
3 AFFECTED ENVIRONMENT

This chapter, as required by the CEQ regulations for implementing NEPA (40 CFR Part 1500-1508), provides a description of the environment that would be affected by the proposed action. The description is focused on those features of the environment that, because of the nature of the activities proposed, would potentially be affected by the one-day SFCP Feasibility Study at Camp Lejeune.

3.1 Land Use

This subchapter discusses on-site and off-site land use patterns on Camp Lejeune and the neighborhoods nearest to the G-10 Impact Area.

3.1.1 Camp Lejeune

Camp Lejeune is located in Onslow County in southeastern North Carolina (Figure 1-1), approximately halfway between Wilmington and New Bern. The Base provides specialized training for amphibious and land combat operations to the 2nd Marine Division, the nucleus of the Marine Corps' east coast force-in-readiness. The Camp Lejeune Complex, including the Marine Corps Base, the New River Air Station, and the Greater Sandy Run Training Area covers approximately 153,000 acres (62,000 ha) on both sides of the New River. The northern boundary of Camp Lejeune adjoins the City of Jacksonville, and the southern boundary extends to the Atlantic Ocean.

G-10 is one of three main impact areas (K-2 and N-1/BT-3 being the others) on Camp Lejeune. Most other ranges are dedicated to special purposes (rifle ranges, Special Operations Training Group ranges, etc.). Generally, ammunition from other live fire ranges, gun positions, and mortar positions will impact onto one of the three main impact areas.

The G-10 Impact Area is a bombing and target range and is entirely over land. It is undeveloped, except for a variety of temporary targets, and is characterized by a variety of upland and wetland forest types, some open grasslands, and ponds (Figure 3-1). It is primarily used for air-to-ground exercises, indirect and direct fire weapons, infantry weapons fire, and as an impact area for anti-tank guided missiles.

3.1.2 Surrounding Communities

Camp Lejeune is located within Onslow County. The county seat and primary commercial center is the city of Jacksonville, adjacent to and north of the military complex. In 1990, the city of Jacksonville annexed much of Camp Lejeune within its municipal boundary, including its

associated Marine Corps Air Station (MCAS) New River. However, the Marine Corps maintains exclusive legislative jurisdiction within the vast majority of the military complex as federal land.

Regional land uses around Camp Lejeune are influenced by the presence of large areas of land within the coastal plain that are ecologically unsuitable for development. Development constraints include extensive areas of wetlands, federal and state land, water bodies, high erosion areas and flood plains, and soil limitations such as wetness, rapid permeability, slow permeability, or low strength.

Acreages associated with principal land uses for the entire area under Onslow County’s regulatory jurisdiction are shown in Table 3-1.

Table 3-1
Onslow County Generalized Land Use 1997

Use	Acres (Hectares)	Square Miles (Square Kilometers)	Percent of Total
Residential	16,050 (6,495)	25.1 (65)	5.6
Developed Non-Residential	8,520 (3,448)	13.3 (34)	3.0
Total Developed	24,570 (9,944)	38.4 (100)	8.6
Agriculture	48,680 (19,700)	76.1 (197)	17.0
Forested	203,960 (82,543)	318.6 (825)	71.1
Water Bodies	9,630 (3,897)	15.0 (39)	3.3
Wetlands*	133,780 (54,141)	209.0 (541)	46.6
Note: * Overlaps other categories. Source: Onslow County, July 1998.			

Residential development in Onslow County is concentrated in the Jacksonville area and the county’s several smaller municipalities. In 1990, there were 40,526 occupied housing units and an additional 6,868 vacant units. Almost 28 percent of these are held for seasonal or occasional use reflecting the coastal character in the south of the county. Between 1992 and 1997, Onslow County recorded substantial new residential development, with 170 new subdivisions, comprised of 2,389 lots, being approved. Swansboro Township accounted for 47.5 percent of this growth.

Commercial and industrial uses are concentrated within the incorporated areas, with the city of Jacksonville serving as the county’s commercial center and accommodating its only industrial park. Outside of the incorporated areas, the county estimates that commercial and industrial zones account for about three percent of the area under the county’s regulatory jurisdiction (Onslow County, July 1998). Strip commercial development is a feature in Jacksonville, particularly along Marine and Western Boulevards. The county airport, Albert J. Ellis Airport,

which is located in western Onslow County off Route 111, occupies approximately 700 ac (283 ha).

The major institutional uses (schools, churches, health services, etc.) are located mostly within the incorporated areas in proximity to the residential population. Major institutional uses are Camp Lejeune, Hofmann Forest (owned by Duke University), and Hammocks Beach State Park, which together account for about 30 percent of the county's land area.

There are no residences under the gunfire trajectories; the closest residential area to the NGF Impact Area is about 2.5 miles (4 km) away.

3.1.3 Coastal Zone Management

The North Carolina Coastal Area Management Act (CAMA) was passed in accordance with the federal Coastal Zone Management Act (CZMA) of 1972. CAMA required local governments in each of the 20 coastal counties in the state to prepare and implement a land use plan and ordinances for its enforcement. Upon approval by the North Carolina Coastal Resources Commission, the plan becomes part of the North Carolina Coastal Management Plan. Coastal zone management policies adopted in each plan must be consistent with established state and federal policies. Specifically, 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. These policies are discussed in detail in Subchapter 4.2.2.

Onslow County recently updated its *Land Use Plan* in conformity with the CAMA (Onslow County, July 1998). The county has zoning control applicable to only one special area (Golden Acres in Stump Sound Township). The county does, however, require review of subdivisions, providing for minimum design standards, enforced by the county Planning Department. Incorporated areas, such as Jacksonville, implement their own zoning regulations with an extension of these controls one mi (1.6 km) beyond their borders.

3.2 Socioeconomics

Demographic and employment data are presented for Onslow County, the city of Jacksonville, and the state of North Carolina. Much of the Camp Lejeune military complex has been part of the city of Jacksonville since 1990.

3.2.1 Demography

Total population for Onslow County and recent trends are shown in Table 3-2. Among all surrounding North Carolina counties, Onslow is the largest in population. It witnessed substantial growth in the 1980s, although it experienced significant out-migration in the 1990s.

Census data on the 1990 racial and ethnic make-up of Onslow County and the city of Jacksonville populations are shown in Table 3-3. Onslow County has similar proportions of white and black populations as North Carolina as a whole, although the overall proportion of “non-white” residents is higher. African-Americans are found in higher proportion in rural Jones and Duplin counties, and in the city of Jacksonville. Persons of Hispanic origin are few except in Onslow County (5.3 percent) and Jacksonville (4.7 percent), indicating their association with the military complex.

3.2.2 Income and Employment

Median household and family incomes reported from the 1990 Census for 1989 are shown in Table 3-4. In 1989, Onslow County had median incomes noticeably lower than the state as a whole. The percentage of persons reporting income below the poverty threshold reflected a similar distribution.

3.3 Community Facilities and Services

There are a range of emergency services and community facilities that serve Camp Lejeune. The Camp Lejeune Fire Protection Division provides firefighting and hazardous materials services to the Camp Lejeune complex. The Provost Marshal’s office serves as the primary police station for the military police force. The Naval Hospital, located on Northeast Creek near Stone Street and Brewster Boulevard, provides services to Camp Lejeune military personnel, dependents, and retirees. The hospital provides medical and administrative support to all military personnel assigned to the Camp Lejeune complex and has cooperative agreements with civil authorities in the region for emergencies. School-age children of military families residing at the Camp Lejeune complex attend the Camp Lejeune Dependents Schools (CLDS) system. The Marine Corps Community Services (MCCS) offices for the Camp Lejeune military complex provide a full range of recreational services and on-station facilities to military personnel and their dependents (MCB Camp Lejeune, 1998).

Table 3-2

Population Trends 1980-2002

Jurisdiction	1980	1990	1997 Estimate	2002 Projected	1980-1990	1990-1997	1997-2002
Onslow County	112,784	149,838	147,352	156,196	32.9	-1.7	6.0
Jacksonville City	18,259	30,398	75,527	n/a	66.5	148.5	n/a
North Carolina	5,880,095	6,632,448	7,431,161	7,931,133	12.8	12.0	6.7

Source: NC Office of State Planning, 1998, 2001.

Table 3-3

Race and Ethnicity 1990 (Percent)

Jurisdiction	White	Black ¹	Other Non-White	Hispanic ²
Onslow County	74.6	19.9	5.6	5.3
Jacksonville City	66.5	26.3	7.2	4.7
North Carolina	75.6	21.9	2.5	1.0

Note: 1. Having origins in any of the black racial groups of Africa.
2. Hispanic origin, may be of any race.
Source: US Department of Commerce, 1990.

Table 3-4

Income

Jurisdiction	1989			1995
	Median Household Income	Median Family Income	Percent of Persons Below Poverty	Per Capita Income ¹
Onslow County	23,386	24,857	12.1	14,897
Jacksonville City	25,698	27,144	11.9	n/a
North Carolina	26,647	31,548	13.0	18,521

Note: 1. 1995 estimates from NC Department of Commerce, 1998.
Source: US Department of Commerce, 1990.

3.4 Transportation

3.4.1 Roadways

The main road in the vicinity of Camp Lejeune is US 17 (Ocean Highway), running roughly north-south, connecting Jacksonville with Wilmington, NC, about 51 mi (82 km) to the south, and New Bern, NC, about 36 mi (58 km) to the north. Jacksonville is also connected to the remainder of the region by US 258/NC 24 northwest to I-40, NC 53 southwest to I-40, and NC 24 east to a series of coastal towns, terminating near Morehead City. Both US 17 and NC 24 are divided, multi-lane facilities with three lanes in each direction in the urbanized area near Jacksonville. NC 172 is a two-lane roadway connecting NC 24 just east of Camp Lejeune with Sneads Ferry and other communities to the south and southeast (Figure 3-2). It is almost entirely within Camp Lejeune. Lyman Road is a two-lane roadway, internal to Camp Lejeune, that runs along the northern boundary of the G-10 Impact Area.

3.4.2 Atlantic Intracoastal Waterway

The Atlantic Intracoastal Waterway (AIWW), which extends for almost the entire length of the East Coast, passes through Camp Lejeune between the beaches and the mainland.

There are no data available for the number of non-military (commercial and recreational) annual boat trips on the AIWW. However, 6,675 boats (commercial and recreational) were registered in Onslow County as of December 31, 1998 (NC Wildlife Resources Commission, 1999). These boats are launched on the New River, Queens Creek, the White Oak River, and other waters within the county. Many of these boats pass through the AIWW to enter or exit the New River estuary and Onslow Bay. In addition, there is transient boat traffic (largely recreational vessels) passing through the AIWW from other areas.

The Marine Corps conducts ongoing boat and amphibious training and readiness operations at Camp Lejeune. Most of these operations occur on the New River, Pamlico Sound, or within Onslow Bay, with use of the AIWW for travel between these areas. Several such operations occur every training (normal week) day, involving one to several boats. These maneuvers generally share these waterways with commercial and recreational water traffic. In some instances, the Marine Corps will close surface danger zones and restricted areas within the AIWW and Onslow Bay to prevent civilians and other non-participating craft from entering the operations area. There are currently about 20 operations per year requiring closure of the surface danger zone. Most closures last about one hour. Camp Lejeune can close it at anytime for as long as is deemed necessary consistent with 33CFR Part 334.440.

3.5 Air Quality

The US Environmental Protection Agency (USEPA), under the requirements of the 1970 Clean Air Act (CAA) as amended in 1977 and 1990, has established National Ambient Air Quality Standards (NAAQS) for six contaminants, referred to as criteria pollutants (40 CFR 50). These are carbon monoxide, nitrogen dioxide, ozone, particulate matter, lead, and sulfur dioxide. The NAAQS standards include primary and secondary standards. The primary standards were established at levels sufficient to protect public health with an adequate margin of safety. The secondary standards were established to protect the public welfare from the adverse effects associated with pollutants in the ambient air.

The North Carolina Department of Environment and Natural Resources (NCDENR) has adopted the USEPA's NAAQS as the statewide ambient air quality standards. When the USEPA amended the standard for particulate matter, changing the regulated pollutant from total suspended particulates (TSP) to PM10 (PM10: diameter ≤ 10 micrometers) that is inhalable, the NCDENR adopted the PM10 standard but continued to use both PM10 and TSP as monitoring indicators for the level of particulate matter. Therefore, the North Carolina ambient air quality standards include all of the NAAQS, plus a standard for TSP.

Areas that meet the NAAQS standard for a criteria pollutant are designated as being in "attainment"; areas where the criteria pollutant level exceeds the NAAQS are designated as being in "nonattainment." Nonattainment areas are subcategorized based on the severity of their pollution problem (marginal, moderate, serious, severe, or extreme). When insufficient data exist to determine an area's attainment status, it is designated "unclassifiable" (or "in attainment"). Camp Lejeune and Onslow County are located in the Southern Coastal Plain Intrastate Air Quality Control Region, which is defined in 40 CFR Part 81.152, and is comprised of 13 counties. Pursuant to 40 CFR Part 81.334, each of the 13 counties that make up the Region has been designated as being in attainment for all criteria pollutants.

The Clean Air Act Amendments (CAAA) of 1990 expand the scope and content of the CAA's conformity provisions by providing a more specific definition of conformity. As stipulated in CAAA Section 176(c), conformity is defined as "conformity to the State Implementation Program's (SIP) purpose of eliminating or reducing the severity and number of violations of the NAAQS and achieving expeditious attainment of such standards."

The USEPA published final rules on general conformity that apply to federal actions in areas designated nonattainment for any of the criteria pollutants under the CAA (40 CFR Parts 51 and 93) in the November 30, 1993 *Federal Register*. Since the proposed action would occur within an attainment area, this rule is not applicable to the project.

3.6 Noise

In 1990, noise levels from military exercises around the perimeter of Camp Lejeune were studied through a noise monitoring program by the US Army Environmental Hygiene Agency (USAEHA) (Table 3-5, Figure 3-3). The measurements were conducted separately for continuous noise levels resulting from aircraft and ground vehicle operations, and for impulsive noise levels from ordnance delivery. The monitored Day Night Sound Levels (DNLs) indicate that two of the continuous monitoring noise sites (Tactical Landing Zone (TLZ) Lark and the Dixon School) experience “normally incompatible” noise levels (65 - 75 dBA) due to ground vehicle and aircraft operations and two of the impulsive noise monitoring sites (Willis Landing and TLZ Canary) experience a high risk of complaints of weapon blast noise during training exercises.

Table 3-5

Noise Environment at Camp Lejeune

Site	Continuous Noise Level (DNL - dBA)		Percent of Impulsive Noise Level (dBp)		
	With aircraft	Without aircraft	110-125 dBp	125-135 dBp	>135 dBp
TLZ Robin	59.7	58.6	40.0	0.0	0.0
TLZ Lark	71.4	70.1	N/A	N/A	N/A
Willis Landing	64.1	62.5	39.9	2.0	0.1
TLZ Canary	59.2	57.7	43.7	7.0	0.0
Dixon School	65.9	65.9	50.0	0.0	0.0
Verona Gate	59.5	59.3	60.2	0.0	0.0

Source: US Army Environmental Hygiene Agency, 1990.

Numerous studies have revealed that health effects can result from continuous noise, such as that occurring near highways, construction sites, and cities with heavy traffic and large airports. However, ambient noise conditions at Camp Lejeune are greatly influenced by impulsive noise generated by bomb explosions or gun firing on the Base’s ranges, and this noise is fundamentally different from continuous noise sources. Thus, the noise threshold criteria for impulsive noise are different than for continuous noise. Permanent damage to unprotected ears due to continuous noise occurs at approximately 85 dBA based on an eight-hour-per-day exposure, while the threshold for permanent damage to unprotected ears due to impulsive noise is approximately 140 dBp (dB Peak) based on 100 exposures per day (Pater, 1976).

In 1991, the USAEHA, now the US Army Center for Health and Promotion and Preventive Medicine (USACHPPM), provided guidelines for evaluating peak blast noise levels generated from military tests and training (Table 3-6). Although these criteria have never been officially adopted, the Army has used them for many years. The USACHPPM conducted a study to correlate annoyance with measured dBp (US Department of the Army National Guard Bureau, 1996) and concluded that:

- dBP criteria are useful for noise complaint management and investigation; and
- dBP provides a good estimate of the perceived vibration of typical residential construction resulting from blasts.

Table 3-6

Guidelines for Evaluating Peak Blast Sound Level

Predicted Sound Levels (dBP)	Risk of Noise Complaints	Action
< 115	Low	Fire all programs
115 - 130	Moderate	Fire important tests; postpone non-critical testing, if feasible
130 - 140	High, and possibility of damage	Only extremely important tests should be fired
> 140	High risk of physiological and structural damage claims	Postpone all explosive operations
Source: US Army Environmental Hygiene Agency, 1990.		

3.7 Infrastructure

The G-10 Impact Area is serviced by a number of dirt roads and tracks, and six observation towers, located not within the impact area itself but in the peripheral ranges. There are no utility systems, but there are a large number and variety of targets (37 targets including abandoned cranes, tanks, trucks, semi-trailers, and buses) within the impact area.

3.8 Cultural Resources

The National Historic Preservation Act (NHPA) of 1966 and subsequent amendments were passed to provide for the protection, enhancement, and preservation of any property that possesses significant archaeological, architectural, historical, or cultural characteristics. Executive Order 11593 of 1974 further defined the obligations of federal agencies concerning this act.

Under Section 106 of the NHPA, the head of any federal agency having direct or indirect jurisdiction over a proposed federal or federally-financed undertaking is required, before the expenditure of any federal funds on that undertaking, to account for its effects on any district, site, building, structure, or object that is included or is eligible for inclusion in the National Register of Historic Places. Under Section 110 of the NHPA, each federal agency is required to establish a program to locate, inventory, and nominate to the Secretary of the Interior all

properties under its ownership or control that appear to qualify for inclusion in the National Register.

Camp Lejeune has developed a draft Historic Preservation Plan (1987) identifying current and potential National Register sites. Additional cultural resource studies are currently underway on Camp Lejeune. Proposed activities are reviewed for their potential to affect known cultural resources.

3.9 Water Resources

The Atlantic Ocean (Onslow Bay) borders Camp Lejeune to the south and east. The New River and its tributaries drain most of the installation and divide it into approximately equal halves.

The state of North Carolina has assigned water quality classifications for all surface waters in the state based on the existing and contemplated “best usage” for which the waters must be protected. Within the tidal portions of the New River, water quality classifications range from SA (the highest rating for tidal waters) to SC (the lowest classification for tidal waters). Class SA waters are suitable for shellfishing and any of the uses specified for “SB” and “SC” classifications. Within the New River estuary, all waters downstream from Grey Point to the New River Inlet at the Atlantic Ocean are classified as SA.

Class SB waters are suitable for primary recreation and other uses as specified by the SC classification. SB waters at Camp Lejeune include the Atlantic Ocean and the tidal portions of Wallace Creek and its two tributaries, Bearhead and Beaverdam Creeks. All other tidal waters within the boundaries of Camp Lejeune north (upstream) of Grey Point are classified as SC (i.e., waters suitable for aquatic life propagation and survival, fishing, wildlife, and secondary recreation (NCDEHNR, 1990a in NAVFACENCOM, Atlantic Division, 1993)). All non-tidal waters on the Base are classified as “C” waters, which, similar to their tidal counterparts, are suitable for aquatic life propagation and survival, fishing, wildlife, and secondary recreation.

The Water Quality Act of 1987 expanded the National Pollutant Discharge Elimination System (NPDES) coverage to include regulation of stormwater discharges. Appropriate documentation has been filed with the NCDENR for stormwater discharges at Camp Lejeune. Camp Lejeune employs Best Management Practices for both quality and quantity control, and has developed a Stormwater Pollution Prevention Plan.

Groundwater resources supply Camp Lejeune’s potable water needs. In the Jacksonville area, as in much of eastern North Carolina, there are four principal aquifer systems: the unconfined surficial or Water Table Unit; the confined Castle Hayne Unit; the Cretaceous Upper Sand Unit; and the Cretaceous Lower Sand Unit. Based on the depths of these various layers, the thickness of the Castle Hayne Unit, and the depths of the wells on Camp Lejeune, most of Camp Lejeune’s wells withdraw water from the Castle Hayne Unit. This unit yields large amounts of hard,

calcium-bicarbonate-type water (Camp Lejeune, 1988). There are no wells located within the G-10 Impact Area.

3.10 Marine Natural Resources

3.10.1 Marine Mammals

The species of marine mammals found in Onslow Bay immediately offshore from Camp Lejeune are generally those species associated with warm temperate or tropical conditions. Table 3-7 lists the marine mammal species that are indigenous to waters off North Carolina. This list includes both toothed and baleen whales.

Mysticetes (Baleen Whales)

Mysticetes (baleen whales) tend to use North Carolina waters either as a wintering ground or to pass through during migrations. They occupy this area only seasonally and probably do not feed while there (Lee and Socci, 1989). Mysticetes, in general, are more common in shallow shelf waters than shelf-edge and slope waters (Kenney and Winn, 1987).

Records for baleen whales included the northern right whale (*Eubalaena glacialis*), fin whale (*Balaenoptera physalus*), humpback whale (*Megaptera novaeangliae*), sei whale (*Balaenoptera borealis*), Bryde's whales (*Balaenoptera edeni*) and minke whale (*Balaenoptera acutorostrata*).

Northern right whales are generally found off the coast of North Carolina from January to March with recorded sightings from September to April. During their northward migration, they usually transit the coast in shallow waters (Lee and Socci, 1989). The southward fall migration appears to occur far out to sea and could account for the limited fall recordings (Lee, 1985). Preferred water depths during recent surveys off the Florida coast range from ten ft (three m) to 239 ft (73 m), with a mean of 41 ft (13 m) (Kraus et al., 1993).

Fin whales have been reported wintering off Onslow Bay in shallow waters (15 to 20 fathoms or 27 to 37 m) and have been observed in deep water (greater than 300 fathoms or 549 m) (Lee and Socci, 1989). Most North Carolina record sightings are from 15 January to 10 April.

Humpback whales off North Carolina are generally distributed in shallow water (11 to 40 fathoms or 20 to 73 m), similar to that found in the northeastern US (CeTAP, 1982; Lee and Socci, 1989). Sightings peak off North Carolina in spring (April and May) and fall (September to December).

Table 3-7

Marine Mammals Found in North Carolina Waters

Order	Common Name	Scientific Name	Protection Status*
Mysticetes	Northern Right Whale	<i>Eubalaena glacialis</i>	Endangered/MMPA
	Fin Whale	<i>Megaptera novaeangliae</i>	Endangered/MMPA
	Humpback Whale	<i>Balaenoptera physalus</i>	Endangered/MMPA
	Sei Whale	<i>Balaenoptera edeni</i>	MMPA
	Bryde's Whale	<i>Balaenoptera borealis</i>	Endangered/MMPA
	Minke Whale	<i>Balaenoptera acutorostrata</i>	MMPA
Odontocetes	Sperm Whale	<i>Physeter macrocephalus</i>	Endangered/MMPA
	Pygmy Sperm Whale	<i>Kogia breviceps</i>	MMPA
	Dwarf Sperm Whale	<i>Kogia simus</i>	MMPA
	Antillean beaked whale	<i>Mesoplodon europeus</i>	MMPA
	True's Beaked Whale	<i>Mesoplodon mirus</i>	MMPA
	Dense-beaked Whale	<i>Mesoplodon densirostris</i>	MMPA
	Sowerby's Beaked Whale	<i>Mesoplodon bidens</i>	MMPA
	Goose-beaked Whale	<i>Ziphius cavirostris</i>	MMPA
	Harbor Porpoise	<i>Phocoena phocoena</i>	MMPA
	Bottlenose Dolphin	<i>Tursiops truncatus</i>	MMPA
	Atlantic Spotted Dolphin	<i>Stenella frontalis</i>	MMPA
	Pantropical Spotted Dolphin	<i>Stenella attenuata</i>	MMPA
	Short-Finned Pilot Whale	<i>Globicephala macrorhynchus</i>	MMPA
	Long-Finned Pilot Whale	<i>Globicephala melas</i>	MMPA
	Killer Whale	<i>Orcinus orca</i>	MMPA
	False Killer Whale	<i>Pseudorca crassidens</i>	MMPA
	Pygmy Killer Whale	<i>Feresa attenuata</i>	MMPA
	Striped Dolphin	<i>Stenella coeruleoalba</i>	MMPA
	Spinner Dolphin	<i>Stenella longirostris</i>	MMPA
	Clymene Dolphin	<i>Stenella clymene</i>	MMPA
Pinnipeds	Harbor Seal	<i>Phoca vitulina</i>	MMPA
	Gray Seal	<i>Halichoerus grypus</i>	MMPA
	Harp Seal	<i>Phoca groenlandica</i>	MMPA
	Hooded Seal	<i>Cystophora cristata</i>	MMPA
Sirens	Manatee	<i>Trichechus manatus</i>	Endangered/MMPA

Source: NUWC, 1999.
Notes: * MMPA indicates protected by the Marine Mammal Protection Act. "Endangered" means listed as an endangered species under the Endangered Species Act.

There are few records of sei whales in North Carolina waters although this species is probably a relatively common migrant off the North Carolina coast (Lee and Socci, 1989). The sei whale is thought to occur over the Continental Shelf. Similarly, there are limited records for Bryde's whales in this region because it is difficult to differentiate from sei whales due to the similarity of appearance.

Lee (1986) indicated that minke whales may winter off the North Carolina coast, but are absent during other seasons. Manomet Bird Observatory (1989) recorded rare sightings of this species in summer, autumn, and winter (i.e., two to five individuals/100 transects) on the shelf north of Cape Hatteras. Like most other baleen whales, minke whales typically occupy the shelf proper, rather than the shelf edge (Blaylock et al., 1995).

Odontocetes (Toothed Whales)

Sperm Whales

Sperm whales, in general, utilize deep shelf-edge waters and are found principally along the 6,560 ft (2000 m) isobath. They are also associated with Gulf Stream waters, particularly where cold and warm waters interface (Waring et al. 1992). Sperm whales can be found off North Carolina year round, but sighting data seem to indicate a peak in spring and summer months. Pygmy and dwarf sperm whales (*Kogia* spp.) are less common than sperm whales in the North Carolina region but exhibit a similar oceanic distribution (CeTAP, 1982; Mullin et al., 1991).

Beaked Whales

Several beaked whales (family Ziphiidae) such as the Antillean beaked whale (*Mesoplodon europaeus*), True's beaked whale (*M. mirus*), dense-beaked whale (*M. densirostris*), Sowerby's beaked whale (*M. bidens*) and goose-beaked whale (*Ziphius cavirostris*) occur in North Carolina's offshore waters throughout the year (Lee, 1986; Waring et al., 1997, 1999). Distribution of the family Ziphiidae in the northwestern Atlantic is known primarily from stranding records and limited observations in deep waters (CeTAP, 1982; Lee, 1986; Mead, 1989; Waring et al., 1992; Hooker and Baird, 1999). They have an offshore distribution and have been observed along the north, middle, and south walls of the Gulf Stream into the Sargasso Sea (CeTAP, 1982; Lee, 1986; Mead, 1989; Waring et al., 1992). The beaked whales can generally be found in shelf-break waters with a distribution centered about the 6,560 ft (2,000 m) isobath (which is a line of constant depth) (CeTAP, 1982; Waring et al., 1992). Lee (1986) noted some deep-water records (>500 fathoms) of goose-beaked whales in North Carolina waters.

Delphinids

Delphinid whales (Delphinidae), a group that includes dolphins, killer whales, and porpoises, are by far the most numerous group off North Carolina. Several of the species found in these waters are widely distributed in tropical, warm-temperate, and temperate waters of the world and can be

truly cosmopolitan in nature (Waring et al., 1992, 1997, 1999). Bottlenose dolphins (*Tursiops truncatus*), spotted dolphins (*Stenella frontalis* and *S. attenuata*), and pilot whales (*Globicephala* spp.) are strongly associated with the shelf-edge (656 ft [200 m] isobath) and north wall of the Gulf Stream as well as on to the shelf and seaward into pelagic waters (CeTAP, 1982; Lee, 1986; Kenney and Winn, 1986, 1987; Payne and Heinemann 1993; Waring et al., 1992, 1997, 1999).

Other delphinids found here are at the fringes of their distributions, appearing in the survey data in very low numbers. These include killer whales (killer whale - *Orcinus orca*, false killer whale - *Pseudorca crassidens*, and pygmy killer whale - *Feresa attenuata*), and striped dolphins (striped dolphin - *Stenella coeruleoalba*, long-snouted spinner dolphin - *S. longirostris*, and short-snouted dolphin - *S. clymene*).

The only representative of the porpoise family (Phocoenidae) found in the Onslow Bay waters is the harbor porpoise (*Phocoena phocoena*). This species is generally found in shallow shelf waters and feeds on demersal fishes (Gaskin, 1977; CeTAP, 1982; Kraus, 1983; Lee, 1986; Palka, 1995). During the fall and spring, harbor porpoises can be found dispersed as far south as the Carolinas (Waring et al., 1997, 1999). There are stranding records as far south as Florida (Smithsonian strandings database), but North Carolina waters may be at the southern limit of its range on the US Atlantic coast.

Pinnipeds

Several pinnipeds, a group that includes seals, walruses, and sea lions, appear in the data for North Carolina. These include the harbor seal (*Phoca vitulina*), gray seal (*Halichoerus grypus*), harp seal (*Phoca groenlandica*), and hooded seal (*Cystophora cristata*). These animals maintain a link to land for both mating and giving birth on shore (Nowak, 1991), and are encountered in coastal habitats (Waring et al., 1997, 1999).

Manatees

Manatees (*Trichechus manatus*) are reported to be uncommon but regular visitors to the North Carolina coastline and its estuaries during the warmer months (Lee and Socci, 1989). In these waters, they may occur at beach fronts and sounds, while in Florida, they have been known to travel up freshwater rivers (Lee and Socci, 1989).

3.10.2 Sea Turtles

Five species of sea turtles occur in the Atlantic coastal waters off the eastern US, including the continental shelf and shelf break regions, as follows:

- Hawksbill (*Eretmochelys imbricata*);
- Leatherback (*Dermochelys coriacea*);
- Green (*Chelonia mydas*);
- Loggerhead (*Caretta caretta*); and

- Kemp's ridley (*Lepidochelys kempii*).

All five species have been found in North Carolina and may occur in Onslow Bay. North Carolina waters appear to be the furthest point north in the Atlantic Exclusive Economic Zone (EEZ) that sea turtles can be found throughout the year. They have been sighted throughout the winter as far north as Oregon Inlet in the Outer Banks of North Carolina (Epperly et al., 1995). In these waters, there is a seasonal inshore-offshore pattern of movement. In the January to March time period, virtually all sea turtle sightings occurred offshore. Sightings are equally divided between inshore and offshore waters during May and June. During the April to December time period, there is generally a large inshore distribution. This inshore-offshore pattern of movement suggests that sea turtles move offshore in the winter toward warmer Gulf Stream waters and back inshore in the spring as the coastal waters warm.

Epperly et al. (1995) conducted aerial surveys of sea turtles and used satellite-derived images of sea surface temperatures to relate sea turtle distribution to the physical oceanography of the North Carolina area. A clear association of turtles with warm shallow waters west of the Gulf Stream was found to be apparent in Raleigh, Onslow, and Long Bays. Turtles were usually sighted when Gulf Stream influences, indicated by surface temperatures greater than or equal to 52° F (11° C), reached within 17 mi (28 km) of shore in the survey zone. Turtles were not sighted when Gulf Stream influences were further offshore of the survey zone. Shoreside distribution of turtles is addressed in Subchapter 3.11.5

3.10.3 Fisheries

Onslow Bay

Over 50 species of fish are harvested from Onslow Bay and other North Carolina marine waters. Some of the important finfish from these waters include summer flounder (*Paralichthys dentatus*), Atlantic croaker, bluefish, striped mullet (*Mugil cephalus*), weakfish (*Cynoscion regalis*), mackerel (*Scomberomorus cavalla* and *S. maculatus*), grouper (*Epinephelus* spp.), and spot (*Leiostomus xanthurus*). Sharks (Squaliformes) are becoming an increasingly important component of the commercial fishery in Onslow Bay. More menhaden (*Brevoortia tyrannus*) are caught in Onslow Bay than any other species.

Important shellfish harvested from Onslow Bay and other marine waters include blue crab, shrimp, scallops (*Aequipecten* and *Placopecten* spp.), and hard clams (US Navy, 1999).

New River and AIWW

The New River ranks among the better North Carolina estuaries for recreational fishing. Common species found in the river, the AIWW, and the associated tidal creeks include flounder (*Paralichthys* spp.), spot, croaker (*Micropogonius undulatus*), weakfish (*Cynoscion regalis*), bluefish (*Pomatomus saltatrix*), and black sea bass (*Centropristes striata*). Although nearly half

of the commercial finfish landings in North Carolina are anadromous species, the New River contains relatively fewer anadromous fish stocks (Sholar, 1975 in: LANTDIV NAVFACENCOM, June 1993).

In addition to finfish, the New River and AIWW provide habitat for many shellfish. Common species associated with the estuary and nearby waters include blue crab (*Callinectes sapidus*), shrimp (*Penaeus* spp.), hard clams (*Mercenaria mercenaria*), and American oyster (*Crassostrea virginica*). The soft substrate of 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 (SAV). Eelgrass (*Zostera marina*) provides food for waterfowl and cover for crabs, fish, and shrimp (LANTDIV NAVFACENCOM, June 1993).

Essential Fish Habitat

The Magnuson-Stevens Fishery Conservation and Management Act (Magnuson-Stevens Act) (16 USC 1801), enacted in 1996, establishes US management authority over all fishing within the Exclusive Economic Zone (EEZ); all anadromous fish throughout their migratory range; and all fish on the continental shelf. Additionally, the act called for the establishment of eight Regional Fishery Management Councils to be responsible for the preparation of fishery management plans (FMPs) to achieve optimum yields from US fisheries in their regions. The act amended the 1976 Magnuson Act and directed the establishment and protection of essential fish habitat (EFH). Federal agencies must consult with the National Marine Fisheries Service (NMFS) on any proposed action that may adversely affect EFH.

There are two essential fish habitats associated with Onslow Bay:

- **Live/Hard Bottom Habitat** - Scattered irregularly over the continental shelf, live/hard bottom habitat is made up of zones of highly concentrated invertebrate and algal growth, in association with marked deviations in topographical relief that support substantial fish assemblages. Lime outcrops covered with live, deep-water corals occur in scattered locations in Onslow Bay. These locations tend to be along the shelf edge, outside and seaward of the N-1/BT-3 range.
- **Sargassum Habitat** - Pelagic brown algae (*Sargassum natans* and *S. fluitans*) form a dynamic structural habitat within warm waters of the western North Atlantic. Pelagic sargassum is considered essential fish habitat because it provides protection, feeding opportunity, and use as a spawning substrate to a variety of fish species (SAFMC, 1998). The presence of this habitat within the Onslow Bay site is transient, and dependent on prevailing surface currents (occasional pieces of sargassum may float through the area).

3.10.4 Protected Species

All marine mammals are protected by the Marine Mammal Protection Act (MMPA) passed in 1972 and amended in 1988 and 1994. The MMPA, subject to limited exceptions, prohibits any person or vessel subject to the jurisdiction of the United States from “taking” marine mammals in the United States or on the high seas without authorization. “Taking” includes any harm or harassment. Section 101(a)(5) of the MMPA 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) within a specified geographical region if certain findings are made and regulations are issued.

In addition to the MMPA, the Endangered Species Act (ESA) of 1973, as amended, authorizes National Oceanic and Atmospheric Administration Fisheries (NOAA Fisheries) and the US Fish and Wildlife Service (USFWS) to provide special protection to species whose numbers are considered depleted or whose existence is threatened. The ESA prohibits jeopardizing endangered and threatened species, adversely modifying critical habitats essential to their survival, or the taking of individuals through direct or indirect means. Section 7 of the act requires consultation with NOAA Fisheries and USFWS to determine whether any endangered or threatened species under their jurisdiction may be affected by the proposed action. The Navy and Marine Corps ensure that consultations are conducted as required with the USFWS and NOAA Fisheries under Section 7 for any action that may affect a threatened or endangered species according to guidance provided in the *Environmental Resources Program Manual* (MCO P5090.2).

Table 3-8 lists threatened and endangered species found in the nearshore and offshore waters near Camp Lejeune. Of the marine mammal species found off the North Carolina coast, six are endangered: the northern right, sei, fin, humpback, and sperm whales, and the manatee. The occurrence and distribution of these species in North Carolina waters has been described in Subchapter 3.10.1. Two of the five sea turtle species are endangered (hawksbill and leatherback). The occurrence and distribution of these turtles has been described in Subchapter 3.10.2. Shoreside distribution of threatened and endangered species is addressed in Subchapter 3.11.5

3.10.5 Coral Reefs

On June 11, 1998 President Clinton issued Executive Order (EO) 13089 on Coral Reef Protection (63 Fed. Reg. 32701) which directs federal agencies to identify their actions that may affect US coral reef ecosystems, to use their authorities and programs to protect and enhance these ecosystems, and, to the extent permitted by law, ensure that any actions they authorize, fund, or carry out will not degrade the conditions of coral reef ecosystems. The EO defines “coral reef ecosystems” as those species, habitats, and other natural resources associated with coral reefs in all maritime areas and zones subject to the jurisdiction or control of the United States, including reef systems in the South Atlantic, Caribbean, Gulf of Mexico, and Pacific Ocean.

Table 3-8

Federally-Listed Animals near Camp Lejeune
in Nearshore and Offshore Waters

Species	Federal Status
REPTILES	
Hawksbill sea turtle (<i>Eremochelys imbricata</i>)	Endangered
Leatherback sea turtle (<i>Dermochelys coriacea</i>)	Endangered
Green sea turtle (<i>Chelonia mydas</i>)	Threatened
Loggerhead sea turtle (<i>Caretta caretta</i>)	Threatened
Kemp's ridley sea turtle (<i>Lepidochelys kempi</i>)	Threatened
MAMMALS	
West Indian manatee (<i>Trichechus manatus</i>)	Endangered
Northern right whale (<i>Eubalaena glacialis</i>)	Endangered
Sei whale (<i>Balaenoptera borealis</i>)	Endangered
Fin whale (<i>Balaenoptera physalus</i>)	Endangered
Humpback whale (<i>Megaptera novaeangliae</i>)	Endangered
Sperm whale (<i>Physeter macrocephalus</i>)	Endangered

As indicated in Subchapter 3.10.3, lime outcrops covered with live, deep-water corals occur in scattered locations in Onslow Bay. However, these locations tend to be along the shelf edge, outside and seaward of the N-1/BT-3 range. Although coral covers these outcrops they are not considered coral reefs, which are generally limited in distribution to those waters where temperatures do not drop below 68°F (20°C).

3.11 Land Natural Resources

3.11.1 Topography, Geology, and Soils

Camp Lejeune and Onslow County are located within the Coastal Plain physiographic province of North Carolina. Elevations on the Base range from sea level to 72 ft (22 m) above mean sea level (MSL). Surface relief varies from marshlands in the south to low, gently rolling hills in the northwest and northeast (LANTDIV NAVFACENGCOM, October 1999). The New River and its tributaries have associated floodplains of various widths. Outside the floodplains, the terrain is relatively flat, characterized by xeric sand flats and ridges or mesic-to-wet inter-stream flats and shallow depressions (LANTDIV NAVFACENGCOM, October 1999).

Soils of Camp Lejeune can generally be described as rock free, sandy in character, with low organic matter and low fertility. A total of 31 soil series are found throughout Camp Lejeune. Most of these soils are classified as sandy loams, and nearly half of the soils on Base are somewhat poorly drained, poorly drained, or very poorly drained. Those soils that are sandy are generally well drained and quite suitable for construction. These include Baymeade fine sands that cover nearly one-third of the Base (Barnhill 1992).

The G-10 Impact Area, like the rest of Camp Lejeune, is characterized by relatively low relief, with the highest elevation at about 15 ft (4.6m) MSL. Slopes range from 0 to 5 percent in most exercise locations. Soils types include Kureb, Leon, and Baymeade fine sands, and much of the area is wetland. A majority of the soils are not classified as having significant erosion potential.

3.11.2 Floodplains

Executive Order 11988 sets forth the responsibilities of federal agencies in 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 present on Camp Lejeune near the New River and its creeks and estuaries. These areas have been mapped and are available on the Base's GIS systems. Within G-10, minor floodplains are associated with two small tributaries of French Creek.

3.11.3 Vegetation and Wetlands

The major plant communities found on Camp Lejeune are pine forests, mixed pine-hardwood forests, hardwood forests, pond pine (*Pinus serotina*), and estuarine marshes. Approximately 45 percent of the Base forested area is comprised of loblolly pine (*Pinus taeda*), 12 percent is in longleaf pine (*Pinus australis*), and 8 percent is in pond pine. The mixed pine-hardwood component occupies about 22 percent of the Base, and the pure hardwood component occupies about 17 percent. Wiregrass (*Aristida stricta*), Broadleaf uniola (*Uniola latifolia*), American holly (*Ilex opaca*), titi (*Cyrilla racemiflora*), wax myrtle (*Myrica cerifera*), greenbrier (*Smilax* spp.), poison ivy (*Toxicodendron radicans*) honeysuckle (*Lonicera japonica*), cutover muhly (*Muhlenbergia* spp.), toothache grass (*Ctenium aromaticum*), panic grasses (*Panicum* spp., *Dicanthelium* spp.), little bluestem (*Andropogon scoparius*), and associated grasses and forbs characterize the understory vegetation over most of the area.

Wetlands occur throughout Camp Lejeune. Due to the low relief of Camp Lejeune, the preponderance of poorly drained soils on the Base, and the proximity of the New River and AIWW, wetland habitats are a prominent feature at Camp Lejeune. A recent basewide Wetlands Management Plan identified a total of approximately 67,000 ac (27,115 ha) of wetlands and open

water habitats at Camp Lejeune (including the GSRA). These wetlands can be categorized according to the USFWS National Wetland Inventory classifications as palustrine forested, palustrine emergent, palustrine scrub-shrub, estuarine emergent, and/or estuarine scrub-shrub.

Palustrine forested wetlands include plant communities typed as pure pond pine, mixed pond pine-hardwood, marshes, pocosins, and wooded swamps. These communities comprise the major acreages of wetland on the Base. Most wetlands on the Base occur in the floodplains and river valleys, but can also occur on inter-stream flats characterized by poor drainage or as tidal marshes shoreward of the barrier islands. The general location of wetlands on the Base is available through the Base's GIS system. Within G-10, wetlands are generally palustrine forested or scrub-shrub (longleaf pine savannahs, pond pine pocosins, and streamhead pocosins).

3.11.4 Wildlife

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*).

A number of other bird and several reptiles (mostly turtles, terrapins, and snakes) also make use of the estuary, particularly its marshes. Of note is the American alligator (*Alligator mississippiensis*) that nests in the brackish waters of the major tributaries.

Camp Lejeune is also home to a variety of mammals and birds. Common mammals occurring on forest/open land edges include: white-tailed deer (*Odocoileus virginianus*), eastern gray squirrel (*Sciurus carolinensis*), fox squirrel (*Sciurus niger*), eastern cottontail (*Sylvilagus floridanus*), marsh rabbit (*Sylvilagus palustris*), opossum (*Didelphis marsupialis*), and raccoon (*Procyon lotor*). Common bird species include: mourning dove (*Zenaida macroura*), northern bobwhite quail (*Colinus virginianus*), starling (*Sturnus vulgaris*), mockingbird (*Nimus polyglottos*), robin (*Turdus migratorius*), sparrow (Fringillidae), and warbler (Parulidae) (MCB Camp Lejeune, September 1987).

Songbirds, birds of prey, and small mammals frequent wildlife openings that primarily have been cleared within forests for game species. Many bird species nest at Camp Lejeune, and many other species, including neotropical migrant birds, stop, rest, and forage at Camp Lejeune on their journey.

The G-10 Impact Area provides habitat for many of the mammal and bird species typically found at Camp Lejeune.

3.11.5 Threatened and Endangered Species

The species listed as federally threatened or endangered at Camp Lejeune are identified in Table 3-9. Locations of the endangered red cockaded woodpecker (individuals and tree nest cavities) have been mapped by Marine Corps personnel for the G-10 Impact Area (Figure 3-4). Figure 3-4 also shows the mapped locations of the endangered rough-leaved loosestrife at the G-10 Impact Area.

Rough-leaved Loosestrife

The federally endangered rough-leaved loosestrife (RLL) is found in 27 known aggregations primarily in the margins of wet pine woodland throughout the Base. Two concentrations or groups are located within 0.4 mi (600 m) of the proposed NGF target area within the G-10 Impact Area. These sites are within the Surface Danger Zone for the G-10 Impact Area, and are thus subject to impacts from ongoing operations. With the exception of RLL sites within the G-10 Impact Area, habitat is marked by single white bands of paint on trees along the perimeter of a 100-ft buffer zone. Because of the threat of unexploded ordinance and the fact that no ground training occurs within the G-10, RLL sites occurring in the impact area are not marked.

Seabeach Amaranth

The federally threatened seabeach amaranth is an herbaceous plant emerging on sand dunes, inlets and over-wash flats in summer and early fall. Because it is an annual, it is rarely seen in the same location for two consecutive seasons. The most persistent locations for seabeach amaranth have been between New River Inlet and Onslow South Tower, which are considerably south of the G-10 Impact Area. Thus, it can be reasonably expected that no seabeach amaranth occurs in the G-10 Impact Area.

Red-cockaded Woodpecker

Camp Lejeune contains 65 red-cockaded woodpecker (RCW) cavity tree clusters, including 14 sites within the buffer zone of the G-10 Impact Area (Table 3-10). There are no sites within the NGF Impact Area. Red-cockaded woodpeckers generally range about 0.5 mi (0.8 km) to forage. Only two of the 14 clusters have suitable foraging habitat within the target buffer area, and the cluster closest to the proposed NGF target is 0.8 mi (1.3 km) away. Both clusters with suitable

Table 3-9
 Federally-Listed Plants and Animals in Onslow County, North Carolina

Species	Federal Status
PLANTS	
Seabeach amaranth (<i>Amaranthus pumilus</i>)	Threatened
Rough-leaved Loosestrife (<i>Lysimachia asperulaefolia</i>)	Endangered
Cooley's meadowrue (<i>Thalictrum cooleyi</i>)	Endangered
BIRDS	
Red-cockaded woodpecker (<i>Picoides borealis</i>)	Endangered
Piping plover (<i>Charadrius melodus</i>)	Threatened
Bald eagle (<i>Haliaeetus leucocephalus</i>)	Threatened
REPTILES	
American alligator (<i>Alligator mississippiensis</i>) ¹	Endangered
Hawksbill sea turtle (<i>Eretmochelys imbricata</i>)	Endangered
Leatherback sea turtle (<i>Dermochelys coriacea</i>)	Endangered
Green sea turtle (<i>Chelonia mydas</i>)	Threatened
Loggerhead sea turtle (<i>Caretta caretta</i>)	Threatened
Kemp's ridley sea turtle (<i>Lepidochelys kempii</i>)	Threatened
Source: USFWS, Raleigh, NC Field Office. Note: ¹ American alligator is listed as endangered due to similarity of appearance with another species that is endangered, and is listed for the protection of that species. This species is not biologically endangered or threatened and is not subject to Section 7 consultation. Eastern cougar is not included in this table because even though it is listed as a protected species, there have been no verified sightings in decades, and this species is generally considered to have been extirpated from the region.	

Table 3-10
 Red-cockaded Woodpecker Group Productivity-Groups within the G-10 Impact Area Buffer Zone

Cluster	90	91	92	93	94	95	96	97	98	99	Sum	Avg.
14	2	4	3	2	3	3	3	1	2	3	26	2.6
15	0	2	2	2	2	1	0	3	1	2	15	1.5
16	*	0	1	2	0	3	2	2	3	1	14	1.56
17	1	0	0	2	2	2	3	2	2	2	16	1.6
23	2	2	2	2	0	0	3	2	2	3	18	1.8
24	1	0	0	1	1	0	2	3	0	1	9	0.9
25	2	0	0	3	3	0	0	2	2	1	13	1.3
26	0	*	1	2	1	0	3	2	0	3	12	1.33
27	4	2	2	1	2	2	3	3	0	3	22	2.2
28	3	1	0	2	2	1	1	2	2	3	17	1.7
37	0	1	1	0	2	2	1	2	1	3	13	1.3
43	*	1	1	0	2	3	2	3	2	2	16	1.78
50	*	*	*	*	*	*	*	2	1	3	6	1.5
51	*	*	*	*	*	*	*	0	2	3	5	1.25

foraging habitat within the buffer area lie within the Surface Danger Zone for G-10 and are currently subject to artillery impacts. Data collected by Camp Lejeune indicates that the clusters closest to the proposed NGF target area have had relatively high productivity over the last ten years, with averages ranging from 1.3 to 2.2 fledglings per year.

In 1979, the USFWS issued a Biological Opinion relative to the effects of mechanized infantry training on Camp Lejeune in specified areas of RCW habitat. This opinion provided for guidelines that eliminated the likelihood of jeopardy to the species.

The woodpecker cluster sites on Camp Lejeune are protected from normal maneuver operations by a 200-foot buffer zone clearly marked with single bands of white paint and signs reading “Restricted Area Endangered Species Site, No Vehicles Allowed, And Endangered Species Colony Site.” Tracked and wheeled vehicles are restricted to existing well-defined, main roads/trails in these areas. Activities prohibited in RCW management areas include digging/disturbing tree roots, burying cable, cutting pine trees, stringing cable through trees, and setting up command posts or bivouacking.

In 1999, Camp Lejeune consulted with the USFWS with regard to: depiction of the G-10 Impact Area in the latest Camp Lejeune Military Installation Map; target modification within the G-10 relative to RLL and RCW habitat; and mitigating actions to offset potential impacts to federally-listed species. The USFWS concurred with the Base’s conclusion that use of the latest military installation map may affect but is not likely to adversely affect federally-listed species at the installation. The USFWS also agreed with Camp Lejeune’s position that target realignment within the G-10 Impact Area may affect but is not likely to adversely affect federally-listed plants or animals.

Piping Plovers

While piping plovers may use beach areas on or near Camp Lejeune for winter foraging and possibly nesting, they are not expected to be present in the G-10 Impact Area.

Sea Turtles

Loggerhead and green turtles have historically used the Onslow Beach area of Camp Lejeune for nesting between the months of June and August. However, they would not be present in the G-10 Impact Area.

American Alligator

The threatened American alligator is found in the waters surrounding Camp Lejeune. Alligators have been sighted in the New River watershed (Camp Lejeune). No current management areas have been designated on the Base. This species is listed as threatened due to similarity of appearance with another endangered species and is listed for the protection of that species.

State-Listed Species

The federally-listed threatened and endangered species are also considered threatened or endangered by the state of North Carolina. In addition to these species, the state lists two other species occurring within the G-10 Impact Area as endangered, namely golden crest (*Lophiola aurea*) and pine barrens smoke grass (*Muhlenbergia torreyana*). Four candidates for state-listing also occur within the G-10 buffer area – Harper’s beak sedge (*Rhynchospora harperii*), pond spice (*Litsea aestivalis*), Savannah milkweed (*Asclepias pedicellata*), and Hooker’s milkwort (*Polygala hookerii*). It is not known whether these occur within the impact area.

3.12 Hazardous Materials/Wastes

This subchapter addresses hazardous materials and hazardous waste management in compliance with the Resource Conservation and Recovery Act (RCRA) on the Base, and potential hazardous waste contamination areas.

3.12.1 Hazardous Materials and Waste Management

The *Standard Operating Procedures for Range Control* (Base Order P3570.1) establish environmental restrictions and procedures for use of the ranges. There are procedures governing a number of environmental concerns, including the handling of hazardous materials and petroleum, oils, and lubricants (POL). These procedures include:

- Spill control and response;
- Disposal of battery waste; and
- Fuel storage.

In addition, impact areas are periodically swept in conjunction with semi-annual retargeting operations for the purpose of neutralizing hazards associated with unexploded ordnance (UXO). Those ranges that are used frequently, or which accumulate an excessive amount of UXO, are swept more frequently, as often as scheduling permits. The sweeps and disposal are conducted by trained and authorized explosive ordnance disposal (EOD) personnel.

3.12.2 Installation Restoration Program Sites

Hazardous waste contamination areas are well known on Camp Lejeune and are being investigated as part of the DoD’s Installation Restoration Program (IRP). This program was instituted to satisfy the requirements of the Comprehensive Environmental Response, Compensation, and Liability Act (CERCLA) for former and current hazardous waste sites.

The use and handling of ordnance is regulated under the USEPA's Military Munitions Rule (40 CFR Parts 260 - 266, 270). USEPA excludes the application of RCRA to ranges used for training with, or the testing of, munitions, as well as range clearance as part of range management activities. However, DoD organizations must pursue aggressive range management policies that ensure compliance with existing regulations and promote environmental stewardship (*Interim Policy for DoD Implementation of the EPA Military Munitions Rule*, 14 February 1997).

Because of its active range status, the G-10 Impact Area is not considered an IRP site.

3.13 Safety

The *Standard Operating Procedures for Range Control* (Base Order P3570.1) establishes standard operating procedures designed to ensure safety during the use and discharge of various types of weapons and the use of weapons platforms. In addition to the procedures governing the impact areas, Base Order P3570.1 sets restrictions on the use of various types of ordnance and the conduct of various types of operations.

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