</i>) Status: Family: Hirundinidae | Breeds in a wide variety of open habitats, with openings in various vertical surfaces, including banks, gorges, and human structures, especially near water and cutaway banks. | Breeds from southern Canada to northern Mexico, including all of the contiguous US. Winters from southern California to southern Florida, and throughout Mexico and Central America. |
| BANK SWALLOW (<i>Riparia riparia</i>) Status: Family: Hirundinidae | Open areas near water with cutaway banks. | Breeds from western Alaska to Newfoundland, southward to central US and southern Texas. Winters in South America, with some in Mexico. |
| CLIFF SWALLOW (<i>Petrochelidon pyrrhonota</i>) Status: Family: Hirundinidae | Breeds in a variety of habitats with open foraging areas and cliffs or buildings for nesting. Avoids heavy forest, desert, or high mountains. | Breeds from western and central Alaska eastward to Nova Scotia, southward to southern Mexico, central Arkansas, northern Georgia, and New Jersey. Winters in southern South America. |
| BARN SWALLOW (<i>Hirundo rustica</i>) Status: Family: Hirundinidae | Found in many habitats with open areas for foraging and structures for nesting, including agricultural areas, cities, and along highways. Needs mud for nest building. | Breeds from southern Alaska through Canada, throughout the US, except for the peninsula of Florida, where it is a local breeder, and parts of desert Southwest. Southward into central Mexico. Winters in Southern Mexico through Central America and throughout lowland South America. |
| CAVE SWALLOW (<i>Petrochelidon fulva</i>) Status: Family: Hirundinidae | Nests in some natural or human-made structure (cave, sinkhole, building, silo, bridge, culvert). During the day forages over nearby open areas, often near water. | Breeds in Texas and southern New Mexico into central Mexico, and in southern Florida and northern Caribbean. Also resident in northern South America. Winters in Mexico and Caribbean. Cliff swallow is similar. |

| Species, Status, Family | Habitat | Rangewide and MCB Camp Lejeune Distribution |
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| BLUE JAY (<i>Cyanocitta cristata</i>) Status: Family: Corvidae | Found in deciduous, coniferous, and mixed forests and woodlands. Found more along forest edges than in deep forest. Common in urban and suburban areas, especially where large oaks are present. | Resident from southern Canada through eastern US to Gulf Coast, westward to central Texas. Small, local, expanding populations westward to Washington. Partially migratory: some birds migrate out of northern portion of range, but some jays remain in all parts of range. |
| AMERICAN CROW (<i>Corvus brachyrhynchos</i>) Status: Family: Corvidae | Variety of habitats. Requires open ground for feeding and scattered trees for roosting, nesting, and refuge. | Breeds from southeastern Yukon Territory eastward to Newfoundland, and southward to Florida and northern Mexico. Absent from desert regions. Winters from southern Canada southward. |
| FISH CROW (<i>Corvus ossifragus</i>) Status: Family: Corvidae | Primarily coastal, along beaches and marshes into forests. Usually near water, but breeds in urban areas and farmland away from coast and large bodies of water. Common at dumps and in urban areas. | Along Atlantic and Gulf coasts and inland from southern Maine to eastern Texas, and up large rivers to Illinois, Oklahoma, and Kansas. Isolated populations further inland in New York. Same as summer range, but moves to areas of abundant food. Wintering areas may be north and inland of breeding area. |
| CAROLINA CHICKADEE (<i>Poecile carolinensis</i>) Status: Family: Paridae | Deciduous and mixed deciduous/coniferous woodlands, swamps, riparian areas, open woods and parks. Also in suburban and urban areas. | Resident from central New Jersey westward to southeastern Kansas and central Texas, southward to Gulf Coast and northern Florida. |
| TUFTED TITMOUSE (<i>Baeolophus bicolor</i>) Status: Family: Paridae | Deciduous forest, swamps, orchards, parks, and suburban areas. | Resident from southern Minnesota, northern Michigan, southern Ontario and southern Vermont, southward to northeastern Mexico and the Gulf Coast. |
| WHITE-BREASTED NUTHATCH (<i>Sitta carolinensis</i>) Status: Family: Sittidae | Found in mature deciduous forests or mixed woods, especially near openings and edges. Also parks and suburbs with large trees. | Resident in deciduous forests from southern Canada southward to northern Florida and southern Mexico. |
| BROWN-HEADED NUTHATCH (<i>Sitta pusilla</i>) Status: BCC, PIF Family: Sittidae | Pine forests, especially in open, mature forests with periodic fires. | Resident in pine forests from eastern Texas and extreme southeastern Oklahoma through the southern coastal states north to Delaware. Also in the Bahamas. |
| RED-BREASTED NUTHATCH (<i>Sitta canadensis</i>) Status: Family: Sittidae | Mature and diverse stands of coniferous forests, especially spruce, fir, larch, and cedar. Also suburban habitat with sufficient conifers. | Resident in coniferous and mixed coniferous forests from southern Alaska across Canada southward to northern US. Other populations in the South from the Appalachians to northern Georgia and throughout the Mountain West. In the winter, resident throughout breeding range. Irruptive movements southward throughout most of the US in years of poor cone production in boreal forest. Some birds move south every year, especially from most northern populations. |
| BROWN CREEPER (<i>Certhia americana</i>) Status: NCWRC-SC Family: Certhiidae | Coniferous and mixed coniferous-deciduous forests. | Breeds through southern Canada from Alaska to Newfoundland and southward to the western and northern US. Spends winters in breeding range and south throughout the US to the Gulf coast and Florida. |
| CAROLINA WREN (<i>Thryothorus ludovicianus</i>) Status: Family: Troglodytidae | Found in a wide range of habitats, from swamps to forest to rural or residential areas. Requires moderately dense shrub or brushy cover, such as forest understory or vines. | Resident from eastern Kansas to southern Ontario and Massachusetts, southward to Gulf Coast and into northeastern Mexico. Also a population in the Yucatan Peninsula. |

| Species, Status, Family | Habitat | Rangewide and MCB Camp Lejeune Distribution |
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| HOUSE WREN (<i>Troglodytes aedon</i>) Status: Family: Troglodytidae | Breeds along forest edges and in open woodlands, city parks, and residential areas with trees. Also in mountain forests and clearings, and aspen groves. Winters in thickets, shrubby areas, residential yards and gardens, chaparral, and riparian areas. | Breeds from southern Canada southward to central California, central New Mexico, northern Arkansas, and northern Georgia. Winters in the southern US and Mexico, from California, Texas, and central Arkansas, to southern Maryland and southward to Gulf Coast and throughout Florida. |
| MARSH WREN (<i>Cistothorus palustris</i>) Status: Family: Troglodytidae | Nests in variety of marshes, especially with dense cattails and rushes. | Breeds from British Columbia to Maine, and southward throughout intermountain West and along all coasts southward to Mexico. Winters in southern US and Mexico, as well as locally in West. |
| WINTER WREN (<i>Troglodytes troglodytes</i>) Status: Family: Troglodytidae | Breeds in many different habitat types, from cliff faces to rocky woodland streams to various forests; occurs in greatest densities in coniferous forests. Prefers areas with fallen logs and other dead wood. Winters in woods, wood piles, and tangles. | Breeds from coastal Alaska southward to northern California, Idaho, and Montana, and across Canada to the Great Lakes, the Maritime Provinces, and the eastern US, as far southward as the southern Appalachians. Also breeds throughout Europe, Asia, and north Winters throughout much of far-western portion of breeding range, including Pacific Coast; also winters across most of the US, from eastern Washington to southern California, Idaho to central Arizona, and from southern New England to Florida and west into Texas. |
| SEDGE WREN (<i>Cistothorus platensis</i>) Status: Family: Troglodytidae | Nests in dense tall sedges and grasses in wet meadows, hayfields, and marshes, often with sedges. Avoids cattails. Winters in grassy marshes, coastal marshes, and dry grass fields. | Breeds in the central prairie provinces and the upper mid-western states eastward to Quebec and New Hampshire. Varies from year to year at the edges of the range. Also in Central and South America. Winters in southern states and Mexico. |
| RUBY-CROWNED KINGLET (<i>Regulus calendula</i>) Status: Family: Regulidae | Summers in coniferous woods; winters in woods and brushy edges. | Breeds from Alaska to Newfoundland, southward to New Hampshire, northern Wisconsin, and central Alberta. Southward in western mountains to southern California, Arizona, and New Mexico. Winters from Connecticut to southern Kansas, and southward to Florida and southern Mexico. Also throughout West northward to southern Canada. |
| GOLDEN-CROWNED KINGLET (<i>Regulus satrapa</i>) Status: Family: Regulidae | Breeds in spruce and fir forests, as well as some mixed coniferous-deciduous forests. Winters in woods and brushy edges. | Breeds from southern Alaska and Northwest Territories, eastward to Newfoundland, southward to northern US and further southward in mountains. Also resident in southern Mexico. Winters from southern Alaska and southern Canada southward and eastward across most of the US. |
| BLUE-GRAY GNATCATCHER (<i>Polioptila caerulea</i>) Status: Family: Sylviidae | Breeds in variety of deciduous wooded habitats from shrub land to mature forest, especially near water. Also in swamps. | Breeds from northern California, southwestern Wyoming, southern Minnesota, southern Ontario, and southern Maine southward to southern Mexico and El Salvador. Winters from southern US southward to Cuba and Central America. |
| EASTERN BLUEBIRD (<i>Sialia sialis</i>) Status: Family: Turdidae | Open habitat with little or no understory and sparse groundcover, such as orchards, clear-cuts, parks, and large lawns in suburban and urban areas. | Breeds across eastern North America from southeastern Saskatchewan to Nova Scotia, southward to central Texas and Florida. Also southeastern Arizona through central Mexico to northern Nicaragua. Winters in southern part of breeding range, from Kansas to Connecticut and south. Also to southeastern New Mexico and west Texas. In mild winters, may be found farther north. |
| WOOD THRUSH (<i>Hylocichla mustelina</i>) Status: BCC, PIF Family: Turdidae | Breeds in the interior and edges of deciduous and mixed forests, in rural to urban areas, generally in cool, moist sites, often near water. | Breeds in eastern North America, from southern Ontario, southwestern Quebec, New Brunswick, and Nova Scotia southward to northern Florida, westward to the eastern parts of the Great Plains in Texas, to eastern Oklahoma, Kansas, Nebraska, and South Dakota. May be slowly expanding its range northward. Winters in lowlands of Central America, from southern Mexico to western Panama; rarely in southeastern US. |

| Species, Status, Family | Habitat | Rangewide and MCB Camp Lejeune Distribution |
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| HERMIT THRUSH (<i>Catharus guttatus</i>) Status: Family: Turdidae | Breeds in interior of deciduous, mixed, and coniferous forest, favoring internal forest edges. Winters in moist and dense cover of woody growth, forests, open woodlands, and in the northern part of range especially in ravines and sheltered sites. | Breeds from southern Alaska through Canada, southward to northeastern states and into Appalachians, and in West southward to southern Arizona. Winters from southern Arizona to southern Missouri and Connecticut, southward to the Gulf of Mexico and Florida and through Mexico to El Salvador. Also up Pacific Coast to southern British Columbia. |
| AMERICAN ROBIN (<i>Turdus migratorius</i>) Status: Family: Turdidae | Found in from woods to open lawns and plains to timberline, especially where short-grass areas are interspersed with shrubs and trees. Common in urban and suburban areas. | Breeds throughout most of North America, from Alaska and northern Canada southward to northern Florida and Mexico. Winters mostly south of Canada to Florida and Gulf Coast, to central Mexico. Winters along Pacific Coast to southern Alaska. |
| GRAY CATBIRD (<i>Dumetella carolinensis</i>) Status: Family: Mimidae | Found in dense, shrubby habitats with tangled thickets, such as abandoned farmland, fencerows, roadsides, stream sides, forest edges, and some residential areas. | Breeds across southern Canada, southward to northeastern Arizona, and eastward to northern Florida. Winters along East Coast from southern Massachusetts to Florida, and from the Gulf Coast southward into Central America and the Caribbean. |
| N. MOCKINGBIRD (<i>Mimus polyglottos</i>) Status: Family: Mimidae | Found in areas with open ground and shrubby vegetation, such as in parkland, cultivated land, and suburbs. | Resident from southern Canada southward to southern Mexico and the Caribbean. |
| BROWN THRASHER (<i>Toxostoma rufum</i>) Status: Family: Mimidae | Breeds in brushy open country in thickets, shelter belts, riparian areas, and suburbs. Winters in hedgerows, gardens, thickets, and brushy woodland edges. | Breeds from southern Canada south to east-central Texas and southern Florida, westward to southeastern Alberta and eastern Montana. Winters from southern Missouri and southern New Jersey southward to Gulf Coast, east-central Texas, and southern Florida. |
| CEDAR WAXWING (<i>Bombycilla cedrorum</i>) Status: Family: Bombycillidae | Breeds in open woodland, old fields with shrubs and small trees, riparian areas, farms, and suburban gardens. Winters in areas with fruit-bearing trees and shrubs, especially open woodlands, parks, gardens, and forest edges. | Breeds from British Columbia across Canada, southward to northern California, northern Arkansas, and northern Georgia. Winters from very southern Canada southward through US and Mexico into Central America. Numbers vary in each location from year to year. |
| WHITE-EYED VIREO (<i>Vireo griseus</i>) Status: Family: Vireonidae | Found in deciduous scrub, dense understory, thickets, hedgerows, overgrown pastures, old fields, wood margins, streamside thickets, and mangroves. | Breeds from Iowa to very southern Ontario and Connecticut, southward to Florida and Mexico. Winters in southern US and southward to northern Central America and the Caribbean. |
| BLUE-HEADED VIREO (<i>Vireo solitarius</i>) Status: Family: Vireonidae | Cool forests. | Breeds from southern Northwest Territories eastward across Canada to Newfoundland, and from northern Minnesota to Connecticut, and southward in Appalachians. Winters in southeastern US, from southern Virginia southward to Central America. |
| YELLOW-THROATED VIREO (<i>Vireo flavifrons</i>) Status: Family: Vireonidae | Breeds in a variety of edge habitats in mature deciduous and mixed deciduous forests. | Breeds from very southern Canada southward to eastern Texas and northern Florida. Winters from southern Mexico to northern South America. |
| RED-EYED VIREO (<i>Vireo olivaceus</i>) Status: Family: Vireonidae | Breeds in deciduous and mixed deciduous forests. More abundant in forest interior. Lives in urban areas and parks with large trees. | Breeds from southeastern Alaska, Yukon, and British Columbia eastward to Newfoundland, and from Canada southward to Oregon, Idaho, South Dakota, eastern Texas and Florida. Also populations resident in South America. Winters in northern South America in the Amazon Basin. |
| N. PARULA WARBLER (<i>Parula americana</i>) Status: BCC, PIF Family: Parulidae | Deciduous and coniferous forests, usually near water. | Breeds from southern Ontario to Nova Scotia, and northern Minnesota to northern New York and southern New Hampshire. Also from southern Iowa to southern New York southward to eastern Texas and Florida. Winters in southern Mexico to Honduras and in the Caribbean. Some in very southern Florida. |

| Species, Status, Family | Habitat | Rangewide and MCB Camp Lejeune Distribution |
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| YELLOW WARBLER (<i>Dendroica petechia</i>) Status: Family: Parulidae | Breeds in wet, deciduous thickets, especially in willows. Also in shrubby areas and old fields, yards and gardens. In southern Florida and farther south, found in mangroves. | Breeds from northern Alaska and Canada southward to middle US (western NC and Northern AL), and in West into Mexico. Also breeds from southern Florida, throughout the Caribbean and Central American coasts, to northern South America. Winters in Mexico, Central and South America. |
| CAPE MAY WARBLER (<i>Dendroica tigrina</i>) Status: Family: Parulidae | Breeds in coniferous (spruce) forest. Winters in various habitats, including settled areas. | Breeds across the Canadian boreal forest, from Alberta to the Atlantic coast, and southward to northern US. Migrates through eastern US and winters throughout the northern Caribbean and on the Caribbean coast of Central America. |
| YELLOW-RUMPED WARBLER (<i>Dendroica coronata</i>) Status: Family: Parulidae | Breeds in mature coniferous and mixed coniferous-deciduous woodlands. Winters in open areas along woodland edge, second growth, dunes, marshes, and residential areas. Only warbler able to digest the waxes found in bayberries and wax myrtles. Its ability to use these fruits allows it to winter farther north than other warblers. | Breeds in coniferous forests from Alaska and Canada, southward to the northern US and southward in the western mountains through Mexico to Guatemala. "Myrtle" form breeds in coniferous forests from Alaska through Canada and to the northern US from Minnesota to Maine and southward to Pennsylvania and West Virginia. Myrtle winters primarily along the Atlantic and Gulf coasts, northward to Massachusetts. Also locally in interior eastern US, along the Pacific Coast. |
| YELLOW-THROATED WARBLER (<i>Dendroica dominica</i>) Status: Family: Parulidae | Breeds in pine forest, sycamore-bald cypress swamp, live oak woodland, floodplain forest and riparian woodland. Found in migration and winter in a variety of woodland, scrub, brush and thicket situations but most frequently in pine woodland if such habitat is available. | Breeds from Iowa to Pennsylvania and New Jersey, southward to eastern Texas and Florida. Winters from Georgia and Texas southward to Central America and Caribbean. |
| PINE WARBLER (<i>Dendroica pinus</i>) Status: Family: Parulidae | Breeds in a variety of pine forests or mixed woodlands and plantations. Winters in similar habitats. | Breeds locally from southeastern Manitoba and Minnesota eastward to Maine and New Brunswick, southward to Gulf Coast, from eastern Texas to Florida. Rare and very local in middle of range. Also Bahamas and Hispaniola. Winters in southeastern US, from Oklahoma to Virginia and southward. |
| PALM WARBLER (<i>Dendroica palmarum</i>) Status: Family: Parulidae | Breeds in spruce bogs, open boreal coniferous forest, and partly open situations with scattered trees and heavy undergrowth, usually near water. Found in migration and winter in a variety of woodland, second growth and thicket habitats, on the ground in savanna and open fields, beaches, lawns, and in mangroves. | Breeds across Canada from Northwest Territories to Newfoundland, southward to Minnesota, Wisconsin, Michigan, New York, and Maine. Winters along Pacific Coast of US and southeastern US, the Yucatan, Central America, and the Caribbean. |
| PRAIRIE WARBLER (<i>Dendroica discolor</i>) Status: BCC, PIF Family: Parulidae | Various shrubby habitats, including regenerating forests, dry brushy areas, open fields, old fields, young pine plantations, mangrove swamps, and Christmas-tree farms. Florida residents live in mangrove forests. | Breeds from southern Maine to southern Missouri, southward to northern Florida and eastern Texas. Also resident along coasts of Florida. Winters throughout Florida, Bermuda, the Bahamas, the Greater Antilles, the Virgin Islands. Occurs uncommonly on the coasts of Belize and Honduras. |
| BLACKPOLL WARBLER (<i>Dendroica striata</i>) Status: Family: Parulidae | Breeds in boreal coniferous forest (primarily spruce or spruce-fir) and woodland, mixed coniferous-deciduous second growth, tall shrubs, and alder thickets; in migration and winter found in a variety of forest, woodland, scrub and brushy habitats. | Breeds from Alaska to Newfoundland, southward to very northeastern US. Winters in South America. |
| BLACK & WHITE WARBLER (<i>Mniotilta varia</i>) Status: Family: Parulidae | Breeds in mature and second-growth deciduous and mixed forests. Winters in variety of habitats from disturbed areas to mature forests. | Breeds from southeastern Yukon to Newfoundland, southward to South Dakota, Texas, and northern Georgia. Winters near the coasts of the southeastern US, Bermuda, and many islands in the Caribbean, throughout most of Mexico, Central America, and northern South America. |
| PROTHONTRY WARBLER (<i>Protonotaria citrea</i>) Status: Family: Parulidae | Breeds in wooded areas near water, especially flooded bottomland hardwood forests, cypress swamps, and along large lakes and rivers. Winters in mangrove swamps and coastal tropical forests. | Breeds from southern Minnesota and southern Ontario southward to central Texas and Florida. Winters in Central and South America. |

| Species, Status, Family | Habitat | Rangewide and MCB Camp Lejeune Distribution |
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| WORM-EATING WARBLER (<i>Helmitheros vermivorum</i>) Status: PIF Family: Parulidae | Breeds in mature deciduous or mixed deciduous-coniferous forest with patches of dense understory, usually on steep hillside. Winters in tropical forests. | Breeds locally in the Appalachian region, and westward to Missouri and eastern Texas, southward to northwestern Florida. Winters in Central America and in Caribbean. |
| ORANGE-CROWNED WARBLER (<i>Vermivora celata</i>) Status: Family: Parulidae | Breeds in streamside thickets and woodland groves with moderately dense foliage, forest edges, brushy fields, and in understory of forests and chaparral. Winters in thickets and shrubs along streams, forests, weedy fields, and dense tangles of shrubs and vines. | Breeds from western Alaska across Canada to Labrador, southward in western US to southern California, Arizona, and New Mexico. Winters from California and coastal Virginia southward to southern Mexico and Guatemala. |
| SWAINSON'S WARBLER (<i>Limnothlypis swainsonii</i>) Status: BCC, PIF Family: Parulidae | Breeds in swamps and southern forests with thick undergrowth, especially canebrakes and floodplain forests in lowlands and rhododendron-mountain laurel in Appalachians. Winters in tropical scrub, evergreen, and gallery forests. | Breeds locally from northeastern Oklahoma, southern Missouri, southern Illinois, West Virginia, and southern Virginia southward to eastern Texas and northern Florida. Winters in Caribbean and Yucatan Peninsula. |
| OVENBIRD (<i>Seiurus aurocapilla</i>) Status: Family: Parulidae | Breeds in mature deciduous and mixed deciduous and coniferous forests. Winters in primary and second growth forests. | Breeds from southeastern Yukon eastward to Newfoundland, southward to Wyoming, Nebraska, Arkansas, and Georgia. Winters in Florida, the Caribbean, Mexico, Central America, and northern South America. |
| AMERICAN OYSTERCATCHER (<i>Haematopus palliatus</i>) Status: USSCP, BCC Family: Haematopodidae | Coastal islands, beaches, and mudflats. | Breeds Along Atlantic and Gulf coasts from Massachusetts to southern Mexico, and scattered locations in the Caribbean. Resident on Pacific Coast from Baja California southward to South America. Winters from New Jersey southward. Range is expanding into NY and Massachusetts, where is used to breed in the 1800s. |
| BLK-NECKED STILT (<i>Himantopus mexicanus</i>) Status: USSCP (Hawaiian population) Family: Recurvirostridae | Shallow fresh and saltwater wetlands, including salt ponds, rice fields, shallow lagoons, mangrove swamps, ditches, ponds salt ponds, or fields. | Breeds in scattered localities across western and southern US southward through Caribbean and Central America to South America. Also in Hawaii. Winters from southern US southward. |
| GREATER YELLOWLEGS (<i>Tringa melanoleuca</i>) Status: Family: Scolopacinae | Breeds in muskeg, wet bogs with small wooded islands , and subarctic forests (usually coniferous) with abundant clearings. Winters in wide variety of shallow fresh and saltwater habitats. | Breeds across southern Alaska and central Canada eastward to Newfoundland. Winters in southern US southward to southern South America, northward along the coasts to southern British Columbia and Connecticut. |
| LESSER YELLOWLEGS (<i>Tringa flavipes</i>) Status: Family: Scolopacidae | Breeds in open boreal forest with scattered shallow wetlands. Winters in wide variety of shallow fresh and saltwater habitats. | Breeds across Alaska and northern Canada eastward to western Quebec. Winters in southern US southward to southern South America, northward along the coasts to southern central California and New Jersey. |
| AMERICAN AVOCET (<i>Recurvirostra americana</i>) Status: Family: Recurvirostridae | Preferred habitats include freshwater marshes and shallow, marshy lakes. Breeds locally in salt or brackish marshes; often moves to coasts during winter. | Breeds from interior Washington, Saskatchewan, and Minnesota south to California and Texas. Spends winters on the west coast north to California, on the Gulf coast, and in Florida. In fall, this bird is a regular visitor on the Atlantic coast. |
| SOLITARY SANDPIPER (<i>Tringa solitaria</i>) Status: USSCP Family: Scolopacidae | Breeds in taiga or boreal bogs, nesting in trees in deserted songbird nests. In migration and winter found along freshwater ponds, stream edges, temporary pools, flooded ditches and fields, more commonly in wooded regions, less frequently on mudflats and open marshes. | Breeds across Alaska and Canada, southward nearly to the US border. Winters from southern Texas southward through Caribbean, Central America, and South America. Migrates through eastern US |

| Species, Status, Family | Habitat | Rangewide and MCB Camp Lejeune Distribution |
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| WILLET (<i>Catoptrophorus semipalmatus</i>) Status: Family: Scolopacidae | Summers on coastal marshes in East and prairie marshes in West; winters on coastal marshes, beaches, and mudflats. | Breeds in interior West from southern Alberta to eastern South Dakota, and southward to northeastern California and western Colorado. Also along Atlantic Coast from Newfoundland to northern Mexico and the West Indies. Winters along both coasts from northern California and Maryland to South America. |
| SPOTTED SANDPIPER (<i>Actitis macularius</i>) Status: Family: Scolopacidae | Breeds in a variety of habitats, such as shoreline (rivers, lakes, seashore), sagebrush, grassland, forest, lawn, or park. Territories must include some shoreline of a stream, lake, or pond. Winters wherever water is present. | Breeds across North America from Alaska to Newfoundland, southward to central California, southern Nebraska, and northern North Carolina. Winters from southern states to southern South America. Also along Pacific Coast northward to Puget Sound. |
| WHIMBREL (<i>Numenius phaeopus</i>) Status: BCC, USSCP Family: Scolopacidae | Breeds in various tundra habitat, from wet lowlands to dry heath. In migration, frequents various coastal and inland habitats, including fields and beaches. Winters in tidal flats and shorelines, occasionally visiting inland habitats. | Breeds along the coasts of Alaska and northern Canada as far eastward as Hudson Bay. Also in northern Europe and Russia. Winters on both coasts of the US, from northern California and North Carolina southward. Also along coasts and offshore islands from Mexico to Chile and Brazil. Old World populations winter in Africa, Asia, and Australia. |
| RUDDY TURNSTONE (<i>Arenaria interpres</i>) Status: USSCP Family: Scolopacidae | Breeds on rocky arctic coasts and tundra. On migration and in winter, mostly along rocky shores, but also sand beaches and mudflats. | Breeds along the arctic coastline, from western Alaska eastward to Greenland. Also across northern Eurasia from northern Scandinavia to eastern Siberia. Winters along coasts from northern California and northern Massachusetts southward to southern tip of South America. |
| RED KNOT (<i>Calidris canutus</i>) Status: BCC, USSCP Family: Scolopacidae | Breeds in drier tundra areas, such as sparsely vegetated hillsides. Outside of breeding season, it is found primarily in intertidal, marine habitats, especially near coastal inlets, estuaries, and bays. | Breeds in extreme northern Alaska and Canada. Also breeds in northern Greenland and Russia. Winters very locally at coastal sites from California and Massachusetts southward to southern South America. |
| SANDERLING (<i>Calidris alba</i>) Status: USSCP Family: Scolopacidae | Nests on islands and coastal tundra of high Arctic. On migration and in winter prefers sandy beaches. | Breeds in extreme northern Canada and parts of Alaska. Also breeds in northern Greenland, Norway, and Russia. Non-breeders occur south of breeding range. Winters on all coasts from southern Alaska and Nova Scotia southward to southern Chile and Argentina. Found on almost all temperate and tropical marine beaches throughout the world. |
| SEMIPLUMBED SANDPIPER (<i>Calidris pusilla</i>) Status: BCC Family: Scolopacidae | Breeds on open tundra, generally near water. Winters and migrates along mudflats, sandy beaches, shores of lakes and ponds, and wet meadows. | Breeds along northern and coastal Alaska across northern Canada to Labrador. Also in eastern Siberia. Winters along northern and central coasts of South America. |
| WESTERN SANDPIPER (<i>Calidris mauri</i>) Status: USSCP Family: Scolopacidae | Breeds in coastal sedge-dwarf tundra. Migrates and winters along mudflats, beaches, shores or lakes and ponds, and flooded fields. | Breeds in western Alaska. Also in eastern Siberia. Winters along Pacific Coast from California to Peru, and along Atlantic Coast from southern New Jersey southward to northern South America. |
| LEAST SANDPIPER (<i>Calidris minutilla</i>) Status: Family: Scolopacidae | Breeds in mossy or wet grassy tundra and tundra near tree line, occasionally in drier areas with scattered scrubby bushes. Migrates and winters in wet meadows, mudflats, flooded fields, shores of pools and lakes, and, less frequently, sandy beaches. | Breeds throughout Alaska and northern Canada eastward to Newfoundland. Winters from Oregon and New Jersey and Texas southward to central South America. |
| WHT-RUMP. SANDPIPER (<i>Calidris fuscicollis</i>) Status: Family: Scolopacidae | Breeds in mossy or grassy tundra near water. On migration and during winter found in grassy marshes, mudflats, sandy beaches, flooded fields, and shores of ponds and lakes. | Breeds across northern Alaska and Canada. Migrates through Eastern US and most of South America except for the west coast. Winters in southern South America. |

| Species, Status, Family | Habitat | Rangewide and MCB Camp Lejeune Distribution |
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| DUNLIN (<i>Calidris alpina</i>) Status: USSCP (Alaska-East Asian and Alaska-Pacific Coast populations) Family: Scolopacidae | Breeds in wet coastal tundra. Winters along mudflats, estuaries, marshes, flooded fields, sandy beaches, and shores of lakes and ponds. | Breeds across northern Alaska and Canada. Winters along coasts from southern Alaska and Massachusetts southward to Mexico. Also on coasts of Eurasia, and western Africa. |
| STILT SANDPIPER (<i>Calidris himantopus</i>) Status: BCC Family: Scolopacidae | Breeds in sedge tundra near water, often near wooded borders of the taiga. On migration and in winter found along mudflats, flooded fields, shallow ponds and pools, and marshes. | Breeds in northern Alaska and Canada. Winters primarily in interior of South America, but some found from very southern US southward to Central America and northern South America. Migrates through Eastern US and Central South America. |
| SHORT-BILLED DOWITCHER (<i>Limnodromus griseus</i>) Status: BCC, USSCP Family: Scolopacidae | Breeds in muskegs of taiga to timberline and on bogs at northern limit of coniferous forests, and barely onto subarctic tundra. Winters on coastal mud flats and brackish lagoons. In migration prefers saltwater tidal flats, beaches, and salt marshes. Found in freshwater mud flats and flooded agricultural fields. | Breeds in three areas in Alaska and Canada: Coastal southern Alaska to central British Columbia; northern Alberta, Saskatchewan, and Manitoba; and southern Hudson Bay to Labrador. Winters locally along both coasts from northern California and southern Virginia south through Central America to South America. |
| COMMON SNIPE (<i>Gallinago gallinago</i>) Status: Family: Scolopacidae | Breeds in bogs, fens, swamps, and around the marshy edges of ponds, rivers, and brooks. Forages in marshes, wet meadows, wet fields, and the marshy edges of streams and ditches. | Breeds across Alaska and Canada, southward to central California, Colorado, Wisconsin, northern Ohio, and southern Maine. Winters from southern Canada southward to South America and the Caribbean. |
| AMERICAN WOODCOCK (<i>Scolopax minor</i>) Status: USSCP, GBBDC Family: Scolopacidae | Forests and thickets with openings, shrubby areas, meadows. | American Woodcocks breed from the Atlantic coast west to the edge of the Great Plains and from southern Canada to the Carolinas and Arkansas. They are permanent residents from west Texas through the southeastern US. Significant populations winter along the Gulf Coast, across the Florida peninsula, and into central Texas. |
| LAUGHING GULL (<i>Larus atricilla</i>) Status: NAWCP Family: Laridae | Nests in marshes, on beaches, and on islands along coast. Found along coasts, in estuaries, bays, and inland lakes. Feeds along the ocean, on rivers, at landfills, and in urban parks. | Breeds from coastal Maine southward along coast to southern Texas. Also breeds in Caribbean and in isolated locations in western Mexico. Winters from North Carolina southward through rest of breeding range to southern South America. |
| BONAPARTE'S GULL (<i>Larus philadelphia</i>) Status: NAWCP Family: Laridae | Summers in northern coniferous forests. Breeds around lakes and marshes in boreal forest. Winters along lakes, rivers, marshes, bays, beaches along coasts, and inland waterways. | Breeds across Alaska and central Canada to Quebec. Winters along coasts from Washington to southern Mexico and New Brunswick to the Caribbean, and along the Great Lakes and large inland lakes and rivers. |
| RING-BILLED GULL (<i>Larus delawarensis</i>) Status: NAWCP Family: Laridae | Nests on islands. Found around fresh water, landfills, golf courses, farm fields, shopping areas, and coastal beaches. | Breeds from eastern British Columbia and northern California eastward to Newfoundland and New Brunswick, through the northern Great Plains and around the Great Lakes. Winters on coasts from British Columbia and Maine to Mexico, around the Great Lakes, and inland across the southern US where open water and food are available. |
| HERRING GULL (<i>Larus argentatus</i>) Status: NAWCP Family: Laridae | Breeds on islands. Forages and winters at sea, along beaches and mudflats, lakes, rivers, fields, at dumps, and other areas where human-produced food is available. Rests in open areas, including parking lots, fields, and airports. | Breeds across Alaska and northern Canada, southward to the Great Lakes and along the Atlantic Coast to North Carolina. Herring Gull or closely related species breed across Eurasia. Winters from southern Alaska southward to Mexico, and from the Great Lakes and Massachusetts southward into the Caribbean and Central America. |

| Species, Status, Family | Habitat | Rangewide and MCB Camp Lejeune Distribution |
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| GREAT BLK-BACKED GULL (<i>Larus marinus</i>) * Status: NAWCP Family: Laridae | Breeds on small islands, salt marshes, spoil islands, and barrier beaches. Most common throughout the year along coast. Travels far out to sea in winter. | Present year-round on East Coast of North America from Labrador to North Carolina, and on Great Lakes. Breeds in discontinuous local colonies south to northern North Carolina. Winters along coast from Newfoundland south to central Florida and inland at large lakes and rivers throughout Northeast. Sub-adults remain on wintering grounds throughout the year until they are four or five years old. |
| CASPIAN TERN (<i>Sterna caspia</i>) Status: NAWCP Family: Laridae | Breeds in wide variety of habitats along water, such as salt marshes, barrier islands, dredge spoil islands, freshwater lake islands, and river islands. During migration and winter found along coastlines, large rivers and lakes. Roosts on islands and isolated spits. | Breeds in scattered locations across North America, along Pacific Coast, in central Canada, around the Great Lakes, in west-central US, along the Gulf Coast, and along the Atlantic Coast. Winters along the Pacific Coast from southern California southward to Guatemala, and along the Atlantic and Gulf coasts from North Carolina westward to Texas, Mexico, and southward to Honduras. |
| ROYAL TERN (<i>Sterna maxima</i>) Status: NAWCP Family: Laridae | Coast. | Breeds along Atlantic Coast from Virginia to Florida, and along Gulf Coast to northern Mexico. Also in very southern California and western Mexico, and in scattered localities in Caribbean and South America. Winters along Pacific Coast from southern California to Peru, and along Atlantic and Gulf coasts from North Carolina southward to northern South America and throughout the Caribbean. |
| SANDWICH TERN (<i>Sterna sandvicensis</i>) Status: NAWCP Family: Laridae | Seacoasts, bays, estuaries, and mudflats, occasionally ocean far from land. | Breeds along coast from Virginia to Texas. Also in Caribbean, Atlantic Coast of South America, Europe, and central Asia. Winters from Gulf Coast southward to South America. Also along coasts of Africa. |
| COMMON TERN (<i>Sterna hirundo</i>) Status: NCWRC-SC, BCC, NAWCP Family: Laridae | Nests on islands, marshes, and sometimes beaches of lakes and ocean. | Breeds from Alberta and Northwest Territories of Canada southward to Montana, and eastward to Newfoundland and New Jersey, southward along Atlantic Coast to South Carolina and Louisiana. Also across Eurasia. Winters along coasts from southern US southward to southern South America. Also along Africa, Asia, and Australia. |
| FORSTER'S TERN (<i>Sterna forsteri</i>) Status: NAWCP Family: Laridae | Breeds in marshes, generally with lots of open water and large stands of island-like vegetation. Winters in marshes, coastal beaches, lakes, and rivers. | Breeds at scattered locations throughout North America. Largest area of breeding on freshwater lakes and marshes across south-central Canada and north-central US. Also in the Great Basin, locally in California, around the western Great Lakes, and locations along the Atlantic and Gulf coasts. Winters along California, Gulf, and lower Atlantic coasts. Also in smaller numbers inland from the upper Gulf Coast and in Central America. |
| LEAST TERN (<i>Sterna antillarum</i>) Status: NCWRC-SC, E, BCC, NAWCP Family: Laridae | Seacoasts, beaches, bays, estuaries, lagoons, lakes and rivers, breeding on sandy or gravelly beaches and banks of rivers or lakes, rarely on flat rooftops of buildings. | Breeds along coasts from central California and southern Maine southward to Mexico. Also along Missouri, Ohio, and Mississippi Rivers to Montana, Kentucky, and Missouri, and other scattered inland locations in to New Mexico, Texas, Colorado, and Nebraska. Also in Mexico, northern Central America, and Caribbean. Winters along coasts from Mexico southward to southern South America. |
| BLACK TERN (<i>Chlidonias niger</i>) Status: BCC, NAWCP Family: Laridae | Summers on wet meadows, marshes, ponds; winters on coast and at sea. | Breeds locally across Canada and northern US, from Northwest Territories to New Brunswick, and central California to southern Indiana. Also in Eurasia. Winters at sea and along shore of both coasts of Central and South America. Also along African coasts. Migrates through Southern US and Central America. |

| Species, Status, Family | Habitat | Rangewide and MCB Camp Lejeune Distribution |
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| BLACK SKIMMER (<i>Rynchops niger</i>) Status: BCC, NAWCP, NCWRC-SC Family: Laridae | Coast. | Breeds along coast from Massachusetts and New York southward to southern Mexico, and from Southern California to southern Mexico. Also in South America. Winters from North Carolina southward to South America. |
| MOURNING DOVE (<i>Zenaida macroura</i>) Status: Family: Columbidae | Breeds in variety of open habitats, including agricultural areas, open woods, deserts, forest edges, cities and suburbs. | Breeds from southern Canada throughout the US to Central America and the Caribbean. Resident over most of range, but leaves Great Plains and northernmost areas in winter. |
| YELLOW-BILLED CUCKOO (<i>Coccyzus americanus</i>) Status: Family: Cuculidae | Open woodlands with clearings and dense scrubby vegetation, thickets, often along water. | Breeds from southeastern Canada southward to Mexico and the Caribbean, westward to Great Plains, and in scattered localities across the West. Winters in South America. |
| E. SCREECH OWL (<i>Megascops asio</i>) Status: Family: Strigidae | Found in most habitats with trees--woods, swamps, parks, suburbs or urban areas. | Resident from central Montana and southeastern Saskatchewan eastward to southern Quebec, southward to Florida, western Texas, and northeastern Mexico. |
| GREAT HORNED OWL (<i>Bubo virginianus</i>) Status: Family: Strigidae | Found in a wide variety of habitats, but prefers open and secondary-growth woodlands and agricultural areas. Also in boreal forest, desert, and suburban and urban areas. | Resident across North America from northern Alaska and Canada through Mexico to Nicaragua. Also in South America to Tierra del Fuego. |
| BARRED OWL (<i>Strix varia</i>) Status: Family: Strigidae | Forested areas, from swamps and riparian areas to uplands. Prefers large blocks of forest. | Widespread resident east of Great Plains from southern Canada to the Gulf Coast and Florida. Also from southeastern Alaska southward to northern California and Idaho, and across central Canada. Disjunct populations in southern Mexico. |
| COMMON NIGHTHAWK (<i>Chordeiles minor</i>) Status: Family: Caprimulgidae | Forests, plains, urban areas | Breeds from Yukon to Labrador, southward to southern California, Florida, and South America. Winters in South America. |
| CHUCK-WILL'S-WIDOW (<i>Caprimulgus carolinensis</i>) Status: BCC Family: Caprimulgidae | Along edges of coniferous or mixed forests; often along rivers. | Breeds from southern Iowa, Ohio, and Long Island southward to Florida and eastern Texas. Winters from southern Florida and central Mexico southward through Caribbean and Central America to South America. |
| WHIP-POOR-WILL (<i>Caprimulgus vociferus</i>) Status: Family: Caprimulgidae | Breeds in deciduous or mixed forests with little or no underbrush--open woods, canyons, dry, brushy areas. Winters in mixed woods near open areas. | Breeds locally from central Canada eastward to Atlantic coast and southward to Oklahoma and Georgia. Also in scattered localities in Southwest and southward into Central America. Winters along southeastern US and into Central America. |
| CHIMNEY SWIFT (<i>Chaetura pelagica</i>) Status: Family: Apodidae | Nests in variety of habitats, especially common in urban or rural areas. More rarely in hollow trees. Forages over open areas. | Breeds east of the Rocky Mountains from very eastern Saskatchewan eastward to Atlantic Coast, and southward to central Texas and Gulf Coast. Small population in southern California. Winters in Amazon Basin of South America. |
| RUBY-THROATED HUMMINGBIRD (<i>Archilochus colubris</i>) Status: Family: Trochilidae | Breeds in mixed woodlands and eastern deciduous forest, streams, parks, gardens, and orchards. Winters in tropical deciduous forest, tropical dry forests, scrubland, citrus groves, and second growth. | Breeds from central Alberta eastward to Nova Scotia, southward from eastern North Dakota to eastern Texas and Florida. Winters in southern Mexico and Central America south to Costa Rica. |

| Species, Status, Family | Habitat | Rangewide and MCB Camp Lejeune Distribution |
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| BELTED KINGFISHER (<i>Megaceryle alcyon</i>) Status: Family: Alcedinidae | Breeds along streams, rivers, lakes, estuaries, and coastal bays with banks for nest holes. Winters along coast, streams, and lakes. | Breeds from Alaska to Newfoundland, southward to southern US. Winters from southern Canada southward to northern South America. |
| RED-HEADED WOODPECKER (<i>Melanerpes erythrocephalus</i>) Status: Family: Picidae | Breeds in deciduous woodlands, especially beech or oak, river bottoms, open woods, groves of dead and dying trees, farmlands, orchards, parks, open country with scattered trees, forest edges, and open wooded swamps with dead trees and stumps. Attracted to burns and recent clearings. Winters in mature stands of forest, especially those with oaks. | Breeds from southern Canada to Gulf Coast, east of the Rocky Mountains and west of New England and eastern Canada. Withdraws from northern part of breeding range and winters farther southwest in Texas. Wintering numbers vary greatly from year to year. |
| RED-BELLIED WOODPECKER (<i>Melanerpes carolinus</i>) Status: Family: Picidae | Lives in a variety of dry or damp forests (deciduous or pine) and in suburban areas. | Resident from Minnesota, Wisconsin, Michigan, New York, and Massachusetts southward to Gulf Coast, westward to eastern Texas and extreme eastern Colorado. Not considered migratory, but at the northern edge of range may move farther south in very cold winters. |
| DOWNY WOODPECKER (<i>Picoides pubescens</i>) Status: Family: Picidae | Open deciduous woodlands, especially in riparian areas. Common in human-modified habitats, such as orchards, farmland, parks, and residential areas. | Resident from western Alaska across Canada, southward to southern California, northern Arizona, and eastern Texas to Florida. |
| HAIRY WOODPECKER (<i>Picoides villosus</i>) Status: Family: Picidae | Found in mature woods, small woodlots, wooded parks, and residential areas with large trees. | Resident from central Alaska to Newfoundland, southward to Florida and Central America. Also in the Bahamas. |
| RED-COCKADED WOODPECKER (<i>Picoides borealis</i>) Status: NCWRC-E, PIF Family: Picidae | Open pine forest maintained by frequent fires, especially longleaf pine forests. | Very local resident in southeastern states from southern Virginia to Texas. |
| N. FLICKER (<i>Colaptes auratus</i>) Status: Family: Picidae | Found in open woodlands and forest edge, including cities, parks, suburbs, and farmlands. | Breeds across North America, from Alaska and northern Canada southward to Cuba and Central America. Red-shafted form breeds from southeastern Alaska through British Columbia, western North Dakota, and Colorado, southward into Mexico. Winters from southern Canada southward. |
| YELLOW-BELLIED SAPSUCKER (<i>Sphyrapicus varius</i>) Status: NCWRC-SC, FSC Family: Picidae | Breeds in young forests and along streams, especially in aspen and birch; also in orchards. Winters in variety of forests, especially semi-open woods. | Breeds from central Alaska to Newfoundland, southward to southern Alberta, northern Iowa, Pennsylvania, and southward in Appalachians to North Carolina. Winters in southeastern quarter of the US, southward to Panama and the West Indies. |
| LA. WATERTHRUSH (<i>Seiurus motacilla</i>) Status: Family: Parulidae | Breeds along wooded ravines near mountain, gravel-bottomed brooks and streams flowing through hilly, deciduous forest. Winters in similar habitat. | Breeds from southeastern Minnesota eastward to southern Maine, and southward to eastern Texas and northern Florida. Winters from Mexico to northern South America, and in the Caribbean. |
| N. WATERTHRUSH (<i>Seiurus noveboracensis</i>) Status: Family: Parulidae | Breeds in willow thickets near slow-moving streams or rivers, lake shores, wooded ponds, swamps, and bogs; in migration and winter, uses a variety of wooded habitats, generally near water, often in mangroves. | Breeds from Alaska to Newfoundland, southward to northern US. Winters from southern Florida and Mexico southward to South America. By late July or early August their journey south begins. Most people in the US see northern water thrushes at this time, when they are migrating. |

| Species, Status, Family | Habitat | Rangewide and MCB Camp Lejeune Distribution |
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| KENTUCKY WARBLER (<i>Oporornis formosus</i>) Status: Family: Parulidae | Ravines and bottomlands of moist deciduous or mixed woodlands. | Breeds from western Wisconsin and southeastern New York, southward to eastern Texas and northern Florida. Winters from Mexico to northern South America. |
| COMMON YELLOW-THROAT (<i>Geothlypis trichas</i>) Status: Family: Parulidae | Common in thick vegetation from wetlands to prairies to pine forests with dense understory. | Breeds in extreme southeastern Alaska and Yukon, across most of Canada to Newfoundland, southward along both coasts to southern Florida and California, to Gulf Coast and eastern Texas. Scattered and local breeding populations throughout western states. Also central to southern Mexico. Winters in coastal states from North Carolina through Texas, in California, and along the Colorado River. Individuals found farther north in winter. |
| HOODED WARBLER (<i>Wilsonia citrina</i>) Status: PIF Family: Parulidae | Dense shrubbery in mature deciduous woodlands, especially near streams. | Breeds from southern Wisconsin, southern Ontario, and Connecticut southward to eastern Texas and northern Florida. Winters in southern Mexico, Central America, and Caribbean. |
| YELLOW-BREASTED CHAT (<i>Icteria virens</i>) Status: Family: Parulidae | Dense second-growth, riparian thickets, and brushy edges in dry or moist areas. | Breeds across eastern US and southern Canada from Iowa to New York, southward to Texas and northern Florida. Also in scattered regions across West from southern Canada to very northern Mexico. Winters in Mexico and Central America. |
| SUMMER TANAGER (<i>Piranga rubra</i>) Status: Family: Thraupidae | Breeds in deciduous forests in eastern part of range, especially open woods and near gaps. In Southeast, breeds in pine-oak forests, willows, and cottonwoods along streams. In West, uses riparian woodlands. Winters in wide range of open and second-growth habitats. | Breeds in southern US and northern Mexico, northward in East to southern Iowa and New Jersey. Winters from southern Mexico southward to northern South America. |
| SCARLET TANAGER (<i>Piranga olivacea</i>) Status: Family: Thraupidae | Breeds in deciduous and mixed deciduous/coniferous woodlands, especially mature forests. Occasionally in suburban areas with large trees. Winters in montane evergreen forests. | Breeds from southern Canada, Manitoba to Nova Scotia, southward to Arkansas and northern Georgia. Winters from Panama southward to northern and western South America. |
| N. CARDINAL (<i>Cardinalis cardinalis</i>) Status: Family: Cardinalidae | Areas with shrubs and small trees, including forest edges, hedgerows, and suburbs. | Resident from southeastern Canada, Minnesota, South Dakota, and Maine southward through southern Florida and Mexico to Belize and Guatemala. Also locally in Arizona, California, and New Mexico. Introduced to Hawaii and Bermuda. |
| ROSE-BREASTED GROSBEAK (<i>Pheucticus ludovicianus</i>) Status: Family: Cardinalidae | Breeds in deciduous and mixed woodlands, especially at the edges, mixed shrubs and trees, second-growth woodlands, orchards, suburban parks and gardens. Winters in open tropical forest. | Breeds from southern Yukon southeastward to northern North Dakota, eastward to Newfoundland, and southward to Nebraska, New Jersey, and in the mountains to northern Georgia. Winters from southern Mexico to northern South America and the Caribbean. |
| BLUE GROSBEAK (<i>Passerina caerulea</i>) Status: Family: Cardinalidae | Forest edge, fields, roadsides, power-line cuts, riparian areas, hedgerows, prairies, and other areas with medium-sized trees and low shrub density. | Breeds from central California across the central US, as far northward as southern North Dakota, to northern New Jersey and southward to central Mexico. Generally does not breed along Gulf Coast or in Florida. Also breeds throughout Mexico and Central America. Winters mostly from Mexico to Panama. Also recorded in winter in South America. |
| INDIGO BUNTING (<i>Passerina cyanea</i>) Status: Family: Cardinalidae | Breeds in brushy and weedy areas along edges of cultivated land, woods, roads, power line rights-of-way, and in open deciduous woods and old fields. Winters in weedy fields, citrus orchards, and weedy cropland. | Breeds from southern Manitoba to Maine, southward to northern Florida and eastern Texas, and westward to southern Nevada. Winters from southern Florida and central Mexico southward through Caribbean and Central America to northern South America. |

| Species, Status, Family | Habitat | Rangewide and MCB Camp Lejeune Distribution |
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| PAINTED BUNTING (<i>Passerina ciris</i>) Status: BCC, PIF Family: Cardinalidae | Open brushlands, thickets, and scattered woodlands. Along Atlantic coast, also in hedges and yards. | Breeds in two different regions. Western population ranges from southern Missouri and Kansas to the Gulf Coast and northern Mexico. Eastern population breeds along the Atlantic coast from central North Carolina to north-central Florida. Western population winters in Mexico southward to Panama. Eastern population winters on the Florida peninsula, the Florida Keys, the Bahamas, and rarely in Cuba. |
| EASTERN TOWHEE (<i>Pipilo erythrophthalmus</i>) Status: Family: Emberizidae | Breeds in shrub habitats or open woods with a shrub understory, often in dry environments and open ground. Old fields and forest edges, dune scrub, oak scrub, riparian thickets, and pine flatwoods with saw palmetto. Winters in similar areas and in residential areas. | Breeds from southern Canada, Manitoba to Quebec, southward to western Louisiana and southern Florida. Winters from Oklahoma, southern Ohio, and New Jersey southward to central Texas and Florida. Occasionally farther north to southern New England. |
| BACHMAN'S SPARROW (<i>Aimophila aestivalis</i>) Status: NCWRC--SC and FSC; BCC, PIF Family: Emberizidae | Open pine or oak woods, brushy fields. Found primarily in open pine woods with understory of wiregrass, palmettos, and weeds, and in oak-palmetto scrub, grasslands. | It breeds throughout most of the Southeast and spends the winter from coastal North Carolina, south through Florida and west from Georgia to southern Arkansas and Louisiana. |
| CHIPPING SPARROW (<i>Spizella passerina</i>) Status: Family: Emberizidae | Breeds in open woodlands with grass, along river and lake shorelines, orchards, farms, and in urban and suburban parks. Winters in similar areas. | Breeds from very eastern Alaska through Canada, southward to southern US and into Mexico and Central America. Absent from southern Great Plains and most of Florida. Winters in Mexico, Central America, and the southern tier of the US. |
| FIELD SPARROW (<i>Spizella pusilla</i>) Status: Family: Emberizidae | Breeds in old fields, woodland openings, open areas with scattered shrubs and small trees, and edges. Winters in fields and forest edges. | Breeds from eastern Montana eastward to southern Quebec and southern Maine, and southward to central Texas and northwestern Florida. Winters from Kansas, Illinois, Pennsylvania, and Massachusetts southward to very northeastern Mexico and northern Florida. |
| SAVANNAH SPARROW (<i>Passerculus sandwichensis</i>) Status: Family: Emberizidae | Inhabits a wide range of open country or moist tall grass areas, including meadows, agricultural fields, pastures, salt marshes, beaches, lake and river edges, and tundra. Varied habitats in winter. | Breeds throughout Alaska and most of Canada, into the US as far southward as coastal southern California, northern New Mexico, the Great Lakes region, and the southern Appalachian Mountains. Also breeds in Baja California and central Mexico. Winters from the mid-Atlantic seaboard across the southern US to the southern California coast, as well as most of Mexico, Guatemala, Belize, and various islands in the Caribbean. |
| FOX SPARROW (<i>Passerella iliaca</i>) Status: Family: Emberizidae | Deciduous for coniferous woods, brushy areas, woods edges or second-growth forests or chaparral. | The red or eastern form has reddish streaks on chest and back, a rufous cap, and a gray face. It breeds across the boreal forest and winters in the southeastern US. |
| GRASSHOPPER SPARROW (<i>Ammodramus savannarum</i>) Status: Family: Emberizidae | Open grasslands, prairies, dry weedy fields, old pastures, hayfields with patches of bare ground. | Breeds from Alberta to New England southward to Texas and Georgia. Also breeds locally in Florida, southern Arizona, eastern Washington, southern Idaho, and California. Populations also resident in localized areas of the Caribbean, Mexico, and Central and South America. Winters from southern US southward into Mexico, Central America, and Caribbean. |
| SALTMARSH SHARP-TAIL SPARROW (<i>Ammodramus caudacutus</i>) Status: BCC Family: Emberizidae | Salt and fresh-water marshes, wet meadows, lakeshores. | Breeds along Atlantic Coast from Maine to Virginia, including Cedar Island Marshes of North Carolina. Winters from New York southward to Florida. |

| Species, Status, Family | Habitat | Rangewide and MCB Camp Lejeune Distribution |
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| NELSON'S SHARP-TAILED SPARROW (<i>Ammodramus nelsoni</i>) Status: BCC Family: Emberizidae | Freshwater marshes, lakeshores, and wet meadows in interior and brackish marshes along coast; in winter in salt and brackish marshes. | Three distinct and geographically separate populations breed and winter in North America. From the southern Northwest Territories southeast to South Dakota, an interior population breeds on wet prairies and marshlands. A second breeding population is limited to the southern coasts of Hudson and James Bays, and a third ranges along the coastline from southern Maine, through the Atlantic Provinces, and then southward around the Gaspé Peninsula into the southern St. Lawrence Estuary. Nelson's Sharp-tailed Sparrows winter from New Jersey to southern Florida's east coast, and from Florida's Gulf Coast well into Texas. |
| SEASIDE SPARROW (<i>Ammodramus maritimus</i>) Status: BCC Family: Emberizidae | Salt marshes, especially spartina grass, rushes, and tidal reeds; "Cape Sable" Seaside Sparrow in marsh prairie. | Breeds along Atlantic Coast from New Hampshire to extreme northeastern Florida, and along Gulf Coast from western Florida to Texas. Also in prairie marshes of extreme southern Florida. Winters along coasts from North Carolina southward to southern Florida and southern Texas. |
| WHITE-CROWNED SPARROW (<i>Zonotrichia leucophrys</i>) Status: Family: Emberizidae | Breeds in tundra, boreal forest, and alpine meadows over most of range. On West Coast is found in suburban areas and near the ocean in areas with bare ground and shrubs, woods, gardens, and parks. | Breeds from Alaska eastward across northern Canada, and southward along Pacific Coast and in the western mountains to southern California and northern New Mexico. Winters from southern British Columbia eastward to southern Michigan and southern New York, southward to the Gulf Coast and central Mexico. |
| SWAMP SPARROW (<i>Melospiza georgiana</i>) Status: Family: Emberizidae | Various wetlands, including freshwater and tidal marshes, bogs, meadows, and swamps. Winters also in damp fields with tall grass. | Breeds from eastern Yukon and British Columbia eastward to Labrador, southward to eastern Nebraska to coastal Maryland. Winters from southern New England to Florida, and from the southern Great Lakes region through Texas into much of the Mexican interior. |
| SONG SPARROW (<i>Melospiza melodia</i>) Status: Family: Emberizidae | Dense shrubs at the edge of open areas such as fields, lawns, or streams. Especially near water in arid regions | Breeds from southwestern Alaska across Canada to Newfoundland, and southward to northern Mexico and northern Georgia. Also in central Mexico. Winters along coasts and from southern Canada southward to Mexico and Florida. |
| WHITE-THROATED SPARROW (<i>Zonotrichia albicollis</i>) Status: Family: Emberizidae | Breeds in coniferous and mixed forests with numerous openings and low, dense vegetation. In winter and in migration found in dense cover, along woodlots, in fence rows, swamps, weedy fields, parks, and in urban areas. | Breeds from southeastern Yukon across Canada to Newfoundland, and southward to the northeastern US. Winters along the Pacific Coast from Washington to Mexico, along the southern states in the Southwest, and all across the mid-western and eastern US. |
| BOBOLINK (<i>Dolichonyx oryzivorus</i>) Status: Family: Icteridae | Breeds in open grasslands and hay fields. In migration and in winter uses freshwater marshes, grasslands, rice and sorghum fields. | Breeds across southern Canada and the northern US, southward to Colorado, Indiana, and northern New Jersey. Winters in central and southern South America. Migrates through the southeastern US. |
| RED-WINGED BLACKBIRD (<i>Agelaius phoeniceus</i>) Status: Family: Icteridae | Breeds in a variety of wetland and grassy areas, including marshes, meadows, alfalfa fields, and open patches in woodlands. | Breeds from southeastern Alaska across Canada and the US, southward to Central America. Winters from southern Canada southward. Local in northern part of winter range. |
| RUSTY BLACKBIRD (<i>Euphagus carolinus</i>) Status: Family: Icteridae | Breeds in wet forests, including areas with fens, bogs, muskeg, and beaver ponds. Winters in swamps, wet woodlands, pond edges, and woods or fields near water. | Breeds across most of Alaska, Canada, and northern New England. Winters in the east-central US, from eastern Nebraska to eastern Texas, and from southern Massachusetts to Florida. |
| E. MEADOWLARK (<i>Sturnella magna</i>) Status: Family: Icteridae | Grasslands, meadows, pastures, and hayfields, as well as croplands, golf courses, and other open habitat. | Breeds in eastern and central North America, from southern Quebec to central Minnesota and from Florida to southeast Arizona. Also breeds in Mexico and parts of Central America and the Caribbean. Resident year-round in much of its breeding range, except Quebec, New England, and the Great Lakes region. |

| Species, Status, Family | Habitat | Rangewide and MCB Camp Lejeune Distribution |
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| BOAT-TAILED GRACKLE (<i>Quiscalus major</i>) Status: Family: Icteridae | Found in freshwater and salt marshes, open upland habitats, parks, lakes, cities, and agricultural fields, usually near the coast. Nests in marshes. | Breeds along Atlantic Coast from New York to Florida, westward to central Texas coast. Winters in most of breeding range, but leaves the most northern locations, depending on the severity of the winter. |
| COMMON GRACKLE (<i>Quiscalus quiscula</i>) Status: Family: Icteridae | Found in a variety of open areas with scattered trees, including open woodland, boreal forest, swamps, marshes, agricultural areas, urban residential areas, and parks. | Breeds from northeastern British Columbia, eastern Idaho, and eastern New Mexico eastward to the Atlantic and Gulf coasts. Winters from southern Minnesota and southern New England southward. |
| BROWN-HEADED COWBIRD (<i>Molothrus ater</i>) Status: Family: Icteridae | Breeds in areas with grassland and low or scattered trees, such as woodland edges, brushy thickets, fields, prairies, pastures, orchards, and residential areas. | Breeds from central British Columbia, southeastern Yukon, and Newfoundland southward to central Mexico and northern Florida. Winters along Pacific Coast of US and southern and eastern US southward to southern Florida and southern Mexico. |
| ORCHARD ORIOLE (<i>Icterus spurius</i>) Status: BCC Family: Icteridae | Nests in gardens, orchards, open woods, wetlands, suburban areas, parks, along streams and lakes, and in large planted trees near houses. In winter found in tropical forests. | Breeds from very southern Saskatchewan eastward to southern New Hampshire, southward to western Texas, central Mexico, and northern Florida. Winters from southern Mexico southward through Central America to northwestern South America. |
| HOUSE FINCH (<i>Carpodacus mexicanus</i>) Status: Family: Fringillidae | In the East, found almost exclusively in urban and suburban habitats, especially in areas with buildings, lawn, and small conifers. In West, found around people, but also in desert, chaparral, oak savanna, riparian areas, and open coniferous forests. | Most of eastern US as far west as eastern Illinois. Also in Western half of North America from southern British Columbia to central Mexico through southwestern Wyoming and Colorado. |
| PINE SISKIN (<i>Carduelis pinus</i>) Status: Family: Fringillidae | Breeds in open coniferous forests. Also in shrub thickets, suburban yards, parks, cemeteries, and in mixed coniferous-deciduous tree associations. Prefers conifers in migration and winter. | Breeds from central Alaska across Canada southward to northern states in East, and through mountain states in West into central Mexico to Guatemala. Southern extent of breeding range variable from year to year. May winter throughout breeding range, but generally winters from southern Canada southward throughout all of the US excluding Florida. In East, winters irregularly southward to Gulf of Mexico, but rarely south of middle states. |
| AMERICAN GOLDFINCH (<i>Carduelis tristis</i>) Status: Family: Fringillidae | Breeds in weedy fields, roadsides, orchards, farms, and gardens. Winters in weedy, open areas with some shrubs and trees, and moves into urban and suburban areas to eat at feeders. | Breeds across continent from central Canada southward to northern Nevada, Oklahoma, and central Georgia. Winters from Canadian border southward (excluding Montana and eastern Wyoming) to southern US and into Mexico. |
| HOUSE SPARROW (<i>Passer domesticus</i>) Status: Family: Passeridae | Found in human modified habitats: parks, farms, residential, and urban areas. | Resident from northern British Columbia to Labrador, and across Canada and the US southward into Mexico and Central America. Native to Eurasia. Introduced into Hawaii, South America, southern Africa, Australia, and New Zealand. |

APPENDIX E
AGENCY COORDINATION

| | |
|--|-----|
| E.1- US Fish and Wildlife Service Consultation..... | E-1 |
| E.2- National Marine Fisheries Service Consultation..... | E-5 |
| E.3- State Historic Preservation Office Concurrence..... | E-9 |

E.1- US Fish and Wildlife Service Consultation



UNITED STATES MARINE CORPS
MARINE CORPS BASE
PSC Box 20004
CAMP LEJEUNE, NC 28542-0004

IN REPLY REFER TO:
5090.11.1
BEMD
SEP 09 2008

Mr. Pete Benjamin
United States Fish and Wildlife Service
Raleigh Field Office
Post Office Box 33726
Raleigh, North Carolina 27636-3726

Dear Mr. Benjamin:

Marine Corps Base (MCB) Camp Lejeune is preparing an Environmental Assessment (EA) to evaluate the potential environmental effects from current and emerging training operations at the MCB Camp Lejeune Range Complex, in Onslow and Jones counties, North Carolina. The MCB Camp Lejeune Range Complex supports air combat, ground combat, and combat service support elements. The EA will address training operations conducted by all services and agencies within the MCB Camp Lejeune Range Complex (i.e., action area see enclosed Figure 1).

The activities analyzed in this EA will include: air combat training in restricted airspace; land-based training, such as infantry ground maneuvers in training areas and weapons firing on ranges; and water-based training on the New River, Atlantic Intracoastal Waterway, and Onslow Bay. Water based training performed within the MCB Camp Lejeune Range Complex includes water based movement of amphibious vehicles and watercraft, as well as weapons firing.

Pursuant to the Endangered Species Act (ESA) and the National Environmental Policy Act (NEPA), we are reviewing information regarding federally listed species and critical habitat that may be present in the action area. In accordance with 50 CFR 402.12 (c) and (d), we plan to include the following federally threatened and endangered species in our analysis: Rough-leaved loosestrife (*Lysimachia asperulaefolia*), Seabeach amaranth (*Amaranthus pumilus*), Loggerhead sea turtle (*Caretta caretta*), Green sea turtle (*Chelonia mydas*), Red-cockaded woodpecker (*Picoides borealis*), West Indian (Florida) manatee (*Trichechus manatus latirostris*), leatherback turtle (*Dermochelys coriacea*).

5090.11.1

BEMD

SEP 09 2008

The list was developed based on USFWS, Threatened and Endangered Species in North Carolina by County website (<http://www.fws.gov/nc-es/es/countyfr.html>; last updated 31 January 2008); previous NEPA and ESA consultation documents of the project area; and existing data possessed by MCB Camp Lejeune.

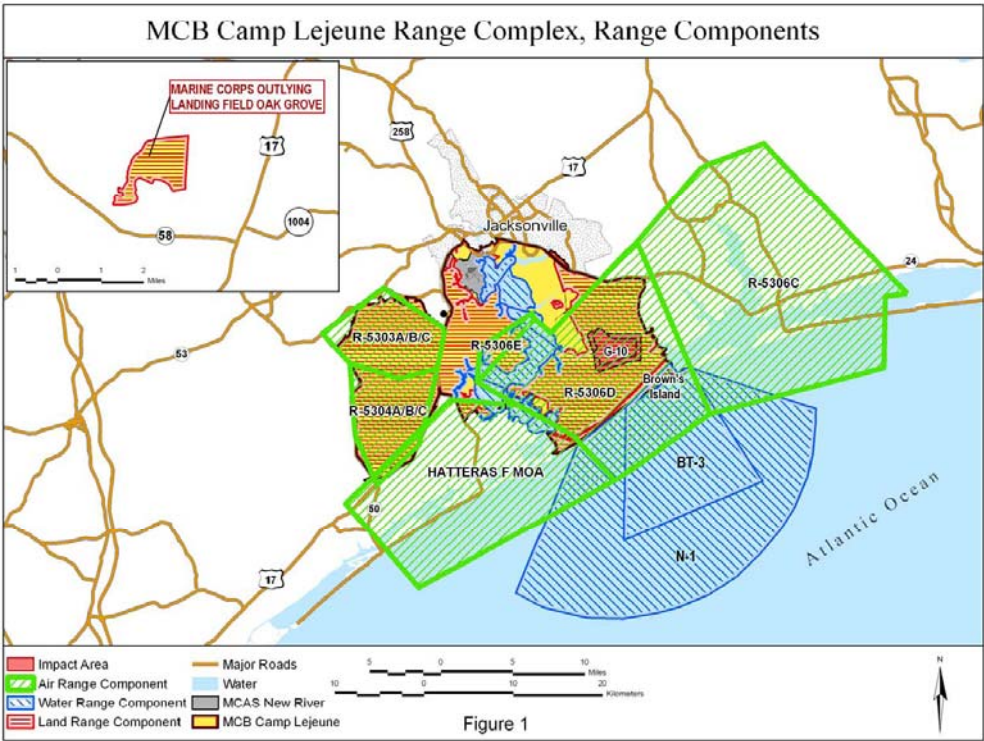
Based on this notification of the species to be included in the EA, we request your concurrence within 30 days of your receipt of this letter. If we have not received a response within that time, we will assume that you concur with the list we have provided, and we will proceed accordingly. If you have any questions, please contact Robin Ferguson at 910-451-4542 or Robin.Ferguson@usmc.mil.

Sincerely,



JOHN R. TOWNSON
Director, Environmental Management
By direction of
the Commanding Officer

Enclosure 1: Figure 1.



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E.2- National Marine Fisheries Service Consultation



UNITED STATES MARINE CORPS
MARINE CORPS BASE
PSC Box 20004
CAMP LEJEUNE, NC 28542-0004

IN REPLY REFER TO:
5090.11.1
BEMD
SEP 09 2008

David Bernhart
National Marine Fisheries Service
Protected Resources Division
263 13th Avenue South
St. Petersburg, FL 33701

Dear Mr. Bernhart:

Marine Corps Base (MCB) Camp Lejeune is preparing an Environmental Assessment (EA) to evaluate the potential environmental effects from current and emerging training operations at the MCB Camp Lejeune Range Complex, in Onslow and Jones counties, North Carolina. The MCB Camp Lejeune Range Complex supports air combat, ground combat, and combat service support elements. The EA will address training operations conducted by all services and agencies within the MCB Camp Lejeune Range Complex (i.e., action area see enclosed Figure 1).

The activities analyzed in this EA will include: air combat training in restricted airspace; land-based training, such as infantry ground maneuvers in training areas and weapons firing on ranges; and water-based training on the New River, Atlantic Intracoastal Waterway, and Onslow Bay. Water based training performed within the MCB Camp Lejeune Range Complex includes water based movement of amphibious vehicles and watercraft, as well as weapons firing.

Pursuant to the Endangered Species Act (ESA) and the National Environmental Policy Act (NEPA), we are reviewing information regarding federally listed species and critical habitat that may be present in the action area. In accordance with 50 CFR 402.12 (c) and (d), we plan to include the following federally threatened and endangered species in our analysis: Green sea turtle (*Chelonia mydas*), Kemp's ridley sea turtle (*Lepidochelys kempii*), Leatherback sea turtle (*Dermochelys coriacea*), Loggerhead sea turtle (*Caretta caretta*), North Atlantic right whale (*Eubalaena glacialis*).

The list was developed based on the Southeast Regional Office's website of the list of threatened and endangered species for North Carolina

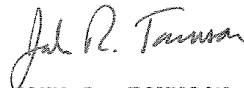
5090.11.1

BEMD
SEP 09 2008

<http://sero.nmfs.noaa.gov/pr/esa/specieslst.htm>; last updated 25 Feb 08); previous NEPA and ESA consultation documents of the project area; and existing data possessed by MCB Camp Lejeune.

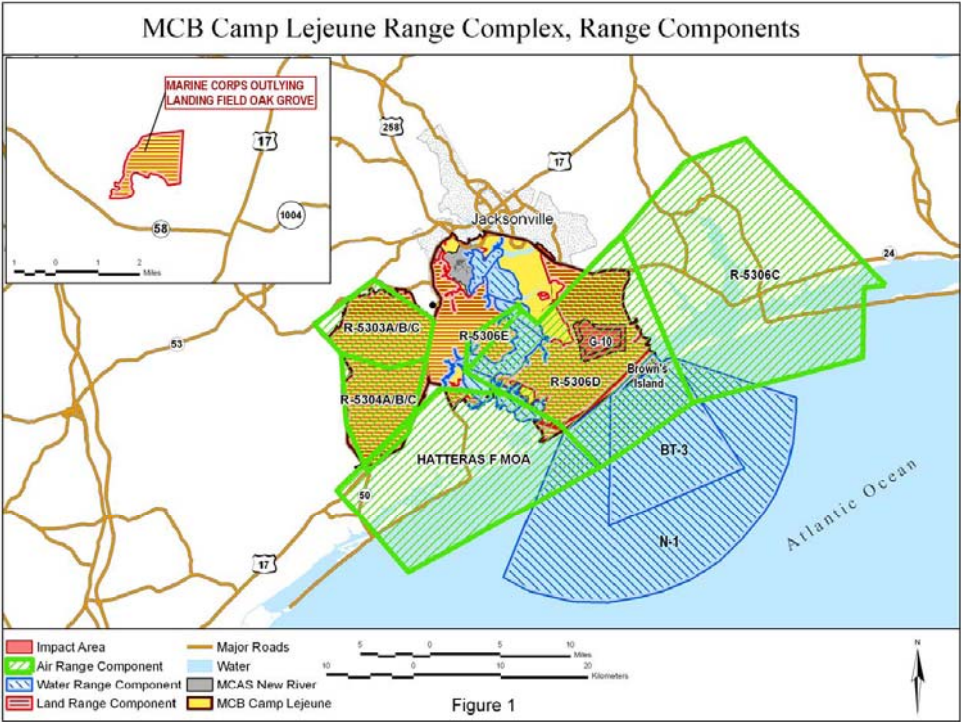
Based on this notification of the species to be included in the EA, we request your concurrence within 30 days of your receipt of this letter. If we have not received a response within that time, we will assume that you concur with the list we have provided, and we will proceed accordingly. If you have any questions, please contact Robin Ferguson at 910-451-4542 or by e-mail at Robin.Ferguson@usmc.mil.

Sincerely,



JOHN R. TOWNSON
Director, Environmental Management
By direction of
the Commanding Officer

Enclosure 1: Figure 1.



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E.3- State Historic Preservation Office Concurrence

NORTH CAROLINA STATE CLEARINGHOUSE
DEPARTMENT OF ADMINISTRATION
INTERGOVERNMENTAL REVIEW

RECEIVED
OCT 29 2008

HISTORIC PRESERVATION OFFICE
G07

STATE NUMBER: 09-E-0000-0116

DATE RECEIVED: 10/28/2008

AGENCY RESPONSE: 11/24/2008

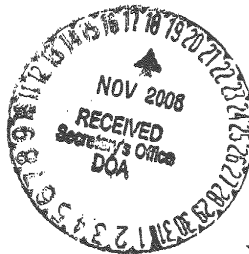
REVIEW CLOSED: 11/28/2008

MS RENEE GLEDHILL-EARLEY
CLEARINGHOUSE COORD
DEPT OF CUL RESOURCES
ARCHIVES-HISTORY BLDG - MSC 4617
RALEIGH NC

CH 08 - 2572

A - (NC) 11/5/08
LCA

REVIEW DISTRIBUTION
CC&PS - DEM, GTMO
DENR - COASTAL MGT
DENR LEGISLATIVE AFFAIRS
DEPT OF CUL RESOURCES
DEPT OF TRANSPORTATION
EASTERN CAROLINA COUNCIL



S - NC 11/14/08
9/8

PROJECT INFORMATION

APPLICANT: United States Marine Corps

TYPE: National Environmental Policy Act

ERD: Environmental Assessment

DESC: Various military activities involved to increase operational training tempo for the Range Operations at Marine Corps Base Camp Lejeune in Onslow & Jones counties

Due 11/17/08

The attached project has been submitted to the N. C. State Clearinghouse for intergovernmental review. Please review and submit your response by the above indicated date to 1301 Mail Service Center, Raleigh NC 27699-1301.

If additional review time is needed, please contact this office at (919)807-2425.

AS A RESULT OF THIS REVIEW THE FOLLOWING IS SUBMITTED:

☒ NO COMMENT

☐ COMMENTS ATTACHED

SIGNED BY:

Renee Gledhill-Earley

DATE:

11-14-08

P.02 Nov 25 2008 14:22

Fax:919-733-9571

NCDH

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APPENDIX F
COASTAL CONSISTENCY DETERMINATION

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**FEDERAL COASTAL CONSISTENCY DETERMINATION FOR
MARINE CORPS BASE CAMP LEJEUNE RANGE OPERATIONS
MARINE CORPS BASE, CAMP LEJEUNE, NORTH CAROLINA**

January 2009

The US Marine Corps has determined that implementing the proposed action is consistent to the maximum extent practicable with the enforceable policies of North Carolina's approved Coastal Management Program.

1.0 FEDERAL AGENCY ACTION

The primary mission of MCB Camp Lejeune is to sustain combat ready units for expeditionary deployments. MCB Camp Lejeune has fulfilled this mission since 1941 by providing ocean, coastal, riverine, inland, and airspace training areas, which together support the combat readiness of Marine Corps and Navy operational forces. The MCB Camp Lejeune Range Complex supports air combat, ground combat, and combat service support elements at varying levels of training complexity. The tempo of training operations fluctuates during times of conflict and declared war.

MCB Camp Lejeune is located along the southern coast of eastern North Carolina adjacent to the City of Jacksonville, with 20.4 kilometers (km), (11 nautical miles [nm]) of Atlantic Ocean coastline (**Figure 1-1**). The action area for potential environmental consequences encompasses all assets of the MCB Camp Lejeune Range Complex, including training operations conducted in land ranges, water ranges, and special use airspace (**Figure 1-2**).

The purpose and need for the proposed action is for the Marine Corps to meet its statutory responsibility to organize, train, equip, and maintain combat-ready Marine Forces at MCB Camp Lejeune. The federal activities analyzed in this consistency determination include: air combat training in restricted airspace; land-based training, such as infantry ground maneuvers in training areas and weapons firing on ranges; and water-based training on the New River, Atlantic Intracoastal Waterway, and Onslow Bay, such as amphibious vehicle operations.

MCB Camp Lejeune Range Complex assets include three types of ranges: land, water, and special use airspace. Land range assets include live-fire ranges, training and maneuver areas, impact areas, and various training facilities. Land range assets cover approximately 57,870 hectares (ha) (143,000 acres [ac]). The topography lacks hilly or mountainous terrain and training areas are typically densely vegetated with pine forest and undergrowth, dotted with pocosin swamps and wetlands. The vegetation, climate, growing season, and high water table characteristics of these land range assets supply an excellent setting for maneuver, live-fire, amphibious, and tactical training.

Location of the Marine Corps Base Camp Lejeune, NC

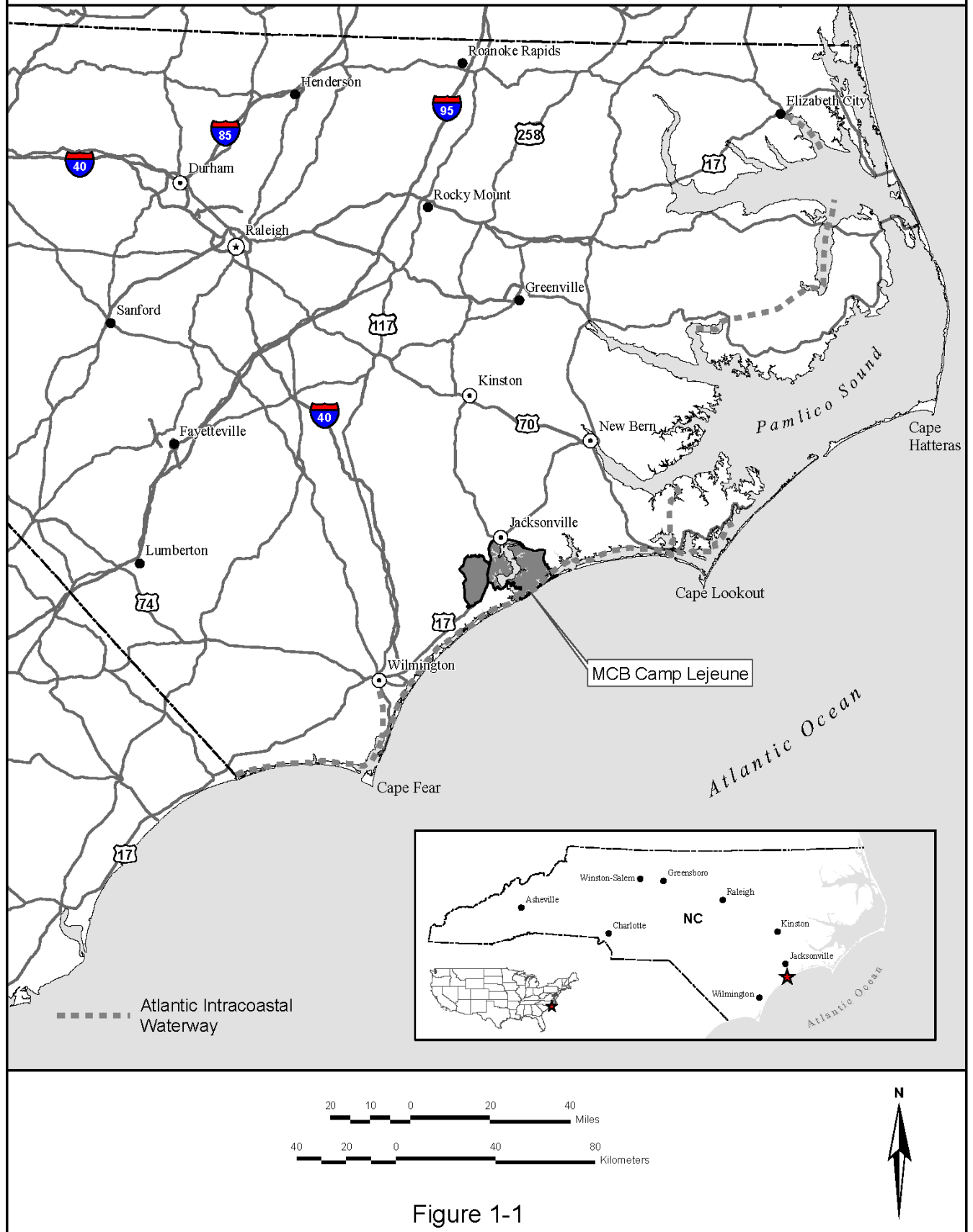
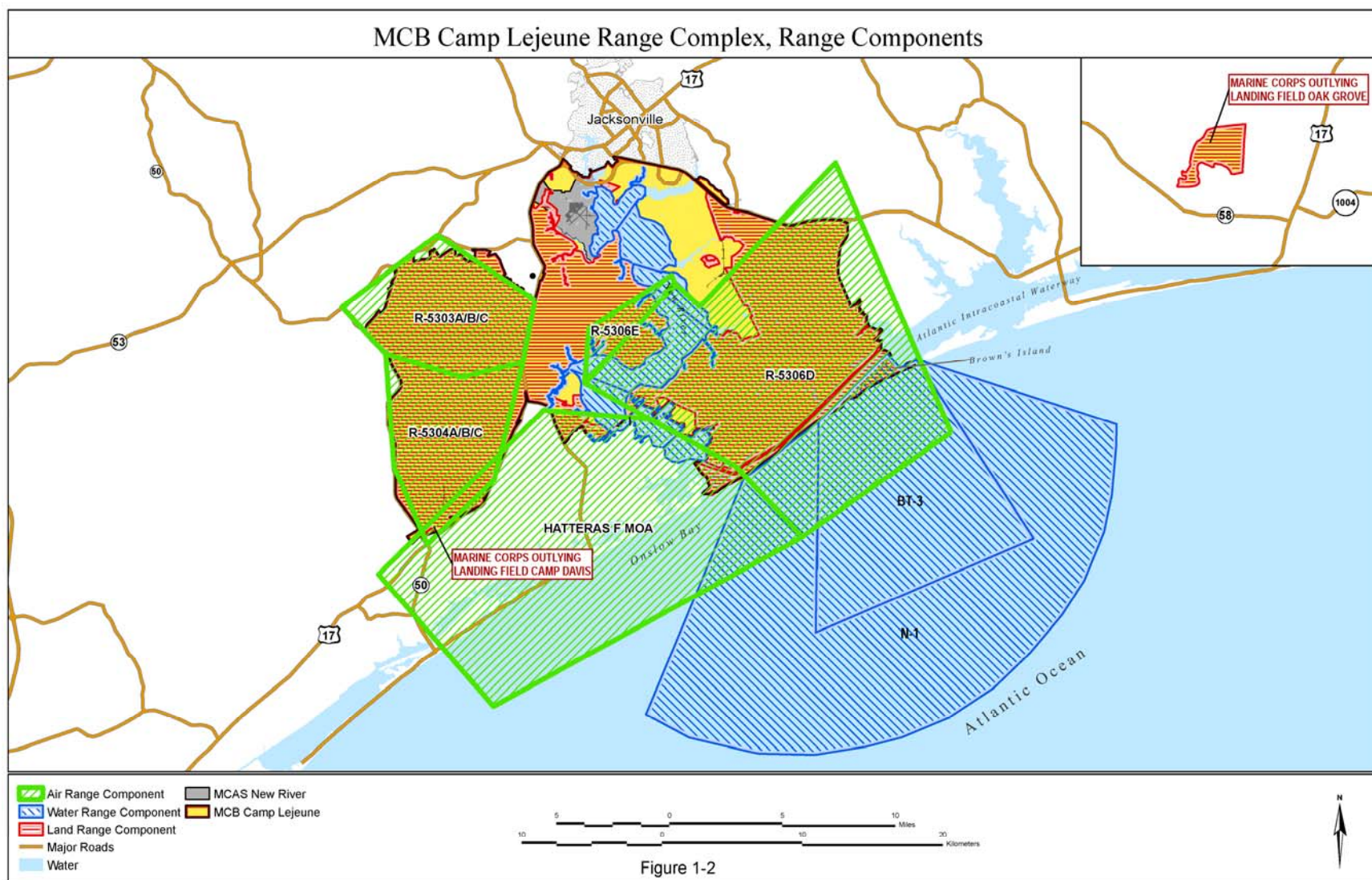


Figure 1-1



Water ranges within the MCB Camp Lejeune Range Complex generally surround land range assets and include: New River, Atlantic Intracoastal Waterway, and Atlantic Ocean. Water ranges are designated by the US Army Corps of Engineers as prohibited areas (existing danger zones [water]) and water restricted areas. Prohibited areas may be closed to the public on a full-time or intermittent basis because they are used for target practice, bombing, rocket-firing or other especially hazardous operations, normally for the armed forces. Water restricted areas prohibit or limit public access to provide security for Government property and/or protection to the public from the risks of damage or injury arising from the Government's use of that area. The Commanding Officer of MCB Camp Lejeune exercises the authority to control access to these navigable waters. Nautical charts show prohibited areas and restricted areas where vessels may not loiter or anchor per US CFR, Part 334 Navigation. The proximity of water ranges to land range assets and their prohibited and restricted designations provide ideal conditions for fording operations, amphibious operations, and small craft training.

Special use airspace within the MCB Camp Lejeune Range Complex includes several segments of restricted airspace (R-) (R-5306D, R-5306E, R-5303 A/B/C, and R-5304 A/B/C) and a military operating area (Hatteras F- Military Operating Area). The configuration of these special use airspace segments in relation to land and water ranges within the range complex provides an exceptional environment for aircraft operations, pilot training, and troop movement.

The proposed action is to support and conduct current and emerging training operations at the MCB Camp Lejeune Range Complex. All of these training operations would be conducted within existing land ranges, water ranges, and special use airspace within the range complex. The proposed action includes the following:

- A 20 percent increase in small arms training, except .50 caliber arms
- An increase in rotary-wing aircraft (helicopter) operations including a 33 percent increase in CH-53 sorties and a 100 percent increase in AH-1 and UH-1 sorties
- A 10 percent increase in training with MK-19 40-mm grenade rounds
- A 5 percent increase in training with artillery, mortar, and other large arms
- A 39 percent increase in tank rounds
- A 33 percent increase in tactical vehicle operations

Under the proposed action, the types of training operations at the MCB Camp Lejeune Range Complex would remain essentially the same.

All training operations within the MCB Camp Lejeune Range Complex are governed by the *Range and Training Regulations, Standing Operating Procedures for Range Control* (Base Order P3570.1B), which provides requirements, instructions, and procedures for training operations on land ranges, water ranges, and special use airspace within the range complex. In addition, the MCB Camp Lejeune *Integrated Natural Resources Management Plan* and the *Environmental Handbook for Trainers* provide specific guidance and measures to ensure that the natural environment is protected to the greatest extent practicable.

This consistency determination assesses the proposed action for its applicability and consistency with the North Carolina Coastal Area Management Act and the Onslow County Land Use Plan.

MCB Camp Lejeune, including Onslow Beach, is federal property and therefore is not included in the state coastal zone. However, portions of the state coastal zone that may potentially be affected by the proposed action include the Atlantic Intracoastal Waterway, the coastal Atlantic Ocean (within 6 km [3 nm]) adjacent to Onslow Beach, and the New River. Other state-regulated resources aboard MCB Camp Lejeune, such as wetlands and threatened and endangered species, are also discussed.

The information contained in this consistency determination is derived primarily from the *Environmental Assessment for the Marine Corps Base, Camp Lejeune, Range Operations*. The Environmental Assessment determined that the proposed action would not result in significant adverse impacts to water resources; terrestrial biology; marine biology; geology, topography, and soils; land use; the coastal zone; commercial and recreational fishing; recreational activities; environmental justice; air quality; noise; cultural resources; hazardous materials; waste management; and public health and safety. Additional information regarding the proposed project can be found in the Environmental Assessment, which is incorporated herein by reference.

2.0 NORTH CAROLINA COASTAL AREA MANAGEMENT ACT

In 1972, Congress passed the Coastal Zone Management Act, which encouraged states to keep the coasts healthy by establishing programs to manage, protect and promote the country's fragile coastal resources. Two years later, the North Carolina General Assembly passed the Coastal Area Management Act. Coastal Area Management Act established the Coastal Resources Commission, required local land use planning in the coastal counties and provided for a program for regulating development. The North Carolina Coastal Management Program was federally approved in 1978. North Carolina's coastal zone includes the 20 counties that are adjacent to, adjoining, intersected by, or bounded by the Atlantic Ocean or any coastal sound, including Onslow County. The coastal zone extends seaward to the three nautical mile territorial sea limit.

There are two tiers of regulatory review for projects within the coastal zone. The first tier includes projects that are located in Areas of Environmental Concern, which are designated by the state. The second tier includes projects located outside of an Area of Environmental Concern but with the potential to affect coastal resources. Both of these are explained in more detail below.

2.1 AREAS OF ENVIRONMENTAL CONCERN

The North Carolina Coastal Resources Commission designated Areas of Environmental Concern within the 20 coastal counties and set rules for managing development within these areas. An Area of Environmental Concern is an area of natural importance; it may be easily destroyed by erosion or flooding, or it may have environmental, social, economic, or aesthetic values that make it valuable. Its classification protects the area from uncontrolled development. Projects located within an Area of Environmental Concern undergo a more thorough level of regulatory review.

Areas of Environmental Concern include almost all coastal waters and about three percent of the land in the 20 coastal counties. The four categories of Areas of Environmental Concern are:

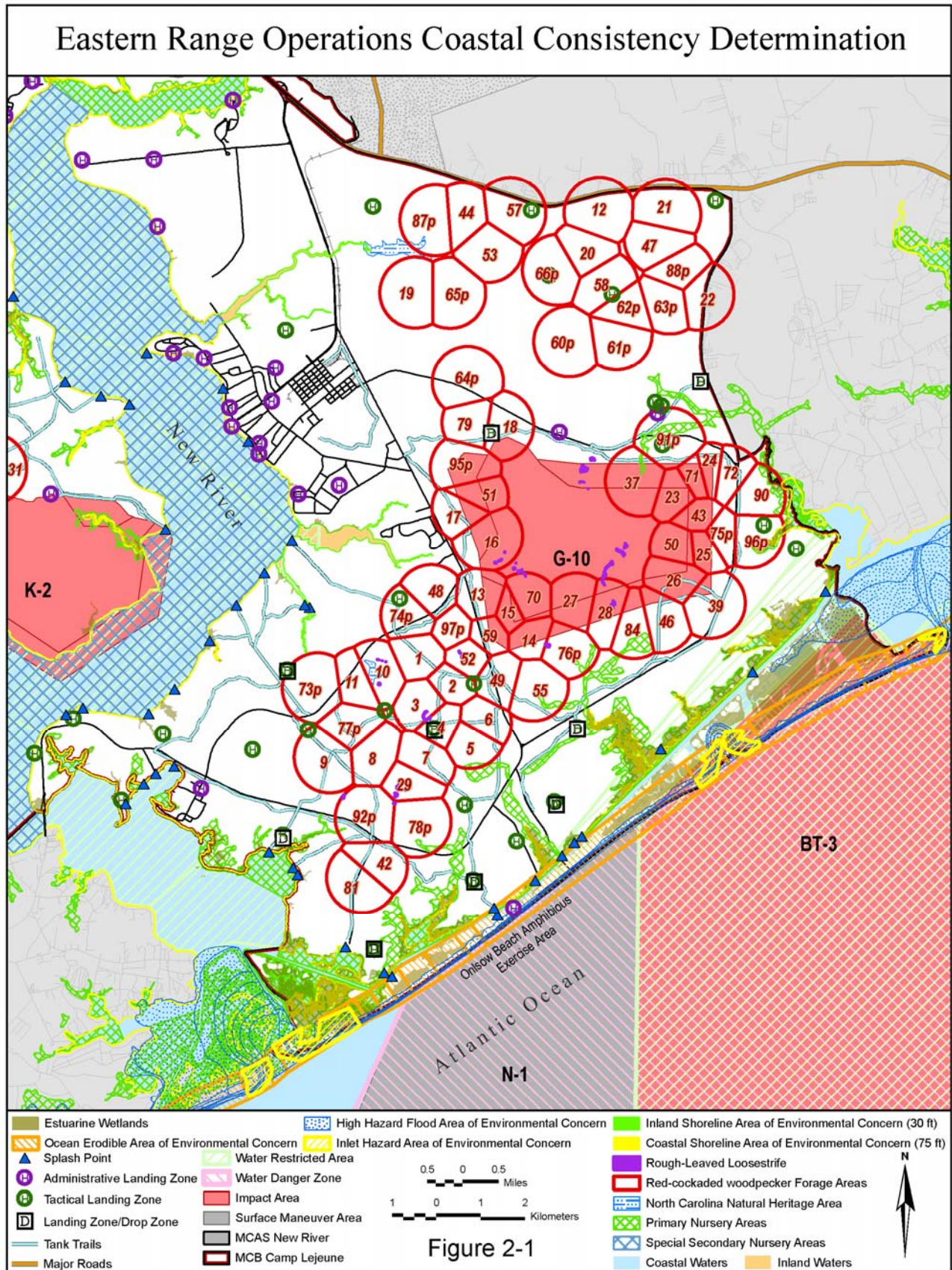
- The Estuarine and Ocean System, which includes public trust areas, estuarine coastal waters, coastal shorelines, and coastal wetlands;
- The Ocean Hazard System, which includes components of barrier island systems;
- Public Water Supplies, which include certain small surface water supply watersheds and public water supply well fields; and
- Natural and Cultural Resource Area, which include coastal complex natural areas; areas providing habitat for federal or state designated rare, threatened or endangered species; unique coastal geologic formations; or significant coastal archaeological or historic resources.

Figures 2-1 and **2-2** show the location of the proposed action relative to the Areas of Environmental Concern in the project vicinity. Various aspects of the proposed action would take place in areas designated as Areas of Environmental Concern under the North Carolina Coastal Management Program. Project activities would occur in estuarine and ocean systems areas, ocean hazard areas, and natural and cultural resource areas. The following is an analysis of the applicability of the Coastal Area Management Act Area of Environmental Concern policies to the proposed project and the project's consistency with those policies, when applicable.

15A NCAC 07H.0200 (Estuarine and Ocean Systems)

Estuarine and ocean systems include estuarine waters, coastal wetlands, public trust areas, and estuarine and public trust shorelines. The management objective of this policy is to conserve and manage these resources as an interrelated group so as to safeguard and perpetuate their biological, social, economic, and aesthetic values and to ensure that development occurring within these Areas of Environmental Concern is compatible with natural characteristics so as to minimize the likelihood of significant loss of private property and public resources. An additional objective is to protect present common-law and statutory public rights of access to the lands and waters of the coastal area.

As shown in **Figures 2-1** and **2-2**, some aspects of the proposed action would occur in the estuarine and ocean system. However, no construction of any permanent facilities or any draining or any new dredging would occur under this alternative. Approximately every 5 to 10 years, Weils Point and Roads Point are dredged to support engineer ribbon bridging movement of tanks from the mainside of MCB Camp Lejeune to the Greater Sandy Run Area. Further, all training and range operations are governed by the MCB Camp Lejeune *Range and Training Regulations, Standing Operating Procedures for Range Control* (Base Order P3570.1B), *Integrated Natural Resources Management Plan*, and the *Environmental Handbook for Trainers* which contain specific measures and procedures to ensure that the natural environment is protected to the greatest extent practicable.



Western Range Operations Coastal Consistency Determination

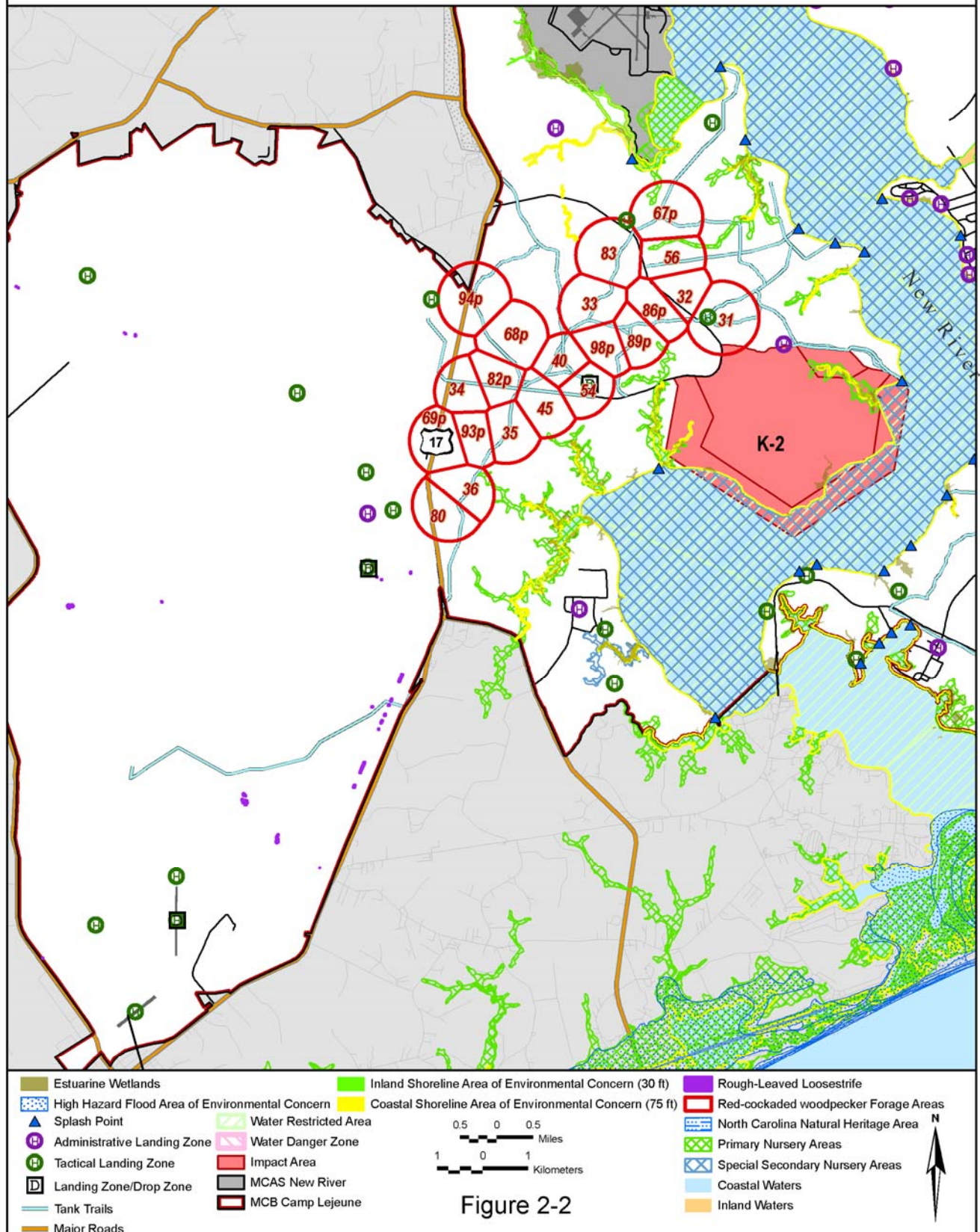


Figure 2-2

To protect public safety, MCB Camp Lejeune has restricted access to its beaches and water areas. The proposed action would not change any existing public access to or use of the shorefront or water. There would be no change to public trust areas under the proposed action.

The general use standards outlined in 15A NCAC 07H.0208 state that uses that are not water dependent shall not be permitted in coastal wetlands, estuarine waters, and public trust areas. The US Marine Corps has been conducting amphibious training at MCB Camp Lejeune since 1941. With extensive beachfront, MCB Camp Lejeune has been a unique and irreplaceable home training Base for Marines. Numerous aspects of the proposed action are water dependent in that Marines must have water-based training opportunities in order to effectively meet their mission requirements. As detailed in Alternative Range Training Locations (**Subchapter 2.4.1**) of the Environmental Assessment, there are no reasonable alternative training sites. In addition, the national defense nature of the proposed action and the current ongoing use of the range complex support the determination that the project is consistent to the maximum extent practicable with this policy.

15A NCAC 07H.0300 (Ocean Hazard Areas)

Ocean hazard areas are those areas along the Atlantic Ocean shoreline where, because of their special vulnerability to erosion or other adverse effects of sand, wind, and water, uncontrolled or incompatible development could unreasonably endanger life or property. Ocean hazard areas include beaches, frontal dunes, inlet lands, and other areas in which geologic, vegetative, and soil conditions indicate a substantial possibility of excessive erosion or flood damage.

The management objectives for these policies are to reduce the loss of life and property through the proper location and design of structures and by care taken in prevention of damage to natural protective features, particularly primary and frontal dunes.

As shown in **Figures 2-1** and **2-2**, some aspects of the proposed action would occur in ocean hazard areas. However, the proposed action would not construct any permanent facilities in the ocean hazard areas. Further, MCB Camp Lejeune has implemented numerous mitigation measures to ensure the prevention of long-term erosion and preservation of the natural ecological conditions of the barrier dune and beach systems (as found in the *Range and Training Regulations*, *Standing Operating Procedures for Range Control* (Base Order P3570.1B), *Integrated Natural Resources Management Plan*, and *Environmental Handbook for Trainers*). Specific mitigation measures are identified below in Section 15A NCAC 07M.0200 (Shoreline Erosion Policies) and 15A NCAC 07M.0700 (Mitigation Policy). Therefore, the project is consistent to the greatest extent practicable with these policies.

15A NCAC 07H.0400 (Public Water Supplies)

This policy addresses valuable small surface water supply watersheds and public water supply well fields. These vulnerable, critical water supplies, if degraded, could adversely affect public health or require substantial monetary outlays by affected communities for alternative water source development. The management objective for this policy is to regulate development within

critical water supply areas to protect and preserve public water supply well fields and surface water sources.

The proposed action would not affect areas where there are small surface water supply watersheds or public water supply well fields. Therefore, policies protecting public water supplies are not applicable.

15A NCAC 07H.0500 (Natural and Cultural Resource Areas)

Fragile coastal natural and cultural resource areas are defined as areas that contain environmental, natural, or cultural resources of more than local significance in which uncontrolled or incompatible development could result in major or irreversible damage to natural systems or cultural resources, scientific, educational, or associative values, or aesthetic qualities.

15A NCAC 07H.0505 (Coastal Areas That Sustain Remnant Species).

Coastal areas that sustain remnant species are those areas that support native plants or animals determined to be rare or endangered within the coastal area. The management objective for this policy is to protect unique habitat conditions that are necessary for the continued survival of threatened and endangered native plants and animals and to minimize land use impacts that might jeopardize these conditions.

MCB Camp Lejeune is home to various threatened and endangered species of animals and plants, and also species considered at risk and diverse natural communities (please refer to Natural Resources – Land and Water Ranges [**Subchapters 3.1.6** and **3.2.5**]). The *Integrated Natural Resource Management Plan* details the management practices that MCB Camp Lejeune employs to protect and conserve these species and their habitats. MCB Camp Lejeune regularly consults with the US Fish and Wildlife Service and National Oceanic and Atmospheric Administration to minimize Marine Corps actions that may jeopardize the continued existence of any endangered or threatened species and are in compliance with the Endangered Species Act. The Marine Corps conducts consultations as required with the US Fish and Wildlife Service and National Oceanic and Atmospheric Administration for any action which “may affect” a threatened or endangered species.

As fully detailed in Terrestrial Biology and Marine Biology (**Subchapters 4.1.6.3** and **4.2.5.3**, respectively) of the Environmental Assessment, the proposed action would have minimal impacts to threatened and endangered species and to species considered at risk. MCB Camp Lejeune implements numerous measures to protect the unique habitat conditions that are necessary to the continued survival of threatened and endangered native plants and animals. Therefore, the proposed action is consistent to the greatest extent practicable with this policy.

15A NCAC 07H.0506 (Coastal Complex Natural Areas).

Coastal complex natural areas are defined as lands that support native plant and animal communities and provide habitat qualities which have remained essentially unchanged by human activity. Such areas may be either significant components of coastal systems or especially

notable habitat areas of scientific, educational, or aesthetic value. The management objective of this policy is to protect the features of a designated coastal complex natural area to safeguard its biological relationships, educational and scientific values, and aesthetic qualities.

MCB Camp Lejeune has two designated natural areas: the CF Russell Longleaf Pine Natural Area and the Wallace Creek Natural Area. Both have been designated and registered as natural areas by the North Carolina Natural Heritage Program. Since 1985, MCB Camp Lejeune has had a memorandum of agreement with the North Carolina Natural Heritage Program to protect and manage these two areas. As fully detailed in Terrestrial Biology (**Subchapter 4.1.6.3**) of the Environmental Assessment, the proposed action would not affect the vegetative cover or habitats of these natural areas. Therefore, the project is consistent to the greatest extent practicable with this policy.

15A NCAC 07H.0507 (Unique Coastal Geologic Formations).

Unique coastal geologic formations are defined as sites that contain geologic formations that are unique or otherwise significant components of coastal systems or that are especially notable examples of geologic formations or processes in the coastal area. The management objective for this policy is to preserve unique resources of more than local significance that function as key physical components of natural systems, as important scientific and educational sites, or as valuable scenic resources. No unique geological formations are located within the proposed project area. This policy is not applicable.

15A NCAC 07H.0509 (Significant Coastal Archaeological Resources).

Significant coastal archaeological resources are defined as areas that contain archaeological remains (objects, features, and/or sites) that have more than local significance to history or prehistory. The management objective for this policy is to conserve coastal archaeological resources of more than local significance to history or prehistory that constitute important scientific sites, or are valuable educational, associative, or aesthetic resources.

MCB Camp Lejeune manages a variety of historic and prehistoric cultural resources in accordance with its *Integrated Cultural Resource Management Plan*. The plan provides guidance and establishes Standard Operating Procedures for the management of culturally significant resources on Base. A total of 1,284 archaeological sites have been identified within the MCB Camp Lejeune Complex (includes Oak Grove Landing Field). They include prehistoric and historic archaeological sites ranging from the early Archaic period (8000 BC) to early European colonization and later settlement. Of these sites, 22 have been determined eligible for listing on the National Register of Historic Places while 223 require further evaluation to determine their eligibility for listing. Approximately 81 percent of all recorded archaeological sites (1,039 sites) at the Installation have been determined ineligible. In addition, all high probability archaeologically sensitive soils located within the proposed project areas have been surveyed.

Potential effects to National Register of Historic Places eligible or potentially eligible resources can be mitigated as follows:

- Mitigation through avoidance (by marking and implementing guidance in the *Range and Training Regulations, Standing Operating Procedures for Range Control* (Base Order P3570.1B))
- Mitigation of adverse impacts through data recovery at the impacted site prior to the impact occurring (results in complete disturbance of the resource, rendering it unavailable for further study)
- Mitigation of adverse effects to some sites by the preservation of others (marking and protecting certain sites for future study)

No underwater surveys have been conducted to establish the presence or absence of archaeological sites or shipwrecks within the vicinity of the BT-3 Impact Area. With respect to prehistoric resources in depths of less than approximately 91 m (300 ft), archaeological sites with Paleo-Indian or Early Archaic components may be present. However, it is likely these sites would be buried under sediments that have accumulated over time. As a result, the only cultural resources likely occurring throughout the range areas would be historic in nature (namely, shipwrecks).

Within the general vicinity of Onslow Beach, Brown's Inlet, Brown's Island, Bear Inlet, and Bear Island, there are 11 reported shipwrecks, most occurring in the vicinity of Bear Inlet. No underwater archaeological sites or recorded shipwrecks have been identified within the BT-3 Impact Area or within the New River. If shipwrecks are present with the project area, it should be noted that due to mechanical, chemical, and biological erosion and decay, it is likely that older shipwrecks are represented by non-organic material (e.g., metal, ballast stones, etc.) and are likely covered by sediments that have accumulated over time. Therefore, the project is consistent to the greatest extent practicable with this policy.

15A NCAC 07H.0510 (Significant Coastal Historic Architectural Resources).

Significant coastal historic architectural resources are defined as districts, structures, buildings, sites or objects that have more than local significance to history or architecture. The management objective for this policy is to conserve coastal historic architectural resources of more than local significance which are valuable educational, scientific, associative or aesthetic resources.

Eight historic districts on MCB Camp Lejeune have been determined eligible for inclusion in the National Register of Historic Places. The majority of the historic architectural properties are located away from the primary ranges and training areas of the Base.

A portion of the Stone Bay Rifle Range Historic District is within the MCB Camp Lejeune Range Complex. Some of the historic buildings and features of the historic district are within the surface danger zone of the Stone Bay rifle range, and the remainder is adjacent to it. This historic district is significant for its direct association with MCB Camp Lejeune's World War II mobilization and training mission, which included training its Marines in the proficient use of pistols and rifles. Under the proposed action, the resources in the historic district would continue to support the training mission of the Stone Bay rifle range. The district's buildings and structures would not be demolished, damaged, or altered by training exercises at the range. The Stone Bay Rifle Range Historic District's historic features and setting would remain unchanged, as it would continue to perform the functions for which it was originally designed and built.

Therefore, no historic architectural resources would be affected. The project would be consistent to the greatest extent practicable with this policy.

2.2 GENERAL POLICY GUIDELINES

The North Carolina Coastal Area Management Act sets forth 11 General Policy Guidelines (two policies on use of coastal airspace and on water- and wetland-based target areas for military training areas are not enforceable), addressing:

- Shoreline erosion policies
- Shorefront access policies
- Coastal energy policies
- Post-disaster policies
- Floating structure policies
- Mitigation policy
- Coastal water quality policies
- Policies on use of coastal airspace
- Policies on water- and wetland-based target areas for military training areas
- Policies on beneficial use and availability of materials resulting from the excavation or maintenance of navigational channels
- Policies on ocean mining

The purpose of these rules is to establish generally applicable objectives and policies to be followed in the public and private use of land and water areas within the coastal area of North Carolina.

The following is an analysis of the applicability of the General Policy Guidelines to the proposed project and the project's consistency with those policies, when applicable and where enforceable.

15A NCAC 07M.0200 (Shoreline Erosion Policies)

This policy states that the general welfare and public interest require that development along the ocean and estuarine shorelines be conducted in a manner that avoids loss of life, property, and amenities. All proposals for shoreline erosion response projects shall avoid losses to North Carolina's natural heritage. All means should be taken to identify and develop response measure that will not adversely affect estuarine and marine productivity.

As shown in **Figures 2-1** and **2-2** some aspects of the proposed action would occur along the shoreline. The proposed action does not include any construction activities or facilities to prevent shoreline erosion.

The use of land for military training combined with sometimes significant weather-related events can result in erosion problems that impact the quality of training and reduce the land's ability to recover naturally. Ranges and training areas at MCB Camp Lejeune support various combat training activities. Off road vehicle traffic, bivouacking, and digging can reduce vegetative cover and cause soil compaction both of which can increase runoff and the potential for soil erosion.

Shoreline erosion would be minimized to the greatest extent feasible by following the relevant sections of the MCB Camp Lejeune *Integrated Natural Resources Management Plan (Chapter 10)*, *Range and Training Regulations*, *Standing Operating Procedures for Range Control* (Base Order P3570.1B), and the *Environmental Handbook for Trainers*. In addition, potential impacts to soils would be addressed by maintenance and hardening of roads and trails, and employing applicable erosion and sedimentation control techniques at training sites. Actions identified in the *Integrated Natural Resources Management Plan* that would be used to help reduce soil erosion and degradation of maneuver areas include:

- Closing selected areas to training use for restoration and recovery of eroded sites;
- Using Best Management Practices for all training-related activities;
- Implementing soil conservation restoration and maintenance projects;
- Planting native warm season grasses where practical in restoring eroded sites; and
- Implementing shoreline stabilization projects.

In addition to these measures, several engineering training areas have maintenance plans that require units to conduct inspection of ranges and training areas of facilities for erosion and land disturbance deficiencies prior to conducting training (see Soils [**Subchapter 4.1.6.1**]). These efforts would minimize environmental impacts to soils due to training by rehabilitating degraded areas, reducing soil erosion and subsequent sedimentation in sensitive riparian habitats, streams and estuaries, and enhancing vegetative recovery on-site by establishing native warm season grasses where feasible to help prevent erosion. With these measures there would be no adverse impacts to soils at MCB Camp Lejeune as a result of the proposed action. Therefore, the proposed action would be consistent to the greatest extent practicable with this policy.

15A NCAC 07M.0300 (Shorefront Access Policies)

This policy fosters, improves, enhances, and ensures optimum access to the public beaches and waters of the 20 coastal counties. Access shall be consistent with rights of private property owners and the concurrent need to protect important coastal natural resources.

Due to extensive daily military training, MCB Camp Lejeune is a closed military installation. Access to Onslow Beach is limited to military personnel and their families; civilians may use the beach only when sponsored by a military member who must be present. Prior to April 2007, the public could use boat launches located on MCB Camp Lejeune. However, due to increased security concerns, the public can no longer launch or recover boats on MCB Camp Lejeune property. The project would not change any existing public access to or use of the shorefront or water. Therefore, the project is consistent to the greatest extent practicable with this policy.

15A NCAC 07M.0400 (Coastal Energy Policies)

These policies state that in order to balance the public benefits attached to necessary energy development against the need to protect valuable coastal resources, the development of energy facilities and energy resources shall avoid significant adverse impacts to coastal resources or uses, public trust areas, and public access rights.

The proposed action does not involve the development of energy facilities or energy resources. As a result, these policies are not applicable.

15A NCAC 07M.0500 (Post-Disaster Policies)

These policies require that all state agencies prepare for disasters and coordinate their activities in the event of a coastal disaster. MCB, Camp Lejeune, Base Order P3440.6E, *Destructive Weather*, addresses how MCB Camp Lejeune would prepare for potential disasters and would respond in the event of a disaster, including coordination with North Carolina emergency services. The proposed action is consistent with this policy.

15A NCAC 07M.0600 (Floating Structure Policies)

These policies state that a floating structure is any structure, not a boat, which is supported by a means of flotation and not a permanent foundation, which is used or intended for human habitation or commerce. A structure will be considered a floating structure when it is inhabited or used for commercial purposes for more than 30 days in any one location.

No floating structures are included in the proposed action; therefore, these policies are not applicable.

15A NCAC 07M.0700 (Mitigation Policy)

This policy states that coastal ecosystems shall be protected and maintained as complete and functional systems by mitigating the adverse impacts of development as much as feasible, by enhancing, creating, or restoring areas with the goal of improving or maintaining ecosystem function and areal proportion. Mitigation shall be used to enhance coastal resources and offset any potential losses occurring from approved and unauthorized development.

Specific procedures and measures that protect natural resources are detailed in the MCB Camp Lejeune *Integrated Natural Resources Management Plan*, *Standing Operating Procedures for Range Control* (Base Order P3570.1B), the *Environmental Handbook for Trainers*, *Memorandum of Agreement Between the Department of the Army and the US Environmental Protection Agency*, *The Determination of Mitigation under the Clean Water Act Section 404(b)(1) Guidelines*, permits, and Biological Opinions, among others. MCB Camp Lejeune uses every means practicable to avoid and minimize damage to the natural environment (please refer to Section 4.7 of the EA).

Other approvals and consultations for the proposed action include:

- Federal Coastal Consistency Determination concurrence by the North Carolina Department of Environment and Natural Resources, Division of Coastal Management
- Compliance with the 2006 revisions of MCB Camp Lejeune's Recovery Plan for the Red-Cockaded Woodpecker
- Consultation with the US Fish and Wildlife Service on the Endangered Species Act and Migratory Bird Treaty Act

- Consultation with the National Marine Fisheries Services on the Endangered Species Act, Marine Mammal Protection Act, and the Magnuson-Stevens Fishery Conservation and Management Reauthorization Act;
- Concurrence from the North Carolina State Historic Preservation Officer on cultural resource effects findings

MCB Camp Lejeune will implement all actions required by these approvals and consultations. Therefore, the proposed action would be consistent to the greatest extent practicable with this policy.

15A NCAC 07M.0800 (Coastal Water Quality Policies)

These policies state that all the waters of the state within the coastal area have a potential for uses which require optimal water quality. Therefore, at every opportunity, existing development adjacent to these waters shall be upgraded to reduce discharge of pollutants. Basinwide management both within and outside of the coastal area is necessary to preserve the quality of coastal waters. Methods to control development so as to eliminate harmful runoff which may impact water quality and the adoption of best management practices to control runoff from undeveloped lands are necessary to prevent the deterioration of coastal waters.

The proposed project would not result in significant impacts to coastal water quality. All stormwater runoff would be managed and controlled in accordance with MCB Camp Lejeune's 2002 state-approved *Stormwater Pollution Prevention Plan*, a state-approved erosion and sediment control plan, and National Pollutant Discharge Elimination Systems Phase I permit requirements. The National Pollutant Discharge Elimination Systems Phase II permit is expected to be issued in 2008. Stormwater runoff would be managed under those permit requirements when the permit becomes effective.

In the continuing effort to protect water quality, MCB Camp Lejeune's ranges are being studied through ongoing Range Environmental Vulnerability Assessments. The initial Range Environmental Vulnerability Assessment methodology consisted of the development of a conceptual site model and screening-level surface and groundwater models, as necessary. Munitions constituents loading from both current and historical use of munitions on the ranges was estimated. Range Environmental Vulnerability Assessment uses modeling as a preliminary screening tool at operational range areas that are determined to be the greatest potential of concern. Priorities are developed using the estimated amount of munitions constituents loaded on a range over time and whether there are identified pathways in which these constituents can get from loading areas to human or sensitive ecological receptors.

Wetland protection measures as outlined in the *Memorandum of Agreement Between the Department of the Army and the US Environmental Protection Agency, The Determination of Mitigation under the Clean Water Act Section 404(b)(1) Guidelines* include:

- Avoidance - avoid potential impacts to the maximum extent practicable
- Minimization - take appropriate and practicable steps to minimize the adverse impacts (e.g., limit the anticipated impact to an area of the wetland with lesser value than other areas, or reduce the actual size of the impacted area)

- Compensatory mitigation - take appropriate and practicable compensatory mitigation action for unavoidable adverse impacts that remain after all appropriate and practicable minimization has been made (e.g., create a new wetland area, restore existing degraded wetland, or enhance low value wetland)

Under the proposed action the type of training operations at the MCB Camp Lejeune range complex would remain essentially the same. Activities such as, operating wheeled and tracked vehicles off-road, fording streams, amphibious operations, digging defensive positions, bivouacking, and landing of rotary wing aircraft can reduce vegetative cover which increases the potential for soil erosion and subsequent sedimentation of wetlands.

These potential impacts would be minimized by avoiding wetlands and floodplains where possible when conducting military training activities, and employing applicable erosion, and sedimentation control techniques at training sites to prevent sedimentation of wetlands. Some actions outlined in the *Integrated Natural Resources Management Plan* for MCB Camp Lejeune that would help protect wetlands include:

- Using Best Management Practices for all training-related activities
- Recovering training areas previously not suited for training due to erosion
- Reducing soil erosion and subsequent sedimentation in sensitive riparian habitats, streams and estuaries
- Enhanced vegetative recovery onsite by planting native warm season grasses where feasible
- Therefore, the proposed project is not expected to greatly affect coastal water quality (See Natural Resources [Subchapter 4.1.6]). Implementation of the proposed project would be consistent to the greatest extent practicable with this policy

15A NCAC 07M.0900 (Policies on Use of Coastal Airspace)

These policies state that access corridors free of special use airspace designations shall be preserved along the length of the barrier islands and laterally at intervals not to exceed 25 miles to provide unobstructed access both along the coastline and from inland areas to the coast. Development of aviation related projects and associated airspace management practices shall, to the maximum extent practicable, facilitate the use of aircraft by local, state, and federal government agencies for purposes of resource management, law enforcement, and other activities related to public health, safety, and welfare. Access to restricted areas shall be provided on a periodic basis for routine enforcement flights and access shall be provided on an emergency basis when required to respond to an immediate threat to public health and safety.

No new special use airspace would be designated as part of the proposed action. Helicopter and fixed-wing aircraft operations would be conducted in a manner that is consistent with policies on use of coastal airspace. Further, all aircraft training activities at MCB Camp Lejeune are governed by the *Standing Operating Procedures for Range Control*. The project would be consistent with these policies.

15A NCAC 07M.1000 (Policies on Water- and Wetland-Based Target Areas for Military Training Areas)

These policies state that all public trust waters subject to surface water restrictions for use in military training shall be opened to commercial fishing at established times appropriate for harvest of the fisheries resources within those areas. In addition, where laser weaponry is used, the area of restricted surface waters shall be at least as large as the recommended laser safety zone. Further, water quality shall be tested periodically in the surface water restricted areas surrounding such targets and results of such testing shall be reported to the North Carolina Department of Environment and Natural Resources.

As discussed above in 15A NCAC 07H.0200 (Estuarine and Ocean Systems), MCB Camp Lejeune has long restricted access to its facilities and water areas to protect the public and to provide security to Government property. For MCB Camp Lejeune to fulfill its mission, Marines must be able to train at water- and wetland-based targets; there are no available alternatives. All training and range activities, including laser use, are governed by MCB Camp Lejeune *Standing Operating Procedures for Range Control*.

In the continuing effort to protect water quality, MCB Camp Lejeune's ranges are being studied through ongoing Range Environmental Vulnerability Assessments. The initial Range Environmental Vulnerability Assessment methodology consisted of the development of a conceptual site model and screening-level surface and groundwater models, as necessary. Munitions constituents loading from both current and historical use of munitions on the ranges was estimated. Range Environmental Vulnerability Assessment uses modeling as a preliminary screening tool at operational range areas that are determined to be the greatest potential of concern. Priorities are developed using the estimated amount of munitions constituents loaded on a range over time and whether there are identified pathways in which these constituents can get from loading areas to human or sensitive ecological receptors.

Wetland protection measures as outlined in the *Memorandum of Agreement Between the Department of the Army and the Environmental Protection Agency, The Determination of Mitigation under the Clean Water Act Section 404(b)(1) Guidelines* include:

- Avoidance - avoid potential impacts to the maximum extent practicable
- Minimization - take appropriate and practicable steps to minimize the adverse impacts (e.g., limit the anticipated impact to an area of the wetland with lesser value than other areas, or reduce the actual size of the impacted area)
- Compensatory mitigation - take appropriate and practicable compensatory mitigation action for unavoidable adverse impacts that remain after all appropriate and practicable minimization has been made (e.g., create a new wetland area, restore existing degraded wetland, or enhance low value wetland)

Under the proposed action the type of training operations at the MCB Camp Lejeune range complex would remain essentially the same. Activities such as, operating wheeled and tracked vehicles off-road, fording streams, amphibious operations, digging defensive positions, bivouacking, and landing of rotary wing aircraft can reduce vegetative cover which increases the potential for soil erosion and subsequent sedimentation of wetlands.

These potential impacts would be minimized by avoiding wetlands and floodplains where possible when conducting military training activities, and employing applicable erosion, and sedimentation control techniques at training sites to prevent sedimentation of wetlands. Some actions outlined in the *Integrated Natural Resources Management Plan* for MCB Camp Lejeune that would help protect wetlands include:

- Using Best Management Practices for all training-related activities
- Recovering training areas previously not suited for training due to erosion
- Reducing soil erosion and subsequent sedimentation in sensitive riparian habitats, streams and estuaries
- Enhanced vegetative recovery onsite by planting native warm season grasses where feasible

Therefore, the project is consistent to the greatest extent practicable with these policies.

5A NCAC 07M.1100 (Policies on Beneficial Use and Availability of Materials Resulting from the Excavation or Maintenance of Navigational Channels)

This policy states that dredge material resulting from the excavation or maintenance of navigation channels should be used in a beneficial way wherever practicable. Dredged material resulting from the excavation or maintenance of navigation channels will be used in a beneficial way wherever practicable.

15A NCAC 07M.1200 (Policies on Ocean Mining)

This policy states that every avenue and opportunity to protect the physical ocean environment and its resources as an integrated and interrelated system will be utilized. No ocean mining shall be conducted unless plans for such mining include reasonable provisions for protection of the physical environment, its resources, and appropriate reclamation or mitigation of the affected area. No ocean mining would be part of the proposed action so these policies are not applicable.

3.0 ONSLOW COUNTY COASTAL MANAGEMENT POLICIES

The Coastal Area Management Act required local governments in each of the 20 coastal counties in the state to prepare, implement, and enforce a land use plan and ordinances consistent with established state and federal policies. Specifically, local policy statements are required on resource protection; resource production and management; economic and community development; continuing public participation; and storm hazard mitigation, post-disaster recovery, and evacuation plans. Upon approval by the North Carolina Coastal Resources Commission, each plan becomes part of the *North Carolina Coastal Management Plan*.

Onslow County adopted its Land Use plan in conformity with the Coastal Area Management Act in 2000, and is currently updating the plan. The county has zoning controls applicable to only one special area, Golden Acres in Stump Sound Township. The county does, however, require review of subdivisions, providing for minimum standards, enforced by the county Planning Department. Incorporated areas within the county implement their own zoning regulations. Onslow County's *Citizen's Comprehensive Plan for Onslow County*, adopted in 2003, also addresses land use planning in relation to the Coastal Area Management Act. Table F-1 contains a list of Onslow County's comprehensive plan policies and their applicability to this project.

Table F-1
Onslow County Comprehensive Plan Policies

| Land Use and Development Policies | Applicability |
|--|----------------|
| Preferred Development Pattern | Not Applicable |
| Housing and Neighborhood Development | Not Applicable |
| Commercial and Office Development | Not Applicable |
| Industrial Development | Not Applicable |
| Agricultural and Rural Area Preservation | Not Applicable |
| Waterfront and Waterborne Development | Not Applicable |
| Infrastructure and Service Policies | Applicability |
| Transportation | Consistent |
| Water and Sewer Services | Consistent |
| Stormwater Management, Drainage and Flooding | Consistent |
| Solid Waste Management | Consistent |
| Natural Resources Management and Use Policies | Applicability |
| Areas of Environmental Concern | Consistent |
| Estuarine and Ocean Resources | Consistent |
| Ocean Hazard System of Areas of Environmental Concern | Consistent |
| Public Water Supply Areas of Environmental Concern | Not Applicable |
| Natural and Cultural Resource Areas | Consistent |
| Other Important Natural Resource Areas | Consistent |
| Water Resources, Surface and Ground | Consistent |
| Wetlands and Hydric Soils | Consistent |
| Economy and Culture Policies | Applicability |
| Economic Development | Not Applicable |
| The Military and the Community | Consistent |
| Educational Facilities | Consistent |
| Parks and Recreation Facilities | Not Applicable |
| Cultural History, Historic Preservation/Revitalization | Not Applicable |
| Community Appearance | Not Applicable |

4.0 CONCLUSION

In conclusion, after careful consideration of the proposed action, the Marine Corps has determined that implementing the proposed action would be fully consistent with the relevant enforceable policies of North Carolina's Coastal Management Program.